

CLASSIFICATION OF GEOSYNCHRONOUS OBJECTS

Produced with the DISCOS Database

Prepared by	ESA's Space Debris Office
Reference	GEN-DB-LOG-00211-OPS-GR
Issue	20
Revision	0
Date of Issue	28 May 2018
Status	Issued
Document Type	Technical Note
Distribution	ESA UNCLASSIFIED - Limited Distribution

Abstract

This is a status report on geosynchronous objects as of 1 January 2018.

Based on orbital data in ESA's DISCOS database and on orbital data provided by KIAM the situation near the geostationary ring is analysed. From 1523 objects for which orbital data are available (of which 0 are outdated, i.e. the last available state dates back to 180 or more days before the reference date), 519 are actively controlled, 795 are drifting above, below or through GEO, 189 are in a libration orbit and 19 are in a highly inclined orbit. For 1 object the status could not be determined.

Furthermore, there are 59 uncontrolled objects without orbital data (of which 54 have not been catalogued). Thus the total number of known objects in the geostationary region is 1582.

If you detect any error or if you have any comment or question please contact:

Stijn Lemmens
European Space Agency
European Space Operations Center
Space Debris Office (OPS-GR)
Robert-Bosch-Str. 5
64293 Darmstadt, Germany
Tel.: +49-6151-902634
E-mail: stijn.lemmens@esa.int

Table of contents

1	Introduction	3
2	Sources	4
2.1	USSTRATCOM Two-Line Elements (TLEs)	4
2.2	Keldysh Institute for Applied Mathematics (KIAM)	4
2.3	JSC Vimpel Space Data	7
3	List of Geosynchronous Objects	8
4	Objects with Ephemeris	41
4.1	Satellites under Longitude and Inclination Control (E-W and N-S Control)	43
4.2	Satellites under Longitude Control (only E-W Control)	68
4.3	Satellites in a Controlled Drift Orbit	78
4.4	Objects in a Drift Orbit	79
4.5	Objects in a Libration Orbit around the Eastern Stable Point	133
4.6	Objects in a Libration Orbit around the Western Stable Point	142
4.7	Objects in a Libration Orbit around both Stable Points	146
4.8	Objects in Highly Inclined Orbits	154
4.9	Objects of Indeterminate Status	156
5	Objects without Ephemeris	157
5.1	Catalogued Objects	157
5.2	Uncatalogued Objects	157
6	Figures	159
7	Summary	167
8	Acknowledgements	168

1 Introduction

All objects that are catalogued in ESA's DISCOS Database (Database and Information System Characterising Objects in Space) and residing at the reference date within one of the orbital classes GEO, IGO and EGO (see table 1 for the class definitions) are listed in this document. The main purpose is to classify all the objects residing in the first two orbital classes according to different categories (top level: controlled, drifting and librating).

Table 1: Orbital classes defined by a combination of inclination i [deg], semi-major axis a [km], eccentricity e , perigee height h_p [km] and apogee height h_a [km]. As they are non-exclusive, orbits are assigned according to the order given here. Additionally, the Inter-Agency Space Debris Coordination Committee (IADC) GEO protected region [1] defined by latitude ϕ [deg] and altitude h [km] is given.

Orbit	Description	Definition		
GEO	Geostationary Orbit	$i \in [0, 25]$	$h_p \in [35586, 35986]$	$h_a \in [35586, 35986]$
IGO	Inclined Geosynchronous Orbit	$i \in [25, 180]$	$a \in [37948, 46380]$	$e \in [0, 0.25]$
EGO	Extended Geostationary Orbit	$i \in [0, 25]$	$a \in [37948, 46380]$	$e \in [0, 0.25]$
GEO _{IADC}	IADC GEO Protected Region	$\phi \in [-15, 15]$	$h \in [35586, 35986]$	

The document is structured as follows: Section 2 describes the sources being used to compile this report and section 3 gives an overview of all the catalogued objects. Detailed information about the objects is given in section 4 and 5 for objects where orbital data is available and where no orbital data is available respectively. Figures are presented in section 6 to visualize the data and section 7 summarises the findings.

2 Sources

Subsequently, each source contributing to this report is presented. From these sources, the report exhibits the categorisation of objects based on observed orbital patterns. Nine different classifications are distinguished:

- C1** objects under longitude and inclination control (E-W as well as N-S control) – the longitude is nearly constant and the inclination is generally less than 0.3 degrees (however control at larger angles within one year is accepted as well),
- C2** objects under longitude control (only E-W control) – the longitude is nearly constant but the inclination is generally greater than 0.3 degrees,
- C4** objects maintaining a drift orbit near or inside GEO_{IADC},
- D** objects in a drift orbit,
- L1** objects in a libration orbit around the Eastern stable point (longitude 75 degrees East),
- L2** objects in a libration orbit around the Western stable point (longitude 105 degrees West),
- L3** objects in a libration orbit around both stable points,
- I** objects in highly inclined orbits with inclination greater than 25.0 degrees,
- Ind** objects of indeterminate status.

2.1 USSTRATCOM Two-Line Elements (TLEs)

The basic source of information are the USSTRATCOM Two-Line Elements (TLEs). The DISCOS Database [2] is updated at regular intervals by ESOC's Space Debris Office with this source. The accuracy of TLE is limited. At the geostationary altitude, TLE are provided on a regular basis, and are mainly for objects larger than about 1 meter in size. TLE for smaller objects are provided rather sporadically. It should be noted that also some of the derived parameters like libration period and libration amplitude may in some cases be subject to a limited accuracy. For further information about the method of classification please refer to Classification of Geostationary Objects [3].

The frame in which the mean orbital elements are expressed for objects from this source is the true equator, mean equinox (TEME) frame. The catalogue number is given as the source id (S-ID).

2.2 Keldysh Institute for Applied Mathematics (KIAM)

This source provides orbital data derived from ground-based optical observations. Data are provided only for objects for which no USSTRATCOM TLEs are published. Orbits given in this report are produced from measurements obtained in 2017 and prepared by Vladimir Agapov, Keldysh Institute for Applied Mathematics, Moscow (KIAM). They are a joint product of the wide cooperation of organizations including:

- Center on collection, processing and analysis of information on space debris at the Keldysh Institute of Applied Mathematics of the Russian Academy of Sciences (KIAM RAS, Moscow, Russia),
- International scientific observation facilities network (ISON) coordinated by KIAM RAS and other observatories operated by Russian scientific and industry organizations:
 - Ussuriysk Astrophysical Observatory of the Far East branch of the RAS (Gornotayozhnoye, Primorsky Krai, Russia),
 - Zvenigorod observatory of the Astronomy Institute of the RAS (INASAN) (Moscow oblast, Russia),
 - Crimean Astrophysical Observatory (Nauchny),
 - Ulugbek Astronomical Observatory (Kitab faciliitiy, Qashqadaryo Province, Uzbekistan),
 - Observation facilities operated by the "Astronomical Scientific Center", JSC:
 - * Artem (Primorsky Krai, Russia),
 - * Blagoveshchensk (Amur region, Russia),
 - * Kislovodsk observatory (Karachaevo-Cherkesskaya Republic, Russia),
 - * Lesosibirsk (Krasnoyarsky Krai, Russia),
 - * Elizovo (Kamchatka Krai, Russia),
 - * La Serena (Chile),
 - Byurakan Astrophysical Observatory of the Armenian Academy of Sciences (Byurakan, Armenia),
 - Andrushivka Observatory (Zhytomyrs'ka oblast, Ukraine),
 - National observatory of Bolivia (Tarija, Bolivia),
 - Sayan Solar Observatory of the Institute of Solar-Terrestrial Physics of the Siberian branch of the RAS (Mondy, Republic of Buryatia, Russia),
 - Observation facility of the PGU (Tiraspol),
 - Odessa State University Astronomical Observatory (Mayaki, Odes'ka oblast, Ukraine),
 - Derenovka observation facility of Laboratory of space researches, Uzhhorod National University (Zakarpats'ka oblast, Ukraine),
 - Chuguyev observation facility of the Astronomy scientific and research institute of Kharkov national university (Kharkiv'ska oblast, Ukraine),
 - Cosalá observation facility of the The Autonomous University of Sinaloa (Universidad Autónoma de Sinaloa, UAS, Mexico),
 - Khureltogoot observatory of the The Research Centre of Astronomy and Geophysics of the Mongolian Academy of Sciences
 - Observatory "Peak Terskol" of the International Center for Astronomical, Medical and Ecological Research (Kabardino-Balkaria Republic, Russia),
 - E.Kharadze Abastumani Astrophysical Observatory of Ilia State University (Abastumani, Adigeni District, Georgia),
 - Mul'ta observation facility (Altai Republic, Russia),
 - Observatory of Altai State Pedagogical University (Barnaul, Altaisky Krai, Russia),
 - Observation facility of El Centro de Investigaciones de Ciencias Físico Matemáticas de la Universidad Autónoma de Nuevo León (UANL, Mexico).

- Astronomical Institute of the University of Bern, partner of ISON, operating the Zimmerwald observatory (Switzerland) and, for space debris observation, the ESA 1m telescope at the optical ground station (OGS), Izaña, Tenerife, Spain,
- Telescope Fabra ROA Montsec (TFRM) operated by the Reial Acadèmia de Ciències i Arts de Barcelona - Observatori Fabra, the Real Instituto y Observatorio de la Armada (ROA) and the Departament d'Astronomia i Meteorologia, Universitat de Barcelona, Spain.

The objects for which an ephemeris was provided by KIAM were observed repeatedly by ground based telescopes. They were listed in issues 7 to 13 as 'Unidentified objects'. During the years 2011-2015, most of them were correlated to a launch thanks to the excellent work of satellite analysts and amateur observers. A source id (S-ID), consisting of a label and number, is given for each such object in order to correlate it with itself from an earlier report. The labels are:

- UI** (formerly) unidentified objects in proximity of GEO_{IADC},
- U** uncontrolled catalogued by the USSTRATCOM objects known to be in or in proximity of GEO_{IADC}, but with no orbital data provided by any source (for this category, the numbers do not correlate with earlier reports), see section 5.1,
- UU** uncontrolled, uncatalogued by the USSTRATCOM objects known to be in or in proximity of GEO_{IADC}, but with no orbital data provided by any source, see section 5.2.

Some of objects with information provided initially by KIAM meanwhile have been catalogued by the USSTRATCOM. Therefore they were removed from the data blocks provided by KIAM. In order to retain consistency while referring to a particular object in different reports the complete list of such objects is provided in table 2.

Table 2: Objects with information initially provided by KIAM with corresponding S-ID and later assigned international designation by the USSTRATCOM.

S-ID	COSPAR	Name	Page
UI089	1968-081R	Transtage 5 fragmentation debris	p. 120
UI094	1997-040A	PAS 6	p. 79
UI099	1977-092K	Ekran 2 fragmentation debris	p. 116
UI153	2008-006C	Briz-M (Proton-M/Briz-M)	p. 80
UI163	2010-006B	Briz-M (Proton-M/Briz-M)	p. 79
UU061	1997-029D	Fengyun 2A operational debris (S-VISSR radiometre cover)	p. 117
UU065	2002-040E	Meteosat 8 (MSG 1) operational debris (SEVIRI Cooler Cover)	p. 123
UU066	2002-040F	Meteosat 8 (MSG 1) operational debris (SEVIRI Entry Baffle Cover)	p. 126
UU068	2004-042D	Fengyun 2C operational debris (S-VISSR radiometre cover)	p. 137
UU070	2008-066D	Fengyun 2E operational debris (S-VISSR radiometre cover)	p. 139
UU071	2012-002D	Fengyun 2F operational debris (S-VISSR radiometre cover)	p. 117
UU072	2012-035E	Meteosat 10 (MSG 3) operational debris (SEVIRI Cooler Cover)	p. 125
UU073	2012-035F	Meteosat 10 (MSG 3) operational debris (SEVIRI Entry Baffle Cover)	p. 128

Orbits were established by processing of optical measurements and propagation to 1 January 2018 00:00:00 UTC except for a few cases when the orbit was propagated to UTC midnight closest to the last obtained measurement. For most of the orbits this epoch is within the orbit determination time interval but for some of them it is outside due to visibility constraints of the participating optical facilities.

The numerical integration model used in the data processing is taking into account the Earth gravity field (8x8, EGM-96), the Moon and the Sun gravity (DE-405 ephemeris) and solar radiation pressure (diffuse reflecting Lambertian sphere model).

All objects are usually relatively bright as a rule (brighter than 15th apparent magnitude at favorable phase angles) and have no significant short term variations in brightness. Though there are a few exceptions.

The osculating orbital elements are given in the standard inertial reference frame J2000 (Earth Mean Equator and Equinox of Julian Date 2451545.0).

2.3 JSC Vimpel Space Data

This source of data is a bulletin prepared jointly by the data-analysis centre of near-Earth space monitoring (DAC NESM) of JSC Vimpel Interstate Corporation and KIAM. Orbital data are obtained from optical information of JSC Vimpel, KIAM, JSC Astronomical Scientific Center, and the International Space Observation Network (ISON) and their partners. The DISCOS Database [2] is updated at regular intervals by ESOC's Space Debris Office with this source. The content of the data is specialised to objects in near-Earth orbit with long, i.e. above 200 minutes, periods not covered in the TLE data source.

When using orbital elements, they are expressed for objects from this source in the Earth Mean Equator and Equinox at 12:00 Terrestrial Time on 1 January 2000 frame (J2000). The catalogue number is given as the source id (S-ID). In this report, orbits from the KIAM source are reported in case of overlap.

3 List of Geosynchronous Objects

All the catalogued objects near the geostationary ring are listed here. They are ordered according to their international designation in COSPAR notation. The index at the end of the document gives a list sorted according to the object's common name.

The table contains

COSPAR satellite designation assigned to an object in the USSTRATCOM catalogue in accordance with the designation system (international naming convention for satellites, sometimes referred to as COSPAR notation) established by the Committee on Space Research (COSPAR) of the International Council for Science and used since 1963. Prior to July 2011 the World Warning Agency for Satellites (WWAS), as part of the World Data Center of International Council for Science, was responsible for assignment of the designators on behalf of COSPAR. This service is no longer available due to changes in organization of the WWAS. Though the same designation system is used for catalogued objects by different space monitoring systems the COSPAR designation assigned to the same object by different systems can be different due to absence of coordination at the international level for the process of international satellite designation assignment;

Name object's common name (or names); an attempt is made to introduce a 'standard' approach for the 'naming scheme' which supposes 'official name' to be the first and other known names (if any) given in parentheses; in case of a rocket body the object name is given in italics as before and the name of launch vehicle is appended in parentheses;

Status the status of the object (see section 2 for explanations of the categories);

nn reference number;

page page number on where to find more detailed information about the object.

Please note, that all objects of the UU category, and all objects of UI category without COSPAR designation assigned in the USSTRATCOM catalogue, are not included in this list (even if their launch of origin is known).

COSPAR	Name	Status	nn	Page
1963-031A	Syncom 2	I	1.	p. 154
1964-047A	Syncom 3	D	575.	p. 117
1965-028A	Intelsat I F-1 (Early Bird)	L2	28.	p. 144
1966-053A	GGTS 1	D	779.	p. 131
1966-053B	OPS 9311 (IDSCS 1)	D	777.	p. 131
1966-053C	OPS 9312 (IDSCS 2)	D	775.	p. 131
1966-053D	OPS 9313 (IDSCS 3)	D	772.	p. 131
1966-053E	OPS 9314 (IDSCS 4)	D	769.	p. 131
1966-053F	OPS 9315 (IDSCS 5)	D	766.	p. 130
1966-053G	OPS 9316 (IDSCS 6)	D	763.	p. 130
1966-053H	OPS 9317 (IDSCS 7)	D	761.	p. 130
1966-053J	<i>Transtage 11 (Titan IIIC)</i>	D	759.	p. 130
1966-110A	ATS 1	D	582.	p. 118
1967-001A	Intelsat II F-2	D	577.	p. 117
1967-003A	OPS 9321 (IDSCS 8)	D	783.	p. 132
1967-003B	OPS 9322 (IDSCS 9)	D	782.	p. 131
1967-003C	OPS 9323 (IDSCS 10)	D	781.	p. 131
1967-003D	OPS 9324 (IDSCS 11)	D	780.	p. 131
1967-003E	OPS 9325 (IDSCS 12)	D	778.	p. 131
1967-003F	OPS 9326 (IDSCS 13)	D	771.	p. 131
1967-003G	OPS 9327 (IDSCS 14)	D	768.	p. 131
1967-003H	OPS 9328 (IDSCS 15)	D	764.	p. 130
1967-026A	Intelsat II F-3	L1	120.	p. 141
1967-066A	OPS 9331 (IDSCS 16)	D	790.	p. 132
1967-066B	OPS 9332 (IDSCS 17)	D	789.	p. 132
1967-066C	OPS 9333 (IDSCS 18)	D	788.	p. 132
1967-066D	OPS 9334 (IDSCS 19, DATS)	D	787.	p. 132
1967-066E	LES 5	D	786.	p. 132
1967-066F	DODGE 1	D	785.	p. 132
1967-066G	<i>Transtage 14 (Titan IIIC)</i>	D	784.	p. 132
1967-094A	Intelsat II F-4	L2	32.	p. 144
1967-111A	ATS 3	L2	17.	p. 143
1968-050A	OPS 9341 (IDSCS 20)	D	776.	p. 131
1968-050B	OPS 9342 (IDSCS 21)	D	774.	p. 131
1968-050C	OPS 9343 (IDSCS 22)	D	773.	p. 131
1968-050D	OPS 9344 (IDSCS 23)	D	770.	p. 131
1968-050E	OPS 9345 (IDSCS 24)	D	767.	p. 130
1968-050F	OPS 9346 (IDSCS 25)	D	765.	p. 130
1968-050G	OPS 9347 (IDSCS 26)	D	762.	p. 130
1968-050H	OPS 9348 (IDSCS 27)	D	760.	p. 130
1968-050J	<i>Transtage 16 (Titan IIIC)</i>	D	756.	p. 130
1968-063A	OPS 2222 (CANYON 1)	D	335.	p. 101
1968-063B	<i>Agenda D (Atlas SLV3A)</i>	D	703.	p. 126
1968-081A	OV2-5 (DG7-2)	D	696.	p. 126
1968-081D	LES 6	L2	26.	p. 143
1968-081E	<i>Transtage 5 (Titan IIIC)</i>	D	693.	p. 125
1968-081G	Transtage 5 fragmentation debris	D	647.	p. 122
1968-081H	Transtage 5 fragmentation debris	D	701.	p. 126

COSPAR	Name	Status	nn	Page
1968-081J	Transtage 5 fragmentation debris	D	639.	p. 122
1968-081K	Transtage 5 fragmentation debris	D	710.	p. 127
1968-081L	Transtage 5 fragmentation debris	D	704.	p. 126
1968-081M	Transtage 5 fragmentation debris	D	628.	p. 121
1968-081N	Transtage 5 fragmentation debris	D	640.	p. 122
1968-081P	Transtage 5 fragmentation debris	D	687.	p. 125
1968-081Q	Transtage 5 fragmentation debris	D	362.	p. 103
1968-081R	Transtage 5 fragmentation debris	D	623.	p. 120
1968-081S	Transtage 5 fragmentation debris	D	310.	p. 99
1968-081T	Transtage 5 fragmentation debris	D	726.	p. 128
1968-081U	Transtage 5 fragmentation debris	D	738.	p. 129
1968-081V	Transtage 5 fragmentation debris	D	365.	p. 103
1968-081W	Transtage 5 fragmentation debris	D	403.	p. 105
1968-081X	Transtage 5 fragmentation debris	D	690.	p. 125
1968-081Y	Transtage 5 fragmentation debris	D	749.	p. 129
1968-081Z	Transtage 5 fragmentation debris	D	637.	p. 121
1968-081AA	Transtage 5 fragmentation debris	D	723.	p. 127
1968-081AB	Transtage 5 fragmentation debris	D	657.	p. 123
1968-081AC	Transtage 5 fragmentation debris	D	716.	p. 127
1968-081AD	Transtage 5 fragmentation debris	D	755.	p. 130
1968-081AE	Transtage 5 fragmentation debris	D	715.	p. 127
1968-081AF	Transtage 5 fragmentation debris	D	709.	p. 126
1968-081AG	Transtage 5 fragmentation debris	D	611.	p. 120
1968-081AH	Transtage 5 fragmentation debris	D	581.	p. 117
1968-081AJ	Transtage 5 fragmentation debris	D	559.	p. 116
1968-081AK	Transtage 5 fragmentation debris	D	589.	p. 118
1968-116A	Intelsat III F-2	D	6.	p. 79
1969-013A	TACSAT 1	D	592.	p. 118
1969-013B	<i>Transtage 17 (Titan IIIC)</i>	D	69.	p. 83
1969-036A	OPS 3148 (CANYON 2)	D	586.	p. 118
1969-036B	<i>Agena D (Atlas SLV3A)</i>	D	741.	p. 129
1969-045A	Intelsat III F-4	D	5.	p. 79
1969-069A	ATS 5	D	401.	p. 105
1969-069C	ATS 5 AKM (JPL SR-28-3)	D	122.	p. 87
1969-101A	Skynet 1A	L2	8.	p. 142
1970-003A	Intelsat III F-6	D	301.	p. 99
1970-021A	NATO I	L2	6.	p. 142
1970-032A	Intelsat III F-7	L1	118.	p. 141
1970-046A	OPS 5346 (Rhyolite 1)	L1	19.	p. 134
1970-055A	Intelsat III F-8	D	718.	p. 127
1970-069A	OPS 7329 (CANYON 3)	L2	44.	p. 145
1970-069B	<i>Agena D (Atlas SLV3A)</i>	D	702.	p. 126
1971-006A	Intelsat IV F-2	D	217.	p. 93
1971-009A	NATO IIB	L2	4.	p. 142
1971-039A	OPS 3811 (DSP F2, DSP 3, DSP Block 1(PHASE I) F2)	D	117.	p. 86
1971-039B	<i>Transtage 20 (Titan IIIC)</i>	D	587.	p. 118
1971-095A	OPS 9431 (DSCS II F-1, DSCS 2-1, DSCS II A-1)	L2	7.	p. 142
1971-095B	OPS 9432 (DSCS II F-2, DSCS 2-2, DSCS II A-2)	L3	1.	p. 146

COSPAR	Name	Status	nn	Page
1971-095C	<i>Transtage 21 (Titan IIIC)</i>	D	56.	p. 82
1971-116A	Intelsat IV F-3	D	434.	p. 108
1972-003A	Intelsat IV F-4	D	481.	p. 111
1972-010A	OPS 1570 (DSP F3, DSP 4, DSP Block 1(PHASE I) F3)	D	462.	p. 109
1972-010B	<i>Transtage 22 (Titan IIIC)</i>	D	622.	p. 120
1972-041A	Intelsat IV F-5	D	543.	p. 115
1972-090A	Anik A1	D	214.	p. 93
1972-101A	OPS 9390 (CANYON 5)	L1	113.	p. 140
1972-101B	<i>Agena D (Atlas SLV3A)</i>	D	719.	p. 127
1973-013A	OPS 6063 (Rhyolite 2)	L1	1.	p. 133
1973-023A	Anik A2	D	471.	p. 110
1973-040A	OPS 6157 (DSP F4, DSP 2, DSP Block 1(PHASE I) F4)	D	475.	p. 110
1973-040B	<i>Transtage 24 (Titan IIIC)</i>	D	418.	p. 107
1973-058A	Intelsat IV F-7	D	295.	p. 98
1973-100A	OPS 9433 (DSCS II F-3, DSCS 2-3, DSCS II B-3)	D	74.	p. 84
1973-100B	OPS 9434 (DSCS II F-4, DSCS 2-4, DSCS II B-4)	D	63.	p. 83
1973-100D	<i>Transtage 26 (Titan IIIC)</i>	D	20.	p. 80
1974-017A	Cosmos-637	D	629.	p. 121
1974-017F	<i>Blok-DM (Proton-K/DM)</i>	D	644.	p. 122
1974-022A	Westar I	D	500.	p. 112
1974-033A	SMS 1	D	173.	p. 90
1974-033F	SMS 1 AKM (SVM-5)	D	795.	p. 132
1974-039A	ATS 6	D	708.	p. 126
1974-039C	<i>Transtage 27 (Titan IIIC)</i>	D	621.	p. 120
1974-060A	Molniya 1-S	L1	68.	p. 137
1974-060F	<i>Blok-DM (Proton-K/DM)</i>	L1	89.	p. 139
1974-075A	Westar II	D	490.	p. 111
1974-093A	Intelsat IV F-8	D	466.	p. 110
1974-094A	Skynet 2B	L1	116.	p. 140
1974-101A	Symphonie A	D	512.	p. 113
1975-011A	SMS 2	D	405.	p. 106
1975-011F	SMS 2 AKM (SVM-5)	D	169.	p. 90
1975-038A	Anik A3	D	535.	p. 114
1975-042A	Intelsat IV F-1	D	343.	p. 101
1975-055A	OPS 4966 (CANYON 6)	L1	91.	p. 139
1975-055B	<i>Agena D (Atlas SLV3A)</i>	D	711.	p. 127
1975-077A	Symphonie B	D	516.	p. 113
1975-091A	Intelsat IVA F-1	D	506.	p. 112
1975-097A	Cosmos-775	L1	76.	p. 138
1975-097F	<i>Blok-DM (Proton-K/DM)</i>	D	544.	p. 115
1975-100A	GOES 1	L2	15.	p. 143
1975-100F	GOES 1 AKM (SVM-5)	D	706.	p. 126
1975-117A	RCA Satcom I	D	432.	p. 107
1975-118A	OPS 3165 (DSP F5, DSP 8, DSP Block 2(PHASE II) F5)	D	594.	p. 118
1975-118C	<i>Transtage 29 (Titan IIIC)</i>	D	604.	p. 119
1975-118D	OPS 3165 debris (DSP F5 IR Sensor telescope sunshade cover)	U	1.	p. 157
1975-123A	Raduga 1	L1	22.	p. 134
1975-123F	<i>Blok-DM (Proton-K/DM)</i>	D	601.	p. 119

COSPAR	Name	Status	nn	Page
1976-004A	Hermes (CTS)	L2	24.	p. 143
1976-004E	Hermes (CTS) operational debris (solar array cover)	L2	16.	p. 143
1976-004F	Hermes (CTS) operational debris (solar array cover)	L2	13.	p. 143
1976-010A	Intelsat IVA F-2	D	447.	p. 108
1976-017A	Marisat 1	D	322.	p. 100
1976-023A	LES 8	L2	10.	p. 142
1976-023B	LES 9	L2	11.	p. 142
1976-023F	<i>Transtage 30 (Titan IIIC)</i>	D	130.	p. 87
1976-023J	LES 8, LES 9 operational debris	D	129.	p. 87
1976-023K	LES 8, LES 9 operational debris	D	682.	p. 125
1976-029A	RCA Satcom II	D	176.	p. 90
1976-035A	NATO IIIA	D	485.	p. 111
1976-042A	Comstar 1A (D-1)	D	478.	p. 111
1976-053A	Marisat 2	D	36.	p. 81
1976-059A	OPS 2112 (DSP F6, DSP 7, DSP Block 2(PHASE II) F6)	D	398.	p. 105
1976-059C	<i>Transtage 28 (Titan IIIC)</i>	D	608.	p. 119
1976-059D	OPS 2112 debris (DSP F6 IR Sensor telescope sunshade cover)	U	2.	p. 157
1976-066A	Palapa 1	D	540.	p. 115
1976-073A	Comstar 1B (D-2)	D	519.	p. 113
1976-092A	Raduga 2	L1	24.	p. 134
1976-092F	<i>Blok-DM (Proton-K/DM)</i>	L1	39.	p. 135
1976-101A	Marisat 3	D	67.	p. 83
1976-107A	Ekran 1	L1	40.	p. 135
1976-107F	<i>Blok-DM (Proton-K/DM)</i>	D	689.	p. 125
1977-005A	NATO IIIB	D	28.	p. 80
1977-007A	OPS 3151 (DSP F7, DSP 9, DSP Block 2(PHASE II) F7)	D	64.	p. 83
1977-007C	<i>Transtage 23 (Titan IIIC)</i>	L2	23.	p. 143
1977-007D	OPS 3151 debris (DSP F7 IR Sensor telescope sunshade cover)	D	610.	p. 120
1977-014A	Kiku 2 (ETS II)	D	525.	p. 114
1977-018A	Palapa 2	D	530.	p. 114
1977-034A	OPS 9437 (DSCS II F-7, DSCS 2-7, DSCS II C-7)	D	47.	p. 82
1977-034B	OPS 9438 (DSCS II F-8, DSCS 2-8, DSCS II C-8)	D	30.	p. 81
1977-034C	<i>Transtage 32 (Titan IIIC)</i>	D	32.	p. 81
1977-038A	OPS 9751 (CANYON 7)	L1	31.	p. 135
1977-038B	<i>Agena D (Atlas SLV3A)</i>	D	720.	p. 127
1977-041A	Intelsat IVA F-4	D	392.	p. 105
1977-048A	GOES 2	D	379.	p. 104
1977-048G	GOES 2 AKM (SVM-5)	D	609.	p. 119
1977-065A	Himawari 1 (GMS 1)	D	338.	p. 101
1977-071A	Raduga 3	L1	80.	p. 138
1977-071F	<i>Blok-DM (Proton-K/DM)</i>	D	83.	p. 84
1977-080A	SIRIO 1	L1	26.	p. 134
1977-092A	Ekran 2	L1	48.	p. 136
1977-092G	<i>Blok-DM (Proton-K/DM)</i>	D	675.	p. 124
1977-092H	Ekran 2 fragmentation debris	L1	102.	p. 139
1977-092J	Ekran 2 fragmentation debris	D	529.	p. 114
1977-092K	Ekran 2 fragmentation debris	D	553.	p. 116
1977-092L	Ekran 2 fragmentation debris	L3	7.	p. 146

COSPAR	Name	Status	nn	Page
1977-108A	Meteosat 1	L1	107.	p. 140
1977-108D	Meteosat 1 AKM (MAGE 1)	D	88.	p. 84
1977-114A	OPS 4258 (AQUACADE 3)	L2	45.	p. 145
1977-118A	Sakura 1 (CS 1)	D	235.	p. 94
1978-002A	Intelsat IVA F-3	D	503.	p. 112
1978-012A	IUE	I	2.	p. 154
1978-012D	IUE dust cover	I	3.	p. 154
1978-016A	OPS 6391 (FLTSATCOM F1)	D	253.	p. 95
1978-035A	Intelsat IVA F-6	L1	117.	p. 140
1978-038A	OPS 8790 (AQUACADE 4)	D	600.	p. 119
1978-039A	Yuri 1 (BSE)	L1	70.	p. 137
1978-044A	OTS 2	D	293.	p. 98
1978-058A	OPS 9454 (VORTEX 1) (CHALET 1)	D	550.	p. 115
1978-058B	<i>Transtage 33 (Titan IIIC)</i>	D	435.	p. 108
1978-062A	GOES 3	D	368.	p. 103
1978-062D	GOES 3 AKM (SVM-5)	D	399.	p. 105
1978-068A	Comstar 1C (D-3)	D	318.	p. 100
1978-071A	ESA GEOS 2	D	371.	p. 103
1978-073A	Raduga 4	L1	74.	p. 138
1978-073F	<i>Blok-DM (Proton-K/DM)</i>	D	65.	p. 83
1978-106A	NATO IIIC	D	157.	p. 89
1978-113A	OPS 9441 (DSCS II F-11, DSCS 2-11, DSCS II C-11)	D	15.	p. 80
1978-113B	OPS 9442 (DSCS II F-12, DSCS 2-12, DSCS II C-12)	D	148.	p. 88
1978-113D	<i>Transtage 36 (Titan IIIC)</i>	D	14.	p. 80
1978-116A	Anik B1	D	474.	p. 110
1979-007A	SCATHA (P78-2)	D	694.	p. 125
1979-007C	SCATHA AKM (FW-5)	D	698.	p. 126
1979-015A	Ekran 3	L1	49.	p. 136
1979-015D	<i>Blok-DM (Proton-K/DM)</i>	D	680.	p. 124
1979-035A	Raduga 5	L1	21.	p. 134
1979-035E	<i>Blok-DM (Proton-K/DM)</i>	D	565.	p. 116
1979-038A	OPS 6392 (FLTSATCOM F2)	D	164.	p. 90
1979-053A	OPS 7484 (DSP F8, DSP 11, DSP Block 3(MOS/PIM) F8)	D	195.	p. 92
1979-053C	<i>Transtage 31 (Titan IIIC)</i>	D	391.	p. 105
1979-053D	OPS 7484 debris (DSP F8 IR Sensor telescope sunshade cover)	U	3.	p. 157
1979-062A	Gorizont 2	L1	28.	p. 135
1979-062D	<i>Blok-DM (Proton-K/DM)</i>	D	77.	p. 84
1979-072A	Westar III	D	511.	p. 113
1979-086A	OPS 1948 (VORTEX 2) (CHALET 2)	D	578.	p. 117
1979-086C	<i>Transtage 34 (Titan IIIC)</i>	D	445.	p. 108
1979-087A	Ekran 4	L1	41.	p. 135
1979-087C	<i>Blok-DM (Proton-K/DM)</i>	D	597.	p. 119
1979-098A	OPS 9443 (DSCS II F-13, DSCS 2-13, DSCS II D-13)	D	33.	p. 81
1979-098B	OPS 9444 (DSCS II F-14, DSCS 2-14, DSCS II D-14)	D	139.	p. 88
1979-098C	<i>Transtage 37 (Titan IIIC)</i>	D	29.	p. 81
1979-105A	Gorizont 3	L1	72.	p. 137
1979-105E	<i>Blok-DM (Proton-K/DM)</i>	D	185.	p. 91
1980-004A	OPS 6393 (FLTSATCOM F3)	L2	40.	p. 144

COSPAR	Name	Status	nn	Page
1980-016A	Raduga 6	L1	67.	p. 137
1980-016D	<i>Blok-DM (Proton-K/DM)</i>	D	72.	p. 83
1980-049A	Gorizont 4	D	178.	p. 90
1980-049F	<i>Blok-DM (Proton-K/DM)</i>	D	98.	p. 85
1980-060A	Ekran 5	L3	5.	p. 146
1980-060F	<i>Blok-DM (Proton-K/DM)</i>	D	699.	p. 126
1980-060G	Ekran 5 debris	D	588.	p. 118
1980-074A	GOES 4	D	330.	p. 101
1980-081A	Raduga 7	L2	36.	p. 144
1980-081F	<i>Blok-DM (Proton-K/DM)</i>	D	515.	p. 113
1980-087A	OPS 6394 (FLTSATCOM F4)	D	239.	p. 95
1980-091A	SBS I	D	477.	p. 110
1980-098A	Intelsat V F-2	D	227.	p. 94
1980-104A	Ekran 6	L1	44.	p. 136
1980-104E	<i>Blok-DM (Proton-K/DM)</i>	D	679.	p. 124
1981-018A	Comstar 1D (D-4)	L1	11.	p. 133
1981-025A	OPS 7350 (DSP F9, DSP 10, DSP Block 3(MOS/PIM) F9)	D	215.	p. 93
1981-025C	<i>Transtage 40 (Titan IIIC)</i>	D	678.	p. 124
1981-027A	Raduga 8	D	585.	p. 118
1981-027F	<i>Blok-DM (Proton-K/DM)</i>	D	76.	p. 84
1981-049A	GOES 5	L2	22.	p. 143
1981-050A	Intelsat V F-1	D	220.	p. 93
1981-057A	Meteosat 2	D	193.	p. 91
1981-057B	APPLE	D	528.	p. 114
1981-057F	Meteosat 2 AKM (MAGE 1)	D	369.	p. 103
1981-061A	Ekran 7	L1	50.	p. 136
1981-061F	<i>Blok-DM (Proton-K/DM)</i>	D	646.	p. 122
1981-069A	Raduga 9	L1	79.	p. 138
1981-069F	<i>Blok-DM (Proton-K/DM)</i>	D	81.	p. 84
1981-073A	FLTSATCOM F5	D	171.	p. 90
1981-076A	Himawari 2 (GMS 2)	D	416.	p. 106
1981-096A	SBS II	D	556.	p. 116
1981-102A	Raduga 10	L1	20.	p. 134
1981-102F	<i>Blok-DM (Proton-K/DM)</i>	D	573.	p. 117
1981-107A	OPS 4029 (VORTEX 3)	L2	29.	p. 144
1981-107C	<i>Transtage 39 (Titan IIIC)</i>	D	431.	p. 107
1981-114A	RCA Satcom IIIR	D	545.	p. 115
1981-119A	Intelsat V F-3	D	397.	p. 105
1981-122A	MARECS A	D	22.	p. 80
1982-004A	RCA Satcom IV	D	426.	p. 107
1982-009A	Ekran 8	D	508.	p. 113
1982-009F	<i>Blok-DM (Proton-K/DM)</i>	D	643.	p. 122
1982-014A	Westar IV	D	461.	p. 109
1982-017A	Intelsat V F-4	D	328.	p. 100
1982-019A	OPS 8701 (DSP F10, DSP 13, DSP Block 3(MOS/PIM) F10)	D	123.	p. 87
1982-019B	<i>Transtage 38 (Titan IIIC)</i>	D	671.	p. 124
1982-020A	Gorizont 5	D	162.	p. 89
1982-020F	<i>Blok-DM (Proton-K/DM)</i>	D	180.	p. 91

COSPAR	Name	Status	nn	Page
1982-031A	INSAT 1A	L1	88.	p. 139
1982-044A	Cosmos-1366	L1	17.	p. 134
1982-044F	<i>Blok-DM (Proton-K/DM)</i>	L3	18.	p. 147
1982-058A	Westar V	D	325.	p. 100
1982-082A	Anik D1	D	547.	p. 115
1982-093A	Ekran 9	L1	61.	p. 137
1982-093F	<i>Blok-DM (Proton-K/DM)</i>	D	669.	p. 124
1982-097A	Intelsat V F-5	D	145.	p. 88
1982-103A	Gorizont 6	L2	34.	p. 144
1982-103E	<i>Blok-DM (Proton-K/DM)</i>	D	584.	p. 118
1982-105A	Aurora I	L2	18.	p. 143
1982-106A	OPS 9445 (DSCS II F-16, DSCS 2-16)	D	23.	p. 80
1982-106B	DSCS III F1 (DSCS 3-1, DSCS III A-1)	D	91.	p. 85
1982-106D	<i>IUS second stage (IUS-2 SRM-2, Orbus 6E) (Titan 34D IUS)</i>	D	372.	p. 103
1982-110B	SBS III	D	507.	p. 112
1982-110C	Anik C3	D	502.	p. 112
1982-113A	Raduga 11	D	82.	p. 84
1982-113F	<i>Blok-DM (Proton-K/DM)</i>	D	66.	p. 83
1983-006A	Sakura 2A (CS 2A)	D	384.	p. 104
1983-016A	Ekran 10	D	21.	p. 80
1983-016F	<i>Blok-DM (Proton-K/DM)</i>	D	652.	p. 123
1983-026B	TDRS 1	D	197.	p. 92
1983-028A	Raduga 12	L1	18.	p. 134
1983-028F	<i>Blok-DM (Proton-K/DM)</i>	D	533.	p. 114
1983-030A	RCA Satcom IR	D	491.	p. 111
1983-041A	GOES 6	L2	19.	p. 143
1983-047A	Intelsat V F-6	D	302.	p. 99
1983-058A	Eutelsat I F-1 (ECS 1)	D	224.	p. 94
1983-059B	Anik C2	D	289.	p. 98
1983-059C	Palapa Pacific 1 (Palapa B1)	D	568.	p. 117
1983-065A	Galaxy I	D	552.	p. 116
1983-066A	Gorizont 7	D	138.	p. 88
1983-066F	<i>Blok-DM (Proton-K/DM)</i>	D	71.	p. 83
1983-077A	Arabsat 1D-R	D	407.	p. 106
1983-081A	Sakura 2B (CS 2B)	D	212.	p. 93
1983-088A	Raduga 13	D	120.	p. 87
1983-088F	<i>Blok-DM (Proton-K/DM)</i>	D	70.	p. 83
1983-089B	INSAT 1B	L1	104.	p. 140
1983-094A	RCA Satcom IIR	D	386.	p. 104
1983-098A	Galaxy II	D	572.	p. 117
1983-100A	Ekran 11	L1	55.	p. 136
1983-100F	<i>Blok-DM (Proton-K/DM)</i>	D	648.	p. 122
1983-105A	Intelsat V F-7	D	448.	p. 109
1983-118A	Gorizont 8	D	131.	p. 87
1983-118F	<i>Blok-DM (Proton-K/DM)</i>	L1	32.	p. 135
1984-005A	Yuri 2A (BS 2A)	D	272.	p. 97
1984-009A	OPS 0441 (VORTEX 4)	L3	12.	p. 147
1984-009C	<i>Titan 34D third stage (Transtage D-10) (Titan 34D Transtage)</i>	D	393.	p. 105

COSPAR	Name	Status	nn	Page
1984-016A	Raduga 14	L1	23.	p. 134
1984-016F	<i>Blok-DM (Proton-K/DM)</i>	L1	47.	p. 136
1984-022A	Cosmos-1540	L1	8.	p. 133
1984-022F	<i>Blok-DM (Proton-K/DM)</i>	D	493.	p. 112
1984-023A	Intelsat V F-8	D	57.	p. 82
1984-028A	Ekran 12	D	42.	p. 81
1984-028F	<i>Blok-DM (Proton-K/DM)</i>	D	688.	p. 125
1984-031A	Cosmos-1546	L1	15.	p. 134
1984-031F	<i>Blok-DM (Proton-K/DM)</i>	D	387.	p. 104
1984-035A	DFH-2 2 (STTW T2)	L1	110.	p. 140
1984-037A	OPS 7641 (DSP F11, DSP 12, DSP Block 3(MOS/PIM) F11)	D	184.	p. 91
1984-037B	<i>Titan 34D third stage (Transtage D-11) (Titan 34D Transtage)</i>	D	659.	p. 123
1984-041A	Gorizont 9	L1	38.	p. 135
1984-041D	<i>Blok-DM (Proton-K/DM)</i>	D	177.	p. 90
1984-049A	Chinasat 5 (Zhongxing 5, ZX 5, Spacenet 1)	D	520.	p. 113
1984-063A	Raduga 15	L1	98.	p. 139
1984-063F	<i>Blok-DM (Proton-K/DM)</i>	D	735.	p. 128
1984-078A	Gorizont 10	L2	31.	p. 144
1984-078F	<i>Blok-DM (Proton-K/DM)</i>	L1	83.	p. 138
1984-080A	Himawari 3 (GMS 3)	D	482.	p. 111
1984-080E	Himawari 3 (GMS 3) AKM (Star 27)	D	456.	p. 109
1984-081A	Eutelsat I F-2 (ECS 2)	D	207.	p. 92
1984-081B	Telecom 1A	D	144.	p. 88
1984-090A	Ekran 13	D	39.	p. 81
1984-090F	<i>Blok-DM (Proton-K/DM)</i>	D	673.	p. 124
1984-093B	SBS IV	D	201.	p. 92
1984-093C	LEASAT 2 (Syncom-4 2)	D	61.	p. 83
1984-093D	Telstar 3C (Telstar 302)	D	464.	p. 110
1984-101A	Galaxy III	D	484.	p. 111
1984-113B	Arabsat 1D	D	230.	p. 94
1984-113C	LEASAT 1 (Syncom-4 1)	D	165.	p. 90
1984-114A	Chinasat 5R (Zhongxing 5R, ZX 5R, Spacenet 2)	D	458.	p. 109
1984-114B	MARECS B2	D	37.	p. 81
1984-115A	NATO IIID	D	19.	p. 80
1984-129A	USA 7 (DSP F12, DSP 6R, DSP Block 4(PHASE II UG) F12)	D	221.	p. 93
1984-129B	<i>Titan 34D third stage (Transtage D-13) (Titan 34D Transtage)</i>	D	658.	p. 123
1985-007A	Gorizont 11	L3	14.	p. 147
1985-007D	<i>Blok-DM (Proton-K/DM)</i>	D	730.	p. 128
1985-010B	USA 8 (MAGNUM 1)	D	473.	p. 110
1985-010D	<i>IUS second stage (IUS-11 SRM-2, Orbus 6E) (Discovery (OV-103))</i>	D	634.	p. 121
1985-015A	Arabsat 1A	D	591.	p. 118
1985-015B	Brazilsat 1	D	415.	p. 106
1985-016A	Cosmos-1629	L2	39.	p. 144
1985-016F	<i>Blok-DM (Proton-K/DM)</i>	D	381.	p. 104
1985-024A	Ekran 14	D	18.	p. 80
1985-024D	<i>Blok-DM (Proton-K/DM)</i>	D	667.	p. 124
1985-025A	Intelsat VA F-10	D	134.	p. 88
1985-028B	Anik C1	D	443.	p. 108

COSPAR	Name	Status	nn	Page
1985-028C	LEASAT 3 (Syncom-4 3)	D	50.	p. 82
1985-035A	GStar 1	L2	1.	p. 142
1985-035B	Telecom 1B	L1	122.	p. 141
1985-048B	Morelos 1	D	395.	p. 105
1985-048C	Arabsat 1B	D	590.	p. 118
1985-048D	Telstar 3D (Telstar 303)	D	495.	p. 112
1985-055A	Intelsat VA F-11	D	541.	p. 115
1985-070A	Raduga 16	L2	35.	p. 144
1985-070F	<i>Blok-DM (Proton-K/DM)</i>	D	89.	p. 85
1985-076B	Optus A1	D	460.	p. 109
1985-076C	ASC 1	L2	14.	p. 143
1985-076D	LEASAT 4 (Syncom-4 3)	D	87.	p. 84
1985-087A	Intelsat VA F-12	D	283.	p. 97
1985-092B	USA 11 (DSCS III F2, DSCS 3-2, DSCS III B-4)	D	246.	p. 95
1985-092C	USA 12 (DSCS III F3, DSCS 3-3, DSCS III B-5)	D	359.	p. 103
1985-092E	<i>IUS second stage (IUS-12 SRM-2, Orbis 6E) (Atlantis (OV-104))</i>	D	651.	p. 122
1985-102A	Cosmos-1700	L1	35.	p. 135
1985-102D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	617.	p. 120
1985-102G	Cosmos-1700 debris	L1	54.	p. 136
1985-107A	Raduga 17	D	563.	p. 116
1985-107F	<i>Blok-DM (Proton-K/DM)</i>	D	62.	p. 83
1985-109B	Morelos 2	D	421.	p. 107
1985-109C	Optus A2	D	510.	p. 113
1985-109D	Satcom Ku-2	D	433.	p. 108
1986-003B	Satcom Ku-1	D	417.	p. 106
1986-007A	Raduga 18	D	213.	p. 93
1986-007F	<i>Blok-DM (Proton-K/DM)</i>	D	86.	p. 84
1986-010A	DFH-2A 1 (STTW 1)	L1	58.	p. 137
1986-016A	Yuri 2B (BS 2B)	D	349.	p. 102
1986-026A	GStar 2	D	469.	p. 110
1986-026B	Brazilsat 2	D	437.	p. 108
1986-027A	Cosmos-1738	L3	13.	p. 147
1986-027F	<i>Blok-DM (Proton-K/DM)</i>	D	80.	p. 84
1986-038A	Ekran 15	D	45.	p. 82
1986-038D	<i>Blok-DM (Proton-K/DM)</i>	D	685.	p. 125
1986-044A	Gorizont 12	L1	71.	p. 137
1986-044F	<i>Blok-DM (Proton-K/DM)</i>	D	78.	p. 84
1986-082A	Raduga 19	D	154.	p. 89
1986-082F	<i>Blok-DM (Proton-K/DM)</i>	D	68.	p. 83
1986-090A	Gorizont 13	D	48.	p. 82
1986-090D	<i>Blok-DM (Proton-K/DM)</i>	L1	94.	p. 139
1986-096A	USA 20 (FLTSATCOM F7)	C2	55.	p. 71
1987-022A	GOES 7	D	501.	p. 112
1987-022F	GOES 7 AKM (Star 27)	D	204.	p. 92
1987-028A	Raduga 20	D	38.	p. 81
1987-028D	<i>Blok-DM (Proton-K/DM)</i>	D	494.	p. 112
1987-029A	Agila 1	D	504.	p. 112
1987-040A	Gorizont 14	D	75.	p. 84

COSPAR	Name	Status	nn	Page
1987-040D	<i>Blok-DM (Proton-K/DM)</i>	D	729.	p. 128
1987-070A	Kiku 5 (ETS V)	D	364.	p. 103
1987-073A	Ekran 16	D	44.	p. 82
1987-073D	<i>Blok-DM (Proton-K/DM)</i>	D	686.	p. 125
1987-078A	Optus A3	D	229.	p. 94
1987-078B	Eutelsat I F-4 (ECS 4)	D	187.	p. 91
1987-084A	Cosmos-1888	L2	48.	p. 145
1987-084D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	532.	p. 114
1987-091A	Cosmos-1894	L2	41.	p. 144
1987-091D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	576.	p. 117
1987-095A	TV-Sat 1	D	236.	p. 94
1987-096A	Cosmos-1897	L1	42.	p. 135
1987-096D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	607.	p. 119
1987-097A	USA 28 (DSP F13, DSP 5R, DSP Block 4(PHASE II UG) F13)	D	142.	p. 88
1987-097B	<i>Titan 34D third stage (Transtage D-14) (Titan 34D Transtage)</i>	D	666.	p. 123
1987-100A	Raduga 21	L2	27.	p. 143
1987-100D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	736.	p. 128
1987-109A	Ekran-M 17	D	35.	p. 81
1987-109D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	635.	p. 121
1988-012A	Sakura 3A (CS 3A)	D	116.	p. 86
1988-014A	DFH-2A 2 (Chinasat 1, Zhongxing 1, ZX 1, STTW 2)	L1	27.	p. 134
1988-018A	Spacenet 3R	D	442.	p. 108
1988-018B	Telecom 1C	D	104.	p. 86
1988-028A	Gorizont 15	D	90.	p. 85
1988-028D	<i>Blok-DM (Proton-K/DM)</i>	D	85.	p. 84
1988-034A	Cosmos-1940	D	620.	p. 120
1988-034D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	542.	p. 115
1988-036A	Ekran-M 18	D	25.	p. 80
1988-036E	<i>Blok-DM (Proton-K/DM)</i>	D	654.	p. 123
1988-040A	Intelsat VA F-13 (NSS 513)	D	166.	p. 90
1988-051A	Meteosat 3	D	49.	p. 82
1988-051C	PAS 1 (PanAmSat 1)	D	376.	p. 104
1988-063A	INSAT 1C	L1	34.	p. 135
1988-063B	Eutelsat I F-5 (ECS 5)	D	118.	p. 86
1988-066A	Cosmos-1961	L1	5.	p. 133
1988-066D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	183.	p. 91
1988-071A	Gorizont 16	D	518.	p. 113
1988-071D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	606.	p. 119
1988-081A	GStar 3	L2	2.	p. 142
1988-081B	SBS V	D	467.	p. 110
1988-086A	Sakura 3B (CS 3B)	D	327.	p. 100
1988-091B	TDRS 3	C2	122.	p. 76
1988-091D	<i>IUS second stage (IUS-7 SRM-2, Orbus 6E) (Discovery (OV-103))</i>	D	596.	p. 119
1988-095A	Raduga 22	L1	109.	p. 140
1988-095F	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	99.	p. 85
1988-098A	TDF 1	D	316.	p. 100
1988-108A	Ekran-M 19	D	46.	p. 82
1988-108D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	691.	p. 125

COSPAR	Name	Status	nn	Page
1988-109A	Skynet 4B	D	446.	p. 108
1988-109B	Astra 1A	D	137.	p. 88
1988-111A	DFH-2A 3 (Chinasat 2, Zhongxing 2, ZX 2, STTW 3)	L1	75.	p. 138
1989-004A	Gorizont 17	D	275.	p. 97
1989-004F	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	107.	p. 86
1989-006A	Intelsat VA F-15	D	281.	p. 97
1989-020A	JCSAT 1	D	410.	p. 106
1989-020B	Meteosat 4 (MOP 1)	D	52.	p. 82
1989-020E	Meteosat 4 AKM (MAGE 1)	D	593.	p. 118
1989-021B	TDRS 4	D	156.	p. 89
1989-021D	<i>IUS second stage (IUS-9 SRM-2, Orbus 6E) (Discovery (OV-103))</i>	D	616.	p. 120
1989-027A	Tele-X	D	308.	p. 99
1989-030A	Raduga 23	L1	85.	p. 138
1989-030D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	97.	p. 85
1989-035A	USA 37 (VORTEX 6)	C2	53.	p. 71
1989-035C	<i>Titan 34D third stage (Transtage D-16) (Titan 34D Transtage)</i>	D	388.	p. 104
1989-041A	Superbird A	D	457.	p. 109
1989-041B	DFS-Kopernikus 1	D	619.	p. 120
1989-046A	USA 39 (DSP F14, DSP 14, DSP Block 5(DSP-1) F14)	D	211.	p. 93
1989-046D	<i>IUS second stage (IUS-8 SRM-2, Orbus 6E) (Titan IVA IUS)</i>	D	676.	p. 124
1989-046E	USA 39 debris (DSP F14 IR Sensor telescope sunshade cover)	D	677.	p. 124
1989-048A	Raduga 1-1	D	189.	p. 91
1989-048D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	96.	p. 85
1989-052A	Gorizont 18	D	380.	p. 104
1989-052D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	731.	p. 128
1989-053A	Olympus 1	D	684.	p. 125
1989-062A	TV-SAT 2	D	487.	p. 111
1989-067A	Sirius 1 (Marcopolo 1)	D	312.	p. 99
1989-069A	USA 43 (DSCS II F-15, DSCS 2-15, DSCS II E-15)	D	170.	p. 90
1989-069B	USA 44 (DSCS III F4, DSCS 3-4, DSCS III A-2)	D	284.	p. 98
1989-069D	<i>Titan 34D third stage (Transtage D-2) (Titan 34D Transtage)</i>	D	668.	p. 124
1989-070A	Himawari 4 (GMS 4)	D	60.	p. 83
1989-070C	Himawari 4 (GMS 4) AKM (Star 27)	D	202.	p. 92
1989-077A	USA 46 (FLTSATCOM F8)	C2	140.	p. 77
1989-081A	Gorizont 19	L1	77.	p. 138
1989-081D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	615.	p. 120
1989-087A	Intelsat VI F-2	D	257.	p. 96
1989-090B	USA 48 (MAGNUM 2)	D	625.	p. 121
1989-090D	<i>IUS second stage (IUS-5 SRM-2, Orbus 6E) (Discovery (OV-103))</i>	D	406.	p. 106
1989-098A	Raduga 24	L1	62.	p. 137
1989-098D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	94.	p. 85
1989-101A	Cosmos-2054	L2	42.	p. 144
1989-101D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	127.	p. 87
1989-101G	Proton-K/DM-2 fragmentation debris	D	93.	p. 85
1990-001A	Skynet 4A	D	251.	p. 95
1990-001B	JCSAT 2	D	163.	p. 89
1990-002B	LEASAT 5 (Syncom-4 5)	D	430.	p. 107
1990-011A	DFH-2A 4 (Chinasat 3, Zhongxing 3, ZX 3, STTW 4)	L1	43.	p. 136

COSPAR	Name	Status	nn	Page
1990-016A	Raduga 25	L2	33.	p. 144
1990-016D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	526.	p. 114
1990-021A	Intelsat VI F-3	D	400.	p. 105
1990-030A	AsiaSat 1	D	334.	p. 101
1990-034A	Palapa B-2R	D	408.	p. 106
1990-051A	INSAT 1D	L1	14.	p. 134
1990-054A	Gorizont 20	L1	37.	p. 135
1990-054D	<i>Blok-DM (Proton-K/DM)</i>	D	603.	p. 119
1990-056A	Intelsat VI F-4	D	147.	p. 88
1990-061A	Cosmos-2085	L1	4.	p. 133
1990-061D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	L1	90.	p. 139
1990-063A	TDF 2	D	174.	p. 90
1990-063B	DFS-Kopernikus 2	D	414.	p. 106
1990-074A	Thor I(Marcopolo 2)	D	324.	p. 100
1990-077A	Yuri 3A (BS 3A)	D	210.	p. 93
1990-079A	Skynet 4C	C2	15.	p. 69
1990-079B	Eutelsat II F-1	D	366.	p. 103
1990-091A	SBS VI	D	250.	p. 95
1990-091B	Galaxy VI	D	459.	p. 109
1990-093A	Inmarsat-2 F1	D	226.	p. 94
1990-094A	Gorizont 21	L3	8.	p. 146
1990-094D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	638.	p. 122
1990-095A	USA 65 (DSP F15, DSP 15, DSP Block 5(DSP-1) F15)	D	143.	p. 88
1990-095D	<i>IUS second stage (IUS-6 SRM-2, Orbus 6E) (Titan IVA IUS)</i>	D	513.	p. 113
1990-095E	USA 65 debris (DSP F15 IR Sensor telescope sunshade cover)	U	4.	p. 157
1990-097B	USA 67 (SDS 2 F2)(QUASAR 2)	D	167.	p. 90
1990-100A	Satcom C-1	D	311.	p. 99
1990-100B	GStar 4	D	294.	p. 98
1990-102A	Gorizont 22	L1	115.	p. 140
1990-102D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	95.	p. 85
1990-112A	Raduga 26	L1	36.	p. 135
1990-112D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	527.	p. 114
1990-116A	Raduga 1-2	L1	52.	p. 136
1990-116D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	101.	p. 85
1991-001A	NATO IVA	D	133.	p. 87
1991-003A	Italsat 1	D	514.	p. 113
1991-003B	Eutelsat II F-2	D	238.	p. 94
1991-010A	Cosmos-2133	L1	7.	p. 133
1991-010F	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	551.	p. 115
1991-014A	Raduga 27	L1	95.	p. 139
1991-014D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	737.	p. 128
1991-015A	Astra 1B	D	159.	p. 89
1991-015B	Meteosat 5 (MOP 2)	D	151.	p. 89
1991-015E	Meteosat 5 AKM (MAGE 1)	D	557.	p. 116
1991-018A	Inmarsat-2 F2	D	192.	p. 91
1991-026A	Anik E2	D	291.	p. 98
1991-028A	Spacenet 4	D	422.	p. 107
1991-037A	Aurora II	D	259.	p. 96

COSPAR	Name	Status	nn	Page
1991-046A	Gorizont 23	D	231.	p. 94
1991-046D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	641.	p. 122
1991-054B	TDRS 5	C2	94.	p. 74
1991-054D	<i>IUS second stage (IUS-15 SRM-2, Orbus 6E) (Atlantis (OV-104))</i>	L3	3.	p. 146
1991-055A	Intelsat VI F-5	D	360.	p. 103
1991-060A	Yuri 3B (BS 3B)	D	205.	p. 92
1991-064A	Cosmos-2155	L3	4.	p. 146
1991-064B	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	499.	p. 112
1991-067A	Anik E1	D	303.	p. 99
1991-074A	Gorizont 24	D	149.	p. 89
1991-074D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	451.	p. 109
1991-075A	Intelsat VI F-1	D	428.	p. 107
1991-079A	Cosmos-2172	L3	19.	p. 147
1991-079D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	175.	p. 90
1991-080B	USA 75 (DSP F16, DSP 16, DSP Block 5(DSP-1) F16)	D	315.	p. 100
1991-080D	<i>IUS second stage (IUS-14 SRM-2, Orbus 6E) (Atlantis (OV-104))</i>	D	674.	p. 124
1991-083A	Eutelsat II F-3	D	351.	p. 102
1991-084A	Telecom 2A	D	241.	p. 95
1991-084B	Inmarsat-2 F3	D	43.	p. 81
1991-087A	Raduga 28	L1	86.	p. 138
1991-087D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	109.	p. 86
1992-006A	USA 78 (DSCS III F5, DSCS 3-5, DSCS III B-14)	D	266.	p. 96
1992-006C	<i>IABS (Atlas II)</i>	D	791.	p. 132
1992-010A	Superbird B1	D	273.	p. 97
1992-010B	INSAT 2DT (Arabsat 1C)	D	186.	p. 91
1992-013A	Galaxy V	D	348.	p. 102
1992-017A	Gorizont 25	D	489.	p. 111
1992-017D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	650.	p. 122
1992-021A	Telecom 2B	D	409.	p. 106
1992-021B	Inmarsat-2 F4	D	102.	p. 85
1992-027A	Palapa B4	D	509.	p. 113
1992-032A	NSS K (Intelsat K)	D	55.	p. 82
1992-037A	USA 82 (DSCS III F6, DSCS 3-6, DSCS III B-12)	D	209.	p. 93
1992-037C	<i>IABS (Atlas II)</i>	D	700.	p. 126
1992-041A	INSAT 2A	D	574.	p. 117
1992-041B	Eutelsat II F-4	D	278.	p. 97
1992-043A	Gorizont 26	D	333.	p. 101
1992-043D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	92.	p. 85
1992-054A	Optus B1	D	321.	p. 100
1992-057A	Satcom C-4	D	260.	p. 96
1992-059A	Cosmos-2209	L2	38.	p. 144
1992-059D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	470.	p. 110
1992-060A	Hispasat 1A	D	357.	p. 102
1992-060B	Satcom C-3	D	51.	p. 82
1992-066A	DFS-Kopernikus 3	D	455.	p. 109
1992-072A	Galaxy VII	D	449.	p. 109
1992-074A	Ekran-M 20	L1	46.	p. 136
1992-074D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	656.	p. 123

COSPAR	Name	Status	nn	Page
1992-082A	Gorizont 27	D	570.	p. 117
1992-082D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	110.	p. 86
1992-084A	Superbird A1	D	285.	p. 98
1992-088A	Cosmos-2224	L1	121.	p. 141
1992-088D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	536.	p. 114
1993-003B	TDRS 6	C2	126.	p. 76
1993-003D	<i>IUS second stage (IUS-13 SRM-2, Orbus 6E) (Endeavour (OV-105))</i>	D	548.	p. 115
1993-013A	Raduga 29	L1	108.	p. 140
1993-013D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	108.	p. 86
1993-015A	USA 98 (UFO F1)	D	339.	p. 101
1993-031A	Astra 1C	D	219.	p. 93
1993-039A	Galaxy IV	L1	2.	p. 133
1993-046A	USA 93 (DSCS III F7, DSCS 3-7, DSCS III B-9)	D	270.	p. 97
1993-046C	<i>IABS (Atlas II)</i>	D	713.	p. 127
1993-048A	Hispasat 1B	D	454.	p. 109
1993-048B	INSAT 2B	D	517.	p. 113
1993-056A	USA 95 (UFO F2)	C2	12.	p. 68
1993-058B	ACTS	L2	3.	p. 142
1993-062A	Raduga 30	L1	13.	p. 134
1993-062D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	L1	119.	p. 141
1993-066A	Intelsat VII F-1	D	358.	p. 102
1993-069A	Gorizont 28	D	439.	p. 108
1993-069D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	598.	p. 119
1993-072A	Gorizont 29	D	558.	p. 116
1993-072D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	733.	p. 128
1993-073A	Solidaridad 1	L2	5.	p. 142
1993-073B	Meteosat 6 (MOP 3)	D	245.	p. 95
1993-073E	Meteosat 6 AKM (MAGE 1)	D	521.	p. 113
1993-074A	USA 97 (DSCS III F8, DSCS 3-8, DSCS III B-10)	D	161.	p. 89
1993-074B	<i>IABS (Atlas II)</i>	D	336.	p. 101
1993-076A	NATO IVB	D	160.	p. 89
1993-077A	Telstar 401	L2	9.	p. 142
1993-078A	DirecTV 1	D	247.	p. 95
1993-078B	Thaicom 1	D	309.	p. 99
1994-002A	Gals 1	L1	82.	p. 138
1994-002D	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	D	396.	p. 105
1994-008A	Raduga 1-3	L1	51.	p. 136
1994-008D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	106.	p. 86
1994-009A	USA 99 (Milstar DFS-1)	C2	129.	p. 76
1994-009B	<i>Centaur-T (Titan IVA Centaur-T)</i>	D	613.	p. 120
1994-012A	Raduga 31	L1	64.	p. 137
1994-012D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	115.	p. 86
1994-013A	Galaxy IR-A	D	326.	p. 100
1994-022A	GOES 8	D	228.	p. 94
1994-030A	Gorizont 30	L3	16.	p. 147
1994-030D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	740.	p. 129
1994-034A	Intelsat VII F-2	D	237.	p. 94
1994-035A	USA 104 (UFO F3)	L2	43.	p. 145

COSPAR	Name	Status	nn	Page
1994-038A	Cosmos-2282	L2	37.	p. 144
1994-038D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	389.	p. 105
1994-040A	Intelsat 2 (PAS 2)	D	314.	p. 100
1994-040B	BS-3N	D	297.	p. 98
1994-043A	Chinasat 5E (Zhongxing 5E, ZX 5E, APStar 1)	D	370.	p. 103
1994-047A	DirecTV-2	D	179.	p. 91
1994-049A	Brazilsat B1	D	337.	p. 101
1994-049B	Turksat 1B	D	269.	p. 97
1994-054A	USA 105 (MERCURY 1)	C2	19.	p. 69
1994-054B	<i>Centaur-T (Titan IVA Centaur-T)</i>	D	423.	p. 107
1994-055A	Optus B3	D	188.	p. 91
1994-060A	Cosmos-2291	L3	11.	p. 146
1994-060D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	537.	p. 114
1994-064A	Intelsat VII F-3 (NSS 703)	D	353.	p. 102
1994-065A	Solidaridad 2	D	223.	p. 93
1994-065B	Thaicom 2	D	427.	p. 107
1994-067A	Ekspress 1 (Ekspress 11L)	D	480.	p. 111
1994-067D	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	L3	17.	p. 147
1994-069A	Elektro 1	L1	16.	p. 134
1994-069D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	549.	p. 115
1994-070A	Astra 1D	C2	117.	p. 75
1994-079A	Telstar 11 (Orion 1)	D	168.	p. 90
1994-080A	DFH 3-1	D	642.	p. 122
1994-082A	Luch 1	L2	46.	p. 145
1994-082D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	631.	p. 121
1994-084A	USA 107 (DSP F17, DSP 17, DSP Block 5(DSP-1) F17)	C2	124.	p. 76
1994-084D	<i>IUS second stage (IUS-20 SRM-2, Orbus 6E) (Titan IVA IUS)</i>	D	663.	p. 123
1994-087A	Raduga 32	L1	6.	p. 133
1994-087D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	538.	p. 115
1995-001A	Intelsat VII F-4	D	307.	p. 99
1995-003A	USA 108 (UFO F4)	C2	109.	p. 75
1995-011B	Himawari 5 (GMS 5)	D	383.	p. 104
1995-011D	Himawari 5 (GMS 5) AKM (Star 27)	D	670.	p. 124
1995-013A	Intelsat VII F-5	D	244.	p. 95
1995-016A	Brazilsat B2	C2	119.	p. 76
1995-016B	Hot Bird 1	D	356.	p. 102
1995-019A	AMSC 1 (M-Sat 2)	C2	107.	p. 75
1995-022A	USA 110 (Advanced ORION 1)	C2	68.	p. 72
1995-022B	<i>Centaur-T (Titan IVA Centaur-T)</i>	D	605.	p. 119
1995-023A	Intelsat VIIA F-1	D	271.	p. 97
1995-025A	GOES 9	D	208.	p. 92
1995-027A	USA 111 (UFO F5)	D	196.	p. 92
1995-029A	DirecTV 3	D	254.	p. 96
1995-035B	TDRS 7	C2	45.	p. 71
1995-035D	<i>IUS second stage (IUS-26 SRM-2, Orbus 6E) (Discovery (OV-103))</i>	D	602.	p. 119
1995-038A	USA 113 (DSCS III F9, DSCS 3-9, DSCS III B-7)	C2	58.	p. 71
1995-038C	<i>IABS (Atlas IIA)</i>	D	672.	p. 124
1995-040A	Intelsat 4 (PAS 4)	D	54.	p. 82

COSPAR	Name	Status	nn	Page
1995-041A	Europe*Star B (Mugunghwa 1, Koreasat 1)	D	444.	p. 108
1995-043A	JCSAT 3	D	296.	p. 98
1995-044A	N-Star 1	D	290.	p. 98
1995-045A	Cosmos-2319	L2	47.	p. 145
1995-045D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	564.	p. 116
1995-049A	Telstar 4 (Telstar 402R)	L2	12.	p. 142
1995-054A	Luch 1-1	L1	9.	p. 133
1995-054D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	L1	106.	p. 140
1995-055A	Astra 1E	D	206.	p. 92
1995-057A	USA 114 (UFO F6)	C2	81.	p. 73
1995-060A	USA 115 (Milstar DFS-2)	C2	115.	p. 75
1995-060B	<i>Centaur-T (Titan IVA Centaur-T)</i>	D	614.	p. 120
1995-063A	Gals 2	D	496.	p. 112
1995-063D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	L1	111.	p. 140
1995-064A	AsiaSat 2	D	354.	p. 102
1995-067A	Telecom 2C	D	100.	p. 85
1995-067B	INSAT 2C	D	465.	p. 110
1995-069A	Galaxy IIIR	L2	20.	p. 143
1995-073A	EchoStar 1	C1	296.	p. 62
1996-002A	Intelsat 3R (PAS 3R)	D	280.	p. 97
1996-002B	MEASAT 1	D	274.	p. 97
1996-003A	ABS 1A (Mugunghwa 2, Koreasat 2)	D	468.	p. 110
1996-005A	Gorizont 31	D	498.	p. 112
1996-005D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	79.	p. 84
1996-006A	Palapa C1	D	429.	p. 107
1996-007A	N-Star 2	D	342.	p. 101
1996-015A	Intelsat VIIA F-2	D	155.	p. 89
1996-020A	Inmarsat-3 F1	C2	30.	p. 70
1996-021A	Astra 1F	C1	55.	p. 46
1996-022A	MSAT	C2	105.	p. 75
1996-026A	USA 118 (MERCURY 2)	C2	23.	p. 69
1996-026B	<i>Centaur-T (Titan IVA Centaur-T)</i>	D	420.	p. 107
1996-030A	Palapa C2	D	255.	p. 96
1996-030B	Intelsat 24 (AMOS 1)	D	53.	p. 82
1996-033A	Galaxy IX	D	413.	p. 106
1996-034A	Gorizont 32	D	569.	p. 117
1996-034D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	103.	p. 85
1996-035A	Intelsat VII F-6	D	306.	p. 99
1996-039A	Chinasat 5D (Zhongxing 5D, ZX 5D, APStar 1A)	D	313.	p. 99
1996-040A	Arabsat 2A	D	329.	p. 101
1996-040B	Turksat 1C	L1	101.	p. 139
1996-042A	USA 127 (UFO F7)	Ind	1.	p. 156
1996-044A	Italsat 2	D	630.	p. 121
1996-044B	Telecom 2D	D	150.	p. 89
1996-053A	Inmarsat-3 F2	C2	138.	p. 77
1996-053D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	113.	p. 86
1996-054A	GE 1	C2	98.	p. 74
1996-055A	EchoStar 2	L2	25.	p. 143

COSPAR	Name	Status	nn	Page
1996-058A	Ekspress 2 (Ekspress 12L)	L1	57.	p. 136
1996-058D	Blok-DM-2M (Proton-K/DM-2M)	L1	81.	p. 138
1996-063A	Arabsat 2B	D	385.	p. 104
1996-063B	MEASAT 2	C2	78.	p. 73
1996-067A	Eutelsat 48A (Eutelsat W48, Eurobird 9, Hot Bird 2)	D	140.	p. 88
1996-070A	Inmarsat-3 F3	C2	89.	p. 74
1997-002A	GE 2	C2	116.	p. 75
1997-002B	Nahuel 1A	D	374.	p. 104
1997-007A	Intelsat 26 (JCSAT R, JCSAT 4)	C2	32.	p. 70
1997-008A	USA 130 (DSP F18, DSP 20, DSP Block 5(DSP-1) F18)	C2	3.	p. 68
1997-008D	IUS second stage (IUS-4 SRM-2, Orbus 6E) (Titan IVB IUS)	D	402.	p. 105
1997-008E	USA 130 debris (DSP F18 IR Sensor telescope sunshade cover)	D	411.	p. 106
1997-009A	Intelsat 801	D	194.	p. 92
1997-011A	Tempo 2	D	263.	p. 96
1997-016A	Thaicom 3	D	200.	p. 92
1997-016B	BSAT 1a	D	287.	p. 98
1997-019A	GOES 10	D	288.	p. 98
1997-021A	DFH 3-2 (Chinasat 6, Zhongxing 6, ZX 6)	L1	93.	p. 139
1997-025A	Thor II	D	243.	p. 95
1997-026A	Galaxy 25 (Intelsat Americas 5, IA 5, Telstar 5)	C1	278.	p. 61
1997-027A	Inmarsat-3 F4	D	404.	p. 106
1997-027B	INSAT 2D	D	753.	p. 130
1997-029A	Fengyun 2A (Fengyun 2-1R)	D	40.	p. 81
1997-029C	Fengyun 2A AKM (FG-36)	D	727.	p. 128
1997-029D	Fengyun 2A operational debris (S-VISSR radiometre cover)	D	579.	p. 117
1997-031A	Intelsat 802	D	114.	p. 86
1997-036A	Superbird C	D	277.	p. 97
1997-040A	PAS 6	D	13.	p. 79
1997-041A	Cosmos-2345	L3	6.	p. 146
1997-041D	Blok-DM-2 (Proton-K/DM-2)	D	523.	p. 114
1997-042A	ABS 3 (Agila 2/ABS 5, Agila 2, Mabuhay 1)	D	341.	p. 101
1997-046A	Badr C (Intelsat 5, Arabsat 2C, PAS 5)	C2	82.	p. 73
1997-049A	Eutelsat W75 (ABS 1B, Eurobird 10, Eurobird 4, Hot Bird 3)	D	721.	p. 127
1997-049B	Meteosat 7 (MTP)	D	135.	p. 88
1997-049E	Meteosat 7 AKM (MAGE 1)	D	618.	p. 120
1997-050A	GE 3	C2	118.	p. 75
1997-053A	NSS 5 (NSS 803, Intelsat 803)	C2	24.	p. 69
1997-059A	EchoStar 3	D	225.	p. 94
1997-062A	Apstar 2R (Telstar 10)	D	323.	p. 100
1997-065A	USA 134 (DSCS III F10, DSCS 3-10, DSCS III B-13)	C2	102.	p. 74
1997-065C	IABS (Atlas IIA)	D	649.	p. 122
1997-070A	Kupon 1	L1	33.	p. 135
1997-070D	Blok-DM-2M (Proton-K/DM-2M)	D	436.	p. 108
1997-071A	Astra 5A (Sirius 2, GE 1E)	D	382.	p. 104
1997-071B	Cakrawatra 1	L1	87.	p. 138
1997-075A	JCSAT 5	D	181.	p. 91
1997-076A	Astra 1G	C2	25.	p. 69
1997-078A	Galaxy VIII-i	D	450.	p. 109

