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Orbital Debris
Quarterly News

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Inside...

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Breakup of ZQ-2E Upperstage

The U.S. Space Forces - Space (S4S) identified a breakup associated with China's ZhuQue-2E (ZQ-2E) upper stage at 08:47 GMT on 9 June 2026. The breakup of this upper stage (International Designator 2026-128C, U.S. Satellite Catalog Number 69537) appeared to occur shortly after the deployment of its payload spacecraft. The apogee and perigee altitudes of 2026-128C at the time of the breakup were approximately 416 km and 327 km, respectively, with an inclination of 54.53 degrees. Many fragments were identified initially. As of 16 July 2026, 7 fragments have been added to the U.S. Satellite Catalog and 4 of them have reentered. This was not the first launch anomaly associated with ZQ-2E. A similar rocket also exploded a few minutes after liftoff in August 2025. ♦

Don Kessler Recognized with Honorary Doctorate

On Thursday, 14 May 2026, the University of Houston's (UH) Cullen College of Engineering awarded Donald Kessler its highest honor, the Doctor of Humane Letters *Honoris Causa*, for his extraordinary service to society, international cooperation, and the environment at its spring 2026 commencement ceremony.

Dr. Kessler graduated in 1965 from UH Bachelor *cum laude* with honors in physics following his service in the U.S. Army's Air Defense Command and after beginning his career in the sciences at the NASA Manned Spacecraft Center (now the Lyndon B. Johnson Space Center) as a cooperative education student.

Intrigued by the risk posed to spacecraft by micrometeoroids, he formulated the concepts of spatial density of a background population, relative velocity, flux, and uncertainties [1]. Noting the large number of "associated objects" accompanying a Delta rocket launch in a satellite catalog, actually fragments from an accidental explosion, he expanded his interest to human-made debris. This led to publishing his seminal works describing the collision frequency

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Kessler Honored

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of artificial satellites [2] and the logical and mathematical formalisms of calculating spatial density, flux, and relative velocity [3] applied to the moons of Jupiter for relevance to a planetary journal. These formed the foundation of modern orbital debris analysis, leading directly to the methodologies and tools in use today by the NASA Orbital Debris Program Office (ODPO) and the orbital debris and space safety community world-wide.

As founder of the ODPO in 1979 and the first NASA Chief Scientist for Orbital Debris, Kessler developed, nurtured, and led NASA efforts to measure, model, and mitigate the risk posed on-orbit to crewed and robotic spacecraft and to the Earth's population by reentry. He led outreach to U.S. military, civil, commercial, and professional organizations, and he led international efforts that culminated in the establishment of the Inter-Agency Space Debris Coordination Committee (IADC) in 1993. Following his retirement from NASA in 1995, he has continued to serve the community as a subject matter expert, consultant, and media personality.

The depth and breadth of his knowledge led many who interacted with Don to assume he possessed a doctorate, and they addressed him so. We congratulate Dr. Kessler on this well-deserved formal recognition by his *alma mater*.

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PROJECT REVIEW

A Decade of Telescope Observations with ES-MCAT

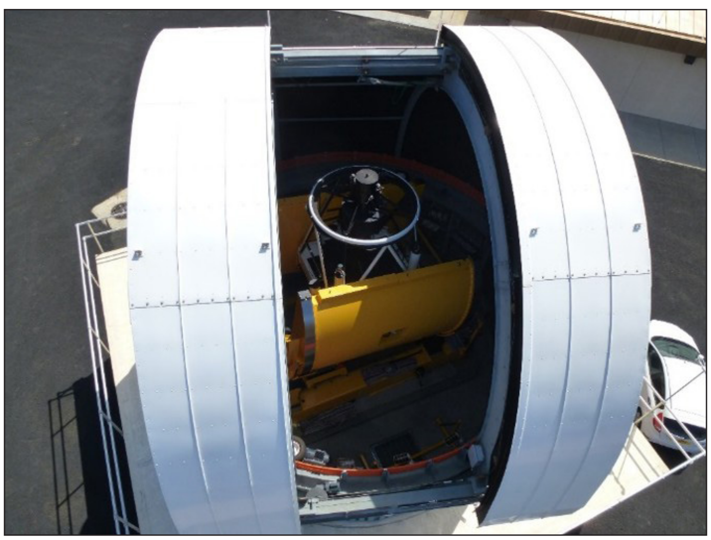

Figure 1. Interior view of the ES-MCAT showing the distinct hydrostatic bearing double-horseshoe equatorial mount.

B. BUCKALEW AND A. MANIS

The NASA Orbital Debris Program Office (ODPO) has used ground-based optical sensors to characterize debris in geosynchronous orbit (GEO) smaller than the tracking threshold of the Space Surveillance Network (SSN) since the early 1990s. For early optical surveys, the ODPO used the Ground-Based Electro-Optical Deep Space Surveillance (GEODSS) sensors, the Charge-Coupled Device (CCD) Debris Telescope (CDT), the Liquid Mirror Telescope (LMT), and the Michigan Orbital Debris Survey Telescope (MODEST). Additional sensors – for example the United Kingdom Infrared Telescope (UKIRT), Magellan telescopes, and telescopes at the Cerro Tololo Inter-American Observatory (CTIO) – were used for specialized observations. Following the success of these early surveys and building on lessons learned during nearly a decade of observations using MODEST, the ODPO initiated a plan to develop a dedicated optical sensor that could be tasked directly by the ODPO for GEO surveys and other observation campaigns such as rapid breakup response. These plans culminated in a joint effort between NASA and the Air Force Research Laboratory (AFRL) to build the John Africano Observatory (JAO) on the U.S. Space Force (USSF) Base (Space Launch Delta 45, Detachment 2) near the Ascension Auxiliary Airfield (AAF) on Ascension Island, a British overseas territory in the South Atlantic. JAO consists of the Consolidated Instrumentation Facility (CIF) communication and control room, the weather tower, the James R. Benbrook Telescope (JRBT) facility, and the Eugene Stansbery Meter-Class Autonomous Telescope (ES-MCAT).

