

ESA's NEO Coordination Centre

Current NEO statistics

The total number of discoveries in 2022 is approaching 3000, very close to the average annual rate of discoveries of the past couple of years.

- Known NEOs: 30 744 asteroids and 118 comets
- NEOs in risk list*: 1477
- NEOs designated during last month: 341
- NEOs discovered since 1 January 2022: 2923

Focus on

The current year has been the first during which two impacting objects have been discovered. Following the impact of 2022 EB5 in March, during the morning UT hours of 19 November, the Catalina Sky Survey found a new likely impactor. The follow-up system worked again very well, and observers in North America were able to quickly collect dozens of accurate observations. This dataset allowed the impact monitoring systems to pinpoint the incoming trajectory and the impact location (the Great Lakes area of North America) in near real-time and to an exquisite level of accuracy. The impact happened less than 4 hours after the discovery observations: together with the advance warning of just 2 hours for 2022 EB5, both events show that the community of NEO follow-up stations is capable of obtaining excellent astrometric coverage on a timescale of hours. The object, now designated 2022 WJ1, is likely the smallest asteroid ever discovered in space. Its absolute magnitude of 33.6 implies a diameter of less than a meter, and thus the impact did not cause any damage and only produced a bright fireball, recorded by many videos and images.

Upcoming interesting close approaches

Only two moderately distant approaches are expected in December, among the asteroids known at the beginning of the month.

- 2015 RN35 and 2010 XC15 are two asteroids, of about 80 and 180 metres respectively, which will come as close as 2 lunar distances during the month of December, reaching magnitude 13.

Recent interesting close approaches

In addition to the impactor, two other small asteroids came close to the Earth within a day of each other, at the end of November.

- 2022 WN9 came to about 50 000 km from the Earth's centre on 27 November. Its estimated diameter is about 4 metres.
- 2022 WM7 is another similarly-sized asteroid that came to about 80 000 km just one day later.

News from the risk list

A new Torino Scale 1 object entered and left the risk list in November.

- 2022 UE28 was a new entry in our risk list, reaching the top position and a Torino Scale rating of 1 for a few days. Subsequent observations, including some obtained by our team with ESA's OGS telescope in Tenerife, led to the removal of all impact solutions for this asteroid.

*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

- Dozens of observatories worldwide reported observations of 2005 LW₃ during its fly-by, contributing to the campaign organised by IAWN to characterise timing biases and uncertainties. Our team used about 15 telescopes in our network to provide data to the campaign. Results are expected over the next few months.

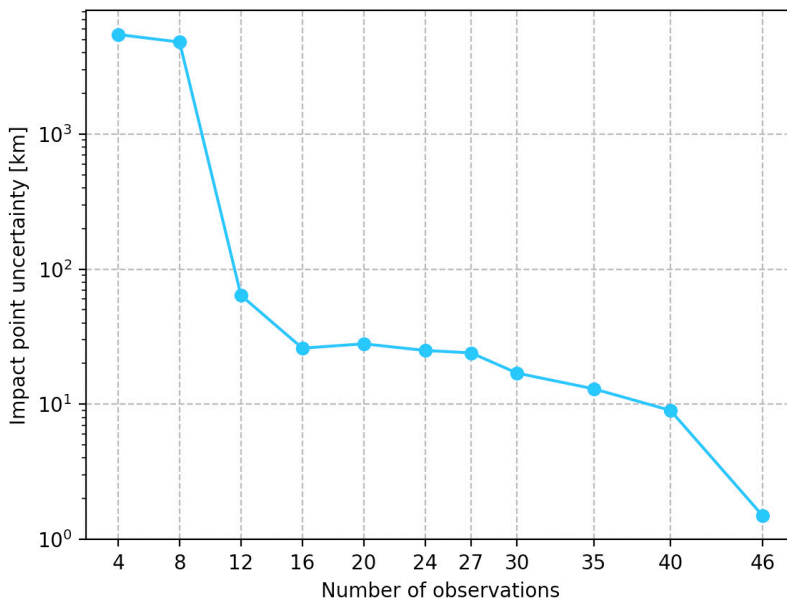
Upcoming events

- EC-ESA Workshop on NEO Imminent Impactors Warning Coordination, 12-14 December 2022, Darmstadt, Germany <https://indico.esa.int/event/422/>
- 2nd ESA NEO and Debris Detection Conference, 24-26 January 2023, Darmstadt, Germany <https://neo-sst-conference.sdo.esoc.esa.int/>
- 8th IAA Planetary Defense Conference, 3-7 April 2023, Vienna, Austria <https://iaaspace.org/event/8th-iaa-planetary-defense-conference-2023/>
- Asteroids, Comets, Meteors Conference, 18-23 June 2023, Flagstaff, USA <https://www.hou.usra.edu/meetings/acm2023/>

List of past impactors

Below is the list of the only six asteroids that have been detected before their impact with the Earth, including 2022 WJ₁, the second one impacted this year.

Object name	Impact time in UT	Time between discovery and impact in hours	Impact latitude in deg	Impact longitude in deg	Size range in m	H magnitude	Expected energy in kt of TNT equivalent	Discovery site
2022 WJ ₁	2022-11-19 08:27	4	43 N	79 W	0.5–1	33.6	0.009	Mt. Lemmon Survey
2022 EB ₅	2022-03-11 21:22	2	70 N	8 W	1–3	31.4	0.3	GINOP-KHK, Piszkesteto
2019 MO	~ 2019-06-22 21:30	~ 13	~ 15 N	~ 70 W	4–8	29.3	3.8	ATLAS-MLO, Mauna Loa
2018 LA	2018-06-02 16:44	8	21 S	24 E	2–5	30.5	0.9	Mt. Lemmon Survey
2014 AA	~ 2014-01-02 02:30	~ 22	~ 13 N	~ 30 W	2–4	30.9	0.2	Mt. Lemmon Survey
2008 TC ₃	2008-10-07 02:45	20	21 N	31 E	4	30.3	0.7	Mt. Lemmon Survey



Plot showing the uncertainty in the localisation of the impact point of 2022 WJ₁, as a function of the number of available observations at the time of the computation. The uncertainty is measured as the distance between the easternmost and westernmost points computed by our system.

The logarithmic vertical scale clearly shows how the uncertainty went from thousands of kilometres at the time of discovery, to mere kilometers after some follow-up. At that level of uncertainty, the actual location of the impact point is dominated by atmospheric effects upon entry, and therefore no further meaningful improvement can be obtained from astrometry only.

[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>

neo.ssa.esa.int

To subscribe to this newsletter fill the form at <https://neo.ssa.esa.int/subscribe-to-services>

To unsubscribe or for any further information please send an email to neocc@esa.int