COSPAR	Name	Status	nn	Page
1997-083A	Intelsat 804	L3	2.	p. 146
1997-086A	HGS-1	L2	30.	p. 144
1998-002A	Skynet 4D	D	300.	p. 99
1998-006A	Brazilsat B3	C2	121.	p. 76
1998-006B	Inmarsat-3 F5	C2	123.	p. 76
1998-013A	Eutelsat 16B (Eurobird 16, Nilesat 103, Hot Bird 4)	D	132.	p. 87
1998-014A	NSS 806 (Intelsat 806)	C1	325.	p. 64
1998-016A	USA 138 (UFO F8)	C2	87.	p. 73
1998-024A	Nilesat 101	D	59.	p. 83
1998-024B	BSAT 1b	D	286.	p. 98
1998-025A	Cosmos-2350	L1	12.	p. 133
1998-025D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	534.	p. 114
1998-028A	EchoStar 4	D	240.	p. 95
1998-029A	USA 139 (Advanced ORION 2)	C2	134.	p. 77
1998-029B	<i>Centaur-T (Titan IVB Centaur-T)</i>	L1	114.	p. 140
1998-033A	Apstar 9A	C2	67.	p. 72
1998-035A	Thor III	C2	145.	p. 77
1998-037A	Intelsat 805	C1	210.	p. 57
1998-044A	PSN 5 (Chinasat 5B, Zhongxing 5B, ZX 5B, Intelsat APR-1)	D	305.	p. 99
1998-049A	ST-1	D	199.	p. 92
1998-050A	Astra 2A	C1	161.	p. 53
1998-052A	Intelsat 7 (PAS 7)	D	126.	p. 87
1998-056A	Eutelsat W2	D	344.	p. 102
1998-056B	Sirius 3	D	264.	p. 96
1998-057A	Eutelsat 4B (Eutelsat 25A, Badr 2, Arabsat 2D, Hot Bird 5)	D	153.	p. 89
1998-058A	USA 140 (UFO F9)	D	119.	p. 87
1998-063A	AfriStar 1	C2	1.	p. 68
1998-063B	GE 5	D	363.	p. 103
1998-065A	Intelsat 8 (PAS 8)	D	26.	p. 80
1998-068A	Bonum 1	D	265.	p. 96
1998-070A	Eutelsat 115 West A (SATMEX 5)	D	190.	p. 91
1998-075A	Intelsat 6B (PAS 6B)	D	299.	p. 99
1999-005A	Galaxy 26 (Intelsat Americas 6, IA 6, Telstar 6)	D	252.	p. 95
1999-006A	JCSAT 6	C2	79.	p. 73
1999-009A	Arabsat 3A	D	560.	p. 116
1999-009B	Skynet 4E	C2	147.	p. 77
1999-010A	Raduga 1-4	L1	78.	p. 138
1999-010D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	111.	p. 86
1999-013A	Asiasat 3S	C2	77.	p. 73
1999-016A	INSAT 2E (Intelsat APR-2)	D	440.	p. 108
1999-018A	Eutelsat 21A (Eutelsat W6, Eutelsat W3)	D	146.	p. 88
1999-027A	Nimiq	C1	284.	p. 62
1999-033A	Astra 1H	C2	133.	p. 76
1999-042A	Telkom 1	C1	106.	p. 50
1999-046A	ABS 7 (Mugungwha 3, Koreasat 3)	C1	165.	p. 54
1999-047A	Yamal 100 No. 1	D	492.	p. 111
1999-047B	Yamal 100 No. 2	D	522.	p. 113
1999-047E	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	D	555.	p. 116

COSPAR	Name	Status	nn	Page
1999-050A	Ciel 1 (EchoStar 5)	D	198.	p. 92
1999-052A	Galaxy 27 (Intelsat Americas 7, IA 7, Telstar 7)	D	261.	p. 96
1999-053A	LMI 1	C1	204.	p. 56
1999-056A	DirectTV 1R	D	242.	p. 95
1999-059A	Telstar 12 (Orion 2)	C2	104.	p. 75
1999-060A	GE 4	C1	223.	p. 57
1999-063A	USA 146 (UFO F10)	C2	34.	p. 70
1999-071A	Galaxy 11	C1	56.	p. 46
2000-001A	USA 148 (DSCS III F11, DSCS 3-11, DSCS III B-8)	C2	90.	p. 74
2000-001C	IABS (<i>Atlas IIA</i>)	D	665.	p. 123
2000-002A	Galaxy 10R	D	438.	p. 108
2000-003A	Chinasat 22 (Zhongxing 22, ZX 22, Feng Huo 1-1)	D	58.	p. 82
2000-007A	Hispasat 1C	D	320.	p. 100
2000-011A	Garuda 1	D	505.	p. 112
2000-012A	Superbird 4	C2	84.	p. 73
2000-013A	Ekspress 2A (Ekspress 6A)	D	128.	p. 87
2000-013D	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	D	627.	p. 121
2000-016A	Asiastar	C2	60.	p. 72
2000-016B	INSAT 3B	D	441.	p. 108
2000-019A	Eutelsat 16C (SESAT 1)	C2	6.	p. 68
2000-019D	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	D	419.	p. 107
2000-020A	Galaxy IVR	D	483.	p. 111
2000-022A	GOES 11	D	268.	p. 96
2000-024A	USA 149 (DSP F20, DSP Block 5(DSP-1) F20)	C2	95.	p. 74
2000-024D	<i>IUS second stage (IUS-22 SRM-2, Orbus 6E) (Titan IVB IUS)</i>	D	452.	p. 109
2000-024E	USA 149 debris (DSP F20 IR Sensor telescope sunshade cover)	D	453.	p. 109
2000-028A	Eutelsat 36A (Eutelsat W4)	C2	141.	p. 77
2000-029A	Gorizont 33	L3	10.	p. 146
2000-029B	<i>Briz-M (Proton-K/Briz-M)</i>	D	583.	p. 118
2000-031A	Ekspress 3A	D	203.	p. 92
2000-031D	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	D	390.	p. 105
2000-032A	Fengyun 2B	D	539.	p. 115
2000-032C	Fengyun 2B AKM (FG-36)	D	566.	p. 116
2000-034A	TDRS 8	C2	47.	p. 71
2000-036A	Cosmos-2371	L1	3.	p. 133
2000-036D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	571.	p. 117
2000-038A	Bermudasat 1 (EchoStar 6)	C2	112.	p. 75
2000-043A	Intelsat 9 (PAS 9)	C2	132.	p. 76
2000-046A	Brasilsat B4	C2	114.	p. 75
2000-046B	Nilesat 102	C2	144.	p. 77
2000-049A	Raduga 1-5	L1	65.	p. 137
2000-049D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	124.	p. 87
2000-052A	Eutelsat 4A (Eurobird 4A, Eutelsat W1)	D	121.	p. 87
2000-054A	Astra 2B	C2	136.	p. 77
2000-054B	GE 7	C1	222.	p. 57
2000-059A	GE 1A	C1	192.	p. 55
2000-060A	N-SAT-110	C1	152.	p. 53
2000-065A	USA 153 (DSCS III F12, DSCS 3-12, DSCS III B-11)	C4	3.	p. 78

COSPAR	Name	Status	nn	Page
2000-065C	<i>IABS (Atlas IIA)</i>	D	664.	p. 123
2000-066A	Thuraya 1	D	248.	p. 95
2000-067A	GE 6	C1	291.	p. 62
2000-068A	Intelsat 12 (PAS 12, Europe*Star 1)	C2	20.	p. 69
2000-069A	Beidou	D	232.	p. 94
2000-072A	Intelsat 1R (PAS 1R)	C2	83.	p. 73
2000-076A	Anik F1	C1	252.	p. 59
2000-080A	USA 155 (SDS 3 F2)	C2	62.	p. 72
2000-081A	Astra 2D	C2	27.	p. 69
2000-081B	GE 8 (Aurora 3)	C1	218.	p. 57
2000-082A	Beidou 1B	D	340.	p. 101
2001-002A	Turksat 2A (Eurasiasat 1)	D	125.	p. 87
2001-005A	SICRAL	C2	7.	p. 68
2001-005B	Skynet 4F	C2	130.	p. 76
2001-009A	USA 157 (Milstar-2 F2)	C2	63.	p. 72
2001-009B	<i>Centaur-T (Titan IVB Centaur-T)</i>	D	599.	p. 119
2001-011A	Eutelsat 33C (Eutelsat 28A, Eurobird 1)	C1	41.	p. 45
2001-011B	BSAT 2a	D	304.	p. 99
2001-012A	XM Radio 2 (Rock)	D	279.	p. 97
2001-014A	Ekran-M 21	D	425.	p. 107
2001-014C	<i>Briz-M (Proton-M/Briz-M)</i>	D	105.	p. 86
2001-015A	GSAT 1	D	739.	p. 129
2001-018A	XM Radio 1 (Roll)	D	258.	p. 96
2001-019A	Intelsat 10 (PAS 10)	C2	22.	p. 69
2001-020A	USA 158 (GeoLITE)	D	218.	p. 93
2001-024A	Intelsat 901	C1	346.	p. 66
2001-025A	Astra 2C	C2	28.	p. 69
2001-029A	Artemis	D	350.	p. 102
2001-031A	GOES 12	D	292.	p. 98
2001-033A	USA 159 (DSP F21, DSP Block 5(DSP-1) F21)	C2	70.	p. 72
2001-033D	<i>IUS second stage (IUS-16 SRM-2, Orbus 6E) (Titan IVB IUS)</i>	D	497.	p. 112
2001-033E	USA 159 debris (DSP F21 IR Sensor telescope sunshade cover)	U	5.	p. 157
2001-037A	Cosmos-2379	L1	105.	p. 140
2001-037D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	L1	84.	p. 138
2001-039A	Intelsat 902	C1	82.	p. 48
2001-042A	Eutelsat 12 West B (Eutelsat 8 West A, Atlantic Bird 2)	C1	351.	p. 66
2001-045A	Raduga 1-6	D	84.	p. 84
2001-045D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	L1	59.	p. 137
2001-046A	USA 162 (SDS 3 F3)	C2	131.	p. 76
2001-052A	DirecTV 4S	C1	264.	p. 60
2002-001A	USA 164 (Milstar-2 F3)	C2	9.	p. 68
2002-001B	<i>Centaur-T (Titan IVB Centaur-T)</i>	D	567.	p. 117
2002-002A	INSAT 3C	D	352.	p. 102
2002-006A	EchoStar 7	C1	236.	p. 58
2002-007A	Intelsat 904	C1	58.	p. 46
2002-011A	TDRS 9	C2	142.	p. 77
2002-015A	JCSAT 8	C2	50.	p. 71
2002-015B	Astra 3A	C2	125.	p. 76

COSPAR	Name	Status	nn	Page
2002-016A	Intelsat 903	C1	338.	p. 65
2002-019A	NSS 7	C2	135.	p. 77
2002-023A	DirecTV 5	C1	249.	p. 59
2002-027A	Intelsat 905	C1	344.	p. 66
2002-029A	Ekspress A1R (Express 4A)	C2	76.	p. 73
2002-029D	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	D	346.	p. 102
2002-030A	Galaxy 3C	C1	275.	p. 61
2002-035A	Eutelsat 5 West A (Atlantic Bird 3, Stellan 5)	C1	358.	p. 66
2002-035B	N-Star 3 (N-Star c)	C2	71.	p. 72
2002-038A	Eutelsat 33D (Eutelsat 8 West C, Hot Bird 6)	D	361.	p. 103
2002-039A	EchoStar 8	D	158.	p. 89
2002-040A	Eutelsat 12 West A (Atlantic Bird 1)	C1	333.	p. 65
2002-040B	Meteosat 8 (MSG 1)	C2	16.	p. 69
2002-040E	Meteosat 8 (MSG 1) operational debris (SEVIRI Cooler Cover)	D	662.	p. 123
2002-040F	Meteosat 8 (MSG 1) operational debris (SEVIRI Entry Baffle Cover)	D	707.	p. 126
2002-041A	Intelsat 906	C1	85.	p. 48
2002-042B	Kodama (DRTS)	D	347.	p. 102
2002-043A	KALPANA-1 (METSAT-1)	C2	36.	p. 70
2002-044A	Hispasat 1D	C1	339.	p. 65
2002-051A	Eutelsat 33B (Eutelsat 25C, Eutelsat 70A, Eutelsat W5)	L1	96.	p. 139
2002-055A	TDRS 10	C2	92.	p. 74
2002-057A	NSS 6	C1	130.	p. 51
2002-062A	Nimiq 2	C2	48.	p. 71
2003-007A	Intelsat 907	C1	342.	p. 65
2003-008A	USA 167 (DSCS III F13, DSCS 3-13, DSCS III A-3)	C2	99.	p. 74
2003-008C	IABS	D	653.	p. 123
2003-012A	USA 169 (Milstar-2 F4)	C2	100.	p. 74
2003-012B	<i>Centaur-T (Titan IVB Centaur-T)</i>	D	612.	p. 120
2003-013A	INSAT 3A	D	472.	p. 110
2003-013B	Galaxy XII	C1	227.	p. 58
2003-014A	Asiasat 4	C1	133.	p. 51
2003-015A	Cosmos-2397	D	595.	p. 118
2003-015F	<i>Blok-DM-2 (Proton-K/DM-2)</i>	L1	103.	p. 140
2003-018A	GSAT 2	D	488.	p. 111
2003-020A	Hellas Sat 2	C1	49.	p. 46
2003-021A	Beidou 3	D	463.	p. 110
2003-024A	AMC 9 (GE 12)	D	262.	p. 96
2003-026A	Thuraya 2	C2	17.	p. 69
2003-028A	BSAT 2c	D	319.	p. 100
2003-028B	Optus C1 (Defense C1)	C1	202.	p. 56
2003-033A	EchoStar 12 (Rainbow 1, Cablevision 1)	C1	285.	p. 62
2003-034A	EchoStar 9 (Galaxy 23, Intelsat Americas 13, Telstar 13)	C1	233.	p. 58
2003-040A	USA 170 (DSCS III F14, DSCS 3-14, DSCS III B-6)	C2	127.	p. 76
2003-040C	IABS	D	626.	p. 121
2003-041A	USA 171 (Advanced ORION 3)	C2	33.	p. 70
2003-041B	<i>Centaur-T (Titan IVB Centaur-T)</i>	D	636.	p. 121
2003-043A	Eutelsat 31A (Eutelsat 33A, Eurobird 3, eBird 1)	C2	13.	p. 68

COSPAR	Name	Status	nn	Page
2003-043E	INSAT 3E	D	632.	p. 121
2003-044A	Galaxy 13 / Horizons 1	C1	229.	p. 58
2003-052A	Chinasat 20 (Zhongxing 20, ZX 20, Shentong 1-1)	C2	21.	p. 69
2003-053A	Yamal 200 N2 (Yamal 202)	C1	65.	p. 47
2003-053B	Yamal 200 N1 (Yamal 201)	L1	30.	p. 135
2003-053E	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	D	531.	p. 114
2003-057A	USA 174 (UFO F11)	C2	37.	p. 70
2003-059A	AMOS 2	D	375.	p. 104
2003-060A	Ekspress-AM 22 (SESAT 2)	C2	41.	p. 70
2003-060D	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	L1	45.	p. 136
2004-001A	Estrela do Sul 1 (Telstar 14)	D	216.	p. 93
2004-003A	AMC 10 (GE 10)	C1	221.	p. 57
2004-004A	USA 176 (DSP F22, DSP Block 5(DSP-1) F22)	C2	31.	p. 70
2004-004D	<i>IUS second stage (IUS-10 SRM-2, Orbus 6E) (Titan IVB IUS)</i>	D	476.	p. 110
2004-007A	ABS 4 (Mobisat, ABS 2i, MBSat 1)	C1	81.	p. 48
2004-008A	Eutelsat 7A (Eutelsat W3A)	C1	8.	p. 43
2004-010A	Raduga 1	L1	100.	p. 139
2004-010F	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	546.	p. 115
2004-011A	Superbird A2 (Superbird 6)	D	394.	p. 105
2004-015A	Ekspress-AM 11	D	332.	p. 101
2004-015D	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	D	624.	p. 121
2004-016A	DirecTV 7S	C1	234.	p. 58
2004-017A	AMC 11 (GE 11)	C1	225.	p. 58
2004-022A	Intelsat 10-02 (Thor 10-02)	C1	362.	p. 67
2004-024A	Telstar 18 (APStar 5)	C1	184.	p. 55
2004-027A	Anik F2	C1	247.	p. 59
2004-031A	Amazonas	D	152.	p. 89
2004-036A	GSAT 3 (EDUSAT)	D	345.	p. 102
2004-041A	AMC 15	C1	255.	p. 60
2004-042A	Fengyun 2C	D	112.	p. 86
2004-042C	Fengyun 2C AKM (FG-36)	D	681.	p. 125
2004-042D	Fengyun 2C operational debris (S-VISSR radiometre cover)	L1	63.	p. 137
2004-043A	Ekspress-AM 1	D	317.	p. 100
2004-043D	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	D	554.	p. 116
2004-048A	AMC 16	C1	289.	p. 62
2005-003A	AMC 12	C1	332.	p. 65
2005-005A	XTAR-EUR	C1	36.	p. 45
2005-006A	Himawari 6 (MTSAT 1R)	D	234.	p. 94
2005-008A	XM Radio 3 (Rhythm)	C1	288.	p. 62
2005-009A	Inmarsat-4 F1	C2	74.	p. 73
2005-010A	Ekspress-AM 2	D	267.	p. 96
2005-010F	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	L1	60.	p. 137
2005-012A	Apstar 6	C1	183.	p. 55
2005-015A	Spaceway 1	C1	260.	p. 60
2005-019A	DirecTV 8	C1	267.	p. 60
2005-022A	Galaxy 28 (Intelsat Americas 8, IA 8, Telstar 8)	C1	281.	p. 61
2005-023A	Ekspress-AM 3	C1	140.	p. 52
2005-023H	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	633.	p. 121

COSPAR	Name	Status	nn	Page
2005-028A	Thaicom 4 (IPStar 1)	C1	168.	p. 54
2005-030A	Galaxy 14	C1	230.	p. 58
2005-036A	Anik F1R	C1	251.	p. 59
2005-041A	Galaxy 15	C1	224.	p. 58
2005-041B	Syracuse 3A	C1	60.	p. 47
2005-044A	Inmarsat-4 F2	C2	29.	p. 70
2005-046A	Telkom 2	C1	203.	p. 56
2005-046B	Spaceway 2	C1	270.	p. 61
2005-049A	INSAT 4A	C1	111.	p. 50
2005-049B	Meteosat 9 (MSG 2)	C2	4.	p. 68
2005-049E	Meteosat 9 (MSG 2) operational debris (SEVIRI Cooler Cover)	D	660.	p. 123
2005-049F	Meteosat 9 (MSG 2) operational debris (SEVIRI Entry Baffle Cover)	D	717.	p. 127
2005-052A	Eutelsat 172A (GE 23, AMC 23)	C1	211.	p. 57
2006-003A	EchoStar 10	C1	248.	p. 59
2006-004A	Himawari 7 (MTSAT 2)	C1	195.	p. 56
2006-007A	Spainsat	C1	340.	p. 65
2006-007B	Eutelsat 9A (Eutelsat 9A, Eurobird 9A, Hot Bird 7A)	C1	16.	p. 44
2006-010A	JCSAT 9	C1	182.	p. 55
2006-012A	Astra 1KR	C1	23.	p. 44
2006-018A	GOES N	C1	301.	p. 63
2006-020A	Eutelsat 113 West A (SATMEX 6, Morelos 4, Solidaridad 1R)	C1	245.	p. 59
2006-020B	Thaicom 5	C1	103.	p. 49
2006-022A	KAZSAT	D	331.	p. 101
2006-022D	<i>Blok-DM-2M (Proton-K/DM-2M)</i>	D	645.	p. 122
2006-023A	Galaxy 16	C1	271.	p. 61
2006-024A	USA 187 (MITEx OSC satellite)	D	172.	p. 90
2006-024B	USA 188 (MITEx Lockheed satellite)	D	222.	p. 93
2006-024C	USA 189 (NRL POTV)	D	743.	p. 129
2006-032A	Eutelsat Hot Bird 13B (Hot Bird 8)	C1	17.	p. 44
2006-033A	JCSAT 3A	C1	174.	p. 54
2006-033B	Syracuse 3B	C1	357.	p. 66
2006-034A	Mugunghwa 5 (Koreasat 5)	C1	159.	p. 53
2006-038A	Chinasat 22A (Zhongxing 22A, ZX 22A, Feng Huo 1-2)	C2	44.	p. 71
2006-043A	DirecTV 9S	C1	265.	p. 60
2006-043B	Optus D1	C1	206.	p. 56
2006-048A	Xinnuo 2	D	11.	p. 79
2006-049A	XM Radio 4 (Blues)	C1	241.	p. 59
2006-051A	Badr 4	C1	31.	p. 45
2006-053A	Fengyun 2D	C2	66.	p. 72
2006-053C	Fengyun 2D AKM (FG-36)	D	367.	p. 103
2006-053D	Fengyun 2D operational debris (S-VISSR radiometre cover)	L1	25.	p. 134
2006-054A	WildBlue 1	C1	246.	p. 59
2006-054B	AMC 18	C1	256.	p. 60
2006-056A	Measat 3	C1	123.	p. 51
2006-059A	Kiku 8 (ETS VIII)	D	256.	p. 96
2007-003A	Beidou 2A	D	298.	p. 98
2007-007A	INSAT 4B	C1	157.	p. 53

COSPAR	Name	Status	nn	Page
2007-007B	Skynet 5A	C1	132.	p. 51
2007-009A	Anik F3	C1	237.	p. 58
2007-016A	Astra 1L	C1	21.	p. 44
2007-016B	Galaxy 17	C1	280.	p. 61
2007-018A	NigComSat 1	L1	69.	p. 137
2007-021A	Eutelsat 8 West D (Eutelsat 3A, Chinasat 5C, Zhongxing 5C)	D	136.	p. 88
2007-031A	Chinasat 6B (Zhongxing 6B, ZX 6B)	C1	162.	p. 53
2007-032A	DirecTV 10	C1	261.	p. 60
2007-036A	Spaceway 3	C1	277.	p. 61
2007-036B	BSAT 3A	C1	150.	p. 53
2007-037A	INSAT 4CR	C1	63.	p. 47
2007-044A	Optus D2	C1	198.	p. 56
2007-044B	Intelsat 11 (IS 11, PAS 11)	C1	329.	p. 65
2007-046A	USA 195 (WGS SV-1)	C1	7.	p. 43
2007-054A	USA 197 (DSP F23, DSP Block 5(DSP-1) F23)	L1	112.	p. 140
2007-054B	<i>Delta IV DCSS 5 (Delta 4H)</i>	D	34.	p. 81
2007-056A	Star One C1	C1	311.	p. 63
2007-056B	Skynet 5B	C1	27.	p. 44
2007-057A	Sirius 4 (Astra 4A)	C1	5.	p. 43
2007-058A	Cosmos-2434 (Raduga-1M1)	D	378.	p. 104
2007-058C	<i>Briz-M (Proton-M/Briz-M)</i>	D	750.	p. 129
2007-063A	Rascom-QAF 1	D	276.	p. 97
2007-063B	Horizons 2	C1	115.	p. 50
2008-001A	Thuraya 3	C2	54.	p. 71
2008-003A	Ekspress-AM 33	C1	134.	p. 52
2008-003B	<i>Briz-M (Proton-M/Briz-M)</i>	D	742.	p. 129
2008-006A	Thor 2R	C1	364.	p. 67
2008-006C	<i>Briz-M (Proton-M/Briz-M)</i>	D	24.	p. 80
2008-007A	Kizuna (WINDS)	C2	73.	p. 72
2008-011A	AMC 14	C2	8.	p. 68
2008-013A	DirecTV 11	C1	269.	p. 61
2008-016A	EchoStar G1 (DBSD G1, ICO G1)	C2	113.	p. 75
2008-018A	VINASAT-1	C1	181.	p. 55
2008-018B	Star One C2	C1	307.	p. 63
2008-019A	Tian Lian 1-01	C2	40.	p. 70
2008-022A	AMOS 3	C1	359.	p. 67
2008-022B	<i>Blok-DM-SL-B (Zenit-3SLB)</i>	D	31.	p. 81
2008-024A	Galaxy 18	C1	232.	p. 58
2008-028A	Chinasat 9 (Zhongxing 9, ZX 9)	C1	126.	p. 51
2008-030A	Skynet 5C	C1	347.	p. 66
2008-030B	Turksat 3A	C1	52.	p. 46
2008-033A	Cosmos-2440	L1	10.	p. 133
2008-033D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	L1	29.	p. 135
2008-034A	Intelsat 25 (Protostar 1)	C1	337.	p. 65
2008-034B	Badr 6	C1	30.	p. 45
2008-035A	EchoStar 11	C1	250.	p. 59
2008-038A	Superbird C2	C1	193.	p. 55
2008-038B	AMC 21	C1	231.	p. 58

COSPAR	Name	Status	nn	Page
2008-039A	Inmarsat-4 F3	C2	111.	p. 75
2008-044A	Nimiq 4	C1	292.	p. 62
2008-045A	Galaxy 19	C1	273.	p. 61
2008-055A	Simon Bolivar	C1	295.	p. 62
2008-057A	Astra 1M	C1	20.	p. 44
2008-063A	Ciel 2	C1	228.	p. 58
2008-065A	Eutelsat Hot Bird 13C (Hot Bird 9)	C1	15.	p. 44
2008-065B	Eutelsat 48D / Afghansat 1 (Eutelsat 28B, Eutelsat W2M)	C1	64.	p. 47
2008-066A	Fengyun 2E	C2	46.	p. 71
2008-066C	Fengyun 2E AKM (FG-36)	D	712.	p. 127
2008-066D	Fengyun 2E operational debris (S-VISSR radiometre cover)	L1	92.	p. 139
2009-001A	USA 202 (NROL-26, ORION)	C2	18.	p. 69
2009-001B	<i>Delta IV DCSS 5 (Delta 4H)</i>	D	41.	p. 81
2009-007A	Ekspress-AM 44	C1	353.	p. 66
2009-007B	Ekspress MD-1	D	282.	p. 97
2009-007D	<i>Briz-M (Proton-M/Briz-M)</i>	D	73.	p. 83
2009-008A	NSS 9	C1	217.	p. 57
2009-008B	Eutelsat Hot Bird 13D (Eutelsat 3C, Atlantic Bird 4A)	C1	42.	p. 45
2009-009A	Telstar 11N	C1	331.	p. 65
2009-010A	Raduga 1	D	479.	p. 111
2009-010B	<i>Blok-DM-2 (Proton-K/DM-2)</i>	D	524.	p. 114
2009-016A	Eutelsat 10A (Eutelsat W2A)	C1	12.	p. 43
2009-017A	USA 204 (WGS SV-2)	C1	80.	p. 48
2009-018A	Beidou DW 2	L1	99.	p. 139
2009-020A	SICRAL 1B	C1	14.	p. 44
2009-027A	Indostar II/Protostar II	C1	146.	p. 52
2009-032A	Measat 3A	C1	125.	p. 51
2009-033A	GOES 14	C1	258.	p. 60
2009-034A	Sirius FM-5 (Radiosat 5)	C1	286.	p. 62
2009-035A	Terrestar 1	C2	103.	p. 74
2009-042A	Asiasat 5	C1	138.	p. 52
2009-044A	JCSAT 12 (JCSAT-RA)	C1	175.	p. 54
2009-044B	Optus D3	C1	201.	p. 56
2009-046A	Palapa D	C1	158.	p. 53
2009-047A	USA 207 (PAN)	C1	62.	p. 47
2009-050A	Nimiq 5	C1	304.	p. 63
2009-054A	Amazonas 2	C1	316.	p. 64
2009-054B	COMSATBw-1	C1	84.	p. 48
2009-058A	NSS 12	C1	76.	p. 48
2009-058B	Thor 6 (Intelsat 1W)	C1	363.	p. 67
2009-064A	Intelsat 14 (IS 14)	C1	326.	p. 64
2009-065A	Eutelsat 36B (Eutelsat W7)	C1	43.	p. 45
2009-067A	Intelsat 15 (IS 15)	C1	117.	p. 50
2009-068A	USA 211 (WGS SV-3)	C1	352.	p. 66
2009-075A	DirecTV 12	C1	262.	p. 60
2010-001A	Beidou DW 3	C1	186.	p. 55
2010-002A	Raduga 1M	C1	116.	p. 50
2010-002B	<i>Briz-M (Proton-M/Briz-M)</i>	D	745.	p. 129

COSPAR	Name	Status	nn	Page
2010-005A	SDO	I	4.	p. 154
2010-006A	Intelsat 16 (IS 16, PAS 11R)	C1	298.	p. 62
2010-006B	<i>Briz-M (Proton-M/Briz-M)</i>	D	1.	p. 79
2010-008A	GOES 15	C1	220.	p. 57
2010-010A	EchoStar 14	C1	235.	p. 58
2010-016A	SES-1	C1	266.	p. 60
2010-021A	Astra 3B	C1	26.	p. 44
2010-021B	COMSATBw-2	C1	18.	p. 44
2010-024A	Beidou DW 4	C1	155.	p. 53
2010-025A	Badr 5	C1	29.	p. 45
2010-032A	COMS 1 (Chollian)	C1	176.	p. 54
2010-032B	Arabsat 5A	C1	37.	p. 45
2010-034A	EchoStar 15	C1	313.	p. 63
2010-036A	Beidou DW 5	I	5.	p. 154
2010-037A	Nilesat 201	C1	356.	p. 66
2010-037B	RASCOM-QAF 1R	C1	3.	p. 43
2010-039A	USA 214 (AEHF 1)	C2	2.	p. 68
2010-042A	Chinasat 6A (Zhongxing 6A, ZX 6A, Sinosat 6, Xinnuo 6)	C1	172.	p. 54
2010-045A	Michibiki-1 (QZS-1)	I	6.	p. 154
2010-053A	Sirius XM-5	C1	287.	p. 62
2010-056B	BSAT 3B	C1	149.	p. 53
2010-057A	Beidou DW 6	C1	205.	p. 56
2010-061A	SkyTerra 1	C2	108.	p. 75
2010-063A	USA 223 (NROL-32, ORION)	C2	52.	p. 71
2010-063B	<i>Delta IV DCSS 5 (Delta 4H)</i>	D	744.	p. 129
2010-064A	Chinasat 20A (Zhongxing 20A, ZX 20A, Shentong 1-2)	C1	179.	p. 55
2010-065A	HYLAS 1	C1	336.	p. 65
2010-065B	Intelsat 17 (IS 17)	C1	87.	p. 48
2010-068A	Beidou DW 7	I	7.	p. 154
2010-069A	Eutelsat KA-SAT 9A (KA-SAT)	C1	10.	p. 43
2010-070A	Hispasat 1E	C1	341.	p. 65
2010-070B	Olleh 1 (Koreasat 6)	C1	164.	p. 54
2011-001A	Elektro-L No. 1	D	562.	p. 116
2011-001B	<i>Fregat-SB (Zenit-3F)</i>	D	725.	p. 128
2011-011A	USA 227 (NROL-27, SDS-3, QUASAR)	C2	97.	p. 74
2011-013A	Beidou DW 8	I	8.	p. 154
2011-016A	Intelsat 28 (New Dawn)	C1	40.	p. 45
2011-016B	Yahsat 1A	C1	69.	p. 47
2011-019A	USA 230 (SBIRS GEO-1)	C2	35.	p. 70
2011-021A	Telstar 14R (Estrela do Sul 2)	C1	312.	p. 63
2011-022A	GSAT 8	C1	74.	p. 48
2011-022B	ST-2	C1	120.	p. 51
2011-026A	Chinasat 10 (Zhongxing 10, ZX 10, Sinosat 5, Xinnuo 5)	C1	154.	p. 53
2011-032A	Tian Lian 1-02	C2	88.	p. 73
2011-034A	GSAT 12	C1	110.	p. 50
2011-035A	SES-3	C1	259.	p. 60
2011-035B	Kazsat-2	C1	118.	p. 50
2011-035D	<i>Briz-M (Proton-M/Briz-M)</i>	D	794.	p. 132

COSPAR	Name	Status	nn	Page
2011-038A	Beidou DW 9	I	9.	p. 154
2011-041A	Astra 1N	C1	22.	p. 44
2011-041B	BSAT 3c	C1	151.	p. 53
2011-042A	Paksat 1R	C1	47.	p. 46
2011-047A	Chinasat 1A (Zhongxing 1A, ZX 1A, Feng Huo 2-1)	C1	178.	p. 54
2011-048A	Cosmos-2473	C1	350.	p. 66
2011-048B	<i>Briz-M (Proton-M/Briz-M)</i>	D	748.	p. 129
2011-049A	SES-2	C1	283.	p. 61
2011-049B	Arabsat 5C	C1	24.	p. 44
2011-051A	Eutelsat 7 West A (Nilesat 104, Atlantic Bird 7)	C1	355.	p. 66
2011-054A	QuetzSat-1	C1	297.	p. 62
2011-056A	Intelsat 18 (IS 18)	C1	215.	p. 57
2011-057A	Eutelsat 16A (Eutelsat W3C)	C1	19.	p. 44
2011-059A	ViaSat-1	C1	242.	p. 59
2011-069A	Asiasat 7	C1	143.	p. 52
2011-073A	Beidou DW 10	I	10.	p. 154
2011-074A	AMOS 5	L1	97.	p. 139
2011-074B	Luch 5A	C2	85.	p. 73
2011-074C	<i>Briz-M (Proton-M/Briz-M)</i>	D	4.	p. 79
2011-077A	NigComSat 1R	C1	54.	p. 46
2012-002A	Fengyun 2F	C2	64.	p. 72
2012-002C	Fengyun 2F AKM (FG-36)	D	377.	p. 104
2012-002D	Fengyun 2F operational debris (S-VISSR radiometre cover)	D	580.	p. 117
2012-003A	USA 233 (WGS SV-4)	C1	121.	p. 51
2012-007A	SES-4	C1	345.	p. 66
2012-008A	Beidou DW 11	C1	78.	p. 48
2012-009A	MUOS 1	C2	91.	p. 74
2012-011A	Intelsat 22 (IS 22)	C1	92.	p. 49
2012-012A	Cosmos-2479	L3	9.	p. 146
2012-012D	<i>Blok-DM-2 (Proton-K/DM-2)</i>	L3	15.	p. 147
2012-013A	Apstar 7	C1	100.	p. 49
2012-016A	Yahsat 1B	C1	61.	p. 47
2012-019A	USA 235 (AEHF 2)	C2	120.	p. 76
2012-023A	JCSAT 13	C1	171.	p. 54
2012-023B	VINASAT-2	C1	180.	p. 55
2012-026A	Nimiq 6	C1	279.	p. 61
2012-028A	Chinasat 2A (Zhongxing 2A, ZX 2A, Shentong 2-1)	C1	137.	p. 52
2012-030A	Intelsat 19 (IS 19)	C1	209.	p. 57
2012-033A	USA 236 (NROL-38, SDS-3, QUASAR)	C2	143.	p. 77
2012-034A	USA 237 (NROL-15, ORION)	C2	26.	p. 69
2012-034B	<i>Delta IV DCSS 5 (Delta 4H)</i>	D	732.	p. 128
2012-035A	EchoStar 17	C1	254.	p. 60
2012-035B	Meteosat 10 (MSG 3)	C1	1.	p. 43
2012-035E	Meteosat 10 (MSG 3) operational debris (SEVIRI Cooler Cover)	D	692.	p. 125
2012-035F	Meteosat 10 (MSG 3) operational debris (SEVIRI Entry Baffle Cover)	D	724.	p. 128
2012-036A	SES-5	C1	6.	p. 43
2012-040A	Tian Lian 1-03	C1	13.	p. 43

COSPAR	Name	Status	nn	Page
2012-043A	Intelsat 20 (IS 20)	C1	89.	p. 49
2012-043B	HYLAS 2	C1	38.	p. 45
2012-045A	Intelsat 21 (IS 21)	C1	319.	p. 64
2012-051A	Astra 2F (Eutelsat 28F)	C1	34.	p. 45
2012-051B	GSAT 10	C1	109.	p. 50
2012-057A	Intelsat 23 (IS 23)	C1	322.	p. 64
2012-057B	<i>Briz-M (Proton-M/Briz-M)</i>	D	2.	p. 79
2012-059A	Beidou DW 16	C1	113.	p. 50
2012-061A	Luch 5B	C2	137.	p. 77
2012-061B	Yamal 300K	C1	216.	p. 57
2012-061D	<i>Briz-M (Proton-M/Briz-M)</i>	D	793.	p. 132
2012-062A	Star One C3	C1	300.	p. 63
2012-062B	Eutelsat 21B	C1	25.	p. 44
2012-065A	EchoStar 16	C1	315.	p. 64
2012-067A	Chinasat 15A (Zhongxing 15A, Chinasat 12, Zhongxing 12)	C1	119.	p. 51
2012-069A	Eutelsat 70B	C1	91.	p. 49
2012-070A	Yamal 402	C1	72.	p. 47
2012-075A	Skynet 5D	C1	70.	p. 47
2012-075B	Mexsat Bicentenario	C1	244.	p. 59
2013-004A	TDRS 11	C2	93.	p. 74
2013-006A	Amazonas 3	C1	317.	p. 64
2013-006B	Azerspace / Africasat-1a	C1	59.	p. 47
2013-011A	USA 241 (SBIRS GEO-2)	C2	10.	p. 68
2013-012A	Eutelsat 117 West A (SATMEX 8)	C1	239.	p. 59
2013-014A	Anik G1	C1	253.	p. 59
2013-020A	Chinasat 11 (Zhongxing 11, ZX 11, SupremeSat 2)	C1	136.	p. 52
2013-022A	Eutelsat 3D	C1	9.	p. 43
2013-024A	USA 243 (WGS SV-5)	C1	323.	p. 64
2013-026A	SES-6	C1	330.	p. 65
2013-034A	IRNSS-R1A	I	11.	p. 154
2013-036A	MUOS 2	C2	110.	p. 75
2013-038A	Alphasat	C2	11.	p. 68
2013-038B	INSAT 3D	C1	107.	p. 50
2013-041A	USA 244 (WGS SV-6)	C1	219.	p. 57
2013-044A	Eutelsat 25B / Es'hail 1	C1	28.	p. 44
2013-044B	GSAT 7	C1	95.	p. 49
2013-045A	AMOS 4	C1	86.	p. 48
2013-050A	USA 246 (AEHF SV-3)	C2	80.	p. 73
2013-056A	Astra 2E (Eutelsat 28E)	C1	35.	p. 45
2013-058A	Sirius FM-6 (Radiosat 6)	C1	240.	p. 59
2013-062A	Raduga 1M	C1	90.	p. 49
2013-062B	<i>Briz-M (Proton-M/Briz-M)</i>	D	747.	p. 129
2013-071A	SES-8	C1	131.	p. 51
2013-073A	Inmarsat-5 F1	C1	83.	p. 48
2013-075A	Tupac Katari (TKSat 1)	C1	282.	p. 61
2013-077A	Ekspress-AM 5	C1	187.	p. 55
2013-077B	<i>Briz-M (Proton-M/Briz-M)</i>	D	3.	p. 79
2014-001A	GSAT 14	C1	94.	p. 49

COSPAR	Name	Status	nn	Page
2014-002A	Thaicom 6	C1	101.	p. 49
2014-004A	TDRS 12	C2	128.	p. 76
2014-006A	ABS 2 (ST 3, Koreasat 8)	C1	98.	p. 49
2014-006B	ATHENA-FIDUS	C1	46.	p. 46
2014-007A	Turksat 4A	C1	53.	p. 46
2014-010A	Ekspress-AT1	C1	75.	p. 48
2014-010B	Ekspress-AT2	C1	185.	p. 55
2014-010C	<i>Briz-M (Proton-M/Briz-M)</i>	D	8.	p. 79
2014-011A	Amazonas 4A	C1	303.	p. 63
2014-011B	Astra 5B (HYLAS 2B)	C1	39.	p. 45
2014-017A	IRNSS-R1B	I	12.	p. 154
2014-020A	USA 250 (NROL-67)	C2	42.	p. 70
2014-023A	Luch 5V	C2	51.	p. 71
2014-023B	Kazsat-3	C1	77.	p. 48
2014-023C	<i>Briz-M (Proton-M/Briz-M)</i>	D	10.	p. 79
2014-027A	USA 252 (NROL-33)	C2	86.	p. 73
2014-030A	Eutelsat 3B	C1	4.	p. 43
2014-043A	USA 253 (GSSAP 1, AFSPC-4 F1)	C4	6.	p. 78
2014-043B	USA 254 (GSSAP 2, AFSPC-4 F2)	C4	4.	p. 78
2014-043C	USA 255 (ANGELS)	D	191.	p. 91
2014-043D	<i>Delta IV DCSS 4 (Delta 4M+(4,2))</i>	D	233.	p. 94
2014-046A	Asiasat 8	C1	360.	p. 67
2014-052A	Asiasat 6	C1	169.	p. 54
2014-054A	Optus 10	C1	208.	p. 56
2014-054B	Measat 3B	C1	124.	p. 51
2014-055A	USA 257 (CLIO)	C4	2.	p. 78
2014-058A	Luch	C1	48.	p. 46
2014-058B	<i>Briz-M (Proton-M/Briz-M)</i>	D	9.	p. 79
2014-060A	Himawari 8	C1	189.	p. 55
2014-061A	IRNSS-R1C	C2	43.	p. 70
2014-062A	Intelsat 30 (DLA 1, ISDLA 1)	C1	274.	p. 61
2014-062B	ARSAT-1	C1	305.	p. 63
2014-064A	Ekspress-AM 6	C1	71.	p. 47
2014-064B	<i>Briz-M (Proton-M/Briz-M)</i>	D	27.	p. 80
2014-078A	GSAT 16	C1	73.	p. 47
2014-078B	DirecTV 14	C1	268.	p. 60
2014-082A	Yamal 401	C1	122.	p. 51
2014-082B	<i>Briz-M (Proton-M/Briz-M)</i>	D	792.	p. 132
2014-085A	GVM/Briz-M	D	16.	p. 80
2014-089A	Astra 2G (Eutelsat 28G)	C1	33.	p. 45
2014-090A	Fengyun 2G	C2	59.	p. 72
2014-090C	Fengyun 2G AKM (FG-36)	D	424.	p. 107
2015-002A	MUOS 3	C2	139.	p. 77
2015-005A	Inmarsat-5 F2	C1	321.	p. 64
2015-010A	ABS 3A	C1	361.	p. 67
2015-010B	Eutelsat 115 West B	C1	243.	p. 59
2015-012A	Ekspress-AM 7	C1	51.	p. 46
2015-018A	IRNSS-R1D	I	13.	p. 154

COSPAR	Name	Status	nn	Page
2015-019A	Beidou DW 17	I	14.	p. 155
2015-022A	Thor 7	C1	365.	p. 67
2015-022B	SICRAL 2	C1	45.	p. 46
2015-023A	TurkmenAlem52E/MonacoSAT	C1	68.	p. 47
2015-026A	DirecTV 15	C1	263.	p. 60
2015-026B	SKY Mexico-1	C1	294.	p. 62
2015-034A	Meteosat 11 (MSG 4)	C2	146.	p. 77
2015-034B	Star One C4	C1	306.	p. 63
2015-034E	Meteosat 11 (MSG 4) operational debris (Cooler Cover)	D	695.	p. 125
2015-034F	Meteosat 11 (MSG 4) operational debris (SEVIRI Entry Baffle Cover)	D	722.	p. 127
2015-036A	USA 263 (WGS SV-7)	C1	213.	p. 57
2015-039A	Intelsat 34 (Hispasat 55W-2)	C1	320.	p. 64
2015-039B	Eutelsat 8 West B	C1	354.	p. 66
2015-041A	GSAT 6	C1	112.	p. 50
2015-042A	Inmarsat-5 F3	C1	214.	p. 57
2015-044A	MUOS 4	C2	38.	p. 70
2015-046A	TJS	C1	200.	p. 56
2015-048A	Ekspress-AM 8	C1	349.	p. 66
2015-048B	<i>Blok-DM-3 (Proton-M/DM-3)</i>	D	182.	p. 91
2015-053A	Beidou DW 20	I	15.	p. 155
2015-054A	Sky Muster	C1	188.	p. 55
2015-054B	ARSAT-2	C1	293.	p. 62
2015-056A	Morelos 3	C2	101.	p. 74
2015-059A	Apstar 9	C1	191.	p. 55
2015-060A	Turksat 4B	C1	66.	p. 47
2015-063A	Chinasat 2C (Zhongxing 2C, ZX 2C, Shentong 2-2)	C1	141.	p. 52
2015-065A	GSAT 15	C1	128.	p. 51
2015-065B	Badr 7	C1	32.	p. 45
2015-067A	LaoSat 1	C1	177.	p. 54
2015-068A	Telstar 12 Vantage (Telstar 12V)	C1	348.	p. 66
2015-073A	Chinasat 1C (Zhongxing 1C, ZX 1C, Feng Huo 2-2)	C1	105.	p. 50
2015-074A	Elektro-L No. 2	C1	99.	p. 49
2015-074B	<i>Fregat-SB (Zenit-3F)</i>	D	728.	p. 128
2015-075A	Cosmos-2513	C1	104.	p. 50
2015-075B	<i>Briz-M (Proton-M/Briz-M)</i>	D	752.	p. 129
2015-075D	Briz-M fragmentation debris	D	754.	p. 130
2015-075E	Briz-M fragmentation debris	D	758.	p. 130
2015-075F	Briz-M fragmentation debris	D	757.	p. 130
2015-075G	Briz-M fragmentation debris	D	751.	p. 129
2015-075H	Briz-M fragmentation debris	D	734.	p. 128
2015-075J	Briz-M fragmentation debris	D	714.	p. 127
2015-082A	Ekspress-AMU 1	C1	44.	p. 46
2015-083A	Gaofen 4	C1	144.	p. 52
2016-001A	BelinterSat-1	C1	67.	p. 47
2016-003A	IRNSS-R1E	I	16.	p. 155
2016-004A	Intelsat 29e (IS-29e)	C1	324.	p. 64
2016-005A	Eutelsat 9B	C1	11.	p. 43

COSPAR	Name	Status	nn	Page
2016-013A	SES-9	C1	147.	p. 52
2016-014A	Eutelsat 65 West A	C1	310.	p. 63
2016-015A	IRNSS-R1F	C2	14.	p. 69
2016-021A	Beidou DW 22	I	17.	p. 155
2016-027A	IRNSS-R1G	C2	69.	p. 72
2016-028A	JCSAT 2B	C1	199.	p. 56
2016-031A	Thaicom 8	C1	102.	p. 49
2016-035A	Intelsat 31 (DLA 2, ISDLA 2)	C1	276.	p. 61
2016-036A	USA 268 (NROL 37, ORION)	C2	61.	p. 72
2016-036B	<i>Delta IV DCSS 5 (Delta 4H)</i>	D	746.	p. 129
2016-037A	Beidou DW 23	C2	75.	p. 73
2016-038A	ABS 2A	C1	97.	p. 49
2016-038B	Eutelsat 117 West B	C1	238.	p. 58
2016-039A	BRISat	C1	197.	p. 56
2016-039B	EchoStar 18	C1	314.	p. 64
2016-041A	MUOS 5	C2	106.	p. 75
2016-047A	USA 269 (Quasar 20, SDS-4 1)	C2	56.	p. 71
2016-048A	Tiantong-1 01	C2	57.	p. 71
2016-050A	JCSAT 16	C1	207.	p. 56
2016-052A	USA 270	C4	7.	p. 78
2016-052B	USA 271	C4	5.	p. 78
2016-052C	<i>Delta IV DCSS 4 (Delta 4M+(4,2))</i>	D	249.	p. 95
2016-053A	Intelsat 36 (IS-36)	C1	88.	p. 48
2016-053B	Intelsat 33e (IS-33e)	C1	79.	p. 48
2016-054A	INSAT 3DR	C1	96.	p. 49
2016-060A	GSAT-18	C1	93.	p. 49
2016-060B	Sky Muster 2	C1	194.	p. 56
2016-064A	Himawari-9	C1	190.	p. 55
2016-065A	Shi Jian 17	C2	65.	p. 72
2016-065C	<i>Yuanzheng-2 (Long March (CZ) 5/YZ-2)</i>	D	12.	p. 79
2016-071A	GOES 16	C1	299.	p. 63
2016-072A	Tian Lian 1-04	C2	39.	p. 70
2016-075A	WGS SV-8	C4	1.	p. 78
2016-077A	Fengyun 4A	C1	142.	p. 52
2016-079A	Echostar 19	C1	272.	p. 61
2016-082A	JCSAT 15	C1	153.	p. 53
2016-082B	Star One D1	C1	290.	p. 62
2017-001A	TJS-2	C1	145.	p. 52
2017-004A	USA 273 (SBIRS GEO-3)	C2	72.	p. 72
2017-005A	Kirameki 2 (DSN-2)	C1	127.	p. 51
2017-006A	Hispasat 36W-1	C1	334.	p. 65
2017-007A	Telkom-3S	C1	167.	p. 54
2017-007B	SkyBrasil-1	C1	328.	p. 64
2017-014A	Echostar 23	C1	327.	p. 64
2017-016A	USA 275 (WGS SV-9)	C1	196.	p. 56
2017-017A	SES-10	C1	309.	p. 63
2017-018A	Shi Jian 13	C1	156.	p. 53
2017-023A	Koreasat 7	C1	163.	p. 53

COSPAR	Name	Status	nn	Page
2017-023B	SGDC-1	C1	302.	p. 63
2017-024A	South Asia Satellite	C1	135.	p. 52
2017-025A	Inmarsat 5F4	C1	166.	p. 54
2017-026A	SES-15	C1	226.	p. 58
2017-028A	Michibiki-2 (QZS-2)	I	18.	p. 155
2017-029A	ViaSat-2	C1	308.	p. 63
2017-029B	Eutelsat 172B	C1	212.	p. 57
2017-031A	GSAT-19E	C1	108.	p. 50
2017-032A	Echostar 21	C2	5.	p. 68
2017-035A	Zhongxing 9A	C1	139.	p. 52
2017-038A	BulgariaSat-1	C1	2.	p. 43
2017-040A	Hellas Sat 3-Inmarsat S EAN	C1	50.	p. 46
2017-040B	GSAT-17	C1	129.	p. 51
2017-041A	Intelsat 35e (IS-35e)	C1	335.	p. 65
2017-046A	Cosmos-2520	C1	57.	p. 46
2017-046C	<i>Briz-M (Proton-M/Briz-M)</i>	D	7.	p. 79
2017-047A	TDRS 13	C2	96.	p. 74
2017-048A	Michibiki-3 (QZS-3)	C1	173.	p. 54
2017-053A	Amazonas 5	C1	318.	p. 64
2017-057A	Asiasat 9	C1	170.	p. 54
2017-059A	Intelsat 37e (IS-37e)	C1	114.	p. 50
2017-059B	BSAT 4a	C1	148.	p. 52
2017-062A	Michibiki-4 (QZS-4)	I	19.	p. 155
2017-063A	SES-11	C1	257.	p. 60
2017-066A	USA 279 (NROL-52, SDS-3, QUASAR)	C2	49.	p. 71
2017-067A	Mugunghwa 5A	C1	160.	p. 53
2017-078A	Alcomsat 1	C1	343.	p. 65
2017-086A	Angosat 1	D	373.	p. 103
2017-086B	<i>Fregat-SB (Zenit-3F)</i>	D	141.	p. 88

4 Objects with Ephemeris

This section contains all objects for which a history of orbital data is available, enabling the determination of the status of such an object. Some of the categorized objects – mainly librating objects with such a small libration magnitude that the routine categorized them as controlled – needed some manual input. If so, the reference number is marked with an ^m.

The following symbols are used:

nn reference number, with the ones being outdated (i.e. epoch older than 180 days with respect to 1 January 2018) marked with _o,

COSPAR designation in COSPAR notation (see section 3 for detailed explanation),

Name object's common name (names); in case of a rocket body the name of the launch vehicle is appended in parentheses,

Type type of the object (PD: Payload Debris, PF: Payload Fragmentation Debris, PL: Payload, PM: Payload Mission Related Object, RB: Rocket Body, RF: Rocket Fragmentation Debris),

Source source of the orbital data (see section 2),

S-ID source internal identifier,

Orbit orbital class, found as a top-down cascade of matching the object's inclination, semi-major axis, eccentricity, perigee and/or apogee to the filters defining an orbital class (see table 1 for all the class definitions),

$f_{IADC}^{GEO} \in [0, 1]$ dwell time within GEO_{IADC} (see table 1 for the definition) as a fraction of the object's period, where (possibly multiple) crossings into and out of the protected region are found analytically assuming a closed orbit at the given epoch, and the dwell time being inferred from Kepler's second law; it is marked as '-' in case the object does not enter the protected region (i.e. $f_{IADC}^{GEO} = 0$) in order to distinguish it from objects very briefly entering (i.e. $f_{IADC}^{GEO} < 0.005$),

Date/Time epoch of the last available orbital data,

$\bar{\lambda}$ mean longitude of the satellite (in degrees East, ranging from 0 to 360 deg),

$\bar{\dot{\lambda}}$ mean drift of the satellite (in deg/days),

$\overline{\Delta a}$ difference between the satellite's mean semi-major axis and the geostationary semi-major axis (in km),

$\overline{\Delta r_p}$ perigee mean deviation from the geostationary altitude (in km),

$\overline{\Delta r_a}$ apogee mean deviation from the geostationary altitude (in km),

P_{lib} libration period (in days),

$\Delta\lambda$ libration magnitude (in degrees): $\Delta\lambda = \lambda_{max} - \lambda_{min}$

λ_{min} minimum longitude of the libration (in degrees East, ranging from 0 to 360 deg)

λ_{max} maximum longitude of the libration (in degrees East, ranging from 0 to 360 deg)

Frame coordinate frame in which the orbital elements are expressed in,

$a, e, i, \Omega, \omega, \lambda$ latest values of the satellite's semi-major axis (in km), eccentricity, inclination (in degrees), right-ascension of the ascending node (in degrees), argument of perigee (in degrees) and longitude (in degrees East, ranging from 0 to 360 deg)

4.1 Satellites under Longitude and Inclination Control (E-W and N-S Control)

The following list contains 365 satellites under longitude and inclination control, sorted according to the ascending order of the mean longitude.

For explanation of symbols, see the definitions at the beginning of section 4.

C1.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time
S-ID	Frame	a	e
		i	Ω
		ω	λ
C1.1^m	2012-035B	Meteosat 10 (MSG 3)	PL
TLEs	GEO (1.00)	2017-12-31	17:17:39.844
38552	TEME	42162.681	0.0002141 0.8540 17.3435 267.0288 0.2628
C1.2	2017-038A	BulgariaSat-1	PL
TLEs	GEO (1.00)	2017-12-31	17:10:48.026
42801	TEME	42164.778	0.0002555 0.0255 45.8271 236.9959 1.9809
C1.3	2010-037B	RASCOM-QAF 1R	PL
TLEs	GEO (1.00)	2017-12-31	17:06:38.947
36831	TEME	42165.388	0.0006387 0.0271 35.7357 248.5071 3.0254
C1.4	2014-030A	Eutelsat 3B	PL
TLEs	GEO (1.00)	2017-12-31	21:03:42.598
39773	TEME	42164.700	0.0003696 0.0681 37.7468 221.1389 3.1099
C1.5	2007-057A	Sirius 4 (Astra 4A)	PL
TLEs	GEO (1.00)	2017-12-31	19:30:39.712
32299	TEME	42164.499	0.0003149 0.0143 28.5519 252.0164 4.8539
C1.6	2012-036A	SES-5	PL
TLEs	GEO (1.00)	2017-12-31	18:20:54.139
38652	TEME	42164.749	0.0002411 0.0469 266.7274 14.8708 5.0000
C1.7	2007-046A	USA 195 (WGS SV-1)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI152	J2000	42167.650	0.0000176 0.1370 80.9357 28.8540 6.0060
C1.8	2004-008A	Eutelsat 7A (Eutelsat W3A)	PL
TLEs	GEO (1.00)	2017-12-31	19:30:39.712
28187	TEME	42164.605	0.0004776 0.0630 18.5623 247.4149 7.0387
C1.9	2013-022A	Eutelsat 3D	PL
TLEs	GEO (1.00)	2017-12-31	16:50:39.558
39163	TEME	42164.587	0.0005140 0.0464 37.9738 290.2225 7.0310
C1.10	2010-069A	Eutelsat KA-SAT 9A (KA-SAT)	PL
TLEs	GEO (1.00)	2017-12-31	16:42:27.849
37258	TEME	42165.641	0.0004492 0.0235 312.2444 346.9358 9.0877
C1.11	2016-005A	Eutelsat 9B	PL
TLEs	GEO (1.00)	2017-12-31	16:42:34.657
41310	TEME	42164.684	0.0006051 0.0592 89.7043 198.4438 9.0571
C1.12	2009-016A	Eutelsat 10A (Eutelsat W2A)	PL
TLEs	GEO (1.00)	2017-12-31	20:16:42.645
34710	TEME	42164.842	0.0005099 0.0622 9.3839 274.8306 10.0264
C1.13	2012-040A	Tian Lian 1-03	PL
TLEs	GEO (1.00)	2017-12-31	16:36:04.745
38730	TEME	42163.827	0.0001888 0.0259 246.8786 16.4984 10.6868

C1.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		e	
		i	
		Ω	
		ω	
C1.14	2009-020A	SICRAL 1B	PL
KIAM	GEO (1.00)	2018-01-01	11.73
UI179	J2000	42167.336	11.7330
		0.0002846	
		0.1736	
		88.4427	
		135.4601	
C1.15	2008-065A	Eutelsat Hot Bird 13C (Hot Bird 9)	PL
TLEs	GEO (1.00)	2017-12-31	12.99
33459	TEME	42164.527	13.0433
		0.0002234	
		0.0793	
		67.2773	
		210.4338	
C1.16	2006-007B	Eutelsat 9A (Eutelsat 9A, Eurobird 9A, Hot Bird 7A)	PL
TLEs	GEO (1.00)	2017-12-31	13.00
28946	TEME	42164.468	13.0430
		0.0004872	
		0.0475	
		144.9895	
		114.2441	
C1.17	2006-032A	Eutelsat Hot Bird 13B (Hot Bird 8)	PL
TLEs	GEO (1.00)	2017-12-31	13.00
29270	TEME	42164.525	13.0490
		0.0005068	
		0.0621	
		18.5599	
		274.5965	
C1.18	2010-021B	COMSATBw-2	PL
TLEs	GEO (1.00)	2017-12-31	13.20
36582	TEME	42164.382	13.2160
		0.0002772	
		0.0128	
		359.4613	
		297.4780	
C1.19	2011-057A	Eutelsat 16A (Eutelsat W3C)	PL
TLEs	GEO (1.00)	2017-12-31	15.95
37836	TEME	42163.844	16.0619
		0.0005003	
		0.0636	
		21.1481	
		267.3566	
C1.20	2008-057A	Astra 1M	PL
TLEs	GEO (1.00)	2017-12-31	19.19
33436	TEME	42164.783	19.1618
		0.0002156	
		0.0284	
		91.6804	
		138.4263	
C1.21	2007-016A	Astra 1L	PL
TLEs	GEO (1.00)	2017-12-31	19.20
31306	TEME	42165.582	19.2452
		0.0005574	
		0.0726	
		303.0623	
		345.0726	
C1.22	2011-041A	Astra 1N	PL
TLEs	GEO (1.00)	2017-12-31	19.21
37775	TEME	42164.496	19.2432
		0.0002984	
		0.0463	
		28.5023	
		306.4837	
C1.23^m	2006-012A	Astra 1KR	PL
TLEs	GEO (1.00)	2017-12-31	19.22
29055	TEME	42165.648	19.2213
		0.0005316	
		0.0619	
		274.7030	
		343.6268	
C1.24	2011-049B	Arabsat 5C	PL
TLEs	GEO (1.00)	2017-12-31	19.99
37810	TEME	42164.223	20.0173
		0.0002739	
		0.0620	
		22.0531	
		258.4157	
C1.25	2012-062B	Eutelsat 21B	PL
TLEs	GEO (1.00)	2017-12-31	21.59
38992	TEME	42164.337	21.6002
		0.0002282	
		0.0636	
		20.6064	
		270.0108	
C1.26	2010-021A	Astra 3B	PL
TLEs	GEO (1.00)	2017-12-31	23.50
36581	TEME	42164.532	23.4749
		0.0002792	
		0.0279	
		3.9172	
		276.3621	
C1.27	2007-056B	Skynet 5B	PL
TLEs	GEO (1.00)	2017-12-31	24.73
32294	TEME	42164.896	25.0615
		0.0004045	
		0.0675	
		2.4760	
		279.4514	
C1.28	2013-044A	Eutelsat 25B / Es'hail 1	PL
TLEs	GEO (1.00)	2017-12-31	25.49
39233	TEME	42165.001	25.4982
		0.0002067	
		0.0540	
		41.1333	
		246.4234	

C1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C1.29	2010-025A	Badr 5					PL
TLEs	GEO (1.00)	2017-12-31	18:46:39.651				26.00
36592	TEME	42164.482	0.0003029	0.0154	92.4919	148.0579	25.9915
C1.30	2008-034B	Badr 6					PL
TLEs	GEO (1.00)	2017-12-31	18:46:39.651				26.00
33154	TEME	42164.343	0.0003352	0.0652	47.2298	276.1722	26.0324
C1.31	2006-051A	Badr 4					PL
TLEs	GEO (1.00)	2017-12-31	22:06:39.674				26.00
29526	TEME	42165.251	0.0005832	0.0517	334.0071	321.9230	26.0076
C1.32	2015-065B	Badr 7					PL
TLEs	GEO (1.00)	2017-12-31	15:34:50.585				26.03
41029	TEME	42165.052	0.0005354	0.0567	250.5313	2.5395	26.0372
C1.33	2014-089A	Astra 2G (Eutelsat 28G)					PL
TLEs	GEO (1.00)	2017-12-31	15:26:13.950				28.18
40364	TEME	42164.681	0.0001755	0.0269	1.8908	8.8148	28.1974
C1.34	2012-051A	Astra 2F (Eutelsat 28F)					PL
TLEs	GEO (1.00)	2017-12-31	15:26:05.514				28.21
38778	TEME	42164.553	0.0004221	0.0728	234.3634	18.2439	28.2307
C1.35	2013-056A	Astra 2E (Eutelsat 28E)					PL
TLEs	GEO (1.00)	2017-12-31	15:25:01.473				28.44
39285	TEME	42165.044	0.0002267	0.0531	10.3786	267.9142	28.4982
C1.36	2005-005A	XTAR-EUR					PL
TLEs	GEO (1.00)	2017-12-31	15:22:51.617				29.01
28542	TEME	42165.329	0.0003257	0.0489	91.6346	195.6919	29.0412
C1.37	2010-032B	Arabsat 5A					PL
TLEs	GEO (1.00)	2017-12-31	22:06:39.674				30.50
36745	TEME	42165.172	0.0003010	0.0495	4.4474	275.4241	30.4773
C1.38	2012-043B	HYLAS 2					PL
TLEs	GEO (1.00)	2017-12-31	15:14:51.158				31.01
38741	TEME	42164.900	0.0002035	0.0171	32.5920	246.3524	31.0467
C1.39	2014-011B	Astra 5B (HYLAS 2B)					PL
TLEs	GEO (1.00)	2017-12-31	22:06:39.674				31.52
39617	TEME	42163.793	0.0003406	0.0379	331.5667	292.5796	31.5335
C1.40	2011-016A	Intelsat 28 (New Dawn)					PL
TLEs	GEO (1.00)	2017-12-31	22:06:39.674				32.82
37392	TEME	42165.104	0.0000917	0.0064	302.8324	313.1677	32.8052
C1.41	2001-011A	Eutelsat 33C (Eutelsat 28A, Europesat 1, Eurobird 1)					PL
TLEs	GEO (1.00)	2017-12-31	22:06:39.674				33.10
26719	TEME	42165.059	0.0005823	0.0583	6.8317	287.5533	33.0898
C1.42	2009-008B	Eutelsat Hot Bird 13D (Eutelsat 3C, Atlantic Bird 4A)					PL
TLEs	GEO (1.00)	2017-12-31	22:06:39.674				33.11
33750	TEME	42164.876	0.0005025	0.0227	12.9996	245.8213	33.0661
C1.43	2009-065A	Eutelsat 36B (Eutelsat W7)					PL
TLEs	GEO (1.00)	2017-12-31	22:05:39.675				35.98
36101	TEME	42165.459	0.0004733	0.0622	7.5794	278.3540	35.9108

C1.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		Time	
		e	
		i	
		Ω	
		ω	
C1.44	2015-082A	Ekspress-AMU 1	PL
TLEs	GEO (1.00)	2017-12-31 22:45:16.589	36.10
41191	TEME	42165.243 0.0002069 0.0007 319.1558 282.1122	36.0761
C1.45	2015-022B	SICRAL 2	PL
KIAM	GEO (1.00)	2018-01-01 00:00:00.000	36.99
UI190	J2000	42165.059 0.0001921 0.1274 78.2708 215.9883	36.9880
C1.46	2014-006B	ATHENA-FIDUS	PL
TLEs	GEO (1.00)	2017-12-31 14:47:52.872	37.81
39509	TEME	42165.000 0.0001425 0.0093 55.4262 225.6735	37.8112
C1.47	2011-042A	Paksat 1R	PL
TLEs	GEO (1.00)	2017-12-31 21:00:42.610	37.99
37779	TEME	42165.435 0.0003923 0.0434 193.2907 95.5845	38.0031
C1.48	2014-058A	Luch	PL
TLEs	GEO (1.00)	2017-12-31 16:44:00.360	38.10
40258	TEME	42163.894 0.0001919 0.0445 135.5308 163.3542	38.1434
C1.49	2003-020A	Hellas Sat 2	PL
TLEs	GEO (1.00)	2017-12-31 21:15:46.372	39.00
27811	TEME	42165.371 0.0006082 0.0592 203.3848 57.8267	38.9735
C1.50	2017-040A	Hellas Sat 3-Inmarsat S EAN	PL
TLEs	GEO (1.00)	2017-12-31 14:43:04.761	39.01
42814	TEME	42164.824 0.0003256 0.0832 77.6677 247.7494	39.0144
C1.51	2015-012A	Ekspress-AM 7	PL
TLEs	GEO (1.00)	2017-12-31 23:37:39.684	40.00
40505	TEME	42164.287 0.0002416 0.0007 126.9978 128.7213	39.9731
C1.52	2008-030B	Turksat 3A	PL
TLEs	GEO (1.00)	2017-12-31 21:58:39.705	42.00
33056	TEME	42164.569 0.0003132 0.0676 88.0041 184.2277	41.9678
C1.53	2014-007A	Turksat 4A	PL
TLEs	GEO (1.00)	2017-12-31 14:30:52.960	42.02
39522	TEME	42165.436 0.0005386 0.0654 271.9901 4.9071	42.0727
C1.54	2011-077A	NigComSat 1R	PL
TLEs	GEO (1.00)	2017-12-31 21:58:39.705	42.50
38014	TEME	42164.347 0.0001533 0.0496 200.1774 108.7959	42.4957
C1.55	1996-021A	Astra 1F	PL
TLEs	GEO (1.00)	2017-12-31 21:58:39.705	44.93
23842	TEME	42165.350 0.0004115 0.0413 41.2796 235.3415	44.2666
C1.56	1999-071A	Galaxy 11	PL
TLEs	GEO (1.00)	2017-12-31 21:58:39.705	44.95
26038	TEME	42164.989 0.0000854 0.1087 95.0514 224.9697	44.9010
C1.57	2017-046A	Cosmos-2520	PL
TLEs	GEO (1.00)	2017-12-31 02:59:13.892	45.03
42907	TEME	42164.454 0.0000778 0.0394 165.3378 262.3448	45.0070
C1.58	2002-007A	Intelsat 904	PL
TLEs	GEO (1.00)	2017-12-31 21:58:39.705	45.10
27380	TEME	42165.071 0.0003092 0.0182 43.1089 240.8744	45.0921

C1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C1.59	2013-006B	Azerspace / Africasat-1a					PL
TLEs	GEO (1.00)	2017-12-31	14:15:10.152				46.00
39079	TEME	42164.664	0.0002428	0.0180	73.0332	228.2365	46.0086
C1.60	2005-041B	Syracuse 3A					PL
TLEs	GEO (1.00)	2017-12-31	21:58:39.705				47.00
28885	TEME	42164.483	0.0002661	0.0413	64.3218	228.7771	46.9484
C1.61	2012-016A	Yahsat 1B					PL
TLEs	GEO (1.00)	2017-12-31	14:08:39.140				47.61
38245	TEME	42165.380	0.0001890	0.0228	18.6322	266.7094	47.6430
C1.62	2009-047A	USA 207 (PAN)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000				47.65
UI158	J2000	42164.716	0.0007535	0.0664	54.0151	238.7198	47.6490
C1.63	2007-037A	INSAT 4CR					PL
TLEs	GEO (1.00)	2017-12-31	21:58:39.705				47.86
32050	TEME	42164.472	0.0003694	0.0112	17.5177	260.2978	47.8760
C1.64	2008-065B	Eutelsat 48D / Afghansat 1 (Eutelsat 28B, Eutelsat W2M)					PL
TLEs	GEO (1.00)	2017-12-31	21:58:39.705				48.10
33460	TEME	42164.474	0.0002619	0.0453	21.9668	260.6006	48.1034
C1.65	2003-053A	Yamal 200 N2 (Yamal 202)					PL
TLEs	GEO (1.00)	2017-12-31	21:58:39.703				48.99
28089	TEME	42164.972	0.0004159	0.0549	93.2733	187.3849	48.9572
C1.66	2015-060A	Turksat 4B					PL
TLEs	GEO (1.00)	2017-12-31	13:59:14.656				50.00
40984	TEME	42165.436	0.0002289	0.0173	0.1340	278.4916	50.0029
C1.67	2016-001A	BelinterSat-1					PL
TLEs	GEO (1.00)	2017-12-31	21:58:39.703				51.49
41238	TEME	42165.250	0.0001391	0.0435	101.3518	138.0091	51.4683
C1.68	2015-023A	TurkmenAlem52E/MonacoSAT					PL
TLEs	GEO (1.00)	2017-12-31	13:51:06.435				51.89
40617	TEME	42164.616	0.0002400	0.0204	62.7638	227.9068	52.0419
C1.69	2011-016B	Yahsat 1A					PL
TLEs	GEO (1.00)	2017-12-31	21:58:39.705				52.50
37393	TEME	42164.938	0.0002659	0.0178	349.5764	268.5242	52.4925
C1.70	2012-075A	Skynet 5D					PL
TLEs	GEO (1.00)	2017-12-31	21:58:39.705				52.74
39034	TEME	42164.737	0.0004383	0.0681	7.6558	268.7778	52.7208
C1.71	2014-064A	Ekspress-AM 6					PL
TLEs	GEO (1.00)	2017-12-31	21:58:39.705				52.95
40277	TEME	42165.179	0.0000344	0.0465	200.2855	142.5162	52.9981
C1.72	2012-070A	Yamal 402					PL
TLEs	GEO (1.00)	2017-12-31	22:39:33.736				54.89
39022	TEME	42164.839	0.0003045	0.0067	23.1838	256.7751	54.8824
C1.73	2014-078A	GSAT 16					PL
TLEs	GEO (1.00)	2017-12-31	13:39:15.260				55.01
40332	TEME	42164.272	0.0002231	0.0400	97.8099	350.5850	55.0128

C1.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		e	
		i	
		Ω	
		ω	
C1.74	2011-022A	GSAT 8	PL
TLEs	GEO (1.00)	2017-12-31	21:51:42.636
37605	TEME	42165.100	0.0008126 0.0742 100.1420 175.6381
			55.05
			55.0370
C1.75	2014-010A	Ekspress-AT1	PL
TLEs	GEO (1.00)	2017-12-31	22:39:33.736
39612	TEME	42164.586	0.0000502 0.0366 199.4333 170.7012
			56.01
			56.0006
C1.76	2009-058A	NSS 12	PL
TLEs	GEO (1.00)	2017-12-31	13:31:13.377
36032	TEME	42164.364	0.0002505 0.0151 25.6217 268.0735
			57.00
			57.0264
C1.77	2014-023B	Kazsat-3	PL
TLEs	GEO (1.00)	2017-12-31	13:25:19.479
39728	TEME	42165.098	0.0000799 0.0103 19.2095 305.5123
			58.51
			58.5055
C1.78^m	2012-008A	Beidou DW 11	PL
TLEs	GEO (1.00)	2017-12-31	22:39:46.737
38091	TEME	42164.748	0.0005920 1.9948 59.2316 233.3408
			58.66
			58.6556
C1.79	2016-053B	Intelsat 33e (IS-33e)	PL
TLEs	GEO (1.00)	2017-12-31	13:19:16.222
41748	TEME	42165.018	0.0002323 0.0170 32.3433 246.8487
			59.95
			60.0221
C1.80	2009-017A	USA 204 (WGS SV-2)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI156	J2000	42164.285	0.0000740 0.1076 76.3931 261.3994
			60.20
			60.2010
C1.81^m	2004-007A	ABS 4 (Mobisat, ABS 2i, MBSat 1)	PL
TLEs	GEO (1.00)	2017-12-31	21:51:42.636
28184	TEME	42164.914	0.0002208 0.0150 311.9846 324.5703
			60.98
			60.9823
C1.82	2001-039A	Intelsat 902	PL
TLEs	GEO (1.00)	2017-12-31	21:51:42.636
26900	TEME	42164.369	0.0003154 0.0367 64.4080 238.1854
			62.00
			61.9696
C1.83	2013-073A	Inmarsat-5 F1	PL
TLEs	GEO (1.00)	2017-12-31	19:42:55.419
39476	TEME	42164.883	0.0000767 0.0038 95.2752 185.5392
			62.61
			62.5980
C1.84	2009-054B	COMSATBw-1	PL
TLEs	GEO (1.00)	2017-12-31	21:51:42.636
35943	TEME	42165.160	0.0003013 0.0583 60.6090 226.9078
			63.00
			62.9363
C1.85	2002-041A	Intelsat 906	PL
TLEs	GEO (1.00)	2017-12-31	19:42:42.420
27513	TEME	42164.789	0.0003505 0.0303 75.9615 243.7934
			64.15
			64.1531
C1.86	2013-045A	AMOS 4	PL
TLEs	GEO (1.00)	2017-12-31	12:59:17.803
39237	TEME	42164.516	0.0002214 0.0477 104.9205 201.3860
			65.01
			65.0315
C1.87	2010-065B	Intelsat 17 (IS 17)	PL
TLEs	GEO (1.00)	2017-12-31	21:50:57.637
37238	TEME	42164.521	0.0002718 0.0199 243.8529 43.5211
			65.98
			65.9817
C1.88	2016-053A	Intelsat 36 (IS-36)	PL
TLEs	GEO (1.00)	2017-12-31	12:45:22.145
41747	TEME	42164.921	0.0002477 0.0110 10.2504 298.9761
			68.51
			68.5203

C1.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time					λ
S-ID	Frame	a	e	i	Ω	ω		λ
C1.89	2012-043A	Intelsat 20 (IS 20)						PL
TLEs	GEO (1.00)	2017-12-31	12:45:27.075					68.51
38740	TEME	42164.647	0.0002665	0.0245	98.1911	91.4954		68.4995
C1.90	2013-062A	Raduga 1M						PL
TLEs	GEO (1.00)	2017-12-31	01:43:39.656					70.01
39375	TEME	42164.746	0.0003814	0.0249	87.0239	207.5157		69.9618
C1.91	2012-069A	Eutelsat 70B						PL
TLEs	GEO (1.00)	2017-12-31	12:37:23.951					70.50
39020	TEME	42164.778	0.0003071	0.0573	0.5105	271.9336		70.5217
C1.92^m	2012-011A	Intelsat 22 (IS 22)						PL
TLEs	GEO (1.00)	2017-12-31	12:31:00.206					72.12
38098	TEME	42164.597	0.0002254	0.0161	24.3388	256.8902		72.1219
C1.93	2016-060A	GSAT-18						PL
TLEs	GEO (1.00)	2017-12-31	12:23:42.154					73.93
41793	TEME	42164.753	0.0002910	0.0665	96.0550	349.1041		73.9521
C1.94	2014-001A	GSAT 14						PL
TLEs	GEO (1.00)	2017-12-31	12:23:24.258					73.99
39498	TEME	42165.042	0.0001288	0.0185	266.9708	24.5135		74.0272
C1.95	2013-044B	GSAT 7						PL
TLEs	GEO (1.00)	2017-12-31	12:23:19.041					74.04
39234	TEME	42165.018	0.0005645	0.0467	265.5926	19.0745		74.0478
C1.96	2016-054A	INSAT 3DR						PL
TLEs	GEO (1.00)	2017-12-31	12:23:03.188					74.10
41752	TEME	42165.276	0.0009626	0.0712	272.8884	3.7059		74.1145
C1.97	2016-038A	ABS 2A						PL
TLEs	GEO (1.00)	2017-12-31	12:20:21.054					74.75
41588	TEME	42164.988	0.0001808	0.0193	67.2820	137.9153		74.7919
C1.98	2014-006A	ABS 2 (ST 3, Koreasat 8)						PL
TLEs	GEO (1.00)	2017-12-31	12:19:43.927					74.92
39508	TEME	42164.637	0.0003375	0.0252	4.6485	299.9627		74.9504
C1.99^m	2015-074A	Elektro-L No. 2						PL
TLEs	GEO (1.00)	2017-12-31	20:45:39.748					76.00
41105	TEME	42164.541	0.0001367	0.0278	288.5399	319.9434		76.0015
C1.100	2012-013A	Apstar 7						PL
TLEs	GEO (1.00)	2017-12-31	21:46:42.569					76.50
38107	TEME	42164.726	0.0002376	0.0299	38.2761	242.3433		76.4984
C1.101	2014-002A	Thaicom 6						PL
TLEs	GEO (1.00)	2017-12-31	21:43:39.666					78.50
39500	TEME	42165.000	0.0001434	0.0673	126.2556	88.0170		78.5019
C1.102	2016-031A	Thaicom 8						PL
TLEs	GEO (1.00)	2017-12-31	12:05:28.487					78.50
41552	TEME	42165.298	0.0004385	0.0699	51.5286	274.9743		78.5227
C1.103	2006-020B	Thaicom 5						PL
TLEs	GEO (1.00)	2017-12-31	21:43:39.666					78.50
29163	TEME	42165.193	0.0006438	0.0184	43.8263	240.4885		78.4763

