

Space Activities in 2018

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Rev 1.0 - initial release
Rev 1.1 - redesignation of 2025-F02 failure to 2025-E01 pad explosion.
Rev 1.2 - miscellaneous data updates, noting 2025-313 launch issue
Rev 1.3 - Updated data, corrected mistakes in table 3
Rev 1.4 - Updated data
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Preface

In this paper I present some statistics characterizing astronomical activity in calendar year 2018. In the 2014 edition of this review [1], I described my methodological approach and some issues of definitional ambiguity; that discussion is not repeated here, and it is assumed that the reader has consulted the earlier document, available at <https://planet4589.org/space/papers/space14.pdf> (The present work may be found as [space25.pdf](#) at the same location).

Most of the data in this paper is derived from my General Catalog of Artificial Space Objects [2]. Principal sources for orbital data are Space-Track [3], Celestrak [4], Mike McCants' hobbyist elements [5], and the United Nations [6].

1 Orbital Launch Attempts

1.1 Launch statistics by country

During 2018 there were 114 orbital launch attempts from Earth, with 112 reaching orbit or marginal orbit.

Table 1(a) gives statistics for all orbital attempts; Table 1(b) includes only launches that reached orbit.

Table 1: (a) Orbital Launch Attempts

	2011	2012	2013	2014	2015	2016	2017	2018
USA	19	16	20	24	20	22	29	31
Russia	30	23	31	32	26	17	19	17
China	19	19	15	16	19	22	18	39
Europe	9	11	8	11	12	11	11	11
<i>India</i>	3	2	3	4	5	7	5	7
<i>Iran</i>	1	3	0	0	1	0	0	0
<i>Japan</i>	3	2	3	4	4	4	7	6
<i>South Korea</i>	0	0	1	0	0	0	0	0
<i>Israel</i>	0	0	0	1	0	1	0	0
<i>North Korea</i>	0	2	0	0	0	1	0	0
<i>New Zealand</i>	0	0	0	0	0	0	1	3
Other	7	9	7	9	10	13	13	16
Total	84	78	81	92	87	85	90	114

Electron is licensed in the USA but can be launched from Mahia, on New Zealand territory, by the New Zealand subsidiary of the US-headquartered Rocket Lab. Mahia-launched Electron rocket stages are registered with the UN by New Zealand. (see, e.g. [7].) I go back and forth on this, but for now I consider Electron flights from Mahia to be a New Zealand launch of a US-manufactured rocket, and include them under New Zealand in Tables 1a and 1b.

Table 1: (b) Launches Reaching Orbit

	2011	2012	2013	2014	2015	2016	2017	2018
USA	18	16	19	23	18	22	29	31
Russia	28	23	30	31	25	16	18	16
China	18	19	14	16	19	21	17	38
Europe	9	11	8	11	12	11	11	11
<i>India</i>	3	2	3	4	5	7	5	7
<i>Iran</i>	1	1	0	0	1	0	0	0
<i>Japan</i>	3	2	3	4	4	4	6	6
<i>South Korea</i>	0	0	1	0	0	0	0	0
<i>Israel</i>	0	0	0	1	0	1	0	0
<i>North Korea</i>	0	1	0	0	0	1	0	0
<i>New Zealand</i>	0	0	0	0	0	0	0	3
Other	7	6	7	9	10	13	11	16
Total	80	75	78	90	84	83	86	112

1.2 Launch failures and uncataloged orbital launches

During the year there were 2 orbital launch failures. In general I award partial success scores to launches which reach orbit but do not successfully deploy their payloads in the targeted orbit; there were no such cases in 2018. However, on one launch (2018-001 Falcon 9/USA-280 ZUMA) the payload failed to separate from its launch vehicle and was deorbited with it; this mission failure is not counted against the launch vehicle because the payload separation system was provided by the payload owner.

On one launch, Ariane VA241, the vehicle entered orbit at the correct altitude but entirely the wrong inclination - I believe the first time this has happened. The payloads were able to use their own fuel to reach their target orbit, and by the rules set out in JSR 669, I score the launch as a success with a rating for statistical purposes of 65% instead of 100%.

In recent years the cubesat market has led to middle-layer companies such as ISIS B.V., ECM, Nanoracks, Spaceflight Industries, etc., which integrate cubesats into dispensers, and act as customers to the launch vehicle provider. When a payload fails to eject from the dispenser, as sometimes happens, this is not counted as a launch vehicle failure but a payload failure, even though it may feel like a launch failure to the cubesat end user customer.

Table 2: F and U launches in 2018

Table 2 (a): 2018 orbital launch failures and partial failures						
Designation	Date	LV Stage	LV	Payload	Type of failure	Launch Score
2018-012	Jan 25	France	Ariane 5ECA	SES-14/Al Yah 3	Software, wrong azimuth	0.65
2018-F01	Oct 11	Russia	Soyuz-FG	Soyuz 11F732A48 No. 740	Blok D bad sep	0.00
2018-F02	Oct 27	China	Zhuque-1	Weilai	S3 lost attitude mid-burn	0.00
Table 2 (b): 2018 other additional launch designations						
Designation	Date	LV Stage	LV	Payload	Type of launch	Launch Score

1.3 Commercial Launches

Of the 114 orbital launch attempts: 62 were carried out by governments; 22 by commercial companies under contract to their host governments, and 30 by commercial companies for commercial customers, including foreign governments.

I count US Commercial Cargo and Crew flights as ‘under contract to host government’; although the launch contract is through a commercial intermediary, the choice of vehicle is negotiated as part of a government contract.

In this table Rocket Lab is counted as a US launch provider, although in other contexts I count the New-Zealand-based launches as belonging to New Zealand, consistent with the UN registration documents.

Table 3: Commercial vs. government launches

Launch Provider	Launches	Type	Customers		
			Gov.	Comm.	Other gov
US Launch Providers					
BOE Delta 2	1	CG	1	0	0
BOE Delta 4	2	CG	2	0	0
LM Atlas V	5	CG	5	0	0
NGIS Antares	1	CX	0	1	0
OATKD Antares	1	CX	0	1	0
RLABU Electron	3	C	1	2	0
SPX Falcon 9	20	CX	3	14	3
SPX Falcon Heavy	1	C	0	1	0
European Launch Providers					
AESP Ariane 5/6	6	CO	2	3	1
AESP Soyuz	3	CO	2	1	0
AESP Vega	2	C	1	0	1
Russian Launch Providers					
EUROK Rokot	1	CO	1	0	0
KHRO Proton	2	G	2	0	0
MORF Rokot	1	G	1	0	0
MORF Soyuz	4	G	4	0	0
ROSK Soyuz	9	G	9	0	0
Chinese Launch Providers					
CALT CZ-11	3	G	3	0	0
CALT CZ-2C	6	G	6	0	0
CALT CZ-3	14	G	14	0	0
CASIC KZ-1A	1	CO	0	1	0
LANDSP ZQ-1	1	C	0	1	0
SAST CZ-2D	8	G	8	0	0
SAST CZ-4	6	G	6	0	0
Other Launch Providers					
ISRO GSLV3	1	G	1	0	0
ISRO PSLV/GSLV	6	G	5	1	0
JAXA Epsilon	1	G	1	0	0
JAXA SS-520	1	G	1	0	0
MHI H-II	4	CG	4	0	0
Total	114		83	26	5

Here G = Government; CO = Commercial operation of government developed rocket; CG = commercial service provision to government; CX = Fully commercial service (but customers may include govt); C = Fully commercial (no govt involved); A = Amateur, academic, non-profit. See the 2014 document for full discussion; in 2022 the letter codes were altered to the current list and are now used in the online GCAT launch database.

2 Satellite Launch Statistics

2013 and 2014 saw a dramatic increase in the numbers of satellites deployed, thanks to the launch of several clusters of cubesats. The record 567 satellites launched in 2018 include 190 with masses above 100 kg.

The 567 satellites listed as deployed in Appendix 2 include two Chinese payloads (SPP/DSB-01 and an unknown payload) which have apparently not been tracked by the US (Chinese satellite registration filings with the UN are highly incomplete, so don't help here.) as well as 2 payloads which failed to separate from the upper stage (the combined satellite/upper stage is considered a valid satellite for my purposes; these were Zuma, and D-Star Phoenix) and 3 which were never intended to separate from the upper stage (Tesla Roadster, Tangguo Guan, NABEO). Failures to reach orbit are not included here.

The list also includes satellites intended to separate from a parent spacecraft in 2019 or later (Mio, attached to BepiColombo MPO; CANYVAL/JERRY, attached to CANYVAL/TOM; SeeMe, attached to EXCITE-PTB1; and MySat, CHEFSAT, Kicksat-2, CATSAT 1/2, UNITE, TES-8, and Delphini 1, aboard ISS awaiting deployment; and over 100 tiny SPRITE satellites aboard Kicksat-2). Excluding these gives 445 satellites placed separately in orbit.

Table 4: Payloads launched per year

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Russia	31	24	25	22	29	34	27	15	24	23
USA	38	44	40	35	86	110	112	94	282	303
China	7	20	18	25	18	26	44	40	36	97
Europe	22	15	16	22	34	28	23	22	42	60
Other	27	19	30	28	41	58	31	50	60	84
Total	125	122	129	132	208	256	237	221	444	567

The 445 satellites listed here and in Appendix 2b as having been deployed during 2018 include some satellites launched in previous years and deployed in 2018.

Table 5: Payloads deployed per year

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Russia	30	23	24	23	29	34	27	14	25	23
USA	37	39	40	35	85	96	106	105	288	188
China	7	20	18	25	18	25	44	40	36	96
Europe	22	15	16	22	34	28	23	21	43	57
Other	26	19	30	28	41	57	31	44	65	81
Total	122	116	128	133	207	240	231	224	457	445

2.1 Satellite ownership by country

I now break this down by class for 2018 (first the launch powers, then other countries).

In 2018 the satellites deployed were owned by 46 countries. and three European organizations: ESA, EUMETSAT and the European Union.

In general I consider western Europe, loosely defined, as a single 'space power' because of the tight integration of its aerospace industry. Within this view, the four leading space powers are USA, China, Russia and (W) Europe. The second tier of space powers is comprised of Japan and India; all others are lumped as 'Other', further broken down regionally (and arbitrarily) for convenience. The 'Other' powers have limited or no launch capability of their own. (South Korea and Canada have space industries that make them candidates for the second tier in the near future). Countries which owned satellites covered in previous editions of the report are included in the table even if they had no new satellites this year.

Table 6: 2018 payloads launched by owner country and class

		A Academic/ NonProfit	B Business/ Commercial	C Civil	D Defense	SS Spaceship	Total Number
USA		134	117	16	31	5	303
China		3	34	19	40	0	96
Russia		4	0	4	9	6	23
FI	Finland	1	3	0	0	0	4
UK	UK	0	12	0	0	0	12
F	France	1	0	0	1	0	2
L	Luxembourg	0	11	0	0	0	11
D	Germany	6	3	1	0	0	10
DK	Denmark	1	0	1	1	0	3
E	Spain	2	2	0	1	0	5
I-EU	EU	0	0	5	0	0	5
I-ESA	ESA	0	0	3	0	0	3
I-EUM	EUMETSAT	0	0	1	0	0	1
NL	Netherlands	0	2	0	0	0	2
I	Italy	0	1	0	0	0	1
CH	Switzerland	0	1	0	0	0	1
Europe (W)		11	35	11	3	0	60
Japan		6	3	2	3	1	15
India		0	1	5	4	0	10
BGN	PR Bulgaria	0	1	0	0	0	1
BY	Belarus	1	0	0	0	0	1
PL	Poland	1	0	0	0	0	1
CZ	Czech Republic	0	1	0	0	0	1
Europe (E)		2	2	0	0	0	4
BR	Brazil	0	1	1	0	0	2
UY	Uruguay	0	2	0	0	0	2
CR	Costa Rica	1	0	0	0	0	1
AR	Argentina	0	0	1	0	0	1
CO	Colombia	0	0	0	1	0	1
Latin America		1	3	2	1	0	7
TR	Turkey	1	0	0	0	0	1
PK	Pakistan	0	0	2	0	0	2
UAE	UAE	1	0	1	0	0	2
QA	Qatar	0	1	0	0	0	1
JO	Jordan	1	0	0	0	0	1
SA	Saudi Arabia	0	0	2	0	0	2
Middle East		3	1	5	0	0	9
KR	South Korea	9	0	3	0	0	12
HK	China(Hong Kong)	0	1	0	0	0	1
BD	Bangladesh	0	1	0	0	0	1
MY	Malaysia	1	1	0	0	0	2
PH	Phillipines	0	0	2	0	0	2
BT	Bhutan	0	0	1	0	0	1
ID	Indonesia	0	1	0	0	0	1
AZ	Azerbaijan	0	0	1	0	0	1
KZ	Kazakhstan	1	2	0	0	0	3
T	Thailand	1	0	0	0	0	1
Asia (other)		12	6	7	0	0	25

		A Academic/ NonProfit	B Business/ Commercial	C Civil	D Defense	SS Spaceship	Total Number
KE	Kenya	1	0	0	0	0	1
MA	Morocco	0	0	0	1	0	1
ZA	South Africa	1	0	0	0	0	1
Africa		2	0	0	1	0	3
Canada		0	5	0	0	0	5
NZ	New Zealand	0	1	0	0	0	1
AU	Australia	0	5	0	1	0	6
Australasia		0	6	0	1	0	7
Total		178	213	71	93	12	567

Table 7: Mass (tonnes) of 2018 payloads launched by owner country and class

		A Academic/ NonProfit	B Business/ Commercial	C Civil	D Defense	SS Spaceship	Total Mass (tonne)
USA		0.1	33.1	9.8	37.7	45.4	126.1
China		0.0	3.7	16.5	37.4	0.0	57.6
Russia		0.0	0.0	1.9	17.2	43.9	63.0
UK	UK	0.0	8.0	0.0	0.0	0.0	8.0
F	France	0.0	0.0	0.0	3.7	0.0	3.7
L	Luxembourg	0.0	13.8	0.0	0.0	0.0	13.8
E	Spain	0.0	6.1	0.0	1.4	0.0	7.5
I-EU	EU	0.0	0.0	4.1	0.0	0.0	4.1
I-ESA	ESA	0.0	0.0	5.6	0.0	0.0	5.6
I-EUM	EUMETSAT	0.0	0.0	4.1	0.0	0.0	4.1
Europe (W)		0.0	28.2	14.1	5.1	0.0	47.3
Japan		0.0	0.7	1.8	8.0	16.1	26.6
India		0.0	0.0	11.1	5.3	0.0	16.4
Europe (E)		0.0	0.0	0.0	0.0	0.0	0.0
BR	Brazil	0.0	3.8	0.0	0.0	0.0	3.8
AR	Argentina	0.0	0.0	3.0	0.0	0.0	3.0
Latin America		0.0	3.9	3.0	0.0	0.0	6.9
PK	Pakistan	0.0	0.0	1.1	0.0	0.0	1.1
QA	Qatar	0.0	5.3	0.0	0.0	0.0	5.3
Middle East		0.0	5.3	2.3	0.0	0.0	7.6
KR	South Korea	0.0	0.0	3.6	0.0	0.0	3.6
HK	China(Hong Kong)	0.0	5.0	0.0	0.0	0.0	5.0
BD	Bangladesh	0.0	3.7	0.0	0.0	0.0	3.7
ID	Indonesia	0.0	5.8	0.0	0.0	0.0	5.8
AZ	Azerbaijan	0.0	0.0	3.5	0.0	0.0	3.5
Asia (other)		0.0	14.6	7.2	0.0	0.0	21.8
MA	Morocco	0.0	0.0	0.0	1.1	0.0	1.1
Africa		0.0	0.0	0.0	1.1	0.0	1.1
Canada		0.0	14.2	0.0	0.0	0.0	14.2
Australasia		0.0	0.0	0.0	0.0	0.0	0.0
Total		0.3	103.7	67.6	111.8	105.5	388.8

2.2 Satellite manufacture by country

Most countries build only very small (cubesat) satellites, purchasing their larger satellites from one of the main space powers. Here I tabulate the manufacturers of the 19 satellites launched in 2018 with estimated launch masses of 100 kg or more.

HSF is 'Human spaceflight', including related robotic missions such as cargo ships to support ISS. 'Surv.' is surveillance, including early warning and space debris surveillance; visible and radar imaging recon satellites and weather sats are under 'Imaging'. Microgravity research, geodesy and planetary probes are included under Sci (Science). Satellites built in the UK, France, Germany, Italy, Spain and the Netherlands are lumped together as 'EUR' to reflect the integration of the western European aerospace industry.

Table 8: 2018 payloads by manufacturer country - 100 kg and up only

	HSF	Comms	Imaging	Nav	SIGINT	Surv.	Sci	Tech	Total
USA	5	38	5	1	0	3	4	8	64
RU	6	5	5	2	1	0	0	0	19
PRC	0	5	21	18	8	0	3	5	60
EUR	0	8	10	4	0	0	4	3	29
India	0	4	2	1	0	0	0	1	8
South Korea	0	0	1	0	0	0	1	0	2
Japan	1	2	4	0	0	0	0	0	7
Pakistan	0	0	1	0	0	0	0	0	1
Argentina	0	0	1	0	0	0	0	0	1
UAE	0	0	1	0	0	0	0	0	1
Saudi Arabia	0	0	0	0	0	0	0	2	2
Total	12	62	51	26	9	3	12	19	194

Scientific Space Programs

2018 saw the launch of several important missions to study the Earth. In LEO, the US-German GRACE-FO followon mission replaced the original GRACE pair to measure the time-variable gravity field. ESA's Aeolus-ADM mission measures wind profiles. Japan's IBUKI-2 measures CO2 and methane.

One major astronomy mission was launched: TESS, the Transiting Exoplanet Survey Satellite, just as the Kepler mission reached the end of its life.

2018 stood out as an exceptional year for planetary exploration. The asteroid sample return missions Hayabusa-2 and Osiris-ReX reached their targets Ryugu and Bennu. As the year ended, New Horizons was on final approach to the Kuiper Belt Object 2014 MU69.

Several new important missions were launched: Parker Solar Probe to go close to the Sun; Insight which landed a seismometer on Mars; the MARCO-A/B flyby probes which relayed data from Insight during its descent; Bepi-Colombo on its way to Mercury; and Chang'e-4, which was preparing for a lunar farside landing as the year closed. China also launched the Queqiao communications satellite to the Earth-Moon L2 point to relay Chang'e-4 communications.