An interior view of ES-MCAT is shown in Figure 1. Construction of the JAO began in 2014, almost immediately after the conclusion of MODEST data collections, and ES-MCAT achieved first light in 2015. Since then, ES-MCAT has served as the ODPO's primary optical sensor for surveying GEO debris. ES-MCAT's early years consisted of initial operations to fully characterize the system, and full operational capability was achieved in 2020. In 2025, ES-MCAT achieved a milestone of 10 years of consistent operations.

The location on Ascension Island was chosen for several reasons: 1) its near-equatorial latitude provides coverage of

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ES-MCAT Observations

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orbits in all orbital regimes, including low-inclination low Earth orbit (LEO), GEO, and GEO transfer orbit (GTO); (2) it fills a gap in longitudinal coverage of the GEO belt not covered by other ground-based telescopes used by the SSN, in particular the GEODSS sensors; (3) its remote location provides very dark skies for astronomical observations, particularly important for small, faint debris; and (4) USSF base infrastructure and personnel on the island allow for long-term logistical support and maintenance. Figure 2 shows the field of view coverage of ES-MCAT along with GEODSS sensors in Hawaii, New Mexico, and Diego Garcia.

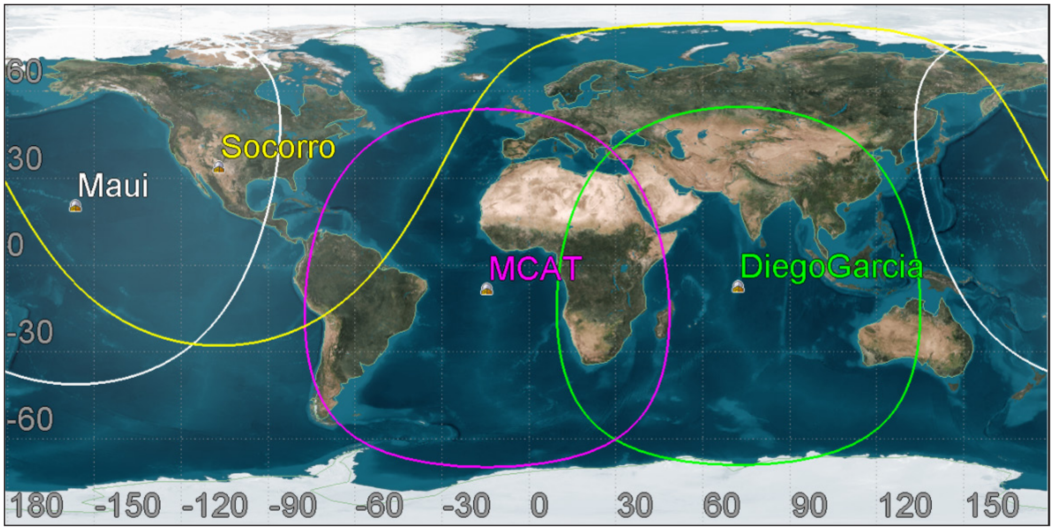

Figure 2. Map showing locations of all current dedicated GEODSS sensors and ES-MCAT. Note that ES MCAT fills a gap in current GEODSS GEO belt coverage.

ES-MCAT's primary goal is to statistically survey small (faint) debris in GEO, below the limit of the SSN, for use in developing orbital debris models. Two GEO debris surveys have been completed using ES-MCAT, covering observations in 2020–2022 [1] and 2023–2025 [2]. A survey strategy has been developed to optimize detections of debris in a GEO region of interest, and an automated processing pipeline—supplemented by a manual review process—is used to process images and identify GEO objects [1]. Figure 3 shows a sample image of objects detected from GEO survey observations during 2023. In GEO survey mode, the telescope points at a fixed right ascension (RA) and declination (Dec) and moves with the Earth through a sequence of images. Thus, stars appear as streaks and GEO, or near-GEO, objects are point sources. Non-GEO objects can be differentiated by their different rates. In Figure 3, a rotating GTO object appears as a sequence of point sources due to magnitude variations during rotation and high angular rates relative to GEO rates.

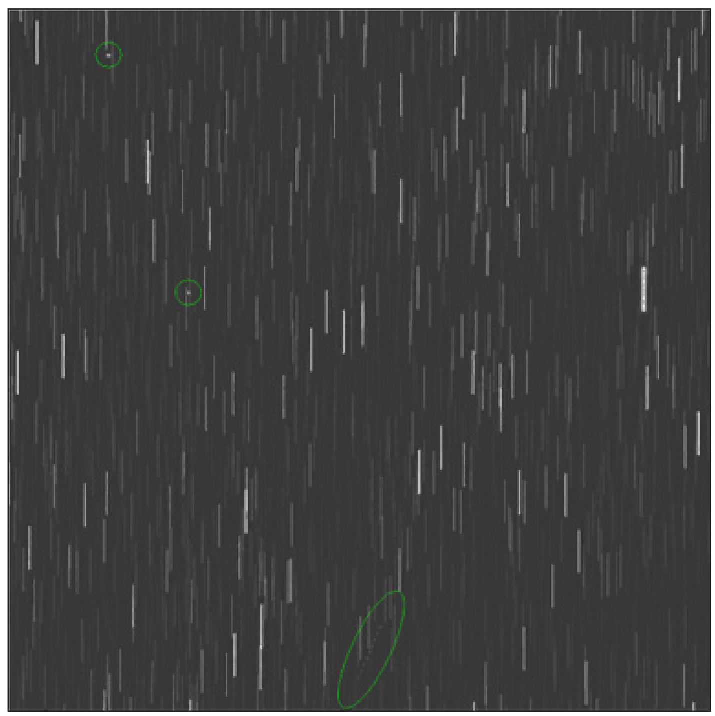

Figure 3. Field of view of ES-MCAT for the 2023–2025 GEO survey. Height and width of the field is 0.6 degrees. Exposure was taken using the Sloan Digital Sky Survey (SDSS) r' filter on 18 January 2023 and was ten seconds long. Three objects in this image are circled in green: two GEO stationary objects and a rotating piece of GTO debris.