C1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C1.104	2015-075A	Cosmos-2513					PL
TLEs	GEO (1.00)	2017-12-31	19:37:08.175				80.25
41121	TEME	42165.055	0.0002516	0.1047	99.4227	187.6712	80.2342
C1.105	2015-073A	Chinasat 1C (Zhongxing 1C, ZX 1C, Feng Huo 2-2)					PL
TLEs	GEO (1.00)	2017-12-31	21:12:33.344				81.51
41103	TEME	42164.932	0.0003616	0.0508	138.0564	140.6836	81.4471
C1.106^m	1999-042A	Telkom 1					PL
TLEs	GEO (1.00)	2017-12-31	20:22:42.640				81.79
25880	TEME	42172.085	0.0026152	0.2564	96.1956	176.7665	81.7926
C1.107	2013-038B	INSAT 3D					PL
TLEs	GEO (1.00)	2017-12-31	11:51:06.436				82.09
39216	TEME	42165.060	0.0001810	0.0697	281.0472	9.4023	82.1245
C1.108	2017-031A	GSAT-19E					PL
TLEs	GEO (1.00)	2017-12-31	11:49:25.713				82.52
42747	TEME	42164.914	0.0003672	0.0495	97.8983	193.9643	82.5461
C1.109	2012-051B	GSAT 10					PL
TLEs	GEO (1.00)	2017-12-31	11:47:32.256				82.99
38779	TEME	42165.347	0.0001968	0.0401	89.1054	191.7064	83.0183
C1.110	2011-034A	GSAT 12					PL
TLEs	GEO (1.00)	2017-12-31	21:43:39.666				83.00
37746	TEME	42165.280	0.0003413	0.0327	267.2573	205.1564	83.0151
C1.111	2005-049A	INSAT 4A					PL
TLEs	GEO (1.00)	2017-12-31	11:47:16.748				83.02
28911	TEME	42164.954	0.0006962	0.0667	104.4937	170.5941	83.0849
C1.112	2015-041A	GSAT 6					PL
TLEs	GEO (1.00)	2017-12-31	11:47:02.716				83.10
40880	TEME	42164.742	0.0010186	0.0956	276.4989	354.5838	83.1434
C1.113^m	2012-059A	Beidou DW 16					PL
TLEs	GEO (1.00)	2017-12-31	23:55:50.455				83.94
38953	TEME	42165.920	0.0004062	1.5065	80.7969	192.9539	83.9404
C1.114	2017-059A	Intelsat 37e (IS-37e)					PL
TLEs	GEO (1.00)	2017-12-31	18:13:42.615				84.57
42950	TEME	42164.426	0.0001168	0.0479	81.3047	225.9981	84.6073
C1.115	2007-063B	Horizons 2					PL
TLEs	GEO (1.00)	2017-12-31	21:36:39.756				84.85
32388	TEME	42164.752	0.0003173	0.0138	48.5405	240.0072	84.8364
C1.116	2010-002A	Raduga 1M					PL
TLEs	GEO (1.00)	2017-12-31	21:36:39.756				85.00
36358	TEME	42165.250	0.0003431	0.0165	342.9498	331.6206	84.9858
C1.117	2009-067A	Intelsat 15 (IS 15)					PL
TLEs	GEO (1.00)	2017-12-31	20:22:42.640				85.15
36106	TEME	42164.951	0.0002634	0.0107	22.9508	263.2595	85.1374
C1.118	2011-035B	Kazsat-2					PL
TLEs	GEO (1.00)	2017-12-31	21:36:39.756				86.50
37749	TEME	42164.445	0.0001070	0.0431	213.5674	131.4641	86.4826

C1.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		e	
		i	
		Ω	
		ω	
C1.119	2012-067A	Chinasat 15A (Zhongxing 15A, Chinasat 12, Zhongxing 12)	PL
TLEs	GEO (1.00)	2017-12-31	87.49
39017	TEME	42165.094	87.4788
C1.120	2011-022B	ST-2	PL
TLEs	GEO (1.00)	2017-12-31	87.97
37606	TEME	42165.076	87.9974
C1.121^m	2012-003A	USA 233 (WGS SV-4)	PL
KIAM	GEO (1.00)	2018-01-01	88.40
UI169	J2000	42164.326	88.3990
C1.122	2014-082A	Yamal 401	PL
TLEs	GEO (1.00)	2017-12-31	89.94
40345	TEME	42164.945	89.9501
C1.123	2006-056A	Measat 3	PL
TLEs	GEO (1.00)	2017-12-31	91.50
29648	TEME	42164.482	91.4708
C1.124	2014-054B	Measat 3B	PL
TLEs	GEO (1.00)	2017-12-31	91.50
40147	TEME	42164.908	91.5127
C1.125	2009-032A	Measat 3A	PL
TLEs	GEO (1.00)	2017-12-31	91.51
35362	TEME	42165.582	91.5421
C1.126	2008-028A	Chinasat 9 (Zhongxing 9, ZX 9)	PL
TLEs	GEO (1.00)	2017-12-31	92.18
33051	TEME	42165.501	92.1682
C1.127	2017-005A	Kirameki 2 (DSN-2)	PL
KIAM	GEO (1.00)	2018-01-01	93.01
UI193	J2000	42164.300	93.0130
C1.128	2015-065A	GSAT 15	PL
TLEs	GEO (1.00)	2017-12-31	93.51
41028	TEME	42165.380	93.5389
C1.129	2017-040B	GSAT-17	PL
TLEs	GEO (1.00)	2017-12-31	93.59
42815	TEME	42165.100	93.5844
C1.130	2002-057A	NSS 6	PL
TLEs	GEO (1.00)	2017-12-31	94.99
27603	TEME	42164.795	94.9650
C1.131	2013-071A	SES-8	PL
TLEs	GEO (1.00)	2017-12-31	95.00
39460	TEME	42165.203	95.0182
C1.132	2007-007B	Skynet 5A	PL
TLEs	GEO (1.00)	2017-12-31	95.17
30794	TEME	42164.468	95.1440
C1.133^m	2003-014A	Asiasat 4	PL
TLEs	GEO (1.00)	2017-12-31	95.35
27718	TEME	42248.007	95.3545

C1.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time					λ
S-ID	Frame	a	e	i	Ω	ω		λ
C1.134	2008-003A	Ekspress-AM 33						PL
TLEs	GEO (1.00)	2017-12-31	19:20:39.691					96.50
32478	TEME	42164.992	0.0000284	0.0451	200.1794	75.3909		96.5024
C1.135	2017-024A	South Asia Satellite						PL
TLEs	GEO (1.00)	2017-12-31	10:50:24.293					97.35
42695	TEME	42165.098	0.0002157	0.0677	257.4175	47.7005		97.3410
C1.136	2013-020A	Chinasat 11 (Zhongxing 11, ZX 11, SupremeSat 2)						PL
TLEs	GEO (1.00)	2017-12-31	06:07:17.838					98.01
39157	TEME	42165.354	0.0003740	0.0131	268.9771	14.8603		98.0145
C1.137	2012-028A	Chinasat 2A (Zhongxing 2A, ZX 2A, Shentong 2-1)						PL
TLEs	GEO (1.00)	2017-12-31	19:20:39.691					98.27
38352	TEME	42165.930	0.0006952	0.0584	237.8268	101.3180		98.2623
C1.138	2009-042A	Asiasat 5						PL
TLEs	GEO (1.00)	2017-12-31	20:26:42.628					100.50
35696	TEME	42164.978	0.0001026	0.0152	272.7632	335.8440		100.5095
C1.139	2017-035A	Zhongxing 9A						PL
TLEs	GEO (1.00)	2017-12-31	23:09:39.686					101.41
42763	TEME	42164.373	0.0000806	0.0074	14.1915	249.5578		101.4440
C1.140	2005-023A	Ekspress-AM 3						PL
TLEs	GEO (1.00)	2017-12-31	03:48:46.108					103.00
28707	TEME	42166.172	0.0002088	0.0354	198.7487	126.9698		102.9661
C1.141	2015-063A	Chinasat 2C (Zhongxing 2C, ZX 2C, Shentong 2-2)						PL
TLEs	GEO (1.00)	2017-12-31	20:26:42.628					103.42
41021	TEME	42165.101	0.0004590	0.0526	123.6254	202.5787		103.4413
C1.142	2016-077A	Fengyun 4A						PL
TLEs	GEO (1.00)	2017-12-31	20:49:31.174					104.68
41882	TEME	42164.233	0.0008790	0.0375	299.5166	182.2271		104.7473
C1.143	2011-069A	Asiasat 7						PL
TLEs	GEO (1.00)	2017-12-31	20:49:31.175					105.49
37933	TEME	42165.313	0.0001402	0.0392	89.7536	175.5428		105.4898
C1.144	2015-083A	Gaofen 4						PL
TLEs	GEO (1.00)	2017-12-31	23:09:39.686					105.78
41194	TEME	42165.289	0.0004397	0.0882	92.6820	147.9345		105.6936
C1.145	2017-001A	TJS-2						PL
TLEs	GEO (1.00)	2017-12-31	23:09:39.686					107.53
41911	TEME	42164.736	0.0001551	0.2577	277.9305	85.5072		107.5827
C1.146	2009-027A	Indostar II/Protostar II						PL
TLEs	GEO (1.00)	2017-12-31	22:16:37.225					108.08
34941	TEME	42165.245	0.0003072	0.0640	82.2990	191.0961		108.2173
C1.147	2016-013A	SES-9						PL
TLEs	GEO (1.00)	2017-12-31	10:06:39.030					108.31
41380	TEME	42165.029	0.0000961	0.0270	310.3727	345.7150		108.3087
C1.148	2017-059B	BSAT 4a						PL
TLEs	GEO (1.00)	2017-12-30	10:04:49.569					109.76
42951	TEME	42164.605	0.0002525	0.0236	357.4129	352.0385		109.7574

C1.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time					λ
S-ID	Frame	a	e	i	Ω	ω		λ
C1.149	2010-056B	BSAT 3B						PL
TLEs	GEO (1.00)	2017-12-31	22:17:29.216					109.85
37207	TEME	42164.571	0.0005088	0.0831	300.0274	1.4955		109.8078
C1.150	2007-036B	BSAT 3A						PL
TLEs	GEO (1.00)	2017-12-31	10:00:17.240					109.87
32019	TEME	42164.054	0.0004512	0.0752	241.9036	13.3168		109.9046
C1.151	2011-041B	BSAT 3c						PL
TLEs	GEO (1.00)	2017-12-31	22:17:29.216					109.97
37776	TEME	42165.042	0.0000080	0.0110	333.8924	144.3798		109.9798
C1.152	2000-060A	N-SAT-110						PL
TLEs	GEO (1.00)	2017-12-31	22:17:29.216					110.07
26559	TEME	42165.017	0.0001007	0.0111	47.0487	37.7434		110.0877
C1.153	2016-082A	JCSAT 15						PL
TLEs	GEO (1.00)	2017-12-31	09:59:33.316					110.09
41903	TEME	42165.231	0.0001899	0.0134	311.2776	324.8922		110.0886
C1.154	2011-026A	Chinasat 10 (Zhongxing 10, ZX 10, Sinosat 5, Xinnuo 5)						PL
TLEs	GEO (1.00)	2017-12-31	22:17:29.215					110.51
37677	TEME	42165.357	0.0002925	0.0353	265.2784	310.4779		110.5113
C1.155^m	2010-024A	Beidou DW 4						PL
TLEs	GEO (1.00)	2017-12-31	20:39:22.314					110.51
36590	TEME	42165.949	0.0007683	1.5054	33.9964	305.5953		110.5110
C1.156	2017-018A	Shi Jian 13						PL
TLEs	GEO (1.00)	2017-12-31	09:57:27.887					110.58
42662	TEME	42165.444	0.0008185	0.0638	93.6104	160.3302		110.6145
C1.157^m	2007-007A	INSAT 4B						PL
TLEs	GEO (1.00)	2017-12-31	22:10:36.192					111.21
30793	TEME	42165.312	0.0003713	0.0727	275.0853	350.6722		111.2100
C1.158	2009-046A	Palapa D						PL
TLEs	GEO (1.00)	2017-12-31	09:47:59.632					112.96
35812	TEME	42165.119	0.0002475	0.0327	80.0305	227.1220		112.9881
C1.159	2006-034A	Mugunghwa 5 (Koreasat 5)						PL
TLEs	GEO (1.00)	2017-12-31	20:27:39.741					113.05
29349	TEME	42164.876	0.0001389	0.0166	27.3498	273.5342		113.0490
C1.160^m	2017-067A	Mugunghwa 5A						PL
TLEs	GEO (1.00)	2017-12-31	09:47:16.279					113.17
42984	TEME	42165.260	0.0000942	0.0280	94.1137	175.5451		113.1678
C1.161	1998-050A	Astra 2A						PL
TLEs	GEO (1.00)	2017-12-31	20:27:39.741					113.49
25462	TEME	42165.578	0.0002708	0.0613	238.1814	44.6050		113.4735
C1.162	2007-031A	Chinasat 6B (Zhongxing 6B, ZX 6B)						PL
TLEs	GEO (1.00)	2017-12-31	20:45:23.820					115.53
31800	TEME	42165.272	0.0004109	0.0163	35.5207	232.2965		115.4592
C1.163	2017-023A	Koreasat 7						PL
TLEs	GEO (1.00)	2017-12-31	09:36:19.929					115.89
42691	TEME	42164.549	0.0001379	0.0245	60.8878	218.8159		115.9128

C1.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		Time	
		e	
		i	
		Ω	
		ω	
C1.164	2010-070B	Olleh 1 (Koreasat 6)	PL
TLEs	GEO (1.00)	2017-12-31 20:45:23.820	116.00
37265	TEME	42164.951 0.0002040 0.0229 65.9660 220.6904	115.9887
C1.165	1999-046A	ABS 7 (Mugungwha 3, Koreasat 3)	PL
TLEs	GEO (1.00)	2017-12-31 20:45:23.820	116.05
25894	TEME	42165.464 0.0002348 0.0222 89.4690 237.3473	116.1012
C1.166	2017-025A	Inmarsat 5F4	PL
TLEs	GEO (1.00)	2017-12-31 09:29:54.923	117.52
42698	TEME	42165.059 0.0000235 0.0312 98.4440 256.2456	117.5214
C1.167	2017-007A	Telkom-3S	PL
TLEs	GEO (1.00)	2017-12-31 09:27:58.496	118.01
41944	TEME	42166.127 0.0002757 0.0246 2.7140 274.2134	118.0059
C1.168	2005-028A	Thaicom 4 (IPStar 1)	PL
TLEs	GEO (1.00)	2017-12-31 20:45:10.817	119.49
28786	TEME	42165.188 0.0002665 0.0104 54.0678 221.6665	119.4680
C1.169	2014-052A	Asiasat 6	PL
TLEs	GEO (1.00)	2017-12-31 23:16:17.698	119.91
40141	TEME	42165.146 0.0000760 0.0117 58.1337 230.6456	119.9127
C1.170	2017-057A	Asiasat 9	PL
TLEs	GEO (1.00)	2017-12-31 03:04:42.566	121.98
42942	TEME	42166.089 0.0002492 0.0385 67.8920 237.3239	122.0300
C1.171	2012-023A	JCSAT 13	PL
TLEs	GEO (1.00)	2017-12-31 09:03:53.616	124.06
38331	TEME	42164.881 0.0002457 0.0109 342.5895 290.2607	124.0434
C1.172	2010-042A	Chinasat 6A (Zhongxing 6A, ZX 6A, Sinosat 6, Xinnuo 6)	PL
TLEs	GEO (1.00)	2017-12-31 22:55:39.885	125.04
37150	TEME	42164.190 0.0001137 0.0605 118.0849 163.0799	125.0759
C1.173	2017-048A	Michibiki-3 (QZS-3)	PL
TLEs	GEO (1.00)	2017-12-31 08:51:59.649	127.06
42917	TEME	42164.469 0.0001930 0.0667 231.3020 38.5494	127.0266
C1.174	2006-033A	JCSAT 3A	PL
TLEs	GEO (1.00)	2017-12-31 19:28:42.893	127.91
29272	TEME	42164.910 0.0002068 0.0268 301.3812 348.3824	128.0062
C1.175	2009-044A	JCSAT 12 (JCSAT-RA)	PL
TLEs	GEO (1.00)	2017-12-31 08:48:16.043	127.93
35755	TEME	42164.847 0.0001261 0.0429 39.3444 240.8271	127.9584
C1.176	2010-032A	COMS 1 (Chollian)	PL
TLEs	GEO (1.00)	2017-12-31 19:28:42.893	128.21
36744	TEME	42164.705 0.0000952 0.0482 182.4828 67.4912	128.2207
C1.177	2015-067A	LaoSat 1	PL
TLEs	GEO (1.00)	2017-12-31 08:46:16.409	128.51
41034	TEME	42166.296 0.0001515 0.0100 254.5626 297.3359	128.4595
C1.178	2011-047A	Chinasat 1A (Zhongxing 1A, ZX 1A, Feng Huo 2-1)	PL
TLEs	GEO (1.00)	2017-12-31 17:09:39.812	129.87
37804	TEME	42164.288 0.0004553 0.0559 246.4337 64.7451	129.8858

C1.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a e i Ω ω	λ
C1.179	2010-064A	Chinasat 20A (Zhongxing 20A, ZX 20A, Shentong 1-2)	PL
TLEs	GEO (1.00)	2017-12-31 15:09:42.596	130.02
37234	TEME	42165.287 0.0005478 0.0550 116.5149 192.4011	130.0754
C1.180	2012-023B	VINASAT-2	PL
TLEs	GEO (1.00)	2017-12-31 18:50:42.631	131.84
38332	TEME	42164.727 0.0002295 0.0110 18.4163 263.7534	131.8176
C1.181	2008-018A	VINASAT-1	PL
TLEs	GEO (1.00)	2017-12-31 08:32:15.006	131.94
32767	TEME	42164.999 0.0002002 0.0094 12.7300 276.3251	131.9735
C1.182	2006-010A	JCSAT 9	PL
TLEs	GEO (1.00)	2017-12-31 18:50:42.631	132.04
29045	TEME	42164.989 0.0002614 0.0120 331.5840 318.2634	132.0411
C1.183	2005-012A	Apstar 6	PL
TLEs	GEO (1.00)	2017-12-31 20:44:57.070	134.00
28638	TEME	42165.833 0.0002082 0.0428 63.6643 222.6489	133.9468
C1.184	2004-024A	Telstar 18 (APStar 5)	PL
TLEs	GEO (1.00)	2017-12-31 18:58:39.769	137.99
28364	TEME	42164.797 0.0003270 0.0188 62.0199 223.8522	137.9636
C1.185	2014-010B	Ekspress-AT2	PL
TLEs	GEO (1.00)	2017-12-31 20:42:12.591	139.85
39613	TEME	42165.745 0.0000226 0.0570 218.2491 220.2098	139.8460
C1.186^m	2010-001A	Beidou DW 3	PL
TLEs	GEO (1.00)	2017-12-31 20:42:12.591	139.96
36287	TEME	42163.837 0.0004094 1.4884 12.7028 208.7904	139.9569
C1.187	2013-077A	Ekspress-AM 5	PL
TLEs	GEO (1.00)	2017-12-31 20:42:12.591	140.04
39487	TEME	42164.521 0.0000254 0.0598 214.8350 93.1341	140.0323
C1.188	2015-054A	Sky Muster	PL
TLEs	GEO (1.00)	2017-12-31 07:59:08.699	140.25
40940	TEME	42164.926 0.0002079 0.0129 312.9883 324.2821	140.2754
C1.189	2014-060A	Himawari 8	PL
TLEs	GEO (1.00)	2017-12-31 07:57:29.687	140.67
40267	TEME	42165.251 0.0001687 0.0189 79.9594 197.6909	140.6889
C1.190	2016-064A	Himawari-9	PL
TLEs	GEO (1.00)	2017-12-31 07:57:05.292	140.78
41836	TEME	42164.720 0.0001471 0.0164 351.1945 267.2438	140.7893
C1.191	2015-059A	Apstar 9	PL
TLEs	GEO (1.00)	2017-12-31 07:52:05.800	142.02
40982	TEME	42165.550 0.0002543 0.0142 359.8519 281.2612	142.0424
C1.192^m	2000-059A	GE 1A	PL
TLEs	GEO (1.00)	2017-12-31 20:41:43.379	142.75
26554	TEME	41984.357 0.0001352 0.0235 315.3415 192.4703	142.7505
C1.193	2008-038A	Superbird C2	PL
TLEs	GEO (1.00)	2017-12-31 19:14:56.848	143.93
33274	TEME	42164.777 0.0001788 0.0188 341.9669 309.8198	143.9423

C1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C1.194	2016-060B	Sky Muster 2					PL
TLEs	GEO (1.00)	2017-12-31	07:40:58.507				144.80
41794	TEME	42164.995	0.0001951	0.0146	331.3508	310.8995	144.8296
C1.195	2006-004A	Himawari 7 (MTSAT 2)					PL
TLEs	GEO (1.00)	2017-12-31	19:14:56.848				145.01
28937	TEME	42166.039	0.0003919	0.0440	72.3517	221.0902	144.9779
C1.196	2017-016A	USA 275 (WGS SV-9)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000				149.84
UI194	J2000	42166.670	0.0001411	0.1132	74.4202	246.7344	149.8400
C1.197	2016-039A	BRISat					PL
TLEs	GEO (1.00)	2017-12-31	07:18:12.524				150.51
41591	TEME	42164.728	0.0002452	0.0190	339.0835	297.6821	150.5369
C1.198	2007-044A	Optus D2					PL
TLEs	GEO (1.00)	2017-12-31	20:08:13.209				152.00
32252	TEME	42164.870	0.0003913	0.0180	35.0264	242.8324	151.9727
C1.199	2016-028A	JCSAT 2B					PL
TLEs	GEO (1.00)	2017-12-31	07:04:16.842				154.01
41471	TEME	42165.606	0.0002372	0.0255	21.4134	258.2598	154.0293
C1.200	2015-046A	TJS					PL
TLEs	GEO (1.00)	2017-12-31	16:24:42.588				155.01
40892	TEME	42165.018	0.0003378	0.0498	262.5018	12.5222	154.9811
C1.201	2009-044B	Optus D3					PL
TLEs	GEO (1.00)	2017-12-31	20:19:51.308				156.01
35756	TEME	42165.034	0.0004072	0.0266	27.8583	268.8858	155.9739
C1.202	2003-028B	Optus C1 (Defense C1)					PL
TLEs	GEO (1.00)	2017-12-31	20:16:58.509				156.01
27831	TEME	42165.010	0.0003614	0.0574	145.0478	120.2788	155.9749
C1.203	2005-046A	Telkom 2					PL
TLEs	GEO (1.00)	2017-12-31	16:24:42.588				157.01
28902	TEME	42165.328	0.0001486	0.0302	62.3825	0.2550	157.0116
C1.204	1999-053A	LMI 1					PL
TLEs	GEO (1.00)	2017-12-31	06:44:21.786				159.03
25924	TEME	42165.634	0.0001122	0.0323	358.9620	159.4662	159.0221
C1.205^m	2010-057A	Beidou DW 6					PL
TLEs	GEO (1.00)	2017-12-31	20:30:28.008				159.91
37210	TEME	42164.623	0.0007598	1.0277	58.7707	198.1721	159.9066
C1.206	2006-043B	Optus D1					PL
TLEs	GEO (1.00)	2017-12-31	20:35:09.509				159.99
29495	TEME	42165.126	0.0003794	0.0207	20.4654	261.5798	159.9574
C1.207	2016-050A	JCSAT 16					PL
TLEs	GEO (1.00)	2017-12-31	06:32:05.234				162.05
41729	TEME	42164.282	0.0002155	0.0239	72.9210	211.7465	162.0976
C1.208	2014-054A	Optus 10					PL
TLEs	GEO (1.00)	2017-12-31	06:24:26.496				164.00
40146	TEME	42164.590	0.0001647	0.1132	14.4332	258.3801	164.0154

C1.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time					λ
S-ID	Frame	a	e	i	Ω	ω		λ
C1.209	2012-030A	Intelsat 19 (IS 19)						PL
TLEs	GEO (1.00)	2017-12-31	06:16:24.537					166.01
38356	TEME	42164.922	0.0002909	0.0215	341.3909	303.7879		166.0293
C1.210^m	1998-037A	Intelsat 805						PL
TLEs	GEO (1.00)	2017-12-31	17:41:11.280					168.97
25371	TEME	42164.669	0.0003584	0.4340	93.9329	188.1408		168.9681
C1.211	2005-052A	Eutelsat 172A (GE 23, AMC 23)						PL
TLEs	GEO (1.00)	2017-12-31	19:58:39.879					172.01
28924	TEME	42164.999	0.0006205	0.0626	11.8111	270.6594		173.9216
C1.212	2017-029B	Eutelsat 172B						PL
TLEs	GEO (1.00)	2017-12-31	05:52:41.823					172.03
42741	TEME	42165.506	0.0000658	0.0199	68.4888	270.5282		171.9748
C1.213^m	2015-036A	USA 263 (WGS SV-7)						PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000					175.05
UI191	J2000	42167.039	0.0001335	0.1121	69.2220	214.8082		175.0520
C1.214	2015-042A	Inmarsat-5 F3						PL
TLEs	GEO (1.00)	2017-12-31	05:22:13.252					179.58
40882	TEME	42165.192	0.0000612	0.0238	19.2598	220.5060		179.6117
C1.215	2011-056A	Intelsat 18 (IS 18)						PL
TLEs	GEO (1.00)	2017-12-31	15:07:39.690					180.00
37834	TEME	42164.845	0.0002542	0.0164	4.5927	290.3861		179.9742
C1.216	2012-061B	Yamal 300K						PL
TLEs	GEO (1.00)	2017-12-31	20:56:31.608					182.95
38978	TEME	42164.805	0.0001543	0.0244	29.6600	239.4772		182.9369
C1.217	2009-008A	NSS 9						PL
TLEs	GEO (1.00)	2017-12-31	20:59:31.907					183.02
33749	TEME	42164.784	0.0002230	0.0218	341.5493	295.8518		183.0455
C1.218	2000-081B	GE 8 (Aurora 3)						PL
TLEs	GEO (1.00)	2017-12-31	14:58:39.711					220.99
26639	TEME	42164.537	0.0002824	0.0176	32.2798	247.0526		220.9646
C1.219	2013-041A	USA 244 (WGS SV-6)						PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000					223.82
UI180	J2000	42152.329	0.0003112	0.1049	74.6309	199.4600		223.8180
C1.220	2010-008A	GOES 15						PL
TLEs	GEO (1.00)	2017-12-31	02:21:54.468					224.88
36411	TEME	42163.068	0.0002918	0.1166	264.0574	295.2841		224.8156
C1.221	2004-003A	AMC 10 (GE 10)						PL
TLEs	GEO (1.00)	2017-12-31	21:13:49.205					224.99
28154	TEME	42165.258	0.0000793	0.0275	307.3602	321.5188		224.9985
C1.222^m	2000-054B	GE 7						PL
TLEs	GEO (1.00)	2017-12-31	02:21:02.041					225.03
26495	TEME	42163.958	0.0002168	0.0270	54.7277	222.6294		225.0326
C1.223	1999-060A	GE 4						PL
TLEs	GEO (1.00)	2017-12-31	02:20:38.158					225.13
25954	TEME	42164.796	0.0002769	0.0107	47.7035	237.2537		225.1329

C1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C1.224	2005-041A	Galaxy 15					PL
TLEs	GEO (1.00)	2017-12-31	15:37:59.342				226.99
28884	TEME	42164.813	0.0002480	0.0195	46.8924	232.2978	226.9619
C1.225	2004-017A	AMC 11 (GE 11)					PL
TLEs	GEO (1.00)	2017-12-31	14:16:12.372				228.99
28252	TEME	42164.815	0.0002992	0.0201	344.6819	305.3375	228.9636
C1.226^m	2017-026A	SES-15					PL
TLEs	GEO (1.00)	2017-12-31	01:57:44.014				230.87
42709	TEME	42164.712	0.0000502	0.0541	118.7710	169.1428	230.8736
C1.227^m	2003-013B	Galaxy XII					PL
TLEs	GEO (1.00)	2017-12-31	21:26:29.606				231.00
27715	TEME	42164.753	0.0002493	0.0148	263.0437	13.7733	231.0006
C1.228	2008-063A	Ciel 2					PL
TLEs	GEO (1.00)	2017-12-31	21:31:53.905				231.14
33453	TEME	42165.089	0.0003382	0.0080	343.3130	287.3062	231.1665
C1.229	2003-044A	Galaxy 13 / Horizons 1					PL
TLEs	GEO (1.00)	2017-12-31	14:51:39.797				232.99
27954	TEME	42164.431	0.0001441	0.0339	74.1108	283.7123	232.9348
C1.230	2005-030A	Galaxy 14					PL
TLEs	GEO (1.00)	2017-12-31	21:36:10.704				234.99
28790	TEME	42164.963	0.0002745	0.0332	289.9870	349.8042	235.0143
C1.231	2008-038B	AMC 21					PL
TLEs	GEO (1.00)	2017-12-31	21:43:38.705				235.09
33275	TEME	42164.697	0.0002713	0.0157	13.7799	270.5118	235.1013
C1.232	2008-024A	Galaxy 18					PL
TLEs	GEO (1.00)	2017-12-31	01:33:10.331				236.99
32951	TEME	42164.742	0.0003328	0.0168	53.1830	230.4055	237.0320
C1.233	2003-034A	EchoStar 9 (Galaxy 23, Intelsat Americas 13, Telstar 13)					PL
TLEs	GEO (1.00)	2017-12-31	17:33:39.827				239.00
27854	TEME	42164.305	0.0003005	0.0414	72.9912	224.7305	238.9640
C1.234	2004-016A	DirecTV 7S					PL
TLEs	GEO (1.00)	2017-12-31	21:52:34.103				240.93
28238	TEME	42163.401	0.0003126	0.0122	356.2176	302.1858	240.9100
C1.235	2010-010A	EchoStar 14					PL
TLEs	GEO (1.00)	2017-12-31	21:55:44.104				241.10
36499	TEME	42165.203	0.0002862	0.0185	341.7986	298.9521	241.1163
C1.236	2002-006A	EchoStar 7					PL
TLEs	GEO (1.00)	2017-12-31	21:58:36.303				241.18
27378	TEME	42164.856	0.0002091	0.0193	325.5872	352.4821	241.1854
C1.237	2007-009A	Anik F3					PL
TLEs	GEO (1.00)	2017-12-31	22:01:14.604				241.29
31102	TEME	42164.780	0.0002338	0.0136	61.9753	233.7960	241.2920
C1.238	2016-038B	Eutelsat 117 West B					PL
TLEs	GEO (1.00)	2017-12-31	01:09:22.981				243.02
41589	TEME	42164.900	0.0000286	0.0102	161.7178	256.9846	242.9987

C1.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		Time	
		e	
		i	
		Ω	
		ω	
C1.239	2013-012A	Eutelsat 117 West A (SATMEX 8)	PL
TLEs	GEO (1.00)	2017-12-31 01:08:26.291	243.23
39122	TEME	42164.956 0.0002925 0.0232 320.3801 328.7272	243.2325
C1.240	2013-058A	Sirius FM-6 (Radiosat 6)	PL
TLEs	GEO (1.00)	2017-12-31 01:05:58.496	243.87
39360	TEME	42165.057 0.0001248 0.0151 321.0131 200.9603	243.8511
C1.241	2006-049A	XM Radio 4 (Blues)	PL
TLEs	GEO (1.00)	2017-12-31 22:05:24.903	244.83
29520	TEME	42165.254 0.0000223 0.0131 175.4965 153.7931	244.7726
C1.242	2011-059A	ViaSat-1	PL
TLEs	GEO (1.00)	2017-12-31 22:08:35.303	244.89
37843	TEME	42165.482 0.0002831 0.0242 17.4224 261.5291	244.9221
C1.243	2015-010B	Eutelsat 115 West B	PL
TLEs	GEO (1.00)	2017-12-31 01:00:59.236	245.11
40425	TEME	42165.205 0.0000313 0.0109 164.3410 266.7698	245.1002
C1.244	2012-075B	Mexsat Bicentenario	PL
TLEs	GEO (1.00)	2017-12-31 01:00:25.122	245.20
39035	TEME	42165.396 0.0002830 0.0180 39.1917 237.9411	245.2409
C1.245	2006-020A	Eutelsat 113 West A (SATMEX 6, Morelos 4, Solidaridad 1R)	PL
TLEs	GEO (1.00)	2017-12-31 00:53:18.427	246.99
29162	TEME	42164.764 0.0002879 0.0233 214.6053 71.1698	247.0261
C1.246	2006-054A	WildBlue 1	PL
TLEs	GEO (1.00)	2017-12-31 17:33:39.827	248.85
29643	TEME	42164.992 0.0002168 0.0458 263.4374 17.2053	248.8213
C1.247	2004-027A	Anik F2	PL
TLEs	GEO (1.00)	2017-12-31 19:09:42.465	248.92
28378	TEME	42165.303 0.0000475 0.0180 53.4485 219.6031	248.9259
C1.248	2006-003A	EchoStar 10	PL
TLEs	GEO (1.00)	2017-12-31 19:09:42.465	249.80
28935	TEME	42165.014 0.0001872 0.0185 333.6282 315.4594	249.7875
C1.249	2002-023A	DirecTV 5	PL
TLEs	GEO (1.00)	2017-12-31 00:41:43.474	249.88
27426	TEME	42165.182 0.0003687 0.0232 26.3304 258.5493	249.9287
C1.250	2008-035A	EchoStar 11	PL
TLEs	GEO (1.00)	2017-12-31 00:41:18.769	250.00
33207	TEME	42165.002 0.0002960 0.0197 299.6423 339.1032	250.0345
C1.251	2005-036A	Anik F1R	PL
TLEs	GEO (1.00)	2017-12-31 19:09:42.465	252.69
28868	TEME	42164.957 0.0002146 0.0235 51.8713 273.9199	252.6649
C1.252	2000-076A	Anik F1	PL
TLEs	GEO (1.00)	2017-12-31 00:30:31.874	252.69
26624	TEME	42165.398 0.0001550 0.0111 61.3118 165.9170	252.7378
C1.253	2013-014A	Anik G1	PL
TLEs	GEO (1.00)	2017-12-31 00:30:34.990	252.70
39127	TEME	42164.984 0.0002899 0.0169 348.2387 287.2718	252.7252

C1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C1.254	2012-035A	EchoStar 17					PL
TLEs	GEO (1.00)	2017-12-31	00:29:46.113				252.89
38551	TEME	42165.184	0.0002084	0.0225	22.5932	255.5606	252.9244
C1.255	2004-041A	AMC 15					PL
TLEs	GEO (1.00)	2017-12-31	19:09:42.465				254.94
28446	TEME	42164.942	0.0003205	0.0166	17.4210	258.8565	254.9558
C1.256	2006-054B	AMC 18					PL
TLEs	GEO (1.00)	2017-12-31	19:09:42.465				255.04
29644	TEME	42165.025	0.0002998	0.0196	59.5840	222.3365	255.0552
C1.257	2017-063A	SES-11					PL
TLEs	GEO (1.00)	2017-12-31	00:21:17.689				255.06
42967	TEME	42165.034	0.0000330	0.0525	227.8245	61.7611	255.0524
C1.258	2009-033A	GOES 14					PL
TLEs	GEO (1.00)	2017-12-31	00:18:22.985				255.15
35491	TEME	42164.918	0.0010229	0.1153	273.4496	326.8970	255.7834
C1.259	2011-035A	SES-3					PL
TLEs	GEO (1.00)	2017-12-31	19:09:42.465				256.96
37748	TEME	42165.162	0.0002490	0.0114	15.8649	261.1229	256.9992
C1.260	2005-015A	Spaceway 1					PL
TLEs	GEO (1.00)	2017-12-31	19:09:42.465				257.09
28644	TEME	42165.288	0.0000687	0.0357	199.1969	3.9599	257.0864
C1.261	2007-032A	DirecTV 10					PL
TLEs	GEO (1.00)	2017-12-31	00:12:51.560				257.16
31862	TEME	42165.048	0.0000393	0.0186	192.6190	62.5041	257.1666
C1.262	2009-075A	DirecTV 12					PL
TLEs	GEO (1.00)	2017-12-31	19:09:42.465				257.21
36131	TEME	42165.517	0.0000574	0.0338	199.9293	80.1935	257.2040
C1.263	2015-026A	DirecTV 15					PL
TLEs	GEO (1.00)	2017-12-31	00:12:27.975				257.26
40663	TEME	42165.125	0.0000300	0.0138	63.8703	158.9669	257.2669
C1.264	2001-052A	DirecTV 4S					PL
TLEs	GEO (1.00)	2017-12-31	19:09:12.466				258.83
26985	TEME	42165.162	0.0003172	0.0222	16.8630	262.8041	258.8167
C1.265	2006-043A	DirecTV 9S					PL
TLEs	GEO (1.00)	2017-12-31	19:09:12.466				258.88
29494	TEME	42165.111	0.0003560	0.0167	31.9552	259.2636	258.9075
C1.266	2010-016A	SES-1					PL
TLEs	GEO (1.00)	2017-12-31	17:19:42.566				258.99
36516	TEME	42164.775	0.0002376	0.0248	322.5831	319.5856	258.9958
C1.267	2005-019A	DirecTV 8					PL
TLEs	GEO (1.00)	2017-12-31	00:04:47.524				259.13
28659	TEME	42165.033	0.0003367	0.0121	24.0700	254.5780	259.1885
C1.268	2014-078B	DirecTV 14					PL
TLEs	GEO (1.00)	2017-12-31	17:19:42.566				260.77
40333	TEME	42165.185	0.0000610	0.0172	316.9053	261.8838	260.7763

C1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C1.269	2008-013A	DirecTV 11					PL
TLEs	GEO (1.00)	2017-12-31	17:19:42.566				260.77
32729	TEME	42165.508	0.0000249	0.0030	241.4334	5.2106	260.8202
C1.270	2005-046B	Spaceway 2					PL
TLEs	GEO (1.00)	2017-12-31	17:19:42.566				260.90
28903	TEME	42165.495	0.0000215	0.0098	110.0362	148.7860	260.9313
C1.271	2006-023A	Galaxy 16					PL
TLEs	GEO (1.00)	2017-12-31	17:19:42.566				260.98
29236	TEME	42165.004	0.0002971	0.0153	68.4806	214.1262	260.9842
C1.272	2016-079A	Echostar 19					PL
TLEs	GEO (1.00)	2017-12-31	23:45:57.926				262.87
41893	TEME	42164.965	0.0001825	0.0135	64.9953	228.9619	262.9207
C1.273	2008-045A	Galaxy 19					PL
TLEs	GEO (1.00)	2017-12-31	23:45:28.131				262.95
33376	TEME	42165.322	0.0003454	0.0164	358.2579	292.5783	263.0440
C1.274	2014-062A	Intelsat 30 (DLA 1, ISDLA 1)					PL
TLEs	GEO (1.00)	2017-12-31	12:12:39.822				264.95
40271	TEME	42164.997	0.0001736	0.0180	24.7950	103.9386	264.9663
C1.275	2002-030A	Galaxy 3C					PL
TLEs	GEO (1.00)	2017-12-30	23:41:42.275				264.96
27445	TEME	42165.225	0.0001371	0.0167	327.9734	327.8306	264.9755
C1.276	2016-035A	Intelsat 31 (DLA 2, ISDLA 2)					PL
TLEs	GEO (1.00)	2017-12-31	23:37:48.434				264.98
41581	TEME	42164.857	0.0002402	0.0280	269.0420	303.9864	264.9639
C1.277	2007-036A	Spaceway 3					PL
TLEs	GEO (1.00)	2017-12-31	14:27:42.567				265.05
32018	TEME	42165.508	0.0000483	0.0079	117.8784	225.7132	265.0344
C1.278	1997-026A	Galaxy 25 (Intelsat Americas 5, IA 5, Telstar 5)					PL
TLEs	GEO (1.00)	2017-12-31	23:30:01.777				266.89
24812	TEME	42165.263	0.0003267	0.0274	40.0705	247.2445	266.9171
C1.279	2012-026A	Nimiq 6					PL
TLEs	GEO (1.00)	2017-12-31	23:21:56.104				268.89
38342	TEME	42164.817	0.0003116	0.0112	358.1112	277.3206	268.9413
C1.280	2007-016B	Galaxy 17					PL
TLEs	GEO (1.00)	2017-12-31	14:27:42.567				268.99
31307	TEME	42164.855	0.0003392	0.0205	4.8988	278.1224	268.9769
C1.281	2005-022A	Galaxy 28 (Intelsat Americas 8, IA 8, Telstar 8)					PL
TLEs	GEO (1.00)	2017-12-31	23:21:39.682				270.99
28702	TEME	42165.092	0.0000367	0.0176	359.4172	222.4031	271.0054
C1.282	2013-075A	Tupac Katari (TKSat 1)					PL
TLEs	GEO (1.00)	2017-12-31	14:20:42.479				272.80
39481	TEME	42165.026	0.0002437	0.0414	170.4555	126.5638	272.7970
C1.283^m	2011-049A	SES-2					PL
TLEs	GEO (1.00)	2017-12-31	12:05:39.690				272.99
37809	TEME	42164.916	0.0002526	0.0243	318.7482	323.8591	272.9862

C1.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		e	
		i	
		Ω	
		ω	
C1.284	1999-027A	Nimiq	PL
TLEs	GEO (1.00)	2017-12-31	273.47
25740	TEME	42163.565	273.4354
C1.285	2003-033A	EchoStar 12 (Rainbow 1, Cablevision 1)	PL
TLEs	GEO (1.00)	2017-12-31	273.62
27852	TEME	42164.533	273.5950
C1.286	2009-034A	Sirius FM-5 (Radiosat 5)	PL
TLEs	GEO (1.00)	2017-12-31	273.87
35493	TEME	42164.987	273.8547
C1.287	2010-053A	Sirius XM-5	PL
TLEs	GEO (1.00)	2017-12-31	274.78
37185	TEME	42165.065	274.7964
C1.288	2005-008A	XM Radio 3 (Rhythm)	PL
TLEs	GEO (1.00)	2017-12-31	274.91
28626	TEME	42165.701	274.9080
C1.289	2004-048A	AMC 16	PL
TLEs	GEO (1.00)	2017-12-31	274.99
28472	TEME	42164.537	274.9797
C1.290	2016-082B	Star One D1	PL
TLEs	GEO (1.00)	2017-12-31	276.00
41904	TEME	42165.204	275.9940
C1.291	2000-067A	GE 6	PL
TLEs	GEO (1.00)	2017-12-31	277.00
26580	TEME	42165.202	277.0068
C1.292	2008-044A	Nimiq 4	PL
TLEs	GEO (1.00)	2017-12-31	277.99
33373	TEME	42164.951	278.0135
C1.293	2015-054B	ARSAT-2	PL
TLEs	GEO (1.00)	2017-12-31	278.97
40941	TEME	42165.410	279.0252
C1.294	2015-026B	SKY Mexico-1	PL
TLEs	GEO (1.00)	2017-12-31	281.20
40664	TEME	42165.387	281.2395
C1.295	2008-055A	Simon Bolivar	PL
TLEs	GEO (1.00)	2017-12-31	281.99
33414	TEME	42166.155	282.0595
C1.296^m	1995-073A	EchoStar 1	PL
TLEs	GEO (1.00)	2017-12-31	282.73
23754	TEME	42165.503	282.7274
C1.297	2011-054A	QuetzSat-1	PL
TLEs	GEO (1.00)	2017-12-31	282.98
37826	TEME	42165.117	283.0155
C1.298	2010-006A	Intelsat 16 (IS 16, PAS 11R)	PL
TLEs	GEO (1.00)	2017-12-31	283.82
36397	TEME	42164.810	283.8168

C1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C1.299^m	2016-071A	GOES 16					PL
TLEs	GEO (1.00)	2017-12-31	22:18:35.235				284.82
41866	TEME	42165.503	0.0001244	0.0430	158.0614	215.8816	284.8223
C1.300	2012-062A	Star One C3					PL
TLEs	GEO (1.00)	2017-12-31	18:26:42.641				284.99
38991	TEME	42165.080	0.0002560	0.0105	352.8367	281.6117	285.0230
C1.301	2006-018A	GOES N					PL
TLEs	GEO (1.00)	2017-12-31	22:15:56.693				285.16
29155	TEME	42165.772	0.0001721	0.2648	103.0051	287.0620	285.4864
C1.302	2017-023B	SGDC-1					PL
TLEs	GEO (1.00)	2017-12-31	22:17:09.451				285.24
42692	TEME	42164.801	0.0002638	0.0105	28.6251	252.4025	285.1815
C1.303^m	2014-011A	Amazonas 4A					PL
TLEs	GEO (1.00)	2017-12-31	22:13:30.991				286.10
39616	TEME	42164.715	0.0003045	0.0744	74.5480	237.1953	286.0966
C1.304	2009-050A	Nimiq 5					PL
TLEs	GEO (1.00)	2017-12-31	20:35:39.872				287.29
35873	TEME	42164.970	0.0002970	0.0042	69.8276	221.5600	287.3290
C1.305	2014-062B	ARSAT-1					PL
TLEs	GEO (1.00)	2017-12-31	20:35:39.872				288.19
40272	TEME	42165.108	0.0001863	0.0146	310.6640	332.9570	288.2365
C1.306	2015-034B	Star One C4					PL
TLEs	GEO (1.00)	2017-12-31	21:57:48.985				290.01
40733	TEME	42164.615	0.0002501	0.0181	21.2655	287.1109	290.0325
C1.307	2008-018B	Star One C2					PL
TLEs	GEO (1.00)	2017-12-31	21:57:52.147				290.01
32768	TEME	42165.080	0.0001874	0.0379	146.6680	118.8457	290.0156
C1.308	2017-029A	ViaSat-2					PL
TLEs	GEO (1.00)	2017-12-31	21:57:28.974				290.25
42740	TEME	42164.874	0.0001522	0.0267	76.3211	118.0463	290.1162
C1.309	2017-017A	SES-10					PL
TLEs	GEO (1.00)	2017-12-31	21:45:24.694				292.93
42432	TEME	42165.198	0.0002893	0.0115	10.3073	276.9654	293.1409
C1.310	2016-014A	Eutelsat 65 West A					PL
TLEs	GEO (1.00)	2017-12-31	21:38:41.040				294.81
41382	TEME	42164.486	0.0002280	0.0446	12.3456	275.8207	294.8248
C1.311	2007-056A	Star One C1					PL
TLEs	GEO (1.00)	2017-12-31	21:37:51.802				295.00
32293	TEME	42165.094	0.0002963	0.0214	13.2846	281.5975	295.0356
C1.312	2011-021A	Telstar 14R (Estrela do Sul 2)					PL
TLEs	GEO (1.00)	2017-12-31	20:35:39.872				296.99
37602	TEME	42165.288	0.0002094	0.0174	26.2185	257.0603	297.0052
C1.313	2010-034A	EchoStar 15					PL
TLEs	GEO (1.00)	2017-12-31	20:35:39.872				298.35
36792	TEME	42164.648	0.0002526	0.0105	356.3024	276.3637	298.3891

C1.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		e	
		i	
		Ω	
		ω	
C1.314	2016-039B	EchoStar 18	PL
TLEs	GEO (1.00)	2017-12-31	298.42
41592	TEME	42165.554	298.6729
		0.0002377	
		0.0190	
		349.3421	
		301.4082	
C1.315	2012-065A	EchoStar 16	PL
TLEs	GEO (1.00)	2017-12-31	298.49
39008	TEME	42165.226	298.5243
		0.0002119	
		0.0223	
		27.4456	
		255.8734	
C1.316	2009-054A	Amazonas 2	PL
TLEs	GEO (1.00)	2017-12-31	298.99
35942	TEME	42164.489	299.0230
		0.0002294	
		0.0430	
		162.0793	
		78.9457	
C1.317	2013-006A	Amazonas 3	PL
TLEs	GEO (1.00)	2017-12-31	299.01
39078	TEME	42165.653	299.0757
		0.0005174	
		0.0025	
		189.5533	
		63.8571	
C1.318	2017-053A	Amazonas 5	PL
TLEs	GEO (1.00)	2017-12-31	299.28
42934	TEME	42165.227	299.0656
		0.0004608	
		0.0314	
		324.8605	
		333.8238	
C1.319	2012-045A	Intelsat 21 (IS 21)	PL
TLEs	GEO (1.00)	2017-12-31	302.00
38749	TEME	42164.932	302.0403
		0.0002336	
		0.0227	
		85.2740	
		195.8325	
C1.320	2015-039A	Intelsat 34 (Hispasat 55W-2)	PL
TLEs	GEO (1.00)	2017-12-31	304.51
40874	TEME	42165.207	304.5114
		0.0000811	
		0.0236	
		9.5300	
		207.4903	
C1.321	2015-005A	Inmarsat-5 F2	PL
TLEs	GEO (1.00)	2017-12-31	305.01
40384	TEME	42165.325	305.0191
		0.0000781	
		0.0240	
		16.0319	
		259.3710	
C1.322	2012-057A	Intelsat 23 (IS 23)	PL
TLEs	GEO (1.00)	2017-12-31	307.01
38867	TEME	42165.274	307.0308
		0.0002140	
		0.0181	
		37.1225	
		245.1760	
C1.323	2013-024A	USA 243 (WGS SV-5)	PL
KIAM	GEO (1.00)	2018-01-01	307.54
UI176	J2000	42165.909	307.5390
		0.0001186	
		0.1072	
		73.8758	
		310.9955	
C1.324	2016-004A	Intelsat 29e (IS-29e)	PL
TLEs	GEO (1.00)	2017-12-31	310.02
41308	TEME	42165.613	310.0181
		0.0001870	
		0.0172	
		22.6468	
		267.8701	
C1.325	1998-014A	NSS 806 (Intelsat 806)	PL
TLEs	GEO (1.00)	2017-12-31	312.49
25239	TEME	42165.244	312.4723
		0.0004851	
		0.0501	
		4.4630	
		276.2163	
C1.326	2009-064A	Intelsat 14 (IS 14)	PL
TLEs	GEO (1.00)	2017-12-31	315.00
36097	TEME	42165.563	315.0486
		0.0002709	
		0.0244	
		16.2415	
		263.9123	
C1.327	2017-014A	Echostar 23	PL
TLEs	GEO (1.00)	2017-12-31	315.10
42070	TEME	42165.404	315.1196
		0.0002075	
		0.0235	
		19.0274	
		258.6975	
C1.328	2017-007B	SkyBrasil-1	PL
TLEs	GEO (1.00)	2017-12-31	316.82
41945	TEME	42165.328	316.8269
		0.0000421	
		0.0124	
		49.3735	
		184.7108	

C1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C1.329	2007-044B	Intelsat 11 (IS 11, PAS 11)					PL
TLEs	GEO (1.00)	2017-12-31	18:05:39.755				316.98
32253	TEME	42165.057	0.0001922	0.0103	84.5560	195.9592	317.0345
C1.330	2013-026A	SES-6					PL
TLEs	GEO (1.00)	2017-12-31	20:00:08.869				319.50
39172	TEME	42165.120	0.0001996	0.0202	20.3214	265.1150	319.5301
C1.331	2009-009A	Telstar 11N					PL
TLEs	GEO (1.00)	2017-12-31	17:58:39.842				322.44
34111	TEME	42165.100	0.0002723	0.0035	92.5311	166.3344	322.4846
C1.332	2005-003A	AMC 12					PL
TLEs	GEO (1.00)	2017-12-31	17:58:39.842				322.58
28526	TEME	42164.613	0.0003069	0.0276	317.4347	322.7351	322.5843
C1.333	2002-040A	Eutelsat 12 West A (Atlantic Bird 1)					PL
TLEs	GEO (1.00)	2017-12-31	19:43:21.252				323.98
27508	TEME	42165.453	0.0005928	0.0643	20.9435	311.1030	323.7373
C1.334	2017-006A	Hispasat 36W-1					PL
TLEs	GEO (1.00)	2017-12-31	19:42:18.332				324.07
41942	TEME	42164.938	0.0000987	0.0204	192.4998	83.6452	324.0006
C1.335	2017-041A	Intelsat 35e (IS-35e)					PL
TLEs	GEO (1.00)	2017-12-31	19:36:15.997				325.53
42818	TEME	42164.986	0.0002423	0.0199	16.9137	264.2598	325.5187
C1.336	2010-065A	HYLAS 1					PL
TLEs	GEO (1.00)	2017-12-31	21:32:44.920				326.50
37237	TEME	42165.611	0.0002052	0.0272	349.3234	299.7119	326.5380
C1.337	2008-034A	Intelsat 25 (Protostar 1)					PL
TLEs	GEO (1.00)	2017-12-31	19:24:12.941				328.49
33153	TEME	42165.240	0.0003000	0.0168	10.4783	263.4671	328.5395
C1.338	2002-016A	Intelsat 903					PL
TLEs	GEO (1.00)	2017-12-31	17:58:39.842				328.53
27403	TEME	42164.956	0.0000864	0.2648	95.1710	202.7452	328.5063
C1.339	2002-044A	Hispasat 1D					PL
TLEs	GEO (1.00)	2017-12-31	19:56:23.141				330.00
27528	TEME	42164.693	0.0006075	0.0521	237.4425	30.1724	330.0695
C1.340	2006-007A	Spainsat					PL
TLEs	GEO (1.00)	2017-12-31	19:18:09.133				330.01
28945	TEME	42164.620	0.0005707	0.0439	311.0870	341.8797	330.0546
C1.341	2010-070A	Hispasat 1E					PL
TLEs	GEO (1.00)	2017-12-31	19:56:23.141				330.01
37264	TEME	42165.273	0.0003040	0.0519	113.5062	147.9304	330.0426
C1.342	2003-007A	Intelsat 907					PL
TLEs	GEO (1.00)	2017-12-31	19:08:13.812				332.50
27683	TEME	42165.368	0.0003300	0.0140	18.0678	265.9690	332.5463
C1.343^m	2017-078A	Alcomsat 1					PL
TLEs	GEO (1.00)	2017-12-31	22:23:25.329				335.28
43039	TEME	42164.900	0.0002775	0.0409	212.1670	95.0835	335.2801

C1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C1.344	2002-027A	Intelsat 905					PL
TLEs	GEO (1.00)	2017-12-31	13:38:39.653				335.50
27438	TEME	42165.222	0.0002559	0.0141	19.7590	234.6569	335.5201
C1.345	2012-007A	SES-4					PL
TLEs	GEO (1.00)	2017-12-31	21:25:42.442				337.91
38087	TEME	42164.917	0.0002319	0.0154	6.1938	276.3780	338.0208
C1.346	2001-024A	Intelsat 901					PL
TLEs	GEO (1.00)	2017-12-31	13:38:39.653				342.00
26824	TEME	42164.936	0.0002690	0.0151	340.7601	288.0376	342.0187
C1.347	2008-030A	Skynet 5C					PL
TLEs	GEO (1.00)	2017-12-31	17:51:24.706				342.20
33055	TEME	42165.064	0.0003974	0.0599	16.1029	262.8069	342.2108
C1.348	2015-068A	Telstar 12 Vantage (Telstar 12V)					PL
TLEs	GEO (1.00)	2017-12-31	18:18:25.842				345.00
41036	TEME	42164.882	0.0002572	0.0140	62.1675	227.0160	345.0290
C1.349	2015-048A	Ekspress-AM 8					PL
TLEs	GEO (1.00)	2017-12-31	07:52:39.759				346.00
40895	TEME	42164.788	0.0000327	0.0430	201.3894	289.4775	346.0224
C1.350	2011-048A	Cosmos-2473					PL
TLEs	GEO (1.00)	2017-12-31	18:12:28.805				346.51
37806	TEME	42164.526	0.0003165	0.0659	93.6215	201.3121	346.5204
C1.351	2001-042A	Eutelsat 12 West B (Eutelsat 8 West A, Atlantic Bird 2)					PL
TLEs	GEO (1.00)	2017-12-31	06:14:21.998				347.51
26927	TEME	42164.947	0.0006610	0.0624	9.2212	269.7488	347.4387
C1.352	2009-068A	USA 211 (WGS SV-3)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000				348.00
UI159	J2000	42167.644	0.0000428	0.1115	74.7794	7.9539	347.9960
C1.353	2009-007A	Ekspress-AM 44					PL
TLEs	GEO (1.00)	2017-12-31	23:39:42.441				349.01
33595	TEME	42164.743	0.0000411	0.0419	201.7666	65.8266	349.0105
C1.354	2015-039B	Eutelsat 8 West B					PL
TLEs	GEO (1.00)	2017-12-31	17:50:26.877				352.01
40875	TEME	42164.654	0.0003616	0.0615	12.2606	273.5624	352.0440
C1.355	2011-051A	Eutelsat 7 West A (Nilesat 104, Atlantic Bird 7)					PL
TLEs	GEO (1.00)	2017-12-31	17:47:33.676				352.70
37816	TEME	42164.683	0.0005308	0.0665	35.7547	204.9862	352.7668
C1.356	2010-037A	Nilesat 201					PL
TLEs	GEO (1.00)	2017-12-31	21:19:39.726				352.99
36830	TEME	42165.055	0.0003934	0.0241	148.7394	141.8564	353.0370
C1.357	2006-033B	Syracuse 3B					PL
TLEs	GEO (1.00)	2017-12-31	21:19:39.726				354.80
29273	TEME	42165.040	0.0005334	0.0242	74.8963	212.8568	354.8409
C1.358	2002-035A	Eutelsat 5 West A (Atlantic Bird 3, Steliat 5)					PL
TLEs	GEO (1.00)	2017-12-31	17:38:24.603				355.00
27460	TEME	42164.951	0.0006005	0.0473	38.2280	245.2670	355.0604

C1.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time					λ
S-ID	Frame	a	e	i	Ω	ω		λ
C1.359	2008-022A	AMOS 3						PL
TLEs	GEO (1.00)	2017-12-31	19:45:39.875					356.00
32794	TEME	42164.632	0.0002647	0.0519	111.6168	165.7527		355.9289
C1.360	2014-046A	Asiasat 8						PL
TLEs	GEO (1.00)	2017-12-31	17:34:08.776					356.11
40107	TEME	42164.761	0.0002369	0.0374	84.8204	197.9580		356.1302
C1.361^m	2015-010A	ABS 3A						PL
TLEs	GEO (1.00)	2017-12-31	17:30:19.122					357.09
40424	TEME	42165.820	0.0001859	0.0246	29.7668	159.1304		357.0883
C1.362	2004-022A	Intelsat 10-02 (Thor 10-02)						PL
TLEs	GEO (1.00)	2017-12-31	21:03:42.598					359.03
28358	TEME	42165.192	0.0000758	0.0221	54.8384	253.9378		359.0301
C1.363	2009-058B	Thor 6 (Intelsat 1W)						PL
TLEs	GEO (1.00)	2017-12-31	21:03:42.598					359.18
36033	TEME	42164.850	0.0002366	0.0329	137.6915	161.8281		359.1750
C1.364	2008-006A	Thor 2R						PL
TLEs	GEO (1.00)	2017-12-31	21:03:42.598					359.26
32487	TEME	42164.774	0.0002774	0.0452	255.0433	32.4716		359.2716
C1.365	2015-022A	Thor 7						PL
TLEs	GEO (1.00)	2017-12-31	17:21:11.484					359.35
40613	TEME	42165.102	0.0002904	0.0063	297.2834	342.0241		359.3766

4.2 Satellites under Longitude Control (only E-W Control)

The following list contains 147 satellites under longitude control only, sorted according to the ascending order of the mean longitude.

For explanation of symbols, see the definitions at the beginning of section 4.

C2.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	$\bar{\lambda}$
S-ID	Frame	a	λ
C2.1^m	1998-063A	AfriStar 1	PL
TLEs	GEO (1.00)	2017-12-31	18:21:08.091
25515	TEME	42305.344	0.0006824
		3.6945	68.5993
			190.5042
			0.1464
C2.2	2010-039A	USA 214 (AEHF 1)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI167	J2000	42166.778	0.0003662
		0.8473	127.8556
			142.7935
			4.0000
C2.3^m	1997-008A	USA 130 (DSP F18, DSP 20, DSP Block 5(DSP-1) F18)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI125	J2000	42169.173	0.0000661
		13.0551	28.1268
			61.0808
			8.01
			8.0070
C2.4	2005-049B	Meteosat 9 (MSG 2)	PL
TLEs	GEO (1.00)	2017-12-31	20:16:42.645
28912	TEME	42164.255	0.0003508
		2.5922	71.5764
			222.3361
			9.3558
C2.5	2017-032A	Echostar 21	PL
TLEs	GEO (1.00)	2017-12-31	13:52:33.664
42749	TEME	42164.911	0.0002882
		7.1615	318.4954
			310.0559
			10.29
			10.2926
C2.6	2000-019A	Eutelsat 16C (SESAT 1)	PL
TLEs	GEO (1.00)	2017-12-31	22:13:42.601
26243	TEME	42164.662	0.0003266
		4.6387	65.3486
			224.5920
			14.4762
C2.7	2001-005A	SICRAL	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI178	J2000	42165.794	0.0004743
		7.7142	49.2699
			262.1426
			16.2650
C2.8	2008-011A	AMC 14	PL
TLEs	GEO (0.57)	2017-12-31	19:59:39.820
32708	TEME	42164.052	0.0035826
		19.4709	59.9069
			349.1984
			18.0256
C2.9	2002-001A	USA 164 (Milstar-2 F3)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI063	J2000	42166.379	0.0002084
		7.9259	36.2678
			247.0553
			18.95
			18.9530
C2.10	2013-011A	USA 241 (SBIRS GEO-2)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI175	J2000	42166.423	0.0001801
		3.3151	325.7802
			332.3173
			20.61
			20.6110
C2.11	2013-038A	Alphasat	PL
TLEs	GEO (1.00)	2017-12-31	17:28:08.430
39215	TEME	42164.321	0.0002404
		1.8400	27.4035
			241.5627
			24.84
			24.8582
C2.12	1993-056A	USA 95 (UFO F2)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI069	J2000	42165.496	0.0003323
		10.9578	21.8587
			299.0060
			28.70
			28.7000
C2.13	2003-043A	Eutelsat 31A (Eutelsat 33A, Eurobird 3, eBird 1)	PL
TLEs	GEO (1.00)	2017-12-31	21:00:42.610
27948	TEME	42165.175	0.0003946
		2.7662	77.5822
			231.8160
			30.84
			30.8825

C2.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		e	
		i	
		Ω	
		ω	
C2.14	2016-015A	IRNSS-R1F	PL
TLEs	GEO (1.00)	2017-12-31	08:31:23.149
41384	TEME	42166.390	0.0017398 3.7529 259.9384 174.0053
C2.15	1990-079A	Skynet 4C	PL
TLEs	GEO (1.00)	2017-12-31	16:01:26.388
20776	TEME	42164.009	0.0004122 13.9005 14.1522 267.8884
C2.16	2002-040B	Meteosat 8 (MSG 1)	PL
TLEs	GEO (1.00)	2017-12-31	18:39:39.722
27509	TEME	42163.537	0.0001643 5.1818 57.5928 245.7313
C2.17	2003-026A	Thuraya 2	PL
TLEs	GEO (1.00)	2017-12-31	19:44:54.798
27825	TEME	42164.100	0.0005105 5.0911 29.9085 242.7765
C2.18	2009-001A	USA 202 (NROL-26, ORION)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI155	J2000	42164.448	0.0010328 5.1076 31.0043 316.5650
C2.19^m	1994-054A	USA 105 (MERCURY 1)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI008	J2000	42163.595	0.0031481 11.2422 32.7658 152.4329
C2.20	2000-068A	Intelsat 12 (PAS 12, Europe*Star 1)	PL
TLEs	GEO (1.00)	2017-12-31	21:58:39.705
26590	TEME	42164.800	0.0004882 0.9068 91.7231 207.0697
C2.21^m	2003-052A	Chinasat 20 (Zhongxing 20, ZX 20, Shentong 1-1)	PL
TLEs	EGO (-)	2017-12-31	23:09:17.303
28082	TEME	42598.140	0.0004804 3.8909 70.3796 210.0145
C2.22	2001-019A	Intelsat 10 (PAS 10)	PL
TLEs	GEO (1.00)	2017-12-31	21:58:39.705
26766	TEME	42165.124	0.0004186 1.9322 84.2517 212.5604
C2.23^m	1996-026A	USA 118 (MERCURY 2)	PL
KIAM	EGO (0.07)	2018-01-01	00:00:00.000
UI073	J2000	42161.420	0.0411695 9.4869 359.9967 247.5559
C2.24	1997-053A	NSS 5 (NSS 803, Intelsat 803)	PL
TLEs	GEO (1.00)	2017-12-31	18:32:39.829
24957	TEME	42164.311	0.0003732 4.2183 68.3316 216.8366
C2.25	1997-076A	Astra 1G	PL
TLEs	GEO (1.00)	2017-12-31	21:57:39.704
25071	TEME	42165.061	0.0003684 2.7266 77.6566 202.5712
C2.26	2012-034A	USA 237 (NROL-15, ORION)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI173	J2000	42164.470	0.0043794 1.0261 26.1492 338.4730
C2.27	2000-081A	Astra 2D	PL
TLEs	GEO (1.00)	2017-12-31	17:55:24.751
26638	TEME	42165.144	0.0001964 4.0304 69.1496 210.4115
C2.28	2001-025A	Astra 2C	PL
TLEs	GEO (1.00)	2017-12-31	21:51:42.636
26853	TEME	42164.785	0.0003741 0.8202 91.0851 185.3091

C2.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		e	
		i	
		Ω	
		ω	
C2.29	2005-044A	Inmarsat-4 F2	PL
TLEs	GEO (1.00)	2017-12-31 14:03:44.858	63.90
28899	TEME	42164.934 0.0004238 2.6216 15.0946 273.4551	63.9449
C2.30	1996-020A	Inmarsat-3 F1	PL
TLEs	GEO (1.00)	2017-12-31 22:33:57.345	64.49
23839	TEME	42164.774 0.0005447 4.3579 66.6044 216.5432	64.4195
C2.31^m	2004-004A	USA 176 (DSP F22, DSP Block 5(DSP-1) F22)	PL
KIAM	GEO (1.00)	2018-01-01 00:00:00.000	65.53
UI108	J2000	42163.658 0.0001765 8.0915 44.8016 281.1184	65.5350
C2.32^m	1997-007A	Intelsat 26 (JCSAT R, JCSAT 4)	PL
TLEs	GEO (1.00)	2017-12-31 02:50:28.959	65.76
24732	TEME	42164.626 0.0003736 7.7576 48.6480 218.0878	65.7591
C2.33^m	2003-041A	USA 171 (Advanced ORION 3)	PL
KIAM	EGO (0.61)	2018-01-01 00:00:00.000	67.97
UI118	J2000	42164.507 0.0057996 9.8047 63.8198 210.9394	67.9720
C2.34	1999-063A	USA 146 (UFO F10)	PL
KIAM	GEO (1.00)	2018-01-01 00:00:00.000	71.66
UI065	J2000	42163.297 0.0005302 6.9315 38.7191 250.7216	71.6630
C2.35	2011-019A	USA 230 (SBIRS GEO-1)	PL
KIAM	GEO (1.00)	2018-01-01 00:00:00.000	72.82
UI166	J2000	42164.108 0.0003129 3.2590 325.2701 324.1617	72.8160
C2.36	2002-043A	KALPANA-1 (METSAT-1)	PL
TLEs	GEO (1.00)	2017-12-31 16:02:25.316	73.90
27525	TEME	42165.374 0.0016142 6.6730 53.9907 236.3311	73.0275
C2.37	2003-057A	USA 174 (UFO F11)	PL
KIAM	GEO (1.00)	2018-01-01 00:00:00.000	74.93
UI117	J2000	42163.255 0.0008493 5.2307 36.3216 250.9579	74.9280
C2.38	2015-044A	MUOS 4	PL
KIAM	EGO (0.60)	2018-01-01 00:00:00.000	75.05
UI192	J2000	42163.951 0.0058717 4.0353 332.7191 358.0267	75.0460
C2.39	2016-072A	Tian Lian 1-04	PL
TLEs	GEO (1.00)	2017-12-31 23:55:39.648	76.96
41869	TEME	42164.703 0.0008036 2.2455 288.3827 151.0972	77.0820
C2.40	2008-019A	Tian Lian 1-01	PL
TLEs	GEO (1.00)	2017-12-31 21:10:22.524	78.43
32779	TEME	42164.383 0.0037854 2.7789 75.1457 230.0724	79.9830
C2.41	2003-060A	Ekspress-AM 22 (SESAT 2)	PL
TLEs	GEO (1.00)	2017-12-31 19:37:08.175	80.12
28134	TEME	42164.894 0.0000536 0.8691 90.5694 237.9434	80.0978
C2.42	2014-020A	USA 250 (NROL-67)	PL
KIAM	GEO (1.00)	2018-01-01 00:00:00.000	82.08
UI182	J2000	42164.222 0.0004001 2.4178 324.7152 327.8054	82.0750
C2.43	2014-061A	IRNSS-R1C	PL
TLEs	GEO (1.00)	2017-12-31 03:57:01.992	83.02
40269	TEME	42165.477 0.0021795 2.6626 241.5675 4.7217	83.0354

C2.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		e	
		i	
		Ω	
		ω	
C2.44^m	2006-038A	Chinasat 22A (Zhongxing 22A, ZX 22A, Feng Huo 1-2)	PL
TLEs	GEO (1.00)	2017-12-31	83.34
29398	TEME	42222.833	83.3400
C2.45	1995-035B	TDRS 7	PL
TLEs	GEO (0.96)	2017-12-31	84.68
23613	TEME	42163.833	85.0860
C2.46	2008-066A	Fengyun 2E	PL
TLEs	GEO (1.00)	2017-12-31	86.54
33463	TEME	42165.068	86.7146
C2.47	2000-034A	TDRS 8	PL
TLEs	GEO (1.00)	2017-12-31	89.07
26388	TEME	42166.933	88.9991
C2.48	2002-062A	Nimiq 2	PL
TLEs	GEO (1.00)	2017-12-31	90.04
27632	TEME	42164.020	89.4822
C2.49	2017-066A	USA 279 (NROL-52, SDS-3, QUASAR)	PL
KIAM	GEO (1.00)	2018-01-01	92.04
UI195	J2000	42164.726	92.0400
C2.50	2002-015A	JCSAT 8	PL
TLEs	GEO (1.00)	2017-12-31	92.98
27399	TEME	42164.891	92.9341
C2.51	2014-023A	Luch 5V	PL
TLEs	GEO (1.00)	2017-12-31	94.78
39727	TEME	42163.951	94.6867
C2.52	2010-063A	USA 223 (NROL-32, ORION)	PL
KIAM	EGO (0.67)	2018-01-01	95.71
UI160	J2000	42164.614	95.7110
C2.53	1989-035A	USA 37 (VORTEX 6)	PL
KIAM	EGO (0.03)	2018-01-01	95.79
UI018	J2000	42163.505	95.7930
C2.54	2008-001A	Thuraya 3	PL
TLEs	GEO (1.00)	2017-12-31	98.60
32404	TEME	42164.993	98.5305
C2.55^m	1986-096A	USA 20 (FLTSATCOM F7)	PL
KIAM	GEO (1.00)	2018-01-01	99.94
UI134	J2000	42160.437	99.9360
C2.56	2016-047A	USA 269 (Quasar 20, SDS-4 1)	PL
KIAM	GEO (1.00)	2018-01-01	99.97
UI196	J2000	42165.460	99.9750
C2.57	2016-048A	Tiantong-1 01	PL
TLEs	GEO (1.00)	2017-12-31	101.40
41725	TEME	42165.339	101.3576
C2.58	1995-038A	USA 113 (DSCS III F9, DSCS 3-9, DSCS III B-7)	PL
KIAM	GEO (1.00)	2018-01-01	103.85
UI115	J2000	42164.319	103.8540

C2.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		e	
		i	
		Ω	
		ω	
C2.59^m	2014-090A	Fengyun 2G	PL
TLEs	GEO (1.00)	2017-12-31	104.67
40367	TEME	42164.011	104.6654
		0.0001349	
		0.1712	
		183.5360	
		116.6444	
C2.60	2000-016A	Asiastar	PL
TLEs	GEO (1.00)	2017-12-31	104.99
26107	TEME	42165.668	104.9684
		0.0004500	
		2.0842	
		81.4512	
		199.1839	
C2.61	2016-036A	USA 268 (NROL 37, ORION)	PL
KIAM	GEO (1.00)	2018-01-01	105.04
UI197	J2000	42164.860	105.0360
		0.0046826	
		7.2403	
		352.8513	
		31.9968	
C2.62^m	2000-080A	USA 155 (SDS 3 F2)	PL
KIAM	GEO (1.00)	2018-01-01	110.13
UI007	J2000	42164.879	110.1290
		0.0008178	
		8.2650	
		35.3491	
		204.1320	
C2.63	2001-009A	USA 157 (Milstar-2 F2)	PL
KIAM	GEO (1.00)	2018-01-01	111.04
UI112	J2000	42166.104	111.0400
		0.0002461	
		8.5462	
		35.4781	
		259.7392	
C2.64	2012-002A	Fengyun 2F	PL
TLEs	GEO (1.00)	2017-12-31	111.98
38049	TEME	42165.071	112.0222
		0.0002409	
		2.1168	
		78.1987	
		248.8971	
C2.65	2016-065A	Shi Jian 17	PL
TLEs	GEO (1.00)	2017-12-31	118.16
41838	TEME	42164.131	118.1275
		0.0000447	
		0.3928	
		97.2076	
		10.2355	
C2.66	2006-053A	Fengyun 2D	PL
TLEs	GEO (1.00)	2017-12-31	123.58
29640	TEME	42162.395	123.4231
		0.0006585	
		4.8122	
		63.4131	
		316.4237	
C2.67	1998-033A	Apstar 9A	PL
TLEs	GEO (1.00)	2017-12-31	125.50
25354	TEME	42165.551	125.5080
		0.0006145	
		1.6600	
		85.9412	
		184.0168	
C2.68	1995-022A	USA 110 (Advanced ORION 1)	PL
KIAM	EGO (0.97)	2018-01-01	126.81
UI128	J2000	42167.108	126.8110
		0.0046912	
		14.1344	
		37.1108	
		99.7607	
C2.69	2016-027A	IRNSS-R1G	PL
TLEs	GEO (1.00)	2017-12-31	129.54
41469	TEME	42163.141	129.4780
		0.0003821	
		3.8228	
		261.4753	
		181.3953	
C2.70^m	2001-033A	USA 159 (DSP F21, DSP Block 5(DSP-1) F21)	PL
KIAM	GEO (1.00)	2018-01-01	130.84
UI001	J2000	42167.844	130.8440
		0.0000847	
		9.9460	
		37.0485	
		255.5096	
C2.71	2002-035B	N-Star 3 (N-Star c)	PL
TLEs	GEO (1.00)	2017-12-31	136.00
27461	TEME	42165.499	135.9913
		0.0000800	
		4.9953	
		63.7319	
		350.4240	
C2.72	2017-004A	USA 273 (SBIRS GEO-3)	PL
KIAM	GEO (1.00)	2018-01-01	139.04
UI198	J2000	42166.502	139.0390
		0.0002841	
		5.4398	
		315.1898	
		327.6812	
C2.73	2008-007A	Kizuna (WINDS)	PL
TLEs	GEO (1.00)	2017-12-31	142.99
32500	TEME	42164.856	142.9763
		0.0002358	
		1.2533	
		89.1727	
		201.2628	

