

## → NEWSLETTER MARCH 2025

### ESA's NEO Coordination Centre

#### Current NEO statistics

We had a February unusually rich of discoveries, with almost 500 new NEOs added to the catalogue.

- Known NEOs: 37 793 asteroids and 123 comets
- NEOs in risk list\*: 1757
- NEOs designated during last month: 491
- NEOs discovered since 1 January 2025: 657

#### Focus on

The impact probability for 2024 YR4, the highlight of the last issue of the newsletter, has now been effectively reduced to zero thanks to new observations. Nevertheless, we can take advantage of what happened to highlight two important points of planetary defence.

The first interesting element is that we currently know less than 20 000 objects with a size range comparable to 2024 YR4, but our population models tell us that there are roughly half a million out there waiting to be discovered. This directly highlights the need for more discovery surveys, like the upcoming ESA Flyeye telescope and the NEOMIR mission currently under consideration. Both instruments are specifically designed to discover objects in this size range.

The second point is somewhat connected: 2024 YR4 reached a peak value in the Palermo Scale of -0.2. A value of zero roughly indicates that an object represents a risk comparable to the background one, between now and the time of impact (2032 in the case of 2024 YR4). Therefore, the case of 2024 YR4 was not so unusual, an object of its size is expected to hit Earth every few centuries, as it happened in Tunguska just a century ago, and it is therefore something we should be prepared for.

#### Upcoming interesting close approaches

None of the objects known in early March will come closer than the distance of the Moon this month.

#### Recent interesting close approaches

A few very small asteroids were discovered around their closest approach last month.

- 2025 DW, 2025 CF, 2025 DK1, 2025 DS1 and 2025 DZ2 are all objects discovered in February that came close to the Earth during the same month. Their closest distances were all between 0.3 and 0.5 lunar distances, and they were all smaller than 10 metres in diameter.

#### News from the risk list

The highest-rated object of the last two decades has now dropped to negligible impact probability.

- 2024 YR4, the highlight of the last few months, has now dropped to negligible impact probability levels thanks to continued observations by various professional follow-up facilities during the month of February. However, a non-negligible probability of impact with the Moon, roughly at the 1% level, still remains as of early March.

\*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

- ESA's Hera mission will perform its scheduled swing-by with Mars and Deimos on 12 March 2025.

## Upcoming events

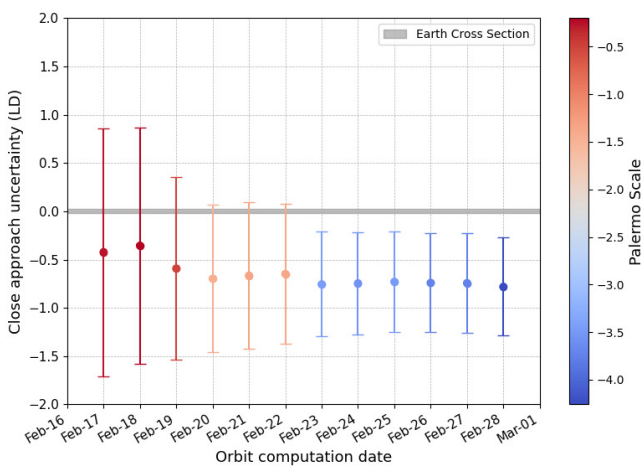
- Apophis T-4 Years: Knowledge Opportunity for the Science of Planetary Defense, 9–10 April, 2025, Tokyo, Japan <https://www.hou.usra.edu/meetings/apophis2025>
- 9<sup>th</sup> IAA Planetary Defense Conference, 5-9 May 2025, Stellenbosch, South Africa <https://iaaspace.org/event/9th-iaa-planetary-defense-conference-2025/>
- Meteoroids 2025, 7-11 July 2025, Perth, Australia <https://meteoroids2025.gfo.rocks>
- Europlanet Science Congress (EPSC) 2025 (joint meeting with the 57<sup>th</sup> Annual Meeting of the AAS Division for Planetary Sciences), 7-12 September 2025, Helsinki, Finland <https://www.epsc-dps2025.eu/>

## Highest-rated historical objects in the risk list

This table presents the same data as the one we published last month, with all objects that reached a Palermo Scale value higher than -0.50 since the definition of the scale 25 years ago. However, this new version includes the peak position reached by 2024 YR4 in February, highlighting how it gained the highest rating of any objects in the past two decades.

Object name	Palermo Scale	Torino Scale	Impact date	Computation date	Currently in risk list
(99942) Apophis	+1.07	4	2029-04-13	2004-12-27	no
(89959) 2002 NT7	+0.18	1	2019-02-01	2002-07-22	no
(29075) 1950 DA	+0.17	Not defined*	2880-03-16	2002-04-05	yes
2024 YR4	-0.20	3	2032-12-22	2025-02-18	yes
(144898) 2004 VD17	-0.23	2	2102-05-02	2006-04-05	no
2011 SM68	-0.29	1	2016-10-17	2011-09-30	no
(410777) 2009 FD	-0.43	Not defined*	2185-03-29	2014-05-30	no
(523662) 2012 MU2	-0.47	1	2015-06-01	2012-06-24	no

\*TS is not defined for impacts that would occur more than 100 years in the future.



The figure shows how our knowledge of 2024 YR4's 2032 approach distance and uncertainty evolved with data available up to a specific day in February. The vertical axis represents Earth's position, while the error bars indicate the 3-sigma (or about 99.7%) uncertainty in lunar distances.

Around 19 February, new observations improved the orbital solution, significantly reducing uncertainty and shifting the possible impact toward the edge of the error bars. Later observations confirmed this trend, and now the Earth location falls entirely outside the error bars.

[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](https://neo.ssa.esa.int)

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