Military Space Activities

Military satellites include navigation, communications, and technology development missions in addition to the intelligence gathering activities that I report here.

Military R&D

SpaceX launched Northrop Grumman's Zuma mission in January; Zuma was a secret payload for an unidentified US government agency. The payload adapter failed to operate and the payload reentered along with the upper stage when the latter was deorbited shortly after launch. Meanwhile, the X-37 mission 5 continued in orbit throughout the year.

The CBAS/EAGLE launch placed a set of research satellites in near-geostationary orbits. EAGLE released at least three small satellites for various secret experiments.

Space surveillance

A new US GEO infrared missile warning satellite, SBIRS GEO-3, was launched.

Reconnaissance and Signals Intelligence

On Mar 29 Russia launched the first EMKA small imaging satellite (Kosmos-2525) to a 316 x 319 km orbit. Its orbit was allowed to decay until October when, at 270 km, regular reboosts began. At the end of the year its orbit was 270 x 275 km.

Russia also launched a LEO signals intelligence satellite, Lotos-S1 No. 804 (Kosmos-2528) to a 900 km orbit.

China launched the third and fourth LKW low orbit imaging satellites and eight small LEO military satellites (the YG-30 04 zu, YG-31 01 zu, YG-32 01 zu clusters) which may be for signals intelligence.

The US launched a TOPAZ radar imaging satellite to an 1100 km retrograde orbit.

High resolution optical imaging satellites were launched by Japan, Morocco, and France. Spain and Japan launched radar spy satellites.

2.3 USA satellite designations in 2018

The USA satellite designations were introduced in 1984 for US military satellites, to obscure the missions of the secret ones. Here is an index of USA names assigned in 2018, including satellites launched earlier but deployed and cataloged during the year.

The agency abbreviations are:

- AFRL Air Force Research Lab
- Del 4 Delta 4, US Space Force
- Del 8 Delta 8, US Space Force
- Del 9 Delta 9, US Space Force
- NRO US National Reconnaissance Office
- SSC Space Systems Command, LAAFB, US Space Force
- USSF US Space Force
- AFRCO Rapid Capabilities Office, WPAFB, US Sace Force

USA 280 failed to separate from its upper stage and was deorbited with it on the day of launch.

Table 9: USA satellite designations 2018

Cover name	Other name	Piece name	Agency	Orbit	Notes
USA 280	ZUMA	2018-001	NRO?	657 x 659 x 52.0	Unknown
USA 281	TOPAZ 5?	2018-005	NRO	1047 x 1057 x 106.0	Radar
USA 282	SBIRS GEO-3	2018-009	AFSPC	35758 x 35815 x 6.3	Early Warn
USA 283	CBAS SATCOM	2018-036	AFSMC	35740 x 35834 x 0.0	Comms
USA 284	EAGLE 1	2018-036	AFRL	35587 x 35618 x 0.0	Tech
USA 285	ESPASAT?	2018-036	AFRL?	35250 x 35306 x 0.8	Unknown
USA 286	ESPASAT?	2018-036	AFRL?	35246 x 35304 x 0.8	Unknown
USA 287	MYCROFT	2018-036	AFRL	35288 x 35288 x 0.0	Tech
USA 288	AEHF SV-4	2018-079	AFMCSW	35767 x 35804 x 4.8	Comms
USA 289	GPS III SV01	2018-109	AFSMC	20171 x 20189 x 54.9	Nav

3 Space Stations in 2018

3.1 ISS traffic

Table 10 lists arrivals, departures, deployments and spacewalks at ISS during 2018 [8].

Updated: 2026 Mar 11 0031:15

ISS event log, 2018

Date	Time	Module/VV	Object	Event	Desc
2018 Jan 13	0958	Harmony Nadir	Dragon CRS-13	Departed	-
2018 Jan 17	2015	SM ODU	ISS TCM-268	Maneuver	dV = 0.2 m/s dt = 16.0 s
2018 Jan 23	11467	Quest	Spacewalk ISS US EVA-47	Depress airlock	EV1 Vandé Hei, M.T. in EMU 3003
2018 Jan 23	11467	Quest	Spacewalk ISS US EVA-47	Depress airlock	EV2 Tingle, S.D. in EMU 3004
2018 Jan 23	1913	Quest	Spacewalk ISS US EVA-47	Repress airlock	EV1 Vandé Hei, M.T. in EMU 3003
2018 Jan 23	1913	Quest	Spacewalk ISS US EVA-47	Repress airlock	EV2 Tingle, S.D. in EMU 3004
2018 Jan 30	1525	SM ODU	ISS TCM-269	Maneuver	dV = 0.3 m/s dt = 23.0 s
2018 Feb 2	1511	Pirs	Spacewalk ISS VPD-44	Depress airlock	02 Shkaplerov, A.N. in Orlan MK-6
2018 Feb 2	1511	Pirs	Spacewalk ISS VPD-44	Depress airlock	01 Misurkin, A.A. in Orlan-MKS No. 4
2018 Feb 2	1941	Zvezda	Shk-317A ONA Receiver (1998-067NM)	Deployed	
2018 Feb 2	2353	Pirs	Spacewalk ISS VPD-44	Repress airlock	02 Shkaplerov, A.N. in Orlan MK-6
2018 Feb 2	2353	Pirs	Spacewalk ISS VPD-44	Repress airlock	01 Misurkin, A.A. in Orlan-MKS No. 4
2018 Feb 5	23007	Zvezda	ISS deb (1998-067NM)	Deployed	from Zvezda
2018 Feb 15	1038	Zvezda	Progress MS-08	Arrived	
2018 Feb 16	11567	Quest	Spacewalk ISS US EVA-48	Depress airlock	EV1 Vandé Hei, M.T. in EMU 3003
2018 Feb 16	11567	Quest	Spacewalk ISS US EVA-48	Depress airlock	EV2 Kanai N. in EMU 3008
2018 Feb 16	1757	Quest	Spacewalk ISS US EVA-48	Repress airlock	EV1 Vandé Hei, M.T. in EMU 3003
2018 Feb 16	1757	Quest	Spacewalk ISS US EVA-48	Repress airlock	EV2 Kanai N. in EMU 3008
2018 Feb 27	2308:36	Poisk	Soyuz MS-06	Departed	-Misurkin, A.A., Vandé Hei, M.T., Acaba, J.M.
2018 Feb 27	2308:36	Poisk	Soyuz MS-06	Departed	
2018 Mar 13	2125	Progress MS-08	ISS TCM-270	Expedition Start	
2018 Mar 13	2125	Progress MS-08	ISS TCM-270	Expedition Start	dV = 0.2 m/s dt = 108.0 s
2018 Mar 23	1940:19	Poisk	Soyuz MS-08	Maneuver	
2018 Mar 23	1940:19	Poisk	Soyuz MS-08	Arrived	+ Artem'ev, O.G., Feustel, A.J., Arnold, R.R.
2018 Mar 28	1350	Pirs	Progress MS-07	Departed	
2018 Mar 29	1325	Quest	Spacewalk ISS US EVA-49	Depress airlock	EV1 Feustel, A.J. in EMU 3006
2018 Mar 29	1325	Quest	Spacewalk ISS US EVA-49	Depress airlock	EV2 Arnold, R.R. in EMU 3003
2018 Mar 29	1325	Quest	Spacewalk ISS US EVA-49	Repress airlock	EV1 Feustel, A.J. in EMU 3006
2018 Mar 29	1943	Quest	Spacewalk ISS US EVA-49	Repress airlock	EV2 Arnold, R.R. in EMU 3003
2018 Mar 29	1943	Quest	Spacewalk ISS US EVA-49	Repress airlock	
2018 Apr 4	1040	Harmony Nadir	Dragon CRS-14	Arrived	
2018 Apr 4	1040	Harmony Nadir	Dragon CRS-14	Arrived	dV = 0.5 m/s dt = 126.0 s
2018 Apr 18	10367	Progress MS-08	ISS TCM-271	Maneuver	
2018 Apr 18	10367	Progress MS-08	ISS TCM-271	Maneuver	
2018 May 5	1323	Harmony Nadir	Dragon CRS-14	Departed	
2018 May 11	1030	JEM	1KUNS-PF (1998-067NP)	Deployed	from J-SSOD No. 8
2018 May 11	1030	JEM	Batsu-CS1 (1998-067NR)	Deployed	from J-SSOD No. 8
2018 May 11	1040	JEM	URAKUSAT (1998-067NQ)	Deployed	from J-SSOD No. 8
2018 May 12	2208	Progress MS-08	ISS TCM-272	Maneuver	dV = 0.3 m/s dt = 172.0 s
2018 May 16	1133	Quest	Spacewalk ISS US EVA-50	Depress airlock	EV1 Feustel, A.J. in EMU 3006
2018 May 16	1133	Quest	Spacewalk ISS US EVA-50	Depress airlock	EV2 Arnold, R.R. in EMU 3003
2018 May 16	1810	Quest	Spacewalk ISS US EVA-50	Repress airlock	EV1 Feustel, A.J. in EMU 3006
2018 May 16	1810	Quest	Spacewalk ISS US EVA-50	Repress airlock	EV2 Arnold, R.R. in EMU 3003
2018 May 24	0926	Unity Nadir	SS J.R. Thompson	Arrived	
2018 Jun 3	0916:36	Rassvet	Soyuz MS-07	Departed	- Shkaplerov, A.N., Tingle, S.D., Kanai N.
2018 Jun 3	0916:36	Rassvet	Soyuz MS-07	Departed	
2018 Jun 8	1301:08	Rassvet	Expedition 56	Expedition Start	
2018 Jun 8	1301:08	Rassvet	Expedition 56	Expedition Start	
2018 Jun 14	1201	Quest	Soyuz MS-09	Arrived	
2018 Jun 14	1201	Quest	Soyuz MS-09	Arrived	+ Prokop'ev, S.V., Gerst, A., Amon-Chancellor, S.M.
2018 Jun 14	1201	Quest	Spacewalk ISS US EVA-51	Depress airlock	EV2 Feustel, A.J. in EMU 3006
2018 Jun 14	1201	Quest	Spacewalk ISS US EVA-51	Depress airlock	EV1 Arnold, R.R. in EMU 3003
2018 Jun 14	1815	Quest	ISS EVA-51 wire tie (1998-067NS)	Deployed	from EMU 3006
2018 Jun 14	1855	Quest	Spacewalk ISS US EVA-51	Repress airlock	EV2 Feustel, A.J. in EMU 3006
2018 Jun 14	1855	Quest	Spacewalk ISS US EVA-51	Repress airlock	EV1 Arnold, R.R. in EMU 3003
2018 Jun 20	1855	Quest	Spacewalk ISS US EVA-51	Repress airlock	from Kaber
2018 Jun 20	11357	JEM	Remdeb (1998-067NT)	Deployed	
2018 Jun 23	0816	Progress MS-08	ISS TCM-273	Maneuver	dV = 0.4- m/s dt = -nan s
2018 Jun 23	0816	Progress MS-08	ISS TCM-273	Maneuver	
2018 Jul 2	1054	Harmony Nadir	Dragon CRS-15	Arrived	
2018 Jul 10	0131	Pirs	Progress MS-09	Arrived	
2018 Jul 10	2054:50	Cygnus DA-9	ISS TCM-274	Arrived	
2018 Jul 13	0805	JEM	RainCube (1998-067NW)	Deployed	dV = 0.1 m/s dt = 50.0 s
2018 Jul 13	0805	JEM	RainCube (1998-067NW)	Deployed	from NRCSD No. 14
2018 Jul 13	0905	JEM	HaloSat (1998-067NX)	Deployed	from NRCSD No. 14
2018 Jul 13	0905	JEM	HaloSat (1998-067NX)	Deployed	from NRCSD No. 14
2018 Jul 13	1235	JEM	Radix (1998-067NY)	Deployed	from NRCSD No. 14
2018 Jul 13	1235	JEM	Radix (1998-067NY)	Deployed	from NRCSD No. 14
2018 Jul 13	1420	JEM	CubeRRT (1998-067NU)	Deployed	from NRCSD No. 14
2018 Jul 13	1420	JEM	CubeRRT (1998-067NU)	Deployed	from NRCSD No. 14
2018 Jul 13	1420	JEM	TEMPPEST-D (1998-067NV)	Deployed	from NRCSD No. 14
2018 Jul 13	1420	JEM	TEMPPEST-D (1998-067NV)	Deployed	from NRCSD No. 14
2018 Jul 13	1420	JEM	Endurosat One (1998-067WZ)	Deployed	from NRCSD No. 14
2018 Jul 13	1420	JEM	Endurosat One (1998-067WZ)	Deployed	from NRCSD No. 14
2018 Jul 13	1420	JEM	Equisat (1998-067PA)	Deployed	from NRCSD No. 14
2018 Jul 13	1420	JEM	Equisat (1998-067PA)	Deployed	from NRCSD No. 14
2018 Jul 13	1420	JEM	RadSat-g (1998-067PB)	Deployed	from NRCSD No. 14
2018 Jul 13	1420	JEM	RadSat-g (1998-067PB)	Deployed	from NRCSD No. 14
2018 Jul 15?	-	Unity	MemSat (1998-067FC)	Deployed	from NRCSD-E DA-9
2018 Jul 15?	-	Unity	Lemur-2-Yuasa (2018-046G)	Deployed	from NRCSD-E DA-9
2018 Jul 15?	-	Unity	Lemur-2-TomHenderson (2018-046H)	Deployed	from NRCSD-E DA-9
2018 Jul 15	1236	Unity Nadir	SS J.R. Thompson	Departed	

ISS event log, 2018

Date	Time	Module/VV	Object	Event	Desc
2018 Jul 26	1610	Progress MS-08	ISS TCM-275	Maneuver	dV = 0.4 m/s dt = 199.2 s
2018 Aug 3	1638	Dragon CRS-15	Dragon CRS-15	Departed	-
2018 Aug 10	0945	Harmony Nadir	ULTRASAT-1 (1998-067PD)	Deployed	from J-SSOD No. 9
2018 Aug 10	0945	JEM	Maya-1 (1998-067PE)	Deployed	from J-SSOD No. 9
2018 Aug 10	0945	JEM	Bhutan-1 (1998-067PF)	Deployed	from J-SSOD No. 9
2018 Aug 15	1552	Pirs	Spacewalk ISS VKD-45	Depress airlock	02 Prokop'ev, S.V. in Orlan-MKS No. 4
2018 Aug 15	1552	Pirs	Spacewalk ISS VKD-45	Depress airlock	01 Artem'ev, O.G. in Orlan-MKS No. 5
2018 Aug 15	1643	Pirs	Tanyusha YuZGU No. 3 (1998-067PJ)	Deployed	from Orlan-MKS No. 4
2018 Aug 15	1645	Pirs	Tanyusha YuZGU No. 4 (1998-067PK)	Deployed	from Orlan-MKS No. 4
2018 Aug 15	1651	Pirs	SiriusSat-1 (1998-067PG)	Deployed	from Orlan-MKS No. 4
2018 Aug 15	1656	Pirs	SiriusSat-2 (1998-067PH)	Deployed	from Orlan-MKS No. 4
2018 Aug 15	19007	Zvezda	EVA insulation deb (VKD-45) (1998-067PL)	Deployed	from Zvezda
2018 Aug 16	0008	Pirs	Spacewalk ISS VKD-45	Repress airlock	02 Prokop'ev, S.V. in Orlan-MKS No. 4
2018 Aug 16	0008	Pirs	Spacewalk ISS VKD-45	Repress airlock	01 Artem'ev, O.G. in Orlan-MKS No. 5
2018 Aug 23	0216	Zvezda	Progress MS-08	Departed	-
2018 Sep 6	0050	SN ODU	ISS TCM-276	Maneuver	dV = 0.2 m/s dt = 13.1 s
2018 Sep 20	1805	SN ODU	ISS TCM-277	Maneuver	dV = 0.3 m/s dt = 17.0 s
2018 Sep 27	1134	Harmony Nadir	Koumatori 7 gouki	Arrived	-
2018 Oct 4	0757:32	Polsk	Soyuz MS-08	Departed	- Artem'ev, O.G., Feustel, A.J., Arnold, R.R.
2018 Oct 4	0757:32	ISS	Expedition 57	Expedition Start	-
2018 Oct 6	0745	JEM	SPATIUM-I (1998-067PN)	Deployed	from J-SSOD No. 10
2018 Oct 6	0800	JEM	RSP-00 (1998-067PP)	Deployed	from J-SSOD No. 10
2018 Oct 6	0800	JEM	Tenryu (1998-067PQ)	Deployed	from J-SSOD No. 10
2018 Oct 6	0800	JEM	Progress MS-10	Arrived	-
2018 Nov 18	1928	Zvezda	SS John Young	Arrived	-
2018 Nov 19	1028	Unity Nadir	Soyuz MS-11	Arrived	+ Kononenko, O.D., Saint-Jacques, D., McClain, A.C.
2018 Dec 3	1733:20	Polsk	Dragon CRS-16	Arrived	-
2018 Dec 8	1221	Harmony Nadir	Spacewalk ISS VKD-45a	Depress airlock	02 Prokop'ev, S.V. in Orlan-MKS No. 4
2018 Dec 11	1539	Pirs	Spacewalk ISS VKD-45a	Depress airlock	01 Kononenko, O.D. in Orlan-MKS No. 5
2018 Dec 11	1539	Pirs	Spacewalk ISS VKD-45a	Deployed	from Soyuz MS-09 BO
2018 Dec 11	2051	Rassvet	Soyuz MS-09 BO insulation (1998-067PS)	Deployed	from Soyuz MS-09 BO
2018 Dec 11	2052	Rassvet	Soyuz MS-09 BO insulation (1998-067PT)	Deployed	from Soyuz MS-09 BO
2018 Dec 11	2348	Pirs	Spacewalk ISS VKD-45a	Repress airlock	02 Prokop'ev, S.V. in Orlan-MKS No. 4
2018 Dec 11	2348	Pirs	Spacewalk ISS VKD-45a	Repress airlock	01 Kononenko, O.D. in Orlan-MKS No. 5
2018 Dec 20	0140:30	Rassvet	Soyuz MS-09	Departed	- Prokop'ev, S.V., Gerst, A., Annon-Chancellor, S.M.
2018 Dec 20	0140:30	ISS	Expedition 58	Expedition Start	-
2018 Dec 20	2249	JEM	SEDA-AP (1998-067PU)	Deployed	from Kibo RMS
2018 Dec 27	0307	Progress MS-10	ISS TCM-278	Maneuver	dV = 0.6 m/s dt = -nan s