C2.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		e	
		i	
		Ω	
		ω	
C2.74	2005-009A	Inmarsat-4 F1	PL
TLEs	GEO (1.00)	2017-12-31	08:45:01.240
28628	TEME	42164.892	0.0003372 2.9022 14.7894 269.5866 143.50 143.5376
C2.75	2016-037A	Beidou DW 23	PL
TLEs	GEO (1.00)	2017-12-31	07:41:52.892
41586	TEME	42165.519	0.0004115 0.9525 330.6386 298.1155 144.55 144.6068
C2.76	2002-029A	Ekspress A1R (Express 4A)	PL
TLEs	GEO (1.00)	2017-12-31	20:34:54.227
27441	TEME	42164.399	0.0003419 6.3900 55.2809 104.8175 145.33 145.6565
C2.77	1999-013A	Asiasat 3S	PL
TLEs	GEO (1.00)	2017-12-31	23:04:15.299
25657	TEME	42164.979	0.0004312 2.9111 77.3113 207.4774 146.04 146.0219
C2.78	1996-063B	MEASAT 2	PL
TLEs	GEO (1.00)	2017-12-31	09:48:39.771
24653	TEME	42164.045	0.0011483 7.7792 48.3072 205.5132 148.01 148.0631
C2.79	1999-006A	JCSAT 6	PL
TLEs	GEO (1.00)	2017-12-31	19:15:54.243
25630	TEME	42164.912	0.0006983 2.7008 79.0499 199.2507 149.98 149.9513
C2.80	2013-050A	USA 246 (AEHF SV-3)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI181	J2000	42167.231	0.0007466 2.1175 305.7094 351.4777 152.30 152.3040
C2.81	1995-057A	USA 114 (UFO F6)	PL
KIAM	EGO (-)	2018-01-01	00:00:00.000
UI119	J2000	42593.923	0.0003579 9.2870 28.8051 212.6351 156.89 156.8880
C2.82	1997-046A	Badr C (Intelsat 5, Arabsat 2C, PAS 5)	PL
TLEs	GEO (1.00)	2017-12-31	11:31:32.563
24916	TEME	42164.752	0.0004361 3.9308 70.1423 195.6944 156.98 156.9007
C2.83	2000-072A	Intelsat 1R (PAS 1R)	PL
TLEs	GEO (1.00)	2017-12-31	20:39:01.407
26608	TEME	42164.868	0.0000388 0.7150 93.7135 160.5288 157.13 157.1012
C2.84	2000-012A	Superbird 4	PL
TLEs	GEO (1.00)	2017-12-31	20:45:13.809
26095	TEME	42164.794	0.0002679 0.8228 92.5651 191.1938 161.99 161.9372
C2.85	2011-074B	Luch 5A	PL
TLEs	GEO (1.00)	2017-12-31	14:47:06.192
37951	TEME	42165.176	0.0004341 1.6706 162.6536 126.6214 167.00 166.9308
C2.86	2014-027A	USA 252 (NROL-33)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI183	J2000	42167.262	0.0004237 2.5615 214.1087 74.2468 169.94 169.9370
C2.87	1998-016A	USA 138 (UFO F8)	PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000
UI111	J2000	42165.584	0.0007408 7.8067 37.0646 258.7770 171.89 171.8890
C2.88	2011-032A	Tian Lian 1-02	PL
TLEs	GEO (1.00)	2017-12-31	17:24:37.590
37737	TEME	42163.737	0.0009897 2.7840 76.5189 192.3964 176.75 176.6853

C2.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C2.89	1996-070A	Inmarsat-3 F3					PL
TLEs	GEO (1.00)	2017-12-31	13:19:26.788				178.10
24674	TEME	42164.186	0.0005378	3.8184	70.8314	211.4052	178.0859
C2.90	2000-001A	USA 148 (DSCS III F11, DSCS 3-11, DSCS III B-8)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000				180.42
UI104	J2000	42165.521	0.0003780	7.1371	52.2047	263.3871	180.4240
C2.91	2012-009A	MUOS 1					PL
KIAM	EGO (0.71)	2018-01-01	00:00:00.000				183.03
UI170	J2000	42166.734	0.0052729	3.0411	344.3927	183.5739	183.0310
C2.92	2002-055A	TDRS 10					PL
TLEs	GEO (1.00)	2017-12-31	08:46:08.188				185.69
27566	TEME	42166.800	0.0013141	5.3724	57.5559	225.4378	185.9098
C2.93	2013-004A	TDRS 11					PL
TLEs	GEO (1.00)	2017-12-31	02:39:50.192				188.95
39070	TEME	42162.861	0.0010973	5.1318	328.5964	301.5626	189.0512
C2.94^m	1991-054B	TDRS 5					PL
TLEs	GEO (1.00)	2017-12-31	17:13:30.920				192.29
21639	TEME	42166.140	0.0023801	14.4883	19.3466	334.7248	192.2937
C2.95	2000-024A	USA 149 (DSP F20, DSP Block 5(DSP-1) F20)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000				194.24
UI004	J2000	42164.964	0.0002762	10.8252	33.6038	296.3016	194.2430
C2.96	2017-047A	TDRS 13					PL
TLEs	GEO (1.00)	2017-12-31	01:29:29.017				210.23
42915	TEME	42165.840	0.0010088	6.8582	332.0919	336.6083	210.1336
C2.97^m	2011-011A	USA 227 (NROL-27, SDS-3, QUASAR)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000				218.91
UI165	J2000	42164.956	0.0005494	4.6141	3.2125	207.2575	218.9110
C2.98^m	1996-054A	GE 1					PL
TLEs	GEO (1.00)	2017-12-31	07:37:31.741				229.11
24315	TEME	42165.064	0.0002729	1.9810	84.0918	195.7721	229.1092
C2.99^m	2003-008A	USA 167 (DSCS III F13, DSCS 3-13, DSCS III A-3)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000				229.99
UI106	J2000	42165.758	0.0003568	5.1002	63.6410	237.5213	229.9860
C2.100	2003-012A	USA 169 (Milstar-2 F4)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000				240.00
UI109	J2000	42164.542	0.0002870	7.8177	51.1301	227.8742	239.9980
C2.101	2015-056A	Morelos 3					PL
TLEs	GEO (1.00)	2017-12-31	22:46:31.192				246.90
40946	TEME	42164.759	0.0003261	6.1630	328.9725	1.4194	246.9137
C2.102	1997-065A	USA 134 (DSCS III F10, DSCS 3-10, DSCS III B-13)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000				248.02
UI110	J2000	42162.902	0.0010325	9.2203	42.6114	233.1259	248.0180
C2.103	2009-035A	Terrestar 1					PL
TLEs	GEO (1.00)	2017-12-31	23:57:48.402				248.99
35496	TEME	42164.593	0.0002898	2.7490	348.8924	302.8761	249.0264

C2.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time				λ
S-ID	Frame	a	e	i	Ω	ω	λ
C2.104	1999-059A	Telstar 12 (Orion 2)					PL
TLEs	GEO (1.00)	2017-12-31	19:09:42.465				250.79
25949	TEME	42164.921	0.0003400	1.3529	88.0373	192.3952	250.7940
C2.105	1996-022A	MSAT					PL
TLEs	GEO (1.00)	2017-12-31	03:40:02.140				253.25
23846	TEME	42164.725	0.0006015	8.0418	47.3794	240.1252	252.5600
C2.106	2016-041A	MUOS 5					PL
KIAM	EGO (0.15)	2018-01-01	00:00:00.000				255.70
UI199	J2000	42164.101	0.0204067	8.9364	316.7208	196.0404	255.6960
C2.107^m	1995-019A	AMSC 1 (M-Sat 2)					PL
TLEs	GEO (1.00)	2017-12-31	02:46:53.317				256.72
23553	TEME	42164.516	0.0003898	10.3211	38.1759	225.1064	256.7202
C2.108	2010-061A	SkyTerra 1					PL
TLEs	GEO (1.00)	2017-12-31	22:17:45.555				258.69
37218	TEME	42165.044	0.0002115	2.9809	333.4185	335.5425	258.7090
C2.109	1995-003A	USA 108 (UFO F4)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000				259.86
UI121	J2000	42164.873	0.0007295	9.8483	26.5268	264.8947	259.8620
C2.110	2013-036A	MUOS 2					PL
KIAM	EGO (0.61)	2018-01-01	00:00:00.000				260.05
UI177	J2000	42164.414	0.0057790	3.4107	338.4775	354.5593	260.0470
C2.111	2008-039A	Inmarsat-4 F3					PL
TLEs	GEO (1.00)	2017-12-31	15:16:39.908				262.22
33278	TEME	42164.842	0.0002925	3.0264	3.4432	283.0842	261.9858
C2.112	2000-038A	Bermudasat 1 (EchoStar 6)					PL
TLEs	GEO (1.00)	2017-12-31	08:28:12.597				263.78
26402	TEME	42165.010	0.0003796	4.5556	66.1045	211.8947	263.7702
C2.113	2008-016A	EchoStar G1 (DBSD G1, ICO G1)					PL
TLEs	GEO (1.00)	2017-12-31	23:21:39.682				267.14
32763	TEME	42164.945	0.0002950	3.7633	357.6252	297.8750	267.1890
C2.114	2000-046A	Brasilsat B4					PL
TLEs	GEO (1.00)	2017-12-31	05:01:43.733				268.02
26469	TEME	42165.703	0.0003529	2.0650	83.8757	206.0957	267.9806
C2.115	1995-060A	USA 115 (Milstar DFS-2)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000				270.04
UI124	J2000	42164.044	0.0002524	12.7041	28.0350	241.0643	270.0420
C2.116	1997-002A	GE 2					PL
TLEs	GEO (1.00)	2017-12-31	12:59:30.808				277.78
24713	TEME	42164.865	0.0005597	4.6997	64.9373	219.9236	275.1107
C2.117	1994-070A	Astra 1D					PL
TLEs	GEO (1.00)	2017-12-31	09:19:16.040				287.36
23331	TEME	42165.365	0.0003494	7.8550	47.8967	236.2728	286.9320
C2.118	1997-050A	GE 3					PL
TLEs	GEO (1.00)	2017-12-31	18:26:12.640				287.99
24936	TEME	42164.845	0.0002859	0.7995	91.5245	181.0730	288.0186

C2.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		e	
		i	
		Ω	
		ω	
C2.119	1995-016A	Brazilsat B2	PL
TLEs	GEO (1.00)	2017-12-31	292.00
23536	TEME	42165.486	291.9506
		0.0002763	
		7.4822	
		49.7820	
		247.8474	
C2.120	2012-019A	USA 235 (AEHF 2)	PL
KIAM	GEO (1.00)	2018-01-01	292.56
UI171	J2000	42165.207	292.5580
		0.0004363	
		1.5486	
		357.9553	
		266.7604	
C2.121	1998-006A	Brazilsat B3	PL
TLEs	GEO (1.00)	2017-12-31	296.81
25152	TEME	42165.013	296.8046
		0.0002378	
		4.3992	
		67.3283	
		209.4413	
C2.122	1988-091B	TDRS 3	PL
TLEs	GEO (1.00)	2017-12-31	297.67
19548	TEME	42165.752	298.0354
		0.0039571	
		14.4462	
		5.9572	
		309.3195	
C2.123	1998-006B	Inmarsat-3 F5	PL
TLEs	GEO (1.00)	2017-12-31	305.98
25153	TEME	42165.630	305.9721
		0.0005395	
		2.9679	
		73.7535	
		207.8328	
C2.124^m	1994-084A	USA 107 (DSP F17, DSP 17, DSP Block 5(DSP-1) F17)	PL
KIAM	GEO (1.00)	2018-01-01	310.94
UI131	J2000	42164.966	310.9380
		0.0000853	
		14.3193	
		20.6605	
		133.4637	
C2.125	2002-015B	Astra 3A	PL
TLEs	GEO (1.00)	2017-12-31	313.02
27400	TEME	42164.145	313.0211
		0.0003226	
		4.1872	
		67.8642	
		212.9548	
C2.126	1993-003B	TDRS 6	PL
TLEs	GEO (1.00)	2017-12-31	314.11
22314	TEME	42165.182	314.0983
		0.0008903	
		14.0352	
		22.3205	
		292.9239	
C2.127^m	2003-040A	USA 170 (DSCS III F14, DSCS 3-14, DSCS III B-6)	PL
KIAM	GEO (1.00)	2018-01-01	317.73
UI107	J2000	42167.230	317.7280
		0.0001353	
		4.2397	
		68.9689	
		200.3338	
C2.128	2014-004A	TDRS 12	PL
TLEs	GEO (1.00)	2017-12-31	319.01
39504	TEME	42164.398	319.1990
		0.0004844	
		5.7590	
		335.9695	
		329.4337	
C2.129	1994-009A	USA 99 (Milstar DFS-1)	PL
KIAM	GEO (1.00)	2018-01-01	321.20
UI142	J2000	42165.643	321.1990
		0.0002317	
		12.7006	
		61.9538	
		234.6400	
C2.130	2001-005B	Skynet 4F	PL
TLEs	GEO (1.00)	2017-12-31	326.00
26695	TEME	42165.683	326.0000
		0.0003310	
		9.1157	
		35.2704	
		240.5314	
C2.131	2001-046A	USA 162 (SDS 3 F3)	PL
KIAM	GEO (1.00)	2018-01-01	329.76
UI151	J2000	42166.809	329.7590
		0.0011816	
		9.5980	
		52.6862	
		210.4623	
C2.132	2000-043A	Intelsat 9 (PAS 9)	PL
TLEs	GEO (1.00)	2017-12-31	330.52
26451	TEME	42164.565	330.5019
		0.0003290	
		3.9160	
		70.3594	
		207.6287	
C2.133^m	1999-033A	Astra 1H	PL
TLEs	GEO (1.00)	2017-12-31	330.55
25785	TEME	42231.461	330.5516
		0.0001274	
		4.2023	
		68.4879	
		287.4655	

C2.nn	COSPAR	Name	Type
Source	Orbit (f_{IADC}^{GEO})	Date	λ
S-ID	Frame	a	λ
		Time	
		e	
		i	
		Ω	
		ω	
C2.134	1998-029A	USA 139 (Advanced ORION 2)	PL
KIAM	GEO (1.00)	2018-01-01 00:00:00.000	333.59
UI074	J2000	42167.077 0.0044523 9.0036 356.8836 257.8223	333.5890
C2.135^m	2002-019A	NSS 7	PL
TLEs	GEO (1.00)	2017-12-31 00:07:20.463	340.02
27414	TEME	42164.520 0.0002590 2.3034 82.0324 208.6832	340.0155
C2.136	2000-054A	Astra 2B	PL
TLEs	GEO (1.00)	2017-12-31 19:59:38.715	340.43
26494	TEME	42165.030 0.0005337 2.6169 78.3210 206.0048	340.4611
C2.137	2012-061A	Luch 5B	PL
TLEs	GEO (1.00)	2017-12-31 21:25:42.442	343.86
38977	TEME	42165.078 0.0004489 3.9361 73.2372 215.3928	343.7552
C2.138	1996-053A	Inmarsat-3 F2	PL
TLEs	GEO (1.00)	2017-12-31 11:16:42.581	344.51
24307	TEME	42164.523 0.0007572 3.0282 76.7508 211.0790	344.4593
C2.139	2015-002A	MUOS 3	PL
KIAM	EGO (0.73)	2018-01-01 00:00:00.000	344.55
UI189	J2000	42167.238 0.0052174 3.8286 334.0933 181.4896	344.5540
C2.140	1989-077A	USA 46 (FLTSATCOM F8)	PL
KIAM	GEO (1.00)	2018-01-01 00:00:00.000	344.57
UI130	J2000	42167.298 0.0006895 13.0381 13.3642 274.0468	344.5720
C2.141	2000-028A	Eutelsat 36A (Eutelsat W4)	PL
TLEs	GEO (1.00)	2017-12-31 19:59:03.374	347.36
26369	TEME	42164.913 0.0006820 1.4290 85.2668 228.0306	347.3670
C2.142	2002-011A	TDRS 9	PL
TLEs	GEO (1.00)	2017-12-31 21:25:42.442	348.02
27389	TEME	42164.952 0.0023289 5.6533 76.7107 240.5591	348.2051
C2.143	2012-033A	USA 236 (NROL-38, SDS-3, QUASAR)	PL
KIAM	GEO (1.00)	2018-01-01 00:00:00.000	349.97
UI172	J2000	42167.346 0.0008479 1.2912 189.8014 83.9681	349.9700
C2.144	2000-046B	Nilesat 102	PL
TLEs	GEO (1.00)	2017-12-31 07:33:37.253	353.00
26470	TEME	42164.587 0.0006549 2.0915 82.7845 200.9385	352.9234
C2.145^m	1998-035A	Thor III	PL
TLEs	GEO (1.00)	2017-12-31 21:26:47.182	355.71
25358	TEME	42164.718 0.0002184 5.7561 58.0255 234.1423	355.7124
C2.146	2015-034A	Meteosat 11 (MSG 4)	PL
TLEs	GEO (1.00)	2017-12-31 08:48:29.134	356.46
40732	TEME	42164.874 0.0001592 1.5093 227.7854 53.3895	356.3707
C2.147	1999-009B	Skynet 4E	PL
TLEs	GEO (1.00)	2017-12-31 19:55:31.870	358.81
25639	TEME	42164.474 0.0003321 10.2979 27.1050 251.3929	358.8184

4.3 Satellites in a Controlled Drift Orbit

The following list contains 7 controlled drifting satellites, sorted according to the ascending order of the mean drift rate (which is equivalent to the decreasing order of the mean semi-major axis).

For explanation of symbols, see the definitions at the beginning of section 4.

C4.nn	COSPAR	Name					Type
Source	Orbit ($f_{\text{IADC}}^{\text{GEO}}$)	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
C4.1	2016-075A	WGS SV-8					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	-0.01	1.088	-1.320	3.496
UI200	J2000	42165.261	0.0000571	0.1528	83.4823	203.4881	56.8130
C4.2	2014-055A	USA 257 (CLIO)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	0.02	-1.600	-66.172	62.972
UI188	J2000	42162.573	0.0015315	0.1584	135.3234	221.7750	81.0410
C4.3^m	2000-065A	USA 153 (DSCS III F12, DSCS 3-12, DSCS III B-11)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	0.40	-34.700	-49.300	-21.000
UI105	J2000	42127.305	0.0001942	6.5445	55.1761	15.4332	77.5500
C4.4^m	2014-043B	USA 254 (GSSAP 2, AFSPC-4 F2)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	0.50	-39.500	-49.700	-29.500
UI185	J2000	42122.356	0.0001872	0.1197	88.3082	224.3200	263.5430
C4.5^m	2016-052B	USA 271					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	0.50	-48.900	-53.000	-44.300
UI201	J2000	42117.764	0.0000933	0.1513	87.9935	253.2824	347.7120
C4.6^m	2014-043A	USA 253 (GSSAP 1, AFSPC-4 F1)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	0.75	-4.500	-9.900	0.900
UI184	J2000	42142.252	0.0000190	0.1716	76.6900	284.1656	91.1010
C4.7^m	2016-052A	USA 270					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	1.00	-22.100	-32.700	-11.900
UI202	J2000	42143.027	0.0002227	0.1735	92.3721	223.0440	143.3330

4.4 Objects in a Drift Orbit

The following list contains 795 drifting objects, sorted according to the ascending order of the mean drift rate (which is equivalent to the decreasing order of the mean semi-major axis).

For explanation of symbols, see the definitions at the beginning of section 4.

D.nn	COSPAR	Name					Type
Source	Orbit ($f_{\text{IADC}}^{\text{GEO}}$)	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.1	2010-006B	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (-)	2017-12-31	13:08:42.594	-47.99	4206.336	2049.964	6362.709
36398	TEME	46370.584	0.0474703	6.6834	63.3795	3.8395	136.9702
D.2	2012-057B	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (-)	2017-12-31	06:15:06.647	-42.80	3700.820	1348.939	6052.700
38868	TEME	45865.276	0.0525848	4.2284	74.6991	345.3957	318.1869
D.3	2013-077B	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (-)	2017-12-31	17:46:19.151	-38.55	3296.928	1022.163	5571.693
39488	TEME	45461.229	0.0502040	2.7454	72.5718	122.4859	65.1403
D.4	2011-074C	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.11)	2017-12-31	12:27:10.094	-38.33	3276.391	-50.348	6603.129
37952	TEME	45440.782	0.0723265	4.3226	59.2863	121.0189	254.1002
D.5	1969-045A	Intelsat III F-4					PL
TLEs	EGO (-)	2017-12-31	14:41:22.817	-36.83	3135.815	3020.157	3251.474
3947	TEME	45299.844	0.0029858	11.6337	312.5476	1.7300	160.8979
D.6	1968-116A	Intelsat III F-2					PL
TLEs	EGO (-)	2017-12-31	20:33:39.705	-36.29	3085.648	2636.616	3534.680
3623	TEME	45249.883	0.0101014	11.5920	315.9783	15.7431	81.0791
D.7	2017-046C	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.12)	2017-12-31	01:18:51.870	-35.79	3039.381	-35.796	6114.558
42909	TEME	45203.713	0.0679506	0.3896	78.2623	99.6272	240.6287
D.8	2014-010C	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.15)	2017-12-31	02:02:59.786	-34.90	2956.888	-135.012	6048.788
39614	TEME	45121.103	0.0696796	3.0329	78.1504	349.8412	307.2940
D.9	2014-058B	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.13)	2017-12-30	22:33:49.076	-30.91	2592.991	3.233	5182.748
40259	TEME	44757.007	0.0587877	2.6474	79.2675	134.1420	0.7007
D.10	2014-023C	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.10)	2017-12-31	12:09:51.265	-27.82	2316.068	-280.681	4912.817
39729	TEME	44480.245	0.0590848	3.0953	58.1871	148.1512	135.2619
D.11	2006-048A	Xinnuo 2					PL
TLEs	EGO (-)	2017-12-31	10:18:28.927	-26.61	2208.610	2026.399	2390.821
29516	TEME	44372.433	0.0043086	6.8372	88.3689	200.1844	193.5089
D.12	2016-065C	Yuanzheng-2 (Long March (CZ) 5/YZ-2)					RB
TLEs	EGO (0.18)	2017-12-31	23:04:51.838	-24.48	2020.837	-149.445	4191.120
41840	TEME	44184.955	0.0494305	1.3268	101.0442	153.3488	13.0545
D.13	1997-040A	PAS 6					PL
TLEs	EGO (0.05)	2017-12-31	08:51:39.770	-23.67	1950.052	-1110.169	5010.274
24891	TEME	44114.284	0.0684725	13.3177	344.0546	183.0154	294.4389

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.14	1978-113D	Transtage 36 (Titan IIIC)					RB
TLEs	EGO (-)	2017-12-31	04:20:59.211	-23.46	1931.792	735.957	3127.627
11147	TEME	44096.019	0.0274699	16.9028	334.5081	348.9708	345.5672
D.15	1978-113A	OPS 9441 (DSCS II F-11, DSCS 2-11, DSCS II C-11)					PL
TLEs	EGO (-)	2017-12-31	20:49:39.701	-22.47	1845.593	1725.617	1965.568
11144	TEME	44009.887	0.0021131	16.1518	340.2262	128.6683	284.0583
D.16	2014-085A	GVM/Briz-M					PL
TLEs	EGO (-)	2017-12-31	11:38:23.720	-22.37	1836.748	374.653	3298.843
40355	TEME	44000.791	0.0333117	2.6346	86.5637	275.3677	171.3446
D.17	—	—					—
KIAM	EGO (-)	2018-01-01	00:00:00.000	-21.42	1755.299	1593.513	1917.085
UI058	J2000	43919.472	0.0036837	16.0332	332.1641	343.9658	28.2700
D.18	1985-024A	Ekran 14					PL
TLEs	EGO (-)	2017-12-30	01:08:42.608	-19.72	1608.642	1529.657	1687.628
15626	TEME	43772.906	0.0024804	16.5604	346.5172	292.4533	56.2282
D.19	1984-115A	NATO IIID					PL
TLEs	EGO (-)	2017-12-31	04:04:12.216	-19.15	1560.225	1119.332	2001.119
15391	TEME	43724.532	0.0096190	14.3674	15.4818	56.6876	231.0497
D.20	1973-100D	Transtage 26 (Titan IIIC)					RB
TLEs	EGO (-)	2017-12-31	06:25:52.131	-19.00	1547.183	384.781	2709.585
6976	TEME	43711.639	0.0261199	13.8460	318.3540	43.7743	270.9192
D.21	1983-016A	Ekran 10					PL
TLEs	EGO (-)	2017-12-31	06:17:13.134	-18.88	1537.104	1396.312	1677.895
13878	TEME	43701.035	0.0037836	16.0793	337.7289	310.5741	162.3071
D.22	1981-122A	MARECS A					PL
TLEs	EGO (-)	2017-12-31	22:14:39.713	-18.84	1534.154	1025.221	2043.087
13010	TEME	43698.507	0.0115772	15.4146	351.3766	192.8267	277.9966
D.23	1982-106A	OPS 9445 (DSCS II F-16, DSCS 2-16)					PL
TLEs	EGO (-)	2017-12-31	10:47:39.804	-18.66	1518.681	1498.255	1539.107
13636	TEME	43683.031	0.0003288	16.0777	350.7776	271.6784	265.4437
D.24	2008-006C	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (-)	2017-12-31	16:19:55.310	-18.55	1509.090	361.267	2656.914
37381	TEME	43673.642	0.0266690	7.9053	39.4194	238.2189	59.0151
D.25	1988-036A	Ekran-M 18					PL
TLEs	EGO (-)	2017-12-31	06:07:58.483	-18.34	1491.621	1446.565	1536.677
19090	TEME	43655.515	0.0012736	16.5654	356.7793	347.6771	347.6843
D.26	1998-065A	Intelsat 8 (PAS 8)					PL
TLEs	EGO (0.06)	2017-12-31	17:03:39.878	-18.32	1489.376	185.055	2793.696
25522	TEME	43653.866	0.0300622	1.4541	87.2176	224.4586	219.2678
D.27	2014-064B	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.06)	2017-12-31	17:27:45.052	-18.18	1478.091	-981.383	3937.565
40278	TEME	43642.518	0.0576412	1.5647	84.6859	150.1775	81.4719
D.28	1977-005A	NATO IIIB					PL
TLEs	EGO (-)	2017-12-31	17:15:16.255	-18.02	1463.950	1272.019	1655.882
9785	TEME	43627.950	0.0048958	14.0302	334.3569	332.3671	176.9918

D.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$	
S-ID	Frame	a	e	i	Ω	ω	λ	
D.29	1979-098C	Transtage 37 (Titan IIIC)						RB
TLEs	EGO (0.13)	2017-12-31	04:21:39.387	-17.84	1448.852	81.568	2816.136	
11623	TEME	43612.913	0.0315579	16.2079	334.9103	354.7850	6.6635	
D.30	1977-034B	OPS 9438 (DSCS II F-8, DSCS 2-8, DSCS II C-8)						PL
TLEs	EGO (-)	2017-12-31	12:40:32.443	-17.45	1415.886	1266.160	1565.613	
10001	TEME	43580.182	0.0030617	15.2523	329.4882	68.3727	218.1034	
D.31	2008-022B	Blok-DM-SL-B (Zenit-3SLB)						RB
TLEs	EGO (0.07)	2017-12-31	11:04:04.806	-17.06	1383.299	-848.701	3615.299	
33059	TEME	43547.676	0.0532472	8.4977	52.6316	345.9237	279.4401	
D.32	1977-034C	Transtage 32 (Titan IIIC)						RB
TLEs	EGO (0.14)	2017-12-31	22:36:45.960	-16.98	1376.508	71.380	2681.636	
10002	TEME	43541.213	0.0299015	15.4350	326.9407	20.5685	77.0907	
D.33	1979-098A	OPS 9443 (DSCS II F-13, DSCS 2-13, DSCS II D-13)						PL
TLEs	EGO (-)	2017-12-31	20:42:09.917	-16.83	1363.625	1322.632	1404.618	
11621	TEME	43527.904	0.0008121	15.6736	339.4090	15.8756	107.3914	
D.34	2007-054B	Delta IV DCSS 5 (Delta 4H)						RB
KIAM	EGO (-)	2018-01-01	00:00:00.000	-15.84	1280.663	228.173	2333.153	
UI147	J2000	43444.836	0.0242259	4.6401	74.9776	59.5859	263.2390	
D.35	1987-109A	Ekran-M 17						PL
TLEs	EGO (-)	2017-12-31	06:14:21.998	-15.81	1277.731	1094.748	1460.714	
18715	TEME	43441.851	0.0039284	16.3076	359.1981	168.9782	347.5032	
D.36	1976-053A	Marisat 2						PL
TLEs	EGO (-)	2017-12-31	06:05:39.725	-15.75	1272.561	734.321	1810.800	
8882	TEME	43436.676	0.0126784	14.1693	328.8542	256.0089	312.3071	
D.37	1984-114B	MARECS B2						PL
TLEs	EGO (-)	2017-12-31	02:35:13.557	-15.64	1264.014	766.771	1761.256	
15386	TEME	43428.068	0.0118561	16.5544	357.8117	334.0847	21.8575	
D.38	1987-028A	Raduga 20						PL
TLEs	EGO (-)	2017-12-30	10:16:39.764	-15.52	1253.692	1134.271	1373.112	
17611	TEME	43417.951	0.0021723	16.9055	354.3479	93.1356	285.6088	
D.39	1984-090A	Ekran 13						PL
TLEs	EGO (-)	2017-12-31	01:27:39.694	-15.30	1235.189	1160.039	1310.339	
15219	TEME	43399.222	0.0012638	15.8602	342.9990	130.3395	38.2219	
D.40	1997-029A	Fengyun 2A (Fengyun 2-1R)						PL
TLEs	EGO (-)	2017-12-30	15:15:12.581	-15.20	1226.846	802.021	1651.672	
24834	TEME	43391.248	0.0099465	13.8874	29.0871	164.9077	242.6727	
D.41	2009-001B	Delta IV DCSS 5 (Delta 4H)						RB
KIAM	EGO (0.12)	2018-01-01	00:00:00.000	-15.20	1226.606	115.637	2337.575	
UI154	J2000	43390.779	0.0256038	5.3501	34.1093	15.4013	198.9080	
D.42	1984-028A	Ekran 12						PL
TLEs	EGO (-)	2017-12-31	17:23:32.109	-15.17	1223.834	1189.184	1258.484	
14821	TEME	43387.616	0.0004525	15.6982	339.6521	29.6048	159.1971	
D.43	1991-084B	Inmarsat-2 F3						PL
TLEs	EGO (-)	2017-12-30	21:55:04.926	-15.16	1223.353	1172.368	1274.338	
21814	TEME	43387.747	0.0010725	11.5495	32.7044	347.0511	105.6602	

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.44	1987-073A	Ekran 16					PL
TLEs	EGO (-)	2017-12-31	14:21:45.459	-13.64	1096.895	1074.355	1119.436
18328	TEME	43261.046	0.0003556	15.9773	352.7343	263.1454	204.0595
D.45	1986-038A	Ekran 15					PL
TLEs	EGO (-)	2017-12-31	15:17:44.001	-13.42	1078.308	1035.117	1121.500
16729	TEME	43242.592	0.0015773	15.8303	347.8051	297.2850	226.2382
D.46	1988-108A	Ekran-M 19					PL
TLEs	EGO (-)	2017-12-31	07:12:09.699	-13.04	1046.865	922.269	1171.461
19683	TEME	43210.652	0.0023405	16.1305	1.1800	143.9542	160.3251
D.47	1977-034A	OPS 9437 (DSCS II F-7, DSCS 2-7, DSCS II C-7)					PL
TLEs	EGO (-)	2017-12-30	03:29:28.945	-12.96	1040.407	967.706	1113.108
10000	TEME	43204.817	0.0021999	14.8428	325.6131	288.9299	280.3813
D.48	1986-090A	Gorizont 13					PL
TLEs	EGO (-)	2017-12-31	00:42:39.720	-12.77	1024.962	957.522	1092.402
17083	TEME	43189.309	0.0020757	15.8531	353.5555	290.0200	64.6922
D.49	1988-051A	Meteosat 3					PL
TLEs	EGO (-)	2017-12-30	21:51:19.570	-11.97	958.976	936.054	981.897
19215	TEME	43123.200	0.0009250	16.0998	6.8122	288.5173	118.3126
D.50	1985-028C	LEASAT 3 (Syncom-4 3)					PL
TLEs	EGO (-)	2017-12-31	09:45:35.785	-11.92	954.468	626.724	1282.213
15643	TEME	43118.758	0.0077007	16.9201	338.2275	224.6461	294.9531
D.51	1992-060B	Satcom C-3					PL
TLEs	EGO (-)	2017-12-31	11:39:31.003	-11.75	940.189	840.220	1040.158
22117	TEME	43104.551	0.0026972	10.4365	40.4088	295.0953	231.9427
D.52	1989-020B	Meteosat 4 (MOP 1)					PL
TLEs	EGO (-)	2017-12-31	02:45:18.031	-11.39	911.010	827.570	994.450
19876	TEME	43075.508	0.0014153	15.9675	11.3430	136.2940	56.2360
D.53	1996-030B	Intelsat 24 (AMOS 1)					PL
TLEs	EGO (-)	2017-12-31	09:16:29.801	-11.36	908.660	863.513	953.807
23865	TEME	43073.085	0.0008913	7.3937	52.9163	163.9524	251.6453
D.54	1995-040A	Intelsat 4 (PAS 4)					PL
TLEs	EGO (-)	2017-12-31	04:34:11.120	-11.33	905.839	796.767	1014.912
23636	TEME	43069.574	0.0031113	6.1399	59.0742	177.1381	357.2325
D.55	1992-032A	NSS K (Intelsat K)					PL
TLEs	EGO (-)	2017-12-31	08:36:32.649	-11.14	890.050	513.889	1266.212
21989	TEME	43053.673	0.0088922	12.3455	35.0651	281.9599	160.5914
D.56	1971-095C	Transtage 21 (Titan IIIC)					RB
TLEs	EGO (-)	2017-12-31	13:54:28.975	-11.11	887.729	225.356	1550.101
5589	TEME	43051.957	0.0150850	10.8018	310.9458	98.5114	212.0318
D.57	1984-023A	Intelsat V F-8					PL
TLEs	EGO (-)	2017-12-31	15:05:39.864	-10.74	857.317	770.117	944.517
14786	TEME	43021.300	0.0014043	15.9621	2.7515	166.3877	209.9670
D.58	2000-003A	Chinasat 22 (Zhongxing 22, ZX 22, Feng Huo 1-1)					PL
TLEs	EGO (-)	2017-12-31	10:15:18.686	-10.62	848.116	826.882	869.350
26058	TEME	43011.915	0.0010142	7.5371	50.1444	237.3398	155.4283

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.59	1998-024A	Nilesat 101					PL
TLEs	EGO (-)	2017-12-31	17:23:03.317	-10.37	827.188	717.319	937.056
25311	TEME	42991.193	0.0032450	3.9107	71.7066	213.2132	199.8969
D.60	1989-070A	Himawari 4 (GMS 4)					PL
TLEs	EGO (-)	2017-12-31	23:14:42.610	-10.30	821.886	621.092	1022.681
20217	TEME	42986.264	0.0041581	15.7988	11.8643	65.3071	283.0564
D.61	1984-093C	LEASAT 2 (Syncom-4 2)					PL
TLEs	EGO (-)	2017-12-31	00:56:19.970	-10.14	808.860	676.704	941.016
15236	TEME	42972.812	0.0029994	16.0524	341.1666	207.9704	333.3501
D.62	1985-107F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	07:05:36.009	-10.00	797.134	720.734	873.534
16339	TEME	42961.062	0.0016117	15.3488	348.2862	30.8151	158.7421
D.63	1973-100B	OPS 9434 (DSCS II F-4, DSCS 2-4, DSCS II B-4)					PL
TLEs	EGO (-)	2017-12-31	07:14:15.844	-9.92	790.397	486.151	1094.644
6974	TEME	42954.208	0.0075694	11.9378	316.2381	355.0657	162.7634
D.64	1977-007A	OPS 3151 (DSP F7, DSP 9, DSP Block 2(PHASE II) F7)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-9.90	788.645	420.003	1157.288
UI057	J2000	42952.818	0.0085825	11.8657	317.4478	317.7559	314.0020
D.65	1978-073F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	12:18:57.024	-9.74	775.779	711.350	840.207
11941	TEME	42940.038	0.0011709	13.4273	321.3919	76.9715	250.4041
D.66	1982-113F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-30	12:52:42.617	-9.73	774.922	678.648	871.195
13954	TEME	42939.308	0.0022606	14.7533	337.9434	216.8933	34.9664
D.67	1976-101A	Marisat 3					PL
TLEs	EGO (-)	2017-12-31	12:41:39.788	-9.66	769.254	339.709	1198.800
9478	TEME	42933.408	0.0106344	11.7970	330.0221	281.9731	31.7824
D.68	1986-082F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	22:14:39.713	-9.63	766.999	647.982	886.016
17065	TEME	42931.571	0.0022885	15.4698	351.4893	88.8904	277.1114
D.69	1969-013B	Transtage 17 (Titan IIIC)					RB
TLEs	EGO (0.20)	2017-12-31	05:57:01.985	-9.59	763.555	119.783	1407.328
3692	TEME	42928.035	0.0162206	6.3963	301.5592	126.7152	343.2819
D.70	1983-088F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	06:22:33.392	-9.57	762.154	695.489	828.818
14333	TEME	42926.167	0.0012641	15.0585	340.4771	49.0711	329.1131
D.71	1983-066F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	12:45:05.781	-9.56	761.509	715.257	807.761
15141	TEME	42926.075	0.0005644	14.9848	340.2286	103.1472	261.5332
D.72	1980-016D	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	09:59:11.270	-9.55	760.083	695.873	824.292
11728	TEME	42924.018	0.0014597	13.9657	325.8471	228.9740	300.5238
D.73	2009-007D	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.27)	2017-12-31	20:42:26.313	-9.51	757.459	-74.887	1589.804
33598	TEME	42921.223	0.0200075	6.9890	56.1672	350.0181	145.9374

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.74	1973-100A	OPS 9433 (DSCS II F-3, DSCS 2-3, DSCS II B-3)					PL
TLEs	EGO (-)	2017-12-31	21:43:39.666	-9.43	750.385	617.679	883.091
6973	TEME	42914.929	0.0026849	12.4523	314.6101	150.8011	69.4700
D.75	1987-040A	Gorizont 14					PL
TLEs	EGO (-)	2017-12-31	06:11:29.880	-9.42	749.558	620.462	878.653
17969	TEME	42913.483	0.0025035	15.3227	345.8237	136.8421	200.0914
D.76	1981-027F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	11:57:09.459	-9.40	748.155	671.873	824.436
14194	TEME	42912.452	0.0013070	14.4989	328.6025	136.2987	239.5385
D.77	1979-062D	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	22:07:47.857	-9.38	746.337	724.950	767.724
14005	TEME	42910.269	0.0003319	13.9681	325.3188	250.9759	117.0389
D.78	1986-044F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	21:46:42.600	-9.38	746.242	702.114	790.370
16797	TEME	42910.755	0.0005288	15.3754	350.4376	137.1668	102.9360
D.79	1996-005D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	16:19:42.796	-9.36	744.831	686.442	803.220
23778	TEME	42909.543	0.0008849	14.7712	22.0434	121.2937	53.8298
D.80	1986-027F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	20:35:39.872	-9.31	740.577	588.991	892.163
16676	TEME	42904.726	0.0032061	15.9321	349.3997	60.7382	301.6323
D.81	1981-069F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	04:21:20.945	-9.27	737.578	644.849	830.307
12850	TEME	42901.362	0.0017164	14.4395	330.2026	103.5858	356.7014
D.82	1982-113A	Raduga 11					PL
TLEs	EGO (-)	2017-12-31	07:21:39.907	-9.24	734.886	560.512	909.260
13669	TEME	42898.855	0.0040375	14.6490	338.2446	216.1366	311.1897
D.83	1977-071F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-30	12:59:39.704	-9.13	726.218	679.585	772.851
11570	TEME	42890.347	0.0009848	12.8220	318.2875	38.1155	19.8571
D.84	2001-045A	Raduga 1-6					PL
TLEs	EGO (-)	2017-12-31	09:32:42.989	-9.10	724.217	651.025	797.409
26936	TEME	42888.020	0.0014652	11.6761	37.1517	146.5411	174.4358
D.85	1988-028D	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	10:06:39.782	-8.96	712.475	624.753	800.197
19020	TEME	42876.691	0.0017557	15.9437	356.6052	38.3764	293.6004
D.86	1986-007F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	13:32:09.677	-8.91	708.537	571.286	845.788
16870	TEME	42873.049	0.0027492	15.3333	348.3063	94.8518	232.6857
D.87	1985-076D	LEASAT 4 (Syncom-4 3)					PL
TLEs	EGO (-)	2017-12-30	14:48:11.227	-8.91	708.298	679.183	737.413
15995	TEME	42872.610	0.0011663	13.6824	351.2164	286.8133	39.6927
D.88	1977-108D	Meteosat 1 AKM (MAGE 1)					PM
TLEs	EGO (-)	2017-12-31	21:36:39.756	-8.89	707.059	335.966	1078.152
13907	TEME	42872.157	0.0083349	13.4859	318.4913	57.3742	75.7778

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.89	1985-070F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-30	09:12:39.741	-8.89	706.625	656.455	756.795
15963	TEME	42871.072	0.0006486	15.2340	346.9321	96.5504	111.2444
D.90	1988-028A	Gorizont 15					PL
TLEs	EGO (-)	2017-12-31	02:35:03.678	-8.81	699.882	545.181	854.583
19017	TEME	42863.739	0.0030055	15.9048	356.8301	115.8947	16.8029
D.91	1982-106B	DSCS III F1 (DSCS 3-1, DSCS III A-1)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-8.80	699.267	644.590	753.944
UI135	J2000	42863.440	0.0012756	15.3330	358.3436	122.6333	275.1270
D.92	1992-043D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	21:54:42.501	-8.79	698.564	590.236	806.892
22044	TEME	42862.819	0.0019906	15.6541	11.7358	120.2070	124.9753
D.93	1989-101G	Proton-K/DM-2 fragmentation debris					RF
TLEs	EGO (-)	2017-12-30	07:38:29.842	-8.72	693.318	574.316	812.321
21648	TEME	42857.112	0.0034710	15.7128	2.9587	253.1448	171.4204
D.94	1989-098D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	15:05:24.864	-8.71	692.485	611.987	772.983
20370	TEME	42856.880	0.0013387	15.9675	2.9457	113.1774	214.5409
D.95	1990-102D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-30	23:38:39.655	-8.66	688.222	606.204	770.240
21046	TEME	42852.931	0.0014471	15.7421	6.0277	139.0449	93.8943
D.96	1989-048D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	22:22:47.529	-8.58	681.287	587.146	775.429
20086	TEME	42846.091	0.0017554	15.6779	1.1379	58.4054	72.8662
D.97	1989-030D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	04:21:30.165	-8.46	672.125	595.305	748.946
19931	TEME	42836.172	0.0012963	15.5836	0.3766	130.9393	0.5123
D.98	1980-049F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	00:26:39.779	-8.41	667.898	539.959	795.837
11862	TEME	42832.040	0.0025604	14.1541	327.7285	134.6418	43.1743
D.99	1988-095F	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	07:33:36.133	-8.40	667.262	606.288	728.236
19777	TEME	42831.115	0.0014293	15.5957	358.8110	202.7636	168.7109
D.100	1995-067A	Telecom 2C					PL
TLEs	EGO (-)	2017-12-31	12:55:34.790	-8.40	666.896	599.081	734.710
23730	TEME	42831.467	0.0021880	11.0670	37.5596	232.3116	103.5224
D.101	1990-116D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	14:58:39.711	-8.39	666.163	525.985	806.342
21041	TEME	42830.815	0.0031890	15.7339	6.3886	11.0161	222.0278
D.102	1992-021B	Inmarsat-2 F4					PL
TLEs	EGO (-)	2017-12-31	16:20:13.750	-8.39	665.958	644.390	687.527
21940	TEME	42830.749	0.0001961	9.5882	30.7716	237.4792	68.1832
D.103	1996-034D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	11:51:39.866	-8.38	665.114	534.366	795.863
23883	TEME	42829.620	0.0028480	14.6416	22.7540	13.9568	291.1604

D.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$	
S-ID	Frame	a	e	i	Ω	ω	λ	
D.104	1988-018B	Telecom 1C						PL
TLEs	EGO (-)	2017-12-31	14:51:39.797	-8.34	662.302	230.457	1094.148	
18952	TEME	42826.835	0.0093792	15.6716	14.9246	74.5438	229.7669	
D.105	2001-014C	Briz-M (Proton-M/Briz-M)						RB
TLEs	EGO (0.28)	2017-12-31	20:49:18.175	-8.31	659.608	-57.656	1376.871	
26738	TEME	42824.170	0.0171251	12.2771	38.6192	158.8264	104.3154	
D.106	1994-008D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-31	17:37:12.177	-8.30	659.287	571.558	747.016	
22984	TEME	42823.715	0.0022245	15.4280	16.5587	336.1497	25.9212	
D.107	1989-004F	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-31	13:25:39.781	-8.21	651.325	552.901	749.748	
19776	TEME	42816.088	0.0020096	15.5666	359.6236	41.0275	241.1245	
D.108	1993-013D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-31	21:32:58.979	-8.14	645.631	575.238	716.024	
22624	TEME	42809.382	0.0012904	15.5959	13.7591	32.1255	318.3947	
D.109	1991-087D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-30	02:42:25.278	-8.12	644.175	571.458	716.892	
21824	TEME	42808.636	0.0017983	15.7238	9.6282	340.9593	42.7900	
D.110	1992-082D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-31	23:55:50.455	-8.10	642.586	602.553	682.619	
22248	TEME	42807.344	0.0008116	15.6138	12.5228	355.4931	84.4840	
D.111	1999-010D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-30	19:22:10.232	-8.02	636.463	546.839	726.087	
25645	TEME	42800.633	0.0025168	14.6983	31.0672	261.6164	19.4286	
D.112	2004-042A	Fengyun 2C						PL
TLEs	EGO (-)	2017-12-31	02:33:24.883	-7.89	625.456	605.141	645.772	
28451	TEME	42789.306	0.0007598	7.6605	49.5421	264.5306	331.1367	
D.113	1996-053D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-31	14:37:03.469	-7.85	622.453	394.690	850.216	
25339	TEME	42786.419	0.0057711	13.7740	27.4586	239.7751	202.9425	
D.114	1997-031A	Intelsat 802						PL
TLEs	EGO (-)	2017-12-31	17:33:39.827	-7.79	617.947	505.134	730.760	
24846	TEME	42782.523	0.0032543	5.3851	61.6744	218.8364	235.8649	
D.115	1994-012D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-31	14:03:27.093	-7.79	617.905	472.603	763.207	
23013	TEME	42782.572	0.0030634	15.3564	16.4056	38.0554	248.7597	
D.116	1988-012A	Sakura 3A (CS 3A)						PL
TLEs	EGO (-)	2017-12-31	06:42:03.794	-7.69	610.024	573.678	646.370	
18877	TEME	42774.279	0.0013637	15.4489	17.3672	263.8493	303.5732	
D.117	1971-039A	OPS 3811 (DSP F2, DSP 3, DSP Block 1(PHASE I) F2)						PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-7.63	604.730	496.345	713.115	
UI042	J2000	42768.903	0.0025342	7.2223	305.3859	305.7709	142.7600	
D.118	1988-063B	Eutelsat I F-5 (ECS 5)						PL
TLEs	EGO (-)	2017-12-31	07:52:40.056	-7.59	601.588	551.144	652.033	
19331	TEME	42765.194	0.0004833	15.6441	11.4579	50.8211	175.1412	

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.119	1998-058A	USA 140 (UFO F9)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-7.57	599.931	536.166	663.697
UI113	J2000	42764.104	0.0014911	8.2426	33.3043	287.9861	189.2900
D.120	1983-088A	Raduga 13					PL
TLEs	EGO (-)	2017-12-29	21:49:32.591	-7.56	599.126	529.388	668.864
14307	TEME	42763.674	0.0018706	14.7955	339.9410	344.0343	92.1554
D.121	2000-052A	Eutelsat 4A (Eurobird 4A, Eutelsat W1)					PL
TLEs	EGO (-)	2017-12-31	18:39:39.722	-7.54	597.280	552.659	641.902
26487	TEME	42761.731	0.0017652	4.9940	67.0531	214.6414	44.9976
D.122	1969-069C	ATS 5 AKM (JPL SR-28-3)					PM
TLEs	EGO (0.23)	2017-12-31	16:14:17.745	-7.53	597.069	35.064	1159.074
21052	TEME	42760.695	0.0125355	8.1570	305.5222	218.9982	143.4837
D.123	1982-019A	OPS 8701 (DSP F10, DSP 13, DSP Block 3(MOS/PIM) F10)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-7.53	596.430	565.506	627.355
UI046	J2000	42760.603	0.0007232	14.8098	337.7046	275.5009	162.4500
D.124	2000-049D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	15:56:35.041	-7.50	594.168	527.632	660.704
26480	TEME	42757.660	0.0017906	12.3036	33.1287	294.9828	140.5502
D.125	2001-002A	Turksat 2A (Eurasiasat 1)					PL
TLEs	EGO (-)	2017-12-31	05:39:06.300	-7.44	589.095	542.964	635.226
26666	TEME	42753.952	0.0014730	1.5816	85.5750	220.9935	260.0765
D.126	1998-052A	Intelsat 7 (PAS 7)					PL
TLEs	EGO (-)	2017-12-31	22:28:44.323	-7.42	588.061	555.528	620.594
25473	TEME	42752.021	0.0008701	3.6406	73.2544	160.2566	355.2182
D.127	1989-101D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	21:46:42.600	-7.29	577.357	533.113	621.600
20394	TEME	42741.966	0.0007670	15.5802	2.6968	178.9747	112.0618
D.128	2000-013A	Ekspress 2A (Ekspress 6A)					PL
TLEs	EGO (-)	2017-12-31	11:17:12.000	-7.26	575.045	544.616	605.473
26098	TEME	42739.506	0.0010120	9.2435	42.8460	294.0376	225.1622
D.129	1976-023J	LES 8, LES 9 operational debris					PM
TLEs	EGO (0.29)	2017-12-31	13:50:05.756	-7.25	573.896	-79.933	1227.725
8832	TEME	42738.332	0.0144590	15.1926	84.8652	5.0198	224.0461
D.130	1976-023F	Transtage 30 (Titan IIIC)					RB
TLEs	EGO (0.29)	2017-12-31	02:32:42.072	-7.24	573.277	-66.391	1212.944
8751	TEME	42737.429	0.0142529	15.1927	84.8579	5.9816	311.9784
D.131	1983-118A	Gorizont 8					PL
TLEs	EGO (-)	2017-12-26	11:23:17.117	-7.22	571.390	456.011	686.768
14532	TEME	42735.547	0.0022549	14.6930	341.2815	104.4564	213.9463
D.132	1998-013A	Eutelsat 16B (Eurobird 16, Nilesat 103, Hot Bird 4)					PL
TLEs	EGO (-)	2017-12-31	14:47:19.068	-7.19	569.308	550.494	588.122
25237	TEME	42733.712	0.0010502	4.7461	65.8280	227.9743	223.1211
D.133	1991-001A	NATO IVA					PL
TLEs	EGO (-)	2017-12-31	12:37:18.895	-7.16	567.206	541.678	592.734
21047	TEME	42731.817	0.0005211	13.1595	15.4914	227.6454	257.2745

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.134	1985-025A	Intelsat VA F-10					PL
TLEs	EGO (-)	2017-12-31	23:59:06.984	-7.16	566.593	430.907	702.279
15629	TEME	42731.777	0.0037910	15.6509	5.8570	296.1954	80.8701
D.135	1997-049B	Meteosat 7 (MTP)					PL
TLEs	EGO (-)	2017-12-31	23:27:24.025	-7.07	559.665	509.984	609.346
24932	TEME	42724.032	0.0011849	10.8808	35.6911	304.1796	303.2672
D.136	2007-021A	Eutelsat 8 West D (Eutelsat 3A, Chinasat 5C, Zhongxing 5C)					PL
TLEs	EGO (-)	2017-12-31	05:49:25.990	-6.98	552.211	535.765	568.656
31577	TEME	42716.754	0.0003189	3.4220	55.4713	5.1558	228.0173
D.137	1988-109B	Astra 1A					PL
TLEs	EGO (-)	2017-12-31	03:55:51.671	-6.97	551.777	485.248	618.306
19688	TEME	42716.051	0.0009630	13.0417	29.6023	24.0984	223.0997
D.138	1983-066A	Gorizont 7					PL
TLEs	EGO (-)	2017-12-31	15:59:16.517	-6.93	548.789	500.188	597.390
14160	TEME	42712.344	0.0015399	14.6103	339.6231	279.0670	174.3141
D.139	1979-098B	OPS 9444 (DSCS II F-14, DSCS 2-14, DSCS II D-14)					PL
TLEs	EGO (-)	2017-12-31	01:05:48.683	-6.92	547.772	527.207	568.336
11622	TEME	42712.373	0.0006685	14.3384	334.3758	336.3951	97.4230
D.140	1996-067A	Eutelsat 48A (Eutelsat W48, Eurobird 9, Hot Bird 2)					PL
TLEs	EGO (-)	2017-12-31	11:53:42.462	-6.81	538.669	505.503	571.835
24665	TEME	42702.368	0.0001805	6.6948	54.0191	109.9639	149.2821
D.141^m	2017-086B	Fregat-SB (Zenit-3F)					RB
TLEs	EGO (0.23)	2017-12-31	15:27:30.774	-6.80	536.600	88.200	984.900
43088	TEME	42700.756	0.0104799	0.2088	9.6805	35.9994	27.8796
D.142	1987-097A	USA 28 (DSP F13, DSP 5R, DSP Block 4(PHASE II UG) F13)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-6.79	537.054	425.450	648.658
UI030	J2000	42701.227	0.0026136	14.4585	1.2861	212.7106	249.4420
D.143	1990-095A	USA 65 (DSP F15, DSP 15, DSP Block 5(DSP-1) F15)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-6.75	534.066	505.471	562.661
UI083	J2000	42698.239	0.0006697	15.4286	9.2983	316.4886	278.8320
D.144	1984-081B	Telecom 1A					PL
TLEs	EGO (-)	2017-12-31	04:38:28.637	-6.74	533.328	384.265	682.391
15159	TEME	42698.011	0.0039686	15.5622	359.4369	322.8887	21.4495
D.145	1982-097A	Intelsat V F-5					PL
TLEs	EGO (-)	2017-12-29	07:06:29.525	-6.72	531.161	434.937	627.386
13595	TEME	42695.359	0.0026501	15.3173	356.5288	317.9170	335.0796
D.146	1999-018A	Eutelsat 21A (Eutelsat W6, Eutelsat W3)					PL
TLEs	EGO (-)	2017-12-31	13:45:39.785	-6.64	524.980	509.650	540.309
25673	TEME	42688.854	0.0007279	3.8709	71.4535	230.9753	323.3541
D.147	1990-056A	Intelsat VI F-4					PL
TLEs	EGO (-)	2017-12-31	15:23:32.303	-6.62	523.659	495.549	551.769
20667	TEME	42688.048	0.0011551	12.3326	33.1931	252.5961	217.6691
D.148	1978-113B	OPS 9442 (DSCS II F-12, DSCS 2-12, DSCS II C-12)					PL
TLEs	EGO (-)	2017-12-31	14:44:39.756	-6.60	521.554	492.607	550.501
11145	TEME	42685.489	0.0002465	14.2687	332.6586	38.1948	12.5263

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.149	1991-074A	Gorizont 24					PL
TLEs	EGO (-)	2017-12-31	23:55:50.455	-6.59	521.155	439.842	602.467
21759	TEME	42685.844	0.0019936	15.4790	8.8425	200.1542	83.5532
D.150	1996-044B	Telecom 2D					PL
TLEs	EGO (-)	2017-12-31	14:27:42.567	-6.57	519.712	455.376	584.048
24209	TEME	42684.410	0.0019744	9.0389	44.3215	283.8617	264.6308
D.151	1991-015B	Meteosat 5 (MOP 2)					PL
TLEs	EGO (-)	2017-12-31	19:47:42.828	-6.56	518.695	487.912	549.479
21140	TEME	42682.470	0.0011432	15.1675	15.2029	228.6598	340.0112
D.152	2004-031A	Amazonas					PL
TLEs	EGO (-)	2017-12-31	16:18:38.468	-6.55	517.690	465.031	570.349
28393	TEME	42681.540	0.0007146	2.1723	82.8687	7.9526	135.9143
D.153	1998-057A	Eutelsat 4B (Eutelsat 25A, Badr 2, Arabsat 2D, Hot Bird 5)					PL
TLEs	EGO (-)	2017-12-31	19:37:39.738	-6.54	517.216	485.239	549.193
25495	TEME	42681.384	0.0007417	3.8454	71.3036	288.8440	213.6144
D.154	1986-082A	Raduga 19					PL
TLEs	EGO (-)	2017-12-31	23:16:39.845	-6.53	516.180	467.263	565.096
17046	TEME	42680.768	0.0005650	15.0807	350.8034	112.7956	91.7626
D.155	1996-015A	Intelsat VIIA F-2					PL
TLEs	EGO (-)	2017-12-31	14:56:39.390	-6.45	509.988	228.592	791.383
23816	TEME	42673.989	0.0070007	3.9434	70.8117	275.3700	127.7290
D.156	1989-021B	TDRS 4					PL
TLEs	EGO (-)	2017-12-31	17:37:24.690	-6.45	509.513	441.345	577.681
19883	TEME	42673.789	0.0022754	12.9361	15.3619	251.7417	31.8203
D.157	1978-106A	NATO IIIC					PL
TLEs	EGO (-)	2017-12-31	11:29:42.590	-6.44	509.172	487.621	530.724
11115	TEME	42674.081	0.0009267	14.1987	340.9848	283.8984	249.2323
D.158	2002-039A	EchoStar 8					PL
TLEs	EGO (-)	2017-12-31	17:41:11.280	-6.35	502.001	472.541	531.461
27501	TEME	42665.757	0.0005628	1.4553	85.3689	291.6599	169.7505
D.159	1991-015A	Astra 1B					PL
TLEs	EGO (-)	2017-12-31	16:19:46.746	-6.35	501.718	472.623	530.813
21139	TEME	42666.396	0.0012536	9.5905	42.7894	267.3748	55.0547
D.160	1993-076A	NATO IVB					PL
TLEs	EGO (-)	2017-12-31	14:44:39.899	-6.32	499.626	479.946	519.306
22921	TEME	42664.511	0.0006943	12.2072	20.7927	277.2344	242.4421
D.161	1993-074A	USA 97 (DSCS III F8, DSCS 3-8, DSCS III B-10)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-6.28	496.524	445.370	547.679
UI066	J2000	42660.697	0.0011991	10.9483	36.9156	273.1998	161.8810
D.162	1982-020A	Gorizont 5					PL
TLEs	EGO (-)	2017-12-31	15:59:16.517	-6.27	495.577	351.000	640.154
13092	TEME	42659.072	0.0030606	14.4657	331.8474	173.9341	172.8751
D.163	1990-001B	JCSAT 2					PL
TLEs	EGO (-)	2017-12-31	16:20:01.896	-6.25	493.753	230.850	756.657
20402	TEME	42658.472	0.0066284	13.3110	37.4370	245.1295	62.3738

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\overline{\Delta a}$	$\overline{\Delta r_p}$	$\overline{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.164	1979-038A	OPS 6392 (FLTSATCOM F2)					PL
TLEs	EGO (-)	2017-12-31	14:25:30.628	-6.23	492.157	423.763	560.551
11353	TEME	42656.532	0.0019833	13.8094	331.5023	348.0064	233.7679
D.165	1984-113C	LEASAT 1 (Syncom-4 1)					PL
TLEs	EGO (-)	2017-12-31	17:41:11.280	-6.23	491.885	367.780	615.989
15384	TEME	42655.436	0.0032476	13.9101	359.6701	231.2273	169.4625
D.166	1988-040A	Intelsat VA F-13 (NSS 513)					PL
TLEs	EGO (-)	2017-12-31	22:18:29.789	-6.11	482.813	426.360	539.266
19121	TEME	42647.550	0.0010428	15.3345	14.3788	355.7610	299.2479
D.167	1990-097B	USA 67 (SDS 2 F2)(QUASAR 2)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-6.10	482.072	406.733	557.411
UI092	J2000	42646.245	0.0017666	16.6307	2.1394	220.9204	193.0360
D.168	1994-079A	Telstar 11 (Orion 1)					PL
TLEs	EGO (-)	2017-12-31	20:49:18.175	-6.09	481.100	402.797	559.404
23413	TEME	42645.747	0.0021268	10.7200	38.2832	289.0676	103.1863
D.169	1975-011F	SMS 2 AKM (SVM-5)					PM
TLEs	EGO (0.26)	2017-12-31	10:34:29.105	-6.07	479.601	63.337	895.866
20835	TEME	42644.209	0.0095787	11.1363	312.5697	44.0740	263.8850
D.170	1989-069A	USA 43 (DSCS II F-15, DSCS 2-15, DSCS II E-15)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-6.01	474.641	403.652	545.630
UI087	J2000	42638.814	0.0016649	15.3847	1.8477	203.8343	328.9530
D.171	1981-073A	FLTSATCOM F5					PL
TLEs	EGO (-)	2017-12-30	22:07:09.516	-6.00	474.094	430.757	517.430
12635	TEME	42638.954	0.0004802	19.1792	342.8854	55.9236	94.3349
D.172	2006-024A	USA 187 (MITEx OSC satellite)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-6.00	473.542	395.153	551.932
UI149	J2000	42637.715	0.0018385	1.1910	75.9019	188.4430	222.5040
D.173	1974-033A	SMS 1					PL
TLEs	EGO (-)	2017-12-31	06:39:39.468	-5.98	472.216	401.537	542.895
7298	TEME	42636.770	0.0021643	11.6545	303.6665	340.0853	273.3031
D.174	1990-063A	TDF 2					PL
TLEs	EGO (-)	2017-12-30	03:06:42.491	-5.98	471.991	269.783	674.199
20705	TEME	42637.282	0.0052481	14.4615	23.6644	246.3839	77.0709
D.175	1991-079D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	12:20:36.700	-5.95	470.109	448.722	491.495
21792	TEME	42635.021	0.0004531	15.5496	8.5542	355.2831	250.3853
D.176	1976-029A	RCA Satcom II					PL
TLEs	EGO (-)	2017-12-31	15:54:53.320	-5.94	468.920	222.206	715.635
8774	TEME	42632.750	0.0054973	14.4755	337.1018	161.7191	187.4535
D.177	1984-041D	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	10:20:42.600	-5.93	468.300	401.414	535.185
14943	TEME	42632.726	0.0010932	14.6179	341.7616	147.6791	269.9603
D.178	1980-049A	Gorizont 4					PL
TLEs	EGO (-)	2017-12-31	12:05:49.350	-5.92	467.451	450.081	484.822
11841	TEME	42632.009	0.0007068	13.6927	327.0406	300.7364	241.8665

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.179	1994-047A	DirecTV-2					PL
TLEs	EGO (-)	2017-12-31	18:53:27.580	-5.90	465.696	423.656	507.736
23192	TEME	42629.883	0.0015168	8.6490	46.3351	253.1715	25.8517
D.180	1982-020F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	19:28:42.893	-5.90	465.375	347.750	583.001
13899	TEME	42629.593	0.0022735	14.4842	331.2639	123.9549	118.2155
D.181	1997-075A	JCSAT 5					PL
TLEs	EGO (-)	2017-12-31	11:12:51.590	-5.83	460.375	376.211	544.540
25067	TEME	42624.555	0.0016136	5.9051	57.7260	130.6280	209.5424
D.182	2015-048B	Blok-DM-3 (Proton-M/DM-3)					RB
TLEs	EGO (0.27)	2017-12-31	06:19:22.002	-5.83	460.000	48.218	871.783
40896	TEME	42624.664	0.0093003	1.7854	85.0553	64.6539	249.5661
D.183	1988-066D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-31	06:14:35.670	-5.81	458.556	318.090	599.022
19347	TEME	42622.261	0.0028916	15.2736	357.1729	58.4806	342.1021
D.184	1984-037A	OPS 7641 (DSP F11, DSP 12, DSP Block 3(MOS/PIM) F11)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-5.73	452.435	417.779	487.091
UI037	J2000	42616.608	0.0008132	15.0641	343.5230	233.6399	87.1920
D.185	1979-105E	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	08:21:39.702	-5.72	451.767	380.890	522.643
11684	TEME	42616.129	0.0016492	13.5229	325.0101	231.3492	278.9686
D.186	1992-010B	INSAT 2DT (Arabsat 1C)					PL
TLEs	EGO (-)	2017-12-31	02:31:32.916	-5.72	451.349	339.044	563.654
21894	TEME	42616.034	0.0033082	11.8596	34.5329	212.0619	281.8425
D.187	1987-078B	Eutelsat I F-4 (ECS 4)					PL
TLEs	EGO (-)	2017-12-30	22:23:42.586	-5.71	450.211	414.357	486.065
18351	TEME	42614.634	0.0015202	15.4723	7.6467	306.9178	293.1784
D.188	1994-055A	Optus B3					PL
TLEs	EGO (-)	2017-12-31	10:45:49.165	-5.68	447.944	422.539	473.349
23227	TEME	42612.552	0.0009150	7.6986	49.0116	262.5793	220.2357
D.189	1989-048A	Raduga 1-1					PL
TLEs	EGO (-)	2017-12-31	12:27:51.050	-5.64	444.647	362.298	526.997
20083	TEME	42609.257	0.0015352	15.3580	0.5447	63.5417	268.6937
D.190	1998-070A	Eutelsat 115 West A (SATMEX 5)					PL
TLEs	EGO (-)	2017-12-31	20:35:44.293	-5.59	441.009	427.466	454.551
25558	TEME	42605.043	0.0004833	3.5789	73.1272	244.0050	23.4145
D.191	2014-043C	USA 255 (ANGELS)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-5.59	440.870	371.185	510.555
UI186	J2000	42605.043	0.0016356	2.3027	74.7740	231.2874	230.7090
D.192	1991-018A	Inmarsat-2 F2					PL
TLEs	EGO (-)	2017-12-31	20:35:38.091	-5.58	440.270	421.331	459.209
21149	TEME	42603.867	0.0008125	10.9391	27.8121	251.3305	143.7410
D.193	1981-057A	Meteosat 2					PL
TLEs	EGO (-)	2017-12-30	16:17:07.046	-5.58	440.015	309.924	570.107
12544	TEME	42603.743	0.0036127	14.8448	345.6503	300.8538	187.1101

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.194	1997-009A	Intelsat 801					PL
TLEs	EGO (-)	2017-12-31	20:34:39.311	-5.54	436.789	396.221	477.358
24742	TEME	42600.158	0.0013498	7.2322	52.3074	271.8959	166.3353
D.195	1979-053A	OPS 7484 (DSP F8, DSP 11, DSP Block 3(MOS/PIM) F8)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-5.52	435.184	393.296	477.072
UI053	J2000	42599.357	0.0009833	13.5979	328.0726	246.4550	202.9700
D.196	1995-027A	USA 111 (UFO F5)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-5.51	434.491	401.490	467.492
UI122	J2000	42598.664	0.0007747	10.2522	26.4369	268.9649	6.5280
D.197	1983-026B	TDRS 1					PL
TLEs	EGO (-)	2017-12-31	12:08:25.808	-5.51	434.285	339.751	528.818
13969	TEME	42599.107	0.0018811	13.3630	342.9137	202.5950	242.5633
D.198	1999-050A	Ciel 1 (EchoStar 5)					PL
TLEs	EGO (-)	2017-12-31	06:29:31.384	-5.50	433.670	412.548	454.791
25913	TEME	42598.492	0.0010087	6.6510	55.1281	222.4695	266.3308
D.199	1998-049A	ST-1					PL
TLEs	EGO (-)	2017-12-31	10:39:39.418	-5.49	433.336	409.813	456.860
25460	TEME	42597.609	0.0009123	4.8543	64.9598	227.0318	218.2489
D.200	1997-016A	Thaicom 3					PL
TLEs	EGO (0.28)	2017-12-31	11:00:01.211	-5.48	432.381	74.542	790.220
24768	TEME	42595.412	0.0085226	8.8986	45.3371	332.0065	177.8423
D.201	1984-093B	SBS IV					PL
TLEs	EGO (-)	2017-12-30	16:18:34.022	-5.44	428.933	390.135	467.732
15235	TEME	42592.968	0.0007728	15.2749	6.9825	351.2747	24.1337
D.202	1989-070C	Himawari 4 (GMS 4) AKM (Star 27)					PM
TLEs	EGO (0.12)	2017-12-31	07:33:50.658	-5.43	428.562	-608.832	1465.957
20317	TEME	42592.341	0.0245000	15.0065	1.7854	340.7997	168.6943
D.203	2000-031A	Ekspress 3A					PL
TLEs	EGO (-)	2017-12-31	16:30:09.732	-5.42	427.783	406.119	449.446
26378	TEME	42592.139	0.0008595	7.4047	51.3702	192.1732	55.6699
D.204	1987-022F	GOES 7 AKM (Star 27)					PM
TLEs	EGO (0.03)	2017-12-30	09:36:42.594	-5.41	426.896	-4112.674	4966.465
28520	TEME	42591.748	0.1060342	14.8552	346.0440	4.9627	103.1312
D.205	1991-060A	Yuri 3B (BS 3B)					PL
TLEs	EGO (-)	2017-12-31	01:44:51.249	-5.34	421.103	396.279	445.928
21668	TEME	42584.870	0.0001820	13.1162	18.7802	243.4118	314.0364
D.206	1995-055A	Astra 1E					PL
TLEs	EGO (-)	2017-12-31	16:20:05.847	-5.33	420.450	390.003	450.896
23686	TEME	42585.374	0.0010200	5.7825	59.4011	270.1337	64.1256
D.207	1984-081A	Eutelsat I F-2 (ECS 2)					PL
TLEs	EGO (-)	2017-12-31	08:13:42.552	-5.32	419.093	379.881	458.305
15158	TEME	42583.151	0.0005544	15.4118	358.5943	182.4607	314.4571
D.208	1995-025A	GOES 9					PL
TLEs	EGO (-)	2017-12-31	14:27:42.567	-5.30	418.127	396.646	439.608
23581	TEME	42582.920	0.0002461	11.1242	36.6026	231.3983	261.4860

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.209	1992-037A	USA 82 (DSCS III F6, DSCS 3-6, DSCS III B-12)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-5.29	417.064	370.276	463.852
UI123	J2000	42581.237	0.0010988	12.0940	32.5084	298.0896	5.2310
D.210	1990-077A	Yuri 3A (BS 3A)					PL
TLEs	EGO (-)	2017-12-31	18:08:39.651	-5.27	415.258	369.144	461.371
20771	TEME	42578.961	0.0015145	14.9415	23.7619	219.5155	11.9884
D.211	1989-046A	USA 39 (DSP F14, DSP 14, DSP Block 5(DSP-1) F14)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-5.26	414.863	395.720	434.007
UI150	J2000	42579.036	0.0004496	14.7504	5.7928	268.7512	352.3690
D.212	1983-081A	Sakura 2B (CS 2B)					PL
TLEs	EGO (-)	2017-12-31	20:18:39.665	-5.26	414.759	394.833	434.685
14248	TEME	42578.697	0.0008175	15.0780	350.4041	309.3465	127.4654
D.213	1986-007A	Raduga 18					PL
TLEs	EGO (0.24)	2017-12-31	06:32:08.880	-5.26	414.639	100.272	729.005
16497	TEME	42578.208	0.0068381	14.8874	347.2979	122.3408	144.5051
D.214	1972-090A	Anik A1					PL
TLEs	EGO (-)	2017-12-31	15:34:35.519	-5.20	410.158	350.018	470.298
6278	TEME	42574.831	0.0008975	12.8707	324.3084	108.3664	232.5124
D.215	1981-025A	OPS 7350 (DSP F9, DSP 10, DSP Block 3(MOS/PIM) F9)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-5.20	410.057	337.098	483.017
UI045	J2000	42574.230	0.0017137	13.9453	333.7919	219.8443	83.6290
D.216	2004-001A	Estrela do Sul 1 (Telstar 14)					PL
TLEs	EGO (-)	2017-12-31	20:34:39.311	-5.19	409.136	389.473	428.799
28137	TEME	42572.535	0.0009802	4.9553	63.8267	232.0547	167.4675
D.217	1971-006A	Intelsat IV F-2					PL
TLEs	EGO (-)	2017-12-31	15:07:39.690	-5.17	407.529	350.237	464.821
4881	TEME	42571.087	0.0016883	11.6190	314.5185	356.2150	182.2829
D.218	2001-020A	USA 158 (GeoLITE)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-5.17	407.491	349.764	465.218
UI114	J2000	42571.664	0.0013560	6.6963	46.6331	36.9107	129.9230
D.219	1993-031A	Astra 1C					PL
TLEs	EGO (-)	2017-12-31	22:28:42.640	-5.16	406.602	389.341	423.863
22653	TEME	42570.180	0.0007732	8.7124	45.3341	252.1058	351.7148
D.220	1981-050A	Intelsat V F-1					PL
TLEs	EGO (-)	2017-12-31	02:35:14.214	-5.11	402.434	378.032	426.835
12474	TEME	42566.989	0.0008220	14.9515	350.3426	257.8806	22.3872
D.221	1984-129A	USA 7 (DSP F12, DSP 6R, DSP Block 4(PHASE II UG) F12)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-5.10	401.872	380.449	423.296
UI034	J2000	42566.045	0.0005033	15.7658	348.9869	272.0919	273.4430
D.222	2006-024B	USA 188 (MITEx Lockheed satellite)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-5.10	401.521	377.803	425.239
UI148	J2000	42565.694	0.0005572	6.3649	56.9970	104.2687	14.3750
D.223	1994-065A	Solidaridad 2					PL
TLEs	EGO (-)	2017-12-31	14:06:42.559	-5.07	399.613	381.085	418.140
23313	TEME	42564.064	0.0008962	7.5634	50.4343	241.0196	289.4572

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.224	1983-058A	Eutelsat I F-1 (ECS 1)					PL
TLEs	EGO (-)	2017-12-29	21:31:42.593	-5.05	398.154	352.409	443.898
14128	TEME	42562.574	0.0003336	15.1819	355.2968	110.7253	113.7648
D.225	1997-059A	EchoStar 3					PL
TLEs	EGO (-)	2017-12-31	00:55:35.723	-5.04	396.969	364.975	428.963
25004	TEME	42561.039	0.0011387	2.5624	74.8453	242.8082	320.8226
D.226	1990-093A	Inmarsat-2 F1					PL
TLEs	EGO (-)	2017-12-31	12:33:03.806	-5.03	396.293	368.837	423.749
20918	TEME	42560.357	0.0013386	11.5200	26.0705	276.1189	121.6273
D.227	1980-098A	Intelsat V F-2					PL
TLEs	EGO (-)	2017-12-30	02:23:06.893	-4.99	392.933	342.079	443.787
12089	TEME	42556.844	0.0016470	14.9967	352.4615	265.0980	40.6041
D.228	1994-022A	GOES 8					PL
TLEs	EGO (-)	2017-12-30	20:38:45.657	-4.93	388.005	362.126	413.883
23051	TEME	42552.631	0.0010404	11.6268	37.0781	249.3401	103.9553
D.229	1987-078A	Optus A3					PL
TLEs	EGO (-)	2017-12-31	08:17:04.155	-4.92	387.701	360.546	414.855
18350	TEME	42551.107	0.0010803	14.7335	16.1863	288.1107	161.0328
D.230	1984-113B	Arabsat 1D					PL
TLEs	EGO (-)	2017-12-28	05:06:14.839	-4.92	387.573	273.041	502.104
15383	TEME	42551.372	0.0031575	15.3025	7.0925	303.0624	14.7940
D.231	1991-046A	Gorizont 23					PL
TLEs	EGO (-)	2017-12-31	15:06:53.359	-4.92	387.259	360.809	413.708
21533	TEME	42551.589	0.0010982	15.4567	7.1973	266.1450	39.2579
D.232	2000-069A	Beidou					PL
TLEs	EGO (-)	2017-12-31	02:31:14.475	-4.91	386.902	330.246	443.559
26599	TEME	42551.771	0.0012724	7.4323	51.8560	272.2098	273.0703
D.233	2014-043D	Delta IV DCSS 4 (Delta 4M+(4,2))					RB
KIAM	EGO (-)	2018-01-01	00:00:00.000	-4.90	385.763	322.725	448.801
UI187	J2000	42549.936	0.0014815	2.2700	75.0672	232.5868	271.2400
D.234	2005-006A	Himawari 6 (MTSAT 1R)					PL
TLEs	EGO (-)	2017-12-31	20:36:39.755	-4.90	385.604	311.424	459.784
28622	TEME	42550.636	0.0021253	2.2084	82.1532	217.7609	54.2121
D.235	1977-118A	Sakura 1 (CS 1)					PL
TLEs	EGO (-)	2017-12-30	00:03:08.490	-4.89	385.466	368.527	402.406
10516	TEME	42549.877	0.0005758	13.7597	328.4468	319.7824	39.5172
D.236	1987-095A	TV-Sat 1					PL
TLEs	EGO (0.21)	2017-12-30	02:41:45.760	-4.88	384.328	130.723	637.934
18570	TEME	42548.202	0.0055250	14.8542	353.0640	47.9682	22.7441
D.237	1994-034A	Intelsat VII F-2					PL
TLEs	EGO (-)	2017-12-31	02:36:22.957	-4.80	378.328	362.784	393.871
23124	TEME	42543.079	0.0005759	4.9045	64.2639	272.9834	285.2637
D.238	1991-003B	Eutelsat II F-2					PL
TLEs	EGO (-)	2017-12-31	09:28:57.642	-4.80	378.037	353.430	402.644
21056	TEME	42541.356	0.0002232	13.7188	26.3522	236.0137	169.4477

