

space situational awareness

→ NEAR-EARTH OBJECTS

Current NEO statistics

More than 200 NEOs were discovered last month, the highest rate since April 2014.

- Known NEOs: 15 934 asteroids and 106 comets
- NEOs in risk list*: 612
- New NEO discoveries since last month: 206
- NEOs discovered since 1 January 2017: 525

Focus on

The closest approach distance is not the only important parameter for assessing the asteroid hazard. The velocity plays a crucial role in shaping the outcome of a close encounter as well as in evaluating the consequences of an impact. The speed at which an asteroid flies by the Earth results from geometrical and dynamical considerations characterizing its pre-encounter orbit. A NEO with an orbital path closely resembling that of the Earth has an extremely low relative velocity at encounter, thus remaining under its gravitational attraction sometimes long enough to be captured as a temporary satellite. An object in retrograde motion (i.e. orbital inclination larger than 90°) would head face-on toward our planet, a worst-case scenario for an impact. Luckily this is a very rare occurrence: only 2 NEAs in retrograde orbits are known.

Upcoming interesting close approaches

A low-velocity encounter and the fly-by of a large asteroid happen in April.

- The 2017 FT102 close approach on 3 April is characterized by an extremely low velocity with respect to the Earth. Although the encounter is not particularly close, occurring at about the distance of the Moon, it results in a significant bending of the trajectory (see figure).
- 2014 JO25 is a km-sized object having a close approach to Earth on 19 April, at 4.6 lunar distances. During the fly-by, it will almost reach magnitude 10.

Recent interesting close approaches

Six known objects came closer than the Moon in March.

- 2017 FN1, a tiny object with a diameter of a few meters, flew by on 21 March at 63 000 km from the Earth centre. It was observed by only two observatories and for less than 12 hours before fading into twilight.
- 2017 FS, 2017 FM1, 2017 FD3, 2017 FJ101 and 2017 DS109 came closer than the Moon during the month of March. They were all small, between 5 and 30 metres in diameter, and reached between magnitude 15 and 17 at their brightest.

News from the risk list

Five new objects were added to the upper part of our risk list.

- 2017 FO63, 2017 FB1, 2017 FR102, 2017 FC3 and 2017 FN1, discovered in the second half of March, entered the risk list with a Palermo Scale higher than -6.

* The risk list of all known objects with a non-zero (although usually very low) impact probability can be found at <http://bit.ly/neorisklist>

In other news

- On 30 March 2017 a presentation of various ESA SSA-NEO Segment activities took place at ESRIN, Frascati, Italy. The day after a follow-on meeting was organized to strengthen the collaborations devoted to NEO observations.

Upcoming events

The ACM 2017 conference and a meeting on Gaia astrometry will take place this month.

- Asteroids, Comets and Meteors (ACM 2017) Conference, 10–14 April 2017, Montevideo, Uruguay
<http://acm2017.uy/>
- IAUS 330: Astrometry and Astrophysics in the Gaia sky, 24–28 April 2017, Nice, France
<http://www.iau.org/science/meetings/future/symposia/1163/>
- IAA Planetary Defense Conference, 15–19 May 2017, Tokyo, Japan
<http://pdc.iaaweb.org/>
- Summer School on "Natural Space Risks", 28 August–1 September 2017, Paris, France
<https://nsr-2017.sciencesconf.org/>
- CELMEC VII, 3–9 September 2017, San Martino al Cimino (VT), Italy
<http://adams.dm.unipi.it/~simca/celmecVII/index.html>

Brightest fly-bys of the decade

List of NEOs which in the past decade became brighter than magnitude 11 at close approach. Note that asteroid Duende is also known with the provisional designation 2012 DA14. Miss distances are from the centre of the Earth.

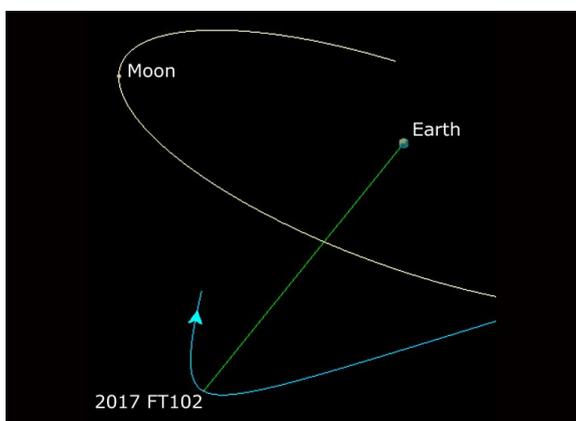
Object name	Close approach date	Miss distance in lunar distances	Miss distance in Earth radii	Miss distance in km	Size in m	Maximum brightness
(367943) Duende	2013-02-15	0.09	5	34 000	18	6.7
(433) Eros	2012-01-31	69.54	4 195	26 730 000	3 300	8.2
(357439) 2004 BL86	2015-01-26	3.12	188	1 200 000	325	9.3
(374851) 2006 VV2	2007-03-31	8.81	532	3 387 000	1 800	10.1
2015 TB145	2015-10-31	1.27	76	487 000	600	10.2
2007 TU24	2008-01-29	1.44	87	554 000	250	10.4
(4179) Toutatis	2012-12-12	18.03	1 088	6 931 000	2 800	10.4
2011 MD	2011-06-27	0.05	3	19 000	6	10.6
2009 DD45	2009-03-02	0.19	11	72 000	19	10.7
(308635) 2005 YU55	2011-11-08	0.85	51	325 000	306	10.8
(164121) 2003 YT1	2016-10-31	13.53	816	5 201 000	1 100	10.8

Links for more information

Website: <http://neo.ssa.esa.int>

Close approaches: <http://neo.ssa.esa.int/web/guest/close-approaches>

Risk List: <http://neo.ssa.esa.int/web/guest/risk-page> or <http://bit.ly/neurisklist>



Graphical representation of the close approach of asteroid 2017 FT102 on 3 April 2017; the bending of the trajectory caused by the Earth gravity can be easily appreciated.

Although the closest approach distance is not particularly low, the deflection of the asteroid motion is extremely significant due to the low relative velocity at the encounter.

Image credits: ESA/NEOCC

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