International Space Station orbital history 2018

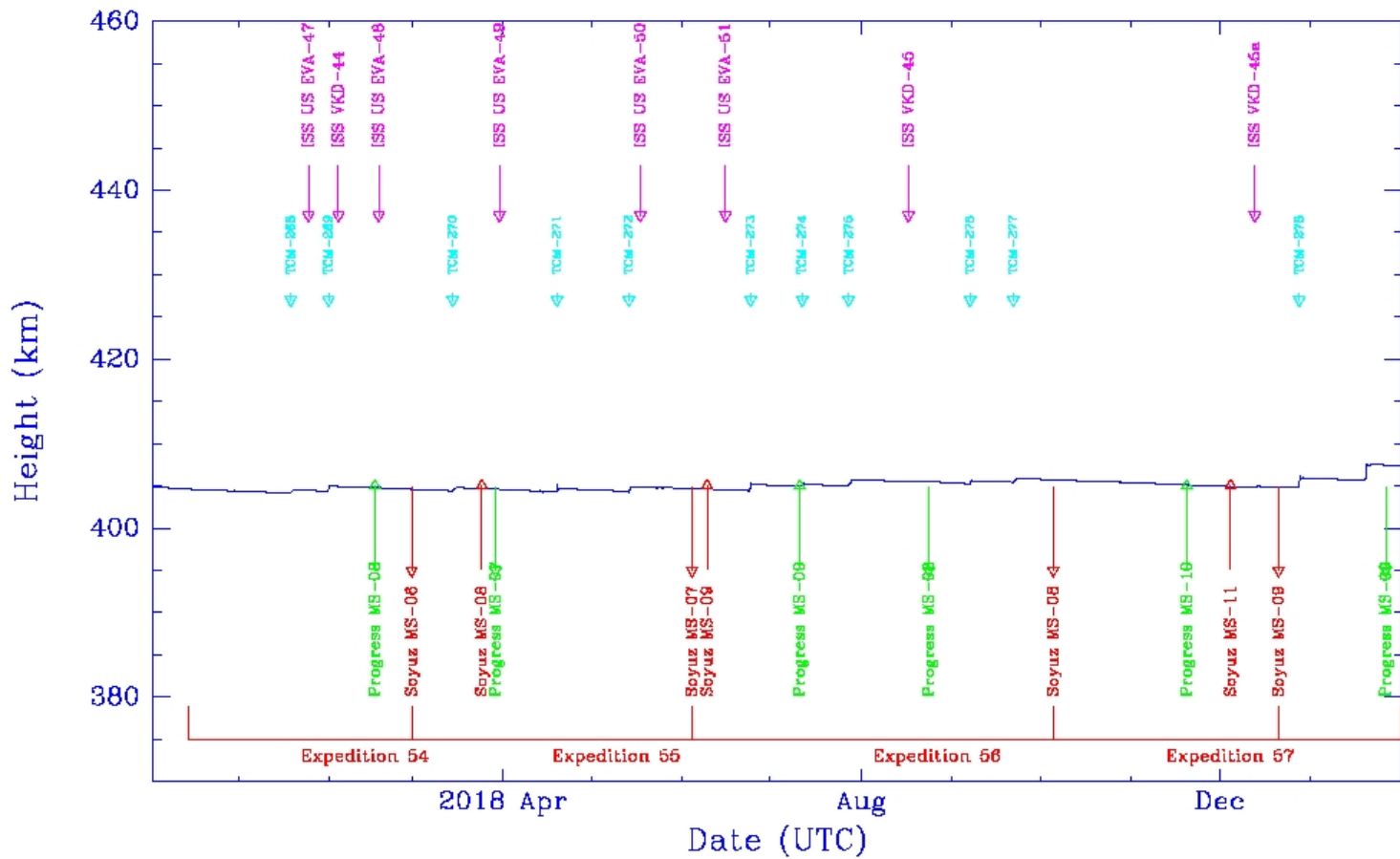


Figure 1: ISS traffic in 2018: Height vs Time plot

4 Orbital Traffic, Debris and Decay

At the end of 2018 there were 19563 cataloged objects in orbit or beyond and the total known mass in orbit increased to 8683 tonnes. The breakdown for number of objects is listed in table 11 and for the mass in orbit in table 12. Note that the sum of the individual mass figures falls short of the mass totals by a few tonnes due to complications with spurious catalog entries; but the uncertainties on those totals are probably in any case probably of the order of ten percent due to the uncertainty on masses of individual objects.

I include as active payloads any satellite thought to be still transmitting even occasionally, while other sources may only include those thought to be in full operational service. In either case, distinguishing active from dead payloads is often partly guesswork for those satellites which do not perform regular orbital maintenance maneuvers, and the uncertainty in the total number of active satellites is probably of order 10%.

Many of the active satellites are now members of large LEO constellations, especially Starlink. For details of large constellation activity see the pages at

<https://planet4589.org/space/con/conlist.html>

The category ‘Alt.Pay.’ (alternative payloads) has been added as a bookkeeping convenience to account for objects that are in a marginal category - could arguably be considered payloads but are not counted as such in most lists. They are mostly short lived and so make only a small contribution here.

Figure 2 shows the evolution of the debris population versus time; I mark Starlink satellites as a separate category. In Figure 3 to 6 I show subsets of this data for small and large objects (below/above 100 kg) and for the lower and upper parts of LEO (below/above 600 km), showing the dramatic difference in the population and its evolution for LLEO (Lower LEO, below 600 km) and ULEO (Upper LEO, 600-2000 km).

Prior to the 2023 edition I called out the two biggest debris clouds (the 2007 Chinese antisatellite test and the 2009 Iridium-Strela collision) as separate entries in the tables and plots. I now tabulate ASAT-related debris and collision-related debris from all debris clouds rather than isolating those particular incidents.

Table 11: Cataloged objects in orbit at end of year, 2014-2018

	Active Payloads	Dead Payloads	Alt Pay.	Rocket Bodies	Op. Debris	ASAT debris	Collision debris	Other debris	Spurious	Total
2014 Dec 31	1294	2527	13	1683	1447	3370	1695	5786	0	17816
2015 Dec 31	1405	2560	14	1721	1454	3292	1577	6398	0	18422
2016 Dec 31	1507	2609	13	1754	1466	3265	1539	6452	0	18606
2017 Dec 31	1814	2697	13	1785	1492	3248	1511	6428	0	18989
2018 Dec 31	2043	2789	17	1846	1545	3233	1487	6602	0	19563

Table 12: Mass of cataloged objects in orbit at end of year, 2014-2018(tonnes)

	Active Payloads	Dead Payloads	Alt Pay.	Rocket Bodies	Op. Debris	ASAT debris	Collision debris	Other debris	Spurious	Total
2014 Dec 31	2550	1808	1	2918	152	0	0	1	0	7431
2015 Dec 31	2715	1833	1	3026	159	0	0	1	0	7737
2016 Dec 31	2845	1885	1	3112	163	0	0	1	0	8010
2017 Dec 31	3002	1928	1	3221	168	0	0	1	0	8323
2018 Dec 31	3179	1956	1	3376	167	0	0	1	0	8683

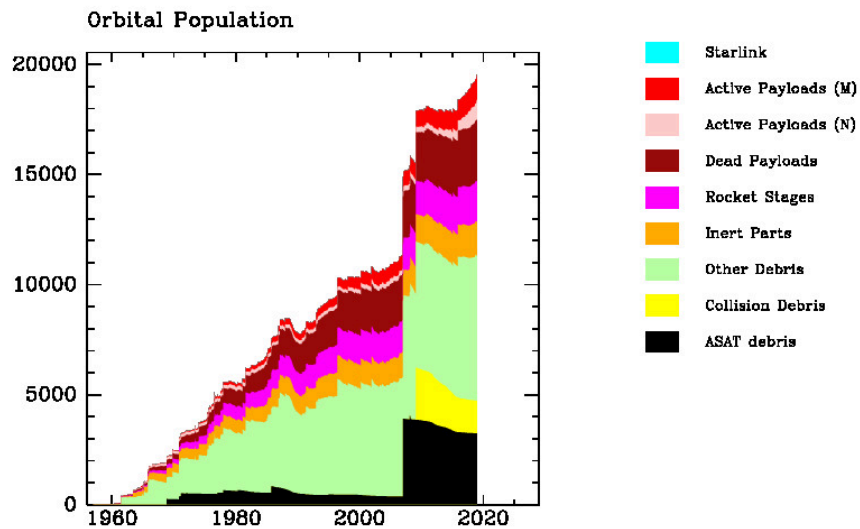


Figure 2: Orbital object population 1957-2018

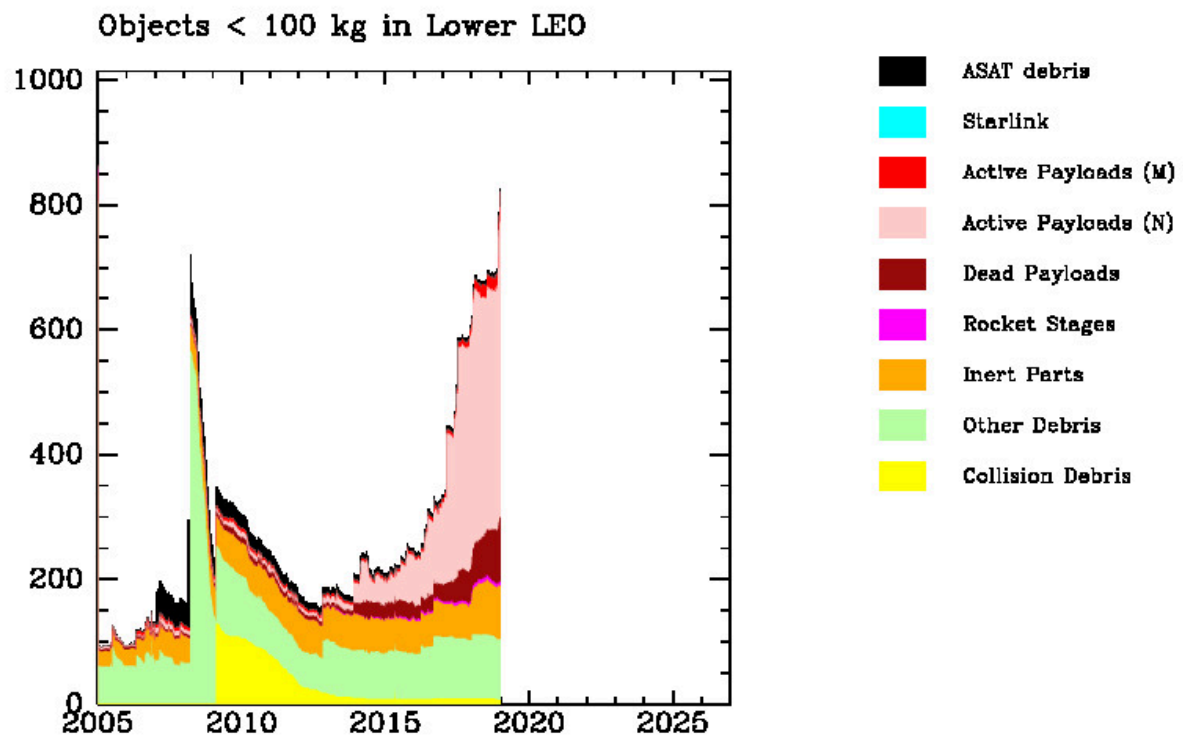


Figure 3: Time evolution of LEO debris and active satellite population (a): Small (<100 kg) objects in lower (< 600 km) LEO

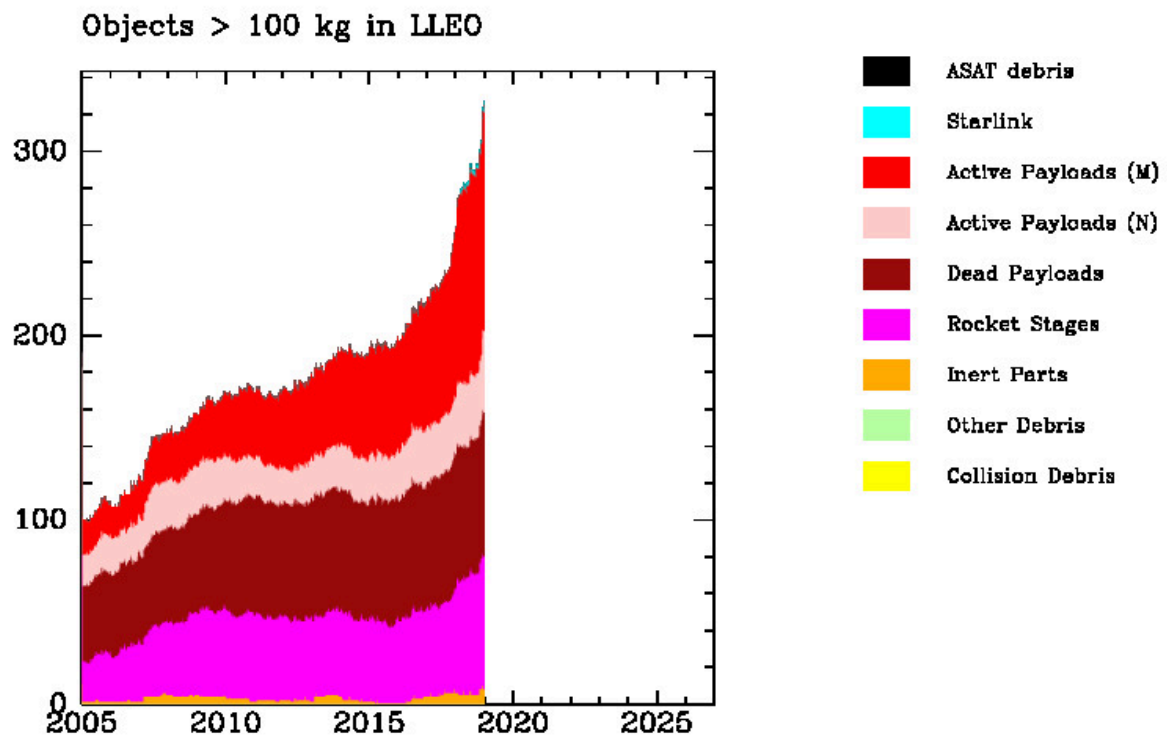


Figure 4: Time evolution of LEO debris and active satellite population (b): Big (>100 kg) objects in lower (< 600 km) LEO

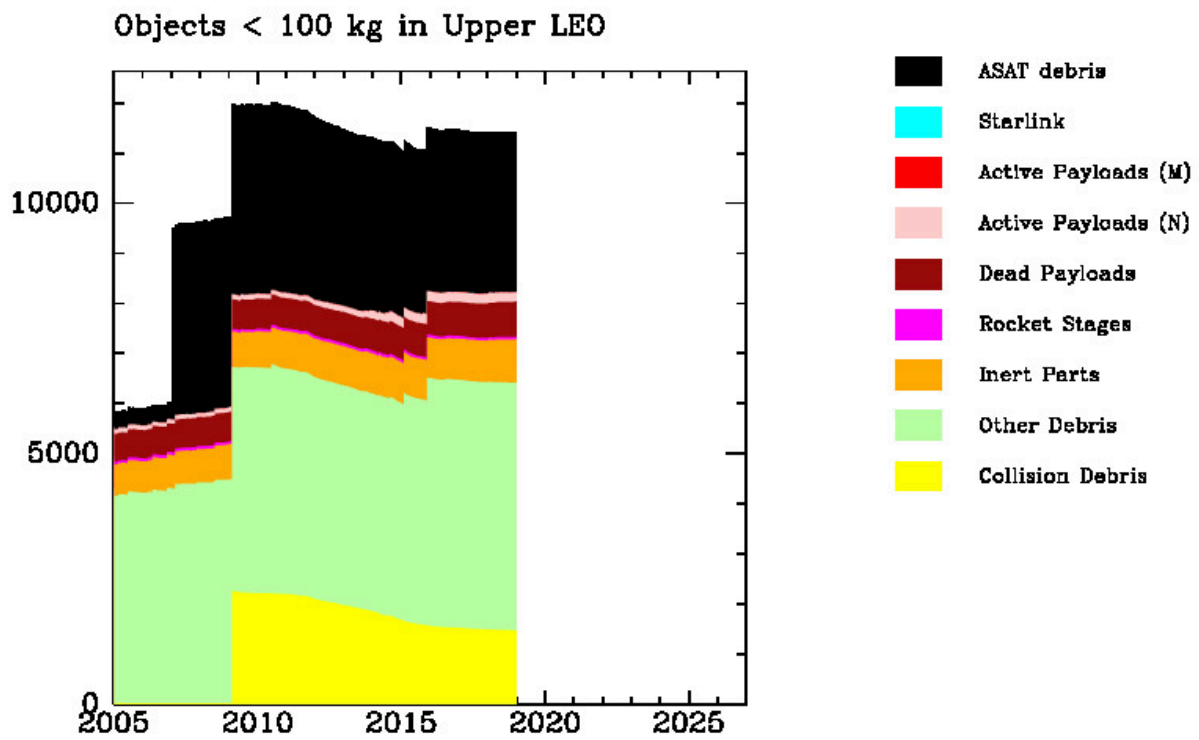


Figure 5: Time evolution of LEO debris and active satellite population (c): Small (<100 kg) objects in upper (> 600 km) LEO

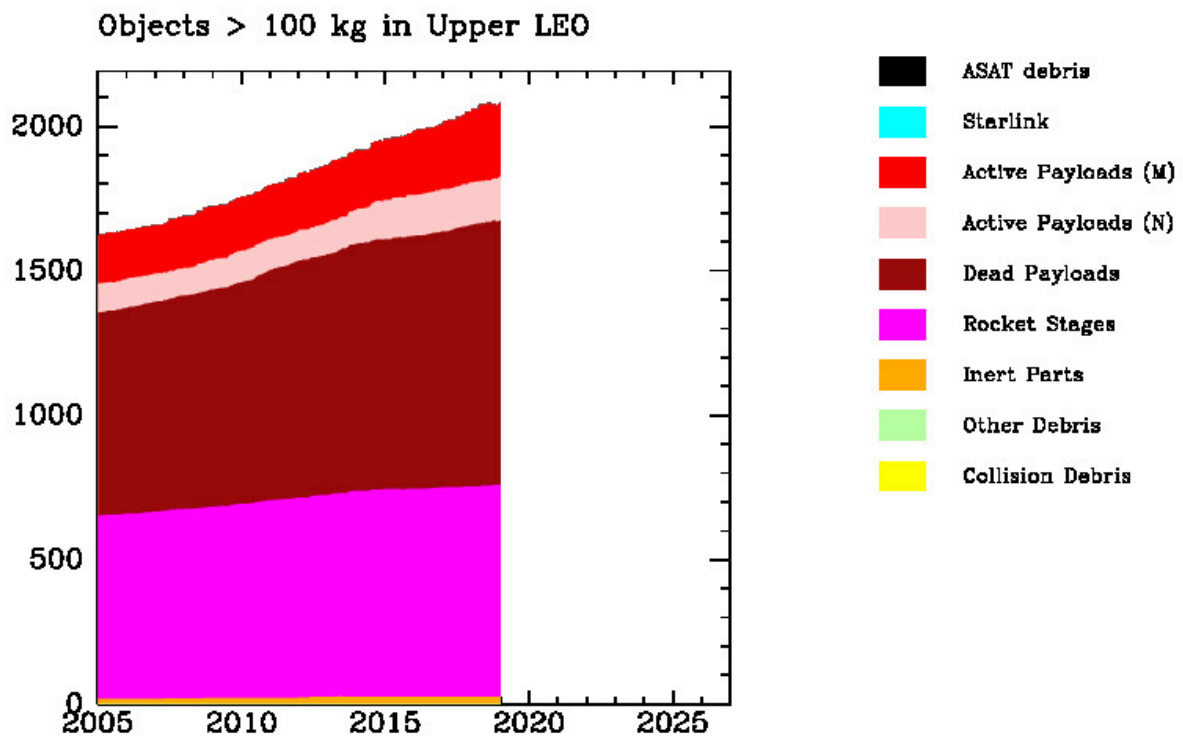


Figure 6: Time evolution of LEO debris and active satellite population (d): Big (>100 kg) objects in upper (> 600 km) LEO

4.1 Disposal of launch vehicle upper stages

For the 112 successful orbital launches I look at which launches went to which type of orbit, and whether rockets disposed of their upper stages in a controlled deorbit or whether they left one or more stages (and possibly associated debris) in orbit to decay naturally. Upper stages that achieve Earth escape are also counted as a controlled disposal.