Figure 4 compares the magnitude histograms from objects detected by manual review during these first 2 GEO surveys for correlated targets (CTs) (*i.e.*, those objects that correlated to an object in the public SSN catalog) and uncorrelated targets (UCTs). The distribution in magnitude of UCT detections during the first ES-MCAT GEO survey (2020–2022) increases up to 16–17 magnitude bin, while the peak increases up to the slightly fainter 18–19 magnitude bin during the second GEO survey (2023–2025). This difference in distribution peaks is likely due to a combination of the primary mirror being recoated before the start of the second GEO survey and an observation strategy less focused on the GEO belt [2]. The roll-off in both UCT magnitude distributions is an artifact of the detection capabilities of the system. The true distribution of smaller (fainter) debris is expected to continue to increase to fainter magnitudes (smaller sizes) following a power law distribution [3].

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ES-MCAT Observations

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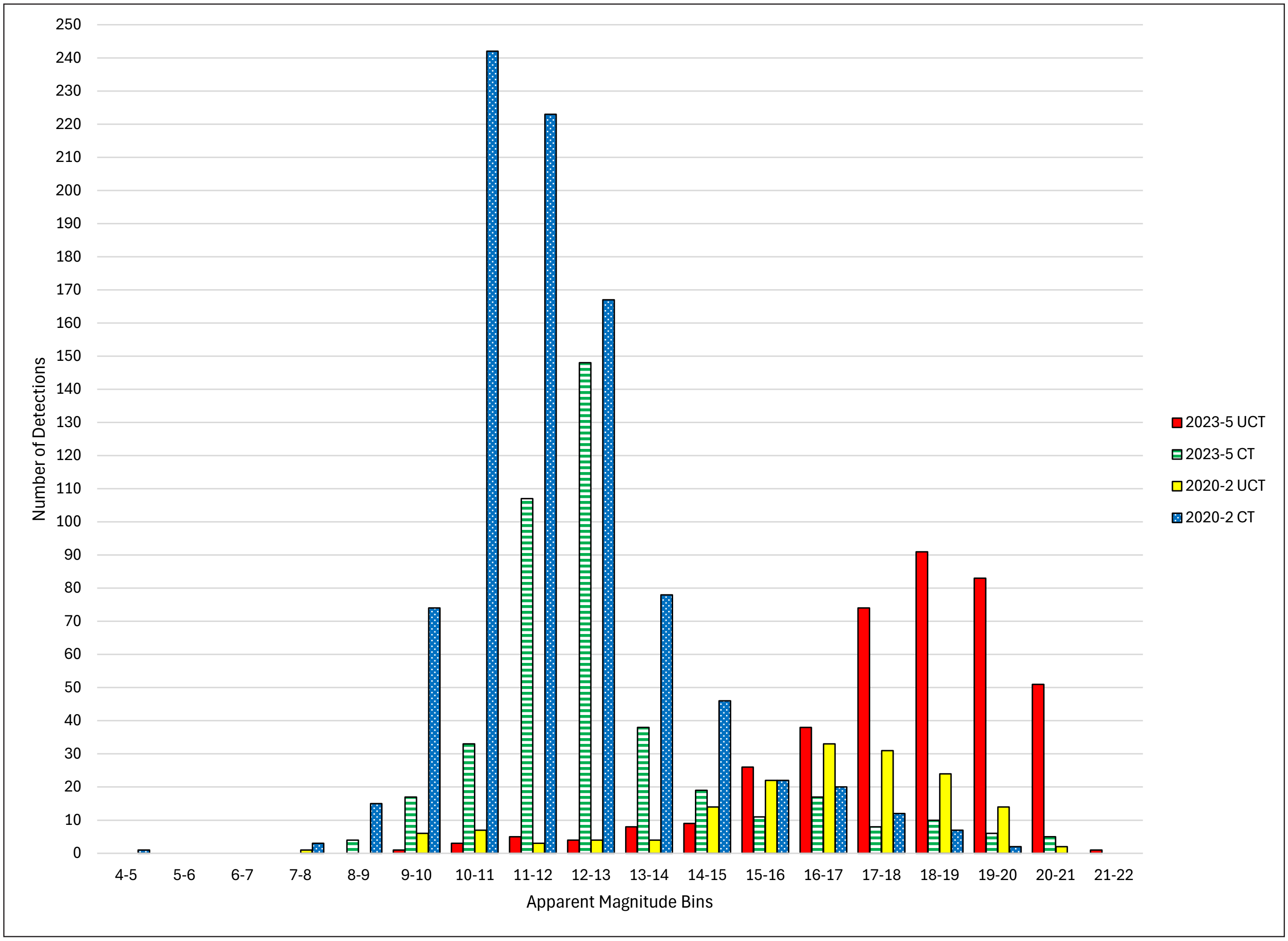

Figure 4. Histogram of detected CTs and UCTs for the 2020–2022 and 2023–2025 GEO surveys, binned by apparent magnitude. Note that the 2023–2025 UCT distribution peaks in the 18–19 magnitude bin compared to the 2020–2022 UCT distribution that peaks in the 16–17 magnitude bin.

