National Aeronautics and Space Administration

Trajectory Study

Planetary Science Decadal Survey
Near Earth Asteroid
Trajectory Opportunities in 2020–2024

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Data Release, Distribution, and Data Use Statements

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The data contained in this document may not be modified in any way.

Planetary Science Decadal Survey

Mission Concept Study Final Report

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Executive Summary

Near Earth objects (NEOs) are attractive targets for spacecraft missions with the purpose of obtaining greater insight to the nature of the original bodies from which the terrestrial planets formed, without having to visit the Main Belt itself. Greater knowledge of NEOs directly sheds light on the origin and evolution of the asteroid belt, the formation of planets, and the history of the Solar System.

This report describes a search for NEOs that would be accessible for missions launching in 2020–2024. A broad trajectory search was done to find the best rendezvous and sample-return trajectories available to 7,030 asteroids. The search found 624 NEOs with spacecraft trajectories available in 2020–2040 and 345 NEOs with Earth-return trajectories available in the same period. These results clearly show that there is a wealth of mission targets available, representing a broad diversity of asteroid types.

This report also discusses the trades behind choosing either chemical or solar electric propulsion to the targets on this list. There are 132 NEOs for which chemical propulsion (using an Atlas V 401 class launcher) could deliver in excess of 1,500 kg for a rendezvous, and 46 NEOs where chemical propulsion could return a 1,500 kg or heavier spacecraft to Earth after an asteroid rendezvous. For these targets, chemical propulsion is likely to be sufficient. For other targets, solar electric propulsion could allow for a larger spacecraft to be flown without stepping up the launch vehicle size. In addition, solar electric propulsion enables more ambitious missions such as rendezvous with multiple asteroids.

1. Scientific Objectives

Background

The near Earth object (NEO) population of asteroids derives from the substantially larger Main Asteroid Belt population between Mars and Jupiter. Objects in the Main Belt that stray into areas of diffusive resonance (possibly by collision, or more likely by thermal drag forces [1]) can be readily injected into the inner Solar System (e.g.,[2]) where they reside for ~10 Ma on average until colliding with a planet such as Earth or the Sun, or are ejected from the solar system.

Because the NEO population represents a random sample of small Main Belt asteroids, and with it a sample of primitive bodies, NEOs are attractive targets for spacecraft missions with the purpose of obtaining greater insight into the nature of the original bodies from which the terrestrial planets formed, without having to visit the Main Belt itself. In many cases the NEO is known in some detail, for instance its photometric properties and rotation state, and even a radar-derived shape model, and this focuses the mission science and enables mission planning.

Specific science questions that could be addressed by missions to NEOs include:

1. What is the elemental and mineralogical composition and water content of primitive bodies? (This is the goal especially of sample return missions.)
2. What is the interior structure of small bodies? Are they rubble piles or are they intact bodies?
3. How do small asteroids respond to perturbations such as artificial cratering events?
4. What is the origin and evolution of binary asteroids?
5. What are the morphological and surface properties of a microgravity planetesimal?
6. What is the origin of primitive bodies, and by extension, the origin of terrestrial planets?

The NEO population is not only the focus of great scientific interest, but also of societal interest. To mitigate the threat of an NEO collision with Earth, Congress in 2005 mandated a search to locate all NEOs having a diameter of greater than 140 m by 2020. Furthermore, the recently released *Augustine Report* [3], providing recommendations for the future of human spaceflight, recommended a 'flexible path' to inner Solar System locations including NEOs, rather than a singular focus on a Moon-Mars strategy.

For all of these reasons, it is of great interest to investigate the possibilities of NEO exploration. This report details the results of a trajectory design study that specifically addresses the most attractive targets for spacecraft missions using impulsive trajectories, and the possibilities for a solar electric powered 'grand tour' of NEO targets for a reasonable cost. The report does not address mission architecture options (i.e., spacecraft, payload, in-situ elements, etc.), but rather concentrates on mission design.

Study Goals

The goal of the study was to highlight some of the best candidates of NEO targets for New Frontiers and Discovery class missions, for rendezvous and for sample return, for chemical and for solar electric propulsion.

The parameters of the study were as follows:

- Launch dates shall be 2020–2024.
- Performance shall be of the NASA Evolutionary Xenon Thruster (NEXT) system. Total SEP mission duration shall be no greater than 5 years for rendezvous.
- Total SEP mission duration shall be no greater than 8 years for sample return.
- For sample return missions, the time at the target shall be 2–6 months.

2. NEO Trajectory Search

Search Methodology

The search for chemical-propulsion NEO missions included both rendezvous and sample-return trajectories. Initially, a broad search was conducted using a simplified, non-optimal, patched conic approximation. The best cases from this search were then optimized as impulsive trajectories using a Sequential Quadratic Programming (SQP) optimizer [4]. This process found rendezvous trajectories for 624 NEOs and sample-return trajectories for 345 NEOs.

The ephemerides and physical parameters for the NEOs were taken from the ssd.jpl.nasa.gov site. From the small body search tool on this website, a list of 7,030 asteroids was generated for the initial broad search. This list was comprised of both numbered and unnumbered asteroids classified as NEOs that had an orbit condition code of 4 or less. The condition code, defined below in Table 2-1, is a measure of the quality of the orbit knowledge for an object.

Table 2-1. Orbit Condition Code

	10-Year Orbital Longitude Runoff			
	(Arc-Seconds)		(Degrees)	
U	Min.	Max.	Min.	Max.
0		1.00	—	—
1	1.00	4.42	—	—
2	4.42	19.56	—	—
3	19.56	86.53	—	—
4	86.53	382.76	—	0.1
5	382.76	1692.98	0.1	0.5
6	1692.98	7488.30	0.5	2.1
7	7488.30	33121.80	2.1	9.2
8	33121.80	146502.30	9.2	41.0
9	146502.30	—	41.0	—

For rendezvous trajectories, the following constraints were placed on the search:

1. Launches from 1-Jan-2020 to 1-Jan-2025
2. Maximum flight time to the asteroid of 5 years
3. Launch C3 less than 25 km^2/s^2
4. Rendezvous ΔV less than 3 km/s
5. One flyby of Mars or Venus allowed before rendezvous

For sample-return trajectories, the following constraints were placed on the search:

1. Launches from 1-Jan-2020 to 1-Jan-2025
2. Maximum flight time to the asteroid of 5 years
3. Maximum flight time to Earth return of 8 years
4. Minimum stay time at asteroid of 60 days
5. Launch C3 less than 25 km^2/s^2
6. Rendezvous ΔV less than 3 km/s

7. Departure ΔV less than 3 km/s
8. One flyby of Mars or Venus allowed before rendezvous
9. One flyby of Mars or Venus allowed before Earth return

For both the rendezvous and sample-return searches, no constraint was placed on the launch declination. Mission-specific implementation details such as launch declination constraints were intentionally overlooked so as to allow for a more straightforward and general presentation of the results.

Trajectory Search Results

Appendices C and D present the search results for the rendezvous trajectory search and sample-return trajectory search, respectively. For each asteroid, the trajectory with the highest delivered spacecraft mass is shown. (In general, the asteroids in the table will have additional trajectories not shown that would require either more deep space delta-V or a higher launch energy and would deliver a lower spacecraft mass as a result.)

The table in Appendix C has the following columns:

1. Trajectory ID number
2. Asteroid name (and number for numbered NEOs)
3. Absolute magnitude
4. Albedo (if known)
5. Estimated diameter based on absolute magnitude and albedo. If albedo is not known, a 15% albedo is assumed
6. Diameter (if known)
7. Rotational period (if known)
8. Spectral type, SMASSII classification system (if known)
9. Spectral type, Tholen classification system (if known)
10. Asteroid orbit mean semi-major axis
11. Asteroid orbit mean eccentricity
12. Asteroid orbit mean inclination relative to ecliptic plane
13. Minimum orbital intersection distance (MOID) with Earth's orbit
14. Orbit condition code (as in Table 2-1)
15. Path, i.e., sequence of bodies in trajectory starting with "E" for Earth launch. "A" denotes an asteroid encounter and "M" or "V" denotes Mars or Venus flybys respectively.
16. Trajectory time of flight (TOF)
17. Launch date
18. Asteroid arrival date
19. Launch C3 (i.e., launch v-infinity squared)
20. Total mission deterministic delta-V (statistical delta-V is not included)
21. Launch mass on Atlas V 401 (chosen as a representative of class of small EELVs)

22. Spacecraft arrival mass estimate (i.e., launch mass minus the fuel mass associated with the total mission deterministic delta-V column, assuming an I_{sp} of 325 seconds)[1]

The table in Appendix D has the following additional columns for the sample-return trajectories:

1. Asteroid departure date for Earth return leg
2. Earth return date
3. Earth return entry speed at 125 km altitude (It is assumed that the sample capsule does a direct entry into the Earth atmosphere.)
4. Spacecraft Earth return mass estimate (i.e., launch mass minus the fuel mass associated with the total mission deterministic delta-V column, assuming an I_{sp} of 325 seconds)[1]

Figure 2-1 plots the rendezvous trajectories from the table in Appendix C. The TOF from the table is plotted against the spacecraft mass. The size of the "bubbles" for each asteroid is based on the estimated diameter column from the table. Figure 2-2 is a similar plot for the sample-return trajectories. Figure 2-1 and 2-2 show the impact of constraints on flight time or spacecraft mass to reduce the trade space. However, it is important to remember that more spacecraft mass is possible with a larger launch vehicle or with the use of SEP. Furthermore, each point has been optimized for spacecraft mass and not for flight time. Shorter flight time trajectories are possible for the target asteroids at the expense of less delivered mass.

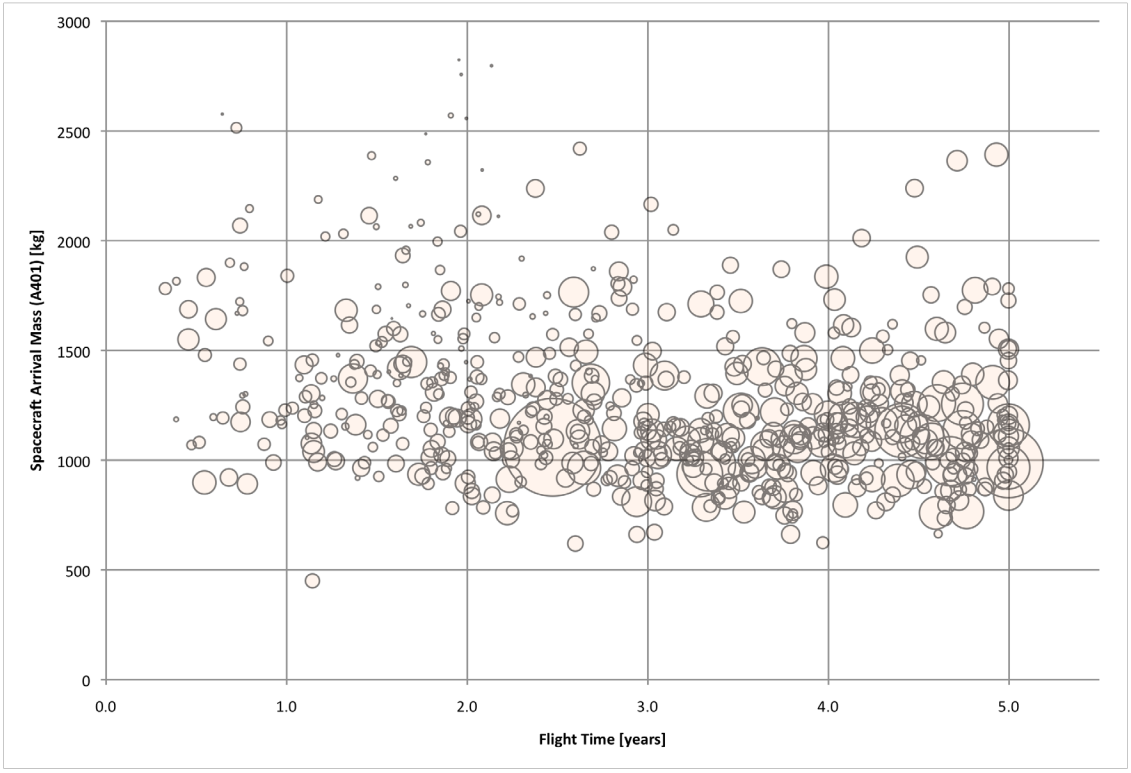

Figure 2-1. Rendezvous Trajectories

[1] This mass estimate neglects launch period variations, statistical delta-V, and spacecraft mass margins. As such, it is representative of trajectory performance, but over-estimates the mass of an actual spacecraft.

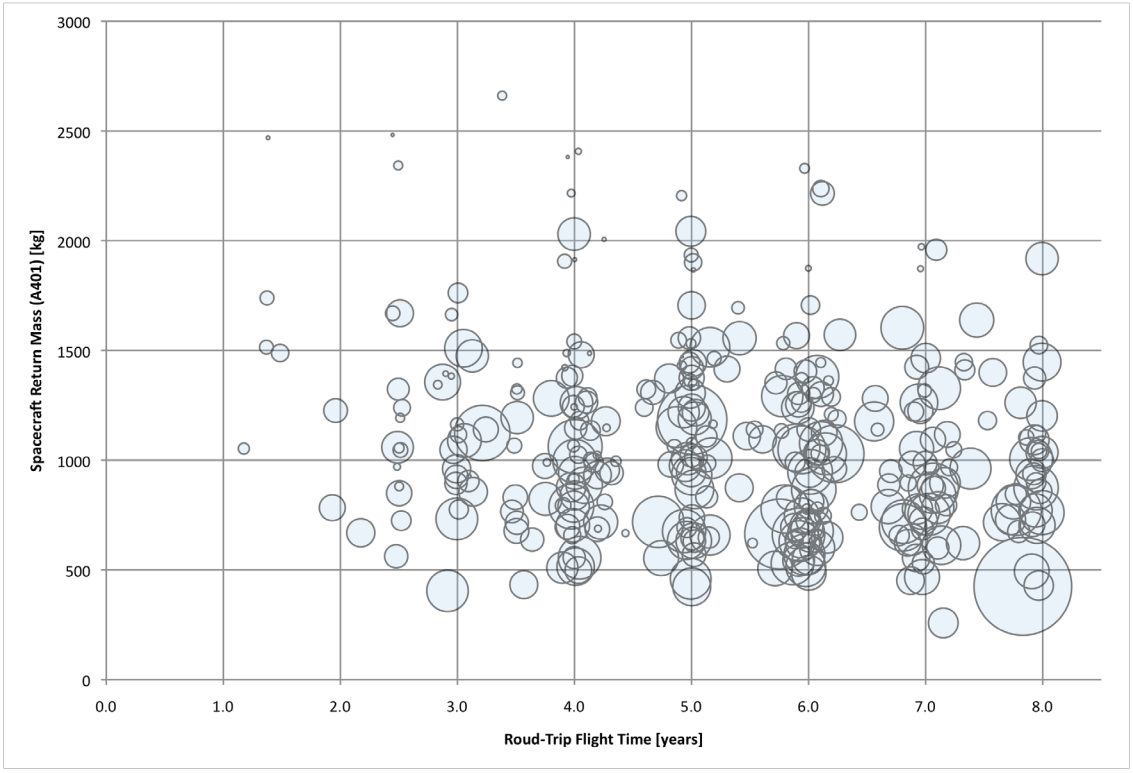

Figure 2-2. Sample Return Trajectories

3. Solar Electric Propulsion (SEP)

Applicability of Trajectory Search Results to SEP Missions

The trajectories in the last section were presented as chemical propulsion trajectories with the spacecraft masses calculated using typical performance for a bi-propellant chemical system (i.e., an I_{sp} of 325 seconds). All of these trajectories may be converted to SEP. However, there are classes of SEP trajectories that do not have an analogous chemical trajectory and these would not be represented in the search results given in the tables in Appendices C and D.

Broad searches of SEP trajectories must address two problems that do not arise in similar searches for chemical trajectories: (1) SEP trajectories are generally more tightly coupled with the spacecraft design than chemical trajectories in that they are dependent on the spacecraft launch mass, spacecraft power system, and the performance characteristics of the electric propulsion system. This makes it difficult to formulate a generic search for SEP trajectories as opposed to a search formulated to a specific spacecraft configuration. (2) SEP systems generally enable a much greater capability in shaping the trajectory than chemical systems. This greatly expands the range of feasible trajectories and can overwhelm broad searches. Both of these problems are currently the subject of ongoing astrodynamics research.

Since we do not currently have the capability to do broad SEP trajectory searches like the chemical propulsion trajectory searches behind the tables in Appendices C and D, this report instead provides specific point examples of how SEP could be used for a NEO exploration mission.

Trading Chemical vs. SEP with Analogous Trajectories

Currently, chemical propulsion systems for deep space missions are generally less expensive than SEP systems (including both power and propulsion systems). If compared using the same trajectory, a SEP mission typically needs to enable the use of a less expensive launch vehicle in order to be more affordable than a comparable chemical propulsion mission. As an example, trajectory #208 from the table in Appendix D was converted to SEP. This is a 7.9-year sample return trajectory in 2024 to the D-type asteroid 2002 AT4. This trajectory has a launch C3 of 18.6 km^2/s^2 and a total deterministic delta-V of 2.98 km/s. With an Atlas V 401 launcher, and a chemical I_{sp} of 325 seconds, the Earth return mass is 938 kg.[2]

To convert this trajectory to SEP, a spacecraft with 10 kW solar arrays (like those used on Dawn) with a single NEXT ion engine was assumed. Many other configurations are possible which would vary performance, but this configuration is representative for a general comparison between SEP and chemical propulsion. Figure 3-1 shows a 7.8-year trajectory to 2002 AT4 that also launches on an Atlas V 401. This trajectory increases the Earth return mass by 45% to 1,362 kg.[3] To exceed this mass with a chemical trajectory, an Altas V 531 or larger launcher would be needed. For a mission concept using this trajectory, the cost of using a SEP system would have to be traded against the cost of the larger launcher needed to achieve similar performance using chemical propulsion.

In addition to enabling smaller launchers, SEP trajectories can lower both mission and implementation risk. SEP reduces *mission risk* by enabling more robust operations due to the much lower time criticality of maneuvers. SEP reduces *implementation risk* by enabling much longer launch periods and by better handling slips of launch dates, in general, than chemical propulsion.

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[2] This mass estimate neglects launch period variations, statistical delta-V, and spacecraft mass margins. As such, it is representative of trajectory performance, but over-estimates the mass of an actual spacecraft.

[3] As with the chemical spacecraft mass estimates, the SEP trajectory masses over-estimate the mass of an actual spacecraft, but are calculated in a way to offer the best comparison to the chemical trajectories in the tables in Appendices C and D.

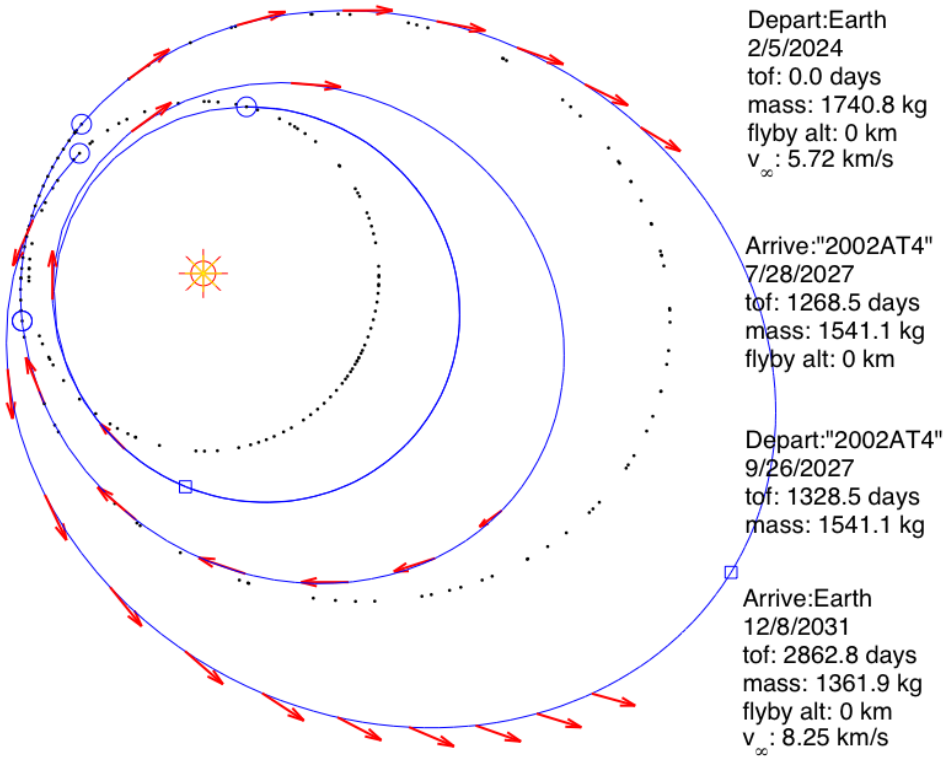

Figure 3-1. Example SEP Sample-Return from D-Type NEO

Trajectories Enabled by SEP

SEP provides a spacecraft with a dramatically higher delta-V capability than chemical propulsion. This could enable new types of trajectories that are not feasible with chemical propulsion. The Dawn mission, which will orbit both Vesta and Ceres is a great example of this enhanced capability. This section presents two similar SEP asteroid tours that rendezvous with multiple NEOs. These two trajectories are example point-designs from a larger set of possible SEP asteroid tours.

For these tours, a spacecraft with 10 kW Dawn-like arrays and a single NEXT ion engine was assumed. This configuration was assumed as an example for the point design and was not optimized for cost or performance.

Figure 3-2 shows a 5-year tour of the C-type 1999 JU3, the Q-type 2001 QC34 [5], and the V-type Orpheus [6]. This trajectory launches at the end of 2021 on an Atlas V 401. It then arrives at 1993 JU3 in 2023, spends 90 days at the NEO, and leaves for 2001 QC34 for a 90-day rendezvous in 2025. The trajectory then arrives at Orpheus in 2026 with a mass of 1652 kg. For this trajectory, the SEP system provides 12.72 km/s of delta-V, and takes the same suite of instruments to asteroids of three very different taxonomic types.

Figure 3-3 shows another 5-year tour that launches on December 30, 2019. (This trajectory could be converted to a January 2020 launch to meet the 2020–2024 launch period.) This tour also visits 2001 QC24 and 1999 JU3, but substitutes a flyby of the D-type 2002 AT4 for a rendezvous with Orpheus. It finishes in 2024 with 1,633 kg at 1999 JU3. For this trajectory, the SEP system provides 13.24 km/s of delta-V.

Both of these asteroid tours are infeasible with chemical propulsion. It is possible that an asteroid tour of another set of NEOs could be found that would be feasible to fly with chemical propulsion. However, the set of such tours feasible with SEP is much larger, which makes it more likely to find a tour of scientifically interesting NEOs using SEP than chemical propulsion.

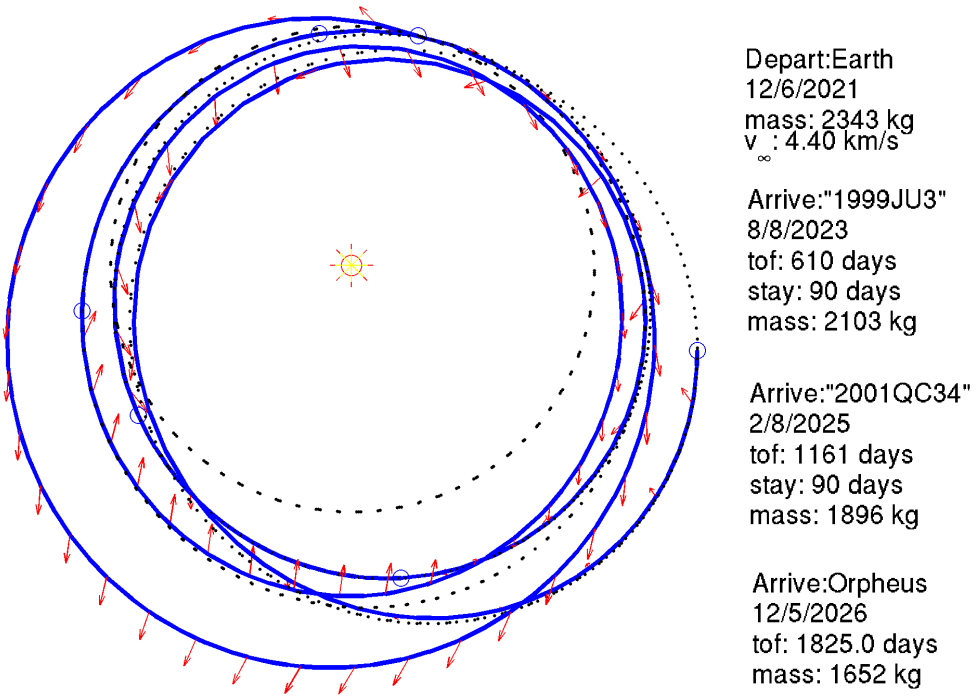

Figure 3-2. Example 2021 NEO Tour

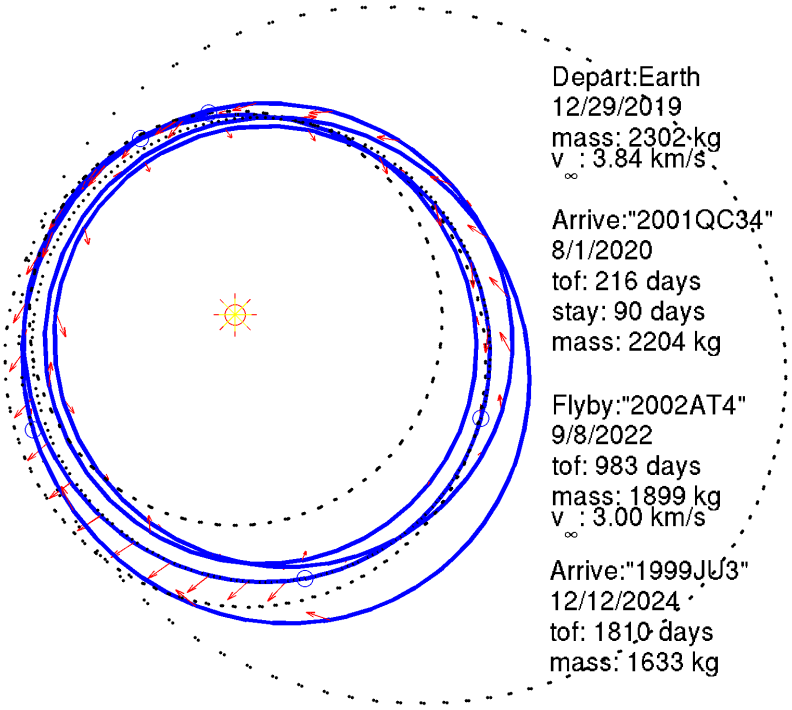

Figure 3-3. Example 2020 NEO Tour

4. Resources

The NEO asteroid physical and orbital characteristics in the tables in Appendices C and D were obtained from the JPL Solar System Dynamics group website: http://ssd.jpl.nasa.gov/.

The SEP trajectories in this report were calculated using the low-thrust trajectory design tool, MALTO [7]. MALTO was developed by JPL for NASA's In-Space Propulsion Program. MALTO is considered a medium-fidelity trajectory design tool and is available to NASA contractors and civil service and academia directly through the JPL website: https://download.jpl.nasa.gov/. Commercial licenses can be obtained through the Caltech Office of Technology Transfer: http://www.ott.caltech.edu/.

Appendix A. Acronyms

EELV	evolved expendable launch vehicle
JPL	Jet Propulsion Laboratory
MALTO	mission analysis low-thrust trajectory optimization
MOID	minimum orbital intersection distance
NEO	near-Earth object
NEXT	NASA Evolutionary Xenon Thruster
NRC	National Research Council
SQP	Sequential Quadratic Programming
TOF	time of flight

Appendix B. References

[1] Vokrouhlicky, D. and Farinella, P., "Efficient delivery of meteorites to the Earth from a wide range of asteroid parent bodies," Nature, 407, 606-608, 2000.

[2] Morbidelli, A., Jedicke, R., Bottke, W.F., Michel, P. and Tedesco, E.F, "From Magnitudes to Diameters: The Albedo Distribution of Near Earth Objects and the Earth Collision Hazard," Icarus, 158, 329-342, 2002.