D.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$	
S-ID	Frame	a	e	i	Ω	ω	λ	
D.239	1980-087A	OPS 6394 (FLTSATCOM F4)						PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-4.78	376.364	347.896	404.832	
UI096	J2000	42540.537	0.0006692	13.8673	333.4053	310.3711	170.5800	
D.240	1998-028A	EchoStar 4						PL
TLEs	EGO (-)	2017-12-31	19:30:39.843	-4.76	374.964	322.997	426.930	
25331	TEME	42539.420	0.0019215	7.0982	47.5338	223.6580	217.8249	
D.241	1991-084A	Telecom 2A						PL
TLEs	EGO (-)	2017-12-31	16:19:43.454	-4.76	374.862	356.753	392.971	
21813	TEME	42539.735	0.0007731	12.7917	30.3064	241.9114	53.8155	
D.242	1999-056A	DirecTV 1R						PL
TLEs	EGO (-)	2017-12-31	10:19:56.741	-4.73	372.204	348.805	395.603	
25937	TEME	42536.421	0.0008422	4.1949	68.7012	201.0670	213.4476	
D.243	1997-025A	Thor II						PL
TLEs	EGO (-)	2017-12-31	11:53:42.462	-4.69	368.870	349.929	387.811	
24808	TEME	42532.278	0.0009179	7.1313	51.0024	241.7740	149.6444	
D.244	1995-013A	Intelsat VII F-5						PL
TLEs	EGO (-)	2017-12-31	20:16:42.645	-4.68	368.409	292.142	444.675	
23528	TEME	42532.218	0.0012150	6.2494	56.6887	16.7188	14.8905	
D.245	1993-073B	Meteosat 6 (MOP 3)						PL
TLEs	EGO (-)	2017-12-31	17:23:03.317	-4.64	365.451	339.766	391.135	
22912	TEME	42529.380	0.0007086	13.4137	25.2222	216.1134	198.9115	
D.246	1985-092B	USA 11 (DSCS III F2, DSCS 3-2, DSCS III B-4)						PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-4.64	365.344	345.810	384.878	
UI079	J2000	42529.517	0.0004593	15.3378	12.1788	321.3027	12.7550	
D.247	1993-078A	DirecTV 1						PL
TLEs	EGO (-)	2017-12-31	20:16:42.645	-4.64	364.895	321.916	407.874	
22930	TEME	42528.720	0.0007905	7.0425	53.1567	160.7253	15.5711	
D.248	2000-066A	Thuraya 1						PL
TLEs	EGO (-)	2017-12-31	11:52:27.836	-4.63	364.783	336.354	393.212	
26578	TEME	42529.325	0.0012780	7.0306	26.9754	272.9693	109.5242	
D.249	2016-052C	Delta IV DCSS 4 (Delta 4M+(4,2))						RB
KIAM	EGO (-)	2018-01-01	00:00:00.000	-4.62	363.723	318.222	409.224	
UI203	J2000	42527.896	0.0010699	1.8489	68.2505	241.7448	127.9520	
D.250	1990-091A	SBS VI						PL
TLEs	EGO (-)	2017-12-31	12:14:12.589	-4.61	363.052	330.983	395.122	
20872	TEME	42527.063	0.0000935	8.1117	48.6760	89.8017	124.3313	
D.251	1990-001A	Skynet 4A						PL
TLEs	EGO (-)	2017-12-31	07:39:52.593	-4.60	361.663	306.302	417.024	
20401	TEME	42524.933	0.0018140	13.3558	10.9227	250.2365	171.4379	
D.252	1999-005A	Galaxy 26 (Intelsat Americas 6, IA 6, Telstar 6)						PL
TLEs	EGO (-)	2017-12-31	22:33:57.345	-4.59	361.612	342.801	380.423	
25626	TEME	42526.630	0.0004848	5.1737	72.0706	192.9122	65.8194	
D.253	1978-016A	OPS 6391 (FLTSATCOM F1)						PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-4.59	361.372	339.773	382.971	
UI101	J2000	42525.545	0.0005079	13.7238	325.4261	246.3239	185.3730	

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.254	1995-029A	DirecTV 3					PL
TLEs	EGO (-)	2017-12-31	21:47:17.117	-4.58	360.403	340.655	380.151
23598	TEME	42523.735	0.0006753	6.7904	54.4007	278.6118	346.9875
D.255	1996-030A	Palapa C2					PL
TLEs	EGO (-)	2017-12-31	23:34:42.587	-4.58	360.188	342.049	378.327
23864	TEME	42523.885	0.0001149	6.1154	57.6570	140.6392	355.7504
D.256	2006-059A	Kiku 8 (ETS VIII)					PL
TLEs	EGO (-)	2017-12-31	04:48:32.558	-4.56	359.209	326.884	391.534
29656	TEME	42523.850	0.0010971	5.9457	58.1725	216.2770	246.1041
D.257	1989-087A	Intelsat VI F-2					PL
TLEs	EGO (-)	2017-12-31	16:18:18.345	-4.56	359.020	335.941	382.099
20315	TEME	42522.578	0.0004618	12.3950	30.7390	214.0272	139.6864
D.258	2001-018A	XM Radio 1 (Roll)					PL
TLEs	EGO (-)	2017-12-31	20:44:57.070	-4.56	358.930	330.638	387.222
26761	TEME	42522.782	0.0011186	1.5012	87.5170	194.8276	135.1079
D.259	1991-037A	Aurora II					PL
TLEs	EGO (-)	2017-12-31	11:47:17.985	-4.53	356.690	334.089	379.290
21392	TEME	42520.687	0.0009639	13.0351	29.4460	236.3942	117.1680
D.260	1992-057A	Satcom C-4					PL
TLEs	EGO (-)	2017-12-30	20:21:03.778	-4.52	356.020	340.903	371.137
22096	TEME	42519.696	0.0008449	10.7085	38.0180	237.1778	353.2865
D.261	1999-052A	Galaxy 27 (Intelsat Americas 7, IA 7, Telstar 7)					PL
TLEs	EGO (-)	2017-12-31	07:24:00.309	-4.52	355.490	331.518	379.462
25922	TEME	42519.976	0.0008296	3.5762	71.6470	250.4286	220.4152
D.262	2003-024A	AMC 9 (GE 12)					PL
TLEs	EGO (-)	2017-12-31	11:37:42.648	-4.48	352.231	279.038	425.423
27820	TEME	42516.111	0.0018801	0.4344	88.6555	240.6629	316.3735
D.263	1997-011A	Tempo 2					PL
TLEs	EGO (-)	2017-12-31	16:41:06.118	-4.47	351.775	229.482	474.067
24748	TEME	42516.728	0.0035162	9.3097	43.2606	240.9422	50.3131
D.264	1998-056B	Sirius 3					PL
TLEs	EGO (-)	2017-12-31	10:09:04.574	-4.46	350.863	340.388	361.339
25492	TEME	42514.143	0.0004874	6.7265	52.1753	256.6191	159.7957
D.265	1998-068A	Bonum 1					PL
TLEs	EGO (-)	2017-12-31	14:35:01.405	-4.45	349.966	334.636	365.296
25546	TEME	42514.549	0.0006730	4.5999	66.3460	245.8158	107.1687
D.266	1992-006A	USA 78 (DSCS III F5, DSCS 3-5, DSCS III B-14)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-4.44	349.461	303.070	395.852
UI127	J2000	42513.634	0.0010912	13.5640	27.4597	263.8856	68.0960
D.267	2005-010A	Ekspress-AM 2					PL
TLEs	EGO (-)	2017-12-31	13:59:42.635	-4.44	349.164	271.317	427.010
28629	TEME	42512.736	0.0017108	2.7596	76.2916	29.9829	149.3847
D.268	2000-022A	GOES 11					PL
TLEs	EGO (-)	2017-12-31	11:39:17.223	-4.43	348.659	327.560	369.757
26352	TEME	42512.025	0.0006957	5.3522	72.1565	188.4835	176.2984

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.269	1994-049B	Turksat 1B					PL
TLEs	EGO (-)	2017-12-31	03:11:47.175	-4.42	347.394	278.874	415.914
23200	TEME	42510.859	0.0011429	10.6262	38.2507	15.2580	352.0298
D.270	1993-046A	USA 93 (DSCS III F7, DSCS 3-7, DSCS III B-9)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-4.40	346.383	328.316	364.450
UI120	J2000	42510.556	0.0004250	11.1983	36.5215	269.8544	86.9300
D.271	1995-023A	Intelsat VIIA F-1					PL
TLEs	EGO (-)	2017-12-31	12:44:09.036	-4.40	345.951	333.278	358.623
23571	TEME	42510.831	0.0003543	4.8294	63.9002	215.7086	235.4262
D.272	1984-005A	Yuri 2A (BS 2A)					PL
TLEs	EGO (-)	2017-12-31	20:35:51.740	-4.40	345.936	292.118	399.755
14659	TEME	42510.039	0.0008795	15.0068	350.6497	205.5313	130.7040
D.273	1992-010A	Superbird B1					PL
TLEs	EGO (-)	2017-12-31	22:55:39.885	-4.39	345.234	284.601	405.866
21893	TEME	42509.051	0.0007908	12.7769	30.2051	36.0745	126.4355
D.274	1996-002B	MEASAT 1					PL
TLEs	EGO (-)	2017-12-31	09:13:28.679	-4.36	342.935	323.387	362.483
23765	TEME	42506.265	0.0009124	7.8790	48.5441	246.4079	174.3770
D.275	1989-004A	Gorizont 17					PL
TLEs	EGO (-)	2017-12-30	06:50:39.868	-4.35	342.047	253.921	430.172
19765	TEME	42505.476	0.0015413	15.1435	358.6977	84.7571	338.4459
D.276	2007-063A	Rascom-QAF 1					PL
TLEs	EGO (-)	2017-12-31	20:16:42.645	-4.35	341.936	301.636	382.236
32387	TEME	42505.678	0.0004989	5.5375	61.1874	332.0149	13.3864
D.277	1997-036A	Superbird C					PL
TLEs	EGO (-)	2017-12-31	16:27:52.825	-4.33	340.390	309.168	371.613
24880	TEME	42505.416	0.0012926	7.0134	52.9469	259.8984	65.6138
D.278	1992-041B	Eutelsat II F-4					PL
TLEs	EGO (-)	2017-12-31	16:20:09.799	-4.30	338.438	309.586	367.291
22028	TEME	42503.600	0.0010035	13.0406	29.7593	223.8727	66.4861
D.279	2001-012A	XM Radio 2 (Rock)					PL
TLEs	EGO (-)	2017-12-31	22:05:03.640	-4.29	337.390	315.300	359.480
26724	TEME	42500.900	0.0003332	2.5508	78.6637	287.9025	6.3822
D.280	1996-002A	Intelsat 3R (PAS 3R)					PL
TLEs	EGO (-)	2017-12-31	10:19:02.106	-4.27	335.882	280.158	391.606
23764	TEME	42500.607	0.0021573	6.3950	55.6234	210.5812	266.2407
D.281	1989-006A	Intelsat VA F-15					PL
TLEs	EGO (-)	2017-12-31	22:20:09.464	-4.21	330.654	238.761	422.547
19772	TEME	42495.027	0.0016980	14.7546	19.8772	25.8374	118.7500
D.282	2009-007B	Ekspress MD-1					PL
TLEs	EGO (-)	2017-12-31	08:21:39.702	-4.18	328.966	295.224	362.707
33596	TEME	42493.749	0.0012846	3.3866	74.4628	250.0220	272.7284
D.283	1985-087A	Intelsat VA F-12					PL
TLEs	EGO (-)	2017-12-31	10:02:39.830	-4.17	328.117	299.611	356.622
16101	TEME	42492.677	0.0013482	15.4606	9.7897	257.7423	117.8067

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.284	1989-069B	USA 44 (DSCS III F4, DSCS 3-4, DSCS III A-2)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-4.17	327.726	264.086	391.366
UI126	J2000	42491.899	0.0014977	13.2764	28.6106	292.0238	211.4130
D.285	1992-084A	Superbird A1					PL
TLEs	EGO (-)	2017-12-31	12:07:39.916	-4.16	326.860	262.497	391.222
22253	TEME	42490.553	0.0009673	8.9140	40.9985	112.4017	127.3485
D.286	1998-024B	BSAT 1b					PL
TLEs	EGO (-)	2017-12-31	08:07:33.257	-4.16	326.714	306.243	347.185
25312	TEME	42490.768	0.0008470	5.2824	67.0081	202.9138	204.9932
D.287	1997-016B	BSAT 1a					PL
TLEs	EGO (-)	2017-12-31	18:46:39.651	-4.15	326.368	309.766	342.970
24769	TEME	42490.505	0.0008584	5.4321	58.5745	219.4358	27.6421
D.288	1997-019A	GOES 10					PL
TLEs	EGO (0.04)	2017-12-31	06:56:52.182	-4.14	325.803	206.978	444.628
24786	TEME	42489.395	0.0029750	9.5293	41.4892	173.8129	197.3543
D.289	1983-059B	Anik C2					PL
TLEs	EGO (0.16)	2017-12-31	22:37:49.212	-4.14	325.701	170.807	480.596
14133	TEME	42490.399	0.0034050	15.3581	1.9796	32.1835	281.9977
D.290	1995-044A	N-Star 1					PL
TLEs	EGO (-)	2017-12-31	05:17:29.662	-4.12	324.186	276.085	372.287
23651	TEME	42487.775	0.0020229	9.5617	42.0452	284.2021	329.9279
D.291	1991-026A	Anik E2					PL
TLEs	EGO (-)	2017-12-31	16:20:09.140	-4.12	324.046	295.741	352.352
21222	TEME	42488.975	0.0011101	11.5045	35.0730	277.6171	65.8744
D.292	2001-031A	GOES 12					PL
TLEs	EGO (-)	2017-12-31	12:23:38.148	-4.09	321.486	287.374	355.597
26871	TEME	42486.477	0.0011878	6.6831	58.5967	234.2632	252.2843
D.293	1978-044A	OTS 2					PL
TLEs	EGO (-)	2017-12-31	18:50:42.631	-4.08	320.852	289.557	352.147
10855	TEME	42484.768	0.0013039	13.9255	333.1777	289.2483	129.7616
D.294	1990-100B	GStar 4					PL
TLEs	EGO (-)	2017-12-31	16:20:26.922	-4.07	319.841	281.172	358.511
20946	TEME	42485.018	0.0014372	11.9921	33.3008	258.8210	74.4763
D.295	1973-058A	Intelsat IV F-7					PL
TLEs	EGO (-)	2017-12-31	06:16:52.569	-4.06	319.267	293.888	344.645
6796	TEME	42482.954	0.0000309	13.6138	328.2449	25.9626	195.2077
D.296	1995-043A	JCSAT 3					PL
TLEs	EGO (-)	2017-12-31	01:02:41.627	-4.05	318.418	256.277	380.559
23649	TEME	42483.523	0.0012855	9.8655	37.0175	333.7269	281.6816
D.297	1994-040B	BS-3N					PL
TLEs	EGO (-)	2017-12-31	09:14:53.714	-4.04	317.603	301.509	333.696
23176	TEME	42480.960	0.0008239	9.8845	41.0972	268.7025	162.3693
D.298	2007-003A	Beidou 2A					PL
TLEs	EGO (0.36)	2017-12-31	14:01:20.774	-4.04	317.339	61.978	572.701
30323	TEME	42480.674	0.0066382	2.7744	83.7421	192.6400	132.7364

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.299	1998-075A	Intelsat 6B (PAS 6B)					PL
TLEs	EGO (-)	2017-12-31	14:06:42.559	-4.03	317.000	239.392	394.609
25585	TEME	42481.373	0.0012344	7.6084	50.1854	110.9508	295.5280
D.300	1998-002A	Skynet 4D					PL
TLEs	EGO (-)	2017-12-31	23:55:25.029	-4.03	316.914	292.866	340.962
25134	TEME	42481.498	0.0001407	10.7133	29.8066	211.2495	110.0297
D.301	1970-003A	Intelsat III F-6					PL
TLEs	EGO (-)	2017-12-31	01:41:31.443	-4.02	315.961	270.616	361.306
4297	TEME	42479.290	0.0015457	6.5192	300.7608	356.5269	349.3570
D.302	1983-047A	Intelsat V F-6					PL
TLEs	EGO (0.22)	2017-12-29	02:54:16.488	-4.00	314.186	201.982	426.391
14077	TEME	42478.462	0.0042891	15.2674	359.3684	263.4665	18.1857
D.303	1991-067A	Anik E1					PL
TLEs	EGO (-)	2017-12-31	05:59:05.402	-3.97	311.881	281.475	342.286
21726	TEME	42475.394	0.0017185	11.5102	35.4321	245.4179	221.5374
D.304	2001-011B	BSAT 2a					PL
TLEs	EGO (-)	2017-12-31	14:21:45.459	-3.95	310.145	286.564	333.727
26720	TEME	42474.036	0.0007749	4.3604	67.5972	189.8867	203.9839
D.305	1998-044A	PSN 5 (Chinasat 5B, Zhongxing 5B, ZX 5B, Intelsat APR-1)					PL
TLEs	EGO (-)	2017-12-31	10:36:42.503	-3.94	309.636	267.108	352.165
25404	TEME	42470.465	0.0012991	4.7844	64.9913	185.2625	167.5650
D.306	1996-035A	Intelsat VII F-6					PL
TLEs	EGO (-)	2017-12-31	15:56:49.077	-3.94	309.302	260.313	358.291
23915	TEME	42472.903	0.0016883	4.3468	67.9309	182.5648	190.0927
D.307	1995-001A	Intelsat VII F-4					PL
TLEs	EGO (-)	2017-12-31	11:30:42.560	-3.93	309.084	289.502	328.667
23461	TEME	42472.726	0.0002422	6.6177	54.6756	201.4976	324.8687
D.308	1989-027A	Tele-X					PL
TLEs	EGO (-)	2017-12-31	14:11:32.925	-3.93	308.775	283.846	333.704
19919	TEME	42473.471	0.0005608	14.9907	18.3326	236.0046	206.8122
D.309	1993-078B	Thaicom 1					PL
TLEs	EGO (-)	2017-12-31	05:46:08.736	-3.93	308.531	285.198	331.865
22931	TEME	42473.493	0.0006569	6.7716	53.7076	190.5144	265.8106
D.310	1968-081S	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.09)	2017-12-31	00:21:22.978	-3.93	308.472	-1094.601	1711.544
38692	TEME	42472.150	0.0341902	6.4898	317.3216	309.9431	212.4694
D.311	1990-100A	Satcom C-1					PL
TLEs	EGO (-)	2017-12-31	08:30:49.254	-3.92	308.266	279.122	337.410
20945	TEME	42471.376	0.0014562	10.5786	36.4206	296.4413	157.9641
D.312	1989-067A	Sirius 1 (Marcopolo 1)					PL
TLEs	EGO (-)	2017-12-30	19:06:42.575	-3.91	307.507	278.548	336.466
20193	TEME	42471.039	0.0010262	13.8249	25.3334	294.3334	1.0249
D.313	1996-039A	Chinasat 5D (Zhongxing 5D, ZX 5D, APStar 1A)					PL
TLEs	EGO (0.09)	2017-12-31	15:16:39.908	-3.90	306.160	211.346	400.974
23943	TEME	42471.171	0.0026393	9.3063	38.7256	268.8056	261.5963

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.314	1994-040A	Intelsat 2 (PAS 2)					PL
TLEs	EGO (-)	2017-12-31	18:39:39.722	-3.89	305.484	282.422	328.546
23175	TEME	42470.166	0.0006593	7.0406	54.9123	258.0360	40.7974
D.315	1991-080B	USA 75 (DSP F16, DSP 16, DSP Block 5(DSP-1) F16)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-3.88	305.183	280.606	329.760
UI133	J2000	42469.356	0.0005787	15.1737	11.2198	310.3655	170.3790
D.316	1988-098A	TDF 1					PL
TLEs	EGO (-)	2017-12-31	21:54:27.501	-3.88	305.028	266.842	343.215
19621	TEME	42468.863	0.0011355	15.1223	16.3503	216.4500	129.2691
D.317	2004-043A	Ekspress-AM 1					PL
TLEs	EGO (-)	2017-12-27	22:31:57.059	-3.88	304.726	263.154	346.298
28463	TEME	42468.830	0.0014521	5.7757	59.0256	191.4996	344.3219
D.318	1978-068A	Comstar 1C (D-3)					PL
TLEs	EGO (-)	2017-12-31	10:14:53.964	-3.87	304.353	217.893	390.813
10975	TEME	42468.597	0.0023909	14.4803	342.1512	250.6422	213.2116
D.319	2003-028A	BSAT 2c					PL
TLEs	EGO (-)	2017-12-31	06:18:16.954	-3.86	303.486	275.687	331.286
27830	TEME	42466.854	0.0010713	3.4549	73.0425	218.4763	344.7068
D.320	2000-007A	Hispasat 1C					PL
TLEs	EGO (-)	2017-12-31	20:05:43.050	-3.85	302.649	274.472	330.826
26071	TEME	42466.106	0.0008085	0.9879	89.4866	166.7827	168.4815
D.321	1992-054A	Optus B1					PL
TLEs	EGO (-)	2017-12-31	19:59:38.715	-3.84	302.057	263.382	340.732
22087	TEME	42465.644	0.0002281	8.9673	44.4074	25.6884	340.5689
D.322	1976-017A	Marisat 1					PL
TLEs	EGO (-)	2017-12-31	04:21:03.163	-3.84	301.785	254.435	349.134
8697	TEME	42465.113	0.0005978	12.4012	324.7388	121.4054	347.7174
D.323	1997-062A	Apstar 2R (Telstar 10)					PL
TLEs	EGO (-)	2017-12-31	18:25:39.679	-3.83	300.861	255.557	346.164
25010	TEME	42465.906	0.0017097	4.3247	68.1109	215.1272	60.1383
D.324	1990-074A	Thor I(Marcopolo 2)					PL
TLEs	EGO (-)	2017-12-31	22:53:39.671	-3.83	300.850	284.420	317.279
20762	TEME	42464.882	0.0007185	12.7198	30.6862	235.6229	312.8739
D.325	1982-058A	Westar V					PL
TLEs	EGO (-)	2017-12-31	14:58:39.711	-3.81	299.295	231.189	367.401
13269	TEME	42463.929	0.0017643	15.4242	3.1845	214.4148	224.6205
D.326	1994-013A	Galaxy IR-A					PL
TLEs	EGO (-)	2017-12-31	13:16:26.921	-3.79	297.384	283.395	311.372
23016	TEME	42462.392	0.0007678	9.1796	42.4410	239.8652	103.1522
D.327	1988-086A	Sakura 3B (CS 3B)					PL
TLEs	EGO (-)	2017-12-31	02:56:00.251	-3.78	296.720	274.542	318.897
19508	TEME	42461.296	0.0010042	14.8057	19.5663	266.8433	40.1902
D.328	1982-017A	Intelsat V F-4					PL
TLEs	EGO (-)	2017-12-31	12:44:51.720	-3.76	295.574	153.655	437.493
13083	TEME	42461.129	0.0022276	14.9697	353.2654	187.7980	261.1760

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.329	1996-040A	Arabsat 2A					PL
TLEs	EGO (-)	2017-12-31	22:55:39.885	-3.76	295.296	264.497	326.094
23948	TEME	42459.281	0.0004919	12.1202	32.2876	271.4719	126.4389
D.330	1980-074A	GOES 4					PL
TLEs	EGO (0.27)	2017-12-31	05:57:01.985	-3.76	295.097	155.455	434.739
11964	TEME	42458.391	0.0033976	13.9570	332.7092	13.6791	344.1850
D.331	2006-022A	KAZSAT					PL
TLEs	EGO (-)	2017-12-31	11:46:42.630	-3.74	294.074	274.536	313.613
29230	TEME	42457.201	0.0005197	6.5834	55.2279	189.7713	160.7166
D.332	2004-015A	Ekspress-AM 11					PL
TLEs	EGO (-)	2017-12-31	22:46:42.580	-3.73	293.201	269.251	317.152
28234	TEME	42456.993	0.0011430	9.1161	43.6989	237.2747	320.7485
D.333	1992-043A	Gorizont 26					PL
TLEs	EGO (0.27)	2017-12-31	02:45:58.941	-3.71	291.445	156.395	426.496
22041	TEME	42456.361	0.0033453	15.0827	10.2475	201.0131	53.6388
D.334	1990-030A	AsiaSat 1					PL
TLEs	EGO (-)	2017-12-31	08:30:49.254	-3.71	291.314	275.945	306.683
20558	TEME	42454.478	0.0007964	14.0902	24.3700	263.9273	157.4910
D.335	1968-063A	OPS 2222 (CANYON 1)					PL
KIAM	EGO (0.03)	2018-01-01	00:00:00.000	-3.70	290.562	-3721.245	4302.369
UI102	J2000	42454.735	0.0944961	13.0989	320.3135	142.9388	75.0940
D.336	1993-074B	IABS (Atlas II)					RB
KIAM	EGO (-)	2018-01-01	00:00:00.000	-3.69	289.936	249.240	330.633
UI084	J2000	42454.109	0.0009586	15.4631	8.3661	312.5855	353.5460
D.337	1994-049A	Brazilsat B1					PL
TLEs	EGO (-)	2017-12-31	12:14:42.588	-3.69	289.679	265.443	313.915
23199	TEME	42453.787	0.0004717	8.4387	46.6390	197.7229	121.5889
D.338	1977-065A	Himawari 1 (GMS 1)					PL
TLEs	EGO (-)	2017-12-31	16:45:39.661	-3.69	289.583	213.995	365.171
10143	TEME	42453.155	0.0013341	13.1387	324.9865	169.8120	324.4912
D.339	1993-015A	USA 98 (UFO F1)					PL
TLEs	EGO (-)	2017-12-31	19:59:21.354	-3.68	288.788	260.768	316.809
22563	TEME	42452.249	0.0008827	18.8880	125.8379	157.9003	1.1332
D.340	2000-082A	Beidou 1B					PL
TLEs	EGO (0.41)	2017-12-31	08:59:54.537	-3.68	288.769	-52.012	629.551
26643	TEME	42451.932	0.0079634	8.2625	46.9856	10.6739	171.9903
D.341^m	1997-042A	ABS 3 (Agila 2/ABS 5, Agila 2, Mabuhay 1)					PL
TLEs	EGO (-)	2017-12-31	17:26:39.657	-3.66	287.356	247.286	327.426
24901	TEME	42451.529	0.0009439	5.2483	62.1839	201.5773	247.6617
D.342	1996-007A	N-Star 2					PL
TLEs	EGO (-)	2017-12-31	16:20:44.048	-3.65	286.368	257.024	315.712
23781	TEME	42451.794	0.0014742	8.6101	45.9217	231.3521	82.1352
D.343	1975-042A	Intelsat IV F-1					PL
TLEs	EGO (-)	2017-12-30	08:00:00.630	-3.65	286.363	233.666	339.060
7815	TEME	42450.851	0.0010704	14.0033	334.8826	212.9019	115.9413

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.344	1998-056A	Eutelsat W2					PL
TLEs	EGO (-)	2017-12-31	15:43:28.873	-3.64	285.885	265.784	305.987
25491	TEME	42451.226	0.0005097	6.1400	57.5946	191.9311	81.3556
D.345	2004-036A	GSAT 3 (EDUSAT)					PL
TLEs	EGO (-)	2017-12-31	14:21:45.459	-3.62	284.590	269.548	299.631
28417	TEME	42448.620	0.0003484	5.5400	60.8310	197.4295	204.9758
D.346	2002-029D	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	EGO (-)	2017-12-31	02:18:39.725	-3.62	283.981	233.546	334.415
27444	TEME	42448.941	0.0014033	11.9132	33.1680	295.3379	81.9529
D.347	2002-042B	Kodama (DRTS)					PL
TLEs	EGO (0.14)	2017-12-31	14:27:42.567	-3.60	282.301	186.000	378.602
27516	TEME	42447.402	0.0021662	5.3957	61.0493	171.3559	264.4919
D.348	1992-013A	Galaxy V					PL
TLEs	EGO (-)	2017-12-30	23:41:03.340	-3.55	278.487	217.387	339.587
21906	TEME	42443.631	0.0011557	10.1807	39.8149	357.2187	59.2401
D.349	1986-016A	Yuri 2B (BS 2B)					PL
TLEs	EGO (-)	2017-12-30	15:53:40.939	-3.54	277.796	203.323	352.268
16597	TEME	42440.847	0.0010653	15.2396	358.1908	168.0067	165.3840
D.350	2001-029A	Artemis					PL
TLEs	EGO (-)	2017-12-31	11:51:39.866	-3.54	277.648	252.977	302.320
26863	TEME	42442.354	0.0004623	12.9053	31.0513	125.5388	291.3073
D.351	1991-083A	Eutelsat II F-3					PL
TLEs	EGO (-)	2017-12-30	14:21:14.107	-3.52	276.079	261.237	290.921
21803	TEME	42441.098	0.0006856	13.6082	26.5513	256.4518	253.7423
D.352	2002-002A	INSAT 3C					PL
TLEs	EGO (-)	2017-12-31	19:15:54.794	-3.50	274.770	229.993	319.548
27298	TEME	42440.046	0.0008064	1.0526	90.6569	102.9440	245.8629
D.353	1994-064A	Intelsat VII F-3 (NSS 703)					PL
TLEs	EGO (-)	2017-12-31	09:21:42.575	-3.49	273.845	248.144	299.547
23305	TEME	42436.982	0.0011637	6.3659	55.8546	200.8681	165.6437
D.354	1995-064A	AsiaSat 2					PL
TLEs	EGO (-)	2017-12-31	07:34:38.144	-3.49	273.721	236.483	310.958
23723	TEME	42437.338	0.0014929	5.4543	60.9872	235.6115	322.3645
D.355	—	Himawari 2 AKM (Star 27)					RB
KIAM	EGO (0.43)	2018-01-01	00:00:00.000	-3.47	272.414	-81.685	626.513
UU020	J2000	42436.587	0.0083442	13.6711	331.2947	28.1264	234.9800
D.356	1995-016B	Hot Bird 1					PL
TLEs	EGO (-)	2017-12-31	03:33:27.180	-3.45	270.776	256.098	285.453
23537	TEME	42435.437	0.0001813	9.2744	43.4531	262.9796	284.2682
D.357	1992-060A	Hispasat 1A					PL
TLEs	EGO (-)	2017-12-31	08:32:26.540	-3.44	270.353	245.937	294.769
22116	TEME	42433.736	0.0011622	11.8907	33.4562	240.6243	183.8064
D.358	1993-066A	Intelsat VII F-1					PL
TLEs	EGO (-)	2017-12-31	04:56:39.827	-3.43	269.064	257.577	280.551
22871	TEME	42434.279	0.0004818	4.5709	66.1041	218.7546	270.9698

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.359	1985-092C	USA 12 (DSCS III F3, DSCS 3-3, DSCS III B-5)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-3.42	268.699	249.176	288.222
UI077	J2000	42432.872	0.0004601	15.2315	13.5685	257.7966	223.6350
D.360	1991-055A	Intelsat VI F-5					PL
TLEs	EGO (-)	2017-12-31	09:05:10.014	-3.41	267.980	254.742	281.217
21653	TEME	42431.537	0.0006057	10.3669	39.2764	235.7204	193.5575
D.361	2002-038A	Eutelsat 33D (Eutelsat 8 West C, Hot Bird 6)					PL
TLEs	EGO (-)	2017-12-31	14:23:51.668	-3.41	267.781	250.339	285.222
27499	TEME	42431.673	0.0007405	1.2131	88.1061	203.5037	130.7764
D.362	1968-081Q	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.11)	2017-12-31	19:18:04.258	-3.40	266.665	-885.123	1418.453
38690	TEME	42431.593	0.0283877	6.4753	316.8489	338.9576	287.0516
D.363	1998-063B	GE 5					PL
TLEs	EGO (-)	2017-12-31	20:57:10.924	-3.39	265.809	251.694	279.923
25516	TEME	42430.876	0.0005776	5.7350	59.4870	248.8585	96.0218
D.364	1987-070A	Kiku 5 (ETS V)					PL
TLEs	EGO (-)	2017-12-31	10:13:39.691	-3.38	265.460	236.495	294.425
18316	TEME	42430.357	0.0010948	15.3437	1.2890	306.5272	288.5023
D.365	1968-081V	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.06)	2017-09-05	05:18:40.230	-3.34	262.071	-1695.515	2219.657
38695	TEME	42425.631	0.0466822	6.2997	317.5649	287.4554	240.3454
D.366	1990-079B	Eutelsat II F-1					PL
TLEs	EGO (-)	2017-12-31	07:25:17.338	-3.34	261.874	240.709	283.039
20777	TEME	42424.936	0.0009004	14.2077	23.4454	236.7385	165.2962
D.367	2006-053C	Fengyun 2D AKM (FG-36)					PM
TLEs	EGO (0.45)	2017-12-31	22:31:58.571	-3.30	259.249	-169.998	688.495
29642	TEME	42424.446	0.0102214	6.3106	57.8738	332.4152	96.6682
D.368	1978-062A	GOES 3					PL
TLEs	EGO (-)	2017-12-31	15:28:44.252	-3.29	257.872	241.467	274.278
10953	TEME	42422.697	0.0005593	13.1614	328.9753	312.5664	226.7424
D.369	1981-057F	Meteosat 2 AKM (MAGE 1)					PM
TLEs	EGO (0.44)	2017-12-31	00:50:31.974	-3.25	255.179	-64.681	575.039
20837	TEME	42420.929	0.0069755	13.8270	329.7869	127.9733	275.0918
D.370	1994-043A	Chinasat 5E (Zhongxing 5E, ZX 5E, APStar 1)					PL
TLEs	EGO (-)	2017-12-31	08:17:57.624	-3.23	253.263	237.171	269.354
23185	TEME	42416.428	0.0007509	10.1175	38.9649	277.8143	180.4839
D.371	1978-071A	ESA GEOS 2					PL
TLEs	EGO (-)	2017-12-31	10:49:39.678	-3.23	253.034	234.818	271.250
10981	TEME	42418.093	0.0008027	12.4667	320.8212	304.9546	52.8703
D.372	1982-106D	IUS second stage (IUS-2 SRM-2, Orbus 6E) (Titan 34D IUS)					RB
TLEs	EGO (0.42)	2017-12-30	16:26:49.064	-3.21	251.779	60.892	442.665
13643	TEME	42414.759	0.0047566	14.7183	339.1851	341.5089	157.0407
D.373^m	2017-086A	Angosat 1					PL
TLEs	EGO (0.25)	2017-12-31	22:43:58.593	-3.20	252.400	185.600	319.200
43087	TEME	42418.088	0.0018291	0.0658	105.0954	98.5093	40.9059

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.374	1997-002B	Nahuel 1A					PL
TLEs	EGO (-)	2017-12-31	09:19:28.286	-3.20	250.643	225.204	276.082
24714	TEME	42414.373	0.0006000	8.0343	48.1695	184.0663	197.5357
D.375	2003-059A	AMOS 2					PL
TLEs	EGO (-)	2017-12-31	15:05:09.864	-3.18	249.389	237.529	261.249
28132	TEME	42412.502	0.0002582	1.1519	89.5401	190.1268	215.0409
D.376	1988-051C	PAS 1 (PanAmSat 1)					PL
TLEs	EGO (-)	2017-12-30	08:59:27.030	-3.17	249.016	230.269	267.762
19217	TEME	42412.285	0.0008866	12.9871	28.9949	261.8143	334.7849
D.377	2012-002C	Fengyun 2F AKM (FG-36)					PM
TLEs	EGO (0.43)	2017-12-31	19:24:42.594	-3.17	248.592	6.945	490.238
38072	TEME	42413.635	0.0059044	2.1028	77.9155	139.7819	55.4632
D.378	2007-058A	Cosmos-2434 (Raduga-1M1)					PL
TLEs	EGO (-)	2017-12-31	14:13:42.629	-3.15	247.412	236.526	258.299
32373	TEME	42412.342	0.0005710	3.4785	72.7796	217.3739	281.7926
D.379	1977-048A	GOES 2					PL
TLEs	EGO (0.30)	2017-12-31	06:51:14.513	-3.15	247.386	184.299	310.474
10061	TEME	42410.343	0.0018837	12.9964	325.3430	324.3842	153.3024
D.380	1989-052A	Gorizont 18					PL
TLEs	EGO (0.38)	2017-12-31	10:14:10.649	-3.14	246.585	94.058	399.112
20107	TEME	42411.134	0.0040688	15.0886	0.0171	272.8657	109.2632
D.381	1985-016F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.34)	2017-12-31	16:37:31.683	-3.13	245.765	135.831	355.699
15581	TEME	42410.851	0.0023001	14.4840	343.2063	179.1275	58.3820
D.382	1997-071A	Astra 5A (Sirius 2, GE 1E)					PL
TLEs	EGO (-)	2017-12-31	20:35:38.091	-3.13	245.343	228.235	262.452
25049	TEME	42408.519	0.0005939	6.9488	53.3004	233.0289	144.5558
D.383	1995-011B	Himawari 5 (GMS 5)					PL
TLEs	EGO (-)	2017-12-31	09:12:16.801	-3.13	245.145	212.869	277.422
23522	TEME	42408.691	0.0002003	12.7914	28.1639	49.9028	324.5365
D.384	1983-006A	Sakura 2A (CS 2A)					PL
TLEs	EGO (0.23)	2017-12-31	11:57:39.689	-3.12	244.965	203.501	286.428
13782	TEME	42410.158	0.0014365	14.6912	346.9050	265.6557	250.3772
D.385	1996-063A	Arabsat 2B					PL
TLEs	EGO (-)	2017-12-31	07:03:41.409	-3.10	243.270	226.446	260.093
24652	TEME	42408.209	0.0006878	4.1082	69.6537	219.7103	279.9995
D.386	1983-094A	RCA Satcom IIR					PL
TLEs	EGO (0.29)	2017-12-31	13:23:04.034	-3.10	243.140	180.001	306.278
14328	TEME	42408.954	0.0017173	15.3411	12.1998	333.0124	55.2746
D.387	1984-031F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.20)	2017-12-31	10:20:42.600	-3.06	239.962	174.289	305.636
14951	TEME	42404.819	0.0011910	14.2686	340.0531	184.1294	269.8794
D.388	1989-035C	Titan 34D third stage (Transtage D-16) (Titan 34D Transtage)					RB
KIAM	EGO (0.03)	2018-01-01	00:00:00.000	-3.04	238.279	-3966.781	4443.339
UI020	J2000	42402.452	0.0991702	8.2321	6.4007	355.2361	44.6800

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.389	1994-038D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (0.35)	2017-12-31	23:10:15.422	-3.03	237.902	131.046	344.758
23171	TEME	42402.453	0.0020126	14.1765	18.6450	62.9242	292.6760
D.390	2000-031D	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	EGO (0.16)	2017-12-31	19:59:03.374	-3.00	235.420	181.535	289.305
26381	TEME	42398.459	0.0009232	13.2070	27.9131	9.5498	346.9447
D.391	1979-053C	Transtage 31 (Titan IIIC)					RB
KIAM	EGO (0.45)	2018-01-01	00:00:00.000	-2.99	234.737	-9.035	478.510
UI051	J2000	42398.910	0.0057495	13.3182	326.8444	218.3548	38.7530
D.392	1977-041A	Intelsat IVA F-4					PL
TLEs	EGO (0.24)	2017-12-31	06:56:42.609	-2.99	234.573	180.539	288.607
10024	TEME	42398.075	0.0011198	14.2200	338.9075	209.3998	320.6393
D.393	1984-009C	Titan 34D third stage (Transtage D-10) (Titan 34D Transtage)					RB
KIAM	EGO (0.03)	2018-01-01	00:00:00.000	-2.98	233.439	-4014.891	4481.769
UI025	J2000	42397.612	0.1002021	7.8007	350.8202	59.3093	35.8090
D.394	2004-011A	Superbird A2 (Superbird 6)					PL
TLEs	EGO (0.42)	2017-12-31	09:25:19.682	-2.92	229.114	142.048	316.180
28218	TEME	42394.501	0.0029191	10.2543	39.1603	314.2869	266.3980
D.395	1985-048B	Morelos 1					PL
TLEs	EGO (-)	2017-12-31	12:24:46.188	-2.90	227.174	209.167	245.181
15824	TEME	42392.344	0.0003260	15.3997	9.2504	315.7141	268.4286
D.396	1994-002D	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	EGO (0.39)	2017-12-31	17:53:09.746	-2.90	227.055	46.278	407.831
22966	TEME	42390.238	0.0037930	15.2461	10.1047	62.8387	1.7845
D.397	1981-119A	Intelsat V F-3					PL
TLEs	EGO (0.40)	2017-12-31	04:21:35.436	-2.89	226.883	125.152	328.613
12994	TEME	42390.660	0.0020224	14.8991	352.9619	181.7335	3.4745
D.398	1976-059A	OPS 2112 (DSP F6, DSP 7, DSP Block 2(PHASE II) F6)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	-2.89	226.671	225.446	227.896
UI056	J2000	42390.844	0.0000289	10.6633	311.1135	259.4597	219.2070
D.399	1978-062D	GOES 3 AKM (SVM-5)					PM
TLEs	EGO (0.31)	2017-12-31	21:43:39.666	-2.87	225.010	-252.389	702.409
20801	TEME	42390.648	0.0116371	13.3514	321.4634	358.3772	77.0733
D.400	1990-021A	Intelsat VI F-3					PL
TLEs	EGO (0.21)	2017-12-31	16:20:27.581	-2.86	223.923	204.658	243.187
20523	TEME	42389.584	0.0007723	11.8667	32.2533	297.4580	74.8771
D.401	1969-069A	ATS 5					PL
TLEs	EGO (0.28)	2017-12-31	15:07:39.690	-2.81	220.619	200.975	240.264
4068	TEME	42383.432	0.0007100	7.4655	302.5016	307.8807	174.1539
D.402	1997-008D	IUS second stage (IUS-4 SRM-2, Orbus 6E) (Titan IVB IUS)					RB
KIAM	EGO (0.43)	2018-01-01	00:00:00.000	-2.81	220.037	132.323	307.751
UI071	J2000	42384.210	0.0020695	13.1961	28.7434	117.0199	339.6730
D.403	1968-081W	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.13)	2017-12-28	09:36:57.034	-2.80	219.797	-707.713	1147.306
38696	TEME	42385.096	0.0236254	6.0313	316.5812	298.0214	75.4044

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.404	1997-027A	Inmarsat-3 F4					PL
TLEs	EGO (0.33)	2017-12-31	22:25:27.636	-2.79	218.655	187.999	249.310
24819	TEME	42382.153	0.0008243	6.0995	56.4242	295.6239	3.4519
D.405	1975-011A	SMS 2					PL
TLEs	EGO (0.36)	2017-12-28	00:08:10.097	-2.75	215.348	161.129	269.567
7648	TEME	42380.954	0.0009672	12.4665	319.4435	201.1371	69.8824
D.406	1989-090D	IUS second stage (IUS-5 SRM-2, Orbus 6E) (Discovery (OV-103))					RB
KIAM	EGO (-)	2018-01-01	00:00:00.000	-2.72	213.127	-1179.688	1605.942
UI090	J2000	42377.300	0.0328670	18.4160	14.1089	16.6671	45.5200
D.407	1983-077A	Arabsat 1D-R					PL
TLEs	EGO (0.39)	2017-12-24	16:40:47.720	-2.70	211.384	99.925	322.843
14234	TEME	42375.359	0.0019737	15.3803	8.3128	88.1089	24.7406
D.408	1990-034A	Palapa B-2R					PL
TLEs	EGO (0.32)	2017-12-30	17:38:39.652	-2.68	210.160	166.060	254.259
20570	TEME	42374.420	0.0004678	13.3775	27.8862	42.9270	30.9329
D.409	1992-021A	Telecom 2B					PL
TLEs	EGO (0.40)	2017-12-31	11:27:33.566	-2.68	210.155	156.957	263.353
21939	TEME	42374.307	0.0008215	13.0943	28.1965	354.3084	151.7648
D.410	1989-020A	JCSAT 1					PL
TLEs	EGO (0.29)	2017-12-25	04:23:42.442	-2.66	208.394	189.782	227.006
19874	TEME	42372.864	0.0003480	14.8090	19.3353	270.2231	35.4370
D.411	1997-008E	USA 130 debris (DSP F18 IR Sensor telescope sunshade cover)					PM
KIAM	EGO (0.39)	2018-01-01	00:00:00.000	-2.66	208.079	-219.737	635.895
UI164	J2000	42372.252	0.0100966	13.3306	28.4825	176.5119	33.8110
D.412	—	Meteosat 3 AKM (MAGE 1)					RB
KIAM	EGO (0.44)	2018-01-01	00:00:00.000	-2.65	207.590	-11.514	426.694
UU041	J2000	42371.763	0.0051710	15.1886	356.4657	92.7301	76.1980
D.413	1996-033A	Galaxy IX					PL
TLEs	EGO (0.41)	2017-12-31	09:54:00.900	-2.64	206.818	165.892	247.745
23877	TEME	42370.006	0.0005167	7.1879	51.7995	127.5870	187.6087
D.414	1990-063B	DFS-Kopernikus 2					PL
TLEs	EGO (0.47)	2017-12-31	16:43:47.036	-2.61	204.636	188.043	221.229
20706	TEME	42368.165	0.0010504	13.1252	28.2038	245.9874	18.0657
D.415	1985-015B	Brazilsat 1					PL
TLEs	EGO (0.40)	2017-12-31	10:06:39.782	-2.61	204.335	184.881	223.789
15561	TEME	42368.672	0.0009457	15.2893	11.1453	273.9601	299.7465
D.416	1981-076A	Himawari 2 (GMS 2)					PL
TLEs	EGO (0.47)	2017-12-30	23:54:00.882	-2.60	203.415	160.738	246.091
12677	TEME	42368.409	0.0012503	13.8533	333.5489	261.1869	47.2167
D.417	1986-003B	Satcom Ku-1					PL
TLEs	EGO (0.48)	2017-12-30	17:59:03.035	-2.59	202.813	183.352	222.273
16482	TEME	42365.673	0.0005978	14.9575	17.2859	252.6575	0.2426

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.418	1973-040B	Transtage 24 (Titan IIIC)					RB
KIAM	EGO (0.49)	2018-01-01	00:00:00.000	-2.58	202.080	45.787	358.373
UI049	J2000	42366.253	0.0036891	8.4038	302.5048	333.7521	166.7400
D.419	2000-019D	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	EGO (0.49)	2017-12-31	17:37:02.955	-2.58	201.843	138.272	265.413
26246	TEME	42365.445	0.0019513	13.5036	26.9283	247.0647	20.8017
D.420	1996-026B	Centaur-T (Titan IVA Centaur-T)					RB
KIAM	EGO (0.07)	2018-01-01	00:00:00.000	-2.56	200.816	-1731.434	2133.066
UI075	J2000	42364.989	0.0456096	9.1642	352.3015	334.8641	27.0990
D.421	1985-109B	Morelos 2					PL
TLEs	EGO (0.47)	2017-12-31	05:56:36.269	-2.55	200.102	176.745	223.459
16274	TEME	42364.875	0.0001908	14.2531	22.2888	315.3101	222.5674
D.422	1991-028A	Spacenet 4					PL
TLEs	EGO (0.51)	2017-12-31	12:33:04.463	-2.54	198.619	182.834	214.403
21227	TEME	42362.748	0.0009855	11.0164	36.2207	259.2389	121.7273
D.423	1994-054B	Centaur-T (Titan IVA Centaur-T)					RB
KIAM	EGO (0.27)	2018-01-01	00:00:00.000	-2.49	195.211	-335.522	725.945
UI017	J2000	42359.384	0.0125293	12.5076	14.7816	277.0400	177.3060
D.424	2014-090C	Fengyun 2G AKM (FG-36)					PM
TLEs	EGO (0.51)	2017-12-31	22:39:33.329	-2.48	193.922	8.971	378.872
40369	TEME	42359.000	0.0041918	0.1735	193.0580	358.1339	279.5662
D.425	2001-014A	Ekran-M 21					PL
TLEs	EGO (0.52)	2017-12-31	09:28:42.636	-2.47	193.357	71.047	315.668
26736	TEME	42355.915	0.0028034	11.8443	37.8503	345.0663	155.7228
D.426	1982-004A	RCA Satcom IV					PL
TLEs	EGO (0.47)	2017-12-31	12:24:46.188	-2.46	192.865	160.931	224.800
13035	TEME	42358.114	0.0013777	15.2860	1.7192	123.9774	267.5460
D.427	1994-065B	Thaicom 2					PL
TLEs	EGO (0.60)	2017-12-31	13:22:42.591	-2.46	192.578	175.569	209.588
23314	TEME	42357.036	0.0005126	5.9569	57.6168	204.2732	114.3370
D.428	1991-075A	Intelsat VI F-1					PL
TLEs	EGO (0.56)	2017-12-31	02:47:33.981	-2.46	192.560	177.473	207.647
21765	TEME	42358.133	0.0007837	10.2906	38.3999	251.0306	256.7764
D.429	1996-006A	Palapa C1					PL
TLEs	EGO (0.57)	2017-12-31	16:21:30.810	-2.45	191.867	158.280	225.453
23779	TEME	42356.845	0.0007721	4.6416	66.1430	170.1829	104.5444
D.430	1990-002B	LEASAT 5 (Syncom-4 5)					PL
TLEs	EGO (0.60)	2017-12-31	17:32:39.177	-2.44	191.303	173.952	208.653
20410	TEME	42354.566	0.0007268	11.7752	10.1005	309.0039	191.2427
D.431	1981-107C	Transtage 39 (Titan IIIC)					RB
KIAM	EGO (0.03)	2018-01-01	00:00:00.000	-2.43	190.471	-4070.542	4451.484
UI076	J2000	42354.644	0.1006032	7.0317	346.5901	82.1602	213.7570
D.432	1975-117A	RCA Satcom I					PL
TLEs	EGO (0.54)	2017-12-30	23:54:00.882	-2.42	189.387	105.897	272.878
8476	TEME	42354.354	0.0016327	13.8284	333.8313	207.0218	46.8419

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.433	1985-109D	Satcom Ku-2					PL
TLEs	EGO (0.56)	2017-12-31	23:48:09.984	-2.40	187.981	148.456	227.505
16276	TEME	42353.185	0.0013692	14.8023	18.4810	226.5637	96.4737
D.434	1971-116A	Intelsat IV F-3					PL
TLEs	EGO (0.61)	2017-12-31	17:21:11.622	-2.35	183.727	134.977	232.477
5709	TEME	42346.150	0.0012813	13.0580	324.2988	10.5940	161.8183
D.435	1978-058B	Transtage 33 (Titan IIIC)					RB
KIAM	EGO (0.02)	2018-01-01	00:00:00.000	-2.34	183.522	-6206.267	6573.311
UI010	J2000	42347.695	0.1508887	7.6718	27.9297	65.1664	204.7680
D.436	1997-070D	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	EGO (0.66)	2017-12-31	10:02:39.830	-2.30	179.914	113.592	246.235
25048	TEME	42343.415	0.0010291	14.5648	20.1622	74.5485	124.7430
D.437	1986-026B	Brazilsat 2					PL
TLEs	EGO (0.72)	2017-12-31	19:18:53.053	-2.28	178.268	161.390	195.146
16650	TEME	42341.035	0.0008546	14.9120	16.5060	271.5285	346.3975
D.438	2000-002A	Galaxy 10R					PL
TLEs	GEO (1.00)	2017-12-31	17:33:39.827	-2.28	178.190	160.332	196.048
26056	TEME	42343.627	0.0004233	7.4200	50.7261	204.5304	236.9659
D.439	1993-069A	Gorizont 28					PL
TLEs	EGO (0.56)	2017-12-31	01:10:30.812	-2.24	175.021	35.464	314.577
22880	TEME	42340.659	0.0027096	14.8718	13.7810	89.2901	58.2741
D.440	1999-016A	INSAT 2E (Intelsat APR-2)					PL
TLEs	EGO (0.67)	2017-12-31	18:53:42.580	-2.22	173.945	142.763	205.126
25666	TEME	42337.891	0.0011995	5.6544	59.7227	218.9207	25.3929
D.441	2000-016B	INSAT 3B					PL
TLEs	EGO (0.73)	2017-12-30	09:54:42.720	-2.21	173.169	151.330	195.008
26108	TEME	42335.602	0.0010110	4.6746	65.6037	192.1401	177.6897
D.442	1988-018A	Spacenet 3R					PL
TLEs	EGO (0.88)	2017-12-31	23:02:39.786	-2.20	172.247	154.411	190.082
18951	TEME	42336.389	0.0007048	13.7781	24.9352	242.5015	119.1346
D.443	1985-028B	Anik C1					PL
TLEs	EGO (0.74)	2017-12-18	12:04:56.784	-2.20	171.842	108.344	235.340
15642	TEME	42336.442	0.0009407	14.8721	18.5473	56.8754	110.0229
D.444	1995-041A	Europe*Star B (Mugunghwa 1, Koreasat 1)					PL
TLEs	GEO (1.00)	2017-12-31	14:21:07.917	-2.18	170.560	153.914	187.206
23639	TEME	42334.646	0.0004533	13.9429	24.0191	270.5675	204.2870
D.445	1979-086C	Transtage 34 (Titan IIIC)					RB
KIAM	EGO (0.02)	2018-01-01	00:00:00.000	-2.15	168.169	-5573.756	5910.094
UI024	J2000	42332.342	0.1356392	6.7196	352.2394	90.9034	123.1110
D.446	1988-109A	Skynet 4B					PL
TLEs	EGO (0.73)	2017-12-30	17:29:27.335	-2.13	166.940	145.361	188.520
19687	TEME	42330.822	0.0009713	15.3971	3.3401	258.6981	1.6463
D.447	1976-010A	Intelsat IVA F-2					PL
TLEs	GEO (1.00)	2017-12-31	06:36:20.043	-2.11	165.083	140.417	189.749
8620	TEME	42328.265	0.0007153	13.7802	333.3537	258.7145	193.1700

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.448	1983-105A	Intelsat V F-7					PL
TLEs	GEO (0.94)	2017-12-31	06:08:25.026	-2.08	162.868	138.922	186.814
14421	TEME	42325.563	0.0007263	15.0696	357.1958	317.4623	345.8667
D.449	1992-072A	Galaxy VII					PL
TLEs	EGO (0.84)	2017-12-31	19:57:22.355	-2.07	161.961	127.464	196.458
22205	TEME	42324.538	0.0010576	13.1161	27.9018	299.3448	343.2107
D.450	1997-078A	Galaxy VIII-i					PL
TLEs	EGO (0.88)	2017-12-30	11:49:42.515	-2.06	161.496	133.203	189.788
25086	TEME	42325.873	0.0009665	11.8018	33.1756	292.8571	115.7162
D.451	1991-074D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (0.91)	2017-12-30	02:42:12.764	-2.04	159.879	144.705	175.052
21762	TEME	42324.574	0.0003467	15.1515	7.3418	267.3318	36.3279
D.452	2000-024D	IUS second stage (IUS-22 SRM-2, Orbus 6E) (Titan IVB IUS)					RB
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	-2.04	159.787	148.372	171.202
UI067	J2000	42323.960	0.0002697	10.9094	34.0331	125.8485	136.5120
D.453	2000-024E	USA 149 debris (DSP F20 IR Sensor telescope sunshade cover)					PM
KIAM	EGO (0.13)	2018-01-01	00:00:00.000	-2.00	156.447	-868.939	1181.833
UI005	J2000	42320.620	0.0242290	11.3159	33.5711	247.4908	222.4030
D.454	1993-048A	Hispasat 1B					PL
TLEs	EGO (0.82)	2017-12-31	06:39:01.021	-1.98	154.790	122.739	186.841
22723	TEME	42319.956	0.0012279	11.0881	35.5453	237.5970	282.0752
D.455	1992-066A	DFS-Kopernikus 3					PL
TLEs	GEO (1.00)	2017-12-31	12:26:47.048	-1.95	152.832	135.236	170.428
22175	TEME	42318.759	0.0004718	12.3580	30.9084	268.2520	253.3049
D.456	1984-080E	Himawari 3 (GMS 3) AKM (Star 27)					PM
TLEs	EGO (0.24)	2017-12-29	10:14:45.742	-1.90	148.920	-419.798	717.638
22266	TEME	42314.359	0.0133528	14.3477	343.1738	24.8577	272.9813
D.457	1989-041A	Superbird A					PL
TLEs	GEO (0.92)	2017-12-31	10:20:42.600	-1.90	148.391	120.017	176.765
20040	TEME	42314.391	0.0011509	15.1164	358.4317	305.6596	278.5166
D.458	1984-114A	Chinasat 5R (Zhongxing 5R, ZX 5R, Spacenet 2)					PL
TLEs	GEO (1.00)	2017-12-31	07:28:02.817	-1.86	145.464	110.547	180.381
15385	TEME	42307.398	0.0009328	14.8006	18.2319	325.2451	167.3125
D.459	1990-091B	Galaxy VI					PL
TLEs	GEO (1.00)	2017-12-31	21:32:44.920	-1.84	143.984	125.005	162.963
20873	TEME	42306.986	0.0006310	11.7648	33.2844	217.9058	326.1103
D.460	1985-076B	Optus A1					PL
TLEs	GEO (0.87)	2017-12-31	01:11:22.805	-1.84	143.884	125.952	161.816
15993	TEME	42309.589	0.0008153	15.3208	5.2036	289.2541	51.6606
D.461	1982-014A	Westar IV					PL
TLEs	GEO (0.89)	2017-12-31	21:32:58.979	-1.81	141.431	123.267	159.595
13069	TEME	42304.746	0.0007739	15.2129	1.1681	261.6972	317.6656
D.462	1972-010A	OPS 1570 (DSP F3, DSP 4, DSP Block 1(PHASE I) F3)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	-1.81	141.410	89.966	192.854
UI144	J2000	42305.583	0.0012160	7.0490	303.2276	309.4103	285.1430

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.463	2003-021A	Beidou 3					PL
TLEs	EGO (0.82)	2017-12-31	18:46:39.651	-1.80	140.485	101.371	179.600
27813	TEME	42305.165	0.0016397	5.5704	61.6003	207.5036	35.3292
D.464	1984-093D	Telstar 3C (Telstar 302)					PL
TLEs	GEO (0.89)	2017-12-31	13:46:01.971	-1.78	139.068	119.412	158.724
15237	TEME	42305.487	0.0002718	15.2259	11.7753	288.6870	65.1105
D.465	1995-067B	INSAT 2C					PL
TLEs	GEO (1.00)	2017-12-31	16:37:47.945	-1.77	138.352	119.547	157.157
23731	TEME	42304.663	0.0007561	12.2393	32.2909	266.1967	69.7985
D.466	1974-093A	Intelsat IV F-8					PL
TLEs	GEO (1.00)	2017-12-31	15:34:29.939	-1.75	137.019	114.605	159.433
7544	TEME	42302.494	0.0002175	13.7929	333.8979	335.9626	231.4653
D.467	1988-081B	SBS V					PL
TLEs	GEO (1.00)	2017-12-31	06:53:26.538	-1.74	135.716	108.703	162.729
19484	TEME	42297.728	0.0011722	13.5168	26.0221	254.9940	151.8749
D.468	1996-003A	ABS 1A (Mugungwha 2, Koreasat 2)					PL
TLEs	GEO (1.00)	2017-12-31	12:13:22.442	-1.73	134.867	121.769	147.964
23768	TEME	42300.864	0.0004330	8.4923	45.6611	243.6451	248.0170
D.469	1986-026A	GStar 2					PL
TLEs	GEO (0.89)	2017-12-31	02:42:08.525	-1.72	134.335	116.617	152.053
16649	TEME	42300.682	0.0007500	15.2191	12.3132	299.5419	70.1466
D.470	1992-059D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (0.84)	2017-12-31	01:12:42.597	-1.72	134.090	85.914	182.267
22115	TEME	42300.986	0.0015743	15.1990	9.7338	260.9120	72.0405
D.471	1973-023A	Anik A2					PL
TLEs	EGO (0.92)	2017-12-31	15:46:02.532	-1.71	133.787	84.697	182.877
6437	TEME	42299.788	0.0015627	13.3163	327.7047	336.5813	245.0729
D.472	2003-013A	INSAT 3A					PL
TLEs	EGO (0.86)	2017-12-31	17:23:12.613	-1.68	131.707	69.718	193.696
27714	TEME	42296.554	0.0017656	1.5755	86.9599	226.6628	114.3670
D.473	1985-010B	USA 8 (MAGNUM 1)					PL
KIAM	EGO (0.15)	2018-01-01	00:00:00.000	-1.67	130.438	-451.709	712.585
UI097	J2000	42294.611	0.0137641	17.4047	346.5711	324.4256	275.0580
D.474	1978-116A	Anik B1					PL
TLEs	EGO (0.77)	2017-12-31	06:15:06.647	-1.65	129.182	50.938	207.427
11153	TEME	42292.768	0.0022290	14.3369	343.1376	249.8126	315.4988
D.475	1973-040A	OPS 6157 (DSP F4, DSP 2, DSP Block 1(PHASE I) F4)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	-1.64	128.330	87.061	169.599
UI048	J2000	42292.503	0.0009758	8.2010	301.9693	315.9548	341.4230
D.476	2004-004D	IUS second stage (IUS-10 SRM-2, Orbus 6E) (Titan IVB IUS)					RB
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	-1.64	128.001	101.568	154.434
UI062	J2000	42292.174	0.0006250	8.1511	45.0124	289.9439	330.8500
D.477	1980-091A	SBS I					PL
TLEs	GEO (1.00)	2017-12-31	07:45:45.554	-1.63	127.015	92.417	161.613
12065	TEME	42288.889	0.0001601	14.6279	345.0874	50.5132	172.6044

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.478	1976-042A	Comstar 1A (D-1)					PL
TLEs	GEO (1.00)	2017-12-30	07:46:39.696	-1.62	126.828	108.524	145.132
8838	TEME	42290.687	0.0008116	13.7859	333.9864	294.2329	121.6334
D.479	2009-010A	Raduga 1					PL
TLEs	GEO (1.00)	2017-12-31	15:46:31.439	-1.62	126.597	88.090	165.104
34264	TEME	42290.995	0.0011032	6.1177	66.5798	296.4592	212.3716
D.480	1994-067A	Ekspress 1 (Ekspress 11L)					PL
TLEs	GEO (1.00)	2017-12-31	14:23:17.435	-1.61	125.987	104.919	147.056
23319	TEME	42291.562	0.0006981	13.2907	26.8711	216.3657	230.6069
D.481	1972-003A	Intelsat IV F-4					PL
TLEs	GEO (1.00)	2017-12-31	12:48:39.682	-1.60	124.808	106.658	142.959
5775	TEME	42288.857	0.0004742	13.2119	326.6868	340.2232	28.8957
D.482	1984-080A	Himawari 3 (GMS 3)					PL
TLEs	GEO (1.00)	2017-12-31	16:37:31.683	-1.59	124.065	94.747	153.382
15152	TEME	42290.427	0.0004792	14.6507	349.8838	9.4032	59.4162
D.483	2000-020A	Galaxy IVR					PL
TLEs	GEO (1.00)	2017-12-31	22:53:39.671	-1.58	123.183	103.346	143.021
26298	TEME	42286.867	0.0007082	8.7993	44.4780	210.7828	311.3407
D.484	1984-101A	Galaxy III					PL
TLEs	GEO (0.89)	2017-12-31	05:33:54.506	-1.57	122.421	95.229	149.613
15308	TEME	42285.202	0.0011020	15.2261	11.5703	294.7193	188.2710
D.485	1976-035A	NATO IIIA					PL
TLEs	EGO (0.77)	2017-12-31	13:00:38.114	-1.55	120.896	20.126	221.665
8808	TEME	42282.431	0.0025793	11.4364	324.5943	253.9855	165.4693
D.486	—	USA 197 debris (DSP F23 IR Sensor telescope sunshade cover)					PM
KIAM	EGO (0.36)	2018-01-01	00:00:00.000	-1.54	120.261	-278.688	519.210
UU069	J2000	42284.434	0.0094349	4.6178	71.1632	49.7466	114.4340
D.487	1989-062A	TV-SAT 2					PL
TLEs	GEO (1.00)	2017-12-31	14:04:39.858	-1.53	119.477	93.869	145.085
20168	TEME	42286.165	0.0006724	14.3010	21.6392	225.4862	249.8642
D.488	2003-018A	GSAT 2					PL
TLEs	GEO (1.00)	2017-12-31	11:37:42.648	-1.53	119.177	101.677	136.678
27807	TEME	42282.826	0.0008503	5.3552	61.2931	236.6110	310.6750
D.489	1992-017A	Gorizont 25					PL
TLEs	EGO (0.73)	2017-12-31	22:23:26.873	-1.52	119.065	9.534	228.595
21922	TEME	42285.896	0.0024161	15.0487	8.5518	22.9998	75.9850
D.490	1974-075A	Westar II					PL
TLEs	GEO (1.00)	2017-12-31	07:17:37.985	-1.51	117.973	97.287	138.660
7466	TEME	42279.479	0.0002217	13.4197	330.1926	281.5385	164.0117
D.491	1983-030A	RCA Satcom IR					PL
TLEs	GEO (0.88)	2017-12-31	11:05:33.120	-1.50	117.569	80.724	154.414
13984	TEME	42283.143	0.0004704	15.2792	4.8830	351.0139	284.6938
D.492	1999-047A	Yamal 100 No. 1					PL
TLEs	EGO (0.40)	2017-12-30	17:38:39.652	-1.47	114.845	-248.027	477.716
25896	TEME	42278.289	0.0087183	13.7182	24.8268	339.3523	22.2754

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.493	1984-022F	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (0.92)	2017-12-31	06:47:09.620	-1.46	113.694	17.874	209.514
14948	TEME	42275.149	0.0020099	15.1282	336.7159	53.8797	151.8956
D.494	1987-028D	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.66)	2017-12-31	02:53:01.844	-1.45	113.298	1.824	224.771
17705	TEME	42277.009	0.0025503	15.3685	349.0384	22.1637	24.4514
D.495	1985-048D	Telstar 3D (Telstar 303)					PL
TLEs	GEO (0.91)	2017-12-31	09:38:57.161	-1.43	111.679	95.539	127.820
15826	TEME	42274.979	0.0005570	15.1575	12.7295	251.2628	128.0006
D.496	1995-063A	Gals 2					PL
TLEs	GEO (1.00)	2017-12-29	20:53:17.287	-1.39	108.763	79.863	137.663
23717	TEME	42270.786	0.0012098	13.1733	27.4167	261.0979	347.2327
D.497	2001-033D	IUS second stage (IUS-16 SRM-2, Orbus 6E) (Titan IVB IUS)					RB
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	-1.39	108.609	68.391	148.827
UI061	J2000	42272.782	0.0009514	10.0134	37.2527	284.4322	77.3940
D.498	1996-005A	Gorizont 31					PL
TLEs	GEO (1.00)	2017-12-31	02:47:42.319	-1.38	107.547	19.025	196.069
23775	TEME	42274.230	0.0019447	14.2158	20.0755	174.1671	58.6629
D.499	1991-064B	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (0.90)	2017-12-31	12:05:39.690	-1.37	106.714	89.230	124.197
21703	TEME	42273.151	0.0007117	15.2044	6.1993	293.7462	273.3758
D.500	1974-022A	Westar I					PL
TLEs	GEO (1.00)	2017-12-31	17:15:16.255	-1.35	105.353	81.123	129.582
7250	TEME	42266.959	0.0010178	13.3656	329.1005	312.0300	177.1759
D.501	1987-022A	GOES 7					PL
TLEs	GEO (0.92)	2017-12-31	23:14:42.610	-1.35	105.144	91.043	119.246
17561	TEME	42271.342	0.0007493	15.1369	3.7555	302.0491	274.0814
D.502	1982-110C	Anik C3					PL
TLEs	GEO (0.91)	2017-12-31	15:02:40.963	-1.32	103.320	87.599	119.040
13652	TEME	42270.621	0.0005835	15.1498	0.4500	293.7110	77.6482
D.503	1978-002A	Intelsat IVA F-3					PL
TLEs	GEO (1.00)	2017-12-31	05:58:39.832	-1.31	102.413	83.939	120.887
10557	TEME	42264.560	0.0005747	14.1431	340.3083	268.7299	330.9756
D.504	1987-029A	Agila 1					PL
TLEs	GEO (0.95)	2017-12-28	15:28:12.295	-1.30	101.857	83.907	119.807
17706	TEME	42267.564	0.0007190	15.0506	14.6560	293.9772	45.3342
D.505	2000-011A	Garuda 1					PL
TLEs	GEO (1.00)	2017-12-31	20:05:43.050	-1.30	101.777	83.505	120.048
26089	TEME	42262.639	0.0007532	2.2232	109.6233	167.6708	163.4542
D.506	1975-091A	Intelsat IVA F-1					PL
TLEs	GEO (1.00)	2017-12-31	15:54:53.320	-1.24	96.827	71.608	122.046
8330	TEME	42258.931	0.0003364	13.7047	333.6878	237.1680	187.5327
D.507	1982-110B	SBS III					PL
TLEs	GEO (0.91)	2017-12-30	09:12:11.535	-1.23	96.325	63.570	129.080
13651	TEME	42260.730	0.0006859	15.1491	0.6644	346.6138	306.7306

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.508	1982-009A	Ekran 8					PL
TLEs	EGO (0.81)	2017-12-31	12:41:39.788	-1.20	93.904	-19.885	207.692
13056	TEME	42259.053	0.0030249	13.3991	328.2889	266.2040	35.4890
D.509	1992-027A	Palapa B4					PL
TLEs	GEO (1.00)	2017-12-30	23:10:39.720	-1.20	93.705	77.098	110.313
21964	TEME	42256.545	0.0007071	10.1053	38.7562	264.7421	129.6088
D.510	1985-109C	Optus A2					PL
TLEs	GEO (0.90)	2017-12-27	20:56:42.487	-1.19	92.557	74.633	110.480
16275	TEME	42254.219	0.0008867	15.2085	6.4965	266.1092	141.3183
D.511	1979-072A	Westar III					PL
TLEs	GEO (1.00)	2017-12-31	15:05:39.864	-1.18	91.747	74.996	108.499
11484	TEME	42256.190	0.0007555	14.5511	347.7153	283.2706	211.7990
D.512	1974-101A	Symphonie A					PL
TLEs	GEO (1.00)	2017-12-31	12:22:10.304	-1.15	89.917	71.237	108.598
7578	TEME	42256.018	0.0006467	11.7262	315.8004	311.3933	226.9613
D.513	1990-095D	IUS second stage (IUS-6 SRM-2, Orbus 6E) (Titan IVA IUS)					RB
KIAM	EGO (0.50)	2018-01-01	00:00:00.000	-1.13	88.097	-173.821	350.015
UI081	J2000	42252.270	0.0061989	15.3651	8.8483	10.1089	147.9010
D.514	1991-003A	Italsat 1					PL
TLEs	GEO (1.00)	2017-12-31	17:37:27.325	-1.11	86.844	30.965	142.723
21055	TEME	42251.255	0.0016055	14.7567	17.7874	310.5498	33.3678
D.515	1980-081F	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-31	14:15:59.604	-1.11	86.605	64.741	108.469
12447	TEME	42252.551	0.0008704	12.8393	323.8938	323.0845	225.7890
D.516	1975-077A	Symphonie B					PL
TLEs	GEO (1.00)	2017-12-31	11:05:37.662	-1.09	84.841	63.002	106.680
8132	TEME	42248.604	0.0009757	11.2575	314.1039	319.9889	206.9896
D.517	1993-048B	INSAT 2B					PL
TLEs	GEO (1.00)	2017-12-30	07:15:41.579	-1.09	84.718	19.046	150.390
22724	TEME	42245.523	0.0013338	13.1419	27.4372	165.7681	351.6913
D.518	1988-071A	Gorizont 16					PL
TLEs	GEO (1.00)	2017-12-31	10:06:39.782	-1.07	83.639	26.579	140.699
19397	TEME	42248.753	0.0014935	14.8047	355.7228	345.4991	292.9908
D.519	1976-073A	Comstar 1B (D-2)					PL
TLEs	GEO (1.00)	2017-12-31	04:21:14.358	-1.06	82.913	66.967	98.858
9047	TEME	42243.998	0.0004339	13.6946	334.2602	310.0326	352.9677
D.520	1984-049A	Chinasat 5 (Zhongxing 5, ZX 5, Spacenet 1)					PL
TLEs	GEO (0.97)	2017-12-31	21:32:39.816	-1.04	81.012	62.037	99.987
14985	TEME	42243.366	0.0009373	15.0128	14.7743	243.8648	132.4848
D.521	1993-073E	Meteosat 6 AKM (MAGE 1)					PM
TLEs	EGO (0.60)	2017-12-31	07:43:22.723	-1.03	80.394	-194.848	355.635
23118	TEME	42244.594	0.0063492	15.0445	13.5200	23.3726	299.5125
D.522	1999-047B	Yamal 100 No. 2					PL
TLEs	GEO (1.00)	2017-12-31	08:49:57.727	-1.03	80.388	65.056	95.721
25897	TEME	42242.205	0.0009935	11.1041	35.3695	264.6115	189.1922

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.523	1997-041D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (0.08)	2017-12-31	18:14:59.818	-0.97	75.668	-1415.345	1566.681
24897	TEME	42239.333	0.0363038	13.8103	23.5499	222.5856	27.9847
D.524	2009-010B	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	10:19:02.451	-0.96	74.634	62.557	86.711
34265	TEME	42242.242	0.0005748	6.1190	66.7535	218.3488	265.8421
D.525	1977-014A	Kiku 2 (ETS II)					PL
TLEs	GEO (1.00)	2017-12-31	17:36:12.525	-0.95	74.264	57.539	90.989
9852	TEME	42236.021	0.0005580	12.2307	319.3689	309.1453	134.9917
D.526	1990-016D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (0.77)	2017-12-31	22:17:03.223	-0.89	69.641	-101.379	240.661
20502	TEME	42235.564	0.0037876	15.0112	1.2399	166.3049	110.3824
D.527	1990-112D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (0.95)	2017-12-30	02:36:04.757	-0.89	69.295	-45.454	184.044
21019	TEME	42235.982	0.0021835	15.0477	4.1601	100.3722	44.5291
D.528	1981-057B	APPLE					PL
TLEs	GEO (1.00)	2017-12-31	08:51:39.770	-0.85	66.614	-39.883	173.112
12545	TEME	42232.308	0.0020736	13.3422	328.5143	145.0455	289.6078
D.529	1977-092J	Ekran 2 fragmentation debris					PF
TLEs	GEO (1.00)	2017-12-31	03:23:37.089	-0.84	65.162	-1.575	131.899
12996	TEME	42226.321	0.0010812	11.5029	314.6611	228.7912	328.6377
D.530	1977-018A	Palapa 2					PL
TLEs	GEO (1.00)	2017-12-31	01:27:39.694	-0.83	64.950	44.663	85.237
9862	TEME	42231.033	0.0005980	14.0100	338.4740	333.4527	40.9763
D.531	2003-053E	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	EGO (0.13)	2017-12-31	19:15:23.669	-0.83	64.808	-883.522	1013.137
28119	TEME	42223.816	0.0231494	11.0004	36.0708	226.1506	155.0854
D.532	1987-084D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	20:44:29.635	-0.82	63.816	-59.858	187.491
18387	TEME	42227.843	0.0026675	14.6179	352.5987	174.0199	121.9189
D.533	1983-028F	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-31	08:44:39.877	-0.81	63.469	-45.686	172.624
13983	TEME	42228.395	0.0021308	13.8852	335.5326	141.4446	296.9278
D.534	1998-025D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	22:22:07.479	-0.81	62.937	-72.143	198.018
25318	TEME	42231.565	0.0027542	12.5700	27.6257	48.5739	88.1577
D.535	1975-038A	Anik A3					PL
TLEs	GEO (1.00)	2017-12-31	06:46:56.843	-0.81	62.819	46.385	79.253
7790	TEME	42227.250	0.0005962	13.6293	332.6796	308.0150	302.0544
D.536	1992-088D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	11:53:26.739	-0.76	58.961	16.313	101.609
22272	TEME	42227.228	0.0005063	14.4674	13.7757	62.1351	98.5579
D.537	1994-060D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	19:01:01.943	-0.72	55.879	19.916	91.843
23270	TEME	42217.120	0.0004529	14.6872	16.1515	36.3115	189.1069