Ascension Island is a tropical volcanic island, which introduces environmental challenges such as acidic volcanic dust, humidity, and salt spray. ES-MCAT sits at an elevation of 145 m and is impacted by regular salt spray. As a result, the ES-MCAT primary mirror requires regular cleaning as well as periodic recoating. The primary mirror was originally coated with a protected aluminum coating. In 2018 and 2022, it was recoated with a protected, enhanced silver coating to provide increased reflectivity over what was achievable with aluminum [4, 5]. In March 2026, the ODPO returned to a protected aluminum coating. While aluminum exhibits lower reflectivity in general, it is expected to provide more durability based on experience with the original mirror coating as well as corroborative evidence from other optical sensors. Regardless of mirror coating composition, regular cleaning and inspection will be critical to maintain the ODPO's capabilities to characterize the small debris environment in GEO in support of orbital debris modeling efforts.

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The NASA Battery Passivation Workshop, 11–13 March 2026

The NASA Battery Passivation Workshop, held 11–13 March 2025 at the Johnson Space Center in Houston, brought together representatives from NASA, other government agencies, and industry to address a growing concern within the orbital debris community: the inconsistent understanding and implementation of battery passivation requirements across the spacecraft development landscape. With NASA increasingly flying commercially built spacecraft buses, many teams have struggled to meet the passivation expectations embedded in NASA-STD-8719.14C, Process for Limiting Orbital Debris, and the U.S. Government Orbital Debris Mitigation Standard Practices (ODMSP). The workshop revealed that, despite the critical role of battery passivation in preventing debris-generating explosions at end-of-mission, there remains substantial confusion about what qualifies as an acceptable practice, what level of testing is required, and how these self-evaluations should be documented for compliance in Orbital Debris Assessment Reports (ODAR).

Discussion during the workshop centered on the core objective of passivation: preventing the generation of long-lived debris larger than 1 mm that could threaten other space missions. Battery failures can occur through a variety of mechanisms, including internal or external shorts; overcharging or overdischarging; high temperature exposure; or mechanical damage. Internal safety features such as positive-temperature coefficient thermistors (PTC), current interrupt devices (CID), and vents do not eliminate the risk of thermal runaway or debris generation, especially for higher energy density batteries. Participants emphasized that commercial standard testing does not meet flight qualification standards, and that missions must establish the full chain of custody for battery cells to avoid counterfeit components. These realities have complicated efforts by commercial providers to satisfy NASA requirements, especially when their bus architectures were not originally designed to support full passivation.

A major theme emerged around the distinction between hard and soft passivation. Hard passivation, the historically preferred method, involves permanently disconnecting the battery from its charging source and draining it to a near-zero state of charge. This method minimizes uncertainty and reduces reliance on extensive testing. NASA specialists outlined multiple ways spacecraft architectures can accomplish such disconnection—through relays, MOSFET-based switches, solar array input shunts, or charging circuit reconfiguration. These methods depend on a bus's electrical design, but the underlying requirement is consistent: once a spacecraft reaches end-of-mission, battery charging must be fully disabled, and the battery energy must be depleted.

Soft passivation, by contrast, remains more challenging. In this approach, the battery is left connected but maintained at a low state of charge where any failure would not generate debris. Demonstrating compliance requires controlled testing on in-family cells and batteries: those sharing chemistry, manufacturer, design, and potentially even lot number. Hypervelocity impact testing may be necessary to verify that a battery at its controlled low state of charge does not produce more debris than a fully depleted battery. Missions relying on soft passivation must justify their methods with empirical evidence, making this approach more burdensome for small satellite missions, CubeSats, and commercially derived platforms. Design-for-containment strategies, where spacecraft structure prevents debris from escaping during a failure event, were also discussed as possible mitigation measures but require testing to validate effectiveness.

Workshop participants reviewed recent on-orbit anomalies to better understand real-world risks. A notable example involved a commercial spacecraft in 2023, whose battery experienced arc-induced thermal runaway propagation traced to a foreign object inside the pack. Diagnostics, including video and telemetry, showed clear signs of cell-to-cell propagation, and ground testing successfully reproduced the failure. This incident highlighted the importance of rigorous cleanliness standards, proper insulation, and appropriately coordinated safety devices. It also served as a cautionary example of the risks associated with cost-optimized, mass-produced batteries.

Commercial bus providers presented their own approaches to passivation, revealing significant variation across industry. Some companies described strategies involving permanent disconnects through relays or MOSFETs, while others relied on spacecraft tumbling to limit solar input or on natural orbital decay to mitigate risk. Several providers noted that their designs drain batteries to undervoltage lockout or disable DC-DC converters to cut off charging paths. Others emphasized inherent battery safety features or containment, though NASA notes such approaches require more evidence before they can be accepted as sole passivation mechanisms. These presentations underscored the gap between industry practice and NASA's technical expectations and reinforced the need for more consistent communication and clearer documentation requirements.

A recurring challenge noted in the workshop is the lack of a comprehensive NASA database on battery failure modes, debris generation potential, and end-of-life behavior. Without large-scale, systematic testing, NASA cannot make generalized probability assessments about post-mission explosions or debris generation. While commercial lithium ion manufacturing statistics suggest spontaneous internal short rates of roughly one-in-one million to one-in-ten million cells, spacecraft-level behavior is far more complex. Thermal runaway propagation, battery ejecta characteristics, and battery debris size distributions remain poorly quantified, and modeling tools lack sufficient validation. NASA experts stressed the need for expanded testing, including micrometeoroid and orbital debris impact testing, end-of-life battery behavior, and controlled demonstrations of passivation techniques, to establish a reliable dataset for future analyses.