[3] "Seeking a Human Spaceflight Program Worthy of a Great Nation," Final report of the Review of U.S. Human Spaceflight Plans Committee, October 2009, (http://legislative.nasa.gov/396093main_HSF_Cmte_FinalReport.pdf).

[4] "Optimization Toolbox User's Guide", The MathWorks, Inc., 2004.

[5] Vilas, F., "Spectral Characteristics of Hayubusa 2 Near-Earth Asteroid Targets 162173 1999 JU3 and 2001 QC34," The Astronomical Journal, 135(4), 1101–1105, 2008.

[6] Wisniewski, W.Z., "Physical Studies of Small Asteroids: I. Lightcurves and Taxonomy of 10 Asteroids," Icarus, 90(1), 117–122, 1991.

[7] Sims, J. A., Finlayson, P. A., Rinderle, E. A., Vavrina, M. A., and Kowalkowski, T. D., "Implementation of a Low-Thrust Trajectory Optimization Algorithm for Preliminary Design," AIAA/AAS Astrodynamics Specialist Conference, Paper No. AIAA-2006-6746, Keystone, Colorado, August 21–24, 2006.

Appendix C. NEO Rendezvous Trajectories

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Arrival Mass [kg]
1	(2008 JL24)	29.6		0.004					1.04	0.11	0.55	0.000	3	EA	2.0	29-Nov-24	13-Nov-26	5.1	0.324	3126	2824
2	(1991 VG)	28.4		0.007					1.03	0.05	1.45	0.003	2	EA	2.1	7-Dec-20	25-Jan-23	1.5	0.575	3350	2797
3	(2009 BD)	28.3		0.007					1.00	0.05	0.38	0.003	1	EA	2.0	23-Mar-20	12-Mar-22	1.3	0.636	3366	2758
4	(2007 UN12)	28.7		0.006					1.05	0.06	0.23	0.001	4	EA	0.6	11-Jan-20	2-Sep-20	0.0	0.923	3443	2577
5	(2000 SG344)	24.8		0.038					0.98	0.07	0.11	0.001	3	EA	1.9	2-Nov-23	29-Sep-25	0.4	0.910	3420	2571
6	(2008 HU4)	28.2		0.008					1.10	0.08	1.32	0.007	4	EA	2.0	7-May-22	4-May-24	0.7	0.908	3400	2557
7	(2002 NV16)	21.4		0.182					1.24	0.22	3.51	0.028	0	EA	0.7	26-Sep-24	16-Jun-25	12.0	0.259	2727	2514
8	(2006 RH120)	29.6		0.004					1.03	0.02	0.60	0.018	1	EA	1.8	5-Dec-24	12-Sep-26	1.4	0.957	3357	2487
9	162783 (2000 YJ11)	20.5		0.267					1.31	0.23	7.26	0.031	0	EMA	2.6	14-Oct-24	30-May-27	11.8	0.395	2739	2419
10	96631 (1999 FP59)	18.0		0.864					1.70	0.26	1.77	0.248	0	EMA	4.9	28-Sep-22	3-Sep-27	14.4	0.261	2597	2392
11	(2003 SM84)	22.7		0.097					1.13	0.08	2.79	0.052	1	EA	1.5	7-Apr-21	26-Sep-22	4.6	0.891	3157	2387
12	141018 (2001 WC47)	18.6		0.668					1.40	0.24	2.87	0.079	0	EMA	4.7	23-Mar-24	8-Dec-28	11.1	0.513	2777	2364
13	(2009 HC)	24.8		0.038					1.04	0.13	3.78	0.011	4	EA	1.8	17-Apr-24	27-Jan-26	7.3	0.765	2997	2357
14	(2006 JY26)	28.3		0.007					1.01	0.08	1.44	0.002	3	EA	2.1	2-Jun-20	3-Jul-22	2.1	1.134	3314	2322
15	(2007 DD)	25.8		0.024					0.99	0.12	2.53	0.007	2	EA	1.6	2-Mar-20	9-Oct-21	3.9	1.075	3201	2284
16	25143 Itokawa (1998 SF36)	19.2		0.496	0.33	12.132	S(IV)		1.32	0.28	1.62	0.013	0	EMA	4.5	25-May-24	15-Nov-28	13.9	0.509	2627	2239
17	162173 (1999 JU3)	19.2		0.500			Cg		1.19	0.19	5.88	0.002	0	EA	2.4	4-Dec-20	21-Apr-23	20.6	0.069	2287	2238
18	(2000 AE205)	22.9		0.091			S		1.16	0.14	4.46	0.031	1	EA	1.2	25-Dec-23	26-Feb-25	6.7	1.038	3030	2188
19	(2001 WT1)	20.2		0.319					1.09	0.40	7.15	0.121	1	EVA	3.0	23-Jan-23	29-Jan-26	11.3	0.781	2767	2166
20	(2009 DO111)	22.9		0.092					1.05	0.28	2.99	0.002	2	EVA	0.8	1-Nov-21	18-Aug-22	14.4	0.609	2598	2146
21	(2009 BW2)	25.1		0.032					1.02	0.14	1.01	0.016	3	EA	2.1	2-Apr-20	25-Apr-22	2.7	1.386	3277	2121
22	138404 (2000 HA24)	19.0		0.552					1.14	0.32	2.17	0.027	0	EVA	2.1	19-Apr-20	19-May-22	11.2	0.863	2773	2115
23	10302 (1989 ML)	19.5		0.432		19	X		1.27	0.14	4.38	0.082	0	EA	1.5	8-Jul-22	22-Dec-23	13.2	0.740	2667	2114
24	(2008 KT)	28.2		0.008					1.02	0.09	1.99	0.000	4	EA	2.2	25-Jun-20	27-Aug-22	2.6	1.404	3279	2111
25	(2008 NP3)	23.3		0.074					1.00	0.33	1.44	0.016	1	EVA	1.7	6-Apr-20	2-Jan-22	9.6	1.017	2865	2082
26	(2001 QC34)	19.9		0.356					1.13	0.19	6.23	0.028	0	EA	0.7	23-Dec-19	19-Sep-20	20.6	0.318	2286	2069
27	(2003 YN107)	26.3		0.019					0.99	0.01	4.32	0.006	0	EA	1.7	19-Dec-19	26-Aug-21	6.3	1.250	3057	2065
28	209215 (2003 WP25)	24.2		0.049					0.99	0.12	2.56	0.023	1	EA	1.5	6-Nov-20	6-May-22	4.3	1.369	3171	2064
29	85585 Mjolnir (1998 FG2)	21.4		0.177					1.30	0.36	4.08	0.022	0	EMA	3.1	11-Dec-22	31-Jan-26	18.7	0.478	2381	2049
30	(2006 YF)	20.9		0.226					1.11	0.20	4.67	0.057	4	EA	2.0	24-Jun-21	10-Jun-23	13.3	0.838	2658	2043
31	89136 (2001 US16)	20.2		0.316					1.36	0.25	1.90	0.029	0	EA	2.8	20-May-23	7-Mar-26	14.3	0.777	2602	2039
32	(1998 HG49)	21.9		0.141					1.20	0.11	4.20	0.077	1	EA	1.3	6-Nov-22	29-Feb-24	6.5	1.286	3041	2031
33	(2006 RJ1)	22.2		0.126					0.95	0.30	1.41	0.001	3	EVA	1.2	3-Nov-21	21-Jan-23	10.5	1.058	2813	2019
34	(2003 HA22)	19.2		0.485					1.88	0.39	1.61	0.120	0	EMA	4.2	4-Jun-22	10-Aug-26	17.8	0.594	2424	2012
35	(1998 KG3)	22.1		0.131					1.16	0.12	5.50	0.097	0	EA	1.8	14-Apr-22	13-Feb-24	10.3	1.106	2824	1996
36	(2008 RH1)	22.6		0.102					1.06	0.16	7.47	0.070	3	EA	1.7	13-Mar-21	9-Nov-22	18.2	0.660	2407	1957
37	(2008 EV5)	20.0		0.343	0.45	3.725			0.96	0.08	7.44	0.015	0	EA	1.6	22-Jun-22	12-Feb-24	14.2	0.958	2611	1933
38	140158 (2001 SX169)	18.2		0.783					1.35	0.46	2.51	0.026	0	EVA	4.5	19-Jul-21	15-Jan-26	15.8	0.866	2526	1925
39	(2008 UB95)	24.7		0.040					0.99	0.27	3.24	0.000	2	EVA	2.3	9-Nov-21	27-Feb-24	8.9	1.321	2904	1918
40	(2006 SY5)	22.1		0.132					1.04	0.15	7.57	0.104	3	EA	0.7	23-Feb-24	30-Oct-24	15.8	0.907	2524	1899
41	4660 Nereus (1982 DB)	18.2	0.55	0.411	0.33	15.1	Xe		1.49	0.36	1.43	0.003	0	EA	3.5	13-Jan-20	28-Jun-23	23.2	0.433	2163	1888
42	(2007 UY1)	22.9		0.091					0.95	0.17	1.02	0.006	2	EA	0.8	17-Mar-20	21-Dec-20	6.7	1.519	3030	1882
43	(2001 UP)	25.7		0.025					0.88	0.29	7.70	0.007	3	EVA	2.7	17-Jul-21	29-Mar-24	14.1	1.064	2614	1872
44	213053 (1998 WT30)	19.5		0.440					1.81	0.34	0.51	0.212	1	EMA	3.7	23-Jan-20	20-Oct-23	13.1	1.132	2667	1870
45	(2004 EO20)	22.0		0.137					1.22	0.06	4.54	0.161	2	EA	1.8	18-Sep-22	25-Jul-24	6.3	1.570	3054	1867
46	136635 (1994 VA1)	18.9		0.565					1.57	0.17	7.64	0.316	1	EMA	2.8	3-May-24	6-Mar-27	10.3	1.331	2825	1860
47	99942 Apophis (2004 MN4)	19.7	0.33	0.266	0.27	30.4	Sq		0.92	0.19	3.33	0.000	0	EA	1.0	21-Mar-22	22-Mar-23	10.3	1.362	2821	1840
48	85867 (1999 BY9)	18.0		0.878					1.83	0.30	0.94	0.282	0	EMA	4.0	30-Jan-20	26-Jan-24	13.3	1.180	2659	1836
49	138911 (2001 AE2)	19.1		0.514			T		1.35	0.08	1.66	0.234	0	EA	0.6	25-Mar-20	14-Oct-20	6.4	1.620	3046	1832
50	(2003 FF5)	23.2		0.080					1.37	0.30	6.36	0.026	4	EMA	2.9	22-Jun-24	25-May-27	15.5	1.061	2542	1823
51	(2006 FH36)	22.9		0.090					0.95	0.20	1.59	0.016	3	EA	0.4	15-Jan-20	5-Jun-20	1.5	1.951	3349	1816
52	(2003 DX10)	20.2		0.307					1.38	0.41	3.15	0.045	1	EVA	2.8	7-Oct-24	8-Aug-27	13.2	1.240	2663	1805
53	(1997 YM9)	24.3		0.047					1.10	0.10	7.84	0.032	0	EA	1.7	23-Jun-20	18-Feb-22	15.4	1.104	2543	1799
54	(2008 GE1)	19.5		0.442					1.65	0.25	6.72	0.275	2	EMA	4.9	20-Dec-19	16-Nov-24	10.1	1.461	2833	1791
55	(2009 CV)	24.3		0.048					1.11	0.15	0.96	0.012	3	EA	1.5	25-Sep-20	29-Mar-22	1.2	2.014	3369	1791
56	162911 (2001 LL5)	19.0		0.552					1.20	0.34	7.95	0.100	0	EMA	2.9	26-Jan-22	5-Dec-24	17.8	0.970	2426	1790
57	65717 (1993 BX3)	20.9		0.230		20.463			1.39	0.28	2.79	0.048	0	EA	0.3	12-Jan-21	12-May-21	16.2	1.083	2503	1782
58	(2006 TD1)	21.0		0.213					1.89	0.36	2.42	0.224	4	EMA	5.0	10-Dec-20	9-Dec-25	21.8	0.714	2229	1781
59	(1999 XX262)	17.6		1.059					1.53	0.18	8.23	0.311	0	EMA	4.8	6-Dec-21	28-Sep-26	10.7	1.455	2801	1774
60	163000 (2001 SW169)	18.9		0.580					1.25	0.05	3.55	0.180	0	EA	1.9	30-Sep-21	28-Aug-23	5.8	1.769	3085	1771
61	163899 (2003 SD220)	16.9		1.457					0.83	0.21	8.46	0.017	1	EVA	2.6	4-Oct-24	8-May-27	14.8	1.207	2578	1765
62	(2005 GK)	20.1		0.334					1.34	0.33	10.87	0.109	2	EMA	3.4	10-Jul-22	27-Nov-25	23.9	0.594	2126	1765
63	68278 (2001 FC7)	18.2		0.787					1.44	0.11	2.62	0.263	0	EMA	2.1	28-Jul-20	27-Aug-22	14.5	1.247	2593	1753
64	(2005 RN33)	19.6		0.415					1.73	0.26	7.19	0.322	2	EMA	4.6	6-Dec-21	1-Jul-26	8.9	1.609	2905	1753
65	(2004 HX53)	23.3		0.076					1.19	0.33	3.55	0.020	3	EVA	2.4	14-Mar-20	22-Aug-22	11.6	1.441	2753	1752
66	(2002 TS69)	24.5		0.044					1.18	0.13	8.45	0.031	4	EA	2.2	15-Oct-20	18-Dec-22	24.8	0.570	2086	1744
67	152563 (1992 BF)	19.7		0.395			Xc		0.91	0.27	7.25	0.063	0	EVA	2.8	3-Nov-24	6-Sep-27	14.9	1.249	2572	1738

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Arrival Mass [kg]
68	163249 (2002 GT)	18.3		0.744					1.34	0.33	6.97	0.015	0	EMA	4.0	28-Aug-22	9-Sep-26	18.9	0.997	2368	1732
69	152671 (1998 HL3)	19.9		0.362					1.13	0.37	2.68	0.045	0	EMA	5.0	24-Aug-22	23-Aug-27	17.9	1.073	2419	1728
70	65803 Didymos (1996 GT)	18.0		0.880		2.2593	Xk		1.64	0.38	3.41	0.041	0	EMA	3.5	5-Nov-20	12-May-24	20.9	0.879	2273	1725
71	(2005 QP11)	26.4		0.018					0.98	0.18	3.96	0.010	3	EA	2.0	25-Sep-24	28-Sep-26	7.8	1.728	2966	1725
72	(2001 CQ36)	22.7		0.099					0.94	0.18	1.29	0.014	2	EA	0.7	18-Aug-20	15-May-21	0.8	2.162	3395	1722
73	(2007 RT12)	24.0		0.055					1.02	0.16	4.25	0.044	2	EA	2.2	9-Mar-20	14-May-22	8.4	1.703	2933	1719
74	101955 (1999 RQ36)	20.8		0.236		4.288			1.13	0.20	6.04	0.003	0	EA	2.3	1-Oct-24	15-Jan-27	25.3	0.593	2062	1712
75	18109 (2000 NG11)	17.5		1.085		4.2534			1.88	0.37	0.81	0.191	0	EMA	3.3	7-Aug-24	22-Nov-27	18.3	1.079	2402	1712
76	(2006 QQ56)	25.9		0.023					0.99	0.05	2.80	0.015	4	EA	1.7	2-Sep-20	7-May-22	5.9	1.885	3079	1704
77	(2005 CN)	22.8		0.094					1.02	0.18	2.30	0.029	2	EA	2.1	20-May-20	12-Jun-22	3.0	2.071	3257	1701
78	52381 (1993 HA)	19.9		0.354					1.28	0.14	7.73	0.169	0	EMA	4.8	20-Feb-20	21-Nov-24	11.0	1.577	2785	1698
79	190491 (2000 FJ10)	20.9		0.232					1.32	0.23	5.29	0.055	0	EA	2.9	16-Oct-20	15-Sep-23	18.6	1.102	2385	1688
80	(2004 FM17)	19.2		0.493					0.89	0.25	6.76	0.061	1	EA	0.5	9-Mar-24	23-Aug-24	22.3	0.855	2207	1687
81	54509 YORP (2000 PH5)	22.6		0.105		0.2029			1.01	0.23	1.60	0.001	0	EA	1.5	18-Jun-20	17-Dec-21	14.2	1.393	2611	1687
82	173664 (2001 JU2)	19.4		0.461					1.52	0.27	4.01	0.110	0	EMA	1.9	28-Jul-20	9-Jun-22	15.1	1.331	2561	1687
83	175706 (1996 FG3)	18.2		0.794		3.5942	C		1.05	0.35	1.99	0.028	0	EVA	1.3	22-Feb-20	21-Jun-21	16.7	1.235	2480	1683
84	(2007 YJ)	21.7		0.159					1.10	0.28	3.31	0.051	4	EA	0.8	17-Apr-23	18-Jan-24	12.0	1.548	2732	1681
85	65679 (1989 UQ)	19.3		0.471		7.733	B		0.92	0.26	1.29	0.014	0	EVA	3.1	11-Aug-24	18-Sep-27	17.6	1.191	2433	1675
86	(2005 BY2)	20.2		0.310					1.27	0.33	7.29	0.041	1	EMA	3.4	22-Apr-22	8-Sep-25	11.0	1.623	2786	1674
87	(2006 BZ147)	25.4		0.028					1.02	0.10	1.41	0.002	3	EA	2.4	21-Mar-20	27-Aug-22	4.8	2.018	3145	1669
88	(2006 SF6)	19.9		0.360					0.95	0.28	5.87	0.019	2	EVA	2.7	9-Sep-24	4-Jun-27	13.6	1.465	2643	1669
89	(2002 TZ66)	25.9		0.023		<1.1			0.93	0.12	8.48	0.005	3	EA	0.7	9-Oct-20	1-Jul-21	23.6	0.796	2142	1669
90	(1999 AO10)	23.9		0.058					0.91	0.11	2.62	0.022	4	EA	1.8	29-Jul-23	29-Apr-25	4.5	2.043	3164	1667
91	208023 (1999 AQ10)	20.3		0.295			S:		0.93	0.24	6.50	0.006	0	EVA	1.8	23-Feb-20	27-Dec-21	15.7	1.332	2528	1665
92	(2008 JG)	20.9		0.231					1.05	0.30	7.91	0.050	3	EVA	2.6	25-May-23	29-Dec-25	17.1	1.246	2460	1664
93	(2001 FR85)	24.5		0.043					0.98	0.03	5.24	0.002	3	EA	2.4	24-Mar-23	2-Aug-25	8.1	1.843	2950	1655
94	(2006 CT)	22.4		0.116					1.10	0.23	2.74	0.002	2	EA	2.1	25-Jul-21	13-Aug-23	24.8	0.745	2084	1650
95	(2005 WK56)	22.5		0.110					1.62	0.39	5.35	0.032	2	EMA	2.7	5-Dec-24	23-Aug-27	15.0	1.411	2567	1649
96	(2008 TC3)	30.7		0.003					1.31	0.31	2.54	0.000	4	EA	1.6	24-Oct-23	24-May-25	22.6	0.909	2189	1646
97	137799 (1999 YB)	18.4		0.709			Sq		1.32	0.08	6.79	0.216	1	EA	0.6	24-Apr-23	2-Dec-23	15.4	1.394	2545	1643
98	154590 (2003 MA3)	21.8		0.152					1.11	0.40	1.41	0.013	0	EMA	3.8	11-Sep-24	29-Jun-28	16.5	1.366	2490	1622
99	154019 (2002 CZ9)	21.9		0.144					1.33	0.36	4.97	0.026	1	EMA	4.4	3-Jun-22	11-Oct-26	18.1	1.265	2409	1620
100	7753 (1988 XB)	18.6		0.654			B		1.47	0.48	3.12	0.007	0	EVA	4.1	19-Jan-20	19-Feb-24	16.3	1.393	2502	1617
101	(2006 SU49)	19.5		0.423					1.41	0.31	2.52	0.001	0	EA	1.3	20-Jan-21	27-May-22	9.4	1.836	2874	1616
102	(2002 TY57)	18.9		0.557					1.92	0.33	3.46	0.302	2	EMA	4.1	20-Nov-22	5-Jan-27	17.7	1.320	2428	1605
103	(2004 PJ2)	21.3		0.190					1.42	0.34	2.58	0.023	0	EMA	4.9	13-Mar-24	23-Jan-29	10.6	1.786	2808	1603
104	138175 (2000 EE104)	20.2		0.318					1.00	0.29	5.24	0.008	0	EVA	1.6	9-Mar-20	12-Oct-21	17.3	1.355	2448	1600
105	7474 (1992 TC)	18.0		0.862		5.54	X		1.57	0.29	7.09	0.168	0	EMA	4.6	24-Oct-24	31-May-29	19.2	1.239	2357	1598
106	154991 Vinciguerra (2005 BX26)	18.4		0.702					1.71	0.32	5.64	0.197	0	EMA	4.6	26-Mar-20	17-Nov-24	11.8	1.754	2742	1582
107	136839 (1997 WT22)	18.6		0.641					1.49	0.31	8.16	0.131	0	EMA	3.9	13-Feb-20	28-Dec-23	14.7	1.561	2580	1581
108	(2007 TK8)	21.1		0.211					1.50	0.16	3.10	0.263	3	EMA	4.0	11-Nov-21	22-Nov-25	8.8	1.944	2908	1580
109	(2008 JE)	25.8		0.023					0.98	0.09	6.97	0.032	4	EVA	1.8	16-Feb-20	9-Dec-21	13.9	1.622	2624	1577
110	(2000 AC6)	21.0		0.212			Q		0.85	0.29	4.70	0.047	1	EVA	2.0	27-Dec-24	21-Dec-26	7.3	2.051	2999	1576
111	(2005 BO1)	21.9		0.145					0.95	0.36	10.67	0.151	3	EVA	2.7	22-Nov-19	25-Jul-22	15.1	1.544	2558	1576
112	141432 (2002 CQ11)	19.8		0.368					0.98	0.43	2.46	0.019	0	EVA	1.5	7-Feb-20	26-Aug-21	16.4	1.468	2497	1575
113	85990 (1999 JV6)	19.8		0.368			Xk		1.01	0.31	5.31	0.031	1	EVA	1.6	20-May-23	4-Jan-25	15.6	1.518	2533	1574
114	(2003 BX33)	20.9		0.229					1.18	0.42	7.92	0.098	2	EVA	2.5	25-May-23	13-Nov-25	15.3	1.540	2550	1573
115	(2006 KL21)	20.7		0.251					1.20	0.13	9.36	0.048	1	EMA	4.3	26-Dec-23	14-Apr-28	9.4	1.940	2875	1564
116	(2008 VB1)	20.6		0.264					1.28	0.28	10.32	0.020	4	EMA	3.5	6-May-22	24-Oct-25	25.4	0.881	2059	1562
117	(2002 SR)	21.6		0.164					1.18	0.20	6.69	0.052	1	EA	2.2	25-Feb-21	22-Apr-23	26.9	0.783	1992	1558
118	(2004 KE1)	21.6		0.164					1.30	0.18	2.88	0.073	0	EA	2.0	26-Oct-24	18-Oct-26	3.6	2.320	3217	1553
119	(2004 OB)	18.8		0.601					1.68	0.43	3.44	0.012	1	EMA	4.9	8-Dec-24	17-Nov-29	15.0	1.597	2564	1553
120	98943 (2001 CC21)	18.4		0.726		5.017	L		1.03	0.22	4.81	0.083	0	EA	0.5	1-Dec-21	16-May-22	7.7	2.078	2975	1550
121	(2006 WB)	22.8		0.094					0.85	0.18	4.91	0.006	3	EA	1.8	30-Nov-19	1-Oct-21	5.5	2.211	3101	1550
122	(2007 MR)	21.8		0.146					1.02	0.26	5.82	0.070	3	EVA	2.9	26-Mar-21	3-Mar-24	17.9	1.428	2419	1546
123	(2007 SQ6)	21.9		0.143					1.04	0.15	9.10	0.009	3	EA	0.9	3-Apr-24	24-Feb-25	28.3	0.715	1932	1544
124	(2009 FF19)	21.4		0.183					1.21	0.41	0.55	0.004	1	EVA	1.5	22-Mar-20	1-Oct-21	15.8	1.576	2523	1539
125	(2007 VV83)	24.8		0.038					0.97	0.10	10.12	0.041	4	EA	1.5	7-May-24	8-Nov-25	24.3	1.014	2108	1533
126	(1999 RA32)	20.9		0.226					1.03	0.09	10.52	0.056	2	EA	1.5	9-Sep-21	8-Mar-23	26.6	0.880	2005	1521
127	164211 (2004 JA27)	19.3		0.464					1.67	0.42	2.26	0.033	1	EMA	3.4	7-Sep-22	11-Feb-26	22.9	1.142	2174	1519
128	3361 Orpheus (1982 HR)	19.0		0.536	0.3	3.58			1.21	0.32	2.68	0.014	0	EA	2.6	5-Jan-23	29-Jul-25	13.9	1.755	2627	1515
129	(2001 AV43)	24.4		0.045		0.1701			1.28	0.24	0.28	0.002	4	EA	2.0	19-Jan-22	8-Jan-24	1.0	2.574	3383	1509
130	(2004 XM35)	19.6		0.418					1.84	0.30	5.35	0.308	0	EMA	5.0	22-Jan-20	20-Jan-25	10.3	1.995	2821	1508
131	203217 (2001 FX9)	18.6		0.653					1.93	0.33	3.49	0.317	0	EMA	5.0	4-Mar-20	3-Mar-25	11.0	1.961	2786	1506
132	(2003 MM)	21.6		0.166					1.05	0.26	8.54	0.131	4	EMA	4.3	3-Feb-24	2-Jun-28	14.4	1.742	2597	1503
133	40329 (1999 ML)	17.6		1.044					2.27	0.45	2.51	0.231	0	EMA	4.2	13-Jul-22	9-Oct-26	19.2	1.439	2355	1500
134	(2007 HF44)	19.2		0.498					1.60	0.31	2.99	0.118	3	EMA	3.0	1-Jan-20	10-Jan-23	10.9	1.984	2789	1497