The main orbit categories are SSO (Sun-synchronous low Earth orbit), ISS (International Space Station launches), LSS (Other low orbit space stations, currently only the Chinese one); Other LEO (Low Earth orbit except for SSO and ISS/LSS); GTO (Geotransfer orbit), Supersync transfer (geotransfer with initial apogee well above GEO); GEO direct (where launch vehicle upper stage deploys payload directly in geostationary orbit), 12-hour circular MEO orbits (as used by GPS), Molniya elliptical orbit, and deep space (beyond about 150,000 km and ‘other high orbit’).

I will note that some SSO/other LEO launches perform a perigee lowering disposal burn to ensure stage reentry within a few weeks. However, the reentry location is still uncontrolled in these cases. Cases where SSO/LEO perigee lowering is to below 180 km are noted with an asterisk in the table.

Table 13: Launches by orbit and launch-associated Earth orbit debris, 2018

Launch vehicle	Total launches	Launches with up- per stage disposal	Stages left in Earth orbit	Other LV debris
(a) SSO				
AESP Soyuz	2	2	0	0
AESP Vega	2	2	0	0
CALT CZ-11	3	0	3 (1*)	0
CALT CZ-2C	4	1	4	4
CASIC KZ-1A	1	0	1	0
EUROK Rokot	1	0	1	0
ISRO PSLV/GSLV	3	0	3	1
JAXA Epsilon	1	0	2	0
MHI H-II	3	0	3	3
MORF Soyuz	1	0	1	0
ROSK Soyuz	2	2	0	0
SAST CZ-2D	7	3	4	24
SAST CZ-4	4	1	3	8
SPX Falcon 9	3	3	0	0
Total SSO	37	14	25 (1*)	40
(b) ISS				
MHI H-II	1	1	0	0
NGIS Antares	1	0	1	0
OATKD Antares	1	0	1	0
ROSK Soyuz	6	0	6	0
SPX Falcon 9	3	3	0	0
Total ISS	12	4	8	0

Table 13 (cont):				
Launch vehicle	Total launches	Launches with up- per stage disposal	Stages left in Earth orbit	Other LV debris
(c) LSS				
(d) Other LEO				
BOE Delta 2	1	1	0	0
BOE Delta 4	1	1	0	0
CALT CZ-2C	2	0	2	4
JAXA SS-520	1	0	1	0
MORF Rokot	1	0	1	0
MORF Soyuz	1	0	1	0
RLABU Electron	3	0	6	0
SAST CZ-2D	1	1	1	0
SAST CZ-4	1	0	1	4
SPX Falcon 9	4	4	0	0
Total Other LEO	16	7	13	8
(e) GTO Transfer				
AESP Ariane 5/6	4	0	4	4
CALT CZ-3	4	0	4	0
ISRO GSLV3	1	0	1	0
ISRO PSLV/GSLV	3	0	3	0
LM Atlas V	3	1	2	0
SPX Falcon 9	6	0	6	0
Total GTO Transfer	21	1	20	4

Table 13 (cont):				
Launch vehicle	Total launches	Launches with up- per stage disposal	Stages left in Earth orbit	Other LV debris
(f) SuperSync Transfer				
SPX Falcon 9	2	0	2	0
Total SuperSync Transfer	2	0	2	0
(g) GEO Direct				
KHRO Proton	2	0	2	2
LM Atlas V	1	0	1	1
Total GEO Direct	3	0	3	3
(h) MEO Transfer				
CALT CZ-3	1	0	1	0
SPX Falcon 9	1	1	0	0
Total MEO Transfer	2	1	1	0
(i) 12-h MEO Direct				
AESP Ariane 5/6	1	0	1	0
AESP Soyuz	1	0	1	0
CALT CZ-3	8	0	16	0
MORF Soyuz	2	0	2	0
Total 12-h MEO Direct	12	0	20	0
(j) Molniya				
(k) Deep Space				
AESP Ariane 5/6	1	0	0	0
BOE Delta 4	1	0	0	0
CALT CZ-3	1	0	1	0
LM Atlas V	1	0	0	0
SAST CZ-4	1	0	1	0
SPX Falcon 9	1	0	0	0
SPX Falcon Heavy	1	0	0	0
Total Deep Space	7	0	2	0
Total Overall	112	27	94 (1*)	55

4.2 Orbituaries

Table 14 gives statistics on reentries in 2018, not including deliberate deorbit and landing.
(Acknowledgements to Collin Krum for the revised section name).

Table 14: Uncontrolled Reentries 2018

	Number	Mass (t)
Active Payloads	88	21.3
Dead Payloads	16	14.9
Rocket Bodies	28	51.3
Operational debris	40	5.7
ASAT debris	15	-
Collision debris	23	-
Other fragment debris	32	-

In this table, ‘active payloads’ represents payloads which were thought to be active at the beginning of the year.

Controlled deorbits and landings

The reentry of the Tiangong-1 spacelab on Apr 1 gained a lot of media attention, emphasizing the fact that the uncontrolled reentry of massive payloads is now rather rare, in contrast to the 1970s and 1980s when much more massive satellites were allowed to reenter by design.

41 first-generation Iridium satellites, each with a mass around 560 kg, had their orbits lowered to ensure rapid decay but uncontrolled reentry during 2018. 10 had reentered previously; 44 of the satellites remained in orbit at the beginning of 2019.

In addition to natural reentries, there were 7 controlled landings and 4 controlled deorbitings of spacecraft during 2018, representing the safe removal of around 96 tonnes from the orbital environment. 4 Russian Soyuz ships landed in Kazakhstan (I do not include the suborbital abort of Soyuz MS-10 here) and four Dragon spacecraft splashed down in the Pacific near California.

Four ISS cargo ships (one Cygnus, one HTV and two Progress) were deorbited; three were sent down over the South Pacific east of New Zealand, but the HTV was deorbited near Japan and ejected a recoverable capsule during descent.

Nine objects reentered and burned up on controlled trajectories associated with landings of spacecraft (Soyuz orbital and propulsion modules, Dragon trunks).

In addition, 30 rocket stages were deorbited after only one or two Earth orbits (1 Centaur, 1 Delta 2, 1 Delta 4, 11 Falcon 9, 2 Vega AVUM, 4 Fregat, 1 H-2B, 6 Chinese CZ-2D, two Yuanzheng stages, and (possibly) an Electron kick stage) Only six of these were assigned catalog numbers. A further 17 rocket stages were inserted into slightly suborbital trajectories that ensured controlled disposal without the need for a deorbit burn (Ariane EPC, Vega Z9A, Proton stage 3, PSLV stage 3, some Soyuz-2 stage 3, and the second stage of the CZ-2C/YZ-1S launch).

Table 15: Most massive uncontrolled reentries, 2018

COSPAR	Spacecraft	Date	Mass/kg	Location	Coords	Life (d)	Type
2017-086D	Zenit 2SB80.5 Stage 2	2018 Jan 27 2332	8300.0	74.3W 9.2S		32.19	Reentry
2017-031B	GSLV-3 D1 Stage 2	2018 Feb 8 0400?	4400.0	136E 14N?		247.67	Reentry
2011-053A	Tiangong 1	2018 Apr 2 0016	7500.0	164.3W 13.6S		2376.46	Reentry
2017-067B	Falcon 9-045 Stage 2	2018 Oct 27 1610?	4000.0	Pacific		361.86	Reentry

Table 16: Landings and deorbits, 2018

COSPAR	Spacecraft	Date	Mass/kg	Location	Coords	Life (d)	Type
2017-080A	Dragon CRS-13	2018 Jan 13 1537	6557.0	30.1N 123.0W		29.00	Landing
2017-054A	Soyuz MS-06	2018 Feb 28 0231:20	2876.0	69.61E 47.36N		168.22	Landing
2018-032A	Dragon CRS-14	2018 May 5 1900?	6444.0	30.0N 122.9W		32.94	Landing
2017-081A	Soyuz MS-07	2018 Jun 3 1239:15	2903.0	69.62E 47.35N		168.22	Landing
2018-055A	Dragon CRS-15	2018 Aug 3 2217?	6718.0	119W 28N		35.52	Landing
2018-026A	Soyuz MS-08	2018 Oct 4 1144:38	2903.0	69.61E 47.32N		196.75	Landing
2018-073	HSRC	2018 Nov 11 0137	180.0	155E 21N		49.32	Landing
2018-051A	Soyuz MS-09	2018 Dec 20 0502	2903.0	69.4E 47.2N		196.74	Landing
2017-065A	Progress MS-07	2018 Apr 26 0451	4325.0	S Pac.		193.84	Deorbit
2018-046A	SS J.R. Thompson	2018 Jul 30 2117	6104.0	165E 48S?		70.52	Deorbit
2018-019A	Progress MS-08	2018 Aug 30 0207	4325.0	41.2S 135.7W		197.75	Deorbit
2018-073A	Kounotori 7 gouki	2018 Nov 10 2138?	6265.0	155E 21N?		49.16	Deorbit

For rocket upper stages deorbited soon after launch, the target impact zones are often many degrees in length along the orbit track, so the locations given below in Table 17 should not be taken too seriously.

Table 17: Vehicles deorbited soon after launch, 2018

COSPAR	Spacecraft	Date	Mass/kg	Location	Coords	Life (d)	Type
2018-001A	Falcon 9-046 Stage 2	2018 Jan 8 0330?	9000.0	60E 30S?		0.10	Deorbit
2018-005B	Delta 379	2018 Jan 13 0033?	3450.0	S Ocean		0.10	Deorbit
2018-006	CZ-2D Y49 Stage 2	2018 Jan 13 0754?	4006.0	Antarctic?		0.03	Deorbit
2018-009B	Centaur AV-076	2018 Jan 20 1013	2020.0	169W 10N?		0.39	Deorbit
2018-014M	Fregat No. 122-03	2018 Feb 1 0734	1003.0	Indian O.		0.23	Deorbit
2018-015H	CZ-2D Y13 Stage 2	2018 Feb 2 0836?	4006.0	Antarctic?		0.03	Deorbit
2018-020D	Falcon 9-049 Stage 2	2018 Feb 22 1730?	4000.0	169W 42N		0.13	Deorbit
2018-025	CZ-2D Y50 Stage 2	2018 Mar 17 0754?	4006.0	Antarctic?		0.03	Deorbit
2018-030L	Falcon 9-053 Stage 2	2018 Mar 30 1610?	4000.0	-		0.08	Deorbit
2018-032	Falcon 9-054 Stage 2	2018 Apr 2 2125?	3000.0	107E 43S?		0.04	Deorbit
2018-047L	Falcon 9-056 Stage 2	2018 May 22 2153?	4000.0	S of S Afr.		0.09	Deorbit
2018-048C	CZ-2D Y20 Stage 2	2018 Jun 2 0501?	4006.0	-		0.03	Deorbit
2018-055D	Falcon 9-060 Stage 2	2018 Jun 29 1615?	3000.0	55W 32N?		0.27	Deorbit
2018-061L	Falcon 9-059 Stage 2	2018 Jul 25 1340?	5000.0	-		0.08	Deorbit
2018-066B	Vega AVUM VV12	2018 Aug 22 2343?	660.0	IOR		0.10	Deorbit
2018-070F	Delta 381	2018 Sep 15 1512	919.0	-		0.09	Deorbit
2018-073B	H-2B F7 Stage 2	2018 Sep 22 1932?	3400.0	-		0.07	Deorbit
2018-076B	Falcon 9-063 Stage 2	2018 Oct 8 0413?	4000.0	152W 11N?		0.08	Deorbit
2018-077C	Yuanzheng-1S Y1	2018 Oct 9 0340?	2500.0	IOR/SO?		0.04	Deorbit
2018-087B	Fregat-M No. 133-14	2018 Nov 7 0318?	1000.0	91E 6S		0.10	Deorbit
2018-094C	CZ-2D Y28 Stage 2	2018 Nov 20 0027?	4006.0	Antarctic?		0.03	Deorbit
2018-095B	Vega AVUM VV13	2018 Nov 21 0409?	660.0	IOR 90E 10S?		0.10	Deorbit
2018-099	Falcon 9-066 Stage 2	2018 Dec 3 2030?	4200.0	-		0.08	Deorbit
2018-101D	Falcon 9-067 Stage 2	2018 Dec 5 1915?	4000.0	125E 45S?		0.04	Deorbit
2018-102P	CZ-2D Y38 Stage 2	2018 Dec 7 0500?	4006.0	Antarctic?		0.03	Deorbit
2018-106B	Fregat-M No. 133-10	2018 Dec 19 1914?	1000.0	-		0.11	Deorbit
2018-109B	Falcon 9-064 Stage 2	2018 Dec 23 2021?	4000.0	0W 24S?		0.27	Deorbit
2018-111	Fregat No. 122-06	2018 Dec 27 0725	1000.0	120W 6N?		0.22	Deorbit
2018-112H	Yuanzheng-3 Y1	2018 Dec 29 1130?	2000.0	-		0.15	Deorbit

Table 18: Vehicles deorbited soon after separation, 2018

COSPAR	Spacecraft	Date	Mass/kg	Location	Coords	Sep Life (d)	Type
2017-080	Dragon Trunk	2018 Jan 13 1516?	2548.0	-		0.01	Deorbit
2017-054	Soyuz MS-06 BO	2018 Feb 28 0210?	1331.0	-		0.00	Deorbit
2017-054	Soyuz MS-06 PAO	2018 Feb 28 0210?	2131.0	-		0.00	Deorbit
2018-032	Dragon Trunk	2018 May 5 1845?	2177.0	-		0.01	Deorbit
2017-081	Soyuz MS-07 BO	2018 Jun 3 1218?	1312.0	-		0.00	Deorbit
2017-081	Soyuz MS-07 PAO	2018 Jun 3 1218?	2125.0	-		0.00	Deorbit
2018-055	Dragon Trunk	2018 Aug 3 2203?	2581.0	-		0.01	Deorbit
2018-026	Soyuz MS-08 BO	2018 Oct 4 1122?	1312.0	-		0.00	Deorbit
2018-026	Soyuz MS-08 PAO	2018 Oct 4 1122?	2125.0	-		0.00	Deorbit
2018-051	Soyuz MS-09 BO	2018 Dec 20 0442?	1312.0	-		0.00	Deorbit
2018-051	Soyuz MS-09 PAO	2018 Dec 20 0442?	2125.0	-		0.00	Deorbit

4.3 New geosynchronous satellites in 2018

Table 19 lists geosynchronous satellites launched or reaching GEO for the first time during 2018. The locations given are their positions at the end of the year.

