

## space situational awareness

### → NEAR-EARTH OBJECTS

#### Current NEO statistics

We are approaching the number of 18 000 known NEOs.

- Known NEOs: 17 936 asteroids and 107 comets
- NEOs in risk list\*: 734
- Number of NEOs designated during last month: 156
- NEOs discovered since 1 January 2018: 479

#### Focus on

Over the past few weeks some media outlets discussed the future impact possibilities of asteroid (101955) Bennu, the target of the ongoing NASA mission Osiris-REx. Bennu is indeed ranked near the top of our risk list, but the earliest year when an impact is possible is 2175, not 2135 as some reports stated. Also, the chances of an impact in year 2175 are quite low, approximately 1 in 24 000 according to our calculations. Comparable low-probability impact scenarios exist in later years, but the total probability of Bennu colliding with the Earth before year 2200 is still less than 0.05 %. These numbers are also consistent with independent calculations performed at NASA JPL, confirming the validity of the conclusions.

#### Upcoming interesting close approaches

Two ~200 m objects will have fly-bys in April.

- Two known asteroids, 2013 US<sub>3</sub> and 2018 EB, will have fly-bys reaching magnitude 15 in April. The former was found almost five years ago by the Catalina Sky Survey, while the latter is a new discovery by the NEOWISE spacecraft.

#### Recent interesting close approaches

Five small objects passed closer than the Moon in March.

- 2018 DV<sub>1</sub>, 2018 FE<sub>3</sub>, 2018 FZ<sub>3</sub>, 2018 EZ<sub>2</sub>, 2018 FQ<sub>3</sub>, all discovered less than a week before the close approach with our planet or right after it, passed by the Earth reaching magnitudes between 14.5 and 17.

#### News from the risk list

The 16th position of our risk list has been taken by an asteroid discovered in March.

- 2018 ED<sub>4</sub>, discovered in March, entered the risk list and now has a Palermo Scale value of  $-4.14$ . This Apollo type NEO is a rather large object of ~500 m in size with a low impact probability of about 1 in 3 million in 2108.
- 2018 FJ<sub>5</sub>, another object that entered our risk list this month, has a relative velocity at encounter with the Earth of 33 km/s, making it one of the fastest in the list. The relative velocity is due to the high eccentricity (approximately 0.87) of its orbit.

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\* The risk list of all known objects with a non-zero (although usually very low) impact probability can be found at <http://neo.ssa.esa.int/web/guest/risk-page>

## In other news

- New objects in nearly-parabolic orbits, but with no signs of activity and therefore asteroidal in appearance, are now being designated using the A/ prefix. Neither of the two recognised today (A/2017 U7 and A/2018 F4) are in NEO orbits, but it might happen for other objects in the future.

## Upcoming events

Relevant international meetings over the next months.

- Division of Dynamical Astronomy Meeting , 15–19 April 2018, San Jose, USA  
<https://dda.aas.org/meetings/2018>
- Asteroid Science Intersections with In-Space Mine Engineering, 16–17 April 2018, Esch sur Alzette, Luxembourg  
<https://asime.uni.lu>
- Didymos Observer Workshop 2018, 19–21 June 2018, Prague, Czech Republic  
<http://didymos2018-mtg.asu.cas.cz/>

## Closest approach of known asteroids in 2017

Ten known objects came closer than 10 Earth radii from the Earth surface in 2017. Almost all of them were discovered during the same year; the exception was 2012 TC4, the small object that became the focus of an international recovery and characterisation campaign, to which our team also contributed.

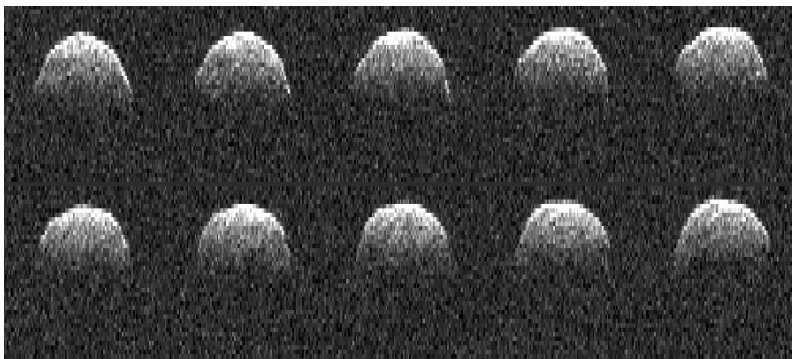
Object name	Close approach date	Miss distance in lunar distances	Miss distance in Earth radii	Miss distance in km	Size in m	H magnitude
2017 GM	2017-04-04	0.026	1.6	9 900	~ 4	29.9
2017 UJ2	2017-10-20	0.030	1.8	11 500	~ 3	30.9
2017 EA	2017-03-02	0.038	2.3	14 500	~ 3	30.7
2017 WE30	2017-11-26	0.062	3.7	23 900	~ 2	31.8
2012 TC4	2017-10-12	0.114	6.9	43 800	~ 19	26.7
2017 BH30	2017-01-30	0.118	7.1	45 500	~ 7	28.8
2017 JB2	2017-05-04	0.128	7.7	49 200	~ 6	29.1
2017 UL6	2017-10-28	0.138	8.4	53 200	~ 2	32.0
2017 QP1	2017-08-14	0.144	8.7	55 300	~ 60	24.2
2017 FN1	2017-03-20	0.148	8.9	56 900	~ 3	30.6

## Links for more information

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

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

Risk List: <http://neo.ssa.esa.int/risk-page>



Radar images of (101955) Bennu obtained by the Goldstone radar in 1999. Our extremely accurate knowledge of the orbit of Bennu and predictability of its motion for the next centuries are mostly due to the very good radar coverage available for this asteroid. Credit: NASA

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