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Arrival Mass [kg]
135	6239 Minos (1989 QF)	17.9		0.903		3.5558			1.15	0.41	3.94	0.026	0	EVA	2.7	23-Sep-21	21-May-24	16.8	1.611	2475	1493
136	(2007 FS35)	19.6		0.415					1.92	0.39	0.32	0.156	1	EMA	3.8	28-Jun-22	12-Apr-26	18.4	1.517	2393	1487
137	(2005 EE)	20.9		0.226					1.13	0.33	6.17	0.018	1	EVA	2.5	23-Mar-20	6-Sep-22	11.6	1.966	2755	1487
138	(2002 AW)	20.5		0.270					1.07	0.26	0.57	0.005	2	EA	0.5	25-Nov-21	13-Jun-22	8.0	2.209	2958	1479
139	(2009 FH)	26.6		0.016					1.48	0.34	0.69	0.000	4	EA	1.3	23-Apr-22	5-Aug-23	6.7	2.285	3029	1479
140	(2006 VG13)	21.5		0.174					0.82	0.30	5.86	0.045	1	EVA	2.3	4-Dec-22	18-Mar-25	8.5	2.192	2924	1470
141	8014 (1990 MF)	18.7		0.624	0.7				1.75	0.46	1.86	0.017	0	EMA	2.4	25-Jul-20	11-Dec-22	24.2	1.161	2115	1469
142	(2002 GF1)	20.4		0.292					2.07	0.40	1.82	0.226	0	EMA	3.6	19-Apr-22	9-Dec-25	16.0	1.721	2516	1466
143	8034 Akka (1992 LR)	17.9		0.903		7.283			1.83	0.41	2.02	0.074	0	EMA	4.1	22-Jul-20	20-Aug-24	25.8	1.059	2041	1464
144	48603 (1995 BC2)	17.5		1.107			X		1.92	0.43	5.03	0.138	0	EMA	3.9	21-Nov-22	3-Oct-26	18.1	1.590	2410	1463
145	(2002 TC70)	20.8		0.240					1.37	0.20	2.15	0.085	1	EA	1.1	9-Aug-20	1-Oct-21	3.4	2.542	3233	1456
146	(2002 GN5)	22.1		0.129					1.60	0.29	6.12	0.140	1	EMA	4.5	20-Mar-24	24-Sep-28	8.2	2.244	2942	1455
147	(2007 EM88)	19.5		0.429					1.65	0.27	3.58	0.223	2	EMA	5.0	25-Nov-24	24-Nov-29	14.4	1.849	2597	1454
148	172974 (2005 YW55)	19.3		0.474					1.64	0.25	8.47	0.294	0	EMA	4.5	27-Mar-20	8-Sep-24	11.7	2.029	2747	1453
149	162422 (2000 EV70)	20.1		0.322					1.21	0.53	1.39	0.012	0	EVA	1.4	12-May-23	30-Sep-24	19.1	1.551	2359	1450
150	(1998 VS)	22.2		0.126					1.40	0.28	6.83	0.042	0	EA	1.7	8-Nov-23	9-Jul-25	29.9	0.794	1859	1449
151	(2008 JV19)	20.6		0.254					0.99	0.25	7.25	0.042	1	EVA	2.1	21-Jun-23	10-Jul-25	14.7	1.844	2582	1448
152	136618 (1994 CN2)	16.7		1.578					1.57	0.40	1.44	0.012	1	EMA	1.7	21-Jul-20	30-Mar-22	18.6	1.595	2387	1447
153	(2005 VN5)	27.0		0.014					0.94	0.23	2.09	0.000	4	EA	2.0	31-Dec-22	28-Dec-24	3.9	2.530	3200	1447
154	(2002 TD60)	19.2		0.502		2.851			1.20	0.08	7.41	0.118	0	EA	1.6	22-May-22	12-Jan-24	13.5	1.942	2645	1438
155	(2001 SG286)	20.8		0.237			D		1.36	0.35	7.77	0.005	0	EMA	0.7	22-Jul-20	19-Apr-21	19.4	1.561	2346	1438
156	152754 (1999 GS6)	19.2		0.502					1.19	0.50	2.02	0.019	1	EVA	3.5	4-Apr-20	13-Oct-23	18.5	1.624	2392	1437
157	(2006 UQ17)	21.9		0.146					1.62	0.38	1.74	0.024	1	EA	1.4	4-Jan-20	21-May-21	10.9	2.120	2793	1436
158	(2003 GA)	21.1		0.209					1.28	0.19	3.84	0.061	0	EA	1.9	18-Sep-24	1-Aug-26	5.8	2.436	3081	1435
159	187040 (2005 JS108)	19.1		0.514					1.36	0.32	6.04	0.019	1	EMA	1.1	11-Oct-24	16-Nov-25	20.3	1.504	2300	1434
160	68359 (2001 OZ13)	17.8		0.939					1.52	0.17	9.86	0.280	0	EMA	3.0	15-Dec-23	10-Dec-26	15.2	1.842	2553	1432
161	(2009 EK1)	21.4		0.181					1.24	0.23	9.11	0.032	2	EA	2.6	22-Sep-23	29-Apr-26	34.9	0.459	1653	1431
162	(2002 AA29)	24.1		0.052		<0.55			0.99	0.01	10.75	0.013	0	EA	1.9	6-Jan-20	12-Nov-21	28.1	0.970	1938	1429
163	2368 Beltrovata (1977 RA)	15.2	0.27	2.322	2.3	5.9		SQ	2.10	0.41	5.24	0.232	0	EMA	3.6	13-Oct-22	1-Jun-26	15.8	1.821	2525	1426
164	(1993 RA)	19.0		0.544					1.92	0.42	5.60	0.171	0	EMA	3.5	14-Jan-25	8-Jul-28	16.6	1.771	2484	1425
165	22099 (2000 EX106)	18.0		0.862		6.334	S:		1.10	0.28	9.84	0.168	0	EVA	1.6	15-Dec-24	30-Jul-26	19.8	1.575	2326	1419
166	162162 (1999 DB7)	19.6		0.411					1.21	0.19	10.84	0.003	0	EMA	3.7	26-Feb-24	11-Nov-27	23.0	1.364	2171	1415
167	(2007 OG3)	18.3		0.751					2.16	0.48	1.69	0.123	4	EMA	3.9	22-Oct-22	6-Sep-26	16.3	1.817	2500	1414
168	(2000 EA14)	21.1		0.211					1.12	0.20	3.55	0.043	1	EA	1.5	3-Apr-23	19-Sep-24	5.5	2.519	3103	1408
169	(2008 TT26)	23.6		0.067					1.35	0.26	8.48	0.009	4	EA	2.7	21-Oct-21	24-Jun-24	23.2	1.375	2162	1404
170	(2002 XY38)	22.9		0.089					0.91	0.22	2.10	0.003	1	EA	1.9	8-Apr-20	24-Feb-22	5.4	2.534	3108	1403
171	(2008 AF3)	26.4		0.018					1.21	0.19	2.07	0.003	4	EA	1.6	1-Jul-22	24-Jan-24	2.3	2.727	3300	1402
172	159467 (2000 QK25)	18.2		0.795					1.81	0.28	6.14	0.316	0	EMA	3.5	11-Sep-22	10-Mar-26	23.2	1.397	2163	1395
173	153814 (2001 WN5)	18.1		0.806					1.71	0.47	1.92	0.002	0	EMA	4.8	20-Sep-22	8-Jul-27	18.7	1.712	2381	1392
174	(2000 SJ344)	22.6		0.104					1.14	0.17	5.77	0.046	0	EA	1.5	30-Mar-21	29-Sep-22	9.2	2.328	2886	1390
175	(2007 FE20)	19.5		0.441					1.75	0.27	7.61	0.309	2	EMA	4.1	27-Jan-22	13-Mar-26	14.3	2.002	2602	1389
176	163373 (2002 PZ39)	18.8		0.592					1.47	0.55	1.66	0.003	0	EVA	4.4	27-Sep-24	18-Feb-29	17.9	1.771	2418	1387
177	(2008 HE66)	21.7		0.154					1.39	0.16	6.94	0.190	4	EA	1.9	23-Apr-23	7-Mar-25	18.0	1.769	2415	1386
178	(1998 KY26)	25.5		0.028	0.03	0.1784			1.23	0.20	1.48	0.003	2	EA	1.6	16-Nov-22	4-Jul-24	0.4	2.876	3418	1386
179	159368 (1979 QB)	17.0		1.350					2.33	0.44	3.35	0.294	0	EMA	3.1	17-Oct-20	20-Nov-23	19.6	1.667	2337	1385
180	(2003 GY)	20.0		0.338					1.38	0.32	4.67	0.023	0	EMA	2.7	24-Jun-24	3-Mar-27	14.8	1.979	2577	1385
181	(2006 WQ29)	18.1		0.831					1.60	0.39	8.07	0.021	2	EMA	3.8	18-May-20	3-Mar-24	20.9	1.578	2271	1384
182	(2009 KW2)	26.7		0.016					1.36	0.25	5.19	0.004	4	EA	2.4	22-May-21	27-Sep-23	7.1	2.476	3009	1384
183	(2006 OB5)	20.1		0.325					1.53	0.22	0.71	0.192	0	EA	2.5	29-Oct-24	26-Apr-27	9.3	2.338	2878	1382
184	(2001 FC58)	20.2		0.306					1.02	0.34	6.77	0.014	1	EVA	2.1	2-Jul-24	22-Jul-26	14.7	2.000	2583	1379
185	(2006 UL217)	20.7		0.246					1.43	0.35	9.92	0.022	1	EMA	3.2	2-Sep-20	15-Nov-23	16.9	1.857	2468	1379
186	(1994 UG)	21.0		0.219					1.24	0.29	5.21	0.024	1	EA	1.9	15-Apr-20	12-Mar-22	28.3	1.075	1929	1377
187	(1999 NW2)	23.1		0.081		<4.2			1.12	0.11	8.68	0.016	1	EA	1.1	7-Jul-24	2-Aug-25	16.2	1.913	2505	1375
188	(2005 HN3)	21.1		0.205					0.85	0.34	7.90	0.079	1	EVA	1.2	16-Mar-20	25-May-21	9.6	2.344	2866	1373
189	67367 (2000 LY27)	17.0		1.381					1.31	0.21	9.02	0.048	0	EA	1.4	13-Dec-20	26-Apr-22	24.7	1.343	2092	1372
190	(2000 CK59)	24.2		0.050					1.48	0.31	5.70	0.040	0	EA	1.3	11-Feb-22	17-May-23	15.3	1.977	2550	1371
191	(2002 LT38)	20.3		0.295					0.84	0.31	6.20	0.034	0	EVA	1.9	16-Mar-23	22-Jan-25	13.7	2.085	2637	1371
192	(2006 UP)	23.1		0.082					1.59	0.30	2.28	0.113	0	EA	2.7	15-Nov-23	30-Jul-26	12.3	2.177	2712	1370
193	(2008 ER)	21.3		0.187					1.21	0.26	9.41	0.091	3	EA	2.1	19-Aug-24	17-Sep-26	32.2	0.811	1766	1370
194	(2003 RU11)	25.6		0.026					0.89	0.18	4.66	0.007	3	EA	2.0	30-Sep-21	6-Oct-23	5.2	2.622	3116	1369
195	(2008 AE)	19.6		0.404					1.28	0.13	11.57	0.134	0	EMA	3.1	2-Feb-24	11-Mar-27	34.8	0.608	1656	1369
196	162361 (2000 AF6)	20.1		0.331					0.88	0.41	2.70	0.024	0	EVA	2.5	21-Feb-23	28-Aug-25	15.4	1.977	2544	1368
197	(2006 BE55)	21.9		0.141					1.20	0.42	2.42	0.024	3	EMA	2.9	1-May-24	27-Mar-27	11.1	2.262	2781	1368
198	189700 (2001 TA45)	18.9		0.568					1.46	0.19	10.72	0.220	0	EMA	5.0	28-Aug-22	26-Aug-27	18.1	1.814	2410	1364
199	153958 (2002 AM31)	18.1		0.838					1.70	0.45	4.62	0.032	0	EMA	4.6	10-Oct-24	31-May-29	17.6	1.869	2437	1356
200	(2008 HS3)	21.6		0.161					1.35	0.23	8.18	0.037	4	EA	1.4	5-May-24	11-Sep-25	19.8	1.719	2324	1355
201	190161 (2005 TJ174)	16.4		1.837					2.24	0.45	3.99	0.226	0	EMA	4.9	21-Aug-20	19-Jul-25	24.8	1.372	2083	1355

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Arrival Mass [kg]
202	(2000 WO148)	20.5		0.268					1.64	0.38	4.42	0.056	1	EMA	4.2	25-Jan-22	20-Apr-26	9.3	2.402	2878	1355
203	(2007 TE66)	21.4		0.182					1.06	0.20	10.25	0.159	3	EA	1.8	6-Apr-23	25-Jan-25	24.4	1.401	2102	1354
204	1943 Anteros (1973 EC)	15.8	0.17	2.282	2.3	2.8695	L	S	1.43	0.26	8.70	0.062	0	EA	2.7	25-May-21	31-Jan-24	36.6	0.510	1587	1352
205	194006 (2001 SG10)	20.2		0.312			X		1.45	0.42	4.26	0.017	0	EMA	3.0	21-Jun-20	17-Jun-23	21.9	1.589	2225	1351
206	(2005 EU2)	23.1		0.084					1.51	0.35	4.58	0.001	1	EA	1.6	31-Mar-22	10-Nov-23	25.7	1.323	2046	1351
207	(2007 BS2)	23.3		0.075					1.58	0.29	6.52	0.136	1	EMA	3.0	16-Dec-21	2-Dec-24	8.9	2.443	2906	1350
208	(2005 UM5)	20.8		0.233					1.21	0.55	3.22	0.050	1	EVA	1.8	25-Jan-23	4-Nov-24	17.6	1.884	2435	1348
209	65733 (1993 PC)	18.0		0.874					1.15	0.47	4.16	0.066	0	EVA	2.3	15-Jun-21	7-Oct-23	14.4	2.096	2596	1345
210	(2005 SR1)	19.1		0.509					2.22	0.50	3.24	0.109	2	EMA	4.7	21-Jun-20	18-Mar-25	22.0	1.602	2220	1343
211	(2009 KQ4)	20.4		0.285					1.53	0.26	6.49	0.144	4	EMA	2.9	8-Apr-24	17-Mar-27	8.5	2.488	2927	1341
212	(2007 BG49)	18.8		0.606					1.84	0.32	7.89	0.281	2	EMA	3.8	8-Apr-24	10-Jan-28	12.7	2.229	2692	1338
213	(2001 EC16)	22.2		0.123					1.35	0.36	4.71	0.012	2	EMA	4.1	18-May-24	26-Jun-28	13.6	2.174	2641	1335
214	164214 (2004 LZ11)	18.9		0.567					2.12	0.39	5.47	0.291	0	EMA	2.4	21-Jul-20	7-Dec-22	22.1	1.618	2212	1332
215	(2002 XP40)	19.8		0.375					1.65	0.30	3.77	0.184	1	EMA	4.0	8-Apr-24	25-Apr-28	8.3	2.523	2937	1331
216	(2002 DU3)	20.6		0.256			Sq		1.15	0.24	8.70	0.007	1	EMA	4.3	28-May-22	7-Sep-26	18.0	1.913	2413	1324
217	164221 (2004 QE20)	20.1		0.330					1.51	0.21	6.48	0.220	1	EMA	4.4	19-Aug-22	27-Jan-27	22.0	1.652	2219	1321
218	141424 (2002 CD)	20.3		0.292					0.98	0.18	6.88	0.073	1	EVA	2.5	22-May-21	19-Nov-23	15.8	2.063	2524	1321
219	(1998 QB28)	20.2		0.312					2.07	0.38	1.08	0.271	2	EMA	3.6	8-Jun-24	1-Feb-28	14.1	2.177	2613	1319
220	154330 (2002 VX94)	18.0		0.871					1.48	0.41	7.17	0.033	0	EMA	4.4	22-Mar-22	18-Aug-26	16.8	2.020	2475	1313
221	155334 (2006 DZ169)	16.9		1.422					2.03	0.41	6.62	0.225	0	EMA	4.3	27-May-22	29-Aug-26	18.2	1.929	2405	1313
222	(2003 FQ6)	20.8		0.238					1.37	0.13	3.62	0.184	1	EA	2.0	11-Nov-20	19-Nov-22	3.5	2.873	3226	1310
223	36017 (1999 ND43)	19.2		0.496			Sl		1.52	0.31	5.55	0.078	0	EA	1.8	6-Sep-20	2-Jul-22	24.4	1.512	2105	1310
224	(2000 DV110)	19.3		0.473					2.09	0.39	4.40	0.276	1	EMA	4.2	11-Apr-20	7-Jul-24	19.2	1.876	2357	1308
225	163679 (2002 XG84)	19.1		0.523					1.49	0.47	5.06	0.072	1	EVA	3.4	2-Feb-20	14-Jun-23	16.4	2.066	2496	1305
226	27031 (1998 RO4)	17.9		0.903					2.14	0.43	5.35	0.234	0	EMA	4.1	30-Jun-22	22-Jul-26	18.5	1.927	2389	1305
227	175189 (2005 EC224)	18.2		0.794					2.06	0.39	2.62	0.251	2	EMA	3.8	10-May-22	7-Mar-26	17.0	2.032	2467	1304
228	207945 (1991 JW)	19.2		0.496					1.04	0.12	8.71	0.019	0	EA	1.1	14-May-24	2-Jul-25	20.0	1.828	2313	1304
229	39565 (1992 SL)	17.9		0.887					1.64	0.33	8.60	0.093	0	EMA	2.7	24-Oct-24	5-Jul-27	12.7	2.314	2694	1304
230	(2001 NJ6)	20.3		0.305					2.17	0.41	5.08	0.272	4	EMA	4.7	27-Jun-22	4-Mar-27	18.5	1.938	2392	1302
231	(2007 VL8)	21.2		0.199					0.94	0.36	9.34	0.111	3	EVA	2.2	18-Jan-25	24-Mar-27	16.5	2.067	2489	1302
232	(2003 LH)	24.9		0.036					0.96	0.15	10.80	0.005	4	EA	0.8	30-May-20	8-Mar-21	36.9	0.614	1578	1301
233	(2007 RN7)	21.5		0.172					1.30	0.11	9.84	0.176	4	EA	1.8	28-Aug-22	1-Jul-24	26.8	1.363	1995	1301
234	(2002 VX91)	24.2		0.050					0.98	0.20	2.34	0.001	2	EA	2.3	14-May-24	10-Sep-26	6.2	2.738	3062	1297
235	(2004 XK3)	24.4		0.045					1.23	0.26	1.48	0.001	0	EA	0.8	24-Dec-22	26-Sep-23	5.8	2.766	3084	1295
236	11284 Belenus (1990 BA)	17.8		0.945					1.74	0.34	1.99	0.170	0	EA	3.3	14-Feb-23	13-Jun-26	22.9	1.658	2174	1292
237	(2004 SW55)	20.8		0.241					1.43	0.33	8.79	0.030	0	EA	1.1	5-Dec-21	13-Jan-23	41.0	0.303	1418	1289
238	(2008 EQ7)	22.6		0.104					1.41	0.22	5.97	0.134	4	EMA	4.4	6-Mar-24	14-Aug-28	8.1	2.638	2950	1289
239	(2003 TM1)	22.0		0.134					1.36	0.56	1.70	0.029	1	EVA	2.2	1-Feb-23	2-Apr-25	15.8	2.143	2524	1288
240	164215 Doloreshill (2004 MF6)	19.9		0.354					2.11	0.40	4.88	0.277	0	EMA	2.2	23-Jul-20	13-Oct-22	23.9	1.607	2130	1287
241	(2001 OX13)	19.1		0.525					2.38	0.46	4.18	0.283	1	EMA	2.9	24-Jul-20	2-Jun-23	23.3	1.651	2155	1284
242	(2007 TH3)	24.6		0.041					0.97	0.12	8.23	0.015	3	EA	1.2	29-Sep-24	10-Dec-25	17.9	2.019	2419	1284
243	164202 (2004 EW)	20.7		0.244					0.99	0.28	4.66	0.025	0	EA	1.4	10-Mar-24	8-Aug-25	26.0	1.468	2033	1283
244	(1994 CJ1)	21.5		0.175					1.49	0.32	2.31	0.032	2	EA	2.6	28-Jun-24	18-Jan-27	12.0	2.418	2733	1280
245	(2002 OA22)	19.3		0.473					0.94	0.24	6.92	0.035	2	EA	1.5	23-Mar-20	23-Sep-21	14.4	2.256	2596	1279
246	(2004 QD14)	20.6		0.259					0.94	0.34	6.25	0.014	2	EVA	2.5	5-Oct-24	3-Apr-27	11.6	2.440	2751	1279
247	(2000 EF104)	18.9		0.577					1.15	0.42	10.82	0.176	0	EVA	2.4	21-Apr-20	30-Sep-22	16.3	2.147	2499	1274
248	(2005 MO13)	20.7		0.247					0.86	0.41	6.31	0.043	1	EVA	1.6	30-Jun-21	21-Jan-23	16.0	2.175	2514	1270
249	(1993 TQ2)	19.9		0.360			Sa		1.99	0.42	6.04	0.202	0	EMA	2.0	2-Jan-23	19-Jan-25	19.6	1.950	2336	1267
250	(2006 QQ23)	19.8		0.377					0.80	0.28	3.44	0.033	2	EVA	2.7	8-May-21	20-Jan-24	7.2	2.753	3004	1267
251	(1999 NA5)	20.4		0.290					1.44	0.25	4.28	0.083	1	EA	1.6	9-Apr-20	1-Nov-21	7.3	2.746	2997	1266
252	(2002 LE27)	19.3		0.480					2.18	0.45	3.10	0.188	1	EMA	3.9	23-Jun-24	1-May-28	14.8	2.267	2577	1265
253	(2006 CG)	19.0		0.549					1.83	0.34	4.35	0.222	1	EMA	4.4	25-Jul-20	24-Dec-24	16.8	2.147	2474	1262
254	136923 (1998 JH2)	16.0		2.194					2.13	0.44	6.62	0.218	0	EMA	4.6	20-Jul-22	25-Feb-27	20.1	1.934	2312	1260
255	(1998 MW5)	19.1		0.524			Sq		1.02	0.36	6.29	0.076	2	EMA	4.3	20-Feb-24	2-Jun-28	9.6	2.617	2861	1259
256	52689 (1998 FF2)	18.8		0.609					1.56	0.29	10.98	0.212	0	EMA	4.9	18-Jun-22	26-May-27	18.7	2.031	2380	1258
257	(2003 ND)	18.5		0.697					2.22	0.45	5.12	0.209	1	EMA	3.9	6-Oct-22	4-Sep-26	15.5	2.247	2542	1256
258	136617 (1994 CC)	17.6		1.057					1.64	0.42	4.68	0.016	0	EMA	4.5	29-Aug-20	19-Feb-25	19.9	1.959	2322	1256
259	5653 Camarillo (1992 WD5)	15.4		2.854		4.834			1.79	0.30	6.88	0.284	0	EMA	4.7	20-Feb-22	18-Nov-26	9.4	2.642	2876	1256
260	(2007 UP6)	22.9		0.091					0.97	0.09	9.58	0.016	2	EA	1.2	21-Oct-24	16-Dec-25	23.0	1.754	2172	1253
261	90373 (2003 SZ219)	18.5		0.679					1.63	0.20	9.87	0.318	0	EMA	3.5	31-Jan-22	10-Aug-25	10.3	2.591	2821	1251
262	(2007 FY20)	24.8		0.038					1.46	0.39	5.38	0.001	4	EMA	4.2	5-Jun-24	9-Aug-28	14.2	2.351	2611	1248
263	(2007 RQ17)	22.6		0.105					1.58	0.37	1.98	0.022	0	EA	2.8	16-Aug-22	31-May-25	17.3	2.150	2448	1247
264	(2002 PD130)	19.9		0.365					1.88	0.34	8.78	0.287	4	EMA	4.1	14-Aug-24	26-Sep-28	19.3	2.025	2350	1245
265	185851 (2000 DP107)	18.1		0.806		2.7754			1.37	0.38	8.67	0.015	0	EMA	4.6	2-Jul-22	21-Jan-27	18.9	2.055	2369	1243
266	(2007 HZ)	20.2		0.313					1.33	0.14	7.42	0.203	0	EA	0.8	14-Apr-21	16-Jan-22	17.8	2.133	2427	1243
267	(1998 XN17)	22.4		0.113					0.98	0.21	7.25	0.056	2	EA	2.0	14-Jun-23	28-Jun-25	16.8	2.194	2474	1243
268	(2005 QA5)	21.3		0.192					1.39	0.21	6.80	0.150	4	EA	1.8	9-Jul-20	17-Apr-22	18.5	2.092	2389	1239