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.538	1994-087D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	06:16:48.718	-0.70	54.773	10.716	98.830
23451	TEME	42215.174	0.0006630	14.6277	17.0560	29.9254	0.7468
D.539	2000-032A	Fengyun 2B					PL
TLEs	GEO (1.00)	2017-12-31	10:52:18.413	-0.67	52.348	37.552	67.145
26382	TEME	42219.065	0.0007158	10.1777	38.6338	247.0793	222.7958
D.540	1976-066A	Palapa 1					PL
TLEs	GEO (1.00)	2017-12-31	11:04:35.332	-0.66	51.197	29.545	72.849
9009	TEME	42220.486	0.0002719	13.6633	334.2376	259.1869	254.8001
D.541	1985-055A	Intelsat VA F-11					PL
TLEs	GEO (0.89)	2017-12-31	21:28:37.629	-0.63	49.099	-3.706	101.903
15873	TEME	42215.086	0.0012799	15.2206	5.2660	344.9098	297.1840
D.542	1988-034D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	12:23:02.844	-0.62	48.078	-55.735	151.892
19076	TEME	42215.681	0.0019342	14.7982	353.8509	108.8601	286.5503
D.543	1972-041A	Intelsat IV F-5					PL
TLEs	GEO (1.00)	2017-12-31	04:10:45.984	-0.58	45.614	26.141	65.087
6052	TEME	42202.897	0.0004269	12.5409	321.7194	276.3938	159.2815
D.544	1975-097F	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-31	16:24:42.588	-0.58	45.447	-50.146	141.039
11676	TEME	42202.935	0.0018990	9.7591	307.9958	126.5024	153.0761
D.545	1981-114A	RCA Satcom IIIR					PL
TLEs	GEO (0.95)	2017-12-30	07:18:35.306	-0.57	44.263	24.913	63.614
12967	TEME	42201.582	0.0009424	15.0520	358.3373	269.8715	163.2790
D.546	2004-010F	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	11:53:26.795	-0.56	43.904	-74.059	161.867
28256	TEME	42201.485	0.0029807	9.9933	44.5996	285.6006	170.6832
D.547	1982-082A	Anik D1					PL
TLEs	GEO (0.95)	2017-12-26	16:45:35.043	-0.56	43.898	19.333	68.463
13431	TEME	42204.855	0.0011213	15.0423	359.3164	275.9087	12.5576
D.548	1993-003D	IUS second stage (IUS-13 SRM-2, Orbus 6E) (Endeavour (OV-105))					RB
TLEs	EGO (0.54)	2017-12-31	14:58:39.711	-0.56	43.506	-239.897	326.909
22316	TEME	42210.577	0.0065144	13.3799	6.7114	43.9514	221.3739
D.549	1994-069D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	11:19:24.962	-0.55	43.117	-55.319	141.554
23330	TEME	42201.819	0.0018112	14.9736	15.9941	63.6070	145.4033
D.550	1978-058A	OPS 9454 (VORTEX 1) (CHALET 1)					PL
KIAM	EGO (0.02)	2018-01-01	00:00:00.000	-0.54	41.884	-6001.264	6085.032
UI009	J2000	42206.057	0.1431820	7.8718	27.8046	357.9983	138.2880
D.551	1991-010F	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	17:53:39.745	-0.53	41.256	-32.289	114.802
21129	TEME	42200.022	0.0014582	14.7351	7.9313	161.3467	358.0004

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.552	1983-065A	Galaxy I					PL
TLEs	GEO (0.90)	2017-12-28	00:33:14.330	-0.52	40.770	25.793	55.747
14158	TEME	42212.753	0.0006825	15.2044	8.2937	267.1854	69.7682
D.553	1977-092K	Ekran 2 fragmentation debris					PF
TLEs	GEO (1.00)	2017-12-31	06:26:39.682	-0.52	40.204	-34.745	115.152
29014	TEME	42204.958	0.0018866	11.3401	314.2511	261.3660	304.0691
D.554	2004-043D	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	GEO (1.00)	2017-12-31	09:37:15.315	-0.50	39.353	7.963	70.744
28466	TEME	42202.850	0.0002751	10.1902	38.0609	85.0032	203.1009
D.555	1999-047E	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	EGO (0.31)	2017-12-31	16:19:59.920	-0.50	38.651	-386.151	463.454
25900	TEME	42210.662	0.0101754	13.6599	24.6381	338.8772	61.7862
D.556	1981-096A	SBS II					PL
TLEs	GEO (1.00)	2017-12-31	07:29:39.712	-0.49	38.049	10.403	65.696
12855	TEME	42199.114	0.0004068	14.5077	348.0819	229.3772	132.9834
D.557	1991-015E	Meteosat 5 AKM (MAGE 1)					PM
TLEs	EGO (0.20)	2017-12-31	13:32:39.678	-0.48	37.360	-636.195	710.916
21904	TEME	42207.556	0.0153820	14.4552	3.2389	155.8051	242.1734
D.558	1993-072A	Gorizont 29					PL
TLEs	GEO (1.00)	2017-12-31	23:48:09.984	-0.48	37.242	-11.979	86.463
22907	TEME	42208.320	0.0016256	14.8148	13.4515	282.1529	96.2748
D.559	1968-081AJ	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.17)	2017-12-31	17:16:39.855	-0.46	35.813	-705.392	777.019
39298	TEME	42195.809	0.0179829	6.3634	314.6779	335.4985	132.5149
D.560	1999-009A	Arabsat 3A					PL
TLEs	GEO (1.00)	2017-12-31	19:15:38.647	-0.44	34.631	13.407	55.855
25638	TEME	42196.402	0.0009906	7.0577	52.1323	248.1009	130.4675
D.561	—	—					—
KIAM	EGO (0.11)	2018-01-01	00:00:00.000	-0.44	34.104	-1150.207	1218.416
UI168	J2000	42198.277	0.0280654	14.3742	356.2164	100.1121	104.0080
D.562^m	2011-001A	Elektro-L No. 1					PL
TLEs	GEO (1.00)	2017-12-31	06:26:02.941	-0.42	32.474	11.233	53.716
37344	TEME	42196.647	0.0005034	2.8399	77.1753	260.8629	240.3567
D.563	1985-107A	Raduga 17					PL
TLEs	GEO (1.00)	2017-12-31	12:51:16.875	-0.42	32.464	-19.538	84.467
16250	TEME	42204.913	0.0007502	14.2013	344.9741	170.0056	264.8927
D.564	1995-045D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	05:56:46.647	-0.41	32.206	-50.175	114.586
23656	TEME	42192.866	0.0021367	14.4143	19.0310	323.7225	12.3272
D.565	1979-035E	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-31	18:16:27.963	-0.39	30.322	-92.659	153.303
17873	TEME	42196.206	0.0025510	12.1998	318.8893	165.5563	119.7286
D.566	2000-032C	Fengyun 2B AKM (FG-36)					PM
TLEs	GEO (1.00)	2017-12-31	04:53:53.756	-0.39	30.270	-69.627	130.167
26460	TEME	42198.369	0.0026060	12.6010	31.0907	311.8536	217.8159

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.567	2002-001B	Centaur-T (Titan IVB Centaur-T)					RB
KIAM	EGO (0.80)	2018-01-01	00:00:00.000	-0.38	29.229	-180.236	238.694
UI013	J2000	42193.402	0.0049644	6.2090	39.0281	67.0088	29.9600
D.568	1983-059C	Palapa Pacific 1 (Palapa B1)					PL
TLEs	GEO (1.00)	2017-12-31	09:08:09.237	-0.34	26.718	7.686	45.751
14134	TEME	42185.722	0.0005648	14.8670	355.8207	317.7637	329.1942
D.569	1996-034A	Gorizont 32					PL
TLEs	GEO (1.00)	2017-12-31	13:25:01.666	-0.34	26.149	-11.028	63.326
23880	TEME	42202.151	0.0013341	14.1220	20.6996	282.2352	63.8283
D.570	1992-082A	Gorizont 27					PL
TLEs	GEO (0.98)	2017-12-31	14:51:39.797	-0.32	25.125	-28.679	78.929
22245	TEME	42198.515	0.0016774	15.0070	10.3413	300.2277	232.1930
D.571	2000-036D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	12:26:47.166	-0.32	24.988	-52.606	102.582
26397	TEME	42200.799	0.0017764	12.0505	31.0761	343.0580	253.4312
D.572	1983-098A	Galaxy II					PL
TLEs	GEO (0.91)	2017-12-30	18:02:17.777	-0.29	22.846	-2.035	47.727
14365	TEME	42181.193	0.0006602	15.1726	8.6138	320.3204	2.8705
D.573	1981-102F	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-31	21:49:04.057	-0.27	21.283	-26.240	68.805
14195	TEME	42199.156	0.0005943	13.0447	326.7436	139.2112	258.9965
D.574	1992-041A	INSAT 2A					PL
TLEs	GEO (1.00)	2017-12-28	08:11:39.695	-0.27	21.143	-1.420	43.707
22027	TEME	42180.142	0.0010697	14.6416	18.2560	236.0458	336.6874
D.575	1964-047A	Syncom 3					PL
TLEs	GEO (1.00)	2017-12-30	12:25:39.701	-0.23	17.967	4.178	31.755
858	TEME	42167.812	0.0005465	0.5967	335.8639	278.5013	165.7768
D.576	1987-091D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	19:14:42.877	-0.21	16.433	-71.562	104.428
18446	TEME	42172.827	0.0019897	14.5532	351.8473	192.9869	151.2775
D.577	1967-001A	Intelsat II F-2					PL
TLEs	GEO (1.00)	2017-12-31	14:46:58.889	-0.21	16.096	-38.046	70.237
2639	TEME	42166.894	0.0013718	4.2568	297.1401	303.2840	166.3255
D.578	1979-086A	OPS 1948 (VORTEX 2) (CHALET 2)					PL
KIAM	EGO (0.02)	2018-01-01	00:00:00.000	-0.20	15.523	-5163.325	5194.371
UI023	J2000	42179.696	0.1227806	6.5497	353.3873	38.7715	135.5840
D.579^m	1997-029D	Fengyun 2A operational debris (S-VISSR radiometre cover)					PM
TLEs	EGO (0.21)	2017-11-15	15:24:11.115	-0.18	14.298	-591.705	620.301
43355	TEME	42178.471	0.0143676	14.2251	23.8024	315.6687	97.8232
D.580^m	2012-002D	Fengyun 2F operational debris (S-VISSR radiometre cover)					PM
TLEs	EGO (0.20)	2017-12-30	00:03:53.794	-0.13	10.276	-626.389	646.942
43396	TEME	42174.449	0.0150960	2.1149	78.4476	215.1275	37.3882
D.581^m	1968-081AH	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.11)	2017-12-24	02:32:50.080	0.03	-2.493	-1205.088	1200.101
39297	TEME	42161.680	0.0285234	6.4162	314.7232	326.1624	183.8160

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.582	1966-110A	ATS 1					PL
TLEs	GEO (1.00)	2017-12-31	14:45:45.084	0.23	-18.219	-44.148	7.709
2608	TEME	42158.267	0.0006979	2.4826	299.1245	289.9202	153.0371
D.583	2000-029B	Briz-M (Proton-K/Briz-M)					RB
TLEs	EGO (0.11)	2017-12-31	13:28:47.042	0.27	-21.364	-1170.634	1127.907
26373	TEME	42127.433	0.0272614	11.7774	29.7565	258.1998	75.4660
D.584	1982-103E	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-31	13:10:39.715	0.31	-24.039	-78.392	30.313
13630	TEME	42131.729	0.0008355	13.2934	331.6713	100.8744	225.8557
D.585	1981-027A	Raduga 8					PL
TLEs	EGO (0.39)	2017-12-28	14:51:12.293	0.38	-29.951	-395.262	335.360
12351	TEME	42143.788	0.0083109	12.9493	324.0576	182.9992	152.8114
D.586	1969-036A	OPS 3148 (CANYON 2)					PL
KIAM	EGO (0.03)	2018-01-01	00:00:00.000	0.41	-31.593	-3805.189	3742.003
UI070	J2000	42132.580	0.0895648	7.5667	69.8133	107.3853	113.2790
D.587	1971-039B	Transtage 20 (Titan IIIC)					RB
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	0.45	-34.722	-178.211	108.767
UI093	J2000	42129.451	0.0034059	5.7353	300.3420	26.4116	328.7090
D.588	1980-060G	Ekran 5 debris					PD
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	0.46	-36.161	-114.831	42.509
UI137	J2000	42128.012	0.0018674	12.2152	320.1401	267.3924	254.3290
D.589	1968-081AK	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.27)	2017-07-13	01:02:12.461	0.49	-38.072	-548.526	472.382
39299	TEME	42133.678	0.0115075	6.6217	315.1952	25.3038	350.6922
D.590	1985-048C	Arabsat 1B					PL
TLEs	GEO (0.96)	2017-12-31	03:11:47.175	0.50	-38.755	-98.861	21.351
15825	TEME	42131.422	0.0021463	15.0258	0.6886	297.5519	351.8577
D.591	1985-015A	Arabsat 1A					PL
TLEs	GEO (1.00)	2017-12-31	00:49:42.629	0.54	-41.734	-58.805	-24.663
15560	TEME	42115.522	0.0006590	14.8858	357.6084	288.5564	62.2144
D.592	1969-013A	TACSAT 1					PL
TLEs	GEO (1.00)	2017-12-31	19:06:42.969	0.54	-42.144	-122.222	37.934
3691	TEME	42120.585	0.0019553	4.6104	300.3044	269.7367	114.5485
D.593	1989-020E	Meteosat 4 AKM (MAGE 1)					PM
TLEs	EGO (0.25)	2017-12-31	07:50:59.648	0.63	-48.971	-598.580	500.639
20800	TEME	42113.365	0.0126527	14.1348	356.0492	175.1007	295.8492
D.594	1975-118A	OPS 3165 (DSP F5, DSP 8, DSP Block 2(PHASE II) F5)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	0.63	-49.185	-186.261	87.891
UI052	J2000	42114.988	0.0032548	9.6182	307.5491	292.3024	342.5340
D.595	2003-015A	Cosmos-2397					PL
TLEs	EGO (0.77)	2017-12-31	12:30:08.872	0.71	-55.369	-235.258	124.519
27775	TEME	42104.009	0.0044968	9.2774	40.6342	286.2467	254.7633

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.596	1988-091D	IUS second stage (IUS-7 SRM-2, Orbus 6E) (Discovery (OV-103))					RB
TLEs	GEO (0.89)	2017-12-31	08:37:42.567	0.72	-55.585	-127.955	16.784
19550	TEME	42110.043	0.0020214	15.2241	358.2488	235.9844	312.5462
D.597	1979-087C	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.77)	2017-12-31	15:47:20.567	0.74	-57.161	-221.286	106.963
17939	TEME	42103.702	0.0044500	12.2431	319.8472	272.2261	229.8901
D.598	1993-069D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	03:01:56.487	0.76	-59.441	-81.304	-37.579
22883	TEME	42100.719	0.0007706	14.7615	13.0361	301.5084	54.3509
D.599	2001-009B	Centaur-T (Titan IVB Centaur-T)					RB
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	0.77	-59.673	-106.560	-12.785
UI003	J2000	42104.500	0.0011136	10.3464	32.5707	61.5442	282.1710
D.600	1978-038A	OPS 8790 (AQUACADE 4)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	0.80	-61.912	-144.234	20.411
UI091	J2000	42102.261	0.0019553	9.0395	328.3046	247.8347	280.0480
D.601	1975-123F	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-31	12:35:57.491	0.80	-62.212	-125.650	1.225
11568	TEME	42097.592	0.0011286	9.8939	309.0725	113.3833	256.8454
D.602	1995-035D	IUS second stage (IUS-26 SRM-2, Orbus 6E) (Discovery (OV-103))					RB
TLEs	GEO (0.69)	2017-12-30	07:40:48.802	0.80	-62.259	-108.149	-16.369
23615	TEME	42104.148	0.0005762	16.9933	11.9678	82.3575	319.9751
D.603	1990-054D	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-31	23:24:24.595	0.83	-64.817	-127.883	-1.750
20662	TEME	42096.094	0.0014389	14.9863	2.0003	3.1190	270.3398
D.604	1975-118C	Transtage 29 (Titan IIIC)					RB
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	0.96	-74.618	-115.424	-33.812
UI050	J2000	42089.555	0.0009695	9.5890	307.6456	104.3177	32.3340
D.605	1995-022B	Centaur-T (Titan IVA Centaur-T)					RB
KIAM	GEO (0.77)	2018-01-01	00:00:00.000	0.98	-76.295	-133.758	-18.832
UI021	J2000	42087.878	0.0013653	16.0637	38.5154	261.5031	121.1970
D.606	1988-071D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-29	07:38:39.690	0.99	-76.743	-159.851	6.364
19400	TEME	42089.505	0.0016515	14.5925	355.2062	165.9131	320.4500
D.607	1987-096D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	06:08:25.026	1.06	-82.442	-177.309	12.425
18578	TEME	42085.061	0.0019686	14.5021	352.4716	172.3569	345.4179
D.608	1976-059C	Transtage 28 (Titan IIIC)					RB
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	1.07	-82.774	-119.280	-46.268
UI054	J2000	42081.399	0.0008675	10.0296	308.8210	169.2682	265.8170
D.609	1977-048G	GOES 2 AKM (SVM-5)					PM
TLEs	EGO (0.14)	2017-12-31	12:32:40.638	1.08	-83.578	-1025.946	858.790
20799	TEME	42077.678	0.0225990	11.2519	314.9055	9.5390	256.3555

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.610	1977-007D	OPS 3151 debris (DSP F7 IR Sensor telescope sunshade cover)					PM
KIAM	EGO (0.19)	2018-01-01	00:00:00.000	1.12	-87.214	-787.964	613.536
UI100	J2000	42076.959	0.0166540	10.2483	308.6386	15.7035	36.6730
D.611	1968-081AG	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.16)	2017-12-29	18:15:50.863	1.14	-88.320	-808.446	631.805
39296	TEME	42078.783	0.0194844	6.2420	313.4962	329.5140	188.8959
D.612	2003-012B	Centaur-T (Titan IVB Centaur-T)					RB
KIAM	EGO (0.91)	2018-01-01	00:00:00.000	1.17	-90.814	-204.757	23.129
UI064	J2000	42073.359	0.0027082	7.7608	38.0458	217.3434	62.1810
D.613	1994-009B	Centaur-T (Titan IVA Centaur-T)					RB
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	1.19	-92.499	-155.169	-29.829
UI014	J2000	42071.674	0.0014896	12.5605	54.8349	171.7096	269.4940
D.614	1995-060B	Centaur-T (Titan IVA Centaur-T)					RB
KIAM	EGO (0.80)	2018-01-01	00:00:00.000	1.19	-92.611	-227.122	41.900
UI016	J2000	42071.562	0.0031972	13.6275	24.6926	148.7616	247.6750
D.615	1989-081D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	13:25:29.874	1.21	-94.037	-206.904	18.831
20266	TEME	42068.019	0.0024585	14.7161	359.0356	33.9249	52.6056
D.616	1989-021D	IUS second stage (IUS-9 SRM-2, Orbus 6E) (Discovery (OV-103))					RB
TLEs	GEO (1.00)	2017-12-31	01:27:39.694	1.21	-94.170	-200.266	11.926
19913	TEME	42068.098	0.0020413	13.1997	344.6056	116.5536	48.2547
D.617	1985-102D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	04:21:05.138	1.27	-98.566	-183.812	-13.319
16214	TEME	42068.443	0.0016545	14.0482	344.8224	67.2898	348.0546
D.618	1997-049E	Meteosat 7 AKM (MAGE 1)					PM
TLEs	EGO (0.43)	2017-12-31	01:04:39.532	1.34	-104.318	-430.890	222.254
25353	TEME	42057.883	0.0082768	13.3296	24.5002	255.0726	268.6909
D.619	1989-041B	DFS-Kopernikus 1					PL
TLEs	GEO (1.00)	2017-12-31	05:47:17.341	1.40	-108.611	-162.288	-54.934
20041	TEME	42057.652	0.0018566	14.8771	13.3416	242.5523	186.6870
D.620	1988-034A	Cosmos-1940					PL
TLEs	GEO (1.00)	2017-12-30	20:42:25.635	1.41	-109.137	-190.825	-27.450
19073	TEME	42053.300	0.0020797	14.5842	353.1159	223.1084	98.3960
D.621	1974-039C	Transtage 27 (Titan IIIC)					RB
TLEs	EGO (0.84)	2017-12-31	16:21:42.060	1.41	-109.402	-208.835	-9.969
7324	TEME	42056.489	0.0025314	10.0995	308.2459	271.7793	134.3613
D.622	1972-010B	Transtage 22 (Titan IIIC)					RB
KIAM	EGO (0.62)	2018-01-01	00:00:00.000	1.43	-110.662	-356.877	135.553
UI038	J2000	42053.511	0.0058548	6.4935	301.8757	65.3159	110.2770
D.623	1968-081R	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.15)	2017-12-31	22:07:47.451	1.57	-121.904	-939.688	695.880
38691	TEME	42040.306	0.0205414	5.2393	313.3968	305.9969	241.1173

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.624	2004-015D	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	EGO (0.80)	2017-12-31	12:21:39.655	1.58	-122.781	-201.050	-44.512
28240	TEME	42040.256	0.0022564	10.5367	36.8986	253.4691	107.0115
D.625	1989-090B	USA 48 (MAGNUM 2)					PL
KIAM	EGO (0.03)	2018-01-01	00:00:00.000	1.65	-127.789	-1295.324	1039.746
UI136	J2000	42036.384	0.0277744	18.2296	13.1702	26.9421	305.8440
D.626	2003-040C	IABS					PM
KIAM	EGO (0.87)	2018-01-01	00:00:00.000	1.67	-129.905	-206.664	-53.146
UI002	J2000	42034.268	0.0018261	10.9292	35.3495	243.1909	117.9460
D.627	2000-013D	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	GEO (1.00)	2017-12-31	17:37:10.200	1.75	-135.974	-167.136	-104.812
26101	TEME	42028.856	0.0008399	13.2399	26.3681	322.5470	24.6697
D.628	1968-081M	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.20)	2017-12-31	11:03:40.824	1.80	-139.535	-763.863	484.794
33511	TEME	42023.399	0.0155645	6.0086	313.0666	343.7800	240.6029
D.629	1974-017A	Cosmos-637					PL
TLEs	EGO (0.60)	2017-12-31	16:26:06.656	1.82	-141.156	-307.298	24.987
7229	TEME	42023.726	0.0044537	8.2181	305.3962	334.1115	126.2485
D.630	1996-044A	Italsat 2					PL
TLEs	EGO (0.78)	2017-12-31	19:38:53.053	1.84	-142.673	-250.567	-34.779
24208	TEME	42023.404	0.0018528	11.9618	30.7711	69.9306	355.6407
D.631	1994-082D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (0.68)	2017-12-31	05:16:29.167	1.89	-146.277	-267.491	-25.064
23429	TEME	42019.577	0.0024678	14.3668	20.9035	50.8804	185.1621
D.632	2003-043E	INSAT 3E					PL
TLEs	EGO (0.70)	2017-12-31	20:42:26.313	1.90	-147.210	-223.366	-71.054
27951	TEME	42018.755	0.0022511	2.9084	77.4561	184.9318	144.4037
D.633	2005-023H	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (0.74)	2017-12-31	18:24:50.667	1.94	-150.096	-209.188	-91.005
28704	TEME	42015.802	0.0017969	9.5903	40.4577	254.4539	335.7634
D.634	1985-010D	IUS second stage (IUS-11 SRM-2, Orbus 6E) (Discovery (OV-103))					RB
KIAM	EGO (0.42)	2018-01-01	00:00:00.000	1.96	-152.267	-273.123	-31.411
UI047	J2000	42011.906	0.0028767	17.5106	346.6800	221.1663	286.3130
D.635	1987-109D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (0.56)	2017-12-30	07:04:39.912	2.01	-156.017	-426.052	114.018
18718	TEME	42009.783	0.0064307	14.4892	353.1582	198.9597	331.8805
D.636	2003-041B	Centaur-T (Titan IVB Centaur-T)					RB
KIAM	EGO (0.59)	2018-01-01	00:00:00.000	2.09	-162.138	-295.213	-29.063
UI072	J2000	42002.035	0.0031683	9.8373	72.3755	20.7188	223.0800
D.637	1968-081Z	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.32)	2017-10-28	21:28:39.885	2.10	-162.864	-612.902	287.173
38699	TEME	42002.133	0.0109213	5.8305	313.2770	314.6529	315.2875

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.638	1990-094D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (0.59)	2017-12-31	12:47:47.679	2.11	-163.890	-310.332	-17.448
20926	TEME	41999.051	0.0030343	14.8664	2.6718	68.6479	262.8754
D.639	1968-081J	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.22)	2017-12-31	10:27:39.007	2.27	-175.797	-727.021	375.427
30000	TEME	41987.328	0.0145297	5.7389	312.7530	344.4483	224.1447
D.640	1968-081N	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.12)	2017-10-28	10:56:39.849	2.32	-180.011	-991.784	631.762
33512	TEME	41983.687	0.0252994	5.7732	313.3645	322.3158	296.8003
D.641	1991-046D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (0.59)	2017-12-31	01:27:29.670	2.36	-183.126	-257.914	-108.338
21536	TEME	41981.915	0.0015756	14.8496	5.2093	179.7893	15.7609
D.642	1994-080A	DFH 3-1					PL
TLEs	EGO (0.38)	2017-12-31	01:29:39.177	2.49	-192.932	-602.879	217.014
23415	TEME	41970.158	0.0101796	14.8416	11.4601	298.6380	249.3858
D.643	1982-009F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.51)	2017-12-31	06:41:04.605	2.55	-197.554	-357.284	-37.823
14117	TEME	41967.918	0.0034137	12.8576	326.7220	112.0374	149.3203
D.644	1974-017F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.50)	2017-12-31	06:34:07.043	2.62	-202.963	-398.691	-7.235
11567	TEME	41961.986	0.0051872	8.0662	305.0850	343.0724	319.6595
D.645	2006-022D	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	EGO (0.49)	2017-12-31	16:20:34.827	2.64	-204.206	-414.378	5.966
29233	TEME	41958.212	0.0050576	8.7798	43.4040	319.3570	77.7760
D.646	1981-061F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.46)	2017-12-31	09:24:34.909	2.64	-204.418	-220.835	-188.002
12851	TEME	41960.812	0.0006364	12.5628	324.5118	328.5979	144.4800
D.647	1968-081G	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.28)	2017-12-31	14:42:14.840	2.74	-211.649	-710.282	286.983
25000	TEME	41954.208	0.0126826	5.7118	312.4394	326.6858	158.8944
D.648	1983-100F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.42)	2017-12-31	20:42:39.770	2.80	-216.447	-297.624	-135.269
14394	TEME	41947.110	0.0016399	13.1314	332.4459	64.6081	283.4833
D.649	1997-065C	IABS (Atlas IIA)					RB
TLEs	EGO (0.44)	2017-12-31	02:29:46.400	2.83	-219.047	-364.956	-73.138
25021	TEME	41944.657	0.0024334	14.2690	18.7093	87.1841	268.9709
D.650	1992-017D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (0.42)	2017-12-31	17:37:13.494	2.93	-226.725	-317.910	-135.540
21925	TEME	41937.699	0.0023857	14.7975	7.3252	336.3750	27.1457
D.651	1985-092E	IUS second stage (IUS-12 SRM-2, Orbus 6E) (Atlantis (OV-104))					RB
KIAM	EGO (0.46)	2018-01-01	00:00:00.000	2.94	-227.639	-451.127	-4.151
UI033	J2000	41936.534	0.0053292	14.7977	344.5261	98.3692	240.4260

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.652	1983-016F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.35)	2017-12-31	20:26:42.628	2.97	-229.783	-289.445	-170.122
14086	TEME	41933.785	0.0016011	12.8409	328.4367	252.1409	107.7458
D.653	2003-008C	IABS					PM
KIAM	EGO (0.38)	2018-01-01	00:00:00.000	3.01	-232.978	-320.358	-145.598
UI006	J2000	41931.195	0.0020839	11.2697	33.9245	187.4876	186.2800
D.654	1988-036E	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.35)	2017-12-31	20:34:39.873	3.03	-234.462	-330.144	-138.781
19094	TEME	41929.880	0.0018056	14.2116	349.4325	100.5855	299.9814
D.655	—	Himawari 1 AKM (Star 27)					RB
KIAM	EGO (0.11)	2018-01-01	00:00:00.000	3.06	-236.872	-1444.366	970.622
UU010	J2000	41927.301	0.0287997	11.2865	314.8546	19.6452	270.9140
D.656	1992-074D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (0.31)	2017-12-31	09:39:53.925	3.13	-242.204	-333.705	-150.702
22213	TEME	41923.491	0.0017422	14.6899	9.4659	58.3847	156.9909
D.657	1968-081AB	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.13)	2017-10-28	21:46:03.228	3.19	-246.472	-1253.959	761.015
38701	TEME	41919.091	0.0250557	5.3085	312.6765	301.4332	308.5846
D.658	1984-129B	Titan 34D third stage (Transtage D-13) (Titan 34D Transtage)					RB
KIAM	EGO (-)	2018-01-01	00:00:00.000	3.20	-247.435	-265.191	-229.679
UI032	J2000	41916.738	0.0004236	14.9231	345.7123	202.8372	266.9740
D.659	1984-037B	Titan 34D third stage (Transtage D-11) (Titan 34D Transtage)					RB
KIAM	EGO (0.39)	2018-01-01	00:00:00.000	3.22	-249.051	-388.297	-109.805
UI095	J2000	41915.122	0.0033221	13.9354	340.1292	247.0222	253.6910
D.660	2005-049E	Meteosat 9 (MSG 2) operational debris (SEVIRI Cooler Cover)					PM
TLEs	EGO (0.31)	2017-12-16	16:06:06.929	3.23	-249.508	-298.408	-200.608
29106	TEME	41914.133	0.0021176	8.1990	52.9053	187.9826	48.3629
D.661	—	USA 107 debris (DSP F17 IR Sensor telescope sunshade cover)					PM
KIAM	EGO (0.44)	2018-01-01	00:00:00.000	3.25	-251.459	-530.803	27.885
UU058	J2000	41912.714	0.0066649	14.1511	19.8577	307.4012	188.8880
D.662	2002-040E	Meteosat 8 (MSG 1) operational debris (SEVIRI Cooler Cover)					PM
TLEs	EGO (0.23)	2017-12-26	08:45:01.613	3.27	-252.536	-324.289	-180.784
39998	TEME	41912.708	0.0016235	9.7060	35.2516	211.5539	168.9476
D.663	1994-084D	IUS second stage (IUS-20 SRM-2, Orbus 6E) (Titan IVA IUS)					RB
KIAM	EGO (-)	2018-01-01	00:00:00.000	3.28	-253.188	-264.856	-241.520
UI019	J2000	41910.985	0.0002784	14.1428	19.9060	288.5049	103.8220
D.664	2000-065C	IABS (Atlas IIA)					RB
KIAM	EGO (0.44)	2018-01-01	00:00:00.000	3.28	-253.754	-511.042	3.534
UI011	J2000	41910.419	0.0061390	12.8524	26.9076	204.7293	278.9480
D.665	2000-001C	IABS (Atlas IIA)					RB
KIAM	EGO (0.17)	2018-01-01	00:00:00.000	3.29	-253.990	-316.885	-191.095
UI015	J2000	41910.183	0.0015007	13.2553	25.3744	281.2706	93.3290
D.666	1987-097B	Titan 34D third stage (Transtage D-14) (Titan 34D Transtage)					RB
KIAM	EGO (-)	2018-01-01	00:00:00.000	3.43	-265.278	-295.600	-234.956
UI029	J2000	41898.895	0.0007237	13.6585	358.0481	216.3124	5.4070

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.667	1985-024D	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	12:46:15.295	3.44	-265.594	-327.820	-203.369
15630	TEME	41897.426	0.0011373	13.5532	337.5979	178.4093	258.8356
D.668	1989-069D	Titan 34D third stage (Transtage D-2) (Titan 34D Transtage)					RB
KIAM	EGO (0.43)	2018-01-01	00:00:00.000	3.52	-271.696	-583.179	39.787
UI088	J2000	41892.477	0.0074353	14.5022	354.6062	267.3397	265.2070
D.669	1982-093F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	07:21:39.907	3.53	-272.496	-299.211	-245.780
14115	TEME	41892.038	0.0007454	12.6958	328.2736	253.7462	310.6513
D.670	1995-011D	Himawari 5 (GMS 5) AKM (Star 27)					PM
TLEs	EGO (0.14)	2017-12-31	01:11:09.805	3.54	-273.390	-1230.485	683.705
23524	TEME	41889.555	0.0230289	14.2870	14.5797	290.6869	53.9928
D.671	1982-019B	Transtage 38 (Titan IIIC)					RB
KIAM	EGO (-)	2018-01-01	00:00:00.000	3.55	-274.092	-320.515	-227.669
UI039	J2000	41890.081	0.0011082	13.3847	332.7775	39.3350	101.4090
D.672	1995-038C	IABS (Atlas IIA)					RB
KIAM	EGO (0.24)	2018-01-01	00:00:00.000	3.55	-274.536	-377.656	-171.416
UI022	J2000	41889.637	0.0024617	14.7922	12.5552	238.1604	125.6380
D.673	1984-090F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-30	12:52:42.617	3.56	-275.222	-344.582	-205.863
17875	TEME	41889.074	0.0012779	13.3366	335.6001	72.9271	33.0163
D.674	1991-080D	IUS second stage (IUS-14 SRM-2, Orbus 6E) (Atlantis (OV-104))					RB
KIAM	EGO (0.26)	2018-01-01	00:00:00.000	3.60	-277.728	-391.115	-164.341
UI078	J2000	41886.445	0.0027070	14.9080	10.0613	271.4914	197.6300
D.675	1977-092G	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	23:51:39.748	3.63	-280.569	-324.627	-236.511
11571	TEME	41883.474	0.0008213	10.7331	312.3490	68.5303	29.0167
D.676	1989-046D	IUS second stage (IUS-8 SRM-2, Orbus 6E) (Titan IVA IUS)					RB
KIAM	EGO (0.36)	2018-01-01	00:00:00.000	3.72	-287.265	-494.195	-80.334
UI080	J2000	41876.908	0.0049414	14.3017	4.2308	290.2488	267.9010
D.677	1989-046E	USA 39 debris (DSP F14 IR Sensor telescope sunshade cover)					PM
KIAM	EGO (0.16)	2018-01-01	00:00:00.000	3.74	-288.475	-1144.950	568.000
UI204	J2000	41875.698	0.0204528	14.3405	4.0812	87.3131	292.4130
D.678	1981-025C	Transtage 40 (Titan IIIC)					RB
KIAM	EGO (0.36)	2018-01-01	00:00:00.000	3.83	-295.693	-519.279	-72.107
UI040	J2000	41868.480	0.0053402	12.7486	329.8218	242.1547	46.9020
D.679	1980-104E	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.19)	2017-12-31	07:35:39.729	3.84	-296.474	-428.230	-164.717
12471	TEME	41867.476	0.0027780	12.2002	322.2335	107.6592	294.9039
D.680	1979-015D	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	04:20:25.620	3.84	-296.518	-336.126	-256.910
13900	TEME	41868.228	0.0009766	11.4134	316.3448	255.1128	328.8381

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.681	2004-042C	Fengyun 2C AKM (FG-36)					PM
TLEs	EGO (0.18)	2017-12-31	21:32:29.880	3.84	-296.732	-393.258	-200.205
28491	TEME	41868.201	0.0027120	9.2559	39.7242	257.4162	317.7939
D.682	1976-023K	LES 8, LES 9 operational debris					PM
TLEs	EGO (-)	2017-12-31	04:20:51.965	3.85	-297.099	-313.046	-281.153
13753	TEME	41868.046	0.0006702	11.7524	318.4494	321.5511	342.0276
D.683	—	USA 75 debris (DSP F16 IR Sensor telescope sunshade cover)					PM
KIAM	EGO (0.44)	2018-01-01	00:00:00.000	3.88	-299.077	-764.462	166.308
UU052	J2000	41865.096	0.0111163	14.9568	9.9080	233.3022	172.0960
D.684	1989-053A	Olympus 1					PL
TLEs	EGO (-)	2017-12-31	12:14:15.137	3.95	-304.714	-364.307	-245.122
20122	TEME	41858.791	0.0020506	14.8415	1.1782	268.0205	248.9775
D.685	1986-038D	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	20:45:23.820	3.95	-304.887	-393.489	-216.286
16732	TEME	41859.209	0.0016781	13.6888	341.5147	93.4361	113.8146
D.686	1987-073D	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-29	20:27:39.861	3.99	-307.985	-379.362	-236.609
18331	TEME	41856.398	0.0013372	13.9526	346.7118	62.9478	120.4729
D.687	1968-081P	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.42)	2017-12-30	09:25:38.511	4.04	-311.308	-716.026	93.411
33513	TEME	41852.359	0.0097785	5.4641	311.3850	330.7289	230.6519
D.688	1984-028F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	09:07:55.521	4.16	-320.554	-403.461	-237.647
15139	TEME	41843.948	0.0023905	12.9481	331.5032	326.1257	316.0496
D.689	1976-107F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	04:20:29.574	4.26	-328.817	-374.979	-282.655
11569	TEME	41836.021	0.0007876	10.0399	309.1935	88.5164	330.8139
D.690^m	1968-081X	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.15)	2017-12-31	05:33:10.376	4.31	-332.436	-1282.674	617.801
38697	TEME	41831.737	0.0227157	4.1848	334.3699	352.3718	151.1354
D.691	1988-108D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-27	01:13:42.560	4.47	-344.242	-409.077	-279.407
19686	TEME	41819.093	0.0010439	14.5442	355.1456	124.7110	61.0372
D.692	2012-035E	Meteosat 10 (MSG 3) operational debris (SEVIRI Cooler Cover)					PM
TLEs	EGO (0.14)	2017-12-31	03:31:36.283	4.47	-344.744	-487.984	-201.504
40871	TEME	41819.041	0.0038212	2.6543	90.8654	203.8913	283.6071
D.693	1968-081E	Transtage 5 (Titan IIIC)					RB
TLEs	EGO (0.40)	2017-12-31	22:26:18.019	4.48	-345.210	-750.659	60.239
3432	TEME	41818.356	0.0104553	5.5201	311.0087	323.4849	94.7481
D.694	1979-007A	SCATHA (P78-2)					PL
TLEs	EGO (0.01)	2017-12-31	16:13:02.772	4.52	-348.127	-7863.864	7167.610
11256	TEME	41816.747	0.1786012	16.6523	324.3235	32.0263	184.2975
D.695	2015-034E	Meteosat 11 (MSG 4) operational debris (Cooler Cover)					PM
TLEs	EGO (0.10)	2017-12-21	09:47:14.561	4.53	-348.734	-495.378	-202.090
40989	TEME	41815.255	0.0037257	1.5490	227.4300	68.4187	351.1922

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.696	1968-081A	OV2-5 (DG7-2)					PL
TLEs	EGO (0.37)	2017-12-31	21:05:51.828	4.62	-356.217	-706.244	-6.189
3428	TEME	41807.107	0.0090656	5.4789	311.1802	328.9480	63.7111
D.697	—	OPS 7641 debris (DSP F11 IR Sensor telescope sunshade cover)					PM
KIAM	EGO (-)	2018-01-01	00:00:00.000	4.63	-356.734	-412.334	-301.134
UU028	J2000	41807.439	0.0013299	13.9119	339.1595	305.5024	99.1590
D.698	1979-007C	SCATHA AKM (FW-5)					PM
TLEs	EGO (0.01)	2017-12-31	04:18:48.945	4.73	-364.695	-7794.360	7064.970
29000	TEME	41800.171	0.1766700	16.5955	324.4139	31.7713	357.5366
D.699	1980-060F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (-)	2017-12-31	07:28:39.819	4.80	-369.321	-445.896	-292.746
14193	TEME	41794.581	0.0016333	11.9273	320.1987	210.9982	298.0772
D.700	1992-037C	IABS (Atlas II)					RB
KIAM	EGO (-)	2018-01-01	00:00:00.000	4.97	-382.786	-472.031	-293.541
UI085	J2000	41781.387	0.0021360	14.6564	1.2694	351.6950	251.0300
D.701	1968-081H	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.28)	2017-12-29	23:47:25.110	5.14	-395.607	-689.045	-102.168
25001	TEME	41769.473	0.0072179	5.4061	310.4854	20.3857	39.8154
D.702	1970-069B	Agna D (Atlas SLV3A)					RB
KIAM	EGO (0.02)	2018-01-01	00:00:00.000	5.17	-398.145	-6353.554	5557.265
UI145	J2000	41766.028	0.1425898	10.8639	228.7191	52.4424	43.5410
D.703	1968-063B	Agna D (Atlas SLV3A)					RB
KIAM	EGO (0.03)	2018-01-01	00:00:00.000	5.36	-412.625	-5052.249	4226.999
UI055	J2000	41751.548	0.1111246	11.7220	313.7548	163.1938	133.8040
D.704^m	1968-081L	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.29)	2017-12-30	06:42:39.835	5.63	-433.117	-809.277	-56.958
33510	TEME	41731.056	0.0090139	5.3791	310.1713	345.3224	148.8307
D.705	—	—					—
KIAM	EGO (0.15)	2018-01-01	00:00:00.000	5.86	-450.349	-1436.022	535.324
UI031	J2000	41713.824	0.0236294	3.5568	311.2316	281.8521	242.6360
D.706	1975-100F	GOES 1 AKM (SVM-5)					PM
TLEs	EGO (0.11)	2017-12-31	11:34:46.843	5.97	-458.580	-1664.370	747.210
20962	TEME	41705.465	0.0300222	9.6042	306.7966	344.8389	33.1062
D.707	2002-040F	Meteosat 8 (MSG 1) operational debris (SEVIRI Entry Baffle Cover)					PM
TLEs	EGO (0.21)	2017-12-31	09:56:34.194	6.11	-468.961	-830.478	-107.444
39999	TEME	41695.209	0.0082223	9.5888	34.5796	46.4749	292.4376
D.708	1974-039A	ATS 6					PL
TLEs	EGO (-)	2017-12-31	18:56:32.775	6.14	-471.638	-599.559	-343.717
7318	TEME	41693.303	0.0028960	9.2255	305.5973	238.2708	142.4659
D.709	1968-081AF	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.13)	2017-12-30	22:44:33.014	6.40	-490.879	-1525.823	544.064
38705	TEME	41670.713	0.0261019	4.1726	309.4954	74.9480	229.0299

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.710	1968-081K	Transtage 5 fragmentation debris					RF
TLEs	EGO (-)	2017-12-30	08:40:28.746	6.45	-495.259	-711.200	-279.319
33509	TEME	41668.175	0.0061353	5.5125	309.4606	35.0692	187.6945
D.711	1975-055B	Agena D (Atlas SLV3A)					RB
KIAM	EGO (0.01)	2018-01-01	00:00:00.000	6.53	-500.974	-6103.220	5101.272
UI103	J2000	41663.199	0.1344651	16.5143	298.4379	23.5979	213.3710
D.712	2008-066C	Fengyun 2E AKM (FG-36)					PM
TLEs	EGO (-)	2017-12-31	12:43:24.026	6.55	-502.732	-652.993	-352.472
33465	TEME	41661.591	0.0039584	4.0452	59.7117	244.2984	128.5156
D.713	1993-046C	IABS (Atlas II)					RB
KIAM	EGO (0.13)	2018-01-01	00:00:00.000	6.66	-510.744	-849.336	-172.152
UI028	J2000	41653.429	0.0081288	14.6475	4.6003	54.5165	328.2450
D.714	2015-075J	Briz-M fragmentation debris					RF
TLEs	EGO (0.09)	2017-12-31	13:11:15.163	6.91	-529.824	-2147.379	1087.731
41548	TEME	41634.795	0.0382108	1.9580	72.4463	57.2428	133.8747
D.715	1968-081AE	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.21)	2017-12-31	19:29:37.314	6.95	-533.001	-1314.156	248.154
38704	TEME	41631.433	0.0201302	3.1993	309.1176	288.2650	276.6518
D.716	1968-081AC	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.23)	2017-12-28	00:12:13.140	6.96	-533.514	-1345.594	278.566
38702	TEME	41630.302	0.0195445	6.2627	308.9975	67.1859	209.3999
D.717	2005-049F	Meteosat 9 (MSG 2) operational debris (SEVIRI Entry Baffle Cover)					PM
TLEs	EGO (-)	2017-12-26	12:48:05.774	7.05	-539.975	-765.391	-314.558
29676	TEME	41623.810	0.0039446	8.1276	52.3883	309.9445	260.5924
D.718	1970-055A	Intelsat III F-8					PL
TLEs	EGO (0.10)	2017-12-31	16:14:43.747	7.17	-548.884	-1988.679	890.910
4478	TEME	41615.691	0.0339407	1.8583	296.8848	187.6760	142.1905
D.719	1972-101B	Agena D (Atlas SLV3A)					RB
KIAM	EGO (0.03)	2018-01-01	00:00:00.000	7.36	-563.319	-5735.262	4608.624
UI059	J2000	41600.854	0.1243230	15.1873	292.0387	58.0954	244.8850
D.720	1977-038B	Agena D (Atlas SLV3A)					RB
KIAM	EGO (0.02)	2018-01-01	00:00:00.000	7.39	-566.038	-6855.892	5723.816
UI205	J2000	41598.135	0.1512052	10.6604	344.7749	107.9640	306.1160
D.721	1997-049A	Eutelsat W75 (ABS 1B, Eurobird 10, Eurobird 4, Hot Bird 3)					PL
TLEs	EGO (-)	2017-12-31	14:23:17.435	7.94	-607.345	-704.135	-510.554
24931	TEME	41556.616	0.0024025	6.6036	52.4846	312.0984	228.9556
D.722	2015-034F	Meteosat 11 (MSG 4) operational debris (SEVIRI Entry Baffle Cover)					PM
TLEs	EGO (-)	2017-12-11	16:58:04.773	8.57	-654.151	-971.083	-337.220
40990	TEME	41509.650	0.0081670	1.5682	228.9522	357.3743	254.5782
D.723	1968-081AA	Transtage 5 fragmentation debris					RF
TLEs	EGO (0.08)	2017-12-30	01:18:38.476	8.84	-674.558	-1148.881	-200.235
38700	TEME	41490.003	0.0117744	5.0103	307.3472	275.7264	189.1949

D.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$	
S-ID	Frame	a	e	i	Ω	ω	λ	
D.724	2012-035F	Meteosat 10 (MSG 3) operational debris (SEVIRI Entry Baffle Cover)						PM
TLEs	EGO (-)	2017-12-16	02:11:45.816	8.88	-677.749	-1056.351	-299.147	
40872	TEME	41487.004	0.0097076	2.5714	90.9468	146.2446	332.5517	
D.725	2011-001B	Fregat-SB (Zenit-3F)						RB
TLEs	EGO (0.22)	2017-12-31	22:21:53.949	9.09	-693.400	-1315.623	-71.177	
37345	TEME	41470.526	0.0152115	4.5321	61.4508	356.5408	99.6116	
D.726	1968-081T	Transtage 5 fragmentation debris						RF
TLEs	EGO (-)	2017-12-31	03:24:21.833	9.18	-699.759	-1145.194	-254.323	
38693	TEME	41464.944	0.0108231	4.2305	307.0137	270.0616	156.4243	
D.727	1997-029C	Fengyun 2A AKM (FG-36)						PM
TLEs	EGO (0.31)	2017-12-30	19:35:53.115	9.37	-714.566	-1611.840	182.708	
25611	TEME	41449.910	0.0219053	13.6969	21.0087	353.2647	346.6905	
D.728	2015-074B	Fregat-SB (Zenit-3F)						RB
TLEs	EGO (0.26)	2017-12-31	02:58:28.819	9.44	-719.471	-1473.934	34.992	
41106	TEME	41444.760	0.0182474	1.0223	90.6374	269.5739	304.9570	
D.729	1987-040D	Blok-DM (Proton-K/DM)						RB
TLEs	EGO (-)	2017-12-31	13:17:42.628	9.88	-752.112	-815.068	-689.156	
17972	TEME	41412.357	0.0017569	12.9883	337.7898	247.4900	210.8754	
D.730	1985-007D	Blok-DM (Proton-K/DM)						RB
TLEs	EGO (-)	2017-12-30	18:33:16.729	9.90	-753.427	-820.558	-686.296	
15487	TEME	41411.107	0.0016818	12.8566	339.2355	228.0939	172.6526	
D.731	1989-052D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-31	15:12:39.761	10.03	-763.662	-892.677	-634.647	
20110	TEME	41400.789	0.0031003	13.8862	355.8863	197.0869	213.7334	
D.732	2012-034B	Delta IV DCSS 5 (Delta 4H)						RB
KIAM	EGO (0.20)	2018-01-01	00:00:00.000	10.36	-788.262	-1512.295	-64.229	
UI174	J2000	41375.911	0.0174989	0.8663	17.8364	162.4000	60.9990	
D.733	1993-072D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-31	16:37:17.233	10.41	-791.587	-871.347	-711.827	
22910	TEME	41372.466	0.0014003	14.0445	10.6257	82.8693	56.8055	
D.734	2015-075H	Briz-M fragmentation debris						RF
TLEs	EGO (0.18)	2017-12-21	19:21:02.934	10.50	-798.423	-1924.506	327.661	
41547	TEME	41365.322	0.0267903	1.4971	102.4039	35.5233	80.6648	
D.735	1984-063F	Blok-DM (Proton-K/DM)						RB
TLEs	EGO (-)	2017-12-31	06:12:39.875	10.86	-824.701	-898.618	-750.783	
15693	TEME	41339.712	0.0014963	12.5638	335.5355	183.3062	317.1849	
D.736	1987-100D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-31	20:35:39.872	11.25	-854.028	-921.442	-786.614	
18634	TEME	41310.154	0.0014740	13.8886	348.7313	194.6638	293.5923	
D.737	1991-014D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	EGO (-)	2017-12-31	01:12:01.809	11.37	-862.585	-966.286	-758.883	
21135	TEME	41301.735	0.0021790	14.6041	0.6431	53.2094	46.4827	

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.738	1968-081U	Transtage 5 fragmentation debris					RF
TLEs	EGO (-)	2017-12-31	03:16:02.102	11.64	-882.979	-1253.405	-512.554
38694	TEME	41281.264	0.0082819	5.3563	304.9303	142.2416	156.3717
D.739	2001-015A	GSAT 1					PL
TLEs	EGO (0.22)	2017-12-31	17:37:27.325	12.78	-966.434	-1914.615	-18.253
26745	TEME	41197.824	0.0240708	11.3639	28.8492	213.3551	33.0354
D.740	1994-030D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	EGO (-)	2017-12-30	02:36:19.125	12.84	-971.095	-1164.409	-777.780
23111	TEME	41193.390	0.0041622	13.8590	11.0537	105.9565	28.2085
D.741	1969-036B	Agenda D (Atlas SLV3A)					RB
KIAM	EGO (0.03)	2018-01-01	00:00:00.000	12.89	-974.966	-5300.154	3350.222
UI012	J2000	41189.207	0.1050078	9.6758	58.8587	161.1905	200.4010
D.742	2008-003B	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (-)	2017-12-31	10:45:42.591	13.43	-1014.150	-1773.425	-254.876
32479	TEME	41150.338	0.0189634	7.1564	48.0467	162.7084	156.3144
D.743	2006-024C	USA 189 (NRL POTV)					PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	13.53	-1021.776	-1045.441	-998.111
UI140	J2000	41142.397	0.0005752	8.2724	42.6026	178.3007	55.1870
D.744	2010-063B	Delta IV DCSS 5 (Delta 4H)					RB
KIAM	EGO (0.18)	2018-01-01	00:00:00.000	13.54	-1022.792	-1987.504	-58.080
UI161	J2000	41141.381	0.0234487	3.2371	174.5162	278.3055	25.4600
D.745	2010-002B	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.12)	2017-12-31	16:21:27.516	13.57	-1024.444	-1866.506	-182.381
36359	TEME	41139.667	0.0215758	5.6920	58.6933	178.2413	103.0211
D.746	2016-036B	Delta IV DCSS 5 (Delta 4H)					RB
KIAM	EGO (0.10)	2018-01-01	00:00:00.000	13.67	-1031.685	-1908.103	-155.267
UI206	J2000	41132.488	0.0213072	7.2945	351.8608	199.7330	328.3250
D.747	2013-062B	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.18)	2017-12-31	08:17:19.885	14.16	-1068.099	-2108.607	-27.592
39376	TEME	41096.023	0.0248168	2.9361	77.0986	29.3710	212.4160
D.748	2011-048B	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.14)	2017-12-31	12:27:10.017	14.36	-1082.694	-2047.497	-117.892
37807	TEME	41081.127	0.0237860	4.3235	63.8545	6.8503	254.3639
D.749	1968-081Y	Transtage 5 fragmentation debris					RF
TLEs	EGO (-)	2017-12-31	21:44:29.414	14.83	-1116.292	-1755.849	-476.736
38698	TEME	41047.006	0.0175212	3.6198	301.3397	278.5461	235.0498
D.750	2007-058C	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.09)	2017-12-31	22:32:39.708	14.96	-1126.064	-2106.354	-145.773
32375	TEME	41038.333	0.0234160	7.3435	46.6066	137.6469	344.8119
D.751	2015-075G	Briz-M fragmentation debris					RF
TLEs	EGO (0.03)	2017-12-25	10:07:11.174	15.71	-1180.869	-2180.151	-181.587
41546	TEME	40983.233	0.0240366	1.4881	101.3375	59.6547	214.6588
D.752	2015-075B	Briz-M (Proton-M/Briz-M)					RB
TLEs	EGO (0.24)	2017-12-31	02:48:07.095	15.72	-1181.327	-2498.097	135.443
41122	TEME	40983.013	0.0317911	1.5921	89.6232	68.2502	307.0087

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.753	1997-027B	INSAT 2D					PL
TLEs	EGO (0.23)	2017-12-31	21:32:39.816	16.27	-1220.957	-2543.687	101.773
24820	TEME	40942.827	0.0324355	13.5706	14.1597	41.7764	132.1243
D.754	2015-075D	Briz-M fragmentation debris					RF
TLEs	EGO (-)	2017-12-30	09:10:34.928	18.12	-1354.825	-2383.947	-325.703
41543	TEME	40809.290	0.0248520	1.5589	91.4993	80.0751	214.0055
D.755	1968-081AD	Transtage 5 fragmentation debris					RF
TLEs	EGO (-)	2017-12-26	03:12:42.569	18.54	-1384.254	-2441.590	-326.918
38703	TEME	40780.287	0.0258440	4.2983	298.0702	154.3430	333.6129
D.756	1968-050J	Transtage 16 (Titan IIIC)					RB
TLEs	EGO (-)	2017-12-31	11:37:42.648	19.16	-1428.843	-2118.644	-739.041
3292	TEME	40735.671	0.0163249	1.6269	49.5212	306.6616	338.5280
D.757	2015-075F	Briz-M fragmentation debris					RF
TLEs	EGO (-)	2017-09-01	19:29:04.322	19.30	-1439.161	-2487.168	-391.154
41545	TEME	40724.893	0.0258370	1.2577	100.4271	72.8643	187.5206
D.758	2015-075E	Briz-M fragmentation debris					RF
TLEs	EGO (-)	2017-12-29	18:32:18.444	19.46	-1450.689	-2655.924	-245.454
41544	TEME	40713.297	0.0293283	1.5074	96.3613	75.7342	79.0242
D.759	1966-053J	Transtage 11 (Titan IIIC)					RB
TLEs	EGO (-)	2017-12-31	19:38:14.232	23.21	-1715.629	-2389.908	-1041.351
2222	TEME	40448.261	0.0156364	2.5847	60.6753	92.5773	73.6733
D.760	1968-050H	OPS 9348 (IDSCS 27)					PL
TLEs	EGO (-)	2017-12-31	13:08:42.594	23.38	-1727.402	-2052.618	-1402.187
3291	TEME	40436.683	0.0075390	1.1596	28.8474	95.8468	99.7451
D.761	1966-053H	OPS 9317 (IDSCS 7)					PL
TLEs	EGO (-)	2017-12-26	09:43:47.085	23.75	-1753.272	-2082.963	-1423.582
2221	TEME	40411.053	0.0075925	2.6940	59.4899	99.1066	192.8369
D.762	1968-050G	OPS 9347 (IDSCS 26)					PL
TLEs	EGO (-)	2017-12-31	11:51:39.866	24.34	-1795.002	-2054.141	-1535.862
3290	TEME	40369.199	0.0059382	1.2354	31.9959	94.8132	300.4161
D.763	1966-053G	OPS 9316 (IDSCS 6)					PL
TLEs	EGO (-)	2017-12-30	02:53:59.496	24.78	-1825.417	-2086.766	-1564.068
2220	TEME	40338.677	0.0059660	2.8103	59.1334	107.1963	279.2179
D.764	1967-003H	OPS 9328 (IDSCS 15)					PL
TLEs	EGO (-)	2017-12-31	10:55:05.466	25.04	-1843.800	-2121.232	-1566.367
2655	TEME	40320.318	0.0067790	2.3715	55.5973	327.9298	225.6481
D.765	1968-050F	OPS 9346 (IDSCS 25)					PL
TLEs	EGO (-)	2017-12-30	05:56:42.588	25.25	-1858.255	-2053.206	-1663.305
3289	TEME	40306.040	0.0043598	1.3289	37.1279	92.3887	133.4574
D.766^m	1966-053F	OPS 9315 (IDSCS 5)					PL
TLEs	EGO (-)	2017-12-12	19:28:50.746	25.65	-1886.121	-2080.809	-1691.433
2219	TEME	40278.052	0.0048336	2.9257	59.3915	116.4824	45.1319
D.767	1968-050E	OPS 9345 (IDSCS 24)					PL
TLEs	EGO (-)	2017-12-31	18:46:39.651	25.94	-1905.963	-2055.310	-1756.616
3288	TEME	40258.382	0.0032381	1.3866	38.2644	93.7793	357.1292

D.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$
S-ID	Frame	a	e	i	Ω	ω	λ
D.768	1967-003G	OPS 9327 (IDSCS 14)					PL
TLEs	EGO (-)	2017-12-29	22:03:42.628	26.05	-1914.165	-2133.375	-1694.956
2654	TEME	40250.078	0.0053548	2.5045	56.7814	337.3528	311.0035
D.769	1966-053E	OPS 9314 (IDSCS 4)					PL
TLEs	EGO (-)	2017-12-31	12:54:37.908	26.32	-1932.592	-2098.861	-1766.322
2218	TEME	40231.701	0.0039396	3.0160	59.0295	127.4600	193.5866
D.770	1968-050D	OPS 9344 (IDSCS 23)					PL
TLEs	EGO (-)	2017-12-31	13:08:42.594	26.52	-1946.346	-2054.094	-1838.598
3287	TEME	40217.741	0.0022464	1.4612	41.3919	95.7874	101.0473
D.771	1967-003F	OPS 9326 (IDSCS 13)					PL
TLEs	EGO (-)	2017-12-31	15:00:39.814	26.91	-1973.401	-2149.614	-1797.187
2653	TEME	40190.678	0.0042761	2.6125	56.2661	351.0659	93.9951
D.772	1966-053D	OPS 9313 (IDSCS 3)					PL
TLEs	EGO (-)	2017-12-22	01:50:33.981	26.93	-1974.799	-2109.662	-1839.935
2217	TEME	40189.307	0.0033679	3.1108	59.2668	140.5196	273.5035
D.773	1968-050C	OPS 9343 (IDSCS 22)					PL
TLEs	EGO (-)	2017-12-31	08:18:12.142	26.94	-1975.529	-2054.473	-1896.585
3286	TEME	40188.807	0.0015617	1.5071	42.5940	100.0273	180.1485
D.774	1968-050B	OPS 9342 (IDSCS 21)					PL
TLEs	EGO (-)	2017-12-30	11:44:43.889	27.16	-1990.820	-2055.551	-1926.089
3285	TEME	40173.396	0.0012200	1.5306	43.1249	105.1420	207.0948
D.775	1966-053C	OPS 9312 (IDSCS 2)					PL
TLEs	EGO (-)	2017-12-29	14:11:33.834	27.28	-1998.687	-2118.725	-1878.648
2216	TEME	40165.689	0.0030670	3.1682	59.2216	150.7380	152.5033
D.776	1968-050A	OPS 9341 (IDSCS 20)					PL
TLEs	EGO (-)	2017-12-31	18:53:42.580	27.29	-1999.553	-2057.221	-1941.884
3284	TEME	40164.754	0.0010381	1.5283	42.3212	106.8524	7.4154
D.777	1966-053B	OPS 9311 (IDSCS 1)					PL
TLEs	EGO (-)	2017-12-31	05:53:08.374	27.49	-2013.169	-2132.983	-1893.354
2215	TEME	40150.957	0.0029588	3.1992	59.1853	157.1247	212.9343
D.778	1967-003E	OPS 9325 (IDSCS 12)					PL
TLEs	EGO (-)	2017-12-25	22:20:08.898	27.61	-2021.604	-2175.609	-1867.599
2652	TEME	40142.742	0.0036208	2.6998	57.0991	6.1415	347.1925
D.779	1966-053A	GGTS 1					PL
TLEs	EGO (-)	2017-12-30	11:12:21.532	27.74	-2030.313	-2143.120	-1917.507
2207	TEME	40131.858	0.0029790	3.2058	58.7512	170.6121	227.2464
D.780	1967-003D	OPS 9324 (IDSCS 11)					PL
TLEs	EGO (-)	2017-12-27	15:16:39.824	28.19	-2061.770	-2204.871	-1918.670
2651	TEME	40102.313	0.0032889	2.7720	56.4557	22.9577	93.2443
D.781	1967-003C	OPS 9323 (IDSCS 10)					PL
TLEs	EGO (-)	2017-12-29	16:31:17.046	28.61	-2090.607	-2233.508	-1947.707
2650	TEME	40073.466	0.0032283	2.8286	56.5043	36.5757	56.3957
D.782	1967-003B	OPS 9322 (IDSCS 9)					PL
TLEs	EGO (-)	2017-12-23	01:51:12.951	28.83	-2105.386	-2250.761	-1960.011
2649	TEME	40058.724	0.0032542	2.8459	56.4705	43.4187	276.2603

D.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	$\bar{\lambda}$	$\bar{\Delta a}$	$\bar{\Delta r_p}$	$\bar{\Delta r_a}$	
S-ID	Frame	a	e	i	Ω	ω	λ	
D.783	1967-003A	OPS 9321 (IDSCS 8)						PL
TLEs	EGO (-)	2017-12-29	02:16:40.353	28.96	-2114.026	-2263.300	-1964.753	
2645	TEME	40050.067	0.0033208	2.8801	57.2499	45.9510	277.6220	
D.784	1967-066G	Transtage 14 (Titan IIIC)						RB
TLEs	EGO (-)	2017-12-31	21:58:39.705	31.08	-2258.771	-2563.532	-1954.011	
2868	TEME	39905.261	0.0077252	4.9540	293.0647	282.0265	49.6561	
D.785	1967-066F	DODGE 1						PL
TLEs	EGO (-)	2017-12-31	09:03:25.683	32.02	-2322.450	-2521.446	-2123.454	
2867	TEME	39841.683	0.0053819	4.8462	291.8402	303.7959	266.7957	
D.786	1967-066E	LES 5						PL
TLEs	EGO (-)	2017-12-31	19:41:09.411	32.93	-2383.668	-2588.630	-2178.706	
2866	TEME	39779.114	0.0058711	4.7030	291.1195	322.6069	69.1029	
D.787	1967-066D	OPS 9334 (IDSCS 19, DATS)						PL
TLEs	EGO (-)	2017-12-19	03:37:12.738	33.66	-2433.043	-2649.871	-2216.214	
2865	TEME	39731.117	0.0060934	4.6282	290.6587	332.6355	288.6062	
D.788	1967-066C	OPS 9333 (IDSCS 18)						PL
TLEs	EGO (-)	2017-12-28	15:05:07.683	34.24	-2472.056	-2708.240	-2235.871	
2864	TEME	39692.310	0.0066128	4.5621	289.8497	342.7050	174.5982	
D.789	1967-066B	OPS 9332 (IDSCS 17)						PL
TLEs	EGO (-)	2017-12-31	18:07:42.564	34.64	-2498.802	-2752.304	-2245.301	
2863	TEME	39665.283	0.0070369	4.4628	289.5819	347.4815	97.8922	
D.790	1967-066A	OPS 9331 (IDSCS 16)						PL
TLEs	EGO (-)	2017-12-31	12:41:39.788	34.85	-2512.841	-2772.783	-2252.900	
2862	TEME	39651.447	0.0072088	4.4710	289.2389	350.0856	0.7691	
D.791	1992-006C	IABS (Atlas II)						RB
KIAM	EGO (-)	2018-01-01	00:00:00.000	37.85	-2711.700	-5217.236	-206.164	
UI132	J2000	39452.473	0.0635077	11.1307	351.5731	4.9069	67.7140	
D.792	2014-082B	Briz-M (Proton-M/Briz-M)						RB
TLEs	EGO (-)	2017-12-31	18:24:51.853	39.82	-2841.169	-5273.886	-408.451	
40346	TEME	39322.881	0.0611667	2.3780	88.9790	84.1557	71.8266	
D.793	2012-061D	Briz-M (Proton-M/Briz-M)						RB
TLEs	EGO (0.11)	2017-12-31	14:30:46.025	43.96	-3109.771	-6216.511	-3.030	
38980	TEME	39054.327	0.0787806	3.8722	63.9929	40.2391	105.8898	
D.794	2011-035D	Briz-M (Proton-M/Briz-M)						RB
TLEs	EGO (-)	2017-12-31	21:34:56.292	44.78	-3162.286	-6014.885	-309.687	
37751	TEME	39001.853	0.0746741	4.5412	61.1065	333.1666	288.7498	
D.795	1974-033F	SMS 1 AKM (SVM-5)						PM
TLEs	EGO (-)	2017-12-31	17:40:46.743	57.28	-3943.407	-4934.138	-2952.676	
9998	TEME	38221.106	0.0254694	1.6514	189.1862	197.3934	183.6330	

4.5 Objects in a Libration Orbit around the Eastern Stable Point

The following list contains 122 objects in libration orbit around the Eastern stable point at longitude 75E, sorted according to the ascending order of the libration period (which is equivalent to the ascending order of the libration magnitude).

For explanation of symbols, see the definitions at the beginning of section 4.