Throughout the workshop, participants emphasized that clearer communication from NASA is critical for improving passivation compliance. Project teams and commercial partners may lack early guidance on what must be included in an ODAR, leading to delays at milestone reviews. Several attendees recommended that NASA issue a formal guidance document or interim directive to clarify acceptable methods, required evidence, and documentation expectations.

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NASA Workshop

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The workshop concluded with a broad recognition that battery passivation remains one of the least characterized and most consequential aspects of spacecraft end-of-mission planning. As NASA continues to adopt commercial buses across science and technology missions, the importance of clear standards, thorough communication, and well-supported testing will only grow. The outcomes of the workshop give a path forward: expanding education for program executives, engineers and scientists, refining ODAR requirements and supporting documentation, developing robust testing standards, and ensuring that passivation methods are implemented with the rigor necessary to safeguard the orbital environment. ♦

MEETING REPORTS

17-19 June 2026: 6th Aerothermodynamics and Design for Demise (ATD3) Workshop, Toulouse, France

The 6th Aerothermodynamics & Design for Demise (ATD3) Workshop in Toulouse brought together 61 participants from the U.S. and across Europe and featured 40 presentations on aerothermodynamics, materials engineering, and spacecraft reentry safety and sustainability. Attendees explored modeling, simulation, and experimental approaches, and through conversations and networking, created collaboration opportunities for improved space debris reentry modeling.

The presentations from the ATD3 Workshop underscored significant progress in destructive reentry modeling, aerothermodynamics, material response, and demise through design strategies. The field embraced integrated, high fidelity, multi physics methods, with stronger experimental validation and collaborative efforts shaping future research.

Several presentations focused on the sustainability of the increased rate of spacecraft reentry and the environmental effects of deposition of metal oxides in the upper atmosphere.

Lastly, a key highlight was the discussion of the updates to ESA's Demise Verification Guidelines, which offer standardized procedures for reentry analysis across European missions. These guidelines harmonize modeling practices, ensuring consistent risk assessment, and supporting regulatory compliance and sustainability objectives by promoting safer reentry and minimizing environmental impacts. Details about this workshop can be found at https://indico.esa.int/event/608/.

3-5 June 2026: 2nd Space Capacity Allocation for Sustainability of Space Activity Workshop, Milan, Italy

The *Politecnico di Milano* organized and hosted the Second Space Capacity Allocation for Sustainability of Space Activity Workshop on 3–5 June 2026 in Milan, Italy. The event was co-sponsored by the Green Species Project, funded by the European Research Council, led by *Politecnico di Milano*, and co-sponsored by Secure World Foundation. The workshop consisted of 12 sessions such as defining the orbital debris problems; identifying challenges associated with orbital debris modeling; assessing the effects of space activities on the near-Earth space environment; measuring capacity; and supporting policy development on orbital debris mitigation and capacity management. The workshop was well-attended, with more than 100 international subject matter experts from governments, industry, and academia. In addition, many *Politecnico di Milano* students also attended the workshop. A combination of keynote, highlight overviews, panel discussions, and presentations made this workshop a successful event. Details about this workshop can be found at https://indico.esa.int/event/648/. ♦

The NASA Orbital Debris Photo Gallery has high resolution, computer-generated images of objects in Earth orbit that are currently being tracked. Photos and graphics may be freely downloaded from the NASA ODPO webpages, unless they include a third-party credit line. In these cases, permission must be granted by the copyright owner.

UPCOMING MEETINGS

15-18 September 2026: 27th Advanced Maui Optical and Space Surveillance Technologies Conference (AMOS), Maui, Hawaii, USA

The technical program of the 27th Advanced Maui Optical and Space Surveillance Technologies (AMOS) Conference will focus on space domain awareness (SDA). The technical sessions will include papers and posters on topics such as space debris; SDA; AI and machine learning; SDA systems and instrumentation; astrodynamics; satellite characterization; and cislunar SDA, among others. The call for papers closed on 2 March 2026, and due to high demand, registration closed early. Prospective participants can still join the waitlist on the website and will be notified if an opening becomes available. All presenters must present their work in-person, but virtual attendance options are available for non-presenters and selected virtual poster presenters. Additional information about the conference is available at https://amostech.com/.

5-9 October 2026: 77th International Astronautical Congress (IAC), Antalya, Türkiye

The 77th International Astronautical Congress (IAC) will be hosted by the Turkish Space Agency (TUA) in Antalya, Türkiye, with a theme of "Gateway to the sky," from 5 to 9 October 2026. The International Academy of Astronautics (IAA) Space Debris Committee will again organize the Space Debris Symposium during the IAC. The technical sessions will address topics in the categories of science and exploration; applications and operations; technology; infrastructure; and space and society. The abstract submission deadline was 28 February 2026. Regular registration closes on 9 September 2026. Additional details for the 77th IAC can be found at: https://www.iac2026.org/.