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Arrival Mass [kg]
269	(2008 RT26)	19.4		0.463					2.25	0.46	2.23	0.222	4	EMA	4.2	1-Oct-24	17-Dec-28	22.9	1.800	2178	1238
270	(2004 BE86)	20.9		0.231		2.42			1.44	0.24	3.78	0.108	1	EA	1.0	16-Apr-20	28-Apr-21	7.6	2.798	2977	1237
271	(2003 JC13)	20.2		0.311					1.07	0.32	8.51	0.143	2	EVA	2.0	7-Feb-20	8-Feb-22	17.6	2.164	2435	1235
272	(1996 FO3)	20.3		0.298					1.44	0.29	5.82	0.043	1	EA	2.4	26-Feb-23	8-Jul-25	10.3	2.638	2825	1235
273	(2003 NB)	19.5		0.425					2.13	0.40	5.97	0.264	1	EMA	3.5	13-Oct-24	20-Apr-28	12.5	2.505	2705	1233
274	(2009 BA71)	20.7		0.249					1.64	0.26	3.85	0.231	2	EMA	3.8	25-Jan-20	2-Nov-23	13.5	2.436	2646	1232
275	(2005 YY36)	19.5		0.431					1.89	0.39	4.61	0.170	2	EMA	4.8	26-Jan-22	30-Oct-26	10.6	2.634	2808	1229
276	138971 (2001 CB21)	18.4		0.731		3.302			1.03	0.33	7.90	0.024	0	EVA	2.6	5-Dec-24	29-Jul-27	18.9	2.095	2370	1228
277	(2008 WN2)	20.7		0.245					1.42	0.31	3.75	0.049	4	EA	1.0	24-Apr-23	20-Apr-24	12.3	2.529	2714	1228
278	(2003 YX1)	20.8		0.236					0.88	0.27	5.76	0.012	1	EVA	1.6	22-Mar-20	31-Oct-21	9.1	2.733	2891	1226
279	(2007 PQ9)	22.1		0.131					1.43	0.24	8.56	0.094	4	EA	1.6	14-Aug-24	4-Apr-26	32.8	1.115	1739	1226
280	(2005 EY95)	20.3		0.306					1.08	0.54	3.17	0.040	2	EVA	1.2	4-Mar-20	30-Apr-21	16.7	2.246	2480	1225
281	12923 Zephyr (1999 GK4)	16.1		2.068		3.891	S:		1.96	0.49	5.29	0.022	0	EMA	3.5	14-Jul-22	18-Jan-26	19.2	2.085	2354	1224
282	(2007 UR3)	21.2		0.202					1.56	0.28	1.31	0.136	0	EA	2.4	8-Mar-21	16-Jul-23	6.5	2.914	3045	1221
283	17511 (1992 QN)	17.1		1.305		5.9902	X		1.19	0.36	9.59	0.132	0	EMA	3.7	15-Apr-24	28-Dec-27	12.8	2.515	2685	1219
284	(2006 WN1)	18.7		0.635					2.10	0.45	4.01	0.162	1	EMA	4.2	24-Jul-20	15-Oct-24	18.8	2.129	2373	1217
285	(2001 VB76)	20.0		0.338					1.46	0.35	4.24	0.043	0	EMA	2.8	11-Feb-24	4-Dec-26	9.1	2.764	2891	1214
286	(2006 GB)	20.3		0.304					0.96	0.18	10.06	0.011	2	EA	1.6	22-Sep-20	8-May-22	30.9	1.297	1820	1211
287	20429 (1998 YN1)	18.0		0.862		2.718			1.56	0.46	6.30	0.056	0	EMA	4.1	23-Apr-22	15-Jun-26	11.2	2.641	2773	1211
288	(2008 YS27)	21.2		0.202					1.47	0.32	4.88	0.024	4	EA	1.3	11-Dec-21	1-Apr-23	6.4	2.946	3050	1210
289	162913 (2001 MT18)	18.2		0.804					1.27	0.52	8.64	0.146	0	EVA	3.0	24-Jul-23	24-Jul-26	17.9	2.218	2421	1207
290	7480 Norwan (1994 PC)	17.2		1.246		35.9	S		1.57	0.32	9.45	0.161	0	EMA	4.0	2-Nov-24	1-Nov-28	19.4	2.115	2343	1207
291	155338 (2006 MZ1)	20.4		0.285					1.57	0.48	2.08	0.013	0	EMA	4.4	24-Oct-24	3-Apr-29	18.8	2.161	2376	1206
292	85640 (1998 OX4)	21.1		0.211					1.58	0.49	4.51	0.002	0	EMA	5.0	1-Dec-22	19-Nov-27	20.7	2.031	2281	1206
293	136564 (1977 VA)	19.1		0.529	0.4			XC	1.87	0.39	2.98	0.138	0	EMA	5.0	7-Dec-22	6-Dec-27	21.1	2.009	2262	1204
294	(2003 CC)	20.3		0.297					1.50	0.33	2.32	0.036	1	EA	1.1	5-Jul-22	10-Aug-23	9.2	2.788	2884	1203
295	(2006 HR29)	20.6		0.256					0.99	0.26	9.54	0.094	1	EVA	1.8	26-Mar-20	29-Dec-21	10.4	2.723	2820	1200
296	(2003 AK18)	19.6		0.405		5.3			0.88	0.38	7.39	0.057	1	EVA	1.9	21-Mar-20	22-Feb-22	16.1	2.355	2512	1200
297	(2001 RB12)	20.6		0.265					1.05	0.38	6.62	0.067	3	EMA	3.4	2-Feb-24	20-Jun-27	7.8	2.888	2968	1199
298	(2001 OG25)	19.8		0.372					1.44	0.25	10.69	0.096	0	EMA	2.4	23-Aug-20	27-Jan-23	19.7	2.119	2330	1199
299	4581 Asclepius (1989 FC)	20.4		0.285					1.02	0.36	4.91	0.003	2	EVA	2.6	24-Apr-20	17-Dec-22	23.7	1.845	2138	1198
300	39557 Gielgud (1992 JG)	16.8		1.469					2.26	0.43	5.57	0.297	0	EMA	4.1	27-Jun-22	28-Jul-26	18.5	2.203	2392	1198
301	171819 (2001 FZ6)	18.3		0.758					1.50	0.17	9.95	0.281	0	EMA	4.2	14-Aug-20	31-Oct-24	17.2	2.287	2453	1197
302	(2002 PN)	24.8		0.038					1.01	0.07	9.14	0.005	2	EA	2.4	4-Aug-22	11-Jan-25	20.6	2.062	2286	1197
303	(2005 YR3)	23.4		0.072					0.82	0.27	3.60	0.011	1	EA	0.6	11-Dec-22	16-Jul-23	43.7	0.319	1322	1196
304	(1999 VG22)	18.6		0.668					1.65	0.33	2.85	0.124	1	EA	1.9	8-Jan-24	3-Dec-25	11.1	2.694	2782	1195
305	(2001 XP88)	20.5		0.270					1.35	0.19	6.75	0.138	1	EA	2.0	18-Dec-22	19-Dec-24	14.1	2.498	2613	1193
306	(2003 VO2)	20.8		0.234					1.32	0.10	7.12	0.217	1	EA	0.6	21-Jun-21	12-Feb-22	18.4	2.220	2393	1192
307	3757 (1982 XB)	19.0	0.18	0.508	0.5	9.0046		S	1.83	0.45	3.87	0.039	0	EA	1.9	6-Dec-20	16-Nov-22	24.2	1.823	2113	1192
308	(2003 QB30)	26.4		0.018					1.23	0.42	0.64	0.003	4	EMA	3.6	25-Dec-19	3-Aug-23	10.2	2.755	2830	1192
309	(2002 AT4)	20.9		0.227			D		1.87	0.45	1.51	0.041	0	EA	3.3	24-Mar-24	25-Jul-27	18.6	2.217	2386	1190
310	163364 (2002 OD20)	18.8		0.597					1.36	0.37	4.17	0.026	0	EA	2.2	9-Apr-24	14-Jun-26	24.6	1.802	2094	1190
311	(2009 KD5)	18.4		0.718					1.05	0.26	13.47	0.049	0	EVA	2.0	17-Apr-20	26-Apr-22	13.2	2.577	2664	1187
312	(2000 UK11)	25.0		0.034		0.2661			0.88	0.25	0.78	0.004	3	EA	0.4	14-Jul-24	3-Dec-24	39.5	0.694	1474	1186
313	(2008 UE7)	20.4		0.287					1.65	0.45	3.95	0.009	2	EMA	4.0	11-Feb-24	8-Feb-28	9.0	2.846	2896	1185
314	(2007 BF72)	19.7		0.387					1.43	0.22	4.10	0.135	2	EA	0.9	14-Nov-20	11-Oct-21	7.9	2.918	2960	1185
315	(2008 SR)	21.8		0.153					2.00	0.40	4.47	0.208	4	EMA	5.0	7-Sep-22	25-Aug-27	24.6	1.820	2094	1183
316	(2004 HZ)	22.2		0.122					1.30	0.44	4.22	0.000	0	EMA	2.7	27-Jul-20	30-Mar-23	24.5	1.831	2100	1183
317	(2009 CR5)	22.1		0.132					1.08	0.26	5.06	0.067	4	EA	1.0	24-May-20	12-May-21	7.3	2.967	2997	1181
318	(2008 BC22)	19.6		0.408					2.19	0.45	3.90	0.210	4	EMA	3.6	17-Mar-24	5-Oct-27	10.7	2.752	2800	1181
319	(2002 PN6)	20.8		0.242					2.27	0.44	5.28	0.275	1	EMA	4.0	4-Oct-22	23-Sep-26	15.5	2.443	2540	1180
320	(2003 GS)	19.0		0.549					0.89	0.22	12.03	0.087	0	EVA	3.0	9-Feb-20	30-Jan-23	16.9	2.362	2468	1176
321	(2005 UY5)	18.6		0.651					2.23	0.42	7.13	0.319	2	EMA	4.5	6-Jul-24	3-Jan-29	15.2	2.476	2556	1175
322	26310 (1998 TX6)	19.2		0.496					2.14	0.47	5.37	0.155	0	EMA	4.1	20-Jul-22	10-Aug-26	19.3	2.209	2350	1175
323	(2002 RW25)	18.8		0.606					0.83	0.29	1.33	0.016	1	EA	0.7	11-Nov-22	9-Aug-23	7.8	2.957	2969	1174
324	(2005 FN)	26.9		0.014					0.93	0.33	3.75	0.001	4	EVA	2.3	29-Oct-21	11-Feb-24	10.6	2.787	2806	1170
325	190166 (2005 UP156)	17.0		1.396					2.12	0.47	4.21	0.134	1	EMA	4.2	22-Jun-22	16-Aug-26	18.4	2.285	2396	1170
326	(2000 SD8)	20.8		0.233					1.13	0.31	6.55	0.086	0	EMA	4.8	18-May-22	19-Feb-27	14.2	2.561	2611	1169
327	(2002 JR100)	24.3		0.047					0.92	0.30	3.71	0.018	2	EA	1.9	21-Oct-23	8-Sep-25	11.0	2.768	2785	1169
328	(2007 CQ5)	22.1		0.130					1.54	0.29	4.64	0.115	4	EMA	4.3	5-Feb-24	31-May-28	8.4	2.937	2936	1168
329	34613 (2000 UR13)	16.6		1.642					2.07	0.39	6.17	0.277	1	EMA	4.3	1-Apr-22	19-Jul-26	15.6	2.470	2533	1167
330	(2003 UN12)	18.4		0.724					2.16	0.40	6.91	0.301	0	EMA	4.0	3-Jun-24	20-Jun-28	14.5	2.545	2594	1167
331	(2007 HX3)	20.0		0.346					1.53	0.31	6.14	0.054	4	EMA	5.0	26-Oct-24	25-Oct-29	12.8	2.655	2685	1167
332	(2001 RV17)	20.2		0.315					0.91	0.34	7.52	0.098	0	EVA	3.1	9-Jun-21	31-Jul-24	21.6	2.077	2236	1166
333	(2005 GE60)	22.1		0.130					0.96	0.25	5.57	0.005	4	EA	1.0	17-Apr-23	7-Apr-24	20.6	2.153	2288	1165
334	(2009 JL1)	21.0		0.215					1.18	0.17	11.51	0.077	3	EMA	3.0	29-Nov-23	21-Nov-26	15.0	2.520	2568	1164
335	206378 (2003 RB)	18.6		0.651		>16.			1.79	0.44	6.74	0.044	0	EMA	5.0	26-Oct-20	25-Oct-25	20.7	2.146	2282	1164

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Arrival Mass [kg]
336	136582 (1992 BA)	19.4		0.445					1.34	0.07	10.50	0.275	0	EMA	2.0	3-Aug-20	5-Aug-22	29.0	1.564	1900	1163
337	13553 (1992 JE)	16.0		2.165		38			2.19	0.46	5.87	0.193	0	EMA	4.4	2-Jul-20	28-Nov-24	22.4	2.034	2202	1163
338	(1999 YR14)	18.5		0.675					1.65	0.40	3.72	0.007	1	EA	1.4	24-Sep-21	11-Feb-23	10.4	2.827	2820	1161
339	(2005 XB1)	21.8		0.150					1.13	0.42	8.70	0.071	2	EVA	2.0	12-Dec-21	30-Dec-23	17.0	2.404	2467	1161
340	6050 Miwablock (1992 AE)	15.4		2.854		5.7566			2.20	0.44	6.40	0.271	0	EMA	5.0	17-Sep-22	16-Sep-27	25.9	1.794	2037	1160
341	168791 (2000 SQ43)	18.3		0.765					2.29	0.51	5.18	0.129	0	EMA	4.4	2-Jul-20	5-Dec-24	22.4	2.051	2202	1157
342	(2002 JX8)	20.0		0.350					0.77	0.31	4.32	0.020	2	EA	1.6	2-Jun-24	29-Dec-25	8.3	2.971	2938	1157
343	(2005 QC5)	19.7		0.400					0.89	0.36	9.45	0.047	1	EVA	2.4	2-Aug-21	5-Jan-24	15.2	2.535	2557	1154
344	(2007 DK)	19.3		0.483					1.40	0.55	5.18	0.089	1	EVA	3.9	17-Feb-20	6-Jan-24	19.9	2.228	2322	1154
345	(2008 WK)	23.2		0.080					1.42	0.28	6.34	0.050	4	EA	1.3	18-Nov-22	16-Mar-24	12.0	2.747	2732	1154
346	(2006 VW2)	21.2		0.194					1.24	0.29	10.05	0.015	3	EMA	3.1	22-Apr-22	6-Jun-25	25.3	1.857	2062	1152
347	(2004 RS25)	20.3		0.304					2.13	0.48	6.65	0.114	1	EMA	4.9	20-Jul-20	5-Jun-25	28.1	1.659	1938	1151
348	154300 (2002 UO)	19.2		0.501					1.21	0.47	8.30	0.142	0	EVA	3.2	8-Oct-21	12-Dec-24	26.1	1.807	2026	1150
349	152560 (1991 BN)	18.9		0.562			Q		1.44	0.40	3.45	0.021	0	EA	3.2	17-Aug-21	13-Oct-24	31.0	1.461	1815	1148
350	(1999 TD5)	19.2		0.497					2.46	0.53	4.16	0.180	0	EMA	4.1	3-Dec-22	14-Jan-27	18.4	2.346	2395	1147
351	(2008 TZ3)	20.3		0.296					1.59	0.39	8.81	0.017	3	EMA	4.8	22-May-22	19-Mar-27	17.6	2.411	2437	1144
352	154007 (2002 BY)	17.8		0.950					1.82	0.35	2.72	0.178	0	EMA	2.8	14-Aug-20	9-Jun-23	16.6	2.471	2483	1143
353	(2000 YF29)	20.2		0.319			S		1.49	0.37	6.30	0.009	0	EMA	3.1	6-Jan-20	6-Feb-23	11.7	2.798	2744	1141
354	3352 McAuliffe (1981 CW)	15.8		2.374			A		1.88	0.37	4.77	0.203	0	EMA	4.7	25-Feb-20	22-Nov-24	10.7	2.871	2804	1139
355	(2002 RQ25)	20.5		0.279					1.11	0.31	4.57	0.050	0	EA	1.8	18-Jun-24	5-Apr-26	9.3	2.959	2880	1138
356	(1999 AJ39)	21.7		0.154					1.16	0.28	10.09	0.163	0	EA	2.3	15-Jul-20	6-Nov-22	29.3	1.614	1886	1137
357	162998 (2001 SK162)	17.8		0.933		68	T		1.93	0.47	1.68	0.031	0	EA	3.3	27-Jan-20	13-May-23	17.3	2.453	2451	1136
358	(2008 DG5)	19.7		0.398					1.26	0.24	5.71	0.019	0	EA	1.1	15-May-24	9-Jul-25	11.5	2.826	2756	1135
359	(2001 BF10)	22.3		0.118		<0.4			1.61	0.44	1.49	0.001	1	EA	3.3	17-Mar-24	11-Jul-27	23.9	2.000	2126	1135
360	5646 (1990 TR)	14.3		4.737	4.3	6.25	U		2.14	0.44	7.91	0.210	0	EMA	4.4	18-Oct-20	15-Mar-25	19.7	2.291	2329	1135
361	53550 (2000 BF19)	18.9		0.582					1.50	0.42	7.17	0.046	0	EMA	3.0	29-Apr-24	28-Apr-27	13.2	2.716	2661	1135
362	163692 (2003 CY18)	18.0		0.861					1.53	0.41	7.20	0.092	0	EMA	3.0	30-Jun-20	9-Jul-23	22.3	2.113	2202	1135
363	(2009 DN1)	20.2		0.307					1.44	0.29	7.86	0.060	4	EA	1.2	24-Jun-23	20-Sep-24	38.9	0.887	1496	1133
364	(2003 UD22)	19.6		0.414					1.17	0.32	10.08	0.136	1	EMA	3.4	2-Aug-24	14-Dec-27	18.4	2.388	2396	1133
365	(2005 QL76)	19.8		0.375					2.21	0.44	5.91	0.252	4	EMA	4.0	11-Sep-24	27-Sep-28	25.2	1.919	2067	1132
366	170086 (2002 XR14)	17.9		0.883					1.90	0.63	2.13	0.011	1	EVA	2.6	19-Aug-21	31-Mar-24	14.6	2.635	2588	1132
367	(2007 CN26)	21.1		0.212					1.29	0.27	7.57	0.002	2	EA	1.9	2-Sep-22	27-Jul-24	37.3	1.031	1562	1131
368	163348 (2002 NN4)	20.0		0.349					0.88	0.43	5.42	0.007	1	EVA	2.6	22-Aug-24	3-Apr-27	15.3	2.595	2550	1130
369	190208 (2006 AQ)	18.0		0.855					2.05	0.49	4.08	0.099	0	EMA	3.8	16-Dec-22	7-Oct-26	18.7	2.381	2380	1128
370	(2002 KJ3)	18.9		0.566					2.27	0.49	6.43	0.183	0	EMA	4.0	2-Jul-22	22-Jun-26	18.8	2.378	2374	1126
371	(2007 DL41)	20.7		0.253					1.46	0.48	4.67	0.046	2	EVA	3.0	19-Mar-20	4-Mar-23	14.4	2.668	2600	1126
372	(2004 RQ10)	20.9		0.230					1.86	0.44	5.69	0.033	2	EMA	3.4	21-Jul-20	29-Nov-23	22.9	2.118	2177	1120
373	154715 (2004 LB6)	18.4		0.718					1.62	0.49	4.10	0.058	0	EMA	4.8	23-Aug-24	9-Jun-29	16.8	2.525	2473	1120
374	(2004 QZ2)	18.0		0.864					2.26	0.50	0.97	0.155	0	EMA	3.7	25-Dec-24	5-Sep-28	15.4	2.617	2543	1119
375	(2007 TO74)	19.8		0.382					2.16	0.48	6.84	0.162	3	EMA	4.0	26-Jun-22	21-Jun-26	18.9	2.397	2372	1118
376	(1997 WB21)	20.5		0.269					1.46	0.32	3.39	0.051	1	EA	2.3	22-Nov-21	29-Feb-24	13.2	2.769	2666	1118
377	66251 (1999 GJ2)	16.8		1.492		2.4621			1.54	0.20	11.28	0.248	0	EMA	5.0	11-Sep-20	10-Sep-25	19.1	2.384	2362	1118
378	(1999 FN19)	22.4		0.113			Sq		1.65	0.39	2.30	0.016	2	EA	1.4	8-Apr-23	19-Sep-24	12.0	2.853	2732	1116
379	(1997 XR2)	20.8		0.235					1.08	0.20	7.17	0.000	0	EA	1.5	10-Dec-21	23-Jun-23	17.1	2.525	2461	1114
380	3908 Nyx (1980 PA)	17.4	0.23	0.918	1	4.426	V	V	1.93	0.46	2.18	0.058	0	EMA	3.4	21-Oct-22	31-Mar-26	16.2	2.582	2503	1113
381	162000 (1990 OS)	19.3		0.475	0.4				1.68	0.46	1.10	0.009	0	EMA	4.5	15-Sep-22	22-Mar-27	37.1	1.095	1567	1112
382	(2000 KL33)	19.0		0.540			S		2.11	0.43	6.91	0.191	1	EMA	3.8	26-May-24	31-Mar-28	13.9	2.739	2625	1112
383	(2000 SB25)	20.1		0.327					1.86	0.35	6.16	0.237	1	EMA	4.2	25-Nov-21	11-Feb-26	10.2	2.981	2830	1111
384	142348 (2002 RX211)	18.1		0.810		5.0689			2.07	0.46	6.06	0.146	0	EMA	3.8	1-Dec-22	5-Oct-26	18.2	2.465	2404	1109
385	(1999 RV2)	18.6		0.650					2.44	0.51	4.80	0.209	1	EMA	5.0	29-Oct-20	28-Oct-25	20.9	2.287	2273	1109
386	(2004 XK4)	20.9		0.226					1.83	0.35	8.45	0.231	0	EMA	4.9	12-Dec-19	23-Nov-24	10.0	2.999	2842	1109
387	68063 (2000 YJ66)	15.2		3.111					2.33	0.46	5.75	0.275	0	EMA	4.5	29-Aug-20	5-Mar-25	25.8	1.948	2041	1108
388	205388 (2001 DV8)	20.7		0.249					1.37	0.17	12.37	0.167	0	EMA	2.3	15-Mar-22	22-Jun-24	14.5	2.709	2590	1107
389	(2006 JY25)	20.4		0.287					1.13	0.48	6.87	0.067	3	EMA	4.1	23-Sep-24	12-Oct-28	18.0	2.493	2417	1106
390	(2003 SK5)	19.9		0.356					2.10	0.46	6.65	0.145	0	EMA	4.4	16-Jun-20	24-Oct-24	21.9	2.230	2225	1105
391	(2004 FH)	26.4		0.018		0.0504			0.82	0.29	0.02	0.000	3	EA	1.1	16-Dec-22	26-Jan-24	10.7	2.973	2801	1102
392	(2007 RT147)	18.1		0.806					2.29	0.47	3.84	0.230	4	EMA	3.9	1-Jan-25	2-Dec-28	15.6	2.654	2533	1102
393	99799 (2002 LJ3)	18.1		0.825					1.46	0.28	7.56	0.121	0	EMA	3.5	21-Aug-22	10-Feb-26	24.5	2.057	2098	1100
394	(2003 SL5)	19.1		0.509					2.11	0.47	6.11	0.148	0	EMA	3.7	7-Jul-24	8-Mar-28	15.1	2.692	2558	1099
395	(2006 JU41)	19.4		0.455					2.12	0.43	7.61	0.226	1	EMA	3.7	9-Jun-24	2-Mar-28	14.3	2.756	2605	1097
396	6037 (1988 EG)	18.7		0.624		2.76			1.27	0.50	3.49	0.024	0	EVA	2.5	13-Mar-20	4-Sep-22	20.7	2.338	2284	1097
397	(2006 XD2)	21.1		0.211					1.27	0.43	3.57	0.018	3	EMA	4.0	21-Mar-22	30-Mar-26	14.1	2.770	2615	1096
398	5620 Jasonwheeler (1990 OA)	17.0		1.366					2.16	0.42	7.86	0.235	0	EMA	3.8	31-May-20	23-Mar-24	21.4	2.291	2249	1096
399	(2001 VB2)	18.7		0.618					1.72	0.40	7.94	0.079	1	EMA	3.0	4-Nov-22	21-Nov-25	17.3	2.568	2451	1095
400	(2006 SU131)	18.7		0.624					1.73	0.40	9.66	0.033	2	EMA	3.0	8-Jun-20	14-Jun-23	21.8	2.270	2230	1094
401	(2003 WO7)	18.9		0.569					2.15	0.44	7.67	0.242	0	EMA	2.6	8-Oct-20	23-May-23	19.0	2.460	2367	1094
402	5189 (1990 UQ)	17.3		1.190					1.55	0.48	3.58	0.044	0	EVA	3.2	2-Dec-21	18-Feb-25	17.4	2.569	2448	1093

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Arrival Mass [kg]
403	(2006 RA55)	19.5		0.441					2.43	0.50	1.81	0.238	4	EMA	4.8	12-Nov-24	15-Sep-29	26.2	1.965	2024	1093
404	(2004 TP1)	20.6		0.261					1.29	0.39	7.49	0.028	1	EVA	2.4	9-May-21	13-Oct-23	17.7	2.551	2432	1092
405	(2009 BC58)	18.9		0.579					2.30	0.48	1.86	0.199	2	EMA	4.8	15-Oct-24	31-Jul-29	26.0	1.983	2032	1090
406	177614 (2004 HK33)	17.5		1.082					1.89	0.52	5.44	0.010	0	EMA	3.3	9-Jul-20	25-Oct-23	22.7	2.219	2186	1089
407	(2008 CQ1)	19.2		0.495					2.19	0.43	3.34	0.238	3	EMA	3.8	14-Mar-24	17-Jan-28	11.5	2.963	2760	1089
408	154589 (2003 MX2)	16.3		1.848					2.29	0.46	7.17	0.268	0	EMA	4.1	27-Sep-20	29-Oct-24	18.5	2.513	2393	1087
409	19764 (2000 NF5)	16.0		2.165		59.3			2.23	0.44	1.33	0.225	0	EMA	4.6	1-Jun-22	27-Dec-26	17.7	2.565	2428	1086
410	(2003 KR18)	17.8		0.966					2.34	0.48	5.58	0.227	0	EMA	4.5	26-Jul-20	7-Feb-25	20.2	2.403	2307	1085
411	(2005 TR15)	18.7		0.634					2.12	0.43	3.92	0.198	2	EMA	4.2	3-Jun-22	30-Aug-26	17.7	2.569	2430	1085
412	(2006 JX25)	19.9		0.363					2.15	0.43	3.08	0.214	2	EMA	1.8	14-Jul-20	16-May-22	14.1	2.806	2615	1084
413	(2004 XN14)	20.1		0.335					0.93	0.27	10.74	0.003	2	EVA	2.4	30-Sep-24	6-Feb-27	25.9	2.010	2034	1083
414	(2004 JX20)	19.4		0.462					0.90	0.27	10.53	0.095	0	EVA	2.1	22-Apr-23	16-May-25	23.9	2.151	2126	1083
415	5797 Bivoj (1980 AA)	19.1		0.519	0.4	2.706			1.89	0.44	4.19	0.072	0	EA	2.1	20-Jan-25	12-Mar-27	26.9	1.945	1992	1082
416	(2000 TV28)	21.6		0.163					2.51	0.49	1.87	0.280	0	EMA	4.0	16-Nov-24	7-Nov-28	14.2	2.805	2609	1082
417	(1998 HD14)	20.9		0.227					0.96	0.31	7.81	0.034	2	EVA	2.1	23-Apr-21	16-May-23	30.1	1.710	1850	1082
418	(2005 QN11)	20.0		0.346					2.17	0.40	5.62	0.303	4	EMA	4.5	12-Jul-20	29-Dec-24	15.0	2.755	2567	1081
419	(2008 TQ2)	20.9		0.231					1.84	0.42	3.88	0.103	4	EA	0.5	24-Dec-23	29-Jun-24	30.1	1.716	1853	1081
420	(2003 BQ35)	20.5		0.271					1.42	0.24	8.48	0.100	1	EMA	4.1	16-Oct-24	7-Nov-28	12.0	2.965	2733	1078
421	11054 (1991 FA)	17.2		1.246		2.5726			1.98	0.45	3.08	0.123	0	EMA	4.0	26-Sep-24	12-Sep-28	22.7	2.254	2184	1077
422	(2005 GW119)	18.5		0.683					1.64	0.23	2.88	0.274	1	EA	1.1	25-Dec-23	12-Feb-25	14.2	2.823	2609	1076
423	(2005 ED318)	20.7		0.247		17.157			1.85	0.45	2.39	0.010	0	EA	1.6	24-May-21	14-Jan-23	14.2	2.827	2609	1075
424	(2007 JX2)	19.5		0.440					1.71	0.53	4.22	0.032	4	EVA	2.7	9-Sep-24	8-Jun-27	14.8	2.790	2575	1073
425	(2005 YU55)	21.9		0.145					1.14	0.43	0.51	0.001	0	EA	2.4	14-Jul-24	24-Dec-26	13.2	2.899	2664	1073
426	(2002 RR25)	20.8		0.242					0.97	0.31	13.54	0.141	2	EVA	0.9	25-Oct-21	9-Sep-22	14.5	2.816	2595	1072
427	(2006 QS)	19.9		0.361					2.55	0.51	4.59	0.235	1	EMA	4.4	23-Jun-22	25-Nov-26	18.3	2.575	2400	1070
428	(2002 XU4)	22.0		0.139					1.33	0.14	10.73	0.207	2	EA	0.5	2-Dec-22	24-May-23	29.4	1.799	1880	1069
429	(2008 LN16)	19.9		0.358					2.14	0.42	7.81	0.268	4	EMA	3.5	24-Aug-20	11-Feb-24	16.9	2.675	2469	1067
430	(2002 XA40)	16.9		1.420					2.26	0.48	4.45	0.188	0	EMA	3.7	15-Oct-22	9-Jun-26	15.8	2.751	2524	1065
431	(2004 AD)	24.5		0.043					1.26	0.26	7.31	0.026	4	EA	2.6	7-Jan-21	14-Aug-23	46.3	0.461	1230	1064
432	(2008 AX28)	20.0		0.349					2.25	0.43	2.16	0.301	3	EMA	2.7	11-Dec-21	20-Aug-24	9.1	3.195	2890	1060
433	(2001 PD1)	18.2		0.799		14.58	K:		2.23	0.46	5.96	0.243	0	EMA	3.7	23-Oct-24	24-Jul-28	14.2	2.872	2611	1060
434	(2006 TU7)	21.9		0.141					0.85	0.47	2.91	0.023	2	EVA	1.5	28-Sep-24	22-Mar-26	19.3	2.537	2349	1060
435	(2001 JV1)	21.3		0.191		<29.	Sq		1.70	0.44	6.63	0.022	3	EMA	3.5	5-Jun-20	21-Nov-23	17.8	2.638	2423	1059
436	433 Eros (1898 DQ)	11.2	0.25	15.580	16.84	5.27	S	S	1.46	0.22	10.83	0.150	0	EA	2.5	23-Jan-21	15-Jul-23	38.7	1.122	1505	1059
437	(2006 KA40)	19.6		0.417					2.35	0.49	4.98	0.218	3	EMA	4.2	19-Jul-20	22-Sep-24	18.2	2.616	2404	1058
438	(2007 LA15)	19.5		0.429					1.73	0.38	8.72	0.058	1	EMA	4.6	29-Sep-24	5-May-29	17.1	2.688	2459	1058
439	(1999 KK1)	18.2		0.777					2.12	0.46	7.10	0.158	1	EMA	5.0	18-Sep-20	17-Sep-25	19.8	2.515	2325	1056
440	(2000 PQ27)	19.3		0.470					2.23	0.42	7.29	0.303	4	EMA	4.6	9-Sep-22	13-Apr-27	22.3	2.347	2205	1056
441	(2003 UC20)	18.1		0.816					0.78	0.34	3.79	0.034	0	EVA	2.2	20-Jan-23	20-Apr-25	21.2	2.429	2260	1055
442	(1989 UP)	20.5		0.275	0.3	6.98			1.86	0.47	3.86	0.007	0	EMA	3.2	28-Nov-24	1-Feb-28	14.6	2.863	2589	1054
443	2063 Bacchus (1977 HB)	17.1		1.305		14.9	Sq		1.08	0.35	9.43	0.068	0	EMA	3.8	3-Jan-20	1-Nov-23	12.1	3.026	2724	1054
444	(2004 RK9)	21.2		0.198					1.84	0.43	6.23	0.110	0	EMA	5.0	15-Jun-24	14-Jun-29	14.7	2.858	2582	1053
445	18106 Blume (2000 NX3)	17.9		0.903					2.44	0.51	4.22	0.195	0	EMA	3.2	27-Jul-20	24-Sep-23	24.9	2.169	2078	1052
446	(2006 SO19)	19.4		0.443					1.24	0.27	14.24	0.107	1	EVA	1.8	7-Nov-24	27-Aug-26	15.1	2.838	2562	1051
447	(2006 OZ)	18.5		0.680					2.20	0.47	5.01	0.183	0	EMA	3.6	3-Oct-22	24-May-26	14.9	2.856	2569	1048
448	(2000 WP19)	22.4		0.114					0.85	0.29	7.68	0.004	2	EVA	2.4	25-Sep-21	22-Feb-24	14.8	2.876	2576	1045
449	(2002 QE7)	19.4		0.455					1.47	0.18	12.11	0.291	1	EMA	3.0	15-Sep-20	7-Sep-23	17.1	2.728	2458	1044
450	(2001 TP103)	19.6		0.421					1.80	0.36	4.74	0.187	2	EA	2.2	5-Dec-21	27-Feb-24	23.6	2.294	2140	1042
451	(2004 RJ84)	18.3		0.753					1.09	0.31	13.24	0.205	0	EMA	3.2	13-Apr-24	10-Jul-27	13.3	2.990	2660	1041
452	(2001 PF14)	19.5		0.423					2.12	0.41	6.78	0.267	1	EMA	3.4	16-Sep-22	6-Feb-26	14.1	2.934	2614	1041
453	(1996 GQ)	23.1		0.081					1.99	0.50	0.89	0.021	0	EA	1.8	29-Jan-23	2-Dec-24	18.3	2.660	2398	1041
454	(2005 UW64)	18.9		0.557					2.28	0.47	5.45	0.210	2	EMA	2.1	12-Jul-20	4-Sep-22	19.4	2.589	2345	1041
455	(2006 TC1)	18.9		0.563					1.72	0.38	4.50	0.093	0	EA	2.8	20-Feb-20	2-Dec-22	13.7	2.966	2638	1040
456	139622 (2001 QQ142)	18.3		0.763			Sq		1.42	0.31	9.31	0.013	0	EA	1.1	15-Dec-23	6-Feb-25	50.6	0.143	1087	1039
457	85236 (1993 KH)	18.5		0.701					1.23	0.31	12.80	0.002	0	EMA	3.4	9-Sep-20	7-Feb-24	17.1	2.751	2462	1038
458	(2002 CW46)	18.8		0.598					1.83	0.34	12.24	0.293	1	EMA	4.8	9-Oct-24	12-Jul-29	27.3	2.047	1973	1038
459	(2008 DJ5)	19.9		0.354					1.25	0.42	8.11	0.103	3	EMA	4.0	7-Sep-20	8-Sep-24	24.6	2.239	2095	1038
460	(2007 YM56)	22.3		0.118					1.25	0.31	6.43	0.029	4	EA	2.8	15-Apr-23	14-Jan-26	13.5	2.996	2650	1035
461	(2002 QE47)	22.0		0.139					1.83	0.37	0.73	0.171	1	EA	2.9	21-Dec-21	1-Dec-24	14.9	2.900	2569	1034
462	41429 (2000 GE2)	20.4		0.289					1.59	0.56	2.19	0.011	0	EMA	3.1	16-Jun-20	12-Jul-23	21.8	2.453	2230	1033
463	(1999 SO5)	20.8		0.234					1.09	0.07	13.37	0.015	0	EA	2.2	5-Apr-24	1-Jun-26	44.4	0.722	1295	1033
464	(1990 UA)	19.6		0.404	0.4				1.64	0.53	0.93	0.012	0	EMA	4.8	10-Sep-22	22-Jun-27	18.3	2.685	2398	1033
465	(2007 TY18)	18.1		0.838					2.15	0.41	8.05	0.289	3	EMA	4.1	31-May-22	23-Jul-26	17.1	2.773	2462	1031
466	(2002 PG80)	18.4		0.709					2.01	0.44	4.41	0.144	1	EMA	3.2	13-Sep-22	7-Dec-25	24.5	2.281	2097	1025
467	(2001 HZ7)	19.7		0.393					1.47	0.50	5.42	0.046	0	EVA	1.9	13-May-20	22-Mar-22	16.8	2.813	2475	1024
468	7350 (1993 VA)	17.3		1.190					1.36	0.39	7.26	0.080	0	EA	3.1	20-Jan-22	9-Feb-25	32.8	1.694	1740	1023
469	(2003 BO1)	20.4		0.279					1.33	0.08	13.70	0.236	1	EMA	4.7	6-Feb-22	15-Oct-26	22.8	2.410	2179	1023

