→ NEWSLETTER JANUARY 2022

ESA's NEO Coordination Centre

Current NEO statistics

For the first time ever, in 2021, more than 3000 new NEAs have been added to the list in a year.

- Known NEOs: 27 764 asteroids and 117 comets
- NEOs in risk list*: 1309
- Number of NEOs designated during last month: 198
- NEOs discovered since 1 January 2021: 3087

Focus on

The appearance of comet C/2021 A1 (Leonard) in our skies has triggered significant media attention, as typically happens with comets observable around Christmas. This is likely a consequence of the common identification of the biblical "Star of Bethlehem" with a cometary object. There is however no convincing evidence that a comet ever appeared in the skies at the appropriate historical time. Astronomical explanations of the biblical event have been brought forward by many scholars in the past, including Kepler himself, who claimed that the "star" corresponded to a Jupiter/Saturn conjunction. Others have theorised the appearance of a particularly bright nova, or a supernova, but this event is unlikely since it should have been recorded in East Asian records of the time, which were typically quite accurate. The identification with an actual comet is seen as unlikely by most scholars, since comets were interpreted as bringers of bad omens in ancient times; it is probably a later reinterpretation, perhaps due to the famous Italian painter Giotto, who probably saw comet 1P/Halley in 1301 and was therefore inspired to paint the "star of Bethelem" as a comet in his fresco in the Scrovegni Chapel, in Padua.

Upcoming interesting close approaches

A large NEO will reach magnitude 10 this month.

- (7482) 1994 PC1 is the most relevant of the known close approaches in the month of January. It is a kilometre-sized NEO, and it will reach a minimum separation of 5 lunar distances from our planet on 18 January. While at its closest, it is expected to reach magnitude 10, a possible visual target for moderate-sized amateur telescopes.

Recent interesting close approaches

The brightest close approachers of December were two large but distant objects.

- (4660) Nereus and (163899) 2003 SD220 are two large NEOs that had very distant approaches in December. Neither came closer than 10 lunar distances, but thanks to their significant size they became brighter than magnitude 14 at the time of their closest approach.

News from the risk list

There were no new high-rated additions to the risk list in December.

- The highest-rated new addition to the risk list is 2020 YR, a small NEO of about 25 metres that has possible Earth impacts from 2050 onward, but with an overall probability of just 1 in 20 000.

*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 James Webb Space Telescope was successfully launched on 25 December. The spacecraft is currently on its way to its operational orbit around L2, one of the Lagrange points in the Earth-Sun system.

Upcoming events

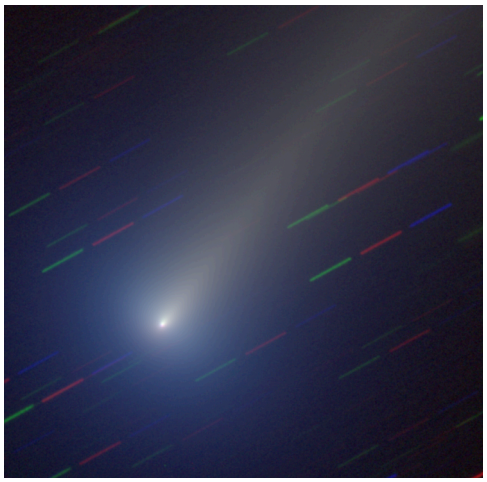
Four events are in the list of relevant international meetings in the coming months.

- Apophis T-7 Years: Knowledge Opportunities for the Science of Planetary Defense, 11-13 May 2022, Virtual
  https://www.hou.usra.edu/meetings/apophis2022
- 53rd Lunar and Planetary Science Conference, 7-11 March 2022, The Woodlands, Texas, USA
  https://www.hou.usra.edu/meetings/lpsc2022
- 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

Highest rated objects added to the risk list in 2021

The table shows the top 10 objects entering the risk list in 2021 and still present, ranked by current Palermo Scale.

Designator	Size range in m	Date of possible impact	Impact probability	Palermo scale	Torino scale	Impact velocity in km/s
2021 QM1	40—80	2052-04-02 01:36	1 / 3 000	-2.72	0	23.72
2021 GX9	22—50	2032-04-16 21:52	1 / 15 000	-3.54	0	20.17
2021 TW2	19—40	2112-10-10 21:25	1 / 2 200	-4.17	0	11.82
2021 EU	22—50	2056-08-29 02:46	1 / 29 000	-4.26	0	23.98
2021 UP	20—40	2113-10-18 15:06	1 / 5 000	-4.29	0	14.67
2021 GE2	4—9	2030-04-03 11:57	1 / 1 500	-4.31	0	18.99
2021 AM6	13—29	2070-01-05 02:26	1 / 3 000	-4.46	0	12.34
2021 TT1	15—30	2048-10-09 17:15	1 / 27 000	-4.62	0	20.45
2021 RB6	7—15	2080-09-09 19:38	1 / 1 200	-4.67	0	14.50
2021 WA1	8—18	2116-11-27 21:44	1 / 1 900	-4.74	0	17.82



Our NEOCC team participated in the "Christmas comet" tradition by obtaining a colour image of C/2021 A1 (Leonard) with the Calar Alto Schmidt telescope in Spain. The image is a stack of 30 frames in each of the *g*, *r*, and *i* filters available on the telescope, mapped to RGB channels in order to produce a realistic impression of the comet's colour. Since the object moved during the sequence and the images were aligned on the comet, the field stars were exposed in different colours at different times, producing coloured streaks in the final image.

Comet Leonard has a perihelion distance of 0.6 au, but it is not considered a near-Earth comet (NEC), because it has a period longer than 200 years. This comet is in a nearly-parabolic orbit, and therefore does not satisfy this constraint.

[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