1-6 November 2026: 18th Hypervelocity Impact Symposium (HVIS), Monterey, California, USA

The Hypervelocity Impact Symposium (HVIS) is a biennial event organized by the Hypervelocity Impact Society that serves as the principal forum for the discussion, interchange, and presentation of the physics of high- and hypervelocity impact and related technical areas. Orbital debris-related topics for this event will include: fracture and fragmentation; launchers and diagnostics; armor/anti-armor and ballistic technology; high-velocity penetration mechanics and target response; material response; spacecraft/meteoroid and debris shielding and failure analysis; hypervelocity phenomenology studies; and theoretical applied mechanics relevant to hypervelocity impact. This year’s symposium will again feature a special session on hypervelocity phenomena related to planetary protection. The abstract submission deadline passed on 10 April 2026. Registration closes on 16 October 2026. Additional information for the 18th Symposium is available at https://www.hvis.org/. ♦

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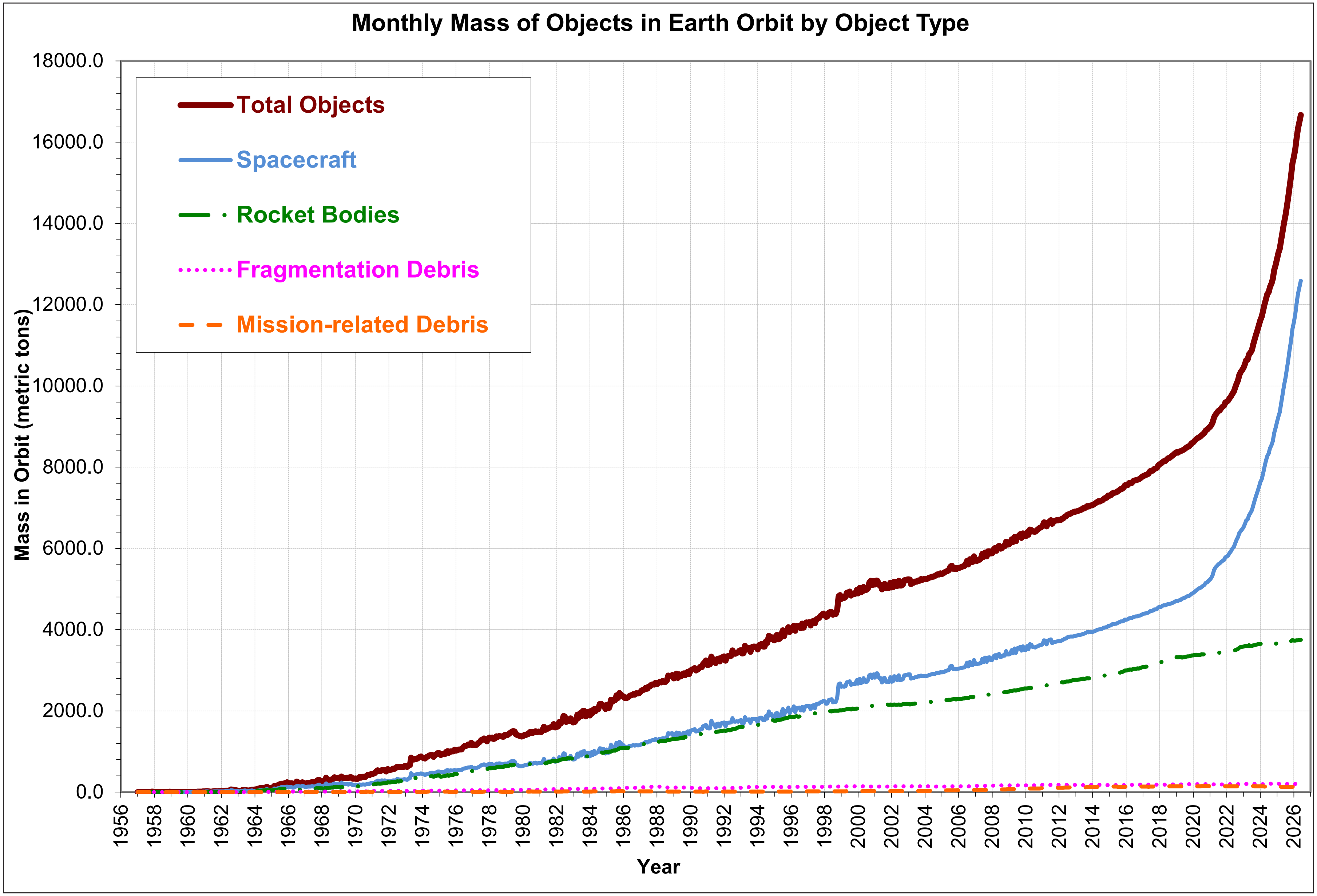
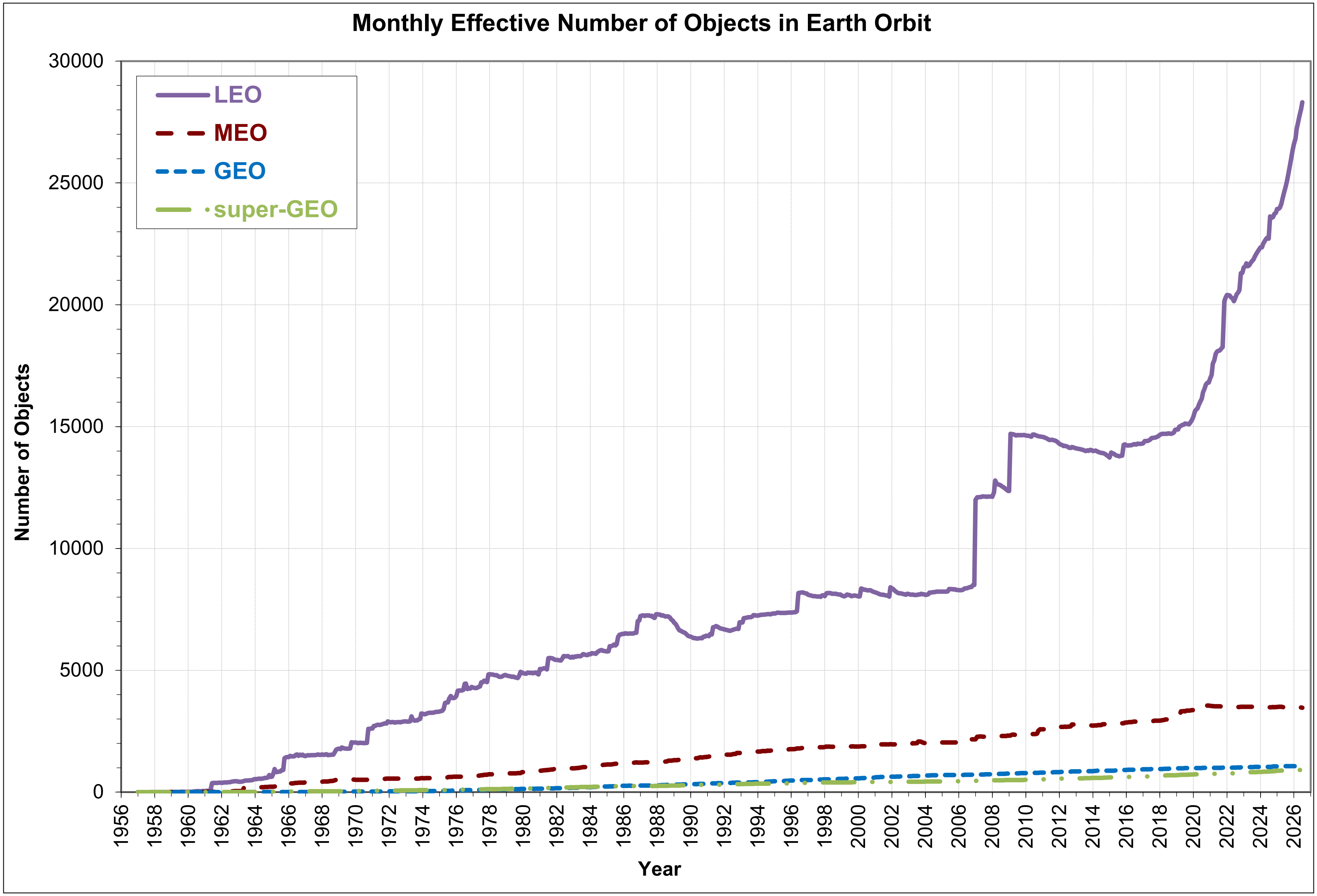