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Arrival Mass [kg]
470	(2007 PS9)	23.5		0.068					1.07	0.08	8.70	0.036	3	EA	2.4	21-Aug-20	25-Jan-23	17.8	2.753	2425	1022
471	(2004 DD)	19.0		0.539					1.59	0.46	11.59	0.131	1	EMA	2.9	13-Oct-24	16-Sep-27	18.4	2.721	2396	1020
472	(2007 XA23)	22.9		0.091					1.61	0.38	8.33	0.097	4	EMA	4.4	4-Feb-22	3-Jul-26	10.6	3.244	2809	1015
473	(2008 PL3)	19.3		0.474					2.28	0.45	5.47	0.259	4	EMA	1.8	8-Oct-20	24-Jul-22	19.1	2.693	2358	1013
474	(2006 GW2)	20.3		0.299					1.45	0.19	9.42	0.208	2	EA	2.4	29-Jul-24	5-Jan-27	29.2	1.992	1891	1012
475	(2008 VK14)	19.3		0.478					1.54	0.51	6.92	0.084	1	EMA	3.3	6-Sep-24	11-Dec-27	21.9	2.509	2223	1011
476	(2003 YR70)	19.9		0.357					1.90	0.43	2.66	0.094	1	EA	3.2	31-Mar-24	29-Jun-27	18.4	2.753	2396	1010
477	(2007 TD14)	18.8		0.586					2.36	0.47	4.78	0.257	2	EMA	5.0	14-Jul-20	13-Jul-25	25.8	2.244	2042	1010
478	(2006 WQ1)	19.4		0.448					1.47	0.24	14.41	0.120	3	EMA	3.0	4-Jan-24	2-Jan-27	19.8	2.662	2326	1009
479	(2006 JU)	19.7		0.401					2.16	0.47	5.36	0.165	1	EMA	1.9	12-Jul-20	4-Jun-22	20.7	2.607	2283	1008
480	(2002 UK11)	21.7		0.159		>5.			1.32	0.58	5.37	0.012	1	EVA	3.4	9-Jun-21	12-Nov-24	31.1	1.874	1810	1005
481	163697 (2003 EF54)	20.0		0.350					1.61	0.47	2.95	0.042	0	EMA	1.3	30-Jun-20	5-Oct-21	16.7	2.878	2479	1005
482	(2002 EX11)	20.4		0.290					1.89	0.41	2.51	0.131	3	EA	3.1	20-Mar-22	16-Apr-25	18.3	2.781	2401	1003
483	(2000 BH19)	19.4		0.460					2.03	0.46	1.32	0.122	0	EA	2.2	1-Jan-24	30-Mar-26	24.3	2.368	2109	1003
484	(2001 OE3)	20.4		0.289					1.61	0.34	11.99	0.107	1	EMA	3.6	10-Aug-24	29-Feb-28	40.3	1.162	1444	1003
485	(2006 TD)	22.4		0.114					1.59	0.39	8.19	0.018	0	EMA	5.0	6-Oct-22	5-Oct-27	15.1	2.991	2560	1002
486	31345 (1998 PG)	17.3		1.190		2.5162	Sq		2.02	0.39	6.49	0.234	0	EMA	3.6	29-Aug-22	27-Mar-26	22.6	2.494	2189	1001
487	162416 (2000 EH26)	21.3		0.185		>24.			1.85	0.48	0.39	0.001	0	EMA	3.2	25-May-22	13-Aug-25	17.4	2.849	2443	999
488	(2004 TK14)	20.0		0.336					1.62	0.24	10.22	0.308	1	EMA	4.7	5-Oct-24	5-Jul-29	24.3	2.377	2106	999
489	26817 (1987 QB)	19.5		0.432					2.81	0.59	3.49	0.134	0	EMA	4.7	27-Jun-20	24-Feb-25	22.2	2.532	2211	999
490	(2006 FJ9)	19.3		0.484					1.75	0.35	4.12	0.150	1	EA	1.3	2-Aug-23	9-Nov-24	17.0	2.891	2466	996
491	5626 (1991 FE)	14.7		3.940		2.46	S		2.20	0.45	3.85	0.215	0	EMA	4.7	16-Oct-24	19-Jun-29	24.7	2.360	2088	995
492	(2005 WE)	19.6		0.413					1.15	0.25	12.36	0.127	1	EMA	3.7	18-Aug-24	2-May-28	20.4	2.675	2296	992
493	65909 (1998 FH12)	19.1		0.522		3			1.09	0.54	3.56	0.013	0	EVA	1.2	20-Mar-20	22-May-21	25.2	2.339	2065	991
494	(2000 CH59)	19.8		0.382					0.86	0.42	3.27	0.023	0	EVA	0.9	17-Feb-20	21-Jan-21	26.8	2.240	1998	989
495	(2001 VC2)	20.8		0.239					1.04	0.13	12.51	0.020	2	EA	1.4	28-May-20	2-Nov-21	51.2	0.240	1066	989
496	139056 (2001 FY)	18.9	0.52	0.312	0.32		S		1.89	0.33	4.73	0.273	0	EMA	4.6	23-Jun-22	19-Jan-27	18.0	2.851	2417	988
497	(2005 EG94)	18.4		0.734					1.60	0.46	10.75	0.057	3	EMA	2.6	20-Oct-20	21-May-23	20.7	2.670	2282	987
498	1627 Ivar (1929 SH)	13.2	0.15	7.861	9.12	4.795	S	S	1.86	0.40	8.45	0.112	0	EMA	5.0	9-Sep-22	8-Sep-27	18.3	2.832	2400	987
499	(2002 FD6)	22.2		0.123					1.23	0.34	10.07	0.005	0	EMA	4.3	13-Jul-22	23-Oct-26	19.2	2.774	2354	986
500	(2000 QW7)	19.4		0.442		71.3			1.95	0.47	4.16	0.030	0	EA	1.6	18-Sep-20	27-Apr-22	20.9	2.665	2272	985
501	(1987 WC)	20.1		0.327					1.36	0.23	15.84	0.116	0	EMA	2.7	22-Sep-22	30-May-25	14.1	3.112	2614	985
502	(2001 TX1)	21.1		0.211					1.05	0.48	2.80	0.042	2	EVA	2.4	9-Oct-21	7-Mar-24	15.0	3.055	2564	983
503	7358 Oze (1995 YA3)	14.4		4.524		5.488	Sq		2.20	0.50	4.66	0.123	0	EMA	3.3	14-Oct-24	16-Feb-28	18.7	2.832	2381	979
504	(1998 QQ52)	20.8		0.235					2.11	0.46	4.82	0.158	0	EMA	3.7	3-Jul-22	25-Mar-26	18.6	2.843	2384	977
505	(2000 HW23)	18.3		0.765					2.15	0.42	7.76	0.261	0	EMA	3.3	16-Aug-22	15-Nov-25	18.5	2.868	2389	971
506	(2009 JK1)	19.9		0.356					1.95	0.42	8.91	0.163	0	EMA	4.0	12-Jul-24	25-Jul-28	15.3	3.079	2550	970
507	137911 (2000 AB246)	17.6		1.015					2.31	0.49	3.75	0.170	0	EMA	3.7	7-Sep-20	28-May-24	17.0	2.976	2467	970
508	141593 (2002 HK12)	18.1		0.837		12.69			2.00	0.53	2.36	0.024	0	EMA	3.6	28-Jun-20	2-Feb-24	24.7	2.450	2090	969
509	(2002 GQ5)	20.7		0.253					1.15	0.48	6.27	0.098	1	EMA	4.7	16-Nov-20	27-Jul-25	21.1	2.712	2263	966
510	8567 (1996 HW1)	15.3		2.989		8.7573			2.05	0.45	8.44	0.123	0	EMA	5.0	21-Oct-22	20-Oct-27	19.7	2.806	2330	966
511	85839 (1998 YO4)	16.4		1.792					1.65	0.25	9.33	0.241	0	EA	2.6	24-Apr-21	17-Dec-23	36.4	1.600	1594	965
512	(2000 PO30)	19.3		0.465					1.84	0.40	3.58	0.121	3	EA	1.4	16-Dec-23	15-May-25	16.7	3.008	2480	965
513	(1999 FA)	20.6		0.259		10.092	S		1.08	0.13	12.03	0.007	0	EA	1.8	9-Mar-24	27-Dec-25	33.7	1.816	1705	964
514	161998 (1988 PA)	17.2		1.236					2.15	0.41	8.22	0.278	0	EMA	4.0	11-Jun-22	22-Jun-26	18.2	2.916	2405	963
515	(2001 YX11)	20.0		0.336					1.75	0.39	5.47	0.110	0	EA	2.9	10-Apr-22	9-Mar-25	23.5	2.556	2147	963
516	(1998 HE3)	21.7		0.156					0.88	0.44	3.38	0.004	0	EVA	1.9	5-Mar-20	23-Jan-22	23.5	2.559	2148	962
517	(2007 HD70)	20.9		0.222					2.12	0.47	5.66	0.145	1	EMA	3.3	7-Jun-22	3-Oct-25	18.0	2.941	2415	960
518	(2007 TW68)	19.3		0.474					2.43	0.51	2.52	0.174	3	EMA	4.1	3-Jun-22	26-Jun-26	17.8	2.957	2426	959
519	(2008 KZ5)	20.1		0.331					1.84	0.45	8.38	0.003	4	EMA	4.8	12-Oct-22	27-Jul-27	19.5	2.840	2338	959
520	(2003 NL7)	19.9		0.353					2.14	0.45	6.87	0.161	1	EMA	3.5	5-Jun-20	30-Nov-23	22.4	2.656	2201	956
521	162567 (2000 RW37)	19.8		0.382			C		1.25	0.25	13.75	0.009	0	EMA	3.8	1-Dec-21	4-Sep-25	15.5	3.127	2539	952
522	16636 (1993 QP)	18.7		0.624					2.31	0.47	7.25	0.235	0	EMA	4.5	10-Aug-20	3-Feb-25	24.3	2.550	2108	947
523	(2003 BR47)	21.1		0.203					1.63	0.50	4.42	0.008	2	EMA	3.0	22-Oct-22	20-Oct-25	16.6	3.077	2486	947
524	(2008 SQ)	19.5		0.424					1.64	0.35	12.71	0.099	1	EMA	5.0	9-Aug-24	8-Aug-29	17.2	3.035	2453	947
525	(2002 EZ2)	20.0		0.348					1.25	0.05	13.03	0.189	0	EA	1.9	24-Sep-22	5-Aug-24	39.1	1.453	1489	944
526	(1998 SE36)	19.3		0.465					1.34	0.10	11.68	0.213	0	EMA	3.6	10-Oct-24	5-May-28	30.4	2.126	1839	944
527	(2001 MQ3)	18.9		0.580					2.23	0.46	5.59	0.208	0	EMA	3.6	8-Sep-24	1-Apr-28	20.8	2.807	2277	944
528	(2002 QG24)	17.7		0.986					2.29	0.49	5.68	0.182	1	EMA	3.9	3-Jun-22	3-May-26	18.8	2.949	2377	942
529	(2003 YO1)	19.3		0.464					1.16	0.40	14.26	0.227	1	EMA	3.8	21-May-22	28-Feb-26	15.6	3.156	2533	941
530	1685 Toro (1948 OA)	14.2	0.31	3.403	3.4	10.196	S	S	1.37	0.44	9.38	0.050	0	EMA	3.3	6-Oct-20	20-Jan-24	19.6	2.907	2333	937
531	(2002 VD118)	20.2		0.318					1.43	0.14	14.25	0.299	1	EMA	4.7	5-May-24	7-Jan-29	27.5	2.361	1964	936
532	27002 (1998 DV9)	18.2		0.786					1.74	0.43	8.70	0.003	0	EA	1.7	30-Jan-24	23-Oct-25	36.4	1.700	1595	936
533	5011 Ptah (6743 P-L)	17.1		1.305					1.64	0.50	7.41	0.025	0	EVA	4.5	30-May-21	13-Nov-25	17.4	3.065	2444	934
534	(2001 XW266)	19.5		0.424					2.29	0.45	4.62	0.261	0	EMA	5.0	23-Jun-20	15-Jun-25	22.0	2.760	2219	933
535	(2002 VR94)	19.0		0.532					2.38	0.56	5.58	0.074	2	EMA	4.0	3-Nov-20	21-Nov-24	20.8	2.847	2277	932
536	(2000 QN130)	17.9		0.913		30.33			2.90	0.57	2.56	0.260	0	EMA	4.7	26-Nov-20	9-Aug-25	21.1	2.832	2264	931

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Arrival Mass [kg]
537	7025 (1993 QA)	18.3		0.751		2.5057			1.48	0.32	12.61	0.064	0	EMA	2.8	11-Feb-20	11-Dec-22	26.5	2.461	2011	929
538	(2006 YN)	19.6		0.408					1.48	0.22	15.27	0.219	1	EMA	4.8	18-Nov-24	23-Aug-29	15.2	3.228	2556	928
539	(2006 TK)	19.8		0.384					2.16	0.51	6.44	0.112	2	EMA	1.8	14-Jul-20	15-Apr-22	20.7	2.870	2282	927
540	(2006 FV35)	21.6		0.167					1.00	0.38	7.10	0.105	2	EVA	1.5	16-Dec-21	20-Jun-23	24.1	2.641	2120	926
541	(1999 RQ28)	20.4		0.290					1.91	0.42	3.56	0.124	0	EA	2.0	20-Sep-21	22-Sep-23	20.2	2.916	2307	924
542	(2001 LM5)	19.2		0.489					1.23	0.03	12.55	0.222	0	EA	0.7	18-Jun-23	21-Feb-24	37.3	1.683	1562	921
543	192559 (1998 VO)	20.3		0.304					1.07	0.23	10.06	0.026	0	EMA	2.8	17-Jul-24	2-May-27	15.9	3.206	2519	921
544	(2001 TD)	25.1		0.033					0.95	0.17	9.01	0.006	4	EA	1.4	14-Oct-20	7-Mar-22	25.1	2.593	2073	919
545	(1999 RH33)	19.1		0.520					1.55	0.17	11.02	0.296	0	EA	2.5	8-Mar-24	24-Sep-26	34.7	1.893	1663	918
546	(2007 PR9)	20.6		0.258					2.45	0.52	5.28	0.198	4	EMA	4.2	6-Sep-22	22-Nov-26	21.6	2.847	2240	917
547	(2000 OG8)	17.5		1.084		4.0734			2.67	0.54	5.29	0.240	0	EMA	4.2	25-Aug-22	21-Nov-26	23.8	2.696	2133	915
548	178601 (2000 CG59)	17.5		1.106					2.47	0.49	4.18	0.276	1	EMA	2.2	12-Oct-24	6-Jan-27	19.6	2.990	2334	913
549	(2009 DD45)	25.8		0.024			S		1.24	0.20	13.75	0.001	3	EMA	4.8	17-Feb-20	7-Dec-24	11.1	3.550	2780	913
550	(2007 DM41)	21.7		0.153					1.18	0.53	2.27	0.008	2	EMA	4.2	18-Jul-20	12-Sep-24	23.7	2.716	2136	911
551	(2006 FK)	21.2		0.198					0.92	0.34	14.62	0.194	4	EVA	2.8	25-Apr-21	1-Feb-24	23.8	2.713	2131	910
552	162011 (1994 AB1)	16.5		1.733			Sq		2.83	0.60	4.56	0.148	1	EMA	4.4	7-Dec-22	26-Apr-27	18.5	3.082	2388	908
553	(2000 GV147)	19.1		0.523					1.75	0.46	10.57	0.003	1	EMA	3.0	25-Jul-20	14-Jul-23	16.3	3.231	2501	908
554	(2007 FE)	19.4		0.458					1.79	0.46	6.99	0.027	1	EMA	5.0	29-Jul-20	17-Jul-25	19.9	2.991	2318	907
555	(2000 RD53)	19.9		0.362		14.96			1.79	0.43	9.28	0.025	0	EMA	3.0	6-Nov-22	24-Nov-25	17.1	3.185	2463	906
556	(2006 PA1)	19.7		0.395					2.03	0.55	2.43	0.030	0	EMA	3.5	31-Oct-20	13-Apr-24	20.7	2.959	2283	902
557	162922 (2001 OY13)	20.7		0.243					1.32	0.38	10.30	0.013	0	EMA	2.9	17-Mar-22	28-Jan-25	20.5	2.973	2289	900
558	(2001 RU17)	21.1		0.204					0.96	0.24	13.88	0.109	4	EVA	2.3	14-Jun-21	30-Sep-23	22.9	2.813	2176	900
559	(2002 NW16)	18.0		0.879					1.11	0.03	14.16	0.067	0	EA	0.5	25-Jul-23	9-Feb-24	51.2	0.545	1066	899
560	(2008 AV28)	19.5		0.436					1.19	0.34	15.29	0.223	3	EMA	3.5	20-Aug-22	24-Feb-26	23.4	2.789	2152	897
561	(1998 MR24)	19.0		0.541					1.96	0.45	6.07	0.108	0	EMA	3.4	28-Jul-22	9-Dec-25	17.9	3.164	2419	896
562	(2003 MJ4)	18.6		0.651					2.31	0.56	5.32	0.093	0	EMA	2.0	9-Sep-22	4-Sep-24	27.4	2.518	1971	895
563	(1998 HH49)	21.3		0.189					1.55	0.50	8.42	0.003	2	EVA	3.4	27-Nov-21	27-Apr-25	23.4	2.803	2154	894
564	(2006 KP1)	20.9		0.228					2.15	0.50	6.78	0.127	4	EMA	1.8	18-Jul-20	1-May-22	22.4	2.868	2198	894
565	138947 (2001 BA40)	18.6		0.661					1.12	0.25	12.84	0.181	0	EA	0.8	18-Jun-21	31-Mar-22	38.1	1.715	1528	892
566	(2008 HB38)	21.1		0.206					1.85	0.49	1.03	0.003	4	EMA	3.0	24-Aug-20	23-Aug-23	25.1	2.708	2069	885
567	141614 (2002 JV15)	19.2		0.505					1.62	0.54	7.17	0.039	0	EMA	3.9	30-Jul-20	9-Jul-24	28.3	2.490	1929	883
568	(2002 XS40)	20.1		0.326					1.50	0.34	11.63	0.155	2	EMA	4.5	11-Apr-22	22-Oct-26	16.6	3.305	2486	881
569	(2006 AL3)	20.0		0.350					1.38	0.13	13.66	0.237	2	EMA	3.7	22-Aug-22	24-Apr-26	28.4	2.498	1926	880
570	199801 (2007 AE12)	19.2		0.490					1.68	0.57	2.28	0.006	0	EMA	4.9	29-Sep-24	11-Aug-29	17.2	3.278	2457	879
571	(2000 NQ11)	19.6		0.420					2.05	0.37	7.62	0.301	1	EMA	3.7	26-Jun-20	5-Mar-24	23.5	2.854	2145	876
572	(2001 QB34)	19.2		0.500					2.21	0.42	5.74	0.301	4	EMA	4.2	24-Jun-20	21-Aug-24	24.3	2.808	2108	874
573	163818 (2003 RX7)	18.4		0.715					1.23	0.35	10.39	0.026	0	EMA	3.4	16-Mar-20	28-Aug-23	12.5	3.597	2701	874
574	(2001 BP61)	20.2		0.318					1.49	0.33	12.96	0.141	0	EMA	3.0	26-Oct-20	13-Nov-23	21.4	3.027	2248	870
575	(2000 CE59)	20.2		0.309			L		1.14	0.17	12.26	0.008	0	EMA	4.9	14-Jun-22	27-Apr-27	16.6	3.350	2485	868
576	(2000 SZ44)	20.2		0.310					2.44	0.50	5.69	0.236	1	EMA	4.8	14-Sep-22	25-Jun-27	23.6	2.879	2143	868
577	(2004 TC10)	20.2		0.314					1.12	0.41	14.12	0.140	3	EVA	2.7	6-Jun-23	16-Feb-26	25.6	2.736	2048	868
578	(2001 PT9)	20.7		0.244					1.47	0.45	7.18	0.029	0	EMA	4.7	20-Mar-24	12-Dec-28	19.7	3.151	2328	866
579	(2005 QY151)	17.6		1.017					1.38	0.44	12.65	0.065	1	EVA	3.8	17-Jun-21	21-Mar-25	19.4	3.179	2345	865
580	(2004 FC32)	18.5		0.680					1.92	0.34	10.94	0.256	0	EMA	4.7	10-Aug-22	15-Apr-27	18.3	3.268	2402	861
581	(2000 OK8)	19.8		0.368					0.98	0.22	9.98	0.136	1	EA	2.0	18-Jan-24	26-Jan-26	29.3	2.501	1885	860
582	(2006 GZ)	19.4		0.445					1.53	0.38	12.48	0.084	1	EMA	4.6	4-Aug-22	24-Mar-27	18.9	3.238	2369	857
583	(2003 MU)	20.3		0.294					2.05	0.49	5.89	0.026	0	EMA	3.6	29-Jun-22	9-Feb-26	18.7	3.271	2382	854
584	(2004 KA)	20.6		0.258					2.00	0.49	7.93	0.126	4	EMA	3.8	13-Jul-20	8-May-24	24.1	2.937	2118	843
585	(2002 SV)	19.7		0.388					1.40	0.24	16.77	0.093	0	EMA	4.4	24-Jul-22	1-Dec-26	18.0	3.355	2413	842
586	(1999 VP6)	19.6		0.407					1.38	0.30	12.82	0.095	1	EMA	2.1	2-Sep-20	23-Oct-22	17.8	3.377	2427	841
587	159495 (2000 UV16)	16.9		1.434					2.35	0.49	4.08	0.199	0	EMA	5.0	9-Aug-20	8-Aug-25	24.8	2.895	2083	840
588	(2002 AA)	19.3		0.479		4.126	Sq		1.15	0.30	11.27	0.058	0	EMA	2.0	19-Oct-24	29-Oct-26	12.7	3.726	2692	836
589	152685 (1998 MZ)	19.2		0.487					1.35	0.57	0.15	0.002	0	EA	2.9	8-Mar-21	13-Jan-24	23.9	2.981	2126	834
590	(2008 AF4)	19.7		0.400					1.38	0.41	8.92	0.003	1	EMA	3.6	9-Oct-20	28-May-24	20.2	3.240	2304	833
591	(2002 WP11)	18.0		0.848					2.13	0.44	5.40	0.193	0	EMA	3.7	18-Jun-20	2-Mar-24	24.1	2.982	2117	831
592	190758 (2001 QH96)	18.0		0.864					1.75	0.36	13.95	0.168	0	EMA	3.4	13-Jul-20	16-Dec-23	22.7	3.090	2187	830
593	(2003 YP17)	18.9		0.571					2.00	0.49	4.90	0.051	1	EA	3.7	23-Mar-20	29-Nov-23	26.7	2.805	1999	829
594	(2003 OQ13)	20.3		0.301					1.30	0.16	16.15	0.092	1	EMA	3.4	20-Jul-22	9-Dec-25	47.8	1.131	1180	828
595	(1998 EP4)	21.8		0.153					1.56	0.44	7.19	0.062	2	EMA	3.4	14-Jun-20	7-Nov-23	22.1	3.140	2215	827
596	(2006 HZ51)	18.5		0.674					1.90	0.45	12.41	0.036	0	EMA	3.0	6-Jun-20	21-Jun-23	21.9	3.191	2222	816
597	(2008 CR118)	18.8		0.603					1.84	0.51	3.92	0.028	1	EMA	4.7	3-Sep-22	25-May-27	18.1	3.453	2411	816
598	35107 (1991 VH)	16.9		1.430		2.6236	Sk		1.14	0.14	13.91	0.026	0	EMA	2.9	15-Jan-22	23-Dec-24	12.5	3.836	2702	811
599	(2004 RN335)	19.1		0.509					2.21	0.42	8.84	0.313	3	EMA	4.3	18-Sep-20	12-Jan-25	20.2	3.332	2306	810
600	(1999 HV1)	17.7		0.971					2.57	0.54	6.48	0.205	2	EMA	4.1	19-Jul-20	22-Aug-24	22.7	3.214	2183	796
601	101869 (1999 MM)	19.3		0.479					1.62	0.61	4.76	0.002	0	EMA	4.7	12-Nov-22	8-Jul-27	20.6	3.362	2285	796
602	(2002 PF43)	20.6		0.255					1.64	0.37	13.86	0.035	1	EMA	3.3	8-Aug-24	13-Dec-27	37.6	2.146	1551	791
603	(2001 UZ16)	19.4		0.457					1.76	0.43	12.69	0.030	0	EMA	3.1	13-Aug-20	15-Sep-23	24.4	3.130	2106	789