L1.nn	COSPAR	Name						Type
Source	Orbit ($f_{\text{IADC}}^{\text{GEO}}$)	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	
S-ID	Frame	a	e	i	Ω	ω	λ	
L1.1^m	1973-013A	OPS 6063 (Rhyolite 2)						PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	738.60	6.35	71.81	78.16	
UI043	J2000	42163.018	0.0018038	7.7152	304.4537	190.2588	75.7200	
L1.2	1993-039A	Galaxy IV						PL
TLEs	GEO (1.00)	2017-12-31	22:23:26.873	738.63	6.82	71.57	78.40	
22694	TEME	42166.235	0.0016270	14.2653	21.0875	242.2716	76.3880	
L1.3	2000-036A	Cosmos-2371						PL
TLEs	GEO (1.00)	2017-12-31	16:20:20.995	739.54	9.88	70.04	79.92	
26394	TEME	42166.770	0.0002477	12.0688	31.1528	248.7411	71.5851	
L1.4	1990-061A	Cosmos-2085						PL
TLEs	GEO (0.96)	2017-12-31	22:22:47.529	739.60	10.07	69.94	80.01	
20693	TEME	42167.449	0.0001854	15.0291	2.6291	254.7896	72.6535	
L1.5	1988-066A	Cosmos-1961						PL
TLEs	GEO (1.00)	2017-12-31	23:58:53.981	739.68	10.33	69.81	80.14	
19344	TEME	42164.303	0.0002882	14.7396	355.6279	331.7696	80.3602	
L1.6	1994-087A	Raduga 32						PL
TLEs	GEO (1.00)	2017-12-31	22:22:20.479	739.69	10.40	69.78	80.18	
23448	TEME	42163.719	0.0009350	14.6082	17.0153	224.9130	80.0117	
L1.7	1991-010A	Cosmos-2133						PL
TLEs	GEO (1.00)	2017-12-31	23:59:06.984	739.83	10.71	69.62	80.33	
21111	TEME	42164.143	0.0001124	14.7635	8.3763	164.6553	80.5234	
L1.8	1984-022A	Cosmos-1540						PL
TLEs	GEO (1.00)	2017-12-31	22:23:00.530	739.93	10.85	69.55	80.40	
14783	TEME	42161.363	0.0005636	14.9904	336.4080	215.2166	72.6701	
L1.9^m	1995-054A	Luch 1-1						PL
TLEs	GEO (1.00)	2017-12-31	20:05:06.819	740.00	5.00	72.50	77.50	
23680	TEME	42166.121	0.0002327	14.1004	25.6927	15.3512	75.4878	
L1.10	2008-033A	Cosmos-2440						PL
TLEs	GEO (1.00)	2017-12-31	17:06:42.615	740.02	11.12	69.41	80.54	
33108	TEME	42162.935	0.0008208	4.9771	56.6998	201.9683	79.4880	
L1.11	1981-018A	Comstar 1D (D-4)						PL
TLEs	GEO (1.00)	2017-12-31	22:23:13.532	740.03	11.24	69.36	80.59	
12309	TEME	42167.091	0.0006502	13.9631	339.0671	322.5115	71.0819	
L1.12	1998-025A	Cosmos-2350						PL
TLEs	GEO (1.00)	2017-12-31	23:50:44.924	740.27	11.81	69.07	80.88	
25315	TEME	42160.830	0.0000555	12.5544	27.5984	119.0963	73.0950	

L1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}
S-ID	Frame	a	e	i	Ω	ω	λ
L1.13	1993-062A	Raduga 30					PL
TLEs	GEO (1.00)	2017-12-30	00:46:33.803	740.40	12.15	68.90	81.04
22836	TEME	42164.042	0.0007833	14.8645	13.3216	261.9775	81.0587
L1.14	1990-051A	INSAT 1D					PL
TLEs	GEO (1.00)	2017-12-31	22:22:20.479	740.52	12.41	68.76	81.18
20643	TEME	42162.714	0.0010671	14.4625	20.1444	127.9864	81.0507
L1.15	1984-031A	Cosmos-1546					PL
TLEs	GEO (1.00)	2017-12-31	22:25:49.927	740.84	13.14	68.40	81.54
14867	TEME	42168.581	0.0027036	13.9233	339.1583	297.5238	75.5955
L1.16	1994-069A	Elektro 1					PL
TLEs	GEO (1.00)	2017-12-31	22:23:26.873	741.42	14.30	67.81	82.12
23327	TEME	42159.877	0.0008331	14.9801	15.9311	215.5900	76.0835
L1.17	1982-044A	Cosmos-1366					PL
TLEs	GEO (1.00)	2017-12-31	11:45:03.720	741.47	14.41	67.76	82.17
13177	TEME	42159.907	0.0007100	14.4760	330.8898	1.9746	77.0748
L1.18	1983-028A	Raduga 12					PL
TLEs	GEO (1.00)	2017-12-31	23:55:39.648	744.80	19.90	64.99	84.89
13974	TEME	42170.321	0.0004884	13.8468	335.4643	314.3367	70.5839
L1.19	1970-046A	OPS 5346 (Rhyolite 1)					PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	744.99	20.61	64.63	85.24
UI035	J2000	42157.700	0.0000650	5.2059	298.1413	143.7064	78.0750
L1.20	1981-102A	Raduga 10					PL
TLEs	GEO (1.00)	2017-12-31	22:53:39.710	745.46	20.81	64.53	85.34
12897	TEME	42159.511	0.0001505	13.1195	327.0203	211.0335	68.0760
L1.21	1979-035A	Raduga 5					PL
TLEs	GEO (1.00)	2017-12-31	22:25:36.501	745.83	21.30	64.28	85.59
11343	TEME	42157.756	0.0000839	12.2521	319.1106	13.4019	77.0276
L1.22	1975-123A	Raduga 1					PL
TLEs	GEO (1.00)	2017-12-29	19:38:42.599	745.95	21.49	64.19	85.68
8513	TEME	42171.367	0.0005046	10.1480	309.8559	206.0190	78.4267
L1.23	1984-016A	Raduga 14					PL
TLEs	GEO (1.00)	2017-12-31	22:25:49.927	747.32	23.17	63.34	86.51
14725	TEME	42156.942	0.0002323	13.8748	338.5991	316.4403	74.7238
L1.24	1976-092A	Raduga 2					PL
TLEs	GEO (1.00)	2017-12-31	21:51:42.636	747.57	23.46	63.19	86.65
9416	TEME	42164.825	0.0031214	10.7667	311.6752	308.3531	63.1791
L1.25	2006-053D	Fengyun 2D operational debris (S-VISSR radiometre cover)					PM
TLEs	EGO (0.42)	2017-12-30	00:09:44.863	748.65	24.66	62.59	87.25
33458	TEME	42169.166	0.0077969	6.2709	57.4534	307.0192	65.5092
L1.26^m	1977-080A	SIRIO 1					PL
TLEs	GEO (1.00)	2017-12-31	15:02:40.963	750.00	1.50	74.40	75.90
10294	TEME	42164.704	0.0004955	13.3811	330.0178	42.6330	75.8991
L1.27	1988-014A	DFH-2A 2 (Chinasat 1, Zhongxing 1, ZX 1, STTW 2)					PL
TLEs	GEO (0.91)	2017-12-31	12:33:52.297	751.75	28.01	60.89	88.90
18922	TEME	42155.493	0.0001028	15.1597	6.0987	40.6883	77.5187

L1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}
S-ID	Frame	a	e	i	Ω	ω	λ
L1.28	1979-062A	Gorizont 2					PL
TLEs	GEO (1.00)	2017-12-31	21:46:42.569	754.20	30.35	59.70	90.06
11440	TEME	42173.882	0.0007335	12.5638	321.3003	290.3360	70.1628
L1.29	2008-033D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	18:33:39.665	755.34	31.32	59.21	90.53
33111	TEME	42160.428	0.0034674	4.9465	56.7895	259.3036	61.0521
L1.30	2003-053B	Yamal 200 N1 (Yamal 201)					PL
TLEs	GEO (1.00)	2017-12-31	22:23:00.530	756.03	31.93	58.90	90.83
28094	TEME	42153.452	0.0005828	2.6943	78.9685	245.0921	73.4056
L1.31	1977-038A	OPS 9751 (CANYON 7)					PL
KIAM	EGO (0.02)	2018-01-01	00:00:00.000	758.69	33.80	57.95	91.75
UI086	J2000	42174.379	0.1244982	11.2895	346.5065	60.5686	68.7600
L1.32	1983-118F	Blok-DM (Proton-K/DM)					RB
TLEs	EGO (0.89)	2017-12-31	23:44:42.618	758.81	34.29	57.70	91.99
14548	TEME	42173.795	0.0047839	13.8324	338.6480	266.2248	65.9277
L1.33	1997-070A	Kupon 1					PL
TLEs	GEO (1.00)	2017-12-30	12:43:50.556	759.23	34.61	57.54	92.15
25045	TEME	42169.609	0.0008298	14.3198	20.6363	252.9770	90.5453
L1.34	1988-063A	INSAT 1C					PL
TLEs	GEO (1.00)	2017-12-31	23:51:23.929	763.74	37.98	55.82	93.81
19330	TEME	42176.402	0.0002523	14.8167	354.0934	351.5171	71.1506
L1.35	1985-102A	Cosmos-1700					PL
TLEs	GEO (1.00)	2017-12-30	22:05:42.573	765.37	39.12	55.24	94.36
16199	TEME	42153.592	0.0003098	14.2513	345.4162	216.4020	84.7177
L1.36	1990-112A	Raduga 26					PL
TLEs	GEO (0.99)	2017-12-31	01:11:09.805	772.68	43.82	52.84	96.67
21016	TEME	42163.350	0.0004570	15.0042	4.0012	336.1100	52.9025
L1.37	1990-054A	Gorizont 20					PL
TLEs	GEO (0.93)	2017-12-31	23:48:22.986	772.70	43.86	52.82	96.69
20659	TEME	42152.795	0.0004538	15.0871	2.3601	194.0464	87.0393
L1.38	1984-041A	Gorizont 9					PL
TLEs	GEO (1.00)	2017-12-30	21:47:39.708	772.91	44.01	52.75	96.76
14940	TEME	42164.339	0.0005714	13.9214	339.8073	238.8620	97.0333
L1.39	1976-092F	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-31	21:51:42.636	773.63	44.40	52.55	96.95
17872	TEME	42176.323	0.0013041	10.7444	311.8382	95.6979	62.7179
L1.40	1976-107A	Ekran 1					PL
TLEs	EGO (0.58)	2017-12-31	21:46:42.569	773.70	44.45	52.52	96.97
9503	TEME	42178.761	0.0060515	10.8470	311.9943	89.7524	71.4586
L1.41	1979-087A	Ekran 4					PL
TLEs	GEO (1.00)	2017-12-30	19:18:41.837	773.73	44.49	52.51	96.99
11561	TEME	42169.633	0.0004499	12.4672	320.6114	12.1297	95.8179
L1.42	1987-096A	Cosmos-1897					PL
TLEs	GEO (1.00)	2017-12-31	22:20:50.612	774.45	44.93	52.28	97.21
18575	TEME	42158.360	0.0004567	14.6467	352.9515	334.5805	95.3377

L1.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	
S-ID	Frame	a	e	i	Ω	ω	λ	
L1.43	1990-011A	DFH-2A 4 (Chinasat 3, Zhongxing 3, ZX 3, STTW 4)						PL
TLEs	GEO (0.94)	2017-12-31	23:48:09.984	776.00	45.83	51.82	97.65	
20473	TEME	42169.677	0.0001555	15.0797	13.0007	320.1703	96.5086	
L1.44	1980-104A	Ekran 6						PL
TLEs	GEO (1.00)	2017-12-31	23:51:09.687	776.58	46.12	51.67	97.79	
12120	TEME	42156.223	0.0010058	12.8674	324.2791	333.6051	56.0188	
L1.45	2003-060D	Blok-DM-2M (Proton-K/DM-2M)						RB
TLEs	GEO (1.00)	2017-12-30	16:23:29.502	780.22	48.14	50.64	98.77	
28139	TEME	42151.760	0.0016333	10.8500	36.2551	171.3569	62.0704	
L1.46	1992-074A	Ekran-M 20						PL
TLEs	GEO (1.00)	2017-12-31	22:23:26.873	781.58	48.89	50.25	99.14	
22210	TEME	42149.023	0.0002205	14.9496	10.4467	221.2526	75.2670	
L1.47	1984-016F	Blok-DM (Proton-K/DM)						RB
TLEs	GEO (1.00)	2017-12-27	22:42:00.959	781.90	49.08	50.15	99.23	
17874	TEME	42149.488	0.0033942	13.8761	338.7123	147.4421	81.5822	
L1.48	1977-092A	Ekran 2						PL
TLEs	GEO (1.00)	2017-12-28	21:50:42.643	782.59	49.44	49.97	99.41	
10365	TEME	42178.748	0.0042036	11.4257	314.5448	289.1622	84.5536	
L1.49	1979-015A	Ekran 3						PL
TLEs	GEO (1.00)	2017-12-31	20:33:39.705	784.11	50.25	49.56	99.80	
11273	TEME	42155.436	0.0041410	12.1097	318.5280	286.4226	94.7286	
L1.50	1981-061A	Ekran 7						PL
TLEs	GEO (1.00)	2017-12-31	22:25:36.501	785.39	50.89	49.22	100.12	
12564	TEME	42180.583	0.0007026	13.0302	325.8838	328.3811	76.9140	
L1.51	1994-008A	Raduga 1-3						PL
TLEs	GEO (1.00)	2017-12-31	22:21:53.949	786.94	51.69	48.81	100.51	
22981	TEME	42160.306	0.0004159	14.8552	14.4933	269.5628	100.0296	
L1.52	1990-116A	Raduga 1-2						PL
TLEs	GEO (0.96)	2017-12-31	16:37:17.233	786.94	51.65	48.83	100.49	
21038	TEME	42176.028	0.0003930	15.0354	4.1026	5.2160	57.1242	
L1.53	—	Fengyun 2G debris (VISSR cover?)						PM
KIAM	EGO (0.28)	2018-01-01	00:00:00.000	788.95	52.45	48.43	100.87	
UU074	J2000	42173.496	0.0111738	0.1821	143.6814	130.0857	53.3570	
L1.54	1985-102G	Cosmos-1700 debris						PD
TLEs	GEO (1.00)	2017-12-30	01:07:56.783	790.98	53.65	47.81	101.46	
40924	TEME	42157.500	0.0022012	14.2407	345.3622	29.0432	50.6921	
L1.55	1983-100A	Ekran 11						PL
TLEs	GEO (1.00)	2017-12-30	21:47:39.708	792.17	54.16	47.55	101.71	
14377	TEME	42178.022	0.0005949	13.5721	333.7718	287.1300	91.0370	
L1.56	—	—						—
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	793.61	55.02	47.10	102.13	
UI044	J2000	42158.278	0.0042384	13.2462	330.0552	11.7101	48.9350	
L1.57	1996-058A	Ekspress 2 (Ekspress 12L)						PL
TLEs	GEO (1.00)	2017-12-31	11:53:26.739	796.88	56.40	46.40	102.79	
24435	TEME	42173.725	0.0012151	14.3697	20.4411	277.8604	98.6048	

L1.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	
S-ID	Frame	a	e	i	Ω	ω	λ	
L1.58	1986-010A	DFH-2A 1 (STTW 1)						PL
TLEs	GEO (1.00)	2017-12-30	01:15:39.693	797.01	56.41	46.39	102.80	
16526	TEME	42175.421	0.0004685	14.6107	350.0544	265.4890	53.0937	
L1.59	2001-045D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	GEO (1.00)	2017-12-31	17:37:56.963	800.31	57.86	45.64	103.50	
26939	TEME	42160.634	0.0028570	11.3461	35.4868	302.1370	46.8314	
L1.60	2005-010F	Blok-DM-2M (Proton-K/DM-2M)						RB
TLEs	GEO (1.00)	2017-12-31	16:19:45.429	802.57	58.83	45.14	103.97	
28634	TEME	42151.875	0.0024940	9.8571	39.8648	203.2898	54.3749	
L1.61	1982-093A	Ekran 9						PL
TLEs	GEO (1.00)	2017-12-30	23:54:14.777	806.34	60.41	44.33	104.74	
13554	TEME	42177.962	0.0029119	13.2279	330.0587	290.7746	54.1933	
L1.62	1989-098A	Raduga 24						PL
TLEs	GEO (0.90)	2017-12-31	15:02:40.963	806.74	60.59	44.23	104.83	
20367	TEME	42183.166	0.0004848	15.1914	0.4334	264.3064	77.0966	
L1.63	2004-042D	Fengyun 2C operational debris (S-VISSR radiometre cover)						PM
TLEs	EGO (0.42)	2017-12-29	13:14:38.463	808.04	61.35	43.84	105.19	
40000	TEME	42155.918	0.0077532	9.4060	40.1038	344.5713	103.2433	
L1.64	1994-012A	Raduga 31						PL
TLEs	GEO (1.00)	2017-12-31	15:07:21.338	808.32	61.22	43.91	105.13	
23010	TEME	42154.346	0.0003011	14.8247	14.4673	300.5097	49.2395	
L1.65	2000-049A	Raduga 1-5						PL
TLEs	GEO (1.00)	2017-12-30	02:42:30.546	809.25	61.61	43.71	105.32	
26477	TEME	42170.619	0.0004048	11.9667	31.7035	273.8353	45.3334	
L1.66	—	Fengyun 2B debris (VISSR cover?)						PM
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	811.75	62.97	43.00	105.97	
UU064	J2000	42145.769	0.0023122	12.6928	31.1225	327.6242	85.2510	
L1.67	1980-016A	Raduga 6						PL
TLEs	GEO (1.00)	2017-12-31	22:51:42.592	820.54	65.92	41.47	107.40	
11708	TEME	42150.322	0.0004096	12.5211	321.6142	275.9077	52.0795	
L1.68	1974-060A	Molniya 1-S						PL
TLEs	GEO (1.00)	2017-12-31	19:36:55.176	822.90	66.78	41.03	107.81	
7392	TEME	42184.992	0.0006276	8.8008	305.1461	179.6816	79.4889	
L1.69	2007-018A	NigComSat 1						PL
TLEs	GEO (1.00)	2017-12-31	18:39:39.722	823.31	66.93	40.95	107.88	
31395	TEME	42165.419	0.0000421	6.9621	52.3446	171.3251	40.8293	
L1.70	1978-039A	Yuri 1 (BSE)						PL
TLEs	GEO (1.00)	2017-12-31	16:37:31.683	825.11	67.58	40.62	108.19	
10792	TEME	42146.758	0.0018152	12.3773	320.0819	247.9940	58.6281	
L1.71	1986-044A	Gorizont 12						PL
TLEs	GEO (1.00)	2017-12-31	23:44:42.618	831.71	69.84	39.44	109.28	
16769	TEME	42185.446	0.0006655	14.3403	347.4704	270.8537	70.1923	
L1.72	1979-105A	Gorizont 3						PL
TLEs	GEO (1.00)	2017-12-30	23:35:39.655	832.07	69.98	39.37	109.35	
11648	TEME	42148.258	0.0010082	12.6811	322.5054	188.5596	53.3696	

L1.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}
S-ID	Frame	a	e	i	Ω	ω	λ
L1.73	—	—					—
KIAM	EGO (0.62)	2018-01-01	00:00:00.000	841.16	73.31	37.64	110.94
UI041	J2000	42142.360	0.0058246	12.9971	330.6652	297.1082	82.2360
L1.74	1978-073A	Raduga 4					PL
TLEs	GEO (1.00)	2017-12-31	23:44:39.837	843.14	73.56	37.50	111.07
10987	TEME	42160.896	0.0013839	11.8662	316.8342	308.7746	37.9580
L1.75	1988-111A	DFH-2A 3 (Chinasat 2, Zhongxing 2, ZX 2, STTW 3)					PL
TLEs	GEO (0.93)	2017-12-31	22:22:07.479	844.32	73.95	37.30	111.25
19710	TEME	42143.701	0.0000431	15.1004	12.1620	48.1745	87.6762
L1.76	1975-097A	Cosmos-775					PL
TLEs	GEO (1.00)	2017-12-31	19:20:39.691	858.63	78.22	35.07	113.29
8357	TEME	42146.679	0.0009229	9.7518	307.9181	61.0710	98.6907
L1.77	1989-081A	Gorizont 19					PL
TLEs	GEO (1.00)	2017-12-31	00:49:42.629	859.51	78.46	34.94	113.40
20263	TEME	42141.685	0.0007731	14.8569	359.4528	255.7829	67.0096
L1.78	1999-010A	Raduga 1-4					PL
TLEs	GEO (1.00)	2017-12-31	17:37:53.670	860.11	78.63	34.86	113.48
25642	TEME	42149.618	0.0007026	14.2858	29.1723	233.6302	45.5650
L1.79	1981-069A	Raduga 9					PL
TLEs	GEO (1.00)	2017-12-31	22:53:39.710	862.88	79.41	34.45	113.86
12618	TEME	42141.667	0.0003350	13.0696	326.2579	326.6250	65.8462
L1.80	1977-071A	Raduga 3					PL
TLEs	GEO (1.00)	2017-12-31	20:33:39.705	863.34	79.52	34.39	113.91
10159	TEME	42184.210	0.0007559	11.3251	313.9344	221.9591	95.7459
L1.81	1996-058D	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	GEO (1.00)	2017-12-31	23:02:39.786	868.13	80.84	33.69	114.54
24438	TEME	42171.100	0.0006568	14.6482	17.2807	13.1675	113.2783
L1.82	1994-002A	Gals 1					PL
TLEs	GEO (1.00)	2017-12-31	11:49:00.780	870.30	81.42	33.39	114.81
22963	TEME	42187.606	0.0007963	14.4016	19.9655	183.5646	85.4528
L1.83	1984-078F	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-30	02:32:42.574	882.49	84.58	31.73	116.31
15181	TEME	42165.829	0.0018984	14.0107	341.0938	132.6882	31.8348
L1.84	2001-037D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	20:49:18.175	886.50	85.77	31.10	116.87
26895	TEME	42146.454	0.0019590	10.4965	36.2103	352.0538	103.4032
L1.85	1989-030A	Raduga 23					PL
TLEs	GEO (1.00)	2017-12-30	23:49:10.718	893.68	87.66	30.10	117.76
19928	TEME	42139.078	0.0015212	14.7868	357.9085	127.7991	83.6887
L1.86	1991-087A	Raduga 28					PL
TLEs	GEO (0.94)	2017-12-31	13:25:43.771	896.75	87.77	30.04	117.81
21821	TEME	42188.233	0.0000796	15.0706	7.3907	356.2329	61.2793
L1.87	1997-071B	Cakrawatra 1					PL
TLEs	GEO (1.00)	2017-12-31	16:21:06.441	897.68	88.04	29.90	117.94
25050	TEME	42187.114	0.0006773	9.4945	41.1236	245.4830	93.0175

L1.nn	COSPAR	Name					Type
Source	Orbit ($f_{\text{IADC}}^{\text{GEO}}$)	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}
S-ID	Frame	a	e	i	Ω	ω	λ
L1.88	1982-031A	INSAT 1A					PL
TLEs	GEO (1.00)	2017-12-16	15:56:13.995	919.96	93.23	27.14	120.37
13129	TEME	42156.884	0.0022949	13.3535	329.7389	324.7431	29.9407
L1.89	1974-060F	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-31	21:58:39.705	926.65	94.62	26.40	121.02
20836	TEME	42141.774	0.0014096	8.7846	304.9019	119.4560	52.2217
L1.90	1990-061D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (0.98)	2017-12-31	11:53:11.199	937.22	96.75	25.26	122.01
20696	TEME	42137.743	0.0029201	15.0093	2.5756	139.0976	83.8839
L1.91^m	1975-055A	OPS 4966 (CANYON 6)					PL
KIAM	EGO (0.01)	2018-01-01	00:00:00.000	939.62	97.53	24.84	122.37
UI060	J2000	42167.186	0.1332305	17.7902	304.0910	324.8019	146.6700
L1.92^m	2008-066D	Fengyun 2E operational debris (S-VISSR radiometre cover)					PM
TLEs	EGO (0.46)	2017-12-31	19:20:48.246	954.80	100.40	23.30	123.70
40987	TEME	42176.057	0.0072375	4.2266	59.6560	260.0641	28.8493
L1.93	1997-021A	DFH 3-2 (Chinasat 6, Zhongxing 6, ZX 6)					PL
TLEs	GEO (1.00)	2017-12-31	12:33:14.344	987.20	105.74	20.40	126.14
24798	TEME	42167.599	0.0003413	10.7881	36.2606	358.0895	126.2926
L1.94	1986-090D	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-30	08:08:32.168	1001.28	107.98	19.18	127.16
17125	TEME	42165.109	0.0005101	14.4500	349.0896	88.5758	128.0064
L1.95	1991-014A	Raduga 27					PL
TLEs	GEO (0.83)	2017-12-31	22:08:20.063	1015.93	110.20	17.96	128.16
21132	TEME	42148.440	0.0004392	15.5604	4.2310	295.5367	117.7692
L1.96	2002-051A	Eutelsat 33B (Eutelsat 25C, Eutelsat 70A, Eutelsat W5)					PL
TLEs	GEO (1.00)	2017-12-31	18:53:42.580	1018.65	110.57	17.75	128.32
27554	TEME	42173.670	0.0015959	1.8048	86.0965	225.4881	21.8399
L1.97	2011-074A	AMOS 5					PL
TLEs	GEO (1.00)	2017-12-31	22:23:13.532	1027.36	111.85	17.04	128.90
37950	TEME	42195.218	0.0003550	1.6058	87.3524	211.5403	71.1624
L1.98	1984-063A	Raduga 15					PL
TLEs	GEO (1.00)	2017-12-31	00:19:39.888	1028.04	111.92	17.00	128.93
15057	TEME	42190.369	0.0001004	13.9408	339.5770	275.8889	50.3840
L1.99	2009-018A	Beidou DW 2					PL
TLEs	EGO (0.29)	2017-12-31	19:03:59.408	1029.25	112.06	16.93	128.99
34779	TEME	42181.119	0.0108477	5.6785	58.3026	205.2133	31.7777
L1.100	2004-010A	Raduga 1					PL
TLEs	GEO (1.00)	2017-12-31	18:53:42.580	1031.68	112.42	16.73	129.15
28194	TEME	42172.211	0.0004648	9.9842	44.3799	217.5779	19.6997
L1.101	1996-040B	Turksat 1C					PL
TLEs	GEO (1.00)	2017-12-31	12:07:39.916	1033.46	112.72	16.56	129.28
23949	TEME	42151.599	0.0005567	7.4478	49.7514	176.2692	122.1848
L1.102	1977-092H	Ekran 2 fragmentation debris					PF
TLEs	GEO (1.00)	2017-12-31	22:25:36.501	1039.58	113.55	16.10	129.65
11581	TEME	42134.201	0.0002780	11.3394	314.2191	204.7750	76.4773

L1.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	
S-ID	Frame	a	e	i	Ω	ω	λ	
L1.103	2003-015F	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	GEO (1.00)	2017-12-31	16:20:48.658	1066.89	117.11	14.11	131.22	
27780	TEME	42195.013	0.0012251	9.2801	40.8691	304.3823	84.5798	
L1.104	1983-089B	INSAT 1B						PL
TLEs	GEO (1.00)	2017-12-31	02:53:01.844	1068.27	117.27	14.02	131.29	
14318	TEME	42178.423	0.0008715	14.7518	353.4277	203.3194	24.6618	
L1.105	2001-037A	Cosmos-2379						PL
TLEs	GEO (1.00)	2017-12-31	22:21:32.006	1094.70	120.46	12.21	132.67	
26892	TEME	42196.006	0.0006178	10.5230	36.0378	204.7249	77.6322	
L1.106	1995-054D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	GEO (1.00)	2017-12-31	05:56:33.644	1102.38	121.31	11.72	133.03	
23683	TEME	42165.028	0.0018194	14.0833	25.6292	6.6447	11.3311	
L1.107	1977-108A	Meteosat 1						PL
TLEs	GEO (1.00)	2017-12-31	18:03:46.819	1115.94	122.82	10.85	133.67	
10489	TEME	42150.988	0.0015571	12.0779	318.3674	354.6716	125.7278	
L1.108	1993-013A	Raduga 29						PL
TLEs	GEO (1.00)	2017-12-31	22:31:58.571	1120.88	123.33	10.56	133.89	
22557	TEME	42193.801	0.0001922	14.9621	11.4822	313.4767	93.8893	
L1.109	1988-095A	Raduga 22						PL
TLEs	GEO (1.00)	2017-12-31	02:35:18.824	1133.45	124.65	9.79	134.44	
19596	TEME	42148.635	0.0000849	14.7623	356.2278	295.6309	24.4646	
L1.110	1984-035A	DFH-2 2 (STTW T2)						PL
TLEs	GEO (1.00)	2017-12-31	04:21:52.559	1136.37	124.94	9.62	134.56	
14899	TEME	42171.732	0.0004263	14.0987	344.4825	107.5851	12.9610	
L1.111	1995-063D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	GEO (1.00)	2017-12-30	21:52:19.014	1164.63	127.68	8.01	135.69	
23720	TEME	42172.116	0.0037876	14.8376	14.5482	111.1121	134.0118	
L1.112	2007-054A	USA 197 (DSP F23, DSP Block 5(DSP-1) F23)						PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	1261.13	135.43	3.27	138.71	
UI141	J2000	42175.443	0.0005037	4.5383	71.4149	199.0448	13.0370	
L1.113	1972-101A	OPS 9390 (CANYON 5)						PL
KIAM	EGO (-)	2018-01-01	00:00:00.000	1298.65	137.87	1.71	139.58	
UI138	J2000	42183.123	0.1380473	16.4002	298.7307	1.0939	24.8470	
L1.114	1998-029B	Centaur-T (Titan IVB Centaur-T)						RB
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	1299.68	138.00	1.62	139.63	
UI027	J2000	42167.830	0.0044578	10.3932	352.5458	109.7205	3.0450	
L1.115	1990-102A	Gorizont 22						PL
TLEs	GEO (1.00)	2017-12-31	01:12:01.809	1305.19	138.35	1.40	139.75	
20953	TEME	42135.975	0.0008091	14.9794	3.4512	282.4851	47.0486	
L1.116	1974-094A	Skynet 2B						PL
TLEs	GEO (1.00)	2017-12-31	02:34:32.062	1367.74	141.79	359.10	140.89	
7547	TEME	42159.554	0.0003388	10.6662	315.5036	340.0976	2.1419	
L1.117	1978-035A	Intelsat IVA F-6						PL
TLEs	GEO (1.00)	2017-12-31	19:28:42.893	1387.87	142.78	358.41	141.19	
10778	TEME	42145.292	0.0009267	13.9843	339.6306	260.9057	123.3644	

L1.nn	COSPAR	Name						Type
Source	Orbit ($f_{\text{IADC}}^{\text{GEO}}$)	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	
S-ID	Frame	a	e	i	Ω	ω	λ	
L1.118	1970-032A	Intelsat III F-7						PL
TLEs	GEO (1.00)	2017-12-31	08:22:38.519	1440.83	145.01	356.83	141.83	
4376	TEME	42130.754	0.0006494	5.2017	295.3087	337.3554	69.9334	
L1.119	1993-062D	Blok-DM-2 (Proton-K/DM-2)						RB
TLEs	GEO (1.00)	2017-12-31	02:59:00.212	1516.55	147.56	354.92	142.48	
22839	TEME	42133.923	0.0010459	14.8355	13.1556	341.8241	51.5042	
L1.120	1967-026A	Intelsat II F-3						PL
TLEs	GEO (1.00)	2017-12-31	18:23:42.645	1612.66	149.89	353.06	142.96	
2717	TEME	42145.899	0.0024181	3.3754	303.7551	298.3850	124.7647	
L1.121	1992-088A	Cosmos-2224						PL
TLEs	GEO (1.00)	2017-12-31	23:09:39.686	1660.42	150.76	352.34	143.10	
22269	TEME	42192.898	0.0007737	14.4213	13.4154	236.6354	105.0741	
L1.122^m	1985-035B	Telecom 1B						PL
TLEs	GEO (1.00)	2017-12-31	06:15:06.647	1677.99	151.04	352.10	143.14	
15678	TEME	42181.509	0.0006295	14.4312	347.6459	295.3027	316.0616	

4.6 Objects in a Libration Orbit around the Western Stable Point

The following list contains 48 objects in libration orbit around the Western stable point at longitude 105W, sorted according to the ascending order of the libration period (which is equivalent to the ascending order of the libration magnitude).

For explanation of symbols, see the definitions at the beginning of section 4.

L2.nn	COSPAR	Name						Type
Source	Orbit ($f_{\text{IADC}}^{\text{GEO}}$)	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	
S-ID	Frame	a	e	i	Ω	ω	λ	
L2.1^m	1985-035A	GStar 1						PL
TLEs	GEO (1.00)	2017-12-30	12:40:47.699	800.00	0.30	254.50	254.80	
15677	TEME	42164.533	0.0005932	14.9160	15.2587	325.0080	254.8444	
L2.2^m	1988-081A	GStar 3						PL
TLEs	GEO (0.84)	2017-12-31	11:29:42.590	850.00	0.30	254.50	254.80	
19483	TEME	42164.462	0.0000905	15.5177	347.6623	117.6822	254.8344	
L2.3^m	1993-058B	ACTS						PL
TLEs	GEO (1.00)	2017-12-31	12:30:24.202	890.00	1.20	254.10	255.30	
22796	TEME	42164.662	0.0027407	14.2069	21.5679	356.6424	255.1162	
L2.4^m	1971-009A	NATO IIB						PL
TLEs	GEO (1.00)	2017-12-31	08:12:06.671	900.00	0.90	254.20	255.10	
4902	TEME	42164.590	0.0001736	8.5731	304.5084	18.3363	254.4106	
L2.5	1993-073A	Solidaridad 1						PL
TLEs	GEO (1.00)	2017-12-31	12:19:59.088	908.17	8.00	250.83	258.83	
22911	TEME	42165.268	0.0007546	13.1006	27.3005	219.2558	250.9898	
L2.6	1970-021A	NATO I						PL
TLEs	GEO (1.00)	2017-12-31	15:23:54.177	908.71	10.18	249.75	259.93	
4353	TEME	42166.583	0.0003559	7.6627	307.7328	301.7593	251.2837	
L2.7	1971-095A	OPS 9431 (DSCS II F-1, DSCS 2-1, DSCS II A-1)						PL
TLEs	GEO (1.00)	2017-12-31	14:11:33.269	909.65	13.19	248.26	261.45	
5587	TEME	42161.421	0.0006031	9.0100	305.8503	297.3941	252.2960	
L2.8^m	1969-101A	Skynet 1A						PL
TLEs	GEO (1.00)	2017-12-30	09:02:14.781	910.00	4.10	252.60	256.70	
4250	TEME	42163.591	0.0022536	7.0097	303.9527	247.2038	253.9001	
L2.9	1993-077A	Telstar 401						PL
TLEs	GEO (1.00)	2017-12-31	01:49:17.381	910.79	16.04	246.85	262.89	
22927	TEME	42168.118	0.0003039	14.7415	17.2887	36.2936	250.2990	
L2.10^m	1976-023A	LES 8						PL
TLEs	GEO (0.75)	2017-12-23	05:55:57.716	912.00	5.70	252.00	257.70	
8746	TEME	42163.721	0.0014649	16.2218	79.5725	35.4468	256.5461	
L2.11^m	1976-023B	LES 9						PL
TLEs	GEO (0.76)	2017-12-31	01:28:07.779	920.00	5.00	252.50	257.50	
8747	TEME	42163.348	0.0020872	16.1989	79.4400	97.2318	253.8966	
L2.12	1995-049A	Telstar 4 (Telstar 402R)						PL
TLEs	GEO (1.00)	2017-12-31	13:10:11.239	921.41	32.03	238.99	271.02	
23670	TEME	42157.867	0.0007978	11.0110	35.3029	255.2525	244.9222	

L2.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	
S-ID	Frame	a	e	i	Ω	ω	λ	
L2.13	1976-004F	Hermes (CTS) operational debris (solar array cover)						PM
TLEs	EGO (0.17)	2017-12-28	20:29:03.130	936.21	45.51	232.43	277.94	
39689	TEME	42152.821	0.0176168	10.6059	310.7057	331.5096	266.0108	
L2.14	1985-076C	ASC 1						PL
TLEs	GEO (0.91)	2017-12-31	14:51:39.797	936.67	45.81	232.28	278.10	
15994	TEME	42162.300	0.0008959	15.1649	9.9755	304.7907	232.1754	
L2.15	1975-100A	GOES 1						PL
TLEs	GEO (1.00)	2017-12-31	09:16:53.511	940.13	48.37	231.05	279.42	
8366	TEME	42176.601	0.0006767	11.7202	316.1542	303.2678	262.2485	
L2.16	1976-004E	Hermes (CTS) operational debris (solar array cover)						PM
TLEs	GEO (1.00)	2017-12-31	15:05:51.389	941.61	49.29	230.60	279.89	
39688	TEME	42168.298	0.0011758	10.5685	310.3560	107.3688	231.8308	
L2.17^m	1967-111A	ATS 3						PL
TLEs	GEO (1.00)	2017-12-31	10:18:48.331	950.00	0.30	254.60	254.90	
3029	TEME	42164.753	0.0013014	4.3480	296.5653	119.5397	254.9332	
L2.18^m	1982-105A	Aurora I						PL
TLEs	GEO (1.00)	2017-12-31	12:27:55.986	950.00	0.80	254.30	255.10	
13631	TEME	42164.635	0.0008682	14.9840	358.8014	302.9642	254.3938	
L2.19	1983-041A	GOES 6						PL
TLEs	GEO (1.00)	2017-12-31	12:22:33.983	957.82	59.40	225.74	285.14	
14050	TEME	42178.659	0.0003596	14.4567	347.8525	273.3018	265.9024	
L2.20	1995-069A	Galaxy IIIR						PL
TLEs	GEO (1.00)	2017-12-31	06:21:41.698	961.78	61.49	224.73	286.23	
23741	TEME	42160.953	0.0005396	10.2798	38.1307	243.8845	225.4771	
L2.21	—	—						—
KIAM	EGO (0.77)	2018-01-01	00:00:00.000	976.49	69.17	221.07	290.24	
UI139	J2000	42147.926	0.0048053	15.1775	3.9192	213.2434	268.4160	
L2.22	1981-049A	GOES 5						PL
TLEs	GEO (1.00)	2017-12-29	10:11:00.180	991.27	75.12	218.24	293.36	
12472	TEME	42182.338	0.0006380	14.2014	342.9813	277.5414	267.1031	
L2.23	1977-007C	Transtage 23 (Titan IIIC)						RB
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	991.96	75.61	218.01	293.62	
UI162	J2000	42153.993	0.0020149	10.6471	311.3185	317.0305	224.0060	
L2.24	1976-004A	Hermes (CTS)						PL
TLEs	GEO (1.00)	2017-12-31	10:18:48.460	1001.97	79.26	216.28	295.54	
8585	TEME	42184.568	0.0011958	11.1691	313.2050	201.5566	254.3826	
L2.25	1996-055A	EchoStar 2						PL
TLEs	GEO (1.00)	2017-12-31	14:13:42.629	1028.05	88.23	212.06	300.29	
24313	TEME	42149.794	0.0003978	7.1979	51.1513	349.1349	286.7971	
L2.26	1968-081D	LES 6						PL
TLEs	GEO (1.00)	2017-12-31	11:12:55.332	1036.81	90.90	210.81	301.71	
3431	TEME	42147.279	0.0013405	6.1472	311.2687	333.0186	227.9140	
L2.27	1987-100A	Raduga 21						PL
TLEs	GEO (0.95)	2017-12-31	08:37:42.567	1093.44	105.58	203.99	309.58	
18631	TEME	42164.764	0.0003258	15.0470	352.5400	282.5847	309.8310	

L2.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	
S-ID	Frame	a	e	i	Ω	ω	λ	
L2.28	1965-028A	Intelsat I F-1 (Early Bird)						PL
TLEs	GEO (1.00)	2017-12-31	12:17:42.561	1120.04	111.22	201.42	312.63	
1317	TEME	42156.695	0.0003410	0.5322	356.7347	213.4155	204.5491	
L2.29	1981-107A	OPS 4029 (VORTEX 3)						PL
KIAM	EGO (0.03)	2018-01-01	00:00:00.000	1251.19	131.91	192.24	324.15	
UI129	J2000	42172.327	0.0897379	7.4663	353.3922	332.5055	319.4770	
L2.30	1997-086A	HGS-1						PL
TLEs	EGO (0.93)	2017-12-31	19:44:39.892	1277.34	135.09	190.89	325.98	
25126	TEME	42150.951	0.0045304	8.1401	56.6186	322.2329	200.4185	
L2.31	1984-078A	Gorizont 10						PL
TLEs	GEO (1.00)	2017-12-31	19:53:34.221	1299.04	137.50	189.89	327.39	
15144	TEME	42175.233	0.0005991	13.9592	340.7770	289.7984	319.2397	
L2.32	1967-094A	Intelsat II F-4						PL
TLEs	GEO (1.00)	2017-12-30	15:07:17.926	1316.53	139.29	189.15	328.44	
2969	TEME	42173.728	0.0013609	3.4221	296.3458	251.3022	193.7149	
L2.33	1990-016A	Raduga 25						PL
TLEs	GEO (1.00)	2017-12-31	06:20:08.132	1318.71	139.52	189.06	328.58	
20499	TEME	42157.714	0.0004220	14.9246	0.8672	269.9237	325.2970	
L2.34	1982-103A	Gorizont 6						PL
TLEs	GEO (1.00)	2017-12-31	12:45:28.175	1327.91	140.43	188.69	329.12	
13624	TEME	42194.611	0.0003680	13.3295	331.7385	280.8505	261.6786	
L2.35	1985-070A	Raduga 16						PL
TLEs	GEO (1.00)	2017-12-31	11:29:42.590	1339.31	141.51	188.26	329.77	
15946	TEME	42194.727	0.0004684	14.1501	343.7846	279.6652	248.8339	
L2.36	1980-081A	Raduga 7						PL
TLEs	GEO (1.00)	2017-12-31	08:51:39.770	1432.40	149.02	185.39	334.41	
12003	TEME	42136.816	0.0012579	12.6443	323.2541	252.4471	282.8559	
L2.37	1994-038A	Cosmos-2282						PL
TLEs	GEO (1.00)	2017-12-31	19:01:01.943	1481.47	152.13	184.30	336.43	
23168	TEME	42173.856	0.0006070	13.9883	17.8019	2.6194	189.1043	
L2.38	1992-059A	Cosmos-2209						PL
TLEs	GEO (0.94)	2017-12-31	21:32:58.979	1486.85	152.46	184.19	336.65	
22112	TEME	42179.675	0.0012923	15.0582	9.1263	249.7952	317.3752	
L2.39	1985-016A	Cosmos-1629						PL
TLEs	GEO (1.00)	2017-12-31	08:09:59.590	1492.25	152.76	184.09	336.85	
15574	TEME	42159.908	0.0004490	14.0866	341.9105	222.1827	184.6798	
L2.40	1980-004A	OPS 6393 (FLTSATCOM F3)						PL
TLEs	GEO (1.00)	2017-12-31	07:33:57.826	1526.97	154.61	183.49	338.10	
11669	TEME	42195.360	0.0022767	12.0210	331.3809	172.7801	268.0144	
L2.41	1987-091A	Cosmos-1894						PL
TLEs	GEO (1.00)	2017-12-31	08:37:42.567	1565.76	156.43	182.94	339.37	
18443	TEME	42183.518	0.0006936	14.5329	351.7210	288.0476	310.3905	
L2.42	1989-101A	Cosmos-2054						PL
TLEs	GEO (1.00)	2017-12-31	15:12:39.761	1603.03	157.95	182.51	340.46	
20391	TEME	42142.994	0.0004713	14.9052	0.4007	287.1278	207.7813	

L2.nn	COSPAR	Name						Type
Source	Orbit ($f_{\text{IADC}}^{\text{GEO}}$)	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	
S-ID	Frame	a	e	i	Ω	ω	λ	
L2.43^m	1994-035A	USA 104 (UFO F3)						PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	1615.74	169.43	179.05	348.48	
UI068	J2000	42189.187	0.0008395	11.0529	25.3693	239.7626	211.7980	
L2.44^m	1970-069A	OPS 7329 (CANYON 3)						PL
KIAM	EGO (0.04)	2018-01-01	00:00:00.000	1621.41	158.52	182.36	340.87	
UI157	J2000	42159.880	0.0849062	12.5953	245.8047	339.6698	187.5080	
L2.45	1977-114A	OPS 4258 (AQUACADE 3)						PL
KIAM	GEO (0.69)	2018-01-01	00:00:00.000	1677.73	168.63	179.84	348.48	
UI146	J2000	42171.297	0.0025985	17.0684	320.0935	291.1062	183.5890	
L2.46	1994-082A	Luch 1						PL
TLEs	GEO (1.00)	2017-12-31	19:59:38.715	1813.90	163.39	181.31	344.70	
23426	TEME	42159.421	0.0002802	14.4821	21.1797	209.0070	339.3460	
L2.47^m	1995-045A	Cosmos-2319						PL
TLEs	GEO (1.00)	2017-12-31	18:18:53.588	2032.00	166.30	180.10	346.40	
23653	TEME	42165.232	0.0007057	14.3948	18.7978	219.2280	346.5970	
L2.48^m	1987-084A	Cosmos-1888						PL
TLEs	GEO (1.00)	2017-12-31	04:21:16.334	2252.00	168.00	179.60	347.60	
18384	TEME	42161.366	0.0004320	14.5212	352.1570	263.0357	353.5332	

4.7 Objects in a Libration Orbit around both Stable Points

The following list contains 19 objects in libration orbit around both stable points, sorted according to the ascending order of the libration period (which is equivalent to the ascending order of the libration magnitude).

It is important to note that this category is special and more sensitive to errors in the measurements. The estimated libration period may have a lower accuracy.

For explanation of symbols, see the definitions at the beginning of section 4.

L3.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}	
S-ID	Frame	a	e	i	Ω	ω	λ	
L3.1	1971-095B	OPS 9432 (DSCS II F-2, DSCS 2-2, DSCS II A-2)						PL
TLEs	GEO (1.00)	2017-12-31	14:48:52.256	2929.02	334.39	174.83	149.22	
5588	TEME	42167.979	0.0007574	8.9686	306.1617	344.9073	149.3553	
L3.2	1997-083A	Intelsat 804						PL
TLEs	GEO (1.00)	2017-12-31	13:29:39.657	2929.79	335.41	174.31	149.72	
25110	TEME	42197.441	0.0008712	9.9709	39.2476	259.6695	95.4181	
L3.3	1991-054D	IUS second stage (IUS-15 SRM-2, Orbus 6E) (Atlantis (OV-104))						RB
TLEs	GEO (0.74)	2017-12-30	21:11:08.549	2932.88	333.13	175.48	148.60	
21641	TEME	42141.554	0.0040069	16.3782	2.1067	269.5404	306.4137	
L3.4	1991-064A	Cosmos-2155						PL
TLEs	GEO (0.94)	2017-12-31	15:53:27.097	2934.95	332.95	175.57	148.52	
21702	TEME	42187.339	0.0005761	15.0755	5.7273	281.5851	206.6528	
L3.5	1980-060A	Ekran 5						PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000	2952.99	331.06	176.54	147.60	
UI098	J2000	42174.810	0.0004822	12.3036	320.3430	131.9898	185.2100	
L3.6^m	1997-041A	Cosmos-2345						PL
TLEs	EGO (0.18)	2017-12-31	14:17:59.972	2960.73	339.72	172.11	151.83	
24894	TEME	42198.316	0.0168345	13.7422	23.3135	223.0108	251.0237	
L3.7	1977-092L	Ekran 2 fragmentation debris						PF
TLEs	EGO (0.29)	2017-12-30	17:36:45.204	3058.78	345.38	169.23	154.61	
33519	TEME	42141.540	0.0108260	11.3638	314.0550	326.7712	310.5820	
L3.8	1990-094A	Gorizont 21						PL
TLEs	GEO (0.96)	2017-12-29	22:20:42.573	3074.49	326.56	178.86	145.41	
20923	TEME	42192.616	0.0006584	15.0377	3.1588	231.4596	107.3255	
L3.9	2012-012A	Cosmos-2479						PL
TLEs	GEO (1.00)	2017-12-31	19:15:10.560	3098.16	346.67	168.58	155.25	
38101	TEME	42158.243	0.0008257	2.0117	70.6933	220.4968	151.8035	
L3.10	2000-029A	Gorizont 33						PL
TLEs	GEO (1.00)	2017-12-31	16:43:47.036	3129.48	325.65	179.33	144.97	
26372	TEME	42182.392	0.0004102	12.0577	30.4120	257.6226	18.9900	
L3.11	1994-060A	Cosmos-2291						PL
TLEs	GEO (1.00)	2017-12-31	23:09:39.686	3374.03	321.48	181.48	142.96	
23267	TEME	42136.886	0.0004141	14.6406	15.7895	204.8131	107.5333	

L3.nn	COSPAR	Name					Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time	P_{lib}	$\Delta\lambda$	λ_{min}	λ_{max}
S-ID	Frame	a	e	i	Ω	ω	λ
L3.12^m	1984-009A	OPS 0441 (VORTEX 4)					PL
KIAM	EGO (0.03)	2018-01-01	00:00:00.000	3376.27	323.62	180.37	143.99
UI026	J2000	42129.047	0.1016749	7.3642	349.5679	353.5096	74.4210
L3.13	1986-027A	Cosmos-1738					PL
TLEs	GEO (1.00)	2017-12-31	18:16:01.599	3427.68	321.66	181.39	143.05
16667	TEME	42153.880	0.0011189	14.8190	345.9662	22.1742	7.1265
L3.14	1985-007A	Gorizont 11					PL
TLEs	GEO (1.00)	2017-12-31	12:02:36.390	3579.43	323.01	180.69	143.70
15484	TEME	42195.695	0.0003100	14.0263	342.5807	293.5523	240.1558
L3.15	2012-012D	Blok-DM-2 (Proton-K/DM-2)					RB
TLEs	GEO (1.00)	2017-12-31	17:51:39.706	3626.72	322.09	181.17	143.26
38104	TEME	42156.133	0.0016629	1.9829	70.7781	226.2125	333.7156
L3.16	1994-030A	Gorizont 30					PL
TLEs	GEO (1.00)	2017-12-31	18:55:03.620	3650.00	322.13	181.15	143.27
23108	TEME	42159.442	0.0006704	14.7563	14.4474	248.4127	181.3667
L3.17	1994-067D	Blok-DM-2M (Proton-K/DM-2M)					RB
TLEs	GEO (0.97)	2017-12-31	15:55:19.842	3670.12	322.87	180.76	143.63
23322	TEME	42181.322	0.0003964	15.0159	11.4345	24.6440	197.1574
L3.18	1982-044F	Blok-DM (Proton-K/DM)					RB
TLEs	GEO (1.00)	2017-12-31	14:51:39.667	3710.51	322.20	181.11	143.31
14114	TEME	42155.479	0.0011917	14.4017	330.4862	107.9871	4.1378
L3.19	1991-079A	Cosmos-2172					PL
TLEs	GEO (0.95)	2017-12-31	03:29:00.929	3808.17	322.29	181.06	143.35
21789	TEME	42184.199	0.0009012	15.0505	6.7899	288.2637	203.0548

The longitude histories of TLE-based objects in this category are plotted in Fig. 4.1 to 4.17.

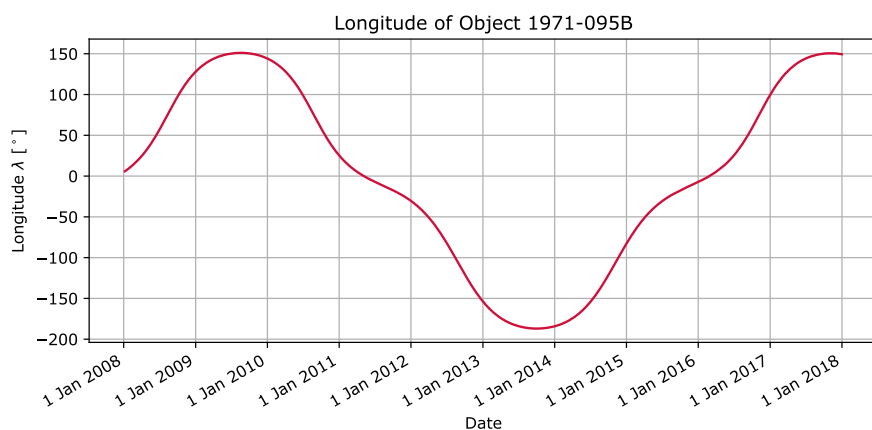


Figure 4.1: Longitude history of object 1971-095B

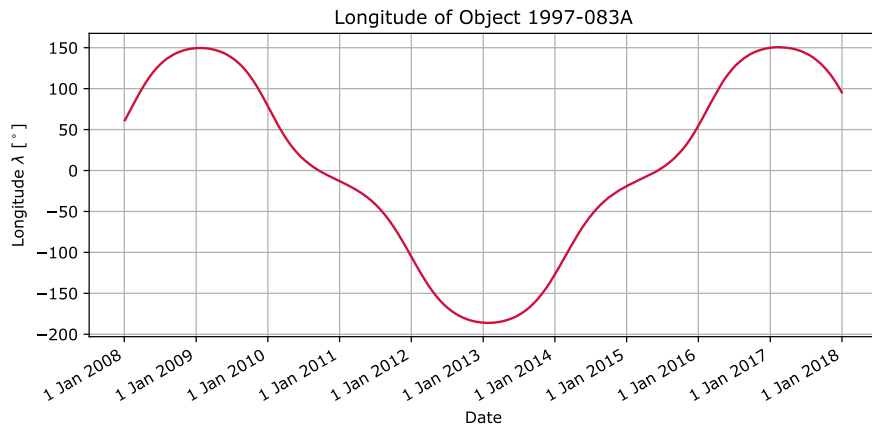


Figure 4.2: Longitude history of object 1997-083A

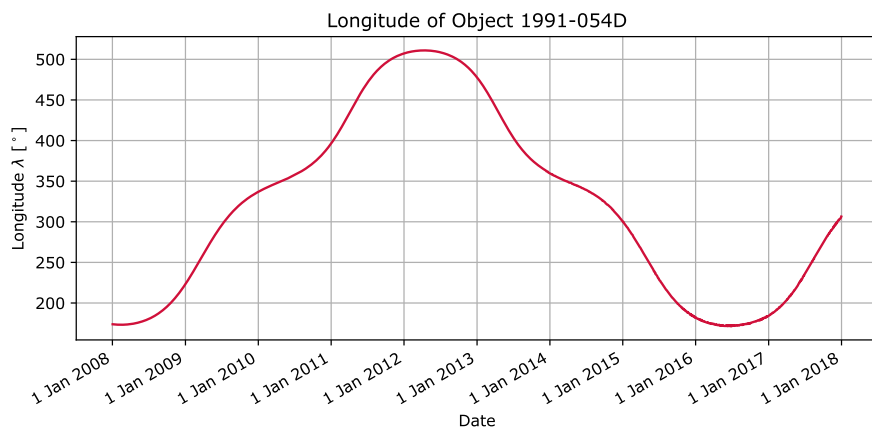


Figure 4.3: Longitude history of object 1991-054D

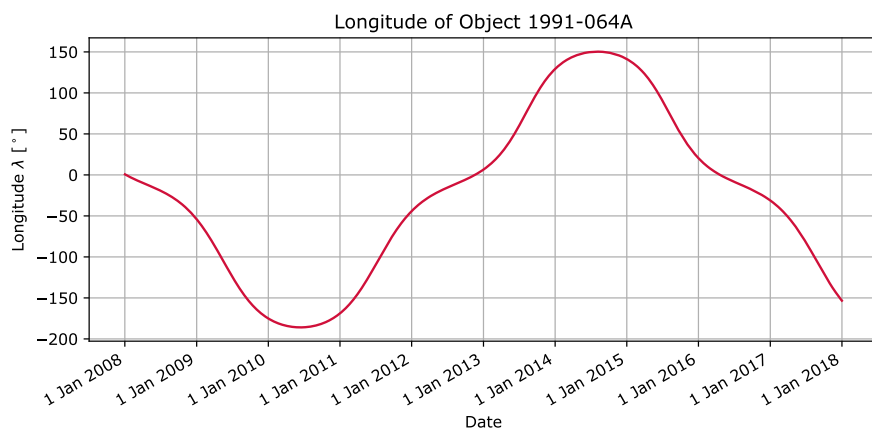


Figure 4.4: Longitude history of object 1991-064A

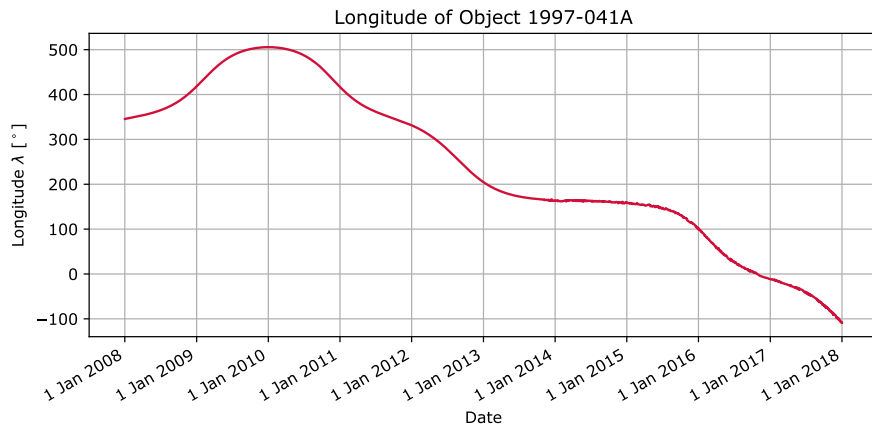


Figure 4.5: Longitude history of object 1997-041A

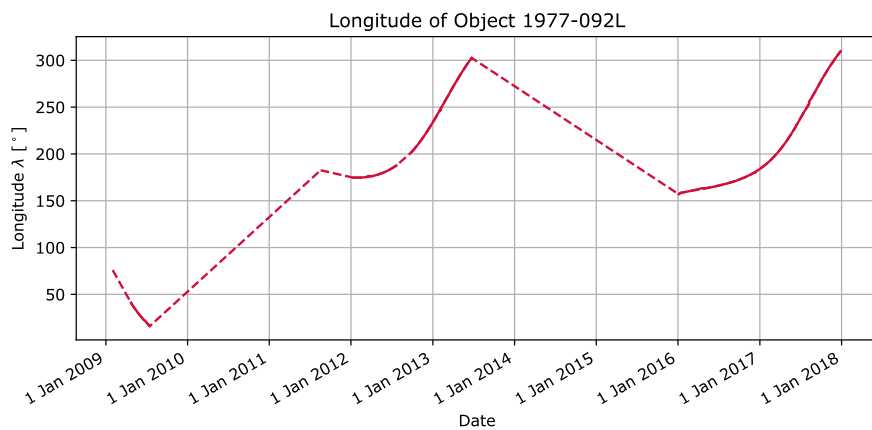


Figure 4.6: Longitude history of object 1977-092L

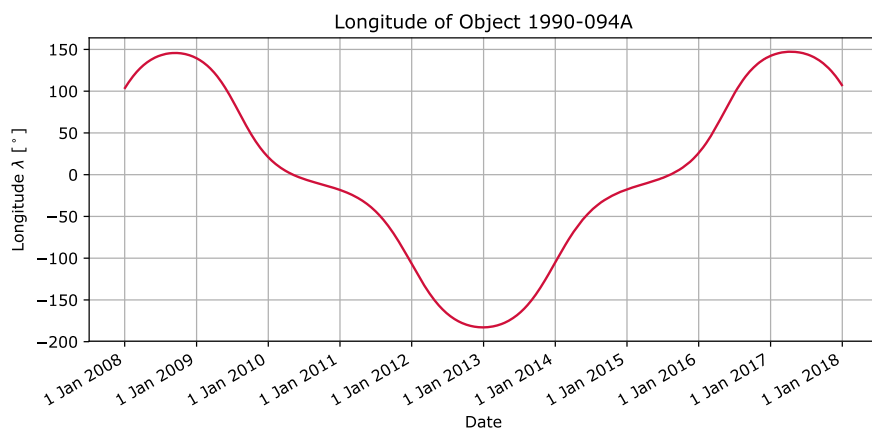


Figure 4.7: Longitude history of object 1990-094A

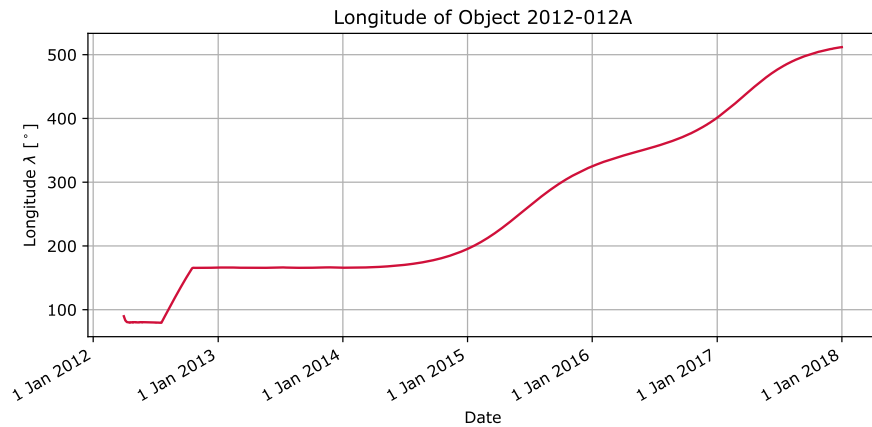


Figure 4.8: Longitude history of object 2012-012A

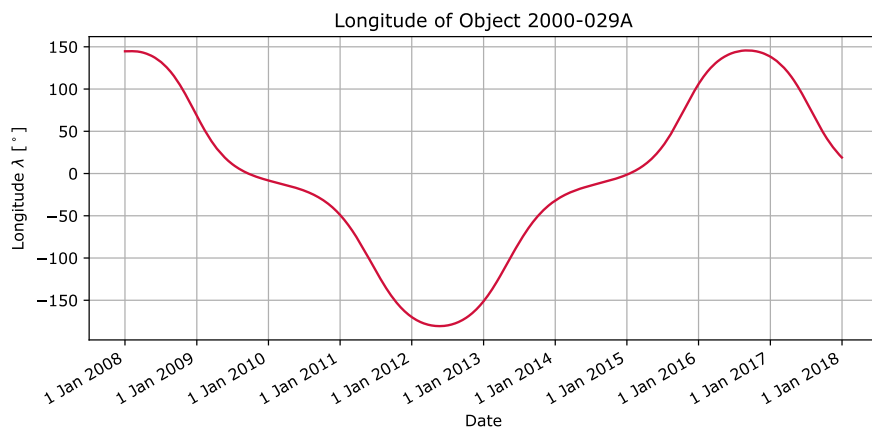


Figure 4.9: Longitude history of object 2000-029A

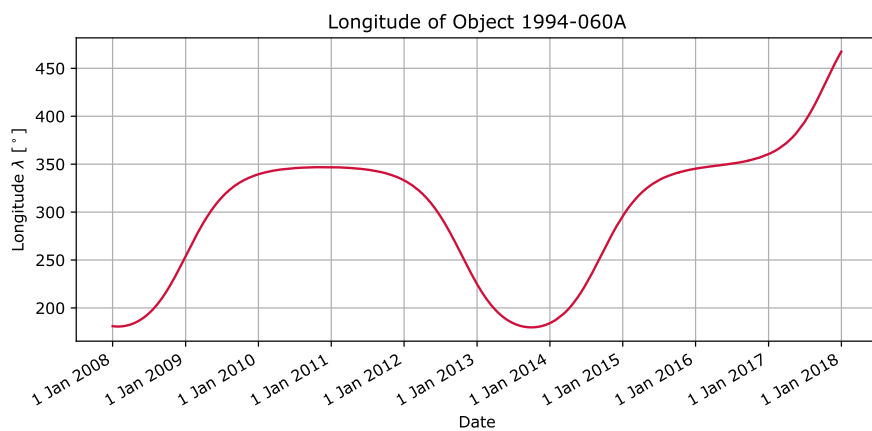


Figure 4.10: Longitude history of object 1994-060A

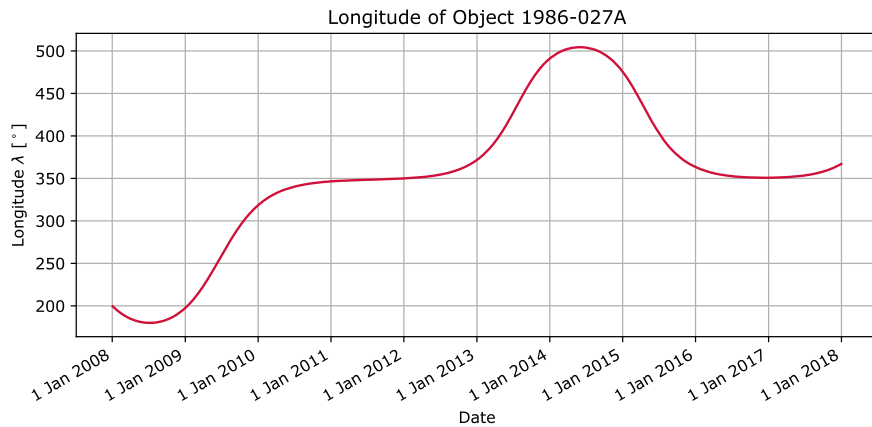


Figure 4.11: Longitude history of object 1986-027A

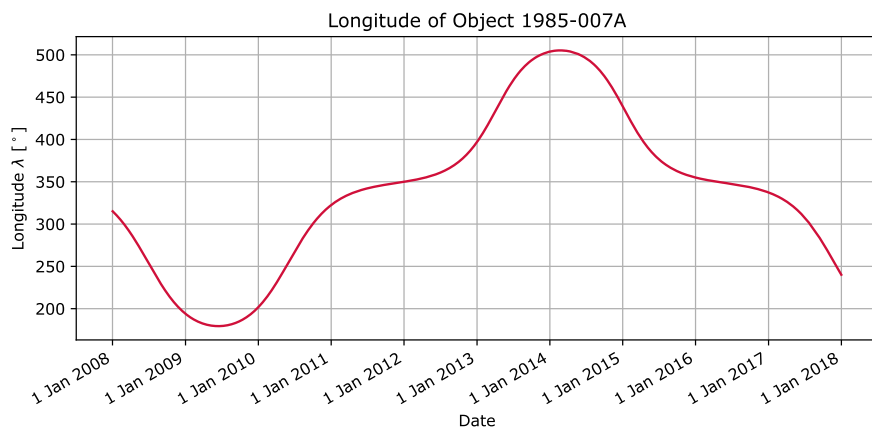


Figure 4.12: Longitude history of object 1985-007A

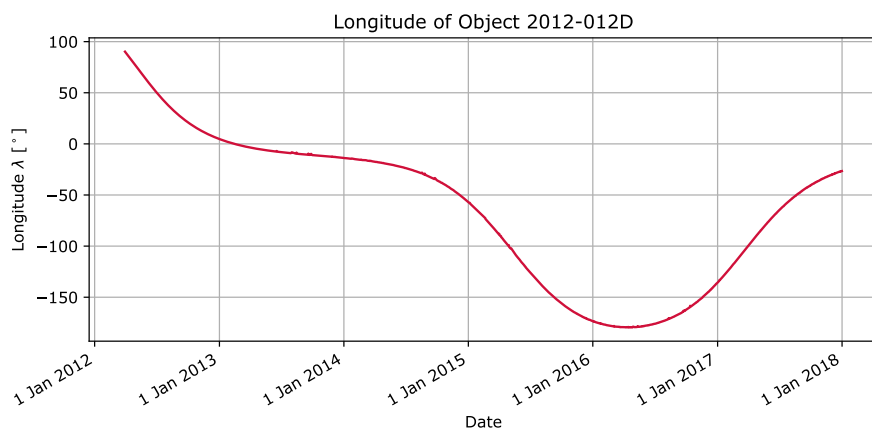


Figure 4.13: Longitude history of object 2012-012D

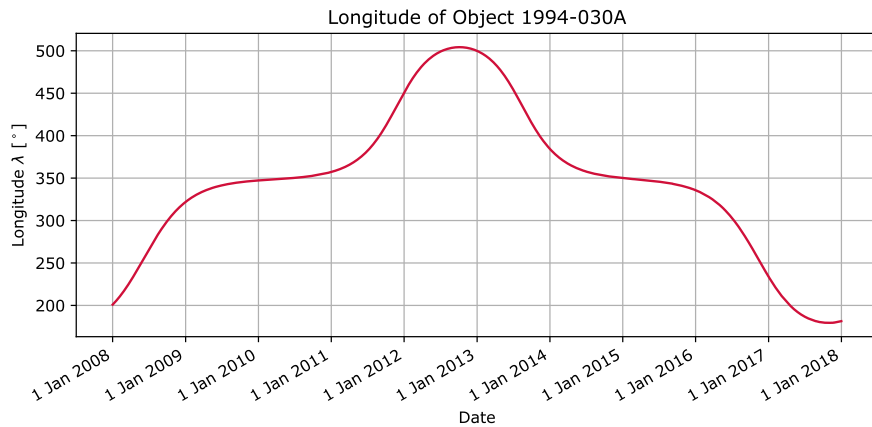


Figure 4.14: Longitude history of object 1994-030A

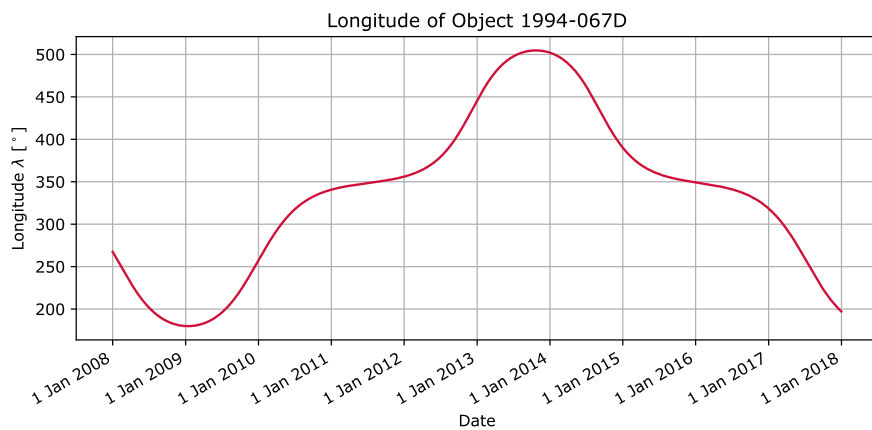


Figure 4.15: Longitude history of object 1994-067D

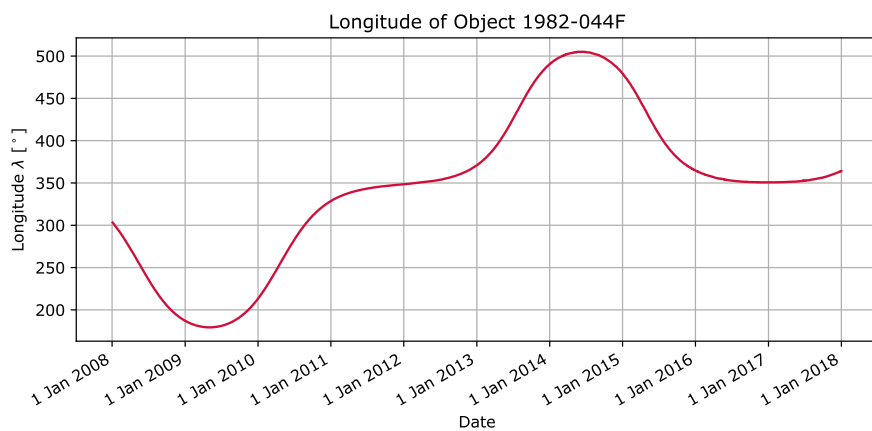


Figure 4.16: Longitude history of object 1982-044F

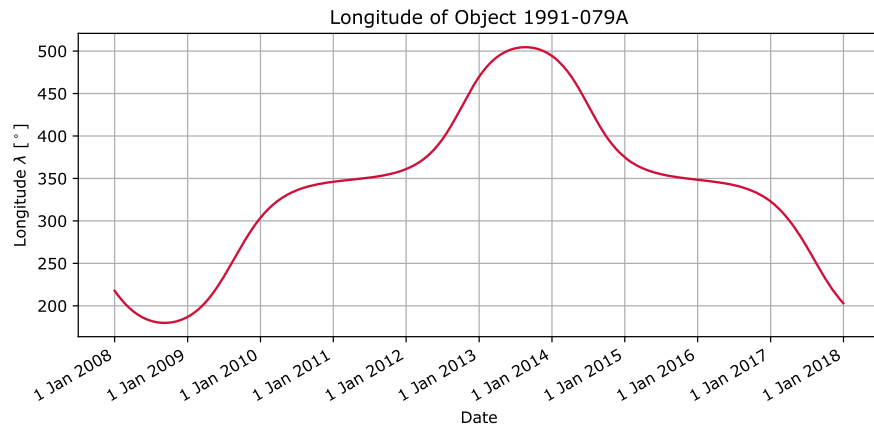


Figure 4.17: Longitude history of object 1991-079A

4.8 Objects in Highly Inclined Orbits

The following list contains 19 objects in highly inclined orbits, sorted according to the ascending order of the COSPAR designation.

For explanation of symbols, see the definitions at the beginning of section 4.

I.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time					
S-ID	Frame	a	e	i	Ω	ω	λ	
I.1	1963-031A	Syncom 2						PL
TLEs	IGO (0.29)	2017-11-11	23:12:37.835					
634	TEME	42167.041	0.0090692	35.3601	343.8765	264.6309	62.5494	
I.2	1978-012A	IUE						PL
TLEs	IGO (-)	2017-12-28	08:47:46.414					
10637	TEME	42223.774	0.1579358	42.9077	333.3979	214.8370	272.4649	
I.3	1978-012D	IUE dust cover						PM
TLEs	IGO (-)	2017-12-31	11:16:10.910					
33000	TEME	42121.471	0.2175046	42.5619	326.6214	231.5765	224.0247	
I.4	2010-005A	SDO						PL
TLEs	IGO (0.36)	2017-12-31	08:44:12.634					
36395	TEME	42165.415	0.0001467	28.9959	136.9062	118.3408	258.1629	
I.5	2010-036A	Beidou DW 5						PL
TLEs	IGO (0.16)	2017-12-31	23:04:39.925					
36828	TEME	42165.890	0.0059865	54.1583	191.5566	227.1934	119.3951	
I.6	2010-045A	Michibiki-1 (QZS-1)						PL
TLEs	IGO (0.04)	2017-12-29	18:23:04.393					
37158	TEME	42164.548	0.0751694	40.9781	156.4907	270.1905	147.8483	
I.7	2010-068A	Beidou DW 7						PL
TLEs	IGO (0.04)	2017-12-31	20:22:36.960					
37256	TEME	42162.977	0.0060440	52.8691	308.9486	206.5580	119.8929	
I.8	2011-013A	Beidou DW 8						PL
TLEs	IGO (0.20)	2017-12-31	22:40:29.601					
37384	TEME	42168.292	0.0033355	58.0784	70.8728	208.4696	119.5058	
I.9	2011-038A	Beidou DW 9						PL
TLEs	IGO (0.21)	2017-12-31	22:10:06.807					
37763	TEME	42164.298	0.0047756	54.4636	193.9442	214.9878	96.6319	
I.10	2011-073A	Beidou DW 10						PL
TLEs	IGO (0.13)	2017-12-31	20:44:13.583					
37948	TEME	42160.095	0.0051715	52.9451	308.4372	208.6826	94.6210	
I.11	2013-034A	IRNSS-R1A						PL
TLEs	IGO (0.36)	2017-12-30	21:08:21.164					
39199	TEME	42163.857	0.0020963	29.1491	111.6522	181.9978	54.9778	
I.12	2014-017A	IRNSS-R1B						PL
TLEs	IGO (0.36)	2017-12-29	09:14:50.021					
39635	TEME	42165.062	0.0018137	28.7210	291.8115	187.5313	55.1126	
I.13	2015-018A	IRNSS-R1D						PL
TLEs	IGO (0.36)	2017-12-31	05:21:05.385					
40547	TEME	42165.478	0.0018682	28.6972	291.9013	183.7898	111.8348	

I.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time					
S-ID	Frame	a	e	i	Ω	ω	λ	
I.14	2015-019A	Beidou DW 17						PL
TLEs	IGO (0.21)	2017-12-31	20:49:05.133					
40549	TEME	42169.716	0.0041892	54.2030	331.5136	193.5479	91.3195	
I.15	2015-053A	Beidou DW 20						PL
TLEs	IGO (0.12)	2017-12-31	11:19:18.824					
40938	TEME	42158.343	0.0047949	53.9335	294.4439	175.7939	93.1600	
I.16	2016-003A	IRNSS-R1E						PL
TLEs	IGO (0.36)	2017-12-31	17:16:27.842					
41241	TEME	42163.902	0.0021309	29.1098	111.2850	180.0002	111.7574	
I.17	2016-021A	Beidou DW 22						PL
TLEs	IGO (0.20)	2017-12-31	22:36:26.561					
41434	TEME	42166.090	0.0031754	55.8046	70.2300	185.7440	95.5861	
I.18	2017-028A	Michibiki-2 (QZS-2)						PL
TLEs	IGO (0.04)	2017-12-31	02:47:56.613					
42738	TEME	42163.022	0.0740642	44.4735	286.8846	270.9523	145.2340	
I.19	2017-062A	Michibiki-4 (QZS-4)						PL
TLEs	IGO (0.04)	2017-12-31	20:57:54.505					
42965	TEME	42162.573	0.0750145	40.5122	23.6400	269.9771	126.8065	

4.9 Objects of Indeterminate Status

The following list contains 1 objects for which no status could be determined by our software, sorted according to the ascending order of the COSPAR designation. The main reason for the difficulty to classify an object is that there are not enough orbital states available or that the status has recently changed (satellite newly launched or recently manoeuvred). Outliers in the dataset can also cause the failure to classify an object status correctly.

For explanation of symbols, see the definitions at the beginning of section 4.

Ind.nn	COSPAR	Name						Type
Source	Orbit (f_{IADC}^{GEO})	Date	Time					
S-ID	Frame	a	e	i	Ω	ω	λ	
Ind.1^m	1996-042A	USA 127 (UFO F7)						PL
KIAM	GEO (1.00)	2018-01-01	00:00:00.000					
UI116	J2000	42180.481	0.0003784	8.5694	31.1574	335.2889	320.3280	

5 Objects without Ephemeris

This section contains all objects for which no orbital data is available, prohibiting the determination of the status of such an object. The following symbols are used:

Source source of the orbital data (see section 2),

S-ID source internal identifier,

COSPAR designation in COSPAR notation (see section 3 for detailed explanation); incomplete in case of not being catalogued,

Name object's common name (names),

Type type of the object (PD: Payload Debris, PF: Payload Fragmentation Debris, PL: Payload, PM: Payload Mission Related Object, RB: Rocket Body, RF: Rocket Fragmentation Debris),

5.1 Catalogued Objects

The following list contains 5 objects, which have been catalogued by USSTRATCOM, but having no orbital data available from whichever source.

For explanation of symbols, see the definitions at the beginning of section 5.

Source	S-ID	COSPAR	Name	Type
KIAM	U001	1975-118D	OPS 3165 debris (DSP F5 IR Sensor telescope sunshade cover)	PM
KIAM	U002	1976-059D	OPS 2112 debris (DSP F6 IR Sensor telescope sunshade cover)	PM
KIAM	U003	1979-053D	OPS 7484 debris (DSP F8 IR Sensor telescope sunshade cover)	PM
KIAM	U004	1990-095E	USA 65 debris (DSP F15 IR Sensor telescope sunshade cover)	PM
KIAM	U005	2001-033E	USA 159 debris (DSP F21 IR Sensor telescope sunshade cover)	PM

5.2 Uncatalogued Objects

The following list contains 54 objects, which are known to have been released from satellites in GEO, but which have been neither catalogued by USSTRATCOM nor identified yet by KIAM among objects discovered and tracked by ISON network.

For explanation of symbols, see the definitions at the beginning of section 5.

Source	S-ID	COSPAR	Name	Type
KIAM	UU001	1971-039	OPS 3811 debris (DSP F2 IR Sensor telescope sunshade cover)	PM
KIAM	UU003	1973-040	OPS 6157 debris (DSP F4 IR Sensor telescope sunshade cover)	PM
KIAM	UU004	1975-011	SMS 2 debris (VISSR cover)	PM
KIAM	UU005	1975-100	GOES 1 debris (VISSR cover)	PM
KIAM	UU008	1977-048	GOES 2 debris (VISSR cover)	PM
KIAM	UU009	1977-065	Himawari 1 debris (VISSR cover)	PM

Source	S-ID	COSPAR	Name	Type
KIAM	UU011	1977-108	Meteosat 1 debris (MVIRI cover)	PM
KIAM	UU012	1977-108	Meteosat 1 debris (MVIRI cooler cover)	PM
KIAM	UU013	1978-062	GOES 3 debris (VISSR cover)	PM
KIAM	UU014	1980-074	GOES 4 debris (VAS cover)	PM
KIAM	UU015	1981-025	OPS 7350 debris (DSP F9 IR Sensor telescope sunshade cover)	PM
KIAM	UU016	1981-049	GOES 5 debris (VAS cover)	PM
KIAM	UU017	1981-057	Meteosat 2 debris (MVIRI cover)	PM
KIAM	UU018	1981-057	Meteosat 2 debris (MVIRI cooler cover)	PM
KIAM	UU019	1981-076	Himawari 2 debris (VISSR cover)	PM
KIAM	UU021	1981-114	Satcom IIR debris (Array restraint cable)	PM
KIAM	UU022	1982-004	Satcom IV debris (Array restraint cable)	PM
KIAM	UU023	1982-019	OPS 8701 debris (DSP F10 IR Sensor telescope sunshade cover)	PM
KIAM	UU024	1982-105	Aurora I debris (Array restraint cable)	PM
KIAM	UU025	1983-030	Satcom IR debris (Array restraint cable)	PM
KIAM	UU026	1983-041	GOES 6 debris (VAS cover)	PM
KIAM	UU027	1983-094	Satcom IIR debris (Array restraint cable)	PM
KIAM	UU029	1984-049	Spacenet 1 debris (Array restraint cable)	PM
KIAM	UU030	1984-080	Himawari 3 debris (VISSR cover)	PM
KIAM	UU031	1984-114	Spacenet 2 debris (Array restraint cable)	PM
KIAM	UU032	1984-129	USA 7 debris (DSP F12 IR Sensor telescope sunshade cover)	PM
KIAM	UU033	1985-035	GStar 1 debris (Array restraint cable)	PM
KIAM	UU034	1985-076	ASC 1 debris (Array restraint cable)	PM
KIAM	UU035	1986-026	GStar 2 debris (Array restraint cable)	PM
KIAM	UU036	1987-022	GOES 7 debris (VAS cover)	PM
KIAM	UU037	1987-097	USA 28 debris (DSP F13 IR Sensor telescope sunshade cover)	PM
KIAM	UU038	1988-018	Spacenet 3R debris (Array restraint cable)	PM
KIAM	UU039	1988-051	Meteosat 3 debris (MVIRI cover)	PM
KIAM	UU040	1988-051	Meteosat 3 debris (MVIRI cooler cover)	PM
KIAM	UU042	1988-051	PAS 1 debris (Array restraint cable)	PM
KIAM	UU043	1989-020	Meteosat 4 debris (MVIRI cover)	PM
KIAM	UU044	1989-020	Meteosat 4 debris (MVIRI cooler cover)	PM
KIAM	UU045	1989-070	Himawari 4 debris (VISSR cover)	PM
KIAM	UU046	1990-100	Satcom C-1 debris (Array restraint cable)	PM
KIAM	UU047	1990-100	GStar 4 debris (Array restraint cable)	PM
KIAM	UU048	1991-015	Meteosat 5 debris (MVIRI cover)	PM
KIAM	UU049	1991-015	Meteosat 5 debris (MVIRI cooler cover)	PM
KIAM	UU050	1991-028	Spacenet 4 debris (Array restraint cable)	PM
KIAM	UU051	1991-037	Aurora II debris (Array restraint cable)	PM
KIAM	UU053	1992-057	Satcom C-4 debris (Array restraint cable)	PM
KIAM	UU054	1992-060	Satcom C-3 debris (Array restraint cable)	PM
KIAM	UU055	1993-073	Meteosat 6 debris (MVIRI cover)	PM
KIAM	UU056	1993-073	Meteosat 6 debris (MVIRI cooler cover)	PM
KIAM	UU057	1994-040	BS-3N debris (Array restraint cable)	PM
KIAM	UU059	1995-011	Himawari 5 debris (VISSR cover)	PM
KIAM	UU060	1996-003	Koreasat 2 debris (Array restraint cable)	PM
KIAM	UU062	1997-049	Meteosat 7 debris (MVIRI cover)	PM
KIAM	UU063	1997-049	Meteosat 7 debris (MVIRI cooler cover)	PM
KIAM	UU067	2004-004	USA 176 debris (DSP F22 IR Sensor telescope sunshade cover)	PM

6 Figures

The following graphs illustrate the evolution of the object population near GEO_{IADC} , as well as the environment at the reference date. Only objects with recent ephemeris with respect to the reference date were used to produce the figures:

- 6.1 trend of absolute number of objects in each category,
- 6.2 trend of relative number of objects in each category,
- 6.3 number of objects under control, in drift orbit or in libration orbit according to the launch year,
- 6.4 distribution of the longitude of the satellites under control,
- 6.5 trend of adherence to the IADC re-orbiting guidelines,
- 6.6 distribution and altitude range of the objects in drift orbit,
- 6.7 zoom in the distribution and altitude range of the objects in drift orbit,
- 6.8 distribution of the perigee mean deviation from the geostationary altitude for the objects in drift orbit,
- 6.9 distribution of objects in libration orbit,
- 6.10 polar representation of the orbital poles of objects.

