

ESA'S NEO Coordination Centre

Current NEO statistics

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

- Known NEOs: 20 323 asteroids and 107 comets
- NEOs in risk list*: 862
- Number of NEOs designated during last month: 137
- NEOs discovered since 1 January 2019: 1076

Focus on

On 22 June 2019, around 21:26 UT (17:26 local time), a roughly 5-metre object entered the atmosphere over the Caribbean Sea, and exploded at an altitude of about 25 km over the sea surface, releasing an energy roughly equivalent to 3 kt of TNT. The explosion was first detected by the Geostationary Lightning Mapper (GLM) instrument on board the GOES-16 geostationary satellite.

A couple of days later the NASA JPL team realised that an object appearing on the NEO Confirmation Page as A10e0M1, discovered on the UT morning of 22 June by the ATLAS survey in Hawaii, USA, could be a good candidate progenitor of the fireball event. This tentative identification allowed the Pan-STARRS team to locate three pre-discovery detections of the object in images obtained by the Pan-STARRS2 telescope a couple of hours before the ATLAS discovery.

Adding the corresponding astrometry to the orbit determination confirmed the identification of the object with the fireball event, pinpointing the impact location with a precision of a few hundred kilometres.

The asteroid has now been designated 2019 MO, and is the fourth known impactor detected by asteroid surveys before its impact with our planet.

Upcoming interesting close approaches

One known object will have a moderately close approach this month.

- 2010 PK9, an object with a diameter of 143 metres as measured by WISE, will become brighter than magnitude 15 when flying-by at 8 lunar distances.

Recent interesting close approaches

Two small NEAs came close in June and another one impacted the Earth on 22 June.

- Besides 2019 MO, the impactor mentioned above, only two small asteroids came closer than the Moon in June: 2019 LY4 and 2019 LW4. They had a diameter of about 10–20 metres and reached a peak brightness between magnitude 15 and 17.

News from the risk list

An object appeared on top of the list, and then was quickly removed from it.

- 2015 YV20 is an old discovery from 2015 that rose to the top position of our risk list in June, when archival pre-discovery observations of the object were found in the Pan-STARRS archive. A few days later the object was linked with existing observations from the Catalina Sky Survey, already present in the MPC database, which led to the removal of any impact chance for the next century.

* 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/risk-page>

In other news

- The Meteoroids2019 conference was held in Bratislava, Slovakia, in June. The event brought together meteor and fireball observers and modellers. Besides discussing observational and modelling aspects of meteors, one of the sessions dealt with the source objects, e.g. comets and asteroids. Another session dealt with the effects of the entry of meteoroids and small asteroids into the Earth's atmosphere. Meteoroids2022 will be held in Huntsville, Alabama.
- For the fifth year, Asteroid Day was celebrated worldwide on 30 June with a special event broadcasted from Luxembourg.
- NASA's OSIRIS-REx spacecraft lowered its orbit around (101955) Bennu to a record altitude of just 680 metres over the asteroid surface.

Upcoming events

Relevant international meetings over the next months.

- EPSC-DPS Joint Meeting 2019, 15–20 September 2019, Geneva, Switzerland
<https://www.epsc-dps2019.eu/home.html>
- AIDA International Workshop, 11–13 September 2019, Rome, Italy
<https://www.cosmos.esa.int/web/aida-international-workshop/home>

List of past impactors

List of the four objects detected before their impact with the Earth.

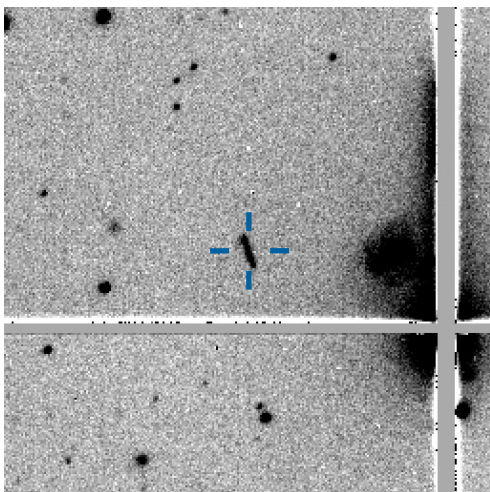
Object name	Impact time in UT	Time between discovery and impact in hours	Impact latitude	Impact longitude	Size range in m	H	Expected energy in kt of TNT equiv.	Discovery site
2008 TC3	2008-10-07 02:46	~20	21	32	4	30.3	0.6	Mt. Lemmon Survey
2014 AA	2014-01-02 04:02	~22	12	-40	2–4	30.9	0.4	Mt. Lemmon Survey
2018 LA	2018-06-02 16:44	~8	-21	24	2–5	30.5	0.9	Mt. Lemmon Survey
2019 MO	2019-06-22 21:26	~13	15	-66	4–8	29.3	3.0	ATLAS-MLO, Mauna Loa

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>



The trail at the centre of this image is the earliest known detection of 2019 MO, the small asteroid that impacted over the Caribbean Sea on 22 June 2019.

The image was obtained by the Pan-STARRS2 telescope at 07:54 UT of the impact day, 13.5 hours before the object entered into Earth's atmosphere.

[Credits: R. Weryk, M. Huber, R. J. Wainscoat (Pan-STARRS/IfA/UH/NASA)]

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