

## → NEWSLETTER SEPTEMBER 2024

### ESA's NEO Coordination Centre

#### Current NEO statistics

The rate of new NEO discoveries remains low during the Northern summer months.

- Known NEOs: 35 475 asteroids and 122 comets
- NEOs in risk list\*: 1631
- NEOs designated during last month: 165
- NEOs discovered since 1 January 2024: 1455

#### Focus on

At 06:39 UTC on 4 September, the Catalina Sky Survey detected an asteroid on a possible collision course with the Earth. Within minutes, all impact warning systems, including our own Meerkat, reported a  $\sim 20\%$  chance of an impact a few hours later. Less than an hour after the alert, follow-up observations were reported by the Magdalena Ridge Observatory: when processed, they confirmed the impact with certainty, and already pinpointed the location to an area near the island of Luzon, in the Philippines, making it the 9<sup>th</sup> occurrence of an asteroid discovered in space before impact. The impactor was now known to be very small, 1 to 2 metres in diameter, and therefore unlikely to pose any threat. Nevertheless, observatories all over the world kept reporting observations, until the impact could be pinpointed, with a precision of  $\sim 100$  m and  $\sim 0.1$  s, to a location just offshore the Eastern coast of Luzon. Our team, using telescopes in Chile and Australia, followed-up the asteroid until it entered into Earth's shadow, 37 minutes before impact. The entry into Earth's atmosphere was witnessed by many people on the ground, confirming the accuracy of the prediction. The object, now designated 2024 RW<sub>1</sub>, was the fastest impactor discovered so far, with an impact velocity of 20.6 km/s: this was largely due to its unusually high orbital eccentricity of 0.7.

#### Upcoming interesting close approaches

A large asteroid discovered at the end of July will have an infrequently close approach with Earth in September.

- 2024 ON, recently discovered by the ATLAS survey, is a large 200 to 500 metre NEO which will come moderately close in September, reaching a minimum distance of about 1 million kilometres. Near the time of close approach, it will become as bright as magnitude 12.

#### Recent interesting close approaches

Only one tiny known asteroid came closer than the Moon last month.

- 2024 PY was the only known asteroid to come any closer than the Moon in August, when it came closer than 100 000 km on 4 August. It is a tiny object with a diameter of just a few metres, and therefore remained fainter than magnitude