Table 19: Geostationary satellites launched in 2018, ordered by longitude

Piece	Name	Operator	Location	Mission
2018-022A	GOES 17	NOAA	137.20W	Weather
2018-036A	CBAS-SATCOM	USAF SMC	112.17W	Communications
2018-059A	Telstar 19 Vantage	Telesat/Skynet	63.00W	Communications
2018-012B	SES-14	SES	47.50W	Communications
2018-033B	Hylas 4	Avanti	33.51W	Communications
2018-023A	Hispasat 30W-6	Hispasat	29.98W	Communications
2017-078A	Alcomsat 1	ASAL	24.83W	Communications
2018-012A	Al Yah 3	Yahsat Brasil	20.09W	Communications
2018-013A	GovSat-1	LuxGovSat	21.44E	Communications
2018-074A	Azerspace-2	Azerkosmos	43.81E	Communications
2018-035A	IRNSS-R11	ISRO	54.96E	Navigation
2018-089A	GSAT-29	ISRO	55.03E	Communications
2018-110A	Tongxin Jishu Shiyuan 3	China Aerospace	58.89E	Technology?
2018-105A	GSAT-7A	Indian AF/ISRO	62.76E	Communications
2018-100B	GSAT-11	ISRO	73.97E	Communications
2018-050A	Feng Yun 2H	CNMSC	78.93E	Weather
2018-064A	Merah Putih	Telkom	107.99E	Communications
2018-049A	SES-12	SES	113.68E	Communications
2018-057A	Beidou DW 32	CNSA	114.15E	Navigation
2018-044A	Bangabandhu 1	BCSCL	119.10E	Communications
2018-037A	Kosmos-2526	VVKO VKS/Voentelekom	128.02E	Communications
2018-100A	Cheollian 2A	KARI	128.26E	Weather
2018-041A	Apstar 6C	APT	134.00E	Communications
2018-069A	Telstar 18 Vantage	Telesat/Skynet	138.01E	Communications
2018-009A	SBIRS GEO-3	USAF AFSPC	138.84E	Early Warn
2018-085A	Beidou DW 41	CNSA	144.50E	Navigation
2018-033A	Kirameki 1	DSN Corp.	162.01E	Communications
2018-074B	Horizons 3e	Horizons	168.99E	Communications
2017-086A	Angosat 1	GGPEN	Drift orbit	Communications
2018-036B	EAGLE	AFRL/RV	Drift orbit	Early Warn
2018-036E	USA 285	AFRL/RV	Drift orbit	Early Warn
2018-036F	USA 286	AFRL/RV	Drift orbit	Technology
2018-036G	MYCROFT	AFRL/RV	Drift orbit	Technology
2018-090A	Es'hailsat-2	Es'hailsat	Drift orbit	Communications
2018-107A	Kosmos-2533	VVKO VKS/Voentelekom	Drift orbit	Communications
2018-110C	TJS-3 subsatellite	China Aerospace	Drift orbit	Technology
2018-079A	AEHF SV-4	USAF MCSW	Orbit raising	Communications

4.4 Retirements in the GEO belt

The GEO graveyard is taken to be 300 km or more above GEO (GEO is at 35786 km height.) Counts of objects in various regimes are shown below. The category 'Below GPZ' is defined to be objects 300 km or more below GEO. That is to say, 'Graveyard' is 36086 km or above, 'Below GPZ' is 35486 km or below.

GEO and the GEO Graveyard

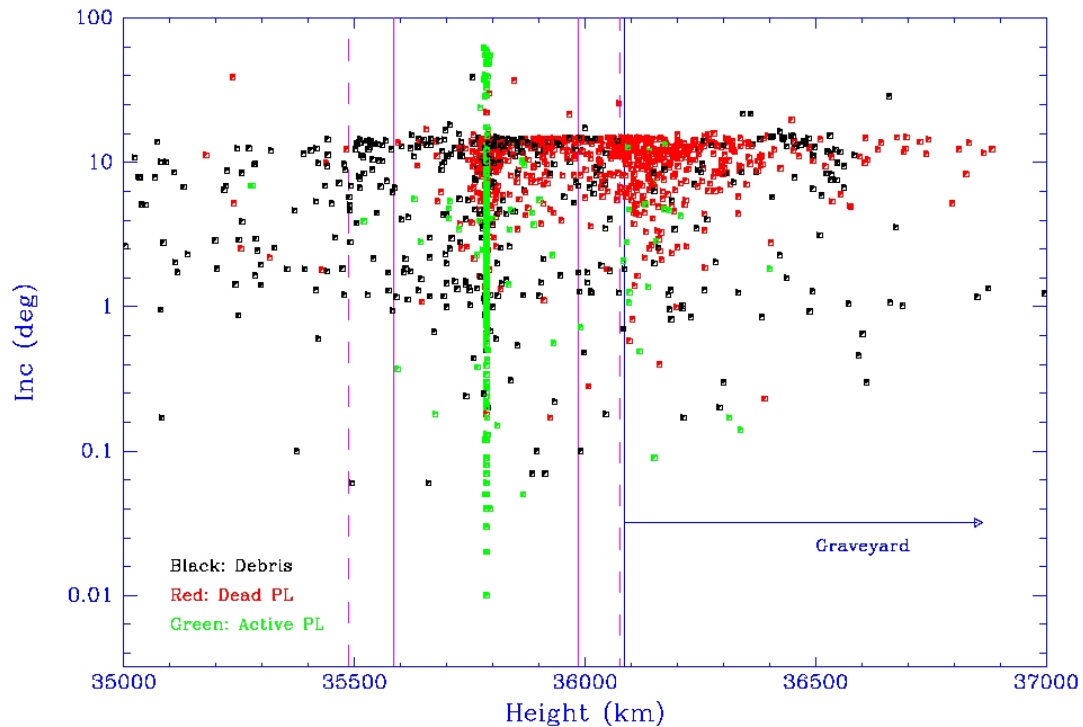


Figure 7: The figure shows log of orbital inclination vs orbital height for objects in the GEO region as of Dec 2018. Eccentricities are neglected. Active satellites (green), dead payloads (red) and debris (black) are indicated. The solid magenta lines are the GEO Protected Zone (GPZ = GEO \pm 200 km). Dashed magenta lines are GPZ \pm 100 km (GEO \pm 300 km) used in the results table. Blue line (GEO+300 km) indicates start of the GEO graveyard.

The recommended GEO graveyard orbit begins at an altitude of 36086 km, 300 km above GEO. The table gives perigee and apogee altitude minus the GEO height of 35786 km, and is ordered by perigee.

During 2018, 15 satellites were retired from GEO; however 5 failed to reach the recommended 300 km 'graveyard' clearance above GEO.

Table 20: GEO Population

	Active payloads	Dead payloads	Debris
Below GPZ	6	20	99
GPZ+-100	612	383	292
Graveyard	21	382	123
Total	639	785	514

Table 21: GEO retirements

ID	Satellite	Retired	Height above GEO in Jan 2019	Notes Notes
1972-010A	DSP F3	2018 Jan 8	94 x 181	
1996-063B	Africasat 2	2018 Jul 17	154 x 197	
2017-086A	Angosat 1	2018 Jan 16?	169 x 333	
1995-016A	Star One B2	2018 Jul 3	274 x 311	
1998-006A	Star One B3	2018 Aug 15	290 x 308	
1998-014A	NSS 806	2018 Oct 8	319 x 355	
2000-012A	Superbird B2	2018 Jun 14 1154	342 x 466	
1998-033A	Zhongxing 5A	2018 Jun 22	343 x 384	
1995-073A	Echostar I	2018 Jan 6	356 x 404	
2000-019A	EUTELSAT 16C	2018 Feb 8	358 x 389	
2003-043A	EUTELSAT 31A	2018 Jan 16	372 x 415	
2000-038A	Echostar VI	2018 May 25	392 x 448	
2002-043A	KALPANA-1	2018 Jul 25?	530 x 571	
2002-040A	EUTELSAT 59A	2018 Nov 12	543 x 585	
2000-046B	Nilesat 102	2018 Jun 24	631 x 643	
Newly cataloged near-GEO debris				
1969-013E	deb Transtage 17	2018 Feb 28	276 x 1474	
1969-013G	deb Transtage 17	2018 Feb 28	333 x 1469	
1969-013H	deb Transtage 17	2018 Feb 28	-588 x 1475	
1969-013J	deb Transtage 17	2018 Feb 28	521 x 1607	
1969-013K	deb Transtage 17	2018 Feb 28	-3064 x 1485	
1969-013M	deb Transtage 17	2018 Feb 28	-2972 x 1559	
1969-013P	deb Transtage 17	2018 Feb 28	-3685 x 2346	
1969-013S	deb Transtage 17	2018 Feb 28	-163 x 1578	
1969-013U	deb Transtage 17	2018 Feb 28	644 x 1532	
2018-036C	Centaur AV-079	2018 Apr 15	-3901 x -323	
2018-036D	EAGLE adapter?	2018 Apr 15	-653 x -476	
2018-037B	Briz-M No. 99563	2018 Apr 19	-82 x 6040	
2018-050C	FG-36 AKM	2018 Jun 6?	-314 x 430	
2018-050D	FY-2H imager cover	2018 Jun 6?	-319 x 310	

4.5 Debris events

There were 7 significant breakups during 2018.

In addition, in September of 2018, asteroid observers detected a number of high-area-to-mass objects (possibly insulation blankets) in orbits around 4000 x 80000 km with inclinations ranging from 10 to 50 degrees. It is unclear whether these reflect a then-recent breakup or just improvements in the ability to detect them.

The table indicates the number of objects cataloged so far from each, but note that often more objects are cataloged in later years following an event.

Table 22: Breakups and debris events 2018

Event date		Source object	Cataloged debris	Event orbit	
2018 Jan 12 2221?	A09086	Delta 379	6	1074 x 1085 x 106.00	Burn
2018 Feb 12 0955?	S43089	Fregat-SBB No. 2006	5	272 x 4059 x 50.44	Residual prop
2018 Feb 28 2100	S03692	Transtage 17	19	35846 x 37254 x 6.27	Residual prop?
2018 May 22 0206	S36407	DM2-116L SOZ-2	23	712 x 18811 x 65.33	Residual prop
2018 Aug 24 2159	S28920	DM2-106L SOZ-2	2	553 x 18933 x 65.28	Residual prop
2018 Aug 30 2204	S40209	Centaur AV-049	103	8202 x 35181 x 22.24	Unknown
2018 Dec 22 0513	S25417	Orbcomm B4	15	780 x 784 x 44.99	Battery explosion??

In addition, more fragments were cataloged from the earlier breakups. See the debris catalog [9] at

<https://planet4589.org/space/debris/debriscat/debris.html>

5 Acknowledgements

The bulk of the data presented here are extracted from my satellite and launch database, generated from open source media reports combined with analysis of US Space-Track orbital elements. The analysis has benefited from the opinions of many colleagues.

The author was formerly an employee of the Smithsonian Institution, but the work reported here was performed independently and does not represent the views of the Smithsonian.

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Appendix 1: 2018 Orbital Launch Attempts

LAUNCH ID	Launch date UTC	Launch vehicle	LV Flight ID	Site	Agency
2018-001	2018 Jan 8 0100	Falcon 9	046/B1043 F048	CC LC40	SPX
2018-002	2018 Jan 9 0324:33	Chang Zheng 2D	Y40	TYSC LC9	SAST
2018-003	2018 Jan 11 2318:04	Chang Zheng 3B/YZ-1	Y45	XSC LC3	CALT
2018-004	2018 Jan 12 0359	PSLV-XL	PSLV-C40	SHAR FLP	ISRO
2018-005	2018 Jan 12 2211	Delta 4M+(5,2)	D4-36/D379	VS SLC6	ULAB
2018-006	2018 Jan 13 0710	Chang Zheng 2D	Y49	JQ LC603	SAST
2018-007	2018 Jan 17 2106:11	Epsilon	E-3	USC EP	JAXA
2018-008	2018 Jan 19 0412:50	Chang Zheng 11	Y3	JQ LC43/95	CALT
2018-009	2018 Jan 20 0048:00	Atlas V 411	AV-076	CC SLC41	ULAL
2018-010	2018 Jan 21 0143	Electron	2	MAHIA LC1A	RLABN
2018-011	2018 Jan 25 0539:05	Chang Zheng 2C	Y36	XSC LC3	CALT
2018-012	2018 Jan 25 2220	Ariane 5ECA	VA241 (5101)	CSG ELA3	AE
2018-013	2018 Jan 31 2125	Falcon 9	050/B1032.2 F049	CC LC40	SPX
2018-014	2018 Feb 1 0207:18	Soyuz-2-1A	N 15000-002/122-03	VOST PUI5	FKA
2018-015	2018 Feb 2 0751:04	Chang Zheng 2D	Y13	JQ LC603	SAST
2018-016	2018 Feb 3 0503	SS-520	SS-520-5	USC K	JAXA
2018-017	2018 Feb 6 2045	Falcon Heavy	001/B1033.1	KSC LC39A	SPX
2018-018	2018 Feb 12 0503:04	Chang Zheng 3B/YZ-1	Y47	XSC LC2	CALT
2018-019	2018 Feb 13 0813:33	Soyuz-2-1A	U 15000-030	GIK-5 LC31	FKA
2018-020	2018 Feb 22 1417	Falcon 9	049/B1038.2 F050	VS SLC4E	SPX
2018-021	2018 Feb 27 0434	H-IIA 202	H-IIA-38	TNSC Y	MHI
2018-022	2018 Mar 1 2202:00	Atlas V 541	AV-077	CC SLC41	ULAL
2018-023	2018 Mar 6 0533	Falcon 9	051/B1044 F051	CC LC40	SPX
2018-024	2018 Mar 9 1710:06	Soyuz-ST-B	R 15000-013/133-06	CSG ELS	AE
2018-025	2018 Mar 17 0710:04	Chang Zheng 2D	Y50	JQ LC603	SAST
2018-026	2018 Mar 21 1744:23	Soyuz-FG	N 15000-066	GIK-5 LC1	FKA
2018-027	2018 Mar 29 1126:00	GSLV Mk II	GSLV-F08	SHAR SLP	ISRO
2018-028	2018 Mar 29 1738:42	Soyuz-2-1V	780-72- 005	GIK-1 LC43/4	VVKO
2018-029	2018 Mar 29 1756:04	Chang Zheng 3B/YZ-1	Y48	XSC LC2	CALT
2018-030	2018 Mar 30 1413:51	Falcon 9	053/B1041.2 F052	VS SLC4E	SPX
2018-031	2018 Mar 31 0322:08	Chang Zheng 4C	Y26	TYSC LC9	SAST
2018-032	2018 Apr 2 2030:38	Falcon 9	054/B1039.2 F053	CC LC40	SPX
2018-033	2018 Apr 5 2134:07	Ariane 5ECA	VA242 (5102)	CSG ELA3	AE
2018-034	2018 Apr 10 0425:03	Chang Zheng 4C	Y25	JQ LC603	SAST
2018-035	2018 Apr 11 2234:00	PSLV-XL	PSLV-C41	SHAR FLP	ISRO
2018-036	2018 Apr 14 2313:00	Atlas V 551	AV-079	CC SLC41	ULAL
2018-037	2018 Apr 18 2212:00	Proton-M/Briz-M	935-62/99563	GIK-5 LC81/24	KHRU
2018-038	2018 Apr 18 2251:30	Falcon 9	052/B1045 F054	CC LC40	SPX
2018-039	2018 Apr 25 1757:51	Rokot	492-1992-010P/72523	GIK-1 LC133/3	EUROK
2018-040	2018 Apr 26 0442	Chang Zheng 11	Y4	JQ LC43/95	CALT
2018-041	2018 May 3 1606:05	Chang Zheng 3B	Y55	XSC LC2?	CALT
2018-042	2018 May 5 1105:01	Atlas V 401	AV-078	VS SLC3E	ULAL
2018-043	2018 May 8 1828:40	Chang Zheng 4C	Y20	TYSC LC9	SAST
2018-044	2018 May 11 2014	Falcon 9	055/B1046 F055	KSC LC39A	SPX
2018-045	2018 May 20 2128:50	Chang Zheng 4C	Y27	XSC LC3	SAST
2018-046	2018 May 21 0844:06	Antares 230	2TRS2S1.6 (8)	MARS Pad 0A	OSC
2018-047	2018 May 22 1947:58	Falcon 9	056/B1043.2 F056	VS SLC4E	SPX
2018-048	2018 Jun 2 0413:04	Chang Zheng 2D	Y20	JQ LC603	SAST
2018-049	2018 Jun 4 0445	Falcon 9	057/B1040.2 F057	CC LC40	SPX
2018-050	2018 Jun 5 1307:04	Chang Zheng 3A	Y25	XSC LC2	CALT
2018-051	2018 Jun 6 1112:39	Soyuz-FG	U 15000-064	GIK-5 LC1	FKA
2018-052	2018 Jun 12 0420:00	H-IIA 202	H-IIA-39	TNSC Y	MHI
2018-053	2018 Jun 16 2146:28	Soyuz-2-1B	L 15000-020/112-06	GIK-1 LC43/4	VVKO
2018-054	2018 Jun 27 0330:06	Chang Zheng 2C	Y44	XSC LC2	CALT
2018-055	2018 Jun 29 0942:42	Falcon 9	060/B1045.2 F058	CC LC40	SPX
2018-056	2018 Jul 9 0356:14	Chang Zheng 2C	Y3	JQ LC603	CALT

