→ NEWSLETTER JUNE 2024

ESA's NEO Coordination Centre

Current NEO statistics

During May we surpassed 1000 annual and 35 000 overall NEO discoveries.

- Known NEOs: 35 025 asteroids and 122 comets
- NEOs in risk list*: 1622
- NEOs designated during last month: 218
- NEOs discovered since 1 January 2024: 1024

Focus on

On 18 May 2024 at 22:46 UTC, a superbolide lit up the sky over Spain and Portugal, briefly turning the night into day. The meteoroid entered the atmosphere with a grazing angle, around 10 degrees from the horizontal. At ~ 40 km/s (~ 140 000 km/h) it traversed more than 500 km over both countries to end up at around 50 km over the Atlantic Ocean. The bolide became tens of times brighter than the full moon and records show that it displayed green and blue colours. This remarkable event was observed from places as far as Algarve in Portugal, Paris or Bretagne in France. Even farther, the fireball was also observed from geostationary orbit by the Lightning Imager instrument of the Meteosat Third Generation Imager-1 satellite, a cooperation between EUMETSAT and ESA (you can read ESA's dedicated news item here).

Preliminary analysis indicates the body diameter was ~ 0.9 m and it had a mass between 600 - 700 kg. The lightcurve matches well with a carbonaceous chondrite, which usually have a low albedo of ~ 0.06 and the absolute magnitude is estimated to be H ~ 34 . Therefore, the on-ground pre-atmospheric visibility of the meteoroid was limited to only a few hours before it getting into Earth's shadow and finally impacting. Apart from the low intrinsic brightness, its detectability was low because it was coming from a very star-crowded part of the sky, close to the galactic center.

Upcoming interesting close approaches

A large asteroid will pass by quite far from us.

- (415029) 2011 UL21 will have the most interesting approach of the month of June, among currently known objects. It's a huge 2.3 km asteroid, but it will approach the Earth reaching a minimum distance of more than 6.6 million kilometres, more than 17 times as far as the Moon. However, despite the significant distance, its large size will make it as bright as magnitude 12 around its closest approach. Our Close Approach Index rates this as an infrequent event.

Recent interesting close approaches

Two small objects had similar fly-bys on 9 and 14 May.

- 2024 JT3 and 2024 JN16 were the two most interesting close approachers during the month of May. They were pretty similar objects: both less than 10 metres in diameter, both passing by at a distance of about 25 000 km from the centre of the Earth, and both reaching magnitude 13 at their closest approach.

News from the risk list

No objects left or entered the top positions of our risk list last month.

*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 continues to be on track for launch. The electromagnetic compatibility tests and the inter-satellite end-to-end tests with the cubesats have been completed.
- This year, the annual Asteroid Day events will be streamed from Luxembourg on June 28 and 29, together with many more independently hosted events all over the world. You can read about the initiative, schedule of events, and speakers at https://asteroidday.org/.

Upcoming events

- Follow-up Observations of Small Bodies in the Solar System in the Era of Large Discovery Surveys, 6 and 8 August 2024, Cape Town, South Africa
  https://sbss2024.saao.ac.za/
- Europlanet Science Congress (EPSC) 2024, 8-13 September 2024, Berlin, Germany
  https://www.epsc2024.eu/
- 43rd International Meteor Conference, 19-22 September 2024, Kutná Hora, Czech Republic
  https://imc2024.imo.net/
- 56th Annual Meeting of the AAS Division for Planetary Sciences (DPS), 6-10 October 2024, Boise, USA
  https://aas.org/meetings/dps56

List of smallest NEAs in cometary orbits

List of smallest known NEAs in cometary orbits with a Jovian Tisserand parameter $T_J < 2.2$, and orbit uncertainty parameter $U < 5$. These are roughly sub-km objects in clearly cometary orbits, analog to the one of the Iberian superbolide discussed earlier in this Newsletter. The table shows that we have discovered and thoroughly tracked only a few objects of this type, and the ones we know are all still much larger than the object creating the fireball. This highlights not just the relative scarcity of NEOs in cometary orbits, but also the difficulty of discovering and following them up from the ground before impact.

Designation	Semi-major axis in au	Eccentricity	Inclination in deg	Jovian Tisserand parameter	Absolute magnitude
2020 CY1	3.14	0.79	66.21	2.04	23.6
2019 EJ3	43.22	0.97	139.77	-0.86	22.5
2009 UJ14	3.31	0.68	59.83	2.16	20.5
2019 QR6	5.77	0.80	10.96	2.15	19.9
2018 YW	3.44	0.74	52.62	2.17	19.6
2011 GS60	3.36	0.92	19.29	2.13	19.1

Iberian superbolide on 18 May 2024 as seen from the Northwestern-oriented camera of AMS82, one of ESA's AllSky7 meteor detection stations located in Casas de Millán, Cáceres (Spain). A second station, AMS81, is located at ESA's ESTRACK station in Cebreros, Ávila (Spain).

Each station is composed of 7 cameras that monitor the sky 24 hours a day, recording sky events like meteors and fireballs.

[Credit: ESA / PDO / AMS82 - AllSky7 Fireball Network]

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