Monthly Mass of All Cataloged Objects in Earth Orbit by Object Type as of 24 August 2026. This chart displays a summary of all objects in Earth orbit officially cataloged by the U.S. Space Surveillance Network. "Fragmentation debris" includes satellite breakup debris and anomalous event debris, while "mission-related debris" includes all objects dispensed, separated, or released as part of the planned mission.



Monthly Effective Number of Objects in Earth Orbit by Orbital Regime cataloged by the U.S. Space Surveillance Network as 24 August 2026. This chart displays the number of all objects in Earth orbit officially cataloged by the U.S. Space Surveillance Network. Low Earth orbit (LEO) includes resident space objects (RSOs) with altitudes within or crossing below 2,000 km; medium Earth orbit (MEO) RSOs with altitudes within or crossing the range from 2,000 km to 35,586 km; geosynchronous orbit (GEO) RSOs with altitudes within or crossing the range from 35,586 km to 35,986 km; and the remainder with altitudes within or crossing the range from 35,986 km to 600,000 km, referred to as Super-GEO. "Effective" number sums the fraction of each orbit that falls within the specified ranges. Cataloged objects without available orbital elements are excluded.

SATELLITE BOX SCORE

(as of 4 August 2026, cataloged by the U.S. SPACE SURVEILLANCE NETWORK)

Country/ Organization	Spacecraft*	Spent R/B & Other Cat. Debris	Total
CHINA	1276	4461	5737
CIS	1627	4948	6575
ESA	114	18	132
FRANCE	132	517	649
INDIA	114	77	191
JAPAN	234	88	322
UK	726	1	727
USA	13635	4688	18323
OTHER	1296	102	1398
Total	19154	14900	34054

* active and defunct

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Orbital Debris Program Office Website
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INTERNATIONAL SPACE MISSIONS