2018-057	2018 Jul 9 2058:04	Chang Zheng 3A	Y27	XSC LC2?	CALT
2018-058	2018 Jul 9 2151:34	Soyuz-2-1A	N 15000-033	GIK-5 LC31	FKA
2018-059	2018 Jul 22 0550	Falcon 9	058/B1047 F059	CC LC40	SPX
2018-060	2018 Jul 25 1125:08	Ariane 5ES	VA244 (596)	CSG ELA3	AE
2018-061	2018 Jul 25 1139:26	Falcon 9	059/B1048 F060	VS SLC4E	SPX
2018-062	2018 Jul 29 0148:05	Chang Zheng 3B/YZ-1	Y49	XSC LC3	CALT
2018-063	2018 Jul 31 0300:04	Chang Zheng 4B	Y37	TYSC LC9	SAST
2018-064	2018 Aug 7 0518	Falcon 9	061/B1046.2 F061	CC LC40	SPX
2018-065	2018 Aug 12 0731	Delta 4H/Star 48BV	D4-37/D380	CC SLC37B	ULAB
2018-066	2018 Aug 22 2120:09	Vega	VV12	CSG ZLV	AE
2018-067	2018 Aug 24 2352:04	Chang Zheng 3B/YZ-1	Y50	XSC LC3	CALT
2018-068	2018 Sep 7 0315:05	Chang Zheng 2C	Y39	TYSC LC9?	CALT
2018-069	2018 Sep 10 0445	Falcon 9	062/B1049 F062	CC LC40	SPX
2018-070	2018 Sep 15 1302	Delta 7420-10C	D381	V SLC2W	ULAB
2018-071	2018 Sep 16 1638	PSLV	PSLV-C42	SHAR FLP	ISRO
2018-072	2018 Sep 19 1407:04	Chang Zheng 3B/YZ-1	Y51	XSC LC2	CALT
2018-073	2018 Sep 22 1752:27	H-IIB	H-IIB-F7	TNSC Y2	MHI
2018-074	2018 Sep 25 2238	Ariane 5ECA	VA243 (5103)	CSG ELA3	AE
2018-075	2018 Sep 29 0413:30	Kuaizhou-1A	Y8	JQ LC43/95	EXPACE
2018-076	2018 Oct 8 0221:28	Falcon 9	063/B1048.2 F063	VS SLC4E	SPX
2018-077	2018 Oct 9 0243:03	Chang Zheng 2C/YZ-1S	Y38	JQ LC603	CALT
2018-F01	2018 Oct 11 0840:15	Soyuz-FG	U 15000-062	GIK-5 LC1	FKA
2018-078	2018 Oct 15 0423:04	Chang Zheng 3B/YZ-1	Y52	XSC LC3	CALT
2018-079	2018 Oct 17 0415	Atlas V 551	AV-073	CC SLC41	ULAL
2018-080	2018 Oct 20 0145:28	Ariane 5ECA	VA245 (5105)	CSG ELA3	AE
2018-081	2018 Oct 24 2257	Chang Zheng 4B	Y34	TYSC LC9	SAST
2018-082	2018 Oct 25 0015:18	Soyuz-2-1B	780-31- 216	GIK-1 LC43/4	VVKO
2018-F02	2018 Oct 27 0800	Zhuque-1	-	JQ LC43/95?	LANDSP
2018-083	2018 Oct 29 0043:14	Chang Zheng 2C	Y22	JQ LC603	CALT
2018-084	2018 Oct 29 0408	H-IIA 202	H-IIA-40	TNSC Y	MHI
2018-085	2018 Nov 1 1557:04	Chang Zheng 3B	Y41	XSC LC2	CALT
2018-086	2018 Nov 3 2017:53	Soyuz-2-1B	R 15000-036/112-08	GIK-1 LC43/4	VVKO
2018-087	2018 Nov 7 0047:28	Soyuz-ST-B	U 15000-014/133-14	CSG ELS	AE
2018-088	2018 Nov 11 0350	Electron	3	MAHIA LC1A	RLABN
2018-089	2018 Nov 14 1138	GSLV Mk III	LVM3-D2	SHAR SLP	ISRO
2018-090	2018 Nov 15 2046	Falcon 9	065/B1047.2 F064	KSC LC39A	SPX
2018-091	2018 Nov 16 1814:08	Soyuz-FG	N 15000-068	GIK-5 LC1	FKA
2018-092	2018 Nov 17 0901:23	Antares 230	2TRS2S1.9 (9)	MARS Pad 0A	NGIS
2018-093	2018 Nov 18 1807:04	Chang Zheng 3B/YZ-1	Y53	XSC LC3	CALT
2018-094	2018 Nov 19 2340:04	Chang Zheng 2D	Y28	JQ LC603	SAST
2018-095	2018 Nov 21 0142:31	Vega	VV13	CSG ZLV	AE
2018-096	2018 Nov 29 0427:30	PSLV	PSLV-C43	SHAR FLP	ISRO
2018-097	2018 Nov 30 0227:34	Rokot	492-3921-126/72529	GIK-1 LC133/3	KVR
2018-098	2018 Dec 3 1131:52	Soyuz-FG	N 15000-067	GIK-5 LC1	FKA
2018-099	2018 Dec 3 1834:05	Falcon 9	066/B1046.3 F065	VS SLC4E	SPX
2018-100	2018 Dec 4 2037:07	Ariane 5ECA	VA246 (5104a)	CSG ELA3	AE
2018-101	2018 Dec 5 1816:16	Falcon 9	067/B1050 F066	CC LC40	SPX
2018-102	2018 Dec 7 0412	Chang Zheng 2D	Y38	JQ LC603	SAST
2018-103	2018 Dec 7 1823	Chang Zheng 3B	Y30	XSC LC2	CALT
2018-104	2018 Dec 16 0633	Electron	4	MAHIA LC1A	RLABN
2018-105	2018 Dec 19 1040	GSLV Mk II	GSLV-F11	SHAR SLP	ISRO
2018-106	2018 Dec 19 1637:14	Soyuz-ST-A	U 15000-009/133-10	CSG ELS	AE
2018-107	2018 Dec 21 0020:00	Proton-M/Briz-M	935-63/99565	GIK-5 LC81/24	KHRU
2018-108	2018 Dec 21 2351	Chang Zheng 11	Y5	JQ LC43/95	CALT
2018-109	2018 Dec 23 1351	Falcon 9	064/B1054 F067	CC LC40	SPX
2018-110	2018 Dec 24 1653:04	Chang Zheng 3C	Y17	XSC LC3	CALT
2018-111	2018 Dec 27 0207:18	Soyuz-2-1A	Ya15000-003/122-06	VOST PU1S	FKA
2018-112	2018 Dec 29 0800:05	Chang Zheng 2D/YZ-3	Y35	JQ LC603	SAST

Note: Owner, Agency and Country codes in the tables are defined in <http://planet4589.org/space/lvdb/sdb/Orgs>.

Launch Sites are defined in <http://planet4589.org/space/lvdb/sdb/Sites>.

Appendix 2: Satellite payloads launched or deployed in 2018

LaunchNo	DeployNo	CATID	LAUNCHID	Name	LaunchDate UTC	Appendix 2(a): Payloads included in annual statistics	Deploy date UTC	Owner	Country	Perigee	Apogee	Inc	Status
1		S43098	2018-001A	USA 280	2018 Jan 8 01:00			NROCS	US	657	659	52.00	Reentered Att to Falcon 9-046 Stage 2
2	1	S43099	2018-002A	Gaoling yi hao 03 xing	2018 Jan 9 03:24:33		2018 Jan 9 03:36?	BHSI	CN	517	536	97.58	In Earth orbit
3	2	S43100	2018-002B	Gaoling yi hao 04 xing	2018 Jan 9 03:24:33		2018 Jan 9 03:36?	BHSI	CN	515	535	97.58	Reentered
4	3	S43107	2018-003A	Beidou DW 26	2018 Jan 11 23:18:04		2018 Jan 12 03:03?	CNSA	CN	21514	21541	55.03	In Earth orbit
5	4	S43108	2018-003B	Beidou DW 27	2018 Jan 11 23:18:04		2018 Jan 12 03:03?	CNSA	CN	21516	21539	55.02	In Earth orbit
6	5	S43111	2018-004A	Cartosat-2 Series Satellite	2018 Jan 12 03:59		2018 Jan 12 04:15	ISRO	IN	495	510	97.56	In Earth orbit
7	6	S43113	2018-004C	LEO Vantage 1	2018 Jan 12 03:59		2018 Jan 12 04:16	TCANL	CA	494	506	97.56	In Earth orbit
8	7	S43114	2018-004D	ICEYE-X1	2018 Jan 12 03:59		2018 Jan 12 04:16	ICEYE	FI	494	506	97.56	Reentered
9	8	S43115	2018-004E	VividX2	2018 Jan 12 03:59		2018 Jan 12 04:18	EARU/KSPOC	UK	493	505	97.56	Reentered
10	9	S43116	2018-004F	INS-1C	2018 Jan 12 03:59		2018 Jan 12 04:18	ISRO	IN	495	508	97.56	Reentered
11	10	S43118	2018-004H	CORVUS BC3	2018 Jan 12 03:59		2018 Jan 12 04:20?	ADIG	US	496	502	97.55	Reentered
12	11	S43119	2018-004J	Flock 3p-3	2018 Jan 12 03:59		2018 Jan 12 04:20?	PLAN	US	495	501	97.56	Reentered
13	12	S43120	2018-004K	Flock 3p-2	2018 Jan 12 03:59		2018 Jan 12 04:20?	PLAN	US	493	504	97.56	Reentered
14	13	S43121	2018-004L	Flock 3p-1	2018 Jan 12 03:59		2018 Jan 12 04:20?	PLAN	US	493	504	97.56	Reentered
15	14	S43122	2018-004M	Flock 3p-4	2018 Jan 12 03:59		2018 Jan 12 04:20?	PLAN	US	492	504	97.55	Reentered
16	15	S43123	2018-004N	Lemur-2-McCafferty	2018 Jan 12 03:59		2018 Jan 12 04:20?	SPIRE	US	493	504	97.56	Reentered
17	16	S43124	2018-004P	Lemur-2-PeterWebster	2018 Jan 12 03:59		2018 Jan 12 04:20?	SPIRE	US	493	504	97.56	Reentered
18	17	S43125	2018-004Q	Lemur-2-BrownCow	2018 Jan 12 03:59		2018 Jan 12 04:20?	SPIRE	US	493	504	97.56	Reentered
19	18	S43126	2018-004R	Lemur-2-DaveWilson	2018 Jan 12 03:59		2018 Jan 12 04:20?	SPIRE	US	495	502	97.56	Reentered
20	19	S43127	2018-004S	DemoSat-2	2018 Jan 12 03:59		2018 Jan 12 04:20?	ASTRAN	US	494	505	97.56	Reentered
21	20	S43128	2018-004T	Microsat-TD	2018 Jan 12 03:59		2018 Jan 12 05:44	DRDO/ISRO	IN	327	368	97.22	Reentered
22	21	S43130	2018-004V	Akyd-6A	2018 Jan 12 03:59		2018 Jan 12 04:20?	PLES	US	493	505	97.56	Reentered
23	22	S43131	2018-004W	MicroMAS-2A	2018 Jan 12 03:59		2018 Jan 12 04:20?	MITLL	US	493	505	97.56	Reentered
24	23	S43132	2018-004X	PICSAT	2018 Jan 12 03:59		2018 Jan 12 04:16	OPM	F	494	505	97.56	Reentered
25	24	S43133	2018-004Y	Papillon	2018 Jan 12 03:59		2018 Jan 12 04:20?	CNU	KR	493	506	97.55	Reentered
26	25	S43134	2018-004Z	? KHUSAT-3	2018 Jan 12 03:59		2018 Jan 12 04:20?	KHUS	KR	493	506	97.56	Reentered
27	26	S43135	2018-004A	? KAUSAT-5	2018 Jan 12 03:59		2018 Jan 12 04:20?	KRAU	KR	493	506	97.56	Reentered
28	27	S43136	2018-004B	? TOM	2018 Jan 12 03:59		2018 Jan 12 04:20?	YONS	KR	494	510	97.42	Reentered
29	28	S43137	2018-004AC	AMISAT AO-92	2018 Jan 12 03:59		2018 Jan 12 04:20?	AMINA	US	494	507	97.56	Reentered
30	29	S43138	2018-004AD	STEP Cube Lab	2018 Jan 12 03:59		2018 Jan 12 04:20?	CHOSU	KR	492	506	97.56	Reentered
31	30	S43139	2018-004AE	SpaceBEE 4	2018 Jan 12 03:59		2018 Jan 12 04:20?	SWARM	US	493	505	97.56	Reentered
32	31	S43140	2018-004AF	SpaceBEE 3	2018 Jan 12 03:59		2018 Jan 12 04:20?	SWARM	US	493	505	97.56	Reentered
33	32	S43141	2018-004AG	SpaceBEE 2	2018 Jan 12 03:59		2018 Jan 12 04:20?	SWARM	US	493	505	97.56	Reentered
34	33	S43142	2018-004AH	SpaceBEE 1	2018 Jan 12 03:59		2018 Jan 12 04:20?	SWARM	US	493	505	97.56	Reentered
35	34	S43143	2018-004AJ	CICERO-7	2018 Jan 12 03:59		2018 Jan 12 04:20?	GEOOPT	US	493	504	97.56	Reentered
36	35	S43144	2018-004AK	GEOSTARE SV1	2018 Jan 12 03:59		2018 Jan 12 04:20?	LNJ/TYVAK	US	493	504	97.56	Reentered
37	-	A09102	2018-004G	JERRY	2018 Jan 12 03:59		-	YONS	KR	494	510	97.42	Reentered Att to TOM
38	36	S43145	2018-005A	USA 281	2018 Jan 12 22:11		2018 Jan 12 23:31?	NROC	US	1047	1057	106.00	In Earth orbit
39	37	S43146	2018-006A	Ludi Kancha Weixing san hao	2018 Jan 13 07:10		2018 Jan 13 07:20?	ZLZB/GCDX?	CN	488	503	97.34	In Earth orbit
40	38	S43152	2018-007A	ASNARO-2	2018 Jan 17 21:06:11		2018 Jan 17 21:58	JSS	J	493	505	97.38	In Earth orbit
41	39	S43155	2018-008A	Hunan xiangjun xinqu hao	2018 Jan 19 04:12:50		2018 Jan 19 04:25?	CTYK	CN	527	547	97.55	Reentered
42	40	S43156	2018-008B	Huai hao Enlai xing	2018 Jan 19 04:12:50		2018 Jan 19 04:25?	HQZS/NUJST	CN	529	547	97.54	Reentered
43	41	S43157	2018-008C	KIPP	2018 Jan 19 04:12:50		2018 Jan 19 04:25?	KEPLER	CA	528	546	97.54	Reentered
44	42	S43158	2018-008D	Quan Tu Tong 1	2018 Jan 19 04:12:50		2018 Jan 19 04:25?	QTT	CN	528	546	97.54	Reentered
45	43	S43159	2018-008E	Deqing-1	2018 Jan 19 04:12:50		2018 Jan 19 04:25?	CGSTZ/CGSTL	CN	523	547	97.54	In Earth orbit
46	44	S43160	2018-008F	Jilin-1 Lingye-2	2018 Jan 19 04:12:50		2018 Jan 19 04:25?	CGSTL	CN	527	546	97.54	In Earth orbit
47	45	S43162	2018-009A	SBIRS GEO-3	2018 Jan 20 00:48:00		2018 Jan 20 01:30	AFSPC	US	35758	35815	6.33	In Earth orbit
48	46	S43163	2018-010A	Dove Pioneer	2018 Jan 21 01:43		2018 Jan 21 01:51	PLAN	US	288	533	82.93	Reentered
49	47	S43165	2018-010C	Lemur-2-Marshal	2018 Jan 21 01:43		2018 Jan 21 01:51	SPIRE	US	494	534	82.93	Reentered
50	48	S43167	2018-010E	Lemur-2-Tailham-ATC	2018 Jan 21 01:43		2018 Jan 21 01:51	SPIRE	US	492	532	82.93	Reentered
51	49	S43168	2018-010F	Humanity Star	2018 Jan 21 01:43		2018 Jan 21 01:51	RLABN	NZ	295	530	82.92	Reentered
52	50	S43169	2018-011A	Weima-1 01 weixing	2018 Jan 25 05:39:05		2018 Jan 25 05:52	WEINA	CN	594	601	35.00	In Earth orbit
53	51	S43170	2018-011B	Yaogan 30 hao 04 zu 01 xing	2018 Jan 25 05:39:05		2018 Jan 25 05:52	ZLZB	CN	591	601	34.99	In Earth orbit
54	52	S43171	2018-011C	Yaogan 30 hao 04 zu 02 xing	2018 Jan 25 05:39:05		2018 Jan 25 05:52	ZLZB	CN	591	601	34.99	In Earth orbit
55	53	S43172	2018-011D	Yaogan 30 hao 04 zu 03 xing	2018 Jan 25 05:39:05		2018 Jan 25 05:52	ZLZB	CN	591	602	34.99	In Earth orbit
56	54	S43174	2018-012A	AI Yah 3	2018 Jan 25 22:20		2018 Jan 25 22:55	YAHBR	BR	30077	42365	2.71	In Earth orbit
57	55	S43175	2018-012B	SFS-14	2018 Jan 31 21:25		2018 Jan 31 22:47	SESSA	L	9001	53246	13.09	Sold from SESSA to SESIBR
58	56	S43178	2018-013A	GovSat-1	2018 Jan 31 21:25		2018 Jan 31 21:57	LUXG	L	35772	35801	0.02	In Earth orbit
59	57	S43180	2018-014A	Kanopus-V No. 3	2018 Feb 1 02:07:18		2018 Feb 1 03:06	VNIIE MI	RU	505	510	97.47	In Earth orbit
60	58	S43181	2018-014B	Kanopus-V No. 4	2018 Feb 1 02:07:18		2018 Feb 1 03:12	VNIIE MI	RU	500	509	97.47	In Earth orbit

