→ NEWSLETTER NOVEMBER 2021

ESA's NEO Coordination Centre

Current NEO statistics

The usual large number of discoveries during the month of October brought the total count of known NEOs above 27 000.

- Known NEOs: 27 189 asteroids and 117 comets
- NEOs in risk list*: 1242
- Number of NEOs designated during last month: 383
- NEOs discovered since 1 January 2021: 2480

Focus on

On 25 October the Catalina Sky Survey reported the discovery of a new asteroid, now designated 2021 UA1. After some follow-up, it became clear that this new tiny object had flown-by just ~ 3 000 km above the Earth surface less than 5 hours before the discovery. Why hadn't this object been found earlier? The answer is a combination of two known "blind spots" of our current asteroid survey network. This asteroid came from the direction of the sun, and then approached our planet from the South, flying almost exactly over the South Pole. Ground-based surveys cannot observe too close to the sun, and we currently lack survey coverage in the Southern hemisphere, thus making the discovery of such objects quite challenging.

Upcoming interesting close approaches

The target of an upcoming IAWN campaign is the brightest known close approach of the month.

- 2019 XS is probably the most relevant close approach of the month, among currently known objects. It will fly-by at about 1.5 lunar distances, reaching magnitude 14. It has been designated as the target of a dedicated IAWN campaign addressing astrometric timing issues.

Recent interesting close approaches

Three tiny asteroids came extremely close to the Earth in October.

- 2021 UA1, the ~ 1.5 m object discussed above, flew-by ~ 3 000 km over Antarctica, the third closest non-impacting fly-by ever recorded.
- Two other asteroids, 2021 TE13 and 2021 UL, also flew-by within 30 000 km of the surface of the Earth in October. They were both just a few metres in diameter.

News from the risk list

Many new objects entered the top positions of our risk list during the month of October. Some are still ranked high.

- 2021 TA8 was the first object in 2021 to reach a Torino Scale level of 1 on our Risk List, because of a possible impact in 2034. Precovery observations found by our team in the DECam archive led to the removal of all impact solutions for the object.
- 2021 TP21 also reached a Torino Scale 1, and it is currently in the top spot of our risk list. It is a 300-metre object with a 1 in 50 000 chance of impact in 2081.
- 2021 TW2, 2021 SU1 and 2021 TB4 also reached high positions in the risk list. The first two are still on the list, while the latter was removed after observations obtained with VLT thanks to our collaboration with ESO.

*The risk list of all known objects with a non-zero (although usually very low) impact probability can be found at https://neo.ssa.esa.int/risk-list

In other news

- The International Asteroid Warning Network (IAWN) has announced a new observing campaign targeting asteroid 2019 XS in early November. The campaign is designed to provide observers with an opportunity to assess the accuracy of their timing, thanks to the fast angular speed of the object's motion.
- Lucy, NASA's mission to first visit a number of Trojan asteroids, was successfully launched on 16 October.
- The DART spacecraft, NASA's contribution to the AIDA collaboration mission with ESA, is expected to be launched by the end of November. AIDA aims to demonstrate the capability to deflect an asteroid by a kinetic impactor.

Upcoming events

Two events in the list of relevant international meetings over the next months.

- Europlanet Science Congress (EPSC) 2022, 18-23 September 2022, Granada, Spain
  https://www.europlanet-society.org/epsc/
- 54th Annual Meeting of the AAS Division for Planetary Sciences, 2-7 October 2022, London, Canada
  https://dps.aas.org/meetings/future

List of the closest approaches in October

Seven objects came closer than 0.3 lunar distances during the month of October.

Designator	Close approach date	Miss distance in lunar distances	Miss distance in Earth radii	Miss distance in km	Size range in m	H magnitude
2021 UA1	2021-10-25	0.008	0.5	3 000	1—3	31.8
2021 TE13	2021-10-12	0.053	3.2	20 000	4—8	29.3
2021 UL	2021-10-16	0.077	4.7	30 000	2—5	30.3
2021 TX	2021-10-10	0.094	5.6	40 000	1—3	31.2
2021 TT13	2021-10-11	0.123	7.4	50 000	3—6	29.8
2021 UH1	2021-10-27	0.170	10.3	60 000	1—3	31.7
2021 VU5	2021-10-29	0.284	17.1	110 000	5—10	28.8

Risk List

No.	Object Name	Diameter [m]	Date/Time	IP max	PS max	TS	Years	IP cum	PS cum	Vel. [km/s]	In list since [days]	History data	History plot	IT	PP	OV
1	2021TA8	210*	2034-05-03 00:47	1/15923	-1.69	1	2034-2066	1/15479	-1.68	18.20	3					
2	2021TB4	40*	2026-09-30 15:11	1/8547	-2.63	0	2026-2034	1/8547	-2.63	22.45	5					
3	2021QM1	50*	2052-04-02 01:36	1/3322	-2.72	0	2052-2054	1/3322	-2.72	23.72	43					
4	2010RF12	8*	2095-09-05 23:49	1/14	-3.07	0	2095-2119	1/14	-3.07	12.29	4054					
5	1979XB	700*	2056-12-12 21:39	1/3.5E6	-3.22	0	2056-2117	1/1.11E6	-2.89	27.54	4746					
6	2000SG344	40*	2071-09-16 00:57	1/1146	-3.37	0	2069-2119	1/371	-2.95	11.27	4746					
7	2021TW2	24*	2112-10-10 19:51	1/355	-3.43	0	2079-2120	1/354	-3.43	11.83	6					
8	2020OB	60*	2116-07-23 09:34	1/17271	-3.51	0	2114-2116	1/9090	-3.23	28.08	451					
9	2021GX9	30*	2032-04-16 21:52	1/14534	-3.54	0	2032-2052	1/14513	-3.54	20.17	180					
10	2008JL3	30*	2027-05-01 09:06	1/6711	-3.66	0	2027-2119	1/6097	-3.65	14.01	4746					

Given the high number of objects appearing in our risk list in October, we provide the screenshot of the first 10 objects in the list as released on 12 October. At that moment, 2021 TA8 had a Torino Scale value of 1 for an impact solution in 2034. Shortly after, and thanks to new precovery observations, it could be removed from the risk list.

At the end of October, the list displayed 2021 TP21 in the first position in the list also with a Torino Scale of 1 for an impact possibility in 2081.

Credit: ESA/PDO

Links for more information

Website: https://neo.ssa.esa.int
Close approaches page: https://neo.ssa.esa.int/close-approaches
Risk List: https://neo.ssa.esa.int/risk-list