1 May 2026 – 31 July 2026

Intl.* Designator	Spacecraft	Country/ Organization	Perigee Alt. (KM)	Apogee Alt.(KM)	Inc. (DEG)	Addl. SC	Earth Orbital R/B	Other Cat. Debris
1998-067	ISS dispensed objects	Various	413	423	51.6	7	0	2
2026-099A	STARLINK-37258	US	462	463	53.16	28	0	0
2026-100A	PEARL-1B	TWN	591	599	97.73	44	0	0
2026-101A	STARLINK-37592	US	465	466	97.29	23	0	0
2026-102A	TIANZHOU 10	PRC	389	391	41.47	0	1	0
2026-103A	USA 586	US	512	517	70.03	21	0	0
2026-104A	QIANFAN-127	PRC	1067	1070	88.99	17	1	0
2026-105B	DUMMY MASS 4	PRC	193	563	88.96	0	1	0
2026-106A	OBJECT A	PRC	522	539	97.51	4	1	0
2026-107A	DRAGON CRS-34	US	416	422	51.63	0	0	0
2026-108A	QIANFAN-145	PRC	1067	1070	89.02	17	1	0
2026-109A	SMILE	ESA	5904	120101	70.03	0	0	0
2026-110A	STARLINK-37726	US	464	467	97.29	23	0	0
2026-111A	STARLINK-37395	US	462	464	53.16	28	0	0
2026-112A	STRIX-7	JPN	545	578	44.91	0	2	0
2026-113A	SZ-23	PRC	389	391	41.47	0	1	0
2026-114A	STARLINK-37380	US	462	464	53.16	28	0	0
2026-115A	STARLINK-37613	US	464	467	97.29	23	0	0
2026-116A	TJS-24	PRC	35784	35791	0.18	0	1	0
2026-117A	STARLINK-37665	US	462	464	53.16	28	0	0
2026-118A	KUIPER-00282	US	628	631	51.9	28	0	0
2026-119A	STARLINK-37501	US	464	467	97.28	23	0	0
2026-120A	OBJECT A	PRC	491	511	55	3	0	0
2026-121A	QIANFAN-163	PRC	1067	1069	89.01	0	1	0
2026-121B	QIANFAN-164	PRC	1067	1070	89.01			
2026-122A	STARLINK-37733	US	464	467	97.29	23	0	0
2026-123A	STARLINK-37651	US	459	460	53.16	28	0	0
2026-124A	QIANFAN-165	PRC	1067	1070	89.01	17	1	0
2026-125A	QIANFAN-183	PRC	1067	1070	88.99	17	1	0
2026-126A	STARLINK-37537	US	464	467	97.29	22	0	0
2026-127A	STARLINK-37629	US	462	463	53.16	28	0	0
2026-128A	OBJECT A	PRC	390	406	54.99	0	1	7
2026-128B	OBJECT B	PRC	392	410	55			
2026-129A	TJS-25	PRC	35772	35800	5.91	0	0	0
2026-130A	ELECTRON R/B (1)	US	189	204	39.99	0	1	0
2026-131A	STARLINK-37816	US	465	466	97.29	23	0	0
2026-132A	STARS-X	JPN	560	578	97.68	5	1	0
2026-133A	STARLINK-37536	US	461	465	53.16	28	0	0
2026-134A	OBJECT A	PRC	529	551	97.7	7	0	0
2026-135A	STARLINK-37880	US	465	466	97.28	23	0	0
2026-136A	SJ-31	PRC	1991	39900	63.49	0	1	0
2026-137A	HULIANWANG DIGUI-169	PRC	1111	1112	50.01	8	1	0
2026-138A	OBJECT A	PRC	830	851	55.14	6	1	1
2026-139A	SPACEMOBILE-008	US	524	530	53	0	0	0
2026-139B	SPACEMOBILE-009	US	524	531	53			
2026-139C	SPACEMOBILE-010	US	525	532	53			
2026-140A	KUIPER-00423	US	463	479	51.88	35	0	0
2026-141A	USA 610	US	442	446	70	8	0	0
2026-142A	VICTUS HAZE PUMA	US	495	510	97.38	0	1	0
2026-143A	STARLINK-37656	US	465	466	97.28	23	0	0
2026-144A	TJS-26A	PRC	35762	35808	6.89	0	1	0
2026-145A	STARLINK-38005	US	464	467	97.28	23	0	0
2026-146A	STRIX-8	JPN	546	559	41.99	0	2	0
2026-147A	STARLINK-38055	US	464	467	97.28	23	0	0
2026-148A	SIRIUS XM-11	US	35716	35725	0.01	0	0	0
2026-149A	OBJECT A	PRC	966	967	99.35	0	1	0
2026-150A	STARLINK-38033	US	465	466	97.28	23	0	0
2026-151A	KUIPER-00258	US	459	476	51.87	28	0	0
2026-152A	LINK	US	316	331	20.59	0	1	0
2026-153A	QIANFAN-201	PRC	841	855	89	17	1	0
2026-154A	STARLINK-37520	US	462	464	53.16	28	0	0
2026-155A	QIANFAN-219	PRC	944	997	89	19	1	0
2026-156A	CAS500-4	SKOR	882	900	98.99	74	0	0
2026-157A	STARLINK-37886	US	458	461	53.16	28	0	0
2026-158A	CHUANG XIN 26 (CX-26)	PRC	804	812	49.98	0	1	1
2026-159A	STARLINK-38024	US	343	345	97.28	23	0	0
2026-160A	STARLINK-38128	US	348	353	70	26	0	0
2026-161A	STARLINK-37844	US	449	451	53.16	28	0	0
2026-162A	SOYUZ MS-29	CIS	413	423	51.63	0	1	0
2026-163A	PRAETORIAN SDA_501	US	934	955	81.48	20	0	0
2026-164A	OBJECT A	IND	434	457	59.93	0	0	0
2026-164B	OBJECT B	IND	433	449	59.92			
2026-164C	OBJECT C	IND	434	451	59.93			
2026-165A	RASSVET-3 17	CIS	282	307	82.3	15	1	0
2026-166A	STARLINK-38222	US	386	390	97.28	23	0	0
2026-167A	OBJECT A	US	334	44728	25.79	3	0	0
2026-168A	OBJECT A	PRC	526	550	97.54	8	1	0
2026-169A	TIANLIAN-2 06	PRC	35771	35800	2.95	0	1	0
2026-170A	OBJECT A	PRC	533	555	97.56	4	0	0
2026-171A	STARLINK-38182	US	343	345	97.28	23	0	0
2026-172A	TIANLIAN-3 01	PRC	35777	35797	0.08	0	1	0
2026-173A	TJS-27A	PRC	1149	1158	64.79	0	1	1
2026-173C	TJS-27B	PRC	1149	1157	64.79			
2026-174A	USA 619	US	NO INITIAL ELEMENTS			0	0	0

Intl. = International; SC = Spacecraft; Alt. = Altitude; Inc. = Inclination; Addl. = Additional; R/B = Rocket Bodies; Cat. = Cataloged

Notes: 1. Orbital elements are as of data cut-off date 4 August 2026. 2. Additional spacecraft on a single launch may have different orbital elements. 3. Additional uncatalogued objects may be associated with a single launch.