61	S43182	2018-014C	Lemur-2-Jin-Luen	2018 Feb 1 0207:18	2018 Feb 1 0437	SPiRE	US	571	589	97.73	In Earth orbit
62	S43183	2018-014D	Lemur-2-UramChanSol	2018 Feb 1 0207:18	2018 Feb 1 0437	SPiRE	US	571	589	97.73	Reentered
63	S43184	2018-014E	Lemur-2-Kadi	2018 Feb 1 0207:18	2018 Feb 1 0437	SPiRE	US	571	588	97.73	In Earth orbit
64	S43185	2018-014F	Lemur-2-TheNickMolo	2018 Feb 1 0207:18	2018 Feb 1 0433	SPiRE	US	571	588	97.73	Reentered
65	S43186	2018-014G	S-NET D	2018 Feb 1 0207:18	2018 Feb 1 0433	TUB	D	572	588	97.73	In Earth orbit
66	S43187	2018-014H	S-NET B	2018 Feb 1 0207:18	2018 Feb 1 0433	TUB	D	571	588	97.73	In Earth orbit
67	S43188	2018-014J	S-NET A	2018 Feb 1 0207:18	2018 Feb 1 0433	TUB	D	571	588	97.73	In Earth orbit
68	S43189	2018-014K	S-NET C	2018 Feb 1 0207:18	2018 Feb 1 0433	TUB	D	571	588	97.73	In Earth orbit
69	A09123	2018-014	D-Star One v1.1 Phoenix	-	-	GOS	D	571	588	97.73	Reentered Alt to Fregat No. 122-03
70	S43192	2018-015A	FengManNiu 1	2018 Feb 2 0751:04	2018 Feb 2 0759:57	LINK	CN	508	507	97.22	Reentered
71	S43194	2018-015C	Zhangheng 1-01	2018 Feb 2 0751:04	2018 Feb 2 0800:07	CAS	CN	488	509	97.34	In Earth orbit
72	S43195	2018-015D	Ada	2018 Feb 2 0751:04	2018 Feb 2 0800:07	URLUGUS	UY	493	503	97.21	Reentered
73	S43196	2018-015E	GOMX-4B	2018 Feb 2 0751:04	2018 Feb 2 0800:07	GOMSP/ESA	DK	483	506	97.33	Reentered
74	S43197	2018-015F	Ulloraq	2018 Feb 2 0751:04	2018 Feb 2 0800:07	FMI	DK	486	508	97.33	Reentered
75	S43199	2018-015H	Shaoman Xing	2018 Feb 2 0751:04	2018 Feb 2 0800:07	SHAOX/BTWK	CN	483	507	97.33	Reentered
76	S43204	2018-015K	Maryam	2018 Feb 2 0751:04	2018 Feb 2 0800:07	URLUGUS	UY	487	508	97.33	Reentered
77	S43201	2018-016A	Tasuki	2018 Feb 3 0503	2018 Feb 3 0510	TOK	J	187	2008	30.90	Reentered
78	S43205	2018-017A	Tesla Roadster	2018 Feb 6 2045	-	SPX	US	180	6939	29.02	Solar orbit Alt to Falcon Heavy-001 Stage
79	S43207	2018-018A	Beidou DW 29	2018 Feb 12 0503:04	2018 Feb 12 0848:87	CNSA	CN	21501	21554	54.99	In Earth orbit
80	S43208	2018-018B	Beidou DW 28	2018 Feb 12 0503:04	2018 Feb 12 0848:87	CNSA	CN	21505	21550	54.99	In Earth orbit
81	S43211	2018-019A	Progress MS-08	2018 Feb 13 0813:33	2018 Feb 13 0822	RKKE	RU	318	324	51.64	Deorbited
82	S43597	1998-067PJ	Tanyusha YuZGU No. 3	2018 Feb 13 0813:33	2018 Aug 15 1643	YUZGU	RU	402	405	51.64	Reentered
83	S43598	1998-067PK	Tanyusha YuZGU No. 4	2018 Feb 13 0813:33	2018 Aug 15 1645	YUZGU	RU	400	408	51.64	Reentered
84	S43215	2018-020A	Paz	2018 Feb 22 1417	2018 Feb 22 1426	HISD	E	503	518	97.46	In Earth orbit
85	S43216	2018-020B	Tintin A	2018 Feb 22 1417	2018 Feb 22 1500:07	SPXS	US	500	517	97.46	Reentered
86	S43217	2018-020C	Tintin B	2018 Feb 22 1417	2018 Feb 22 1500:07	SPXS	US	516	499	97.46	Reentered
87	S43223	2018-021A	JSE kouigaku 6 gouki	2018 Feb 27 0434	2018 Feb 27 0454:47	CSICE	J	485	499	97.21	In Earth orbit
88	S43226	2018-022A	GOES 17	2018 Mar 1 2202:00	2018 Mar 2 0134	NOAA	US	35779	35794	0.05	In Earth orbit
89	S43228	2018-023A	Hispasat 30W-6	2018 Mar 6 0533	2018 Mar 6 0605	HISP	E	35774	35798	0.05	In Earth orbit
90	S43229	2018-023B	PODSAT	2018 Mar 6 0533	2018 Mar 6 0650:07	DARPA2	US	180	22166	27.07	In Earth orbit
91	S43231	2018-024A	O3b FMI5	2018 Mar 9 1710:06	2018 Mar 9 1932	O3BS	UK	8061	8069	0.05	Renamed from O3b FMI5, sold from O3BS to SESAGB
92	S43232	2018-024B	O3b FMI6	2018 Mar 9 1710:06	2018 Mar 9 1911	O3BS	UK	8061	8069	0.05	Renamed from O3b FMI6, sold from O3BS to SESAGB
93	S43233	2018-024C	O3b FMI4	2018 Mar 9 1710:06	2018 Mar 9 1932	O3BS	UK	8062	8069	0.05	Renamed from O3b FMI4, sold from O3BS to SESAGB
94	S43234	2018-024D	O3b FMI3	2018 Mar 9 1710:06	2018 Mar 9 1911	O3BS	UK	8062	8069	0.05	Renamed from O3b FMI3, sold from O3BS to SESAGB
95	S43236	2018-025A	Ludi Kancha Weixing si hao	2018 Mar 17 0710:04	2018 Mar 17 0720:07	ZLZB/GCDX?	CN	489	502	97.33	In Earth orbit
96	S43238	2018-026A	Soyuz MS-08	2018 Mar 21 1744:23	2018 Mar 21 1753:11	RKKE	RU	311	320	51.64	Landed
97	S43241	2018-027A	GSAT-6A	2018 Mar 29 1126:00	2018 Mar 29 1143	ISRO	IN	25977	36370	3.20	In Earth orbit
98	S43243	2018-028A	Kosmos-2525	2018 Mar 29 1738:42	2018 Mar 29 1748:87	MORF	RU	315	318	96.64	Reentered
99	S43245	2018-029A	Beidou DW 30	2018 Mar 29 1756:04	2018 Mar 29 2142:27	CNSA	CN	21523	21532	55.05	In Earth orbit
100	S43246	2018-029B	Beidou DW 31	2018 Mar 29 1756:04	2018 Mar 29 2142:27	CNSA	CN	21512	21543	55.05	In Earth orbit
101	S43249	2018-030A	Iridium Next SV144	2018 Mar 30 1413:51	2018 Mar 30 1510	IRIDS	US	606	625	86.68	In Earth orbit
102	S43250	2018-030B	Iridium Next SV149	2018 Mar 30 1413:51	2018 Mar 30 1511	IRIDS	US	608	626	86.68	In Earth orbit
103	S43251	2018-030C	Iridium Next SV157	2018 Mar 30 1413:51	2018 Mar 30 1514	IRIDS	US	607	626	86.68	In Earth orbit
104	S43252	2018-030D	Iridium Next SV140	2018 Mar 30 1413:51	2018 Mar 30 1516	IRIDS	US	607	626	86.68	In Earth orbit
105	S43253	2018-030E	Iridium Next SV145	2018 Mar 30 1413:51	2018 Mar 30 1517	IRIDS	US	607	626	86.68	In Earth orbit
106	S43254	2018-030F	Iridium Next SV146	2018 Mar 30 1413:51	2018 Mar 30 1519	IRIDS	US	608	627	86.68	In Earth orbit
107	S43255	2018-030G	Iridium Next SV148	2018 Mar 30 1413:51	2018 Mar 30 1521	IRIDS	US	606	625	86.68	In Earth orbit
108	S43256	2018-030H	Iridium Next SV142	2018 Mar 30 1413:51	2018 Mar 30 1522	IRIDS	US	608	626	86.68	In Earth orbit
109	S43257	2018-030I	Iridium Next SV150	2018 Mar 30 1413:51	2018 Mar 30 1524	IRIDS	US	606	626	86.68	In Earth orbit
110	S43258	2018-030K	Iridium Next SV143	2018 Mar 30 1413:51	2018 Mar 30 1526	IRIDS	US	608	626	86.68	In Earth orbit
111	S43259	2018-031A	Gao Fen 1-02	2018 Mar 31 0322:08	2018 Mar 31 0344:47	CNSAS	CN	638	642	98.04	In Earth orbit
112	S43260	2018-031B	Gao Fen 1-03	2018 Mar 31 0322:08	2018 Mar 31 0344:47	CNSAS	CN	638	641	98.04	In Earth orbit
113	S43262	2018-031D	Gao Fen 1-04	2018 Mar 31 0322:08	2018 Mar 31 0344:47	CNSAS	CN	638	642	98.04	In Earth orbit
114	S43267	2018-032A	Dragon CRS-14	2018 Apr 2 2030:38	2018 Apr 2 2040	SPX	US	391	396	51.64	Landed
115	S43466	1998-067NP	IKUNSPF	2018 Apr 2 2030:38	2018 May 11 1030	NAIR	KE	396	408	51.66	Reentered
116	S43467	1998-067NQ	UBAKUSAT	2018 Apr 2 2030:38	2018 May 11 1040	ITUTR	TR	402	402	51.66	Reentered
117	S43468	1998-067NR	Batsu-CSI	2018 Apr 2 2030:38	2018 May 11 1030	ACAE/ITCR	CR	400	402	51.64	Reentered
118	S43510	1998-067NT	RemovgeDebris	2018 Apr 2 2030:38	2018 Jun 20 1135	SSTLA	UK	401	407	51.64	Reentered
119	S43621	1998-067PM	DebrisSat-1/Net	2018 Apr 2 2030:38	2018 Sep 16 2306	SSTLA	UK	398	405	51.65	Reentered
120	S43680	1998-067PR	DebrisSat-2	2018 Apr 2 2030:38	2018 Oct 28 0615	SSTLA	UK	398	403	51.64	Reentered
121	S43271	2018-033A	Kirameki 1	2018 Apr 5 2134:07	2018 Apr 5 2203	DSNC	J	35772	35800	0.02	In Earth orbit

188	S43539	2018-057A	Beidou DW 32	2018 Jul 9 2058:04	2018 Jul 9 21:12?	CNSA				35695	35877	55.05	In Earth orbit
189	S43537	2018-058A	Progress MS-09	2018 Jul 9 21:51:34	2018 Jul 9 22:00	RKKE				367	404	51.65	Deorbited
190	S43595	1998-067PG	SiriusSat-1	2018 Jul 9 21:51:34	2018 Aug 15 16:51	SIROTS				401	407	51.64	Reentered
191	S43596	1998-067PH	SiriusSat-2	2018 Jul 9 21:51:34	2018 Aug 15 16:56	SIROTS				401	408	51.64	Reentered
192	S43562	2018-059A	Telstar 19 Vantage	2018 Jul 22 05:50	2018 Jul 22 06:22	TSKY				35779	35799	0.01	In Earth orbit
193	S43564	2018-060A	GalileoSat-25	2018 Jul 25 11:25:08	2018 Jul 25 15:01	GSXEU				22971	22982	56.37	In Earth orbit
194	S43565	2018-060B	GalileoSat-26	2018 Jul 25 11:25:08	2018 Jul 25 15:21	GSXEU				23019	23050	56.37	In Earth orbit
195	S43566	2018-060C	GalileoSat-23	2018 Jul 25 11:25:08	2018 Jul 25 15:01	GSXEU				23230	23252	56.38	In Earth orbit
196	S43567	2018-060D	GalileoSat-24	2018 Jul 25 11:25:08	2018 Jul 25 15:21	GSXEU				23087	23151	56.36	In Earth orbit
197	S43568	2018-061A	Iridium Next SV160	2018 Jul 25 11:39:26	2018 Jul 25 12:42	IRIDS				609	623	86.67	In Earth orbit
198	S43569	2018-061B	Iridium Next SV166	2018 Jul 25 11:39:26	2018 Jul 25 12:50	IRIDS				624	624	86.68	In Earth orbit
199	S43570	2018-061C	Iridium Next SV158	2018 Jul 25 11:39:26	2018 Jul 25 12:47	IRIDS				609	623	86.67	In Earth orbit
200	S43571	2018-061D	Iridium Next SV165	2018 Jul 25 11:39:26	2018 Jul 25 12:46	IRIDS				609	623	86.67	In Earth orbit
201	S43572	2018-061E	Iridium Next SV155	2018 Jul 25 11:39:26	2018 Jul 25 12:44	IRIDS				608	623	86.67	In Earth orbit
202	S43573	2018-061F	Iridium Next SV154	2018 Jul 25 11:39:26	2018 Jul 25 12:42	IRIDS				608	623	86.68	In Earth orbit
203	S43574	2018-061G	Iridium Next SV163	2018 Jul 25 11:39:26	2018 Jul 25 12:41	IRIDS				607	623	86.68	In Earth orbit
204	S43575	2018-061H	Iridium Next SV156	2018 Jul 25 11:39:26	2018 Jul 25 12:39	IRIDS				607	623	86.68	In Earth orbit
205	S43576	2018-061I	Iridium Next SV164	2018 Jul 25 11:39:26	2018 Jul 25 12:37	IRIDS				607	623	86.67	In Earth orbit
206	S43577	2018-061J	Iridium Next SV159	2018 Jul 25 11:39:26	2018 Jul 25 12:36	IRIDS				607	622	86.67	In Earth orbit
207	S43578	2018-061K	Beidou DW 33	2018 Jul 29 01:48:05	2018 Jul 29 05:35?	CNSA				21509	21546	54.95	In Earth orbit
208	S43581	2018-062A	Beidou DW 34	2018 Jul 29 01:48:05	2018 Jul 29 05:35?	CNSA				21515	21540	54.95	In Earth orbit
209	S43582	2018-062B	Beidou DW 35	2018 Jul 31 03:00:04	2018 Jul 31 03:14?	ZLZB				241	689	97.43	In Earth orbit
210	S43583	2018-063A	Gao Fen 11-01	2018 Aug 7 05:18	2018 Aug 7 05:49	TELEK				35781	35793	0.02	In Earth orbit
211	S43587	2018-064A	Merah Putih	2018 Aug 12 07:31	2018 Aug 12 08:14	GSFC				617	-18602	32.95	Sun
212	S43592	2018-065A	Parker Solar Probe	2018 Aug 12 07:31	2018 Aug 12 08:14	GSFC				617	-18602	32.95	Sun
213	S43600	2018-066A	Aeolus	2018 Aug 22 21:20:09	2018 Aug 22 21:14	ESA				314	317	96.73	Reentered
214	S43602	2018-067A	Beidou DW 36	2018 Aug 24 23:52:04	2018 Aug 25 03:39?	CNSA				21538	21538	54.99	In Earth orbit
215	S43603	2018-067B	Beidou DW 35	2018 Aug 24 23:52:04	2018 Aug 25 03:39?	CNSA				21512	21543	54.99	In Earth orbit
216	S43609	2018-068A	Hai Yang 1-03	2018 Sep 7 03:15:05	2018 Sep 7 03:28?	GYZ/CASC				769	786	98.60	In Earth orbit
217	S43611	2018-069A	Telstar 18 Vantage	2018 Sep 10 04:45	2018 Sep 10 05:17	TSKY				35778	35792	0.04	In Earth orbit
218	S43613	2018-070A	ICESAT 2	2018 Sep 15 13:02	2018 Sep 15 13:54	GSFC				455	468	93.02	In Earth orbit
219	S43614	2018-070B	SurfSat	2018 Sep 15 13:02	2018 Sep 15 14:21	UCF				443	468	93.04	Reentered
220	S43615	2018-070C	CP7	2018 Sep 15 13:02	2018 Sep 15 14:21	CALP				447	466	93.03	Reentered
221	S43616	2018-070D	ELFIN-STAR	2018 Sep 15 13:02	2018 Sep 15 14:20	UCLA				449	465	93.02	Reentered
222	S43617	2018-070E	ELFIN	2018 Sep 15 13:02	2018 Sep 15 14:18	UCLA				443	469	93.04	Reentered
223	S43618	2018-071A	S1-4	2018 Sep 16 16:38	2018 Sep 16 16:55	SSTLA				574	591	97.82	In Earth orbit
224	S43619	2018-071B	NovasAR-S	2018 Sep 16 16:38	2018 Sep 16 16:55	SSTLA				574	592	97.82	In Earth orbit
225	S43620	2018-072A	Beidou DW 37	2018 Sep 19 14:07:04	2018 Sep 19 17:54?	CNSA				21514	21541	54.98	In Earth orbit
226	S43622	2018-072B	Beidou DW 38	2018 Sep 19 14:07:04	2018 Sep 19 17:54?	CNSA				21514	21540	54.98	In Earth orbit
227	S43630	2018-073A	Koumori 7 gouki	2018 Sep 22 17:52:27	2018 Sep 22 18:07	JAXA				276	302	51.64	Deorbited
228	S43638	1998-067PN	SPATIUM-1	2018 Sep 22 17:52:27	2018 Oct 6 07:45	KYUT/NTU				400	406	51.64	Reentered
229	S43639	1998-067PP	RSP-400	2018 Sep 22 17:52:27	2018 Oct 6 08:00	RSP				400	406	51.64	Reentered
230	S43640	1998-067PQ	Tennyu	2018 Sep 22 17:52:27	2018 Oct 6 08:00	SHZ				401	406	51.64	Reentered
231	S43632	2018-074A	Azerspace-2	2018 Sep 25 22:38	2018 Sep 25 23:20	AZER				19523	39918	1.28	In Earth orbit
232	S43633	2018-074B	Horizons 3e	2018 Sep 25 22:38	2018 Sep 25 23:06	HORZ				35780	35792	0.05	In Earth orbit
233	S43641	2018-075A	Xiangrikui 1	2018 Sep 29 04:13:30	2018 Sep 29 04:30	CENIT				695	709	98.22	In Earth orbit
234	S43642	2018-076A	SAOCOM 1A	2018 Oct 8 02:21:28	2018 Oct 8 02:34	CONAE				615	634	97.90	In Earth orbit
235	S43643	2018-077A	Yaogan 32 hao 01 zu 01 xing	2018 Oct 9 02:43:03	2018 Oct 9 02:56?	ZLZB				689	704	98.27	In Earth orbit
236	S43644	2018-077B	Yaogan 32 hao 01 zu 02 xing	2018 Oct 9 02:43:03	2018 Oct 9 02:58?	ZLZB				681	698	98.28	In Earth orbit
237	S43647	2018-078A	Beidou DW 40	2018 Oct 15 04:23:04	2018 Oct 15 08:10?	CNSA				21535	21783	55.01	In Earth orbit
238	S43648	2018-078B	Beidou DW 39	2018 Oct 15 04:23:04	2018 Oct 15 08:10?	CNSA				21509	21545	55.02	In Earth orbit
239	S43651	2018-079A	AEHF SV-4	2018 Oct 17 04:15	2018 Oct 17 07:47	AFMCSW				35768	35804	4.81	In Earth orbit
240	A09204	2018-080A	BepiColombo MPO	2018 Oct 20 01:45:28	-	ESA				170	-78605	5.50	Sun to BepiColombo MTM
241	S43655	2018-081A	Mio	2018 Oct 20 01:45:28	-	JAXA				170	-78605	5.50	Sun to BepiColombo MOSIF
242	S43656	2018-081B	Hai Yang 2-02	2018 Oct 24 22:57	-	GYZ/CASC				949	957	99.35	In Earth orbit
243	A09210	2018-081C	Tangguo Gun	2018 Oct 24 22:57	-	ALLEX				640	940	99.45	Attached to CZ-4B Y34 Stage 3
244	A09210	2018-081D	SPP/DSB-01	2018 Oct 24 22:57	-	CASC				939	939	99.33	In Earth orbit
245	S43657	2018-082A	Kosmos-2528	2018 Oct 25 00:15:18	2018 Oct 25 00:25?	VVKOV				244	900	67.14	In Earth orbit
246	S43662	2018-083A	Zhongfa Haiyang Weixing	2018 Oct 29 00:43:14	2018 Oct 29 00:55?	GZZB/CNIES				509	523	97.53	In Earth orbit
247	S43663	2018-083B	Zhaojin-1	2018 Oct 29 00:43:14	2018 Oct 29 00:55?	TSHUA				507	523	97.52	Reentered
248	S43664	2018-083C	Xiaoxiang-102 xing	2018 Oct 29 00:43:14	2018 Oct 29 00:55?	FLUT				509	523	97.52	Reentered
249	S43665	2018-083D	Xinghe	2018 Oct 29 00:43:14	2018 Oct 29 00:55?	GUOX/CTYK				509	523	97.54	Reentered
250	S43666	2018-083E	CubeBel-1	2018 Oct 29 00:43:14	2018 Oct 29 00:55?	BSUBY				509	524	97.53	Reentered
251	S43668	2018-083G	Tianqi Xingzuo 1-01	2018 Oct 29 00:43:14	2018 Oct 29 00:55?	GUOG				510	522	97.52	Reentered
252	S43669	2018-083H	Changsha gaoxin	2018 Oct 29 00:43:14	2018 Oct 29 00:55?	CTYK				510	522	97.54	Reentered
253	A09212	2018-083J	Unknown Chinese payload	2018 Oct 29 00:43:14	2018 Oct 29 00:55?	CASIT				510	522	97.54	In Earth orbit
254	S43672	2018-084B	Ibuki 2	2018 Oct 29 04:08	2018 Oct 29 04:24	JAXA				585	599	97.85	In Earth orbit