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Arrival Mass [kg]
604	86819 (2000 GK137)	17.2		1.253		3.03	Sq		2.00	0.51	10.06	0.017	0	EMA	3.3	11-Aug-22	7-Dec-25	20.2	3.435	2306	785
605	(2003 EO16)	20.4		0.281					0.93	0.25	13.22	0.137	4	EVA	2.1	10-Jan-22	11-Feb-24	22.3	3.290	2203	785
606	(2002 CD14)	20.6		0.263					1.78	0.58	2.88	0.028	1	EVA	1.9	17-Oct-21	17-Sep-23	25.5	3.078	2053	782
607	(2000 SJ8)	19.4		0.452					2.67	0.55	7.12	0.222	4	EMA	4.3	31-Jul-22	4-Nov-26	20.1	3.493	2308	772
608	105141 (2000 NF11)	18.8		0.605					1.42	0.19	14.82	0.213	0	EMA	3.8	19-Jul-22	8-May-26	46.7	1.461	1217	770
609	(2002 CY58)	21.0		0.221					1.37	0.38	8.28	0.060	2	EA	2.3	9-Sep-20	10-Dec-22	49.3	1.222	1128	769
610	159923 (2004 YJ32)	16.3		1.918					2.52	0.52	7.52	0.221	1	EMA	4.8	25-Jul-20	1-May-25	21.7	3.409	2234	766
611	(2009 KN4)	18.2		0.776					1.94	0.53	9.17	0.012	0	EMA	3.5	6-Sep-22	20-Mar-26	24.9	3.195	2081	764
612	9172 Abhramu (1989 OB)	16.5		1.720					2.71	0.55	7.84	0.248	0	EMA	4.6	28-Aug-20	2-Apr-25	26.4	3.104	2013	760
613	67399 (2000 PJ6)	18.0		0.876					1.30	0.35	14.70	0.051	0	EMA	2.2	1-Apr-22	21-Jun-24	17.8	3.703	2424	758
614	(2001 XX4)	22.1		0.133					1.01	0.56	0.85	0.011	1	EMA	3.8	19-Jul-20	8-May-24	19.7	3.582	2329	757
615	(2005 WR2)	19.3		0.477					1.53	0.55	7.86	0.075	1	EMA	3.8	1-Sep-20	4-Jun-24	35.1	2.513	1646	748
616	(2005 SB71)	21.1		0.208					1.26	0.26	13.21	0.087	1	EMA	3.8	4-Sep-20	23-Jun-24	18.2	3.757	2403	739
617	(2008 QS11)	19.8		0.368					1.86	0.48	12.50	0.008	2	EMA	4.6	22-Nov-22	15-Jul-27	19.7	3.676	2331	735
618	(2006 BQ6)	19.7		0.402					1.47	0.40	12.99	0.009	1	EMA	3.0	26-Mar-24	9-Apr-27	22.0	3.812	2221	672
619	(2008 GG2)	22.7		0.100					1.59	0.28	13.02	0.145	0	EMA	4.6	2-Oct-24	11-May-29	22.3	3.821	2204	664
620	(2005 WR54)	19.1		0.526					1.94	0.41	14.78	0.195	1	EMA	3.8	25-Sep-22	10-Jul-26	25.1	3.636	2073	662
621	(2007 AT2)	19.6		0.414					1.69	0.38	13.64	0.111	1	EMA	2.9	14-Jan-24	23-Dec-26	34.1	2.985	1688	662
622	162183 (1999 NB5)	20.9		0.228					2.08	0.53	1.42	0.014	0	EMA	4.0	4-Sep-22	23-Aug-26	27.7	3.643	1957	624
623	(2007 EH88)	19.8		0.383					1.12	0.44	12.09	0.133	1	EVA	2.6	13-Mar-20	18-Oct-22	50.0	1.842	1105	620
624	(2003 AA3)	20.1		0.321					1.42	0.29	13.78	0.033	0	EA	1.1	5-Jan-20	25-Feb-21	70.3	0.413	513	450

Appendix D. NEO Sample-Return Trajectories

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Departure Date	Return Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Earth Entry Speed [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Return Mass [kg]
1	(2000 SG344)	24.8		0.038					0.98	0.07	0.11	0.001	3	EAE	3.4	24-Dec-24	23-Sep-26	21-Mar-27	12-May-28	0.8	0.775	11.2	3394	2661
2	(2008 JL24)	29.6		0.004					1.04	0.11	0.55	0.000	3	EAE	2.4	30-Nov-24	3-Mar-26	10-Jun-26	12-May-27	5.0	0.739	11.5	3129	2482
3	(2007 UN12)	28.7		0.006					1.05	0.06	0.23	0.001	4	EAE	1.4	17-Jun-20	2-Nov-20	1-Jan-21	4-Nov-21	3.2	0.869	11.4	3243	2469
4	(2008 AF3)	26.4		0.018					1.21	0.19	2.07	0.003	4	EAE	4.0	11-Jan-20	31-May-21	30-Jul-21	23-Jan-24	8.6	0.613	11.5	2918	2407
5	(2006 RH120)	29.6		0.004					1.03	0.02	0.60	0.018	1	EAE	3.9	4-Dec-24	11-Sep-26	28-Jan-27	13-Nov-28	1.4	1.094	11.1	3357	2382
6	(2009 HC)	24.8		0.038					1.04	0.13	3.78	0.011	4	EAE	2.5	15-Oct-24	25-Dec-25	10-Oct-26	14-Apr-27	8.4	0.719	11.7	2935	2343
7	(2001 AV43)	24.4		0.045		0.1701			1.28	0.24	0.28	0.002	4	EAE	6.0	1-Dec-23	4-Sep-26	1-Jan-27	17-Nov-29	10.7	0.587	11.7	2801	2330
8	(2006 RJ1)	22.2		0.126					0.95	0.30	1.41	0.001	3	EVAVE	6.1	27-Sep-24	11-Sep-27	9-Dec-27	5-Nov-30	11.3	0.682	12.2	2771	2237
9	(1998 KY26)	25.5		0.028	0.03	0.1784			1.23	0.20	1.48	0.003	2	EAE	4.0	15-Jun-24	14-Oct-25	13-Dec-25	5-Jun-28	14.6	0.494	11.8	2588	2217
10	162783 (2000 YJ11)	20.5		0.267					1.31	0.23	7.26	0.031	0	EMAE	6.1	14-Oct-24	14-May-27	14-Jun-28	27-Nov-30	11.8	0.675	12.5	2738	2215
11	(2009 CV)	24.3		0.048					1.11	0.15	0.96	0.012	3	EAE	4.9	14-Apr-23	8-Feb-25	23-Oct-25	13-Mar-28	3.6	1.203	11.9	3216	2205
12	(2006 SU49)	19.5		0.423					1.41	0.31	2.52	0.001	0	EAE	5.0	25-Jan-24	21-May-27	20-Jul-27	22-Jan-29	23.7	0.146	12.2	2138	2043
13	162173 (1999 JU3)	19.2		0.500			Cq		1.19	0.19	5.88	0.002	0	EAE	4.0	5-Dec-20	27-Jan-22	12-Apr-22	3-Dec-24	20.4	0.395	12.1	2298	2030
14	(2009 BD)	28.3		0.007					1.00	0.05	0.38	0.003	1	EAE	4.3	13-Apr-20	7-Apr-22	14-Oct-22	15-Jul-24	1.7	1.623	11.3	3338	2006
15	(2003 QB30)	26.4		0.018					1.23	0.42	0.64	0.003	4	EVAVE	7.0	2-Apr-23	8-Nov-26	12-Jan-27	20-Mar-30	14.1	0.902	11.8	2617	1972
16	(2006 XD2)	21.1		0.211					1.27	0.43	3.57	0.018	3	EVAVE	7.1	30-Aug-24	26-May-28	10-Nov-28	2-Oct-31	20.1	0.526	12.4	2310	1959
17	(2000 AE205)	22.9		0.091			S		1.16	0.14	4.46	0.031	1	EAE	5.0	22-Dec-23	1-Feb-26	30-Jun-26	20-Dec-28	8.9	1.295	11.6	2905	1935
18	25143 Itokawa (1998 SF36)	19.2		0.496	0.33	12.132	S(IV)		1.32	0.28	1.62	0.013	0	EMAE	8.0	31-May-22	13-Jul-27	16-Nov-27	29-May-30	17.6	0.758	11.8	2434	1918
19	(1991 VG)	28.4		0.007					1.03	0.05	1.45	0.003	2	EAE	4.0	6-Dec-19	27-Dec-21	25-Feb-22	7-Dec-23	1.2	1.801	11.1	3368	1914
20	(2006 WB)	22.8		0.094					0.85	0.18	4.91	0.006	3	EAVE	3.9	29-Nov-24	24-Apr-26	27-Nov-26	30-Oct-28	16.3	0.866	12.2	2502	1906
21	(1998 HG49)	21.9		0.141					1.20	0.11	4.20	0.077	1	EAE	5.0	2-Nov-22	12-Nov-24	30-Dec-25	7-Nov-27	8.5	1.373	11.7	2925	1901
22	(2009 KW2)	26.7		0.016					1.36	0.25	5.19	0.004	4	EAE	6.0	25-May-22	9-Apr-25	8-Jun-25	24-May-28	17.3	0.853	12.0	2450	1874
23	(2009 FH)	26.6		0.016					1.48	0.34	0.69	0.000	4	EAE	7.0	5-Apr-20	6-Aug-23	5-Oct-23	21-Mar-27	18.0	0.813	12.5	2417	1873
24	(2008 HU4)	28.2		0.008					1.10	0.08	1.32	0.007	4	EAE	5.0	27-Apr-24	24-Jul-26	22-Sep-26	3-May-29	3.1	1.766	11.3	3248	1866
25	(2002 NV16)	21.4		0.182					1.24	0.22	3.51	0.028	0	EAE	3.0	26-Sep-24	23-Jun-25	19-Dec-25	28-Sep-27	12.0	1.394	12.1	2729	1762
26	(2007 UY1)	22.9		0.091					0.95	0.17	1.02	0.006	2	EAE	1.4	3-Oct-20	31-May-21	30-Jul-21	17-Feb-22	21.8	0.792	12.4	2230	1739
27	(2008 HS3)	21.6		0.161					1.35	0.23	8.18	0.037	4	EMAE	6.0	2-May-24	21-May-27	20-Jul-27	8-May-30	13.4	1.406	12.5	2653	1706
28	(2001 QC34)	19.9		0.356					1.13	0.19	6.23	0.028	0	EAE	5.0	23-Dec-19	25-Nov-21	18-Aug-22	22-Dec-24	20.8	0.919	12.5	2276	1706
29	(2008 NP3)	23.3		0.074					1.00	0.33	1.44	0.016	1	EVAVE	5.4	27-Mar-20	23-Jul-22	25-Jan-23	20-Aug-25	9.2	1.701	12.1	2889	1694
30	(2008 EV5)	20.0		0.343	0.45	3.725			0.96	0.08	7.44	0.015	0	EAE	2.5	22-Jun-21	1-Apr-23	31-May-23	26-Dec-23	14.4	1.410	12.0	2598	1669
31	(2001 CQ36)	22.7		0.099					0.94	0.18	1.29	0.014	2	EAE	2.4	13-Dec-19	2-May-21	22-Sep-21	25-May-22	6.1	1.939	12.0	3068	1669
32	(2005 YR3)	23.4		0.072					0.82	0.27	3.60	0.011	1	EVAE	2.9	29-Dec-19	19-May-22	8-Oct-22	10-Dec-22	15.6	1.342	13.3	2535	1664
33	138404 (2000 HA24)	19.0		0.552					1.14	0.32	2.17	0.027	0	EVAME	7.4	17-Aug-24	7-Aug-27	6-Oct-27	24-Jan-32	10.4	1.727	11.5	2817	1638
34	96631 (1999 FP59)	18.0		0.864					1.70	0.26	1.77	0.248	0	EMAME	6.8	27-Sep-22	25-Apr-24	26-Oct-24	15-Jul-29	14.3	1.544	11.9	2602	1603
35	65679 (1989 UQ)	19.3		0.471		7.733	B		0.92	0.26	1.29	0.014	0	EVAVE	6.3	10-Aug-24	19-Sep-27	25-Jan-28	17-Nov-30	17.8	1.383	12.2	2425	1571
36	89136 (2001 US16)	20.2		0.316					1.36	0.25	1.90	0.029	0	EAE	5.9	20-May-23	7-Mar-26	11-Sep-26	12-Apr-29	14.3	1.614	12.0	2601	1567
37	101955 (1999 RQ36)	20.8		0.236		4.288			1.13	0.20	6.04	0.003	0	EAE	5.0	1-Oct-24	15-Jan-27	12-May-27	25-Sep-29	25.3	0.896	12.8	2062	1557
38	(1998 MW5)	19.1		0.524			Sq		1.02	0.36	6.29	0.076	2	EVAVE	5.4	20-Apr-23	5-Sep-25	28-Apr-26	16-Sep-28	15.4	1.572	12.0	2548	1556
39	(2006 CT)	22.4		0.116					1.10	0.23	2.74	0.002	2	EAE	4.9	15-Aug-23	21-Jan-26	24-May-26	5-Jul-28	9.4	1.975	12.9	2874	1546
40	(2000 SJ344)	22.6		0.104					1.14	0.17	5.77	0.046	0	EAE	4.0	8-Oct-23	31-Oct-24	29-Apr-25	7-Oct-27	15.8	1.576	12.1	2526	1541
41	(2003 FF5)	23.2		0.080					1.37	0.30	6.36	0.026	4	EMAE	5.8	22-Jun-24	25-May-27	31-Jul-27	4-Apr-30	15.4	1.617	13.1	2546	1533
42	(2002 TS69)	24.5		0.044					1.18	0.13	8.45	0.031	4	EAE	5.0	15-Oct-20	19-Dec-22	8-May-23	14-Oct-25	24.7	0.988	12.2	2088	1532
43	(2006 UQ17)	21.9		0.146					1.62	0.38	1.74	0.024	1	EAE	8.0	29-Dec-23	29-Jun-27	23-Nov-27	17-Dec-31	21.8	1.208	12.4	2227	1524
44	(2006 FH36)	22.9		0.090					0.95	0.20	1.59	0.016	3	EAE	1.4	22-Mar-20	5-Jul-20	22-Nov-20	4-Aug-21	19.5	1.386	12.2	2341	1515
45	163249 (2002 GT)	18.3		0.744					1.34	0.33	6.97	0.015	0	EMAE	5.2	18-Aug-22	17-Aug-26	16-Oct-26	14-Oct-27	14.7	1.701	13.6	2583	1515
46	141018 (2001 WC47)	18.6		0.668					1.40	0.24	2.87	0.079	0	EAME	3.1	15-Apr-22	30-Jun-23	20-Sep-23	3-May-25	13.7	1.778	12.2	2638	1510
47	(2007 DD)	25.8		0.024					0.99	0.12	2.53	0.007	2	EAE	3.9	2-Mar-20	9-Oct-21	16-Dec-21	7-Feb-24	3.8	2.442	11.4	3203	1488
48	(2007 SQ6)	21.9		0.143					1.04	0.15	9.10	0.009	3	EAE	1.5	6-Oct-23	19-Jan-24	19-Mar-24	1-Apr-25	29.0	0.779	12.6	1900	1488
49	(2006 JY26)	28.3		0.007					1.01	0.08	1.44	0.002	3	EAE	4.1	19-Oct-20	3-Mar-23	2-May-23	5-Dec-24	3.1	2.494	12.4	3252	1487
50	(2001 WT1)	20.2		0.319					1.09	0.40	7.15	0.121	1	EVAVE	4.1	23-Jan-23	11-Nov-24	10-Jan-25	13-Feb-27	11.3	1.997	12.3	2770	1480
51	(2004 FM17)	19.2		0.493					0.89	0.25	6.76	0.061	1	EVAE	3.1	23-Jan-20	25-Oct-21	14-Jan-22	10-Mar-23	14.9	1.770	12.3	2570	1475
52	(2008 TC3)	30.7		0.003					1.31	0.31	2.54	0.000	4	EAE	4.9	6-Nov-21	11-Jan-25	28-Apr-25	8-Oct-26	19.4	1.489	13.3	2347	1471
53	4660 Nereus (1982 DB)	18.2	0.55	0.411	0.33	15.1	Xe		1.49	0.36	1.43	0.003	0	EAE	7.0	13-Feb-24	6-Jun-27	7-Oct-27	13-Feb-31	32.7	0.556	12.7	1745	1465
54	(2009 DO111)	22.9		0.092					1.05	0.28	2.99	0.002	2	EVAVE	5.2	17-Nov-21	16-Mar-24	4-Oct-24	27-Jan-27	11.6	2.016	11.8	2755	1463
55	(1999 YR14)	18.5		0.675					1.65	0.40	3.72	0.007	1	EAE	8.0	26-Sep-23	14-May-27	18-Jul-27	24-Sep-31	25.3	1.130	12.7	2062	1447
56	(2006 BE55)	21.9		0.141					1.20	0.42	2.42	0.024	3	EVAVE	7.3	7-Oct-24	4-Jun-28	3-Aug-28	4-Feb-32	11.7	2.045	12.3	2748	1447
57	(2008 YS27)	21.2		0.202					1.47	0.32	4.88	0.024	4	EAE	5.0	1-Jan-20	14-Jan-23	12-Aug-23	25-Dec-24	22.3	1.348	12.3	2206	1445
58	(2004 XK3)	24.4		0.045					1.23	0.26	1.48	0.001	0	EMAE	6.1	6-Oct-24	2-Dec-27	31-Jan-28	13-Nov-30	18.7	1.592	12.5	2380	1444
59	(2007 TH3)	24.6		0.041					0.97	0.12	8.23	0.015	3	EAE	3.5	31-Mar-24	16-Feb-26	17-Apr-26	5-Oct-27	20.1	1.500	12.4	2311	1443
60	(2003 GY)	20.0		0.338					1.38	0.32	4.67	0.023	0	EAE	5.0	10-Aug-24	27-Oct-26	27-Jan-27	15-Aug-29	31.0	0.727	12.6	1812	1443
61	(2008 UB95)	24.7		0.040					0.99	0.27	3.24	0.000	2	EVAE	4.9	15-Nov-21	3-Apr-24	27-Jul-24	16-Oct-26	12.7	2.013	14.1	2691	1431
62	(1997 WB21)	20.5		0.269					1.46	0.32	3.39	0.051	1	EMAME	6.9	20-Sep-20	15-Feb-23	17-Aug-23	2-Sep-27	18.7	1.634	12.8	2378	1424
63	(2005 QP11)	26.4		0.018					0.98	0.18	3.96	0.010	3	EAE	3.9	26-Sep-24	27-Sep-26	13-Jan-27	27-Aug-28	7.6	2.355	11.7	2977	1422
64	(2006 KL21)	20.7		0.251					1.20	0.13	9.36	0.048	1	EAE	5.0	19-Jul-22	3-Apr-25	5-Jul-25	20-Jul-27	27.6	1.026	12.4	1959	1420
65	(1994 UG)	21.0		0.219					1.24	0.29	5.21	0.024	1	EMAE	5.8	7-Jun-24	14-Mar-28	17-Jun-28	29-Mar-30	14.2	1.948	13.0	2609	1416
66	138175 (2000 EE104)	20.2		0.318					1.00	0.29	5.24	0.008	0	EVAVE	5.3	27-Nov-21	7-Aug-24	11-Dec-24	18-Mar-27	18.9	1.640	12.7	2368	1415
67	(2004 PJ2)	21.3		0.190					1.42	0.34	2.58	0.023	0	EMAE	7.3	13-Mar-24	23-Jan-29	11-Aug-29	14-Jul-31	10.6	2.191	13.9	2806	1411
68	(2002 TC70)	20.8		0.240					1.37	0.20	2.15	0.085	1	EAME	6.0	3-Aug-23	29-Oct-25	28-Dec-25	23-Jul-29	11.0	2.183	11.7	2787	1405
69	152671 (1998 HL3)	19.9		0.362					1.13	0.37	2.68	0.045	0	EMAVE	7.6	23-Aug-22	25-Aug-27	24-Oct-27	20-Mar-30	17.9	1.745	12.6	2420	1400
70	(2005 VN5)	27.0		0.014					0.94	0.23	2.09	0.000	4	EAE	2.9	13-Dec-24	15-Oct-26	1-Mar-27	7-Nov-27	12.1	2.135	12.5	2724	1394
71	(2000 EA14)	21.1		0.211					1.12	0.20	3.55	0.043	1	EAE	4.0	15-Oct-20	11-Feb-23	24-Aug-23	8-Oct-24	9.4	2.328	12.5	2874	1384
72	(2004 FH)	26.4		0.018		0.0504			0.82	0.29	0.02	0.000	3	EAE	2.9	2-Feb-24	8-Mar-25	12-Jun-25	13-Jan-27	23.7	1.387	12.7	2137	1383
73	65803 Didymos (1996 GT)	18.0		0.880		2.2593	Xk		1.64	0.38	3.41	0.041	0	EMAE	6.1	5-Nov-20	12-May-24	22-Jul-24	3-Dec-26	20.9	1.592	13.2	2273	1380
74	(2003 GA)	21.1		0.209					1.28	0.19	3.84	0.061	0	EAE	3.9	27-Apr-22	10-Dec-23	2-Mar-24	3-Apr-26	13.5	2.086	12.7	2647	1376
75	(1996 FO3)	20.3		0.298					1.44	0.29	5.82	0.043	1	EAE	5.0	22-Feb-22	9-Jan-25	3-May-25	23-Feb-27	28.5	1.062	12.1	1920	1375
76	(2004 BE86)	20.9		0.231		2.42			1.44	0.24	3.78	0.108	1	EMAE	7.9	20-Mar-20	2-Dec-24	26-Jul-25	24-Feb-28	11.3	2.231	12.0	2767	1374