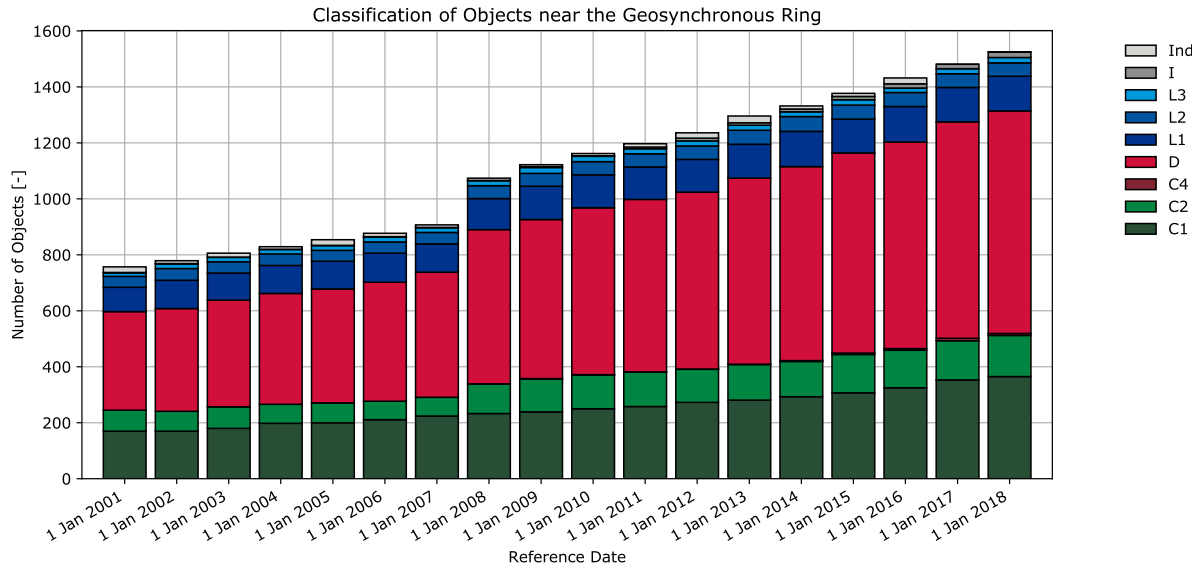


Figure 6.1: Absolute number of geosynchronous objects in their respective category bins. Please note that the apparent jump for reference date Jan 1 2008 is due to the addition of the KIAM catalogue.

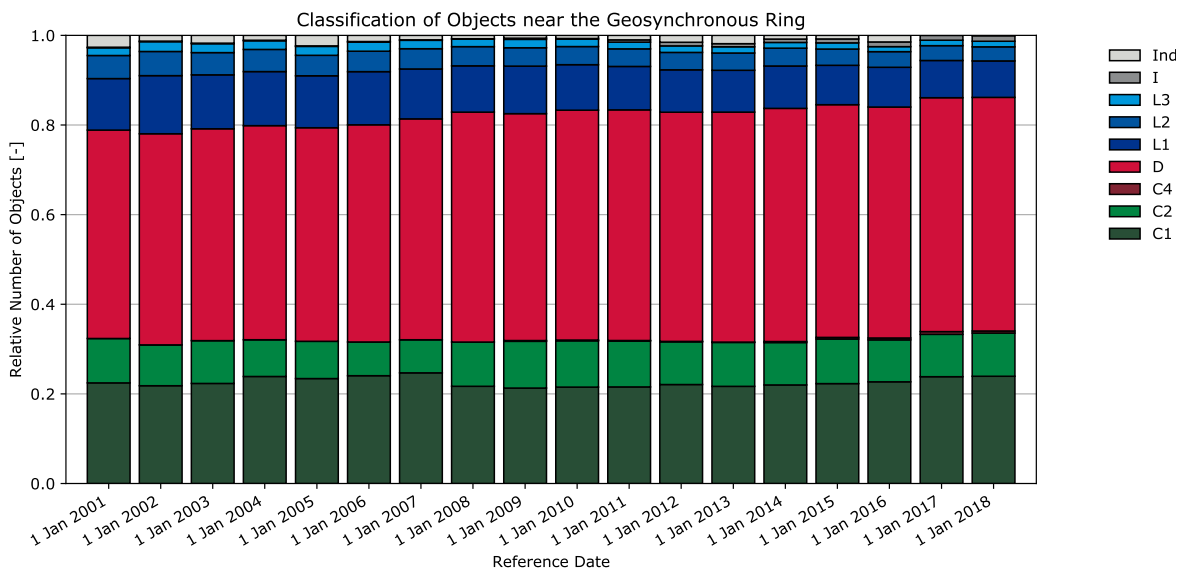


Figure 6.2: Relative number of geosynchronous objects in their respective category bins.

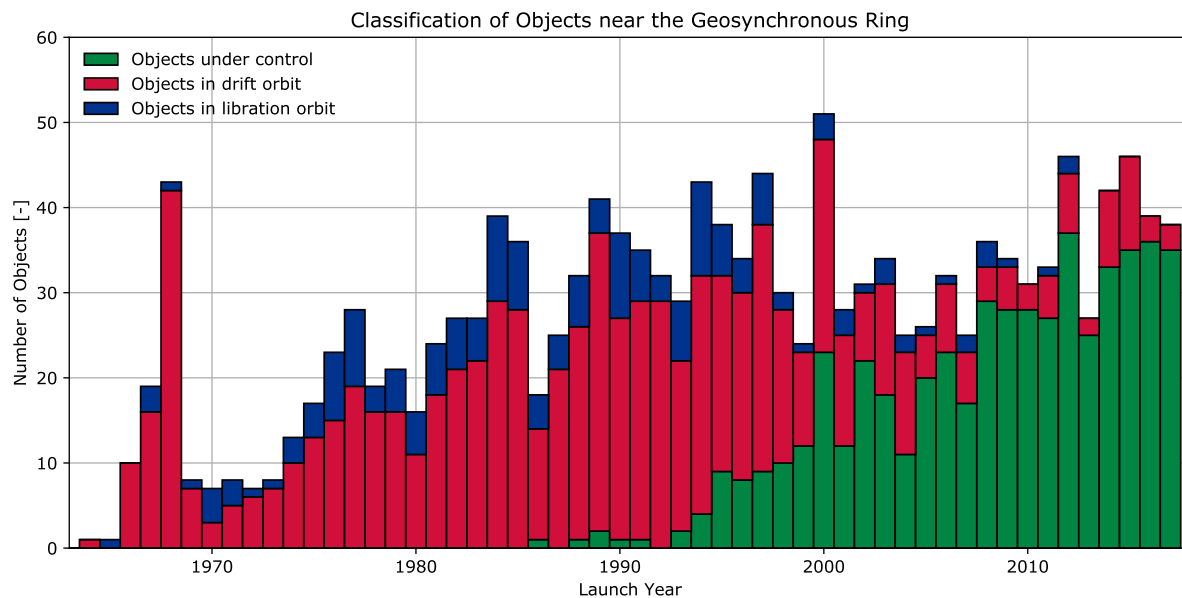


Figure 6.3: Number of objects in each category according to launch year (without categories I and Ind).

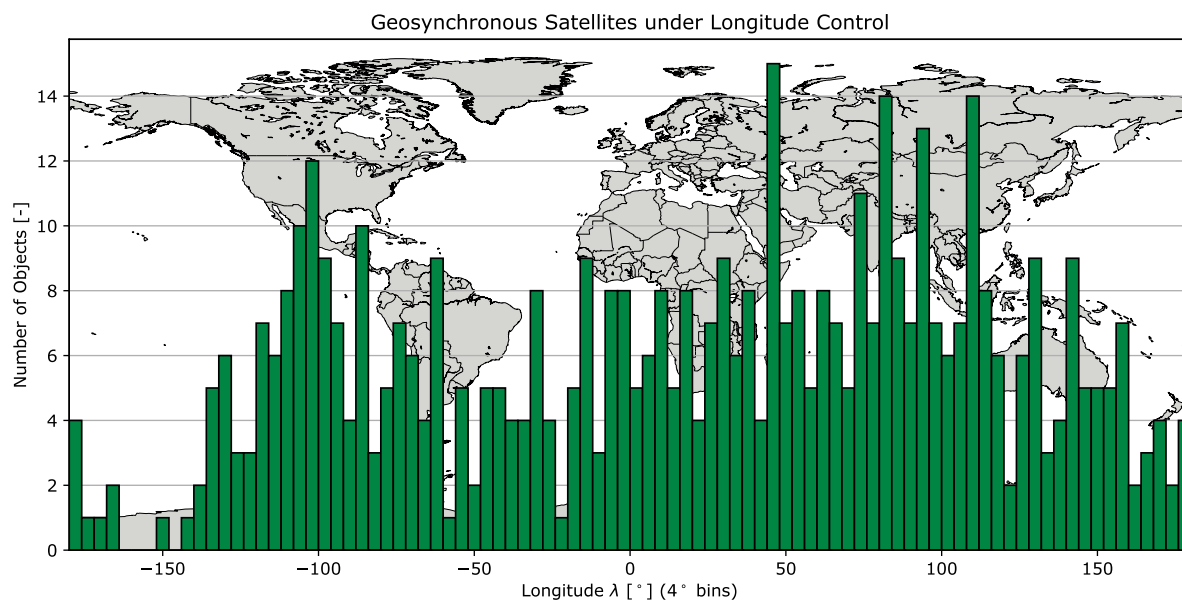
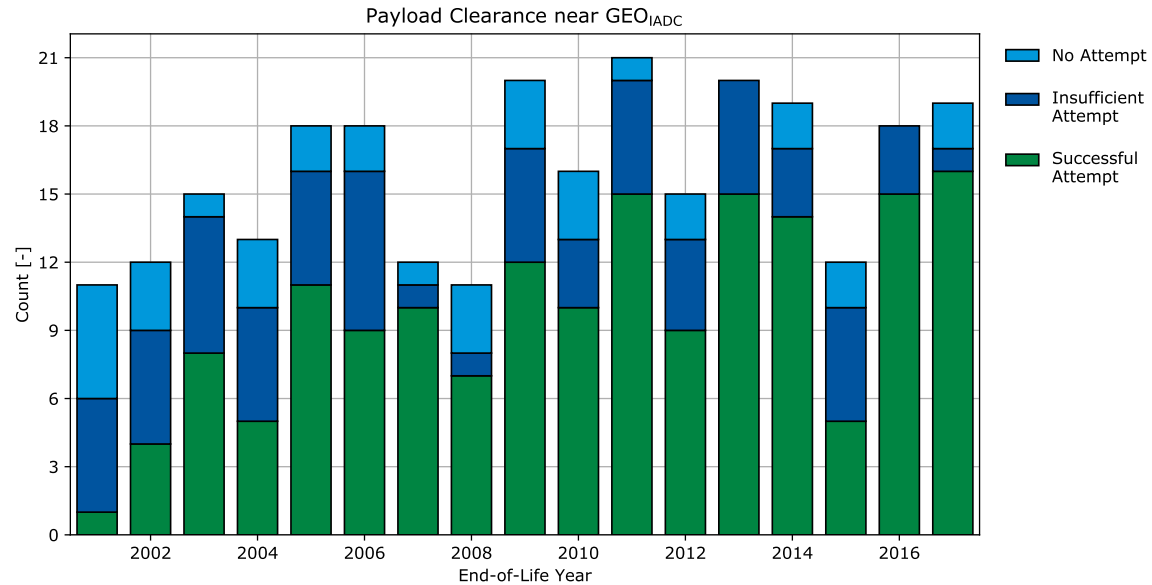
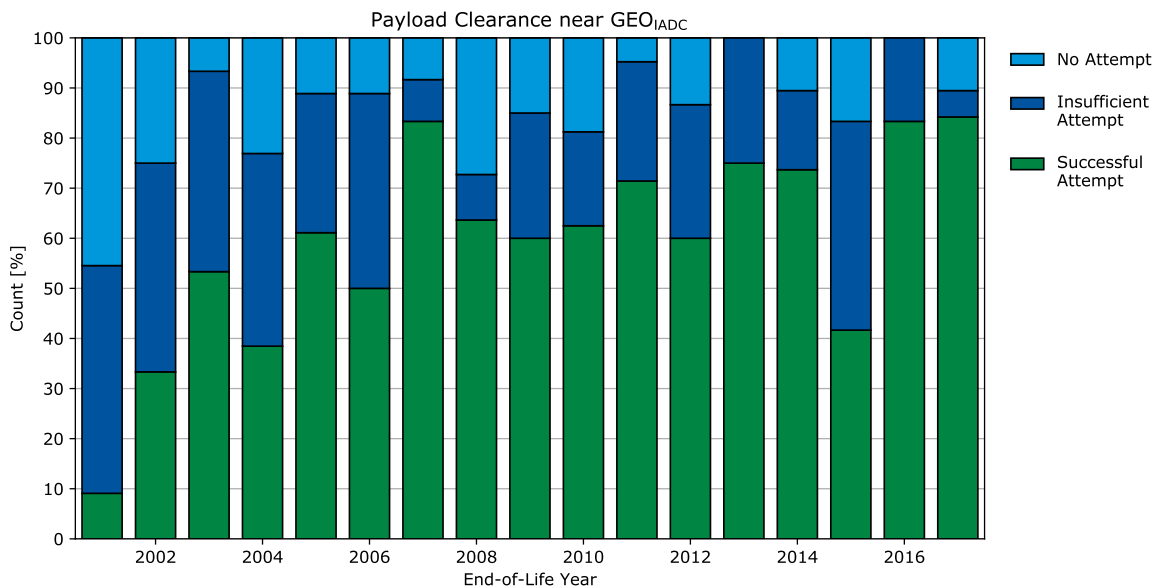


Figure 6.4: Distribution of the longitude of the satellites under control (without category C4).



(a) Absolute number of payloads



(b) Relative number of payloads

Figure 6.5: Trend plots for the overall adherence to the IADC re-orbiting guidelines for payloads with as reference epoch the 1th of January of the identified year. An attempt is identified when a re-orbit manoeuvre is detected, and identified as successful when the IADC re-orbiting guidelines condition is estimated to be met.

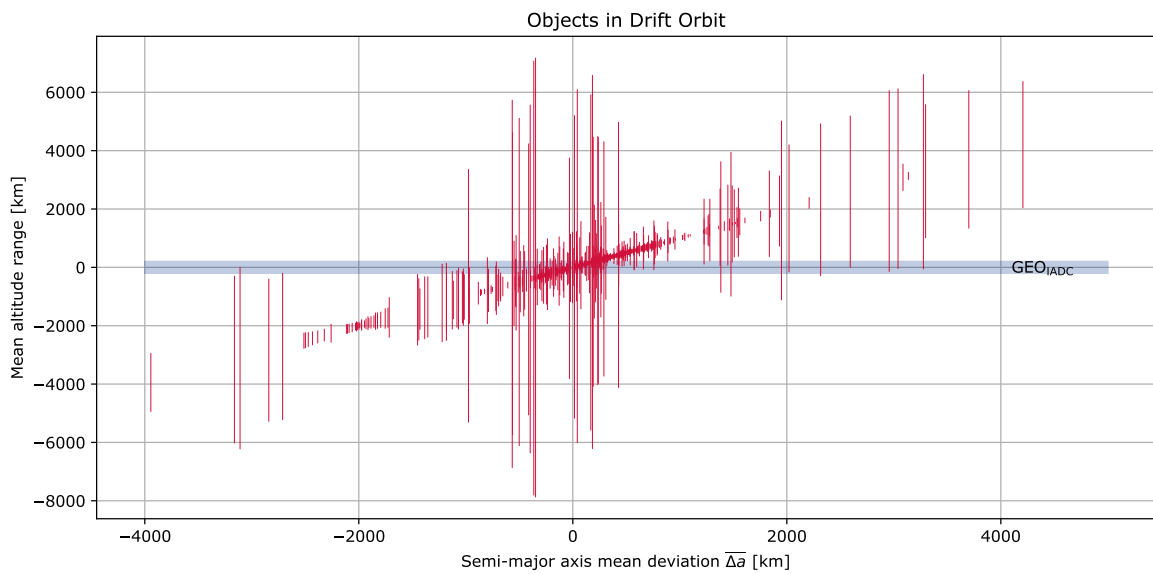


Figure 6.6: Distribution and altitude range of the objects in drift orbit.

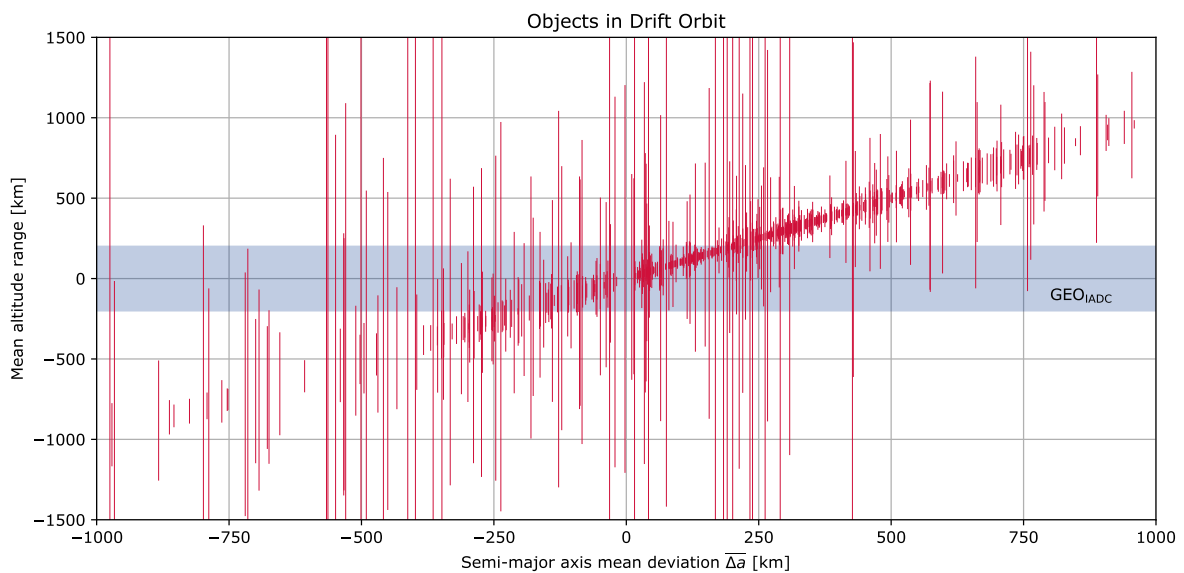


Figure 6.7: Zoom in the distribution and altitude range of the objects in drift orbit.

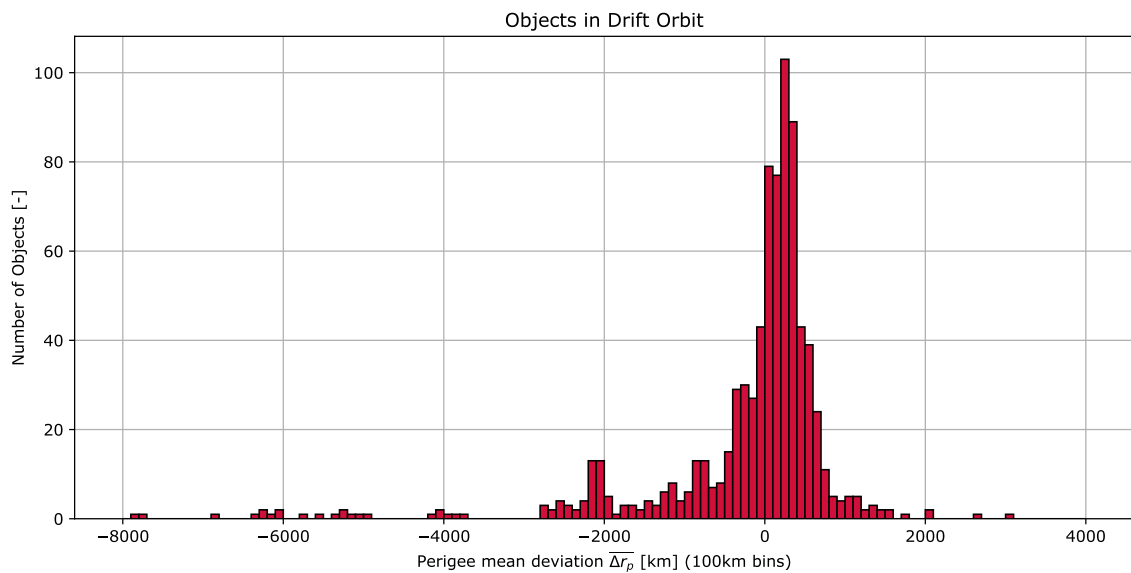


Figure 6.8: Distribution of the perigee mean deviation from the geostationary altitude.

Distribution of Librating Objects near the Geosynchronous Ring

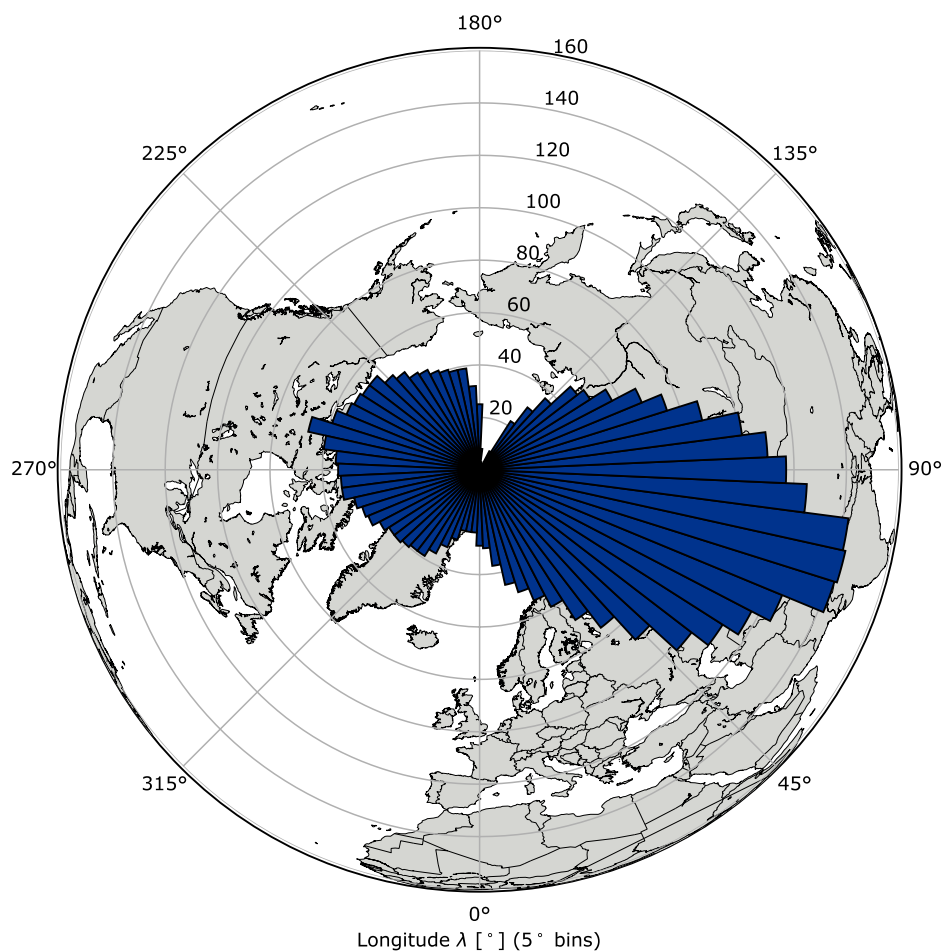


Figure 6.9: Distribution of objects in libration orbit. For every longitude interval, the number of objects librating through this interval is given, e.g. the interval encompassing the Eastern stable point (75°) contains the sum of the objects in classes L1 and L3.

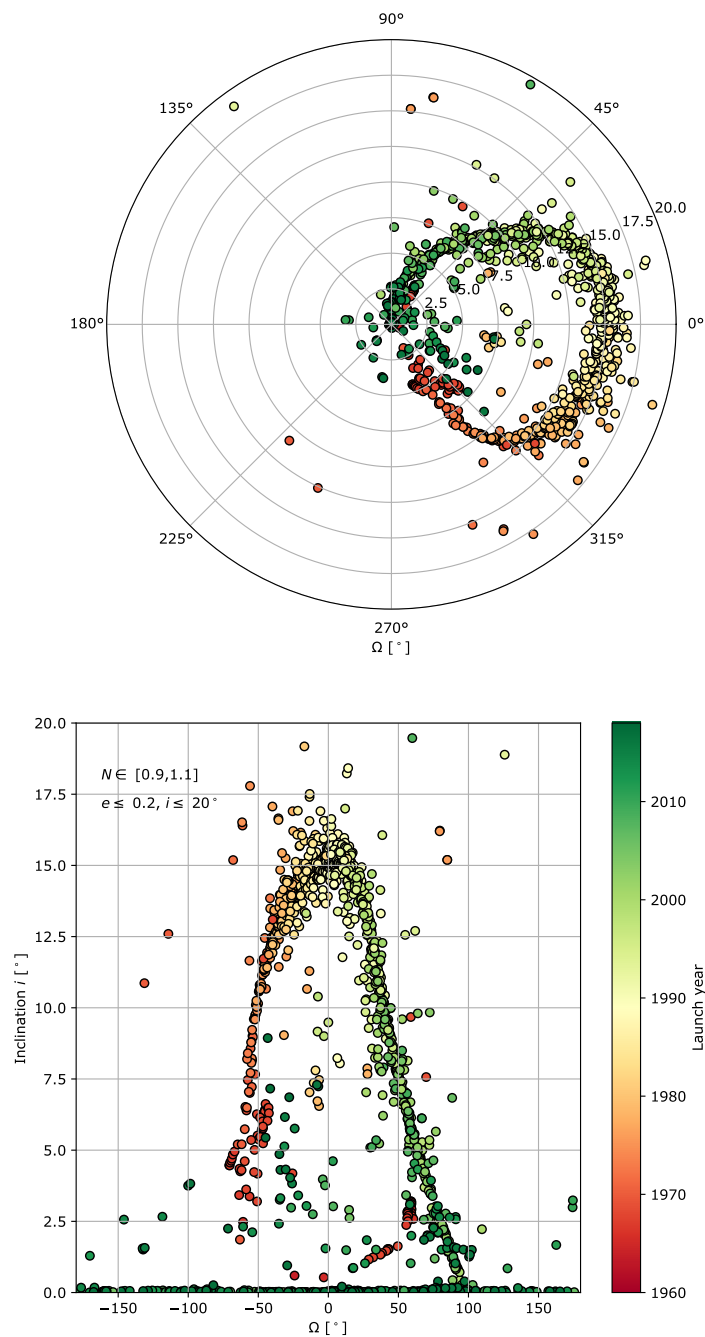


Figure 6.10: Polar representation of the orbital poles of objects listed in this report.

7 Summary

All objects catalogued in ESA's DISCOS Database (Database and Information System Characterising Objects in Space) and residing at the reference date within one of the orbital regimes GEO, IGO and EGO (see table 1 for the class definitions) are listed in this document.

1523 objects met these criteria as of 1 January 2018. A total of 0 objects have only old orbital data available (i.e. older than 180 days compared to the reference date). For 207 of the objects KIAM provided orbital elements. A total of 59 additional objects are also known to be present in this orbital region. Of these only 5 objects have been correlated by USSTRATCOM with a launch but orbital data for them are not available from whichever source. 54 objects are known to have been released from satellites in GEO, but they have been neither catalogued by USSTRATCOM nor identified yet by KIAM among objects discovered and tracked by ISON network. Thus, the total number of known objects in the geostationary region is 1582.

The 1523 objects with orbital data can be classified as follows:

- 519 are controlled,
- 795 are in a drift orbit,
- 189 are in a libration orbit,
- 19 are in a highly inclined orbit,
- 1 could not be classified.

In 2017 at least 17 spacecraft reached end of life as far as can be inferred from the orbital elements stored in DISCOS, from data provided by KIAM, or declared by spacecraft operators (for information on the registration of space objects see [4]). From issue 19 of this document, the International Organization for Standardization's requirement derived from the IADC re-orbiting guidelines is adopted as a measure to verify compliance [5]. Prior to issue 19 of this document, the compliance was established by applying the IADC re-orbiting guidelines' formulation for re-orbit perigee height and eccentricity, which is included in the current measures as well. According to these measures, sixteen spacecraft were re-orbited sufficiently above GEO_{IADC} and complied with the IADC re-orbiting guidelines:

- Intelsat VII F-1 (1993-066A, 256.47×281.59 km, see p. 102),
- USA 114 (UFO F6) (1995-057A, 413.27×445.06 km, see p. 73),
- Eutelsat 48A (Eutelsat W48, Eurobird 9, Hot Bird 2) (1996-067A, 508.95×568.41 km, see p. 88),
- ABS 3 (Agila 2/ ABS 5, Agila 2, Mabuhay 1) (1997-042A, 246.93×325.65 km, see p. 101),
- Meteosat 7 (MTP) (1997-049B, 509.65×609.72 km, see p. 88),
- EchoStar 3 (1997-059A, 361.13×432.82 km, see p. 94),
- JCSAT 5 (1997-075A, 379.82×540.96 km, see p. 91),
- Hispasat 1C (2000-007A, 274.33×331.14 km, see p. 100),
- Artemis (2001-029A, 255.96×299.46 km, see p. 102),
- INSAT 3C (2002-002A, 232.58×316.74 km, see p. 102),

- EchoStar 8 (2002-039A, 472.57×531.43 km, see p. 89),
- AMC 9 (GE 12) (2003-024A, 274.76×429.64 km, see p. 96),
- AMOS 2 (2003-059A, 237.52×260.77 km, see p. 104),
- Amazonas (2004-031A, 467.94×567.42 km, see p. 89),
- Kiku 8 (ETS VIII) (2006-059A, 325.74×392.61 km, see p. 96),
- USA 255 (ANGELS) (2014-043C, 375.00×507.00 km, see p. 91).

One spacecraft was re-orbited, however just too low with respect to the IADC re-orbiting guidelines:

- Kodama (DRTS) (2002-042B, 187.53×376.94 km, see p. 102).

Two spacecraft seem to be abandoned:

- Elektro-L No. 1 (2011-001A, see p. 116),
- Angosat 1 (2017-086A, see p. 103).

In 2017 a total of 38 new payloads have been launched into GEO_{IADC}.

Whereas the scope of this document is focussing on spacecraft activities in GEO, it is important to mention that Two rocket bodies have been left in a drift orbit close to or crossing the GEO_{IADC}:

- Briz-M (Proton-M/Briz-M) (2017-046C, see p. 79),
- Fregat-SB (Zenit-3F) (2017-086B, see p. 88).

For more information on the penetration of GEO_{IADC} by spacecraft and rocket bodies on orbits which cross the protected regions, the reader is advised to consult [6].

This analysis has shown that in 2017, twenty years after the IADC guidelines were established and sixteen years after their adoption, there is in general a pronounced willingness to comply with the guidelines. A special mention for the year 2017 goes to the operators of AMC 9 (GE 12) (2003-024A, see p. 96), which after experiencing an on-orbit anomaly with a break-up event which led to loss of contact with the satellite managed to regain just enough control to re-orbit the satellite over the course of two months.

8 Acknowledgements

The authors, Francesca Letizia, Jan Siminski and Stijn Lemmens, take the opportunity to thank Vladimir Agapov (KIAM) and J.-C. Liou (NASA) for their suggestions and valuable contributions. They also thank Tim Flohrer and Benjamin Bastida Virgili for providing technical support and further input.

References

- [1] Inter-Agency Space Debris Coordination Committee. Support to the IADC space debris mitigation guidelines. Working Group 4 - Action Item 26.2, 2014. Rev 5.5.
- [2] T. Flohrer, S. Lemmens, B. Bastida Virgili, H. Krag, H. Klinkrad, E. Parrilla, N. Sanchez, J. Oliveira, and F. Pina. DISCOS - current status and future developments. 6th European Conference on Space Debris, Proceedings of the conference, 2013.

- [3] C. Hernandez. Classification of geostationary objects. ESOC - MAS Working Paper No. 420, 2002.
- [4] United Nations Office for Outer Space Affairs. United Nations register of objects launched into outer space. <http://www.unoosa.org/oosa/en/spaceobjectregister/index.html>.
- [5] International Standards Organisation. Space Systems - Space Debris Mitigation, ISO TC 20/SC 14 N 24113, 2011.
- [6] ESA Space Debris Office. Space Environment Report. Issue 2, GEN-DB-LOG-00239-OPS-GR, ESA/ESOC, Darmstadt, Germany, 2018. <https://discosweb.esoc.esa.int/web/guest/statistics>.

Glossary

ABS	Asia Broadcast Satellite. 48, 49, 54, 67, 101, 110, 127, 167
ACTS	Advanced Communications Technology Satellite. 142
AEHF	Advanced Extremely High Frequency. 68, 73, 76
AKM	Apogee Kick Motor. 84, 87, 90, 92, 102–107, 109, 113, 116, 118–120, 123–128, 132
Alcomsat	Algerian Communication Satellite. 65
AMC	Americom. 57, 58, 60, 62, 65, 68, 96, 168
AMOS	Affordable Modular Optimized Satellite. 48, 67, 82, 104, 139, 168
AMSC	American Mobile Satellite Corporation. 75
ANGELS	Automated Navigation and Guidance Experiment for Local Space. 91, 168
APPLE	Ariane Passenger PayLoad Experiment. 114
Artemis	Advanced Relay and Technology Mission. 102, 167
ASC	American Satellite Company. 143, 158
ATHENA-FIDUS	Access on theatres for European allied forces nations-French Italian dual use satellite. 46
ATS	Applications Technology Satellite. 87, 105, 118, 126, 143
BRISat	Bank Rakyat Indonesia Satellite. 56
BS	Broadcasting Satellite. 48, 75, 92, 93, 97, 98, 102, 158
BSAT	Broadcasting Satellite. 52, 53, 98–100
BSE	Broadcasting Satellite Experimental. 137
COMS	Communication, Ocean and Meteorological Satellite. 54
COMSATBw	Communication Satellite for Bundeswehr. 44, 48
CS	Communication Satellite. 86, 93, 94, 100, 104
CTS	Communications Technology Satellite. 143
CZ	Chang Zheng. 79
DATS	Despun Antenna Test Satellite. 132
DCSS	Delta Cryogenic Second Stage. 81, 94, 95, 128, 129
DFH	Dōngfānghóng. 122, 134, 136–140
DFS	Deutscher Fernmeldesatellit. 106, 109, 120
DLA	DIRECTV Latin America. 61
DODGE	Department of Defense Gravity Experiment. 132
DRTS	Data Relay & Tracking Satellite. 102, 168
DSCS	Defense Satellite Communications System. 71, 74, 76, 78, 80–85, 88–90, 93, 95–98, 103, 142, 146
DSP	Defense Support Program. 68, 70, 72, 74, 76, 83, 86–88, 91–93, 100, 105, 106, 109–111, 118, 120, 123–126, 140, 157, 158
ECS	European Communications Satellite. 86, 91, 92, 94
EDUSAT	Education Satellite. 102
ETS	Engineering Test Satellite. 96, 103, 114, 168
FLTSATCOM	Fleet Satellite Communications. 71, 77, 90, 95, 144

GeoLITE	Geosynchronous Lightweight Technology Experiment. 93
GEOS	Geostationary Scientific Satellite. 103
GGTS	Gravity Gradient Test Satellite. 131
GMS	Geostationary Meteorological Satellite. 83, 92, 101, 104, 106, 109, 111, 124
GOES	Geostationary Operational Environmental Satellite. 57, 60, 63, 92, 94, 96, 98, 101, 103–105, 112, 119, 126, 143, 157, 158
GSAT	Geosynchronous Satellite. 47–51, 102, 111, 129
GSSAP	Geosynchronous Space Situational Awareness Program. 78
HGS	Hughes Global Services. 144
HYLAS	Highly Adaptable Satellite. 45, 65
IABS	Integrated Apogee Boost System. 101, 121–124, 126, 127, 132
IDSCS	Initial Defense Satellite Communications System. 130–132
INSAT	Indian National Satellite. 47, 49, 50, 53, 91, 102, 108, 110, 113, 117, 121, 130, 134, 135, 139, 140, 167
Intelsat	International Telecommunications Satellite. 45, 46, 48–50, 57, 58, 61, 62, 64–67, 69, 70, 73, 76, 79, 80, 82, 86–90, 92–103, 105, 107–112, 115, 117, 127, 140, 141, 144, 146, 167
IRNSS	Indian Regional Navigation Satellite System. 69, 70, 72, 154, 155
IUE	International Ultraviolet Explorer. 154
IUS	Inertial Upper Stage (originally - Interim Upper Stage). 103, 105, 106, 109, 110, 112, 113, 115, 119–124, 146
JCSAT	Japan Communications Satellite. 53–56, 70, 71, 73, 89, 91, 98, 106, 167
JPL	Jet Propulsion Laboratory. 87
KAZSAT	Kazakh Satellite. 101
LEASAT	Leased Satellite. 82–84, 90, 107
LES	Lincoln Experimental Satellite. 87, 125, 132, 142, 143
LMI	Lockheed Martin Intersputnik. 56
MAGE	Moteur d'Apogée Géostationnaire Européen. 84, 103, 106, 113, 116, 118, 120
MARECS	Maritime European Communications Satellite. 80, 81
MEASAT	Malaysia East Asia Satellite. 73, 97
METSAT	Meteorological Satellite. 70
Milstar DFS	Military Strategic and Tactical Relay Development Flight Satellite. 75, 76
MITEx	Micro-satellite Technology Experiment. 90, 93
MOP	Meteosat Operational Programme. 82, 89, 95
MOS/PIM	Multi-Orbit Satellite/Performance Improvement Modification. 87, 91–93
MSAT	Mobile Satellite. 75
MSG	Meteosat Second Generation. 6, 43, 68, 69, 77, 123, 125–128
MTP	Meteosat Transition Programme. 88, 167
MTSAT	Multi-Functional Transport Satellite. 56, 94
MUOS	Mobile User Objective System. 70, 74, 75, 77
MVIRI	Meteosat Visible and InfraRed Imager. 158
NATO	North Atlantic Treaty Organization. 80, 87, 89, 111, 142
NigComSat	Nigerian Communication Satellite. 46, 137

NRL	Naval Research Laboratory. 129
NROL	NRO Launch. 69–74, 77
NSS	New Skies Satellites. 48, 51, 57, 64, 69, 77, 82, 90, 102
OPS	Operations (?). 80–84, 86–88, 90–93, 95, 101, 105, 109, 110, 115, 117–120, 126, 130–135, 139, 140, 142, 144–147, 157, 158
OSC	Orbital Sciences Corporation. 90
OTS	Orbital Test Satellite. 98
OV	Orbiting Vehicle. 106, 115, 119–122, 124, 126, 146
PAS	PanAmSat. 6, 62, 65, 69, 73, 76, 79, 80, 82, 87, 97, 99, 100, 104, 158
POTV	Precision Orbital Transfer Vehicle. 129
PSN	Pasifik Satelit Nusantara. 99
QZS	Quasi-Zenith Satellite. 54, 154, 155
RASCOM	Regional African Satellite Communication (Organization). 43
RCA	Radio Corporation of America. 90, 104, 107, 111, 115
S-VISSR	Stretched Visible and Infrared Spin Scan Radiometer. 6, 117, 134, 137, 139
SBIRS	Space-Based Infrared System. 68, 70, 72
SBS	Satellite Business Systems. 92, 95, 110, 112, 116
SCATHA	Spacecraft Charging AT High Altitudes. 125, 126
SDO	Solar Dynamics Observatory. 154
SDS	Satellite Data System. 71, 72, 74, 76, 77, 90
SES	Société Européenne des Satellites. 43, 51, 52, 58, 60, 61, 63, 65, 66
SESAT	Siberian-European Satellite. 68, 70
SEVIRI	Spinning Enhanced Visible and Infrared Imager. 6, 123, 125–128
SGDC	Satélite Geoestacionário de Defesa e Comunicações Estratégicas. 63
SICRAL	Sistema Italiano per Comunicazioni Riservate ed Allarmi. 44, 46, 68
SIRIO	Satellite Italiano di Ricerca Industriale Orientata. 134
SMS	Synchronous Meteorological Satellite. 90, 106, 132, 157
ST	Singapore-Taiwan. 49, 51, 92
STTW	Shiyan Tongbu Tongxing Weixing. 134, 136–138, 140
Syncom	Synchronous Communication. 82–84, 90, 107, 117, 154
Syracuse	Système de Radiocommunication utilisant un satellite. 47, 66
TACSAT	Tactical Communications. 118
TDF	TéléDiffusion de France. 90, 100
TDRS	Tracking and Data Relay Satellite. 71, 74, 76, 77, 89, 92
TJS	Tōngxùn Jìshù Shìyàn. 52, 56
UFO	UHF (Ultra High Frequency) Follow-On. 68, 70, 73, 75, 87, 92, 101, 145, 156, 167
VAS	VISSR Atmospheric Sounder. 158
VINASAT	Vietnamese Satellite. 55
VISSR	Visible and Infrared Spin Scan Radiometer. 136, 137, 157, 158
WGS	Wideband Global SATCOM (initially - Wideband Gapfiller Satellite). 43, 48, 51, 56, 57, 64, 66, 78

WINDS Wideband InterNetworking engineering test and Demonstration Satellite. 72

ZX Zhongxing. 50–55, 69, 71, 82, 99, 103, 109, 113, 134, 136, 138, 139

Index

Please note that alternative names are being omitted throughout the index to facilitate readability.

ABS 1A, 110	Anik E1, 99
ABS 2, 49	Anik E2, 98
ABS 2A, 49	Anik F1, 59
ABS 3, 101	Anik F1R, 59
ABS 3A, 67	Anik F2, 59
ABS 4, 48	Anik F3, 58
ABS 7, 54	Anik G1, 59
ACTS, 142	APPLE, 114
AfriStar 1, 68	Apstar 2R, 100
Agena D, 126, 127, 129	Apstar 6, 55
Agila 1, 112	Apstar 7, 49
Alcomsat 1, 65	Apstar 9, 55
Alphasat, 68	Apstar 9A, 72
Amazonas, 89	Arabsat 1A, 118
Amazonas 2, 64	Arabsat 1B, 118
Amazonas 3, 64	Arabsat 1D, 94
Amazonas 4A, 63	Arabsat 1D-R, 106
Amazonas 5, 64	Arabsat 2A, 101
AMC 9, 96	Arabsat 2B, 104
AMC 10, 57	Arabsat 3A, 116
AMC 11, 58	Arabsat 5A, 45
AMC 12, 65	Arabsat 5C, 44
AMC 14, 68	ARSAT-1, 63
AMC 15, 60	ARSAT-2, 62
AMC 16, 62	Artemis, 102
AMC 18, 60	ASC 1, 143
AMC 21, 58	ASC 1 debris, 158
AMOS 2, 104	AsiaSat 1, 101
AMOS 3, 67	AsiaSat 2, 102
AMOS 4, 48	Asiasat 3S, 73
AMOS 5, 139	Asiasat 4, 51
AMSC 1, 75	Asiasat 5, 52
Angosat 1, 103	Asiasat 6, 54
Anik A1, 93	Asiasat 7, 52
Anik A2, 110	Asiasat 8, 67
Anik A3, 114	Asiasat 9, 54
Anik B1, 110	Asiastar, 72
Anik C1, 108	Astra 1A, 88
Anik C2, 98	Astra 1B, 89
Anik C3, 112	Astra 1C, 93
Anik D1, 115	Astra 1D, 75

Astra 1E, 92
 Astra 1F, 46
 Astra 1G, 69
 Astra 1H, 76
 Astra 1KR, 44
 Astra 1L, 44
 Astra 1M, 44
 Astra 1N, 44
 Astra 2A, 53
 Astra 2B, 77
 Astra 2C, 69
 Astra 2D, 69
 Astra 2E, 45
 Astra 2F, 45
 Astra 2G, 45
 Astra 3A, 76
 Astra 3B, 44
 Astra 5A, 104
 Astra 5B, 45
 ATHENA-FIDUS, 46
 ATS 1, 118
 ATS 3, 143
 ATS 5, 105
 ATS 5 AKM, 87
 ATS 6, 126
 Aurora I, 143
 Aurora I debris, 158
 Aurora II, 96
 Aurora II debris, 158
 Azerspace / Africasat-1a, 47

 Badr 4, 45
 Badr 5, 45
 Badr 6, 45
 Badr 7, 45
 Badr C, 73
 Beidou, 94
 Beidou 1B, 101
 Beidou 2A, 98
 Beidou 3, 110
 Beidou DW 2, 139
 Beidou DW 3, 55
 Beidou DW 4, 53
 Beidou DW 5, 154
 Beidou DW 6, 56
 Beidou DW 7, 154
 Beidou DW 8, 154
 Beidou DW 9, 154
 Beidou DW 10, 154
 Beidou DW 11, 48

 Beidou DW 16, 50
 Beidou DW 17, 155
 Beidou DW 20, 155
 Beidou DW 22, 155
 Beidou DW 23, 73
 BelinterSat-1, 47
 Bermudasat 1, 75
 Blok-DM, 83–85, 90, 91, 104, 112–119, 122–126,
 128, 135, 136, 138, 139, 147
 Blok-DM-2, 84–87, 90, 91, 105, 109, 110, 112,
 114–117, 119–123, 125, 128, 129, 135,
 137–141, 147
 Blok-DM-2M, 102, 105, 107, 108, 114, 116, 121,
 122, 136–138, 147
 Blok-DM-3, 91
 Blok-DM-SL-B, 81
 Bonum 1, 96
 Brasilsat B4, 75
 Brazilsat 1, 106
 Brazilsat 2, 108
 Brazilsat B1, 101
 Brazilsat B2, 76
 Brazilsat B3, 76
 BRISat, 56
 Briz-M, 79, 80, 83, 86, 118, 129, 132
 Briz-M fragmentation debris, 127–130
 BS-3N, 98
 BS-3N debris, 158
 BSAT 1a, 98
 BSAT 1b, 98
 BSAT 2a, 99
 BSAT 2c, 100
 BSAT 3A, 53
 BSAT 3B, 53
 BSAT 3c, 53
 BSAT 4a, 52
 BulgariaSat-1, 43

 Cakrawatra 1, 138
 Centaur-T, 107, 117, 119–121, 140
 Chinasat 1A, 54
 Chinasat 1C, 50
 Chinasat 2A, 52
 Chinasat 2C, 52
 Chinasat 5, 113
 Chinasat 5D, 99
 Chinasat 5E, 103
 Chinasat 5R, 109
 Chinasat 6A, 54
 Chinasat 6B, 53

Chinasat 9, 51	Cosmos-2513, 50
Chinasat 10, 53	Cosmos-2520, 46
Chinasat 11, 52	
Chinasat 15A, 51	Delta IV DCSS 4, 94, 95
Chinasat 20, 69	Delta IV DCSS 5, 81, 128, 129
Chinasat 20A, 55	DFH 3-1, 122
Chinasat 22, 82	DFH 3-2, 139
Chinasat 22A, 71	DFH-2 2, 140
Ciel 1, 92	DFH-2A 1, 137
Ciel 2, 58	DFH-2A 2, 134
COMS 1, 54	DFH-2A 3, 138
COMSATBw-1, 48	DFH-2A 4, 136
COMSATBw-2, 44	DFS-Kopernikus 1, 120
Comstar 1A, 111	DFS-Kopernikus 2, 106
Comstar 1B, 113	DFS-Kopernikus 3, 109
Comstar 1C, 100	DirecTV 1, 95
Comstar 1D, 133	DirecTV 1R, 95
Cosmos-637, 121	DirecTV 3, 96
Cosmos-775, 138	DirecTV 4S, 60
Cosmos-1366, 134	DirecTV 5, 59
Cosmos-1540, 133	DirecTV 7S, 58
Cosmos-1546, 134	DirecTV 8, 60
Cosmos-1629, 144	DirecTV 9S, 60
Cosmos-1700, 135	DirecTV 10, 60
Cosmos-1700 debris, 136	DirecTV 11, 61
Cosmos-1738, 147	DirecTV 12, 60
Cosmos-1888, 145	DirecTV 14, 60
Cosmos-1894, 144	DirecTV 15, 60
Cosmos-1897, 135	DirecTV-2, 91
Cosmos-1940, 120	DODGE 1, 132
Cosmos-1961, 133	DSCS III F1, 85
Cosmos-2054, 144	
Cosmos-2085, 133	EchoStar 1, 62
Cosmos-2133, 133	EchoStar 2, 143
Cosmos-2155, 146	EchoStar 3, 94
Cosmos-2172, 147	EchoStar 4, 95
Cosmos-2209, 144	EchoStar 7, 58
Cosmos-2224, 141	EchoStar 8, 89
Cosmos-2282, 144	EchoStar 9, 58
Cosmos-2291, 146	EchoStar 10, 59
Cosmos-2319, 145	EchoStar 11, 59
Cosmos-2345, 146	EchoStar 12, 62
Cosmos-2350, 133	EchoStar 14, 58
Cosmos-2371, 133	EchoStar 15, 63
Cosmos-2379, 140	EchoStar 16, 64
Cosmos-2397, 118	EchoStar 17, 60
Cosmos-2434, 104	EchoStar 18, 64
Cosmos-2440, 133	Echostar 19, 61
Cosmos-2473, 66	Echostar 21, 68
Cosmos-2479, 146	Echostar 23, 64
	EchoStar G1, 75

Ekran 1, 135	Eutelsat 3D, 43
Ekran 2, 136	Eutelsat 4A, 87
Ekran 2 fragmentation debris, 114, 116, 139, 146	Eutelsat 4B, 89
Ekran 3, 136	Eutelsat 5 West A, 66
Ekran 4, 135	Eutelsat 7 West A, 66
Ekran 5, 146	Eutelsat 7A, 43
Ekran 5 debris, 118	Eutelsat 8 West B, 66
Ekran 6, 136	Eutelsat 8 West D, 88
Ekran 7, 136	Eutelsat 9A, 44
Ekran 8, 113	Eutelsat 9B, 43
Ekran 9, 137	Eutelsat 10A, 43
Ekran 10, 80	Eutelsat 12 West A, 65
Ekran 11, 136	Eutelsat 12 West B, 66
Ekran 12, 81	Eutelsat 16A, 44
Ekran 13, 81	Eutelsat 16B, 87
Ekran 14, 80	Eutelsat 16C, 68
Ekran 15, 82	Eutelsat 21A, 88
Ekran 16, 82	Eutelsat 21B, 44
Ekran-M 17, 81	Eutelsat 25B / Es'hail 1, 44
Ekran-M 18, 80	Eutelsat 31A, 68
Ekran-M 19, 82	Eutelsat 33B, 139
Ekran-M 20, 136	Eutelsat 33C, 45
Ekran-M 21, 107	Eutelsat 33D, 103
Ekspress 1, 111	Eutelsat 36A, 77
Ekspress 2, 136	Eutelsat 36B, 45
Ekspress 2A, 87	Eutelsat 48A, 88
Ekspress 3A, 92	Eutelsat 48D / Afghansat 1, 47
Ekspress A1R, 73	Eutelsat 65 West A, 63
Ekspress MD-1, 97	Eutelsat 70B, 49
Ekspress-AM 1, 100	Eutelsat 113 West A, 59
Ekspress-AM 2, 96	Eutelsat 115 West A, 91
Ekspress-AM 3, 52	Eutelsat 115 West B, 59
Ekspress-AM 5, 55	Eutelsat 117 West A, 59
Ekspress-AM 6, 47	Eutelsat 117 West B, 58
Ekspress-AM 7, 46	Eutelsat 172A, 57
Ekspress-AM 8, 66	Eutelsat 172B, 57
Ekspress-AM 11, 101	Eutelsat Hot Bird 13B, 44
Ekspress-AM 22, 70	Eutelsat Hot Bird 13C, 44
Ekspress-AM 33, 52	Eutelsat Hot Bird 13D, 45
Ekspress-AM 44, 66	Eutelsat I F-1, 94
Ekspress-AMU 1, 46	Eutelsat I F-2, 92
Ekspress-AT1, 48	Eutelsat I F-4, 91
Ekspress-AT2, 55	Eutelsat I F-5, 86
Elektro 1, 134	Eutelsat II F-1, 103
Elektro-L No. 1, 116	Eutelsat II F-2, 94
Elektro-L No. 2, 49	Eutelsat II F-3, 102
ESA GEOS 2, 103	Eutelsat II F-4, 97
Estrela do Sul 1, 93	Eutelsat KA-SAT 9A, 43
Europe*Star B, 108	Eutelsat W2, 102
Eutelsat 3B, 43	Eutelsat W75, 127

Fengyun 2A, 81
 Fengyun 2A AKM, 128
 Fengyun 2A operational debris, 117
 Fengyun 2B, 115
 Fengyun 2B AKM, 116
 Fengyun 2B debris, 137
 Fengyun 2C, 86
 Fengyun 2C AKM, 125
 Fengyun 2C operational debris, 137
 Fengyun 2D, 72
 Fengyun 2D AKM, 103
 Fengyun 2D operational debris, 134
 Fengyun 2E, 71
 Fengyun 2E AKM, 127
 Fengyun 2E operational debris, 139
 Fengyun 2F, 72
 Fengyun 2F AKM, 104
 Fengyun 2F operational debris, 117
 Fengyun 2G, 72
 Fengyun 2G AKM, 107
 Fengyun 2G debris, 136
 Fengyun 4A, 52
 FLTSATCOM F5, 90
 Fregat-SB, 88, 128

Galaxy 3C, 61
 Galaxy 10R, 108
 Galaxy 11, 46
 Galaxy 13 / Horizons 1, 58
 Galaxy 14, 58
 Galaxy 15, 58
 Galaxy 16, 61
 Galaxy 17, 61
 Galaxy 18, 58
 Galaxy 19, 61
 Galaxy 25, 61
 Galaxy 26, 95
 Galaxy 27, 96
 Galaxy 28, 61
 Galaxy I, 116
 Galaxy II, 117
 Galaxy III, 111
 Galaxy IIIR, 143
 Galaxy IR-A, 100
 Galaxy IV, 133
 Galaxy IVR, 111
 Galaxy IX, 106
 Galaxy V, 102
 Galaxy VI, 109
 Galaxy VII, 109

Galaxy VIII-i, 109
 Galaxy XII, 58
 Gals 1, 138
 Gals 2, 112
 Gaofen 4, 52
 Garuda 1, 112
 GE 1, 74
 GE 1A, 55
 GE 2, 75
 GE 3, 75
 GE 4, 57
 GE 5, 103
 GE 6, 62
 GE 7, 57
 GE 8, 57
 GGTS 1, 131
 GOES 1, 143
 GOES 1 AKM, 126
 GOES 1 debris, 157
 GOES 2, 104
 GOES 2 AKM, 119
 GOES 2 debris, 157
 GOES 3, 103
 GOES 3 AKM, 105
 GOES 3 debris, 158
 GOES 4, 101
 GOES 4 debris, 158
 GOES 5, 143
 GOES 5 debris, 158
 GOES 6, 143
 GOES 6 debris, 158
 GOES 7, 112
 GOES 7 AKM, 92
 GOES 7 debris, 158
 GOES 8, 94
 GOES 9, 92
 GOES 10, 98
 GOES 11, 96
 GOES 12, 98
 GOES 14, 60
 GOES 15, 57
 GOES 16, 63
 GOES N, 63
 Gorizont 2, 135
 Gorizont 3, 137
 Gorizont 4, 90
 Gorizont 5, 89
 Gorizont 6, 144
 Gorizont 7, 88
 Gorizont 8, 87

Gorizont 9, 135	Hermes, 143
Gorizont 10, 144	HGS-1, 144
Gorizont 11, 147	Himawari 1, 101
Gorizont 12, 137	Himawari 1 AKM, 123
Gorizont 13, 82	Himawari 1 debris, 157
Gorizont 14, 84	Himawari 2, 106
Gorizont 15, 85	Himawari 2 AKM, 102
Gorizont 16, 113	Himawari 2 debris, 158
Gorizont 17, 97	Himawari 3, 109, 111
Gorizont 18, 104	Himawari 3 debris, 158
Gorizont 19, 138	Himawari 4, 83, 92
Gorizont 20, 135	Himawari 4 debris, 158
Gorizont 21, 146	Himawari 5, 104, 124
Gorizont 22, 140	Himawari 5 debris, 158
Gorizont 23, 94	Himawari 6, 94
Gorizont 24, 89	Himawari 7, 56
Gorizont 25, 111	Himawari 8, 55
Gorizont 26, 101	Himawari-9, 55
Gorizont 27, 117	Hispasat 1A, 102
Gorizont 28, 108	Hispasat 1B, 109
Gorizont 29, 116	Hispasat 1C, 100
Gorizont 30, 147	Hispasat 1D, 65
Gorizont 31, 112	Hispasat 1E, 65
Gorizont 32, 117	Hispasat 36W-1, 65
Gorizont 33, 146	Horizons 2, 50
GSAT 1, 129	Hot Bird 1, 102
GSAT 2, 111	HYLAS 1, 65
GSAT 3, 102	HYLAS 2, 45
GSAT 6, 50	
GSAT 7, 49	IABS, 101, 121–124, 126, 127, 132
GSAT 8, 48	Indostar II/Protostar II, 52
GSAT 10, 50	Inmarsat 5F4, 54
GSAT 12, 50	Inmarsat-2 F1, 94
GSAT 14, 49	Inmarsat-2 F2, 91
GSAT 15, 51	Inmarsat-2 F3, 81
GSAT 16, 47	Inmarsat-2 F4, 85
GSAT-17, 51	Inmarsat-3 F1, 70
GSAT-18, 49	Inmarsat-3 F2, 77
GSAT-19E, 50	Inmarsat-3 F3, 74
GStar 1, 142	Inmarsat-3 F4, 106
GStar 1 debris, 158	Inmarsat-3 F5, 76
GStar 2, 110	Inmarsat-4 F1, 73
GStar 2 debris, 158	Inmarsat-4 F2, 70
GStar 3, 142	Inmarsat-4 F3, 75
GStar 4, 98	Inmarsat-5 F1, 48
GStar 4 debris, 158	Inmarsat-5 F2, 64
GVM/Briz-M, 80	Inmarsat-5 F3, 57
	INSAT 1A, 139
Hellas Sat 2, 46	INSAT 1B, 140
Hellas Sat 3-Inmarsat S EAN, 46	INSAT 1C, 135

INSAT 1D, 134	Intelsat 801, 92
INSAT 2A, 117	Intelsat 802, 86
INSAT 2B, 113	Intelsat 804, 146
INSAT 2C, 110	Intelsat 805, 57
INSAT 2D, 130	Intelsat 901, 66
INSAT 2DT, 91	Intelsat 902, 48
INSAT 2E, 108	Intelsat 903, 65
INSAT 3A, 110	Intelsat 904, 46
INSAT 3B, 108	Intelsat 905, 66
INSAT 3C, 102	Intelsat 906, 48
INSAT 3D, 50	Intelsat 907, 65
INSAT 3DR, 49	Intelsat I F-1, 144
INSAT 3E, 121	Intelsat II F-2, 117
INSAT 4A, 50	Intelsat II F-3, 141
INSAT 4B, 53	Intelsat II F-4, 144
INSAT 4CR, 47	Intelsat III F-2, 79
Intelsat 1R, 73	Intelsat III F-4, 79
Intelsat 2, 100	Intelsat III F-6, 99
Intelsat 3R, 97	Intelsat III F-7, 141
Intelsat 4, 82	Intelsat III F-8, 127
Intelsat 6B, 99	Intelsat IV F-1, 101
Intelsat 7, 87	Intelsat IV F-2, 93
Intelsat 8, 80	Intelsat IV F-3, 108
Intelsat 9, 76	Intelsat IV F-4, 111
Intelsat 10, 69	Intelsat IV F-5, 115
Intelsat 10-02, 67	Intelsat IV F-7, 98
Intelsat 11, 65	Intelsat IV F-8, 110
Intelsat 12, 69	Intelsat IVA F-1, 112
Intelsat 14, 64	Intelsat IVA F-2, 108
Intelsat 15, 50	Intelsat IVA F-3, 112
Intelsat 16, 62	Intelsat IVA F-4, 105
Intelsat 17, 48	Intelsat IVA F-6, 140
Intelsat 18, 57	Intelsat V F-1, 93
Intelsat 19, 57	Intelsat V F-2, 94
Intelsat 20, 49	Intelsat V F-3, 105
Intelsat 21, 64	Intelsat V F-4, 100
Intelsat 22, 49	Intelsat V F-5, 88
Intelsat 23, 64	Intelsat V F-6, 99
Intelsat 24, 82	Intelsat V F-7, 109
Intelsat 25, 65	Intelsat V F-8, 82
Intelsat 26, 70	Intelsat VA F-10, 88
Intelsat 28, 45	Intelsat VA F-11, 115
Intelsat 29e, 64	Intelsat VA F-12, 97
Intelsat 30, 61	Intelsat VA F-13, 90
Intelsat 31, 61	Intelsat VA F-15, 97
Intelsat 33e, 48	Intelsat VI F-1, 107
Intelsat 34, 64	Intelsat VI F-2, 96
Intelsat 35e, 65	Intelsat VI F-3, 105
Intelsat 36, 48	Intelsat VI F-4, 88
Intelsat 37e, 50	Intelsat VI F-5, 103

Intelsat VII F-1, 102
 Intelsat VII F-2, 94
 Intelsat VII F-3, 102
 Intelsat VII F-4, 99
 Intelsat VII F-5, 95
 Intelsat VII F-6, 99
 Intelsat VIIA F-1, 97
 Intelsat VIIA F-2, 89
 IRNSS-R1A, 154
 IRNSS-R1B, 154
 IRNSS-R1C, 70
 IRNSS-R1D, 154
 IRNSS-R1E, 155
 IRNSS-R1F, 69
 IRNSS-R1G, 72
 Italsat 1, 113
 Italsat 2, 121
 IUE, 154
 IUE dust cover, 154
 IUS second stage, 103, 105, 106, 109, 110, 112,
 113, 115, 119–124, 146

 JCSAT 1, 106
 JCSAT 2, 89
 JCSAT 2B, 56
 JCSAT 3, 98
 JCSAT 3A, 54
 JCSAT 5, 91
 JCSAT 6, 73
 JCSAT 8, 71
 JCSAT 9, 55
 JCSAT 12, 54
 JCSAT 13, 54
 JCSAT 15, 53
 JCSAT 16, 56

 KALPANA-1, 70
 KAZSAT, 101
 Kazsat-2, 50
 Kazsat-3, 48
 Kiku 2, 114
 Kiku 5, 103
 Kiku 8, 96
 Kirameki 2, 51
 Kizuna, 72
 Kodama, 102
 Koreasat 2 debris, 158
 Koreasat 7, 53
 Kupon 1, 135

 LaoSat 1, 54

 LEASAT 1, 90
 LEASAT 2, 83
 LEASAT 3, 82
 LEASAT 4, 84
 LEASAT 5, 107
 LES 5, 132
 LES 6, 143
 LES 8, 142
 LES 8, LES 9 operational debris, 87, 125
 LES 9, 142
 LMI 1, 56
 Luch, 46
 Luch 1, 145
 Luch 1-1, 133
 Luch 5A, 73
 Luch 5B, 77
 Luch 5V, 71

 MARECS A, 80
 MARECS B2, 81
 Marisat 1, 100
 Marisat 2, 81
 Marisat 3, 83
 MEASAT 1, 97
 MEASAT 2, 73
 Measat 3, 51
 Measat 3A, 51
 Measat 3B, 51
 Meteosat 1, 140
 Meteosat 1 AKM, 84
 Meteosat 1 debris, 158
 Meteosat 2, 91
 Meteosat 2 AKM, 103
 Meteosat 2 debris, 158
 Meteosat 3, 82
 Meteosat 3 AKM, 106
 Meteosat 3 debris, 158
 Meteosat 4, 82
 Meteosat 4 AKM, 118
 Meteosat 4 debris, 158
 Meteosat 5, 89
 Meteosat 5 AKM, 116
 Meteosat 5 debris, 158
 Meteosat 6, 95
 Meteosat 6 AKM, 113
 Meteosat 6 debris, 158
 Meteosat 7, 88
 Meteosat 7 AKM, 120
 Meteosat 7 debris, 158
 Meteosat 8, 69, 123, 126

Meteosat 9, 68, 123, 127	NSS K, 82
Meteosat 10, 43, 125, 128	
Meteosat 11, 77, 125, 127	Olleh 1, 54
Mexsat Bicentenario, 59	Olympus 1, 125
Michibiki-1, 154	OPS 0441, 147
Michibiki-2, 155	OPS 1570, 109
Michibiki-3, 54	OPS 1948, 117
Michibiki-4, 155	OPS 2112, 105
Molniya 1-S, 137	OPS 2112 debris, 157
Morelos 1, 105	OPS 2222, 101
Morelos 2, 107	OPS 3148, 118
Morelos 3, 74	OPS 3151, 83
MSAT, 75	OPS 3151 debris, 120
Mugunghwa 5, 53	OPS 3165, 118
Mugunghwa 5A, 53	OPS 3165 debris, 157
MUOS 1, 74	OPS 3811, 86
MUOS 2, 75	OPS 3811 debris, 157
MUOS 3, 77	OPS 4029, 144
MUOS 4, 70	OPS 4258, 145
MUOS 5, 75	OPS 4966, 139
	OPS 5346, 134
N-SAT-110, 53	OPS 6063, 133
N-Star 1, 98	OPS 6157, 110
N-Star 2, 101	OPS 6157 debris, 157
N-Star 3, 72	OPS 6391, 95
Nahuel 1A, 104	OPS 6392, 90
NATO I, 142	OPS 6393, 144
NATO IIB, 142	OPS 6394, 95
NATO IIIA, 111	OPS 7329, 145
NATO IIIB, 80	OPS 7350, 93
NATO IIIC, 89	OPS 7350 debris, 158
NATO IIID, 80	OPS 7484, 92
NATO IVA, 87	OPS 7484 debris, 157
NATO IVB, 89	OPS 7641, 91
NigComSat 1, 137	OPS 7641 debris, 126
NigComSat 1R, 46	OPS 8701, 87
Nilesat 101, 83	OPS 8701 debris, 158
Nilesat 102, 77	OPS 8790, 119
Nilesat 201, 66	OPS 9311, 131
Nimiq, 62	OPS 9312, 131
Nimiq 2, 71	OPS 9313, 131
Nimiq 4, 62	OPS 9314, 131
Nimiq 5, 63	OPS 9315, 130
Nimiq 6, 61	OPS 9316, 130
NSS 5, 69	OPS 9317, 130
NSS 6, 51	OPS 9321, 132
NSS 7, 77	OPS 9322, 131
NSS 9, 57	OPS 9323, 131
NSS 12, 48	OPS 9324, 131
NSS 806, 64	OPS 9325, 131

OPS 9326, 131
 OPS 9327, 131
 OPS 9328, 130
 OPS 9331, 132
 OPS 9332, 132
 OPS 9333, 132
 OPS 9334, 132
 OPS 9341, 131
 OPS 9342, 131
 OPS 9343, 131
 OPS 9344, 131
 OPS 9345, 130
 OPS 9346, 130
 OPS 9347, 130
 OPS 9348, 130
 OPS 9390, 140
 OPS 9431, 142
 OPS 9432, 146
 OPS 9433, 84
 OPS 9434, 83
 OPS 9437, 82
 OPS 9438, 81
 OPS 9441, 80
 OPS 9442, 88
 OPS 9443, 81
 OPS 9444, 88
 OPS 9445, 80
 OPS 9454, 115
 OPS 9751, 135
 Optus 10, 56
 Optus A1, 109
 Optus A2, 113
 Optus A3, 94
 Optus B1, 100
 Optus B3, 91
 Optus C1, 56
 Optus D1, 56
 Optus D2, 56
 Optus D3, 56
 OTS 2, 98
 OV2-5, 126

 Paksat 1R, 46
 Palapa 1, 115
 Palapa 2, 114
 Palapa B-2R, 106
 Palapa B4, 113
 Palapa C1, 107
 Palapa C2, 96
 Palapa D, 53

Palapa Pacific 1, 117
 PAS 1, 104
 PAS 1 debris, 158
 PAS 6, 79
 Proton-K/DM-2 fragmentation debris, 85
 PSN 5, 99

 QuetzSat-1, 62

 Raduga 1, 111, 134, 139
 Raduga 1-1, 91
 Raduga 1-2, 136
 Raduga 1-3, 136
 Raduga 1-4, 138
 Raduga 1-5, 137
 Raduga 1-6, 84
 Raduga 1M, 49, 50
 Raduga 2, 134
 Raduga 3, 138
 Raduga 4, 138
 Raduga 5, 134
 Raduga 6, 137
 Raduga 7, 144
 Raduga 8, 118
 Raduga 9, 138
 Raduga 10, 134
 Raduga 11, 84
 Raduga 12, 134
 Raduga 13, 87
 Raduga 14, 134
 Raduga 15, 139
 Raduga 16, 144
 Raduga 17, 116
 Raduga 18, 93
 Raduga 19, 89
 Raduga 20, 81
 Raduga 21, 143
 Raduga 22, 140
 Raduga 23, 138
 Raduga 24, 137
 Raduga 25, 144
 Raduga 26, 135
 Raduga 27, 139
 Raduga 28, 138
 Raduga 29, 140
 Raduga 30, 134
 Raduga 31, 137
 Raduga 32, 133
 Rascom-QAF 1, 97
 RASCOM-QAF 1R, 43
 RCA Satcom I, 107

RCA Satcom II, 90	SIRIO 1, 134
RCA Satcom IIIR, 115	Sirius 1, 99
RCA Satcom IIR, 104	Sirius 3, 96
RCA Satcom IR, 111	Sirius 4, 43
RCA Satcom IV, 107	Sirius FM-5, 62
	Sirius FM-6, 59
Sakura 1, 94	Sirius XM-5, 62
Sakura 2A, 104	SKY Mexico-1, 62
Sakura 2B, 93	Sky Muster, 55
Sakura 3A, 86	Sky Muster 2, 56
Sakura 3B, 100	SkyBrasil-1, 64
Satcom C-1, 99	Skynet 1A, 142
Satcom C-1 debris, 158	Skynet 2B, 140
Satcom C-3, 82	Skynet 4A, 95
Satcom C-3 debris, 158	Skynet 4B, 108
Satcom C-4, 96	Skynet 4C, 69
Satcom C-4 debris, 158	Skynet 4D, 99
Satcom IIIR debris, 158	Skynet 4E, 77
Satcom IIR debris, 158	Skynet 4F, 76
Satcom IR debris, 158	Skynet 5A, 51
Satcom IV debris, 158	Skynet 5B, 44
Satcom Ku-1, 106	Skynet 5C, 66
Satcom Ku-2, 108	Skynet 5D, 47
SBS I, 110	SkyTerra 1, 75
SBS II, 116	SMS 1, 90
SBS III, 112	SMS 1 AKM, 132
SBS IV, 92	SMS 2, 106
SBS V, 110	SMS 2 AKM, 90
SBS VI, 95	SMS 2 debris, 157
SCATHA, 125	Solidaridad 1, 142
SCATHA AKM, 126	Solidaridad 2, 93
SDO, 154	South Asia Satellite, 52
SES-1, 60	Spacenet 1 debris, 158
SES-2, 61	Spacenet 2 debris, 158
SES-3, 60	Spacenet 3R, 108
SES-4, 66	Spacenet 3R debris, 158
SES-5, 43	Spacenet 4, 107
SES-6, 65	Spacenet 4 debris, 158
SES-8, 51	Spaceway 1, 60
SES-9, 52	Spaceway 2, 61
SES-10, 63	Spaceway 3, 61
SES-11, 60	Spainsat, 65
SES-15, 58	ST-1, 92
SGDC-1, 63	ST-2, 51
Shi Jian 13, 53	Star One C1, 63
Shi Jian 17, 72	Star One C2, 63
SICRAL, 68	Star One C3, 63
SICRAL 1B, 44	Star One C4, 63
SICRAL 2, 46	Star One D1, 62
Simon Bolivar, 62	Superbird 4, 73

Superbird A, 109	Terrestar 1, 74
Superbird A1, 98	Thaicom 1, 99
Superbird A2, 105	Thaicom 2, 107
Superbird B1, 97	Thaicom 3, 92
Superbird C, 97	Thaicom 4, 54
Superbird C2, 55	Thaicom 5, 49
Symphonie A, 113	Thaicom 6, 49
Symphonie B, 113	Thaicom 8, 49
Syncom 2, 154	Thor 2R, 67
Syncom 3, 117	Thor 6, 67
Syracuse 3A, 47	Thor 7, 67
Syracuse 3B, 66	Thor I, 100
	Thor II, 95
TACSAT 1, 118	Thor III, 77
TDF 1, 100	Thuraya 1, 95
TDF 2, 90	Thuraya 2, 69
TDRS 1, 92	Thuraya 3, 71
TDRS 3, 76	Tian Lian 1-01, 70
TDRS 4, 89	Tian Lian 1-02, 73
TDRS 5, 74	Tian Lian 1-03, 43
TDRS 6, 76	Tian Lian 1-04, 70
TDRS 7, 71	Tiantong-1 01, 71
TDRS 8, 71	Titan 34D third stage, 104, 105, 123, 124
TDRS 9, 77	TJS, 56
TDRS 10, 74	TJS-2, 52
TDRS 11, 74	Transtage 5, 125
TDRS 12, 76	Transtage 5 fragmentation debris, 99, 103, 105, 116–118, 120–123, 125–130
TDRS 13, 74	Transtage 11, 130
Tele-X, 99	Transtage 14, 132
Telecom 1A, 88	Transtage 16, 130
Telecom 1B, 141	Transtage 17, 83
Telecom 1C, 86	Transtage 20, 118
Telecom 2A, 95	Transtage 21, 82
Telecom 2B, 106	Transtage 22, 120
Telecom 2C, 85	Transtage 23, 143
Telecom 2D, 89	Transtage 24, 107
Telkom 1, 50	Transtage 26, 80
Telkom 2, 56	Transtage 27, 120
Telkom-3S, 54	Transtage 28, 119
Telstar 3C, 110	Transtage 29, 119
Telstar 3D, 112	Transtage 30, 87
Telstar 4, 142	Transtage 31, 105
Telstar 11, 90	Transtage 32, 81
Telstar 11N, 65	Transtage 33, 108
Telstar 12, 75	Transtage 34, 108
Telstar 12 Vantage, 66	Transtage 36, 80
Telstar 14R, 63	Transtage 37, 81
Telstar 18, 55	Transtage 38, 124
Telstar 401, 142	Transtage 39, 107
Tempo 2, 96	

Transtage 40, 124	USA 127, 156
Tupac Katari, 61	USA 130, 68
TurkmenAlem52E/MonacoSAT, 47	USA 130 debris, 106
Turksat 1B, 97	USA 134, 74
Turksat 1C, 139	USA 138, 73
Turksat 2A, 87	USA 139, 77
Turksat 3A, 46	USA 140, 87
Turksat 4A, 46	USA 146, 70
Turksat 4B, 47	USA 148, 74
TV-Sat 1, 94	USA 149, 74
TV-SAT 2, 111	USA 149 debris, 109
	USA 153, 78
USA 7, 93	USA 155, 72
USA 7 debris, 158	USA 157, 72
USA 8, 110	USA 158, 93
USA 11, 95	USA 159, 72
USA 12, 103	USA 159 debris, 157
USA 20, 71	USA 162, 76
USA 28, 88	USA 164, 68
USA 28 debris, 158	USA 167, 74
USA 37, 71	USA 169, 74
USA 39, 93	USA 170, 76
USA 39 debris, 124	USA 171, 70
USA 43, 90	USA 174, 70
USA 44, 98	USA 176, 70
USA 46, 77	USA 176 debris, 158
USA 48, 121	USA 187, 90
USA 65, 88	USA 188, 93
USA 65 debris, 157	USA 189, 129
USA 67, 90	USA 195, 43
USA 75, 100	USA 197, 140
USA 75 debris, 125	USA 197 debris, 111
USA 78, 96	USA 202, 69
USA 82, 93	USA 204, 48
USA 93, 97	USA 207, 47
USA 95, 68	USA 211, 66
USA 97, 89	USA 214, 68
USA 98, 101	USA 223, 71
USA 99, 76	USA 227, 74
USA 104, 145	USA 230, 70
USA 105, 69	USA 233, 51
USA 107, 76	USA 235, 76
USA 107 debris, 123	USA 236, 77
USA 108, 75	USA 237, 69
USA 110, 72	USA 241, 68
USA 111, 92	USA 243, 64
USA 113, 71	USA 244, 57
USA 114, 73	USA 246, 73
USA 115, 75	USA 250, 70
USA 118, 69	USA 252, 73

USA 253, 78
USA 254, 78
USA 255, 91
USA 257, 78
USA 263, 57
USA 268, 72
USA 269, 71
USA 270, 78
USA 271, 78
USA 273, 72
USA 275, 56
USA 279, 71

ViaSat-1, 59
ViaSat-2, 63
VINASAT-1, 55
VINASAT-2, 55

Westar I, 112
Westar II, 111
Westar III, 113
Westar IV, 109
Westar V, 100
WGS SV-8, 78
WildBlue 1, 59

Xinnuo 2, 79
XM Radio 1, 96
XM Radio 2, 97
XM Radio 3, 62
XM Radio 4, 59
XTAR-EUR, 45

Yahsat 1A, 47
Yahsat 1B, 47
Yamal 100 No. 1, 111
Yamal 100 No. 2, 113
Yamal 200 N1, 135
Yamal 200 N2, 47
Yamal 300K, 57
Yamal 401, 51
Yamal 402, 47
Yuanzheng-2, 79
Yuri 1, 137
Yuri 2A, 97
Yuri 2B, 102
Yuri 3A, 93
Yuri 3B, 92

Zhongxing 9A, 52