320	-	A09327	2018-092BD	Sprinte (88,89)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
321	-	A09328	2018-092BE	Sprinte (90,91)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
322	-	A09329	2018-092BF	Sprinte (92,93)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
323	-	A09330	2018-092BG	Sprinte (94,95)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
324	-	A09331	2018-092BH	Sprinte (96,97)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
325	-	A09332	2018-092BI	Sprinte (98,99)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
326	-	A09333	2018-092BK	Sprinte (100,101)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
327	-	A09334	2018-092BL	Sprinte (102,103)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
328	-	A09335	2018-092BM	Sprinte (104,105)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
329	-	A09336	2018-092BN	Sprinte (106,107)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
330	-	A09337	2018-092BP	Sprinte (108,109)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
331	-	A09338	2018-092BQ	Sprinte (110,111)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
332	-	A09339	2018-092BR	Sprinte (112,113)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
333	-	A09340	2018-092BS	Sprinte (114,115)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
334	-	A09341	2018-092BT	Sprinte (116,117)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
335	-	A09342	2018-092BU	Sprinte (118,119)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
336	-	A09343	2018-092BV	Sprinte (120,121)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
337	-	A09344	2018-092BW	Sprinte (122,123)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
338	-	A09345	2018-092BX	Sprinte (124,125)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
339	-	A09346	2018-092BY	Sprinte (126,127)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
340	-	A09347	2018-092BZ	Sprinte (128,129)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
341	-	A09348	2018-092CA	Sprinte (130,131)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
342	-	A09349	2018-092CB	Sprinte (132,133)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
343	-	A09350	2018-092CC	Sprinte (134,135)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
344	-	A09351	2018-092CD	Sprinte (136,137)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
345	-	A09352	2018-092CE	Sprinte (138,139)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
346	-	A09353	2018-092CF	Sprinte (140,141)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
347	-	A09354	2018-092CG	Sprinte (142,143)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
348	-	A09355	2018-092CH	Sprinte (144,145)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
349	-	A09356	2018-092CI	Sprinte (146,147)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
350	-	A09357	2018-092CK	Sprinte (148,149)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
351	-	A09358	2018-092CL	Sprinte (150,151)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
352	-	A09359	2018-092CM	Sprinte (152,153)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
353	-	A09360	2018-092CN	Sprinte (154,155)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
354	-	A09361	2018-092CP	Sprinte (156,157)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
355	-	A09362	2018-092CQ	Sprinte (158,159)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
356	-	A09363	2018-092CR	Sprinte (160,161)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
357	-	A09364	2018-092CS	Sprinte (162,163)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
358	-	A09365	2018-092CT	Sprinte (164,165)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
359	-	A09366	2018-092CU	Sprinte (166,167)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
360	-	A09367	2018-092CV	Sprinte (168,169)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
361	-	A09368	2018-092CW	Sprinte (170,171)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
362	-	A09369	2018-092CX	Sprinte (172,173)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
363	-	A09370	2018-092CY	Sprinte (174,175)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
364	-	A09371	2018-092CZ	Sprinte (176,177)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
365	-	A09372	2018-092DA	Sprinte (178,179)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
366	-	A09373	2018-092DB	Sprinte (180,181)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
367	-	A09374	2018-092DC	Sprinte (182,183)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
368	-	A09375	2018-092DD	Sprinte (184,185)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
369	-	A09376	2018-092DE	Sprinte (186,187)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
370	-	A09377	2018-092DF	Sprinte (188,189)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
371	-	A09378	2018-092DG	Sprinte (190,191)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
372	-	A09379	2018-092DH	Sprinte (192,193)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
373	-	A09380	2018-092DI	Sprinte (194,195)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
374	-	A09381	2018-092DK	Sprinte (196,197)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
375	-	A09382	2018-092DL	Sprinte (198,199)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
376	-	A09383	2018-092DM	Sprinte (200,201)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
377	-	A09384	2018-092DN	Sprinte (202,203)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
378	-	A09385	2018-092DP	Sprinte (204,205)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
379	-	A09386	2018-092DQ	Sprinte (206,207)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
380	-	A09435	2018-092DR	Sprinte (208,209)	2018 Nov 17 0901:23	2019 Mar 19 0340	STAN/ARC	US	260	273	51.63	Reentered
381	266	S43706	2018-093A	Beidou DW 42	2018 Nov 18 1807:04	2018 Nov 18 2154:47	CNSA	CN	21523	22194	54.99	In Earth orbit
382	267	S43707	2018-093B	Beidou DW 43	2018 Nov 18 1807:04	2018 Nov 18 2154:47	CNSA	CN	21532	22072	55.00	In Earth orbit
383	268	S43710	2018-094A	Tianzh-1	2018 Nov 19 2340:04	2018 Nov 19 2352:27	ISCAS	CN	488	504	97.41	Reentered
384	269	S43711	2018-094B	Shiyan 6	2018 Nov 19 2340:04	2018 Nov 19 2352:27	CNSA	CN	487	504	97.41	In Earth orbit
385	270	S43712	2018-094C	Tianpang-1A	2018 Nov 19 2340:04	2018 Nov 19 2352:27	GUOX	CN	486	504	97.41	Reentered

452	43786	2018-099AE	ITASAT-1	2018 Dec 3 1834:05	2018 Dec 3 23:00?	ITA	BR	573	592	97.77	In Earth orbit
453	43787	2018-099AF	KazSciSat 1	2018 Dec 3 1834:05	2018 Dec 3 23:00?	GHALAM	KZ	572	589	97.77	Reentered
454	43788	2018-099AG	Flock 3s-3	2018 Dec 3 1834:05	2018 Dec 3 23:00?	PLAN	US	573	590	97.76	Reentered
455	43789	2018-099AH	IRVINE02	2018 Dec 3 1834:05	2018 Dec 3 23:00?	IFSF	US	572	591	97.77	Reentered
456	43790	2018-099AJ	Eaglet 1	2018 Dec 3 1834:05	2018 Dec 3 23:00?	OHBI	I	573	591	97.77	In Earth orbit
457	43791	2018-099AK	Demali	2018 Dec 3 1834:05	2018 Dec 3 23:00?	CAPSP	US	573	591	97.77	Reentered
458	43792	2018-099AL	ESEO	2018 Dec 3 1834:05	2018 Dec 3 2047	ESA	HESA	572	589	97.77	In Earth orbit
459	43793	2018-099AM	CSIM-FD	2018 Dec 3 1834:05	2018 Dec 3 23:00?	CLASP	US	573	590	97.77	Reentered
460	43794	2018-099AN	Hawk B	2018 Dec 3 1834:05	2018 Dec 3 23:00?	HE360	US	577	590	97.77	In Earth orbit
461	43795	2018-099AO	OrbWeaver 1	2018 Dec 3 1834:05	2018 Dec 3 23:00?	DARPA2	US	572	587	97.77	Reentered
462	43796	2018-099AP	Aurora Insight Alpha	2018 Dec 3 1834:05	2018 Dec 3 23:00?	AUINS/SPQ	US	571	589	97.77	In Earth orbit
463	43797	2018-099AR	SkySat C12	2018 Dec 3 1834:05	2018 Dec 3 23:00?	PLABST	US	572	588	97.77	In Earth orbit
464	43798	2018-099AS	Kiwi 1	2018 Dec 3 1834:05	2018 Dec 3 23:00?	ACAST	CH	574	590	97.77	In Earth orbit
465	43799	2018-099AT	Hawk C	2018 Dec 3 1834:05	2018 Dec 3 23:00?	HE360	US	574	592	97.77	In Earth orbit
466	43800	2018-099AU	ICEYE-X2	2018 Dec 3 1834:05	2018 Dec 3 23:00?	ICEYE	FI	570	588	97.77	In Earth orbit
467	43801	2018-099AV	K2SAT	2018 Dec 3 1834:05	2018 Dec 3 23:00?	KAIST/KAFA	KR	571	591	97.77	Reentered
468	43802	2018-099AW	SkySat C13	2018 Dec 3 1834:05	2018 Dec 3 23:00?	PLABST	US	573	590	97.77	In Earth orbit
469	43803	2018-099AX	Jordan-OSCAR-97	2018 Dec 3 1834:05	2018 Dec 3 23:00?	JUST	JO	573	590	97.77	In Earth orbit
470	43804	2018-099AY	Suomi-100	2018 Dec 3 1834:05	2018 Dec 3 23:00?	AALTO	FI	573	589	97.77	In Earth orbit
471	43805	2018-099AZ	Al-Farabi 2	2018 Dec 3 1834:05	2018 Dec 3 23:00?	KAZNU	KZ	573	589	97.77	In Earth orbit
472	43806	2018-099BA	KNACKSAT	2018 Dec 3 1834:05	2018 Dec 3 23:00?	KMUTNB	T	573	589	97.77	In Earth orbit
473	43807	2018-099BB	Eu-CROPIIS	2018 Dec 3 1834:05	2018 Dec 3 1905	DLR2	D	574	591	97.77	In Earth orbit
474	43808	2018-099BC	Yukon	2018 Dec 3 1834:05	2018 Dec 3 23:00?	USCGR/DHSST	US	573	591	97.77	In Earth orbit
475	43809	2018-099BD	Centauri 1	2018 Dec 3 1834:05	2018 Dec 3 23:00?	FLEET	AU	572	591	97.77	In Earth orbit
476	43810	2018-099BE	Audacy Zero	2018 Dec 3 1834:05	2018 Dec 3 23:00?	AUDACY	US	574	591	97.77	In Earth orbit
477	43811	2018-099BF	NEXTSat 1	2018 Dec 3 1834:05	2018 Dec 3 23:00?	KAIST	KR	572	589	97.77	In Earth orbit
478	43812	2018-099BG	Global-2	2018 Dec 3 1834:05	2018 Dec 3 23:00?	BSKG	US	577	591	97.77	In Earth orbit
479	43813	2018-099BH	BRIO	2018 Dec 3 1834:05	2018 Dec 3 23:00?	MYRI/SPQ	US	574	591	97.76	Reentered
480	43814	2018-099BJ	PW-Sat2	2018 Dec 3 1834:05	2018 Dec 3 23:00?	PWAR	PL	572	591	97.77	Reentered
481	43815	2018-099BK	FalconSat 6	2018 Dec 3 1834:05	2018 Dec 3 23:00?	AFSMC	US	572	592	97.77	In Earth orbit
482	43816	2018-099BL	SpaceBEE 7	2018 Dec 3 1834:05	2018 Dec 3 23:00?	SWARM	US	573	589	97.76	In Earth orbit
483	43817	2018-099BM	SpaceBEE 5	2018 Dec 3 1834:05	2018 Dec 3 23:00?	SWARM	US	573	590	97.77	Reentered
484	43818	2018-099BN	SpaceBEE 6	2018 Dec 3 1834:05	2018 Dec 3 23:00?	SWARM	US	573	589	97.77	Reentered
485	43819	2018-099BP	eXCITe	2018 Dec 3 1834:05	2018 Dec 3 1900?	DARPA2	US	569	588	97.77	In Earth orbit
486	43820	2018-099BQ	SeaHawk 1	2018 Dec 3 1834:05	2018 Dec 3 23:00?	UNCV/MOOREF	US	573	587	97.77	In Earth orbit
487	43821	2018-099BR	Flock 3s-2	2018 Dec 3 1834:05	2018 Dec 3 23:00?	PLAN	US	572	592	97.77	Reentered
488	43822	2018-099BS	VisionCube	2018 Dec 3 1834:05	2018 Dec 3 23:00?	KRAU	KR	573	589	97.77	In Earth orbit
489	A09257	2018-099C	Elysum Star 2	2018 Dec 3 1834:05	-	ELYS	US	573	589	97.77	Reentered Att to Sherpa LFF
490	43823	2018-100A	Cheollin 2A	2018 Dec 4 2037:07	2018 Dec 4 2110	KARI	KR	35783	35788	0.05	In Earth orbit
491	43824	2018-100B	GSAT-11	2018 Dec 4 2037:07	2018 Dec 4 2106	ISRO	IN	35775	35798	0.12	In Earth orbit
492	43827	2018-101A	Dragon CRS-16	2018 Dec 5 1816:16	2018 Dec 5 1826	SPX	US	401	408	51.64	Landed
493	44029	1998-067PV	CAT-2	2018 Dec 5 1816:16	2019 Jan 31 1025	APL	US	403	408	51.64	Reentered
494	44030	1998-067PW	Delphinii 1	2018 Dec 5 1816:16	2019 Jan 31 1200	AARH	DK	402	408	51.64	Reentered
495	84031	1998-067PX	UNITE	2018 Dec 5 1816:16	2019 Jan 31 1340	USIN	US	402	407	51.64	Reentered
496	84032	1998-067PY	TechEdSat-8	2018 Dec 5 1816:16	2019 Jan 31 1645	ARC/SJSU	US	402	409	51.64	Reentered
497	84033	1998-067PZ	CAT-1	2018 Dec 5 1816:16	2019 Jan 31 1025	APL	US	402	409	51.64	Reentered
498	84041	2018-092C	Quantum Radar 1	2018 Dec 5 1816:16	2019 Feb 9 0000	HYPGG	US	455	459	51.64	Reentered
499	84042	2018-092D	Quantum Radar 2	2018 Dec 5 1816:16	2019 Feb 9 0000	HYPGG	US	457	457	51.64	Reentered
500	84381	2018-102A	Saudisat-5A	2018 Dec 7 0412	2018 Dec 7 0422?	KACST	SA	533	551	97.63	In Earth orbit
501	84382	2018-102B	TY/DF-1	2018 Dec 7 0412	2018 Dec 7 0422?	CTYK/GUOX	CN	531	551	97.63	Reentered
502	84383	2018-102C	Saudisat-5B	2018 Dec 7 0412	2018 Dec 7 0422?	KACST	SA	532	551	97.63	In Earth orbit
503	84384	2018-102D	TFSTAR	2018 Dec 7 0412	2018 Dec 7 0422?	UESTC/GUOX	CN	532	550	97.63	In Earth orbit
504	84385	2018-102E	Xinjiang Jiaotong-01	2018 Dec 7 0412	2018 Dec 7 0422?	CTYK	CN	531	550	97.63	Reentered
505	84386	2018-102F	Shaonian-0FO	2018 Dec 7 0412	2018 Dec 7 0422?	BTWK/OFO	CN	531	550	97.63	Reentered
506	84387	2018-102G	Maoxang Shouyinji, Xing	2018 Dec 7 0412	2018 Dec 7 0422?	BTWK/MAOW	CN	530	549	97.63	Reentered
507	84388	2018-102H	Huami xing	2018 Dec 7 0412	2018 Dec 7 0422?	BTWK/HUAMI	CN	529	550	97.63	Reentered
508	84389	2018-102J	REX xing	2018 Dec 7 0412	2018 Dec 7 0422?	BTWK/LUHAN	CN	528	549	97.64	Reentered
509	84390	2018-102K	Likeda jiaoyu weixing	2018 Dec 7 0412	2018 Dec 7 0422?	BTWK/LIDA	CN	528	549	97.63	Reentered
510	84391	2018-102L	Tianmao guoji xing	2018 Dec 7 0412	2018 Dec 7 0422?	BTWK/ALIEX	CN	528	549	97.64	Reentered
511	84392	2018-102M	Shaonian-5C-04	2018 Dec 7 0412	2018 Dec 7 0422?	WEINA/JIUT	CN	529	549	97.64	Reentered
512	84393	2018-103A	Chang'e-4	2018 Dec 7 1823	2018 Dec 7 1843?	CASC	CN	-1416	423507	29.45	Lunar orbit
513	84394	2018-104A	TOMSAT R3	2018 Dec 16 0633	2018 Dec 16 0726?	AERO	US	492	512	85.04	Reentered
514	84395	2018-104B	Shields	2018 Dec 16 0633	2018 Dec 16 0726?	LARCN	US	494	514	85.03	Reentered
515	84396	2018-104D	STF-1	2018 Dec 16 0633	2018 Dec 16 0726?	GSFC/WVU	US	494	513	85.03	Reentered
516	84397	2018-104E	CeREs	2018 Dec 16 0633	2018 Dec 16 0726?	GSFC	US	494	511	85.04	Reentered
517	84398	2018-104F	RSat	2018 Dec 16 0633	2018 Dec 16 0726?	USNA	US	492	519	85.03	Reentered

12	9	S43898	2018-111Y	?	ICEYE mass simulator	2018 Dec 27 0207:18	2018 Dec 27 0625?	ROSK	RU	480	508	97.30	Reentered
13	10	S43900	2018-111AA	?	SAMSON mass simulator	2018 Dec 27 0207:18	2018 Dec 27 0625?	ROSK	RU	479	508	97.30	In Earth orbit