

## space situational awareness

### → NEAR-EARTH OBJECTS

#### Current NEO statistics

Already more than a thousand NEOs have been discovered this year.

- Known NEOs: 16 496 asteroids and 106 comets
- NEOs in risk list\*: 644
- Number of NEOs designated during last month: 152
- NEOs discovered since 1 January 2017: 1082

#### Focus on

Asteroid 2012 TC<sub>4</sub>, discovered five years ago by the Pan-STARRS survey, will come back close to Earth on 12 October 2017. It will fly-by at 44 000 km from the surface, providing a rare chance to carefully observe a small known object during its entire approach to our planet. In order to take full advantage of this opportunity, an international campaign devoted to it has been organised, to which our team at ESA is contributing. The object was expected to reach the limit for observability with the largest ground-based telescopes at the end of July; around that time our team, in the framework of our collaboration with the European Southern Observatory, was able to use the 8.2-metre Very Large Telescope in Chile to recover the asteroid at magnitude 27, the first detection of the object in almost 5 years, and the faintest observation of an NEO ever reported. Our data helped establishing the incoming trajectory with much greater accuracy, an essential information for other observers to plan their detailed follow-up over the next two months.

#### Upcoming interesting close approaches

A very bright close approach of a large NEO will happen in early September.

- (3122) Florence, with a diameter of 4350 metres, will reach magnitude 8,5 when passing at 18.4 lunar distances on 1 September.

#### Recent interesting close approaches

Two small objects came closer than one lunar distance in August.

- 2017 QP<sub>1</sub> and 2017 QN<sub>2</sub> came at ~0.2 and ~0.6 lunar distances respectively around mid-August. The former had reached magnitude 10 near close approach, two days before discovery.

#### News from the risk list

Two objects with Palermo Scale of about -4 entered the risk list in August.

- 2017 PV<sub>26</sub>, roughly 200 metres in diameter, jumped at the top of our risk list on 20 August, but has then dropped to a more routine ranking thanks to follow-up observations obtained by the OASI observatory in Brazil, and measured by our team.
- 2017 PL<sub>26</sub>, a ~150 m NEO, was discovered on 13 August and also entered our risk list.

\* 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

- More information on the international campaign to observe and characterise 2012 TC<sub>4</sub>, including a detailed analysis of the object and a calendar of the planned contributions from various collaborators, can be accessed via the campaign website at <http://2012tc4.astro.umd.edu/>.

## Upcoming events

Both the EPSC and the CELMEC meeting will take place during this month.

- CELMEC VII, 3–9 September 2017, San Martino al Cimino (VT), Italy  
<http://adams.dm.unipi.it/~simca/celmecVII/index.html>
- European Planetary Science Congress, 17–22 September 2017, Riga, Latvia  
<http://www.epsc2017.eu>
- 3rd Chianti Topics International Focus Workshop, Near Earth Objects: Opportunities and Risks, 9–11 October 2017, San Donato in Poggio (FI), Italy  
<http://chiantitopics.it>
- AAS Division for Planetary Sciences Meeting, 15–20 October 2017, Provo, UT, USA  
<http://dps.aas.org/meetings/current>

## List of closest approaches in the past year

Only four objects came closer than 50 000 km to the Earth surface over the past 12 months. They were all discovered before close approach, with an advance warning ranging from a couple of days to just a few hours. All of them were discoveries of the Catalina Sky Survey project.

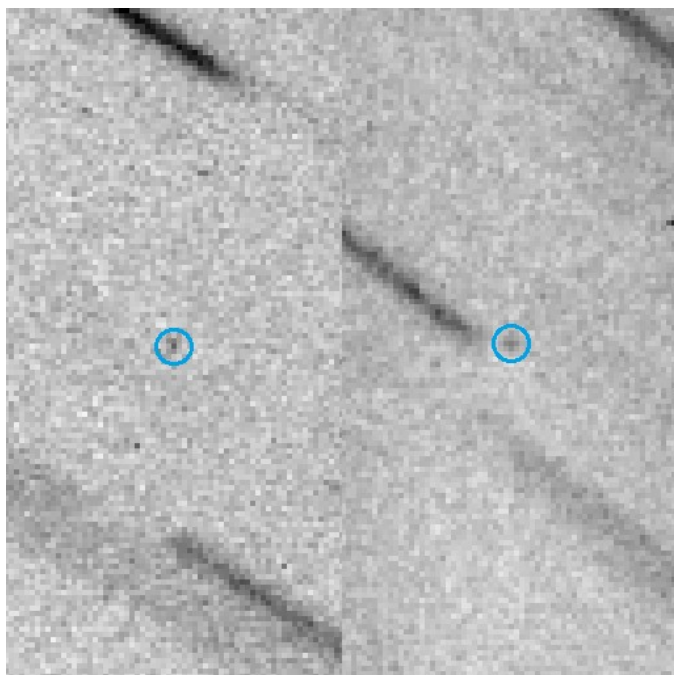
| Object name | Close approach date | Miss distance in lunar distances | Miss distance in Earth radii | Miss distance in km from Earth surface | Size in m | H magnitude |
|-------------|---------------------|----------------------------------|------------------------------|--|-----------|-------------|
| 2017 GM     | 2017-04-04          | 0.03                             | 1.6                          | 10 000                                 | ~4        | 29.9        |
| 2017 EA     | 2017-03-02          | 0.04                             | 2.3                          | 15 000                                 | ~3        | 30.7        |
| 2016 RN41   | 2016-09-11          | 0.05                             | 2.9                          | 18 000                                 | ~3        | 30.9        |
| 2016 RB1    | 2016-09-07          | 0.09                             | 5.4                          | 34 000                                 | ~10       | 28.2        |

## 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>



Recovery images of 2012 TC<sub>4</sub> obtained with ESO's Very Large Telescope on 2017 July 27 (left) and 2017 August 5 (right).

At the time of the first image the asteroid had a magnitude of approximately 27, the faintest NEO ever reported.

Image credit: ESO / ESA NEOCC / Olivier Hainaut / Marco Micheli / Detlef Koschny

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