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Departure Date	Return Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Earth Entry Speed [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Return Mass [kg]
77	(2008 DG5)	19.7		0.398					1.26	0.24	5.71	0.019	0	EMAE	4.8	6-Aug-20	17-Feb-24	1-May-24	28-May-25	24.2	1.376	13.3	2114	1372
78	(2006 UP)	23.1		0.082					1.59	0.30	2.28	0.113	0	EMAE	5.9	20-Nov-22	14-Dec-26	12-Feb-27	29-Oct-28	17.8	1.824	12.2	2426	1369
79	(1999 NW2)	23.1		0.081		<4.2			1.12	0.11	8.68	0.016	1	EAE	5.0	15-Jul-20	20-Jan-23	11-Apr-23	12-Jul-25	23.8	1.428	12.3	2133	1363
80	(2004 AD)	24.5		0.043					1.26	0.26	7.31	0.026	4	EMAE	6.2	2-Nov-24	18-Mar-28	17-May-28	4-Jan-31	13.7	2.105	12.9	2637	1362
81	(2002 RW25)	18.8		0.606					0.83	0.29	1.33	0.016	1	EAE	2.9	31-Aug-20	2-Nov-21	20-Apr-22	16-Jul-23	17.9	1.846	13.0	2420	1356
82	(2008 JG)	20.9		0.231					1.05	0.30	7.91	0.050	3	EVAVE	5.7	20-May-23	5-Jan-26	6-Mar-26	7-Feb-29	17.4	1.890	12.9	2447	1352
83	(2000 CK59)	24.2		0.050					1.48	0.31	5.70	0.040	0	EAE	5.0	31-Jan-20	21-Jan-23	22-Mar-23	6-Feb-25	24.5	1.422	12.2	2100	1344
84	(2000 UK11)	25.0		0.034		0.2661			0.88	0.25	0.78	0.004	3	EVAE	2.8	5-Oct-21	26-Jun-23	25-Aug-23	5-Aug-24	11.9	2.263	12.8	2734	1344
85	65717 (1993 BX3)	20.9		0.230		20.463			1.39	0.28	2.79	0.048	0	EAE	6.0	5-Feb-23	12-Oct-25	6-Jul-26	18-Feb-29	14.2	2.151	13.3	2611	1330
86	7474 (1992 TC)	18.0		0.862		5.54	X		1.57	0.29	7.09	0.168	0	EMAME	7.1	20-Sep-24	20-Nov-27	12-Apr-28	2-Nov-31	23.6	1.522	12.0	2140	1328
87	209215 (2003 WP25)	24.2		0.049					0.99	0.12	2.56	0.023	1	EAE	3.5	8-Nov-20	28-Apr-22	27-Jun-22	12-May-24	4.3	2.782	11.9	3172	1325
88	(1999 RA32)	20.9		0.226					1.03	0.09	10.52	0.056	2	EAE	2.5	9-Sep-21	8-Mar-23	2-Aug-23	8-Mar-24	26.6	1.323	12.5	2005	1323
89	(2003 MM)	21.6		0.166					1.05	0.26	8.54	0.131	4	EVAE	4.6	17-Jun-21	29-Jan-24	29-Mar-24	27-Jan-26	13.1	2.236	12.3	2668	1323
90	(2005 EU2)	23.1		0.084					1.51	0.35	4.58	0.001	1	EAE	7.0	3-Apr-22	10-Sep-25	9-Nov-25	30-Mar-29	33.1	0.863	12.9	1727	1318
91	(2002 AW)	20.5		0.270					1.07	0.26	0.57	0.005	2	EAVE	4.7	30-Jun-24	29-Jan-26	30-Mar-26	1-Mar-29	5.4	2.754	12.3	3106	1309
92	(2007 UP6)	22.9		0.091					0.97	0.09	9.58	0.016	2	EAE	3.5	20-Apr-24	20-Feb-26	21-Apr-26	25-Oct-27	25.5	1.440	12.5	2054	1307
93	10302 (1989 ML)	19.5		0.432		19	X		1.27	0.14	4.38	0.082	0	EAE	5.0	9-Jul-21	2-Dec-23	3-Apr-24	4-Jul-26	7.1	2.661	11.7	3010	1306
94	(2003 VO2)	20.8		0.234					1.32	0.10	7.12	0.217	1	EMAE	5.9	20-Jan-22	3-Nov-26	3-Mar-27	21-Dec-27	10.3	2.462	11.9	2823	1304
95	(1999 NA5)	20.4		0.290					1.44	0.25	4.28	0.083	1	EMAE	6.1	24-Apr-22	1-Feb-27	2-Apr-27	1-Jun-28	11.3	2.404	13.0	2766	1301
96	(2007 RQ17)	22.6		0.105					1.58	0.37	1.98	0.022	0	EAE	6.0	22-Jul-23	21-Sep-25	20-Nov-25	5-Aug-29	26.8	1.374	12.6	1995	1297
97	153814 (2001 WN5)	18.1		0.806					1.71	0.47	1.92	0.002	0	EMAE	5.8	22-Sep-22	4-Jul-27	2-Sep-27	1-Jul-28	18.6	1.955	14.5	2385	1292
98	(2004 KE1)	21.6		0.164					1.30	0.18	2.88	0.073	0	EMAE	6.2	23-Jul-20	6-Dec-23	23-Jun-24	2-Oct-26	14.3	2.245	25.1	2604	1288
99	(2002 SR)	21.6		0.164					1.18	0.20	6.69	0.052	1	EMAE	4.1	18-Jan-22	17-Feb-25	26-Jul-25	28-Feb-26	12.9	2.340	13.0	2681	1287
100	(2004 OB)	18.8		0.601					1.68	0.43	3.44	0.012	1	EMAE	3.8	4-Dec-24	21-Nov-27	20-Jan-28	23-Sep-28	14.6	2.236	13.8	2585	1282
101	(2007 HZ)	20.2		0.313					1.33	0.14	7.42	0.203	0	EMAE	6.6	27-Mar-24	6-Aug-28	5-Oct-28	22-Oct-30	9.0	2.599	12.3	2897	1281
102	(2003 YX1)	20.8		0.236					0.88	0.27	5.76	0.012	1	EVAE	4.1	17-Nov-22	4-Sep-25	6-Feb-26	25-Dec-26	14.4	2.296	12.5	2598	1264
103	(2009 EK1)	21.4		0.181					1.24	0.23	9.11	0.032	2	EMAE	5.9	13-Oct-24	25-Jan-28	25-Mar-28	21-Sep-30	19.1	1.994	12.5	2361	1263
104	(1999 VG22)	18.6		0.668					1.65	0.33	2.85	0.124	1	EMAE	6.9	23-Jan-20	19-May-23	26-Oct-23	2-Jan-27	13.2	2.380	12.2	2663	1262
105	164211 (2004 JA27)	19.3		0.464					1.67	0.42	2.26	0.033	1	EMAE	7.8	30-Sep-24	3-Sep-29	21-Nov-29	23-Jul-32	17.0	2.132	13.8	2463	1262
106	(2002 TD60)	19.2		0.502		2.851			1.20	0.08	7.41	0.118	0	EMAE	4.0	19-Nov-23	19-Nov-26	5-May-27	25-Nov-27	10.9	2.533	11.9	2792	1261
107	(2003 JC13)	20.2		0.311					1.07	0.32	8.51	0.143	2	EVAVE	5.9	18-Apr-21	31-May-24	10-Mar-25	18-Mar-27	37.4	0.689	12.7	1558	1255
108	(2006 YF)	20.9		0.226					1.11	0.20	4.67	0.057	4	EAE	4.0	25-Jun-21	15-Jun-22	24-Jan-23	21-Jun-25	12.3	2.484	12.7	2714	1245
109	(2003 YN107)	26.3		0.019					0.99	0.01	4.32	0.006	0	EAE	4.0	18-Dec-20	17-Aug-22	16-Oct-22	17-Dec-24	6.8	2.838	11.4	3028	1243
110	(2007 MR)	21.8		0.146					1.02	0.26	5.82	0.070	3	EVAE	4.6	10-Feb-23	15-Jun-25	14-Aug-25	15-Sep-27	12.8	2.466	12.9	2688	1240
111	(2007 HX3)	20.0		0.346					1.53	0.31	6.14	0.054	4	EAE	5.0	7-Oct-23	8-Sep-26	2-Dec-27	7-Oct-28	24.9	1.652	12.8	2082	1240
112	(2006 SY5)	22.1		0.132					1.04	0.15	7.57	0.104	3	EAE	2.5	19-Feb-24	11-Nov-24	31-Mar-25	29-Aug-26	13.4	2.428	11.7	2654	1239
113	(2007 HF44)	19.2		0.498					1.60	0.31	2.99	0.118	3	EAME	5.9	11-Dec-20	23-Apr-22	23-Sep-22	8-Nov-26	21.9	1.867	12.1	2226	1239
114	99942 Apophis (2004 MN4)	19.7	0.33	0.266	0.27	30.4	Sq		0.92	0.19	3.33	0.000	0	EAE	2.0	5-May-20	2-Mar-21	21-Jun-21	21-Apr-22	10.8	2.627	13.3	2796	1226
115	(2003 CC)	20.3		0.297					1.50	0.33	2.32	0.036	1	EMAME	7.0	23-May-22	17-May-27	16-Nov-27	6-May-29	17.4	2.206	14.8	2445	1224
116	(1994 CJ1)	21.5		0.175					1.49	0.32	2.31	0.032	2	EAE	6.9	12-May-23	10-Oct-26	27-Apr-27	5-Apr-30	22.4	1.876	12.5	2200	1221
117	173664 (2001 JU2)	19.4		0.461					1.52	0.27	4.01	0.110	0	EMAE	4.9	28-Jul-20	4-Jun-22	17-Sep-22	4-Jul-25	14.6	2.400	12.5	2588	1219
118	(2005 GK)	20.1		0.334					1.34	0.33	10.87	0.109	2	EMAE	5.0	10-Jul-22	27-Nov-25	15-Feb-26	23-Jul-27	24.0	1.776	13.7	2124	1217
119	(2002 XY38)	22.9		0.089					0.91	0.22	2.10	0.003	1	EVAVE	6.2	7-Dec-22	3-Nov-25	6-Feb-26	15-Feb-29	8.9	2.794	11.9	2906	1209
120	213053 (1998 WT30)	19.5		0.440					1.81	0.34	0.51	0.212	1	EMAE	8.0	27-Jan-20	20-Oct-23	29-Sep-24	25-Jan-28	13.4	2.525	13.6	2655	1202
121	207945 (1991 JW)	19.2		0.496					1.04	0.12	8.71	0.019	0	EAE	3.5	14-May-24	2-Jul-25	14-Jan-26	17-Nov-27	20.1	2.104	12.3	2311	1194
122	(2007 VV83)	24.8		0.038					0.97	0.10	10.12	0.041	4	EAE	2.5	6-May-23	24-Dec-24	15-Mar-25	8-Nov-25	26.8	1.642	12.3	1997	1193
123	138911 (2001 AE2)	19.1		0.514			T		1.35	0.08	1.66	0.234	0	EAME	5.0	25-Mar-20	14-Oct-20	16-Mar-21	4-Apr-25	6.4	2.995	11.8	3046	1190
124	154590 (2003 MA3)	21.8		0.152					1.11	0.40	1.41	0.013	0	EVAVE	6.2	16-Jan-23	17-Sep-26	25-Feb-27	14-Apr-29	19.8	2.137	13.7	2323	1188
125	1943 Anteros (1973 EC)	15.8	0.17	2.282	2.3	2.8695	L	S	1.43	0.26	8.70	0.062	0	EAE	5.0	25-May-21	31-Jan-24	17-May-24	28-May-26	36.6	0.932	12.8	1587	1185
126	(2008 HE66)	21.7		0.154					1.39	0.16	6.94	0.190	4	EMAME	7.5	1-Oct-24	17-Nov-28	5-Jul-29	11-Apr-32	18.4	2.251	12.1	2393	1181
127	(2007 YJ)	21.7		0.159					1.10	0.28	3.31	0.051	4	EAME	4.0	17-Apr-23	18-Jan-24	25-Mar-24	3-May-27	12.0	2.677	11.7	2733	1180
128	152563 (1992 BF)	19.7		0.395			Xc		0.91	0.27	7.25	0.063	0	EVAE	4.3	29-Oct-24	20-Aug-27	16-Nov-27	4-Feb-29	14.3	2.532	12.3	2606	1177
129	98943 (2001 CC21)	18.4		0.726		5.017	L		1.03	0.22	4.81	0.083	0	EMAVE	6.6	20-May-24	6-Sep-28	16-Feb-29	11-Dec-30	13.2	2.608	12.0	2667	1177
130	(2009 BW2)	25.1		0.032					1.02	0.14	1.01	0.016	3	EAME	5.2	31-Mar-20	18-Apr-22	17-Jun-22	5-Jun-25	2.6	3.303	11.7	3282	1164
131	(2008 WK)	23.2		0.080					1.42	0.28	6.34	0.050	4	EAE	3.0	25-Nov-20	7-Jul-22	5-Sep-22	25-Nov-23	23.0	1.986	12.2	2169	1163
132	140158 (2001 SX169)	18.2		0.783					1.35	0.46	2.51	0.026	0	EVAE	4.9	17-Jul-21	28-Mar-24	27-May-24	31-May-26	16.0	2.489	18.0	2513	1151
133	(2001 UP)	25.7		0.025					0.88	0.29	7.70	0.007	3	EVAVE	4.3	12-Jul-21	15-Jun-23	1-Dec-23	20-Oct-25	14.3	2.614	12.1	2606	1147
134	190491 (2000 FJ10)	20.9		0.232					1.32	0.23	5.29	0.055	0	EAE	4.0	29-Sep-22	17-Jan-24	10-Jun-24	3-Oct-26	8.5	2.986	12.5	2925	1146
135	(2007 PO9)	22.1		0.131					1.43	0.24	8.56	0.094	4	EMAE	5.5	23-Jan-24	23-Apr-27	27-Jun-27	7-Aug-29	11.2	2.836	13.4	2776	1140
136	(2002 LT38)	20.3		0.295					0.84	0.31	6.20	0.034	0	EVAE	3.2	14-Mar-23	22-Jan-25	15-Apr-25	10-Jun-26	13.7	2.673	12.5	2637	1140
137	(2008 VB1)	20.6		0.264					1.28	0.28	10.32	0.020	4	EMAE	6.0	10-May-22	14-Sep-25	13-Nov-25	10-May-28	30.0	1.550	13.7	1853	1139
138	(2004 HX53)	23.3		0.076					1.19	0.33	3.55	0.020	3	EVAME	6.6	12-Nov-22	20-Apr-26	22-Jun-26	15-Jun-29	25.1	1.904	12.1	2070	1139
139	(2009 FF19)	21.4		0.183					1.21	0.41	0.55	0.004	1	EVAVE	4.1	23-Mar-20	29-Sep-21	28-Nov-21	11-May-24	15.8	2.549	13.3	2526	1135
140	(2003 SM84)	22.7		0.097					1.13	0.08	2.79	0.052	1	EAME	5.8	22-Sep-21	6-Jun-22	5-Aug-22	29-Jun-27	4.6	3.266	11.8	3158	1133
141	(2005 BY2)	20.2		0.310					1.27	0.33	7.29	0.041	1	EMAE	6.1	21-Apr-22	24-Nov-26	26-Jan-27	8-Jun-28	11.0	2.893	13.1	2786	1124
142	163899 (2003 SD220)	16.9		1.457					0.83	0.21	8.46	0.017	1	EVAE	3.2	7-Oct-24	21-Mar-27	20-May-27	24-Dec-27	14.2	2.683	13.0	2607	1123
143	(2005 YU55)	21.9		0.145					1.14	0.43	0.51	0.001	0	EVAME	8.0	13-Nov-21	16-Nov-24	6-Mar-25	26-Oct-29	16.9	2.523	15.2	2470	1119
144	(1998 QB28)	20.2		0.312					2.07	0.38	1.08	0.271	2	EMAME	7.2	28-May-24	13-Mar-28	12-May-28	5-Aug-31	13.9	2.722	12.5	2625	1117
145	(1998 VS)	22.2		0.126					1.40	0.28	6.83	0.042	0	EAE	3.0	8-Nov-23	1-Feb-25	2-Apr-25	11-Nov-26	29.8	1.630	12.8	1862	1117
146	(2008 DJ5)	19.9		0.354					1.25	0.42	8.11	0.103	3	EVAME	5.5	7-Dec-19	24-Dec-21	22-Feb-22	28-May-25	18.7	2.432	14.7	2380	1110
147	(2007 TK8)	21.1		0.211					1.50	0.16	3.10	0.263	3	EMAE	5.1	12-Sep-22	8-Sep-26	11-Dec-26	28-Oct-27	13.7	2.763	12.0	2637	1108
148	(2005 WK56)	22.5		0.110					1.62	0.39	5.35	0.032	2	EMAME	7.9	6-Dec-24	6-Aug-27	5-Oct-27	15-Oct-32	15.0	2.689	12.4	2566	1104
149	52381 (1993 HA)	19.9		0.354					1.28	0.14	7.73	0.169	0	EMAE	5.6	20-Feb-20	21-Nov-24	10-Feb-25	29-Sep-25	11.0	2.976	13.0	2785	1095
150	(2006 GW2)	20.3		0.299					1.45	0.19	9.42	0.208	2	EMAME	7.1	17-Jul-20	24-Apr-24	13-Jul-24	9-Aug-27	21.4	2.297	13.3	2248	1093
151	(2005 RN33)	19.6		0.415					1.73	0.26	7.19	0.322	2	EMAME	7.9	6-Dec-21	1-Jul-26	21-Sep-26	10-Nov-29	8.9	3.118	11.7	2906	1093
152	3361 Orpheus (1982 HR)	19.0		0.536	0.3	3.58			1.21	0.32	2.68	0.014	0	EAE	3.1	5-Mar-23	28-Jan-25	29-Mar-25	26-Mar-26	16.1	2.663	12.5	2512	1089

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Departure Date	Return Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Earth Entry Speed [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Return Mass [kg]
153	(2007 RT12)	24.0		0.055					1.02	0.16	4.25	0.044	2	EAME	5.0	9-Mar-20	14-May-22	19-Jul-22	10-Mar-25	8.4	3.189	12.5	2932	1078
154	85867 (1999 BY9)	18.0		0.878					1.83	0.30	0.94	0.282	0	EMAE	6.1	9-Feb-20	23-Aug-24	23-Oct-24	19-Mar-26	14.7	2.784	12.4	2581	1078
155	54509 YORP (2000 PH5)	22.6		0.105		0.2029			1.01	0.23	1.60	0.001	0	EAE	3.5	18-Jun-20	17-Dec-21	5-Jun-22	14-Dec-23	14.1	2.856	11.8	2612	1066
156	(2008 TT26)	23.6		0.067					1.35	0.26	8.48	0.009	4	EAE	4.0	26-Oct-21	9-May-24	8-Jul-24	24-Oct-25	23.9	2.205	12.3	2127	1065
157	67367 (2000 LY27)	17.0		1.381					1.31	0.21	9.02	0.048	0	EAE	4.0	14-Dec-20	17-Apr-22	28-Jun-22	16-Dec-24	24.0	2.206	12.5	2122	1062
158	(2005 CN)	22.8		0.094					1.02	0.18	2.30	0.029	2	EAVE	4.9	10-May-21	17-Jun-23	16-Aug-23	18-Mar-26	3.3	3.549	12.3	3234	1062
159	(2002 OA22)	19.3		0.473					0.94	0.24	6.92	0.035	2	EAE	2.5	23-Mar-20	23-Sep-21	28-Feb-22	17-Sep-22	14.5	2.856	12.5	2594	1059
160	136617 (1994 CC)	17.6		1.057					1.64	0.42	4.68	0.016	0	EMAE	5.9	26-Jul-20	13-Feb-22	17-May-22	18-Jun-26	17.4	2.675	13.7	2446	1057
161	(1997 YM9)	24.3		0.047					1.10	0.10	7.84	0.032	0	EAE	2.5	26-Jun-21	14-Jan-22	15-Mar-22	27-Dec-23	16.4	2.741	11.8	2494	1055
162	162911 (2001 LL5)	19.0		0.552					1.20	0.34	7.95	0.100	0	EMAE	6.9	28-Jan-22	8-Oct-26	7-Dec-26	31-Dec-28	20.3	2.488	12.5	2299	1053
163	(1999 AO10)	23.9		0.058					0.91	0.11	2.62	0.022	4	EAE	1.2	29-Dec-24	2-Nov-25	1-Jan-26	3-Mar-26	17.6	2.672	11.5	2435	1053
164	18109 (2000 NG11)	17.5		1.085		4.2534			1.88	0.37	0.81	0.191	0	EMAE	5.9	23-Oct-22	3-Sep-26	13-Feb-27	2-Oct-28	16.3	2.772	12.5	2500	1048
165	(2007 YM56)	22.3		0.118					1.25	0.31	6.43	0.029	4	EMAE	7.2	1-Apr-22	28-Aug-26	29-Nov-26	28-Jun-29	9.9	3.186	13.2	2846	1048
166	(2002 JX8)	20.0		0.350					0.77	0.31	4.32	0.020	2	EAE	3.0	31-May-20	6-Dec-21	22-Mar-22	20-May-23	10.6	3.140	12.5	2805	1047
167	(2008 RH1)	22.6		0.102					1.06	0.16	7.47	0.070	3	EAE	2.5	10-Mar-21	30-Nov-21	19-Mar-22	14-Sep-23	21.6	2.423	11.8	2238	1046
168	(2007 UR3)	21.2		0.202					1.56	0.28	1.31	0.136	0	EAME	8.0	21-Jan-20	25-Jan-23	11-Aug-23	8-Jan-28	19.3	2.590	12.5	2351	1043
169	(1999 FN19)	22.4		0.113			Sq		1.65	0.39	2.30	0.016	2	EAE	8.0	2-May-23	5-Sep-26	26-Dec-26	20-Apr-31	21.8	2.420	13.1	2226	1042
170	(2003 HA22)	19.2		0.485					1.88	0.39	1.61	0.120	0	EMAE	8.0	6-Jun-22	9-Aug-26	3-Dec-26	4-Jun-30	18.3	2.681	12.2	2402	1036
171	194006 (2001 SG10)	20.2		0.312			X		1.45	0.42	4.26	0.017	0	EMAME	6.1	21-Jun-20	13-Jun-23	12-Aug-23	16-Jul-26	21.9	2.436	12.5	2224	1036
172	154019 (2002 CZ9)	21.9		0.144					1.33	0.36	4.97	0.026	1	EMAE	6.1	2-Jun-22	16-Oct-26	1-Mar-27	7-Jul-28	17.9	2.721	13.8	2421	1031
173	136618 (1994 CN2)	16.7		1.578					1.57	0.40	1.44	0.012	1	EMAME	6.2	21-Jul-20	31-Mar-22	21-Jul-22	13-Oct-26	18.5	2.683	12.4	2388	1029
174	(2006 WQ29)	18.1		0.831					1.60	0.39	8.07	0.021	2	EMAE	6.1	22-May-22	30-Jun-25	19-Mar-26	13-Jul-28	18.0	2.720	15.0	2415	1029
175	(2002 QE47)	22.0		0.139					1.83	0.37	0.73	0.171	1	EMAE	4.0	28-Nov-20	25-May-23	24-Jul-23	10-Dec-24	21.7	2.480	14.2	2231	1025
176	(2006 BZ147)	25.4		0.028					1.02	0.10	1.41	0.002	3	EVAE	4.2	3-Jan-23	12-Aug-24	26-Dec-24	14-Mar-27	9.6	3.283	12.1	2865	1023
177	(2004 SW55)	20.8		0.241					1.43	0.33	8.79	0.030	0	EAE	5.0	7-Dec-21	2-Jul-24	14-May-25	7-Dec-26	41.2	1.037	12.7	1413	1021
178	(2008 WN2)	20.7		0.245					1.42	0.31	3.75	0.049	4	EAE	5.0	30-Mar-21	1-Jul-22	5-Oct-22	13-Apr-26	21.6	2.527	13.8	2238	1013
179	68278 (2001 FC7)	18.2		0.787					1.44	0.11	2.62	0.263	0	EMAME	5.2	28-Jul-20	24-Aug-22	24-Oct-22	29-Sep-25	14.4	3.016	12.4	2600	1009
180	36017 (1999 ND43)	19.2		0.496			Sl		1.52	0.31	5.55	0.078	0	EAE	5.0	7-Sep-20	1-Jul-22	7-Oct-22	25-Aug-25	24.3	2.353	13.2	2106	1007
181	154330 (2002 VX94)	18.0		0.871					1.48	0.41	7.17	0.033	0	EMAE	7.9	14-Mar-22	15-Aug-26	26-Oct-26	6-Feb-30	24.5	2.349	13.9	2101	1005
182	(2006 TD)	22.4		0.114					1.59	0.39	8.19	0.018	0	EMAE	4.1	19-Jul-20	12-Sep-21	26-Sep-22	9-Sep-24	19.4	2.711	14.0	2343	1001
183	(2005 ED318)	20.7		0.247		17.157			1.85	0.45	2.39	0.010	0	EAE	8.0	10-Jun-24	16-Dec-27	24-Feb-28	8-Jun-32	23.1	2.461	12.7	2165	1000
184	(2002 VX91)	24.2		0.050					0.98	0.20	2.34	0.001	2	EVAVE	4.4	3-Oct-22	6-Apr-25	24-Jul-25	9-Feb-27	18.9	2.763	11.8	2368	995
185	8034 Akka (1992 LR)	17.9		0.903		7.283			1.83	0.41	2.02	0.074	0	EMAE	4.0	15-Jul-20	3-Apr-22	11-Sep-22	16-Jul-24	16.1	2.948	12.5	2509	995
186	162416 (2000 EH26)	21.3		0.185		>24.			1.85	0.48	0.39	0.001	0	EAE	5.9	20-May-24	6-Feb-28	6-Apr-28	9-Apr-30	23.3	2.475	13.8	2155	991
187	(2003 RU11)	25.6		0.026					0.89	0.18	4.66	0.007	3	EAVE	3.8	27-Sep-23	29-Jul-24	22-Jan-25	3-Jul-27	8.7	3.441	11.7	2914	990
188	(2006 VG13)	21.5		0.174					0.82	0.30	5.86	0.045	1	EVAVE	4.2	5-Oct-22	20-Mar-25	19-May-25	3-Dec-26	18.6	2.808	13.3	2384	988
189	(2000 WO148)	20.5		0.268					1.64	0.38	4.42	0.056	1	EAE	7.0	11-Feb-21	1-Feb-24	27-Aug-24	10-Feb-28	20.7	2.677	13.4	2284	986
190	(1998 KG3)	22.1		0.131					1.16	0.12	5.50	0.097	0	EMAE	5.1	24-Feb-24	26-Mar-27	17-Jun-27	14-Apr-29	8.3	3.484	12.8	2941	985
191	(2003 DX10)	20.2		0.307					1.38	0.41	3.15	0.045	1	EAME	4.8	24-May-22	24-Apr-25	25-Nov-25	20-Mar-27	25.4	2.361	16.3	2058	981
192	(2001 VB76)	20.0		0.338					1.46	0.35	4.24	0.043	0	EAE	6.9	2-Feb-23	17-Jun-26	29-Jan-27	21-Dec-29	26.9	2.259	13.9	1991	980
193	162000 (1990 OS)	19.3		0.475	0.4				1.68	0.46	1.10	0.009	0	EMAE	4.9	10-Sep-22	24-Mar-26	23-May-26	21-Aug-27	24.7	2.430	14.1	2090	975
194	208023 (1999 AQ10)	20.3		0.295			S:		0.93	0.24	6.50	0.006	0	EVAVE	3.7	24-Feb-20	23-Dec-21	21-Feb-22	24-Nov-23	15.8	3.040	12.1	2526	973
195	(2002 TZ66)	25.9		0.023		<1.1			0.93	0.12	8.48	0.005	3	EAE	2.5	8-Oct-20	17-May-21	16-Jul-21	3-Apr-23	21.7	2.658	12.8	2233	970
196	(2008 EQ7)	22.6		0.104					1.41	0.22	5.97	0.134	4	EMAE	7.0	25-Jan-24	12-Jul-28	7-Oct-28	12-Feb-31	8.1	3.552	12.8	2952	969
197	(2009 CR5)	22.1		0.132					1.08	0.26	5.06	0.067	4	EMAE	7.2	7-Jun-20	13-Feb-25	20-Sep-25	20-Aug-27	18.3	2.895	12.3	2400	967
198	175706 (1996 FG3)	18.2		0.794		3.5942	C		1.05	0.35	1.99	0.028	0	EMAVE	7.4	2-Sep-24	16-Nov-28	4-Feb-29	20-Jan-32	20.0	2.803	12.7	2317	962
199	(2006 QQ23)	19.8		0.377					0.80	0.28	3.44	0.033	2	EAE	3.0	27-Aug-24	6-Dec-25	25-Apr-26	25-Aug-27	22.9	2.601	12.4	2174	961
200	155338 (2006 MZ1)	20.4		0.285					1.57	0.48	2.08	0.013	0	EMAE	6.2	8-Sep-20	9-May-22	8-Jul-22	28-Nov-26	17.4	2.979	16.4	2445	960
201	(2002 RQ25)	20.5		0.279					1.11	0.31	4.57	0.050	0	EAME	4.3	8-Apr-23	21-Mar-24	1-Jun-24	20-Jul-27	20.2	2.813	13.1	2307	954
202	(2003 FQ6)	20.8		0.238					1.37	0.13	3.62	0.184	1	EMAME	6.7	27-Sep-22	30-Apr-26	29-Jun-26	10-Jun-29	14.4	3.206	12.4	2597	950
203	11284 Belenus (1990 BA)	17.8		0.945					1.74	0.34	1.99	0.170	0	EAE	6.0	24-Jan-25	13-Jul-27	11-Sep-27	29-Jan-31	20.8	2.794	12.5	2275	947
204	162162 (1999 DB7)	19.6		0.411					1.21	0.19	10.84	0.003	0	EAE	5.0	27-Feb-23	4-Aug-25	3-Oct-25	26-Feb-28	44.3	1.018	12.9	1302	946
205	(2007 FS35)	19.6		0.415					1.92	0.39	0.32	0.156	1	EMAE	6.0	25-Jun-22	20-Apr-26	29-Sep-26	28-Jun-28	18.4	2.970	12.4	2395	943
206	3757 (1982 XB)	19.0	0.18	0.508	0.5	9.0046		S	1.83	0.45	3.87	0.039	0	EAE	4.0	6-Dec-20	14-Nov-22	13-Jan-23	7-Dec-24	24.2	2.573	12.6	2113	942
207	(2004 QD14)	20.6		0.259					0.94	0.34	6.25	0.014	2	EVAVE	4.3	14-Sep-21	9-Aug-23	24-Oct-23	8-Jan-26	15.7	3.149	12.1	2528	941
208	(2002 AT4)	20.9		0.227			D		1.87	0.45	1.51	0.041	0	EAE	7.9	25-Mar-24	25-Jul-27	1-Dec-27	25-Feb-32	18.6	2.975	12.5	2386	938
209	(2007 LA15)	19.5		0.429					1.73	0.38	8.72	0.058	1	EMAE	7.9	1-Oct-24	6-May-29	5-Jul-29	25-Aug-32	17.1	3.076	13.4	2462	938
210	139622 (2001 QQ142)	18.3		0.763			Sq		1.42	0.31	9.31	0.013	0	EAE	5.0	15-Dec-23	12-Nov-26	27-Feb-27	15-Dec-28	50.7	0.472	13.1	1083	934
211	(2006 SF6)	19.9		0.360					0.95	0.28	5.87	0.019	2	EVAE	4.2	28-Aug-24	9-Apr-27	8-Jun-27	8-Nov-28	16.7	3.119	12.6	2482	933
212	(2008 KT)	28.2		0.008					1.02	0.09	1.99	0.000	4	EAE	3.1	14-Nov-20	19-Mar-22	18-May-22	21-Dec-23	5.5	3.850	12.5	3102	927
213	(1999 FA)	20.6		0.259		10.092	S		1.08	0.13	12.03	0.007	0	EAE	3.0	9-Mar-24	26-Dec-25	24-Feb-26	7-Mar-27	33.7	1.951	13.2	1704	924
214	(2002 AA29)	24.1		0.052		<0.55			0.99	0.01	10.75	0.013	0	EAE	4.0	8-Jan-21	23-Sep-22	22-Nov-22	6-Jan-25	31.6	2.142	12.6	1790	914
215	(2000 AC6)	21.0		0.212			Q		0.85	0.29	4.70	0.047	1	EVAE	3.1	7-Dec-21	1-Oct-23	30-Nov-23	10-Jan-25	16.1	3.253	12.9	2512	905
216	85585 Mjolnir (1998 FG2)	21.4		0.177					1.30	0.36	4.08	0.022	0	EAME	7.9	30-Nov-23	31-Mar-27	11-Jul-27	9-Nov-31	22.2	2.869	12.4	2210	898
217	(2008 GE1)	19.5		0.442					1.65	0.25	6.72	0.275	2	EMAME	7.2	5-Dec-22	22-Feb-25	23-Apr-25	3-Feb-30	18.6	3.118	13.0	2384	896
218	(2001 EC16)	22.2		0.123					1.35	0.36	4.71	0.012	2	EMAE	6.9	18-May-24	26-Jun-28	4-Jun-29	26-Mar-31	13.7	3.440	16.0	2637	896
219	(1997 XR2)	20.8		0.235					1.08	0.20	7.17	0.000	0	EAE	3.0	8-Dec-22	25-Jul-24	23-Sep-24	3-Dec-25	21.8	2.908	13.4	2227	894
220	(2000 SD8)	20.8		0.233					1.13	0.31	6.55	0.086	0	EMAE	6.7	26-Jun-22	30-Jan-27	24-May-27	3-Mar-29	18.5	3.159	13.7	2391	887
221	(2006 SU131)	18.7		0.624					1.73	0.40	9.66	0.033	2	EMAE	4.1	9-Jun-20	30-Apr-23	29-Jun-23	9-Jul-24	21.7	2.948	13.8	2234	886
222	(2006 OB5)	20.1		0.325					1.53	0.22	0.71	0.192	0	EAME	7.0	23-Oct-22	16-May-25	15-Jul-25	6-Nov-29	10.8	3.666	12.1	2796	885
223	(2003 LH)	24.9		0.036					0.96	0.15	10.80	0.005	4	EAE	2.5	30-May-20	8-Mar-21	7-Jul-21	30-Nov-22	36.8	1.859	12.5	1578	881
224	(1990 UA)	19.6		0.404	0.4				1.64	0.53	0.93	0.012	0	EMAE	4.0	7-Jun-24	9-Apr-27	8-Jun-27	28-May-28	14.2	3.475	16.7	2610	877
225	162998 (2001 SK162)	17.8		0.933		68	T		1.93	0.47	1.68	0.031	0	EAE	7.9	27-Jan-20	13-May-23	19-Aug-23	6-Jan-28	17.3	3.283	12.5	2451	875
226	85990 (1999 JV6)	19.8		0.368			Xk		1.01	0.31	5.31	0.031	1	EVAVE	5.4	15-Dec-24	1-Nov-27	7-Jan-28	13-May-30	24.5	2.789	12.4	2098	874
227	7350 (1993 VA)	17.3		1.190					1.36	0.39	7.26	0.080	0	EMAE	7.1	9-Jan-25	23-Aug-29	22-Oct-29	3-Feb-32	16.0	3.373	13.3	2514	873
228	(2003 BO35)	20.5		0.271					1.42	0.24	8.48	0.100	1	EMAME	7.1	14-Sep-22	21-May-25	20-Jul-25	8-Oct-29	19.3	3.157	12.2	2350	873

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Departure Date	Return Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Earth Entry Speed [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Return Mass [kg]
229	137799 (1999 YB)	18.4		0.709			Sq		1.32	0.08	6.79	0.216	1	EAME	5.0	19-Apr-20	20-Dec-20	18-Feb-21	28-Apr-25	18.8	3.211	12.3	2375	867
230	68359 (2001 OZ13)	17.8		0.939					1.52	0.17	9.86	0.280	0	EMAE	6.0	15-Dec-23	10-Dec-26	5-Jul-27	31-Dec-29	15.3	3.440	13.0	2551	867
231	(1989 UP)	20.5		0.275	0.3	6.98			1.86	0.47	3.86	0.007	0	EAE	8.0	22-Nov-21	22-Jun-25	21-Aug-25	13-Nov-29	26.9	2.687	12.8	1992	857
232	(2007 BF72)	19.7		0.387					1.43	0.22	4.10	0.135	2	EAE	3.1	25-Sep-23	19-Nov-24	21-Jan-25	13-Nov-26	14.6	3.526	12.1	2587	856
233	(2006 GB)	20.3		0.304					0.96	0.18	10.06	0.011	2	EAE	2.5	28-Mar-23	17-Dec-23	20-Feb-24	26-Sep-25	36.0	2.038	12.8	1610	849
234	85640 (1998 OX4)	21.1		0.211					1.58	0.49	4.51	0.002	0	EMAE	7.8	1-Dec-22	19-Nov-27	24-Jan-28	8-Sep-30	20.7	3.163	17.6	2281	846
235	8014 (1990 MF)	18.7		0.624	0.7				1.75	0.46	1.86	0.017	0	EMAE	7.1	22-Aug-22	30-May-27	7-Nov-27	28-Sep-29	18.0	3.349	14.9	2417	845
236	(2008 AE)	19.6		0.404					1.28	0.13	11.57	0.134	0	EMAE	4.0	1-Feb-24	26-Jan-27	27-Mar-27	2-Feb-28	36.1	2.071	12.9	1607	839
237	(2005 EE)	20.9		0.226					1.13	0.33	6.17	0.018	1	EVAVE	5.1	23-Mar-20	6-Sep-22	16-Jan-23	9-May-25	11.5	3.820	11.7	2759	832
238	4581 Asclepius (1989 FC)	20.4		0.285					1.02	0.36	4.91	0.003	2	EAVE	3.5	9-Oct-20	3-Sep-21	2-Nov-21	8-Apr-24	21.5	3.164	13.3	2244	831
239	(2001 XP88)	20.5		0.270					1.35	0.19	6.75	0.138	1	EMAE	5.8	1-Sep-24	2-Feb-28	21-May-28	1-Jul-30	19.8	3.290	12.0	2326	829
240	187040 (2005 JS108)	19.1		0.514					1.36	0.32	6.04	0.019	1	EMAE	3.8	11-Oct-24	16-Nov-25	28-Mar-26	13-Jul-28	20.3	3.272	12.6	2300	824
241	(2009 KO4)	20.4		0.285					1.53	0.26	6.49	0.144	4	EAE	6.0	7-May-23	11-Sep-26	12-Nov-26	16-May-29	33.2	2.399	13.8	1722	811
242	152560 (1991 BN)	18.9		0.562			Q		1.44	0.40	3.45	0.021	0	EMAE	7.7	11-Oct-24	16-Oct-29	15-Dec-29	12-Jul-32	12.7	3.828	16.1	2694	810
243	(1998 XN17)	22.4		0.113					0.98	0.21	7.25	0.056	2	EVAVE	4.3	23-Dec-19	30-Mar-22	29-May-22	27-Mar-24	15.1	3.663	11.8	2558	810
244	(2006 TD1)	21.0		0.213					1.89	0.36	2.42	0.224	4	EMAE	7.2	2-Oct-22	12-Jan-27	13-Mar-27	4-Dec-29	25.8	2.999	12.5	2038	795
245	(2000 WP19)	22.4		0.114					0.85	0.29	7.68	0.004	2	EVAE	3.9	26-Dec-22	12-Sep-25	19-Jan-26	20-Nov-26	17.6	3.572	13.4	2435	794
246	154007 (2002 BY)	17.8		0.950					1.82	0.35	2.72	0.178	0	EAE	4.0	9-May-20	15-Sep-22	14-Nov-22	29-Apr-24	21.7	3.317	12.6	2234	789
247	(1993 RA)	19.0		0.544					1.92	0.42	5.60	0.171	0	EMAE	6.0	13-Jan-25	5-Jul-28	27-Jun-29	21-Jan-31	16.6	3.659	16.2	2487	789
248	(2002 TY57)	18.9		0.557					1.92	0.33	3.46	0.302	2	EMAE	6.7	1-Jan-22	6-Oct-26	12-Mar-27	6-Sep-28	8.8	4.162	12.2	2910	789
249	(2000 PO30)	19.3		0.465					1.84	0.40	3.58	0.121	3	EAE	4.0	17-Oct-23	23-Sep-25	25-Apr-26	15-Oct-27	20.1	3.427	13.5	2310	788
250	(2006 FJ9)	19.3		0.484					1.75	0.35	4.12	0.150	1	EMAE	7.1	3-Jun-24	13-Aug-29	31-Jan-30	12-Jul-31	14.0	3.843	13.9	2618	784
251	(2000 YF29)	20.2		0.319			S		1.49	0.37	6.30	0.009	0	EAE	1.9	19-Feb-21	6-Aug-21	5-Oct-21	25-Jan-23	23.4	3.224	13.8	2154	783
252	(2007 BS2)	23.3		0.075					1.58	0.29	6.52	0.136	1	EMAE	6.1	16-Dec-21	2-Dec-24	3-Mar-25	13-Jan-28	8.8	4.193	12.4	2907	780
253	(2005 YY36)	19.5		0.431					1.89	0.39	4.61	0.170	2	EMAE	6.9	26-Jan-22	31-Oct-26	6-May-27	31-Dec-28	10.7	4.085	12.7	2802	778
254	48603 (1995 BC2)	17.5		1.107			X		1.92	0.43	5.03	0.138	0	EMAE	5.8	19-Nov-22	10-Oct-26	13-Dec-26	7-Sep-28	18.7	3.564	15.0	2379	778
255	(2002 JR100)	24.3		0.047					0.92	0.30	3.71	0.018	2	EVAVE	6.0	14-Jul-24	16-Sep-27	15-Nov-27	9-Jul-30	12.5	3.971	11.6	2702	777
256	(2007 RN7)	21.5		0.172					1.30	0.11	9.84	0.176	4	EMAE	3.0	21-Aug-20	17-Apr-22	17-Oct-22	26-Aug-23	24.5	3.175	12.4	2101	776
257	5189 (1990 UQ)	17.3		1.190					1.55	0.48	3.58	0.044	0	EVAE	7.8	2-Dec-21	18-Feb-25	4-Nov-25	10-Sep-29	17.4	3.680	14.8	2447	771
258	163679 (2002 XG84)	19.1		0.523					1.49	0.47	5.06	0.072	1	EMAME	7.9	26-Oct-20	27-Aug-25	30-Dec-25	4-Oct-28	20.3	3.481	12.4	2298	771
259	164202 (2004 EW)	20.7		0.244					0.99	0.28	4.66	0.025	0	EAE	3.5	9-Mar-24	12-Aug-25	6-Dec-25	27-Aug-27	26.0	3.108	13.7	2032	766
260	(2006 TC1)	18.9		0.563					1.72	0.38	4.50	0.093	0	EAE	7.0	17-Feb-22	24-Feb-25	7-Aug-25	6-Feb-29	18.1	3.664	12.9	2411	764
261	(2001 BF10)	22.3		0.118		<0.4			1.61	0.44	1.49	0.001	1	EVAE	6.4	22-Oct-21	3-Jan-24	3-Mar-24	28-Mar-28	15.1	3.859	12.5	2559	763
262	3908 Nyx (1980 PA)	17.4	0.23	0.918	1	4.426	V	V	1.93	0.46	2.18	0.058	0	EMAE	8.0	28-Oct-22	29-Mar-26	9-Jul-26	26-Oct-30	16.7	3.766	12.8	2481	761
263	153958 (2002 AM31)	18.1		0.838					1.70	0.45	4.62	0.032	0	EMAE	7.0	2-Aug-20	13-Oct-23	12-Dec-23	14-Aug-27	17.7	3.730	12.6	2429	753
264	163000 (2001 SW169)	18.9		0.580					1.25	0.05	3.55	0.180	0	EMAE	5.9	17-Oct-24	27-Jun-28	4-Nov-28	26-Sep-30	18.5	3.700	12.0	2389	748
265	(2002 GN5)	22.1		0.129					1.60	0.29	6.12	0.140	1	EMAE	6.1	2-Mar-22	22-Oct-26	29-Dec-26	15-Apr-28	9.7	4.279	12.9	2858	746
266	(2009 DN1)	20.2		0.307					1.44	0.29	7.86	0.060	4	EAE	5.0	24-Jun-23	1-May-26	30-Jun-26	25-Jun-28	41.6	2.029	13.0	1396	738
267	99799 (2002 LJ3)	18.1		0.825					1.46	0.28	7.56	0.121	0	EAE	3.0	2-Aug-22	9-Mar-24	8-Oct-24	31-Jul-25	24.1	3.388	14.5	2120	733
268	(2007 EM88)	19.5		0.429					1.65	0.27	3.58	0.223	2	EAME	7.7	30-Nov-23	18-Jan-27	26-Mar-27	22-Aug-31	23.4	3.454	11.9	2153	729
269	(2002 GF1)	20.4		0.292					2.07	0.40	1.82	0.226	0	EMAE	6.0	19-Apr-22	8-Dec-25	18-Jul-26	18-Apr-28	16.0	3.966	12.6	2516	725
270	(2007 TE66)	21.4		0.182					1.06	0.20	10.25	0.159	3	EAE	2.5	2-Apr-22	31-Dec-22	8-Jun-23	8-Oct-24	26.3	3.262	12.3	2016	725
271	(2001 OG25)	19.8		0.372					1.44	0.25	10.69	0.096	0	EMAME	7.0	31-Aug-20	19-Jan-23	26-Sep-23	24-Aug-27	46.8	1.652	13.6	1215	724
272	6239 Minos (1989 QF)	17.9		0.903		3.5558			1.15	0.41	3.94	0.026	0	EMAE	6.8	18-Apr-22	5-Nov-26	30-May-27	8-Feb-29	11.3	4.291	14.9	2768	720
273	7480 Norwan (1994 PC)	17.2		1.246		35.9	S		1.57	0.32	9.45	0.161	0	EMAE	4.7	10-Nov-22	19-Jan-26	20-Jun-26	29-Jul-27	17.6	3.887	13.7	2435	719
274	(2006 CG)	19.0		0.549					1.83	0.34	4.35	0.222	1	EMAE	4.2	16-Jul-20	11-Oct-22	12-Apr-23	5-Oct-24	14.3	4.105	14.2	2604	718
275	7753 (1988 XB)	18.6		0.654			B		1.47	0.48	3.12	0.007	0	EMAVE	7.7	2-Oct-24	4-Jul-29	7-Oct-29	28-May-32	25.7	3.337	12.3	2043	717
276	(2008 JV19)	20.6		0.254					0.99	0.25	7.25	0.042	1	EAE	3.5	11-Aug-22	1-Sep-23	3-Mar-24	12-Feb-26	24.1	3.464	11.9	2119	715
277	(1999 RQ28)	20.4		0.290					1.91	0.42	3.56	0.124	0	EMAE	7.9	17-Oct-24	11-Oct-28	26-Jan-29	15-Sep-32	24.1	3.495	12.5	2119	708
278	136564 (1977 VA)	19.1		0.529	0.4			XC	1.87	0.39	2.98	0.138	0	EAE	4.0	1-Nov-21	12-Dec-23	10-Feb-24	26-Oct-25	24.0	3.519	12.7	2122	703
279	(2001 VB2)	18.7		0.618					1.72	0.40	7.94	0.079	1	EMAME	8.0	21-Oct-20	20-Jul-25	18-Sep-25	3-Oct-28	23.0	3.591	12.5	2170	703
280	5797 Bivoi (1980 AA)	19.1		0.519	0.4	2.706			1.89	0.44	4.19	0.072	0	EAE	6.0	20-Jan-20	25-Aug-21	19-Dec-21	12-Jan-26	18.8	3.900	12.9	2373	698
281	(2002 EX11)	20.4		0.290					1.89	0.41	2.51	0.131	3	EAE	3.9	15-Mar-21	15-Mar-23	19-May-23	21-Feb-25	20.3	3.805	13.0	2299	697
282	(2003 YR70)	19.9		0.357					1.90	0.43	2.66	0.094	1	EAE	5.9	24-Mar-21	1-Nov-24	30-Apr-25	8-Feb-27	24.4	3.536	12.5	2105	694
283	(1999 XX262)	17.6		1.059					1.53	0.18	8.23	0.311	0	EMAME	6.8	2-Nov-24	22-Nov-28	24-Mar-29	24-Aug-31	18.4	3.950	12.6	2395	693
284	(2008 ER)	21.3		0.187					1.21	0.26	9.41	0.091	3	EAME	5.0	12-Aug-24	15-Aug-25	2-Dec-25	28-Jul-29	36.3	2.666	12.6	1600	693
285	(2006 QQ56)	25.9		0.023					0.99	0.05	2.80	0.015	4	EVAE	4.2	15-Dec-22	29-Jun-24	23-Nov-24	27-Feb-27	9.5	4.549	11.6	2867	688
286	(2004 XK4)	20.9		0.226					1.83	0.35	8.45	0.231	0	EMAE	7.0	12-Dec-19	23-Nov-24	5-Aug-25	2-Dec-26	10.0	4.527	14.6	2842	686
287	(2008 UE7)	20.4		0.287					1.65	0.45	3.95	0.009	2	EAE	4.2	4-Jan-24	22-Jan-26	7-Sep-26	16-Mar-28	38.4	2.535	14.3	1519	685
288	141424 (2002 CD)	20.3		0.292					0.98	0.18	6.88	0.073	1	EAE	3.5	26-Sep-24	24-Aug-26	6-Nov-26	28-Mar-28	28.5	3.317	11.8	1920	678
289	22099 (2000 EX106)	18.0		0.862		6.334	S:		1.10	0.28	9.84	0.168	0	EMAE	6.0	28-Jul-22	1-Apr-27	6-Aug-27	7-Aug-28	24.9	3.580	13.1	2082	677
290	39565 (1992 SL)	17.9		0.887					1.64	0.33	8.60	0.093	0	EMAE	4.9	13-Oct-24	21-Jan-26	16-Aug-26	20-Sep-29	20.8	3.868	13.7	2279	677
291	(2008 TO2)	20.9		0.231					1.84	0.42	3.88	0.103	4	EAE	7.8	23-Jan-23	29-Apr-26	9-Feb-27	9-Nov-30	18.3	4.041	14.5	2399	675
292	(2002 XP40)	19.8		0.375					1.65	0.30	3.77	0.184	1	EAE	2.2	17-Jan-22	16-Jun-22	11-Jan-23	21-Mar-24	16.2	4.206	13.3	2505	669
293	(2000 QW7)	19.4		0.442		71.3			1.95	0.47	4.16	0.030	0	EAE	6.0	18-Sep-20	27-Apr-22	18-Jul-22	1-Sep-26	20.9	3.897	12.6	2272	669
294	(2008 JE)	25.8		0.023					0.98	0.09	6.97	0.032	4	EVAE	4.4	26-May-23	11-Jan-25	19-Jul-25	1-Nov-27	12.1	4.482	11.9	2724	667
295	(2007 FY20)	24.8		0.038					1.46	0.39	5.38	0.001	4	EMAE	6.1	4-Jun-24	9-Aug-28	4-Jan-29	7-Jul-30	14.2	4.363	13.1	2610	664
296	2368 Beltrovata (1977 RA)	15.2	0.27	2.322	2.3	5.9		SQ	2.10	0.41	5.24	0.232	0	EMAE	5.8	13-Oct-22	31-May-26	4-Nov-26	14-Jul-28	15.8	4.260	12.7	2525	663
297	17511 (1992 QN)	17.1		1.305		5.9902	X		1.19	0.36	9.59	0.132	0	EMAE	5.9	16-Apr-24	27-Dec-27	10-Mar-28	16-Mar-30	12.5	4.485	12.9	2704	662
298	171819 (2001 FZ6)	18.3		0.758					1.50	0.17	9.95	0.281	0	EMAE	5.2	13-Aug-20	30-Oct-24	24-Feb-25	10-Oct-25	17.3	4.186	13.4	2451	659
299	(2004 EO20)	22.0		0.137					1.22	0.06	4.54	0.161	2	EMAE	4.0	22-Sep-24	10-Aug-26	8-Nov-26	15-Sep-28	20.8	3.955	12.5	2277	658
300	(2005 QA5)	21.3		0.192					1.39	0.21	6.80	0.150	4	EMAE	6.8	16-Sep-22	11-Feb-27	12-Apr-27	25-Jun-29	25.6	3.625	12.6	2048	657
301	(2004 JX20)	19.4		0.462					0.90	0.27	10.53	0.095	0	EVAVE	6.2	23-Mar-21	6-Jun-24	20-Nov-24	21-May-27	24.3	3.764	11.7	2109	648
302	(2007 CN26)	21.1		0.212					1.29	0.27	7.57	0.002	2	EMAE	5.1	1-Jul-20	24-Feb-24	24-Apr-24	24-Aug-25	19.5	4.092	12.7	2338	648
303	(2009 BA71)	20.7		0.249					1.64	0.26	3.85	0.231	2	EAE	5.0	30-Jan-20	18-Jan-22	19-Mar-22	1-Feb-25	17.1	4.279	12.0	2462	643
304	(1999 AJ39)	21.7		0.154					1.16	0.28	10.09	0.163	0	EMAE	5.9	4-Sep-22	5-Mar-26	27-Aug-26	20-Jul-28	20.3	4.086	12.8	2303	639

Traj. ID	Name	Absolute Magnitude	Albedo	Diameter Est. [km]	Known Diameter [km]	Rotational Period [hr]	Spectral Type (SMASSII)	Spectral Type (Tholen)	Orbit SMA [AU]	Orbit Ecc.	Orbit Inc. [deg]	MOID [AU]	Orbit Condition Code	Path	TOF [yrs]	Launch Date	Arrival Date	Departure Date	Return Date	Launch C3 [km^2/s^2]	Total DV [km/s]	Earth Entry Speed [km/s]	Launch Mass [kg]: Atlas V (401)	S/C Return Mass [kg]
305	(2006 HR29)	20.6		0.256					0.99	0.26	9.54	0.094	1	EVAE	3.6	26-Mar-20	17-Dec-21	15-Feb-22	15-Nov-23	10.6	4.721	12.5	2808	638
306	(2008 RT26)	19.4		0.463					2.25	0.46	2.23	0.222	4	EMAE	6.9	13-Nov-20	3-Oct-25	2-Dec-25	2-Oct-27	21.1	4.034	12.5	2262	638
307	(2005 GW119)	18.5		0.683					1.64	0.23	2.88	0.274	1	EAE	5.0	30-Sep-23	30-Oct-25	29-Dec-25	13-Sep-28	16.0	4.393	12.4	2517	634
308	163364 (2002 OD20)	18.8		0.597					1.36	0.37	4.17	0.026	0	EAE	5.0	9-Apr-24	15-May-26	14-Jul-26	16-Apr-29	22.3	3.978	12.4	2204	633
309	(2007 PS9)	23.5		0.068					1.07	0.08	8.70	0.036	3	EAME	6.1	3-Feb-24	8-Nov-25	7-Jan-26	24-Feb-30	16.9	4.347	11.5	2471	632
310	(2001 SG286)	20.8		0.237			D		1.36	0.35	7.77	0.005	0	EMAME	5.0	25-Jul-20	6-Mar-21	5-May-21	4-Aug-25	18.7	4.230	12.3	2380	631
311	159467 (2000 QK25)	18.2		0.795					1.81	0.28	6.14	0.316	0	EMAE	5.9	11-Sep-22	23-Jan-25	30-Jul-25	13-Aug-28	23.5	3.904	12.6	2148	631
312	164221 (2004 QE20)	20.1		0.330					1.51	0.21	6.48	0.220	1	EMAE	6.8	20-Aug-22	17-Dec-26	15-Feb-27	24-Jun-29	22.5	4.013	12.2	2197	624
313	(2001 TP103)	19.6		0.421					1.80	0.36	4.74	0.187	2	EAE	5.9	5-Dec-21	27-Feb-24	6-Jul-24	9-Nov-27	23.6	3.934	14.5	2141	623
314	(2001 FR85)	24.5		0.043					0.98	0.03	5.24	0.002	3	EVAE	5.5	19-Mar-21	18-Sep-23	1-Apr-24	26-Sep-26	13.7	4.601	12.1	2636	622
315	(2001 OX13)	19.1		0.525					2.38	0.46	4.18	0.283	1	EMAME	7.3	24-Jul-20	2-Jun-23	3-Nov-23	18-Nov-27	23.3	3.966	13.2	2159	622
316	154991 Vinciguerra (2005 BX26)	18.4		0.702					1.71	0.32	5.64	0.197	0	EMAE	7.1	25-Feb-22	22-Mar-27	27-Jan-28	16-Apr-29	21.3	4.147	15.4	2251	613
317	53550 (2000 BF19)	18.9		0.582					1.50	0.42	7.17	0.046	0	EAE	6.1	14-Jul-22	29-Oct-25	8-Feb-26	9-Aug-28	34.7	3.250	15.7	1664	600
318	(1998 OO52)	20.8		0.235					2.11	0.46	4.82	0.158	0	EMAE	7.1	19-Jul-20	21-Dec-22	8-Jul-23	26-Aug-27	30.0	3.599	14.9	1856	600
319	175189 (2005 EC224)	18.2		0.794					2.06	0.39	2.62	0.251	2	EMAE	6.0	10-May-22	7-Mar-26	10-Sep-26	27-Apr-28	17.0	4.672	12.3	2467	570
320	(2001 RB12)	20.6		0.265					1.05	0.38	6.62	0.067	3	EMAE	5.0	19-Feb-24	15-Feb-28	24-Apr-28	26-Feb-29	9.6	5.144	12.1	2860	569
321	(2002 DU3)	20.6		0.256			Sq		1.15	0.24	8.70	0.007	1	EAE	2.5	25-Sep-21	5-Apr-23	4-Jun-23	18-Mar-24	23.1	4.301	13.0	2167	562
322	(1999 SO5)	20.8		0.234					1.09	0.07	13.37	0.015	0	EAE	4.0	6-Apr-24	20-Apr-26	19-Jun-26	5-Apr-28	46.6	2.503	13.1	1220	556
323	163692 (2003 CY18)	18.0		0.861					1.53	0.41	7.20	0.092	0	EMAE	4.0	30-Jun-20	18-Apr-23	17-Jun-23	16-Jul-24	22.4	4.388	12.9	2202	556
324	164215 Doloreshill (2004 MF6)	19.9		0.354					2.11	0.40	4.88	0.277	0	EMAE	6.9	23-Jul-20	13-Oct-22	16-Jun-23	23-Jun-27	23.9	4.288	12.7	2130	555
325	(2000 EF104)	18.9		0.577					1.15	0.42	10.82	0.176	0	EVAE	4.7	3-Mar-20	13-Jul-22	11-Sep-22	28-Nov-24	21.1	4.484	13.2	2261	554
326	(2002 LE27)	19.3		0.480					2.18	0.45	3.10	0.188	1	EMAE	6.0	28-Jun-24	2-May-28	5-Sep-28	27-Jun-30	15.9	4.842	12.5	2520	551
327	172974 (2005 YW55)	19.3		0.474					1.64	0.25	8.47	0.294	0	EMAE	5.9	23-Dec-21	8-Feb-25	24-Apr-25	22-Nov-27	8.4	5.371	13.1	2931	543
328	(2004 RQ10)	20.9		0.230					1.86	0.44	5.69	0.033	2	EAE	7.0	1-Sep-21	2-Dec-24	22-Feb-25	25-Aug-28	25.7	4.286	12.8	2042	532
329	(2004 QZ2)	18.0		0.864					2.26	0.50	0.97	0.155	0	EMAE	5.9	26-Dec-24	5-Sep-28	3-Dec-28	6-Nov-30	15.4	5.000	12.4	2543	530
330	138947 (2001 BA40)	18.6		0.661					1.12	0.25	12.84	0.181	0	EAME	4.0	18-Jun-21	1-Apr-22	8-Jul-22	22-Jun-25	38.2	3.460	13.2	1524	515
331	(2007 OG3)	18.3		0.751					2.16	0.48	1.69	0.123	4	EMAE	6.0	22-Aug-22	13-Sep-26	19-Nov-26	13-Aug-28	22.0	4.660	12.2	2220	515
332	(2000 BH19)	19.4		0.460					2.03	0.46	1.32	0.122	0	EAE	3.9	19-Feb-24	27-Oct-25	5-Apr-26	12-Jan-28	24.7	4.493	12.3	2090	510
333	164214 (2004 LZ11)	18.9		0.567					2.12	0.39	5.47	0.291	0	EMAE	5.7	15-Sep-22	6-Apr-26	28-Oct-26	2-Jun-28	13.9	5.248	14.9	2627	506
334	(2001 YX11)	20.0		0.336					1.75	0.39	5.47	0.110	0	EAE	4.0	14-Feb-21	1-Apr-23	31-May-23	26-Feb-25	22.2	4.738	12.6	2208	499
335	(2003 YP17)	18.9		0.571					2.00	0.49	4.90	0.051	1	EAE	7.9	23-Mar-20	29-Nov-23	13-Mar-24	18-Feb-28	26.7	4.458	12.8	1999	494
336	189700 (2001 TA45)	18.9		0.568					1.46	0.19	10.72	0.220	0	EAME	6.0	10-Oct-21	1-Mar-24	30-Apr-24	11-Oct-27	31.7	4.141	12.9	1786	487
337	(2009 BC58)	18.9		0.579					2.30	0.48	1.86	0.199	2	EMAE	7.0	15-Oct-24	31-Jul-29	21-Nov-29	4-Oct-31	26.0	4.684	12.4	2032	467
338	27002 (1998 DV9)	18.2		0.786					1.74	0.43	8.70	0.003	0	EAE	5.0	3-Feb-24	16-Sep-25	15-Nov-25	31-Jan-29	37.4	3.882	12.8	1555	460
339	(1993 TQ2)	19.9		0.360			Sa		1.99	0.42	6.04	0.202	0	EMAE	6.9	11-Jan-20	9-Oct-24	6-Feb-25	24-Nov-26	13.8	5.619	12.4	2630	451
340	(2000 OK8)	19.8		0.368					0.98	0.22	9.98	0.136	1	EAE	3.6	10-Jan-24	25-Jan-26	5-Apr-26	4-Aug-27	23.4	5.110	12.5	2151	433
341	(2008 BC22)	19.6		0.408					2.19	0.45	3.90	0.210	4	EMAE	8.0	9-Apr-24	24-Sep-27	2-Mar-28	27-Mar-32	15.4	5.673	12.6	2544	429
342	7358 Oze (1995 YA3)	14.4		4.524		5.488	Sq		2.20	0.50	4.66	0.123	0	EMAE	7.8	3-Oct-24	6-Feb-28	9-May-28	2-Aug-32	17.3	5.584	13.3	2451	425
343	90373 (2003 SZ219)	18.5		0.679					1.63	0.20	9.87	0.318	0	EMAE	5.0	2-Oct-22	21-Oct-24	13-Jan-25	3-Oct-27	41.5	3.813	12.9	1400	423
344	(2003 UC20)	18.1		0.816					0.78	0.34	3.79	0.034	0	EAE	2.9	1-Nov-23	5-Jan-25	1-Jun-25	30-Sep-26	44.9	3.662	13.0	1277	405
345	(2004 XM35)	19.6		0.418					1.84	0.30	5.35	0.308	0	EMAE	7.2	15-Nov-24	17-Mar-29	16-May-29	10-Jan-32	14.2	7.369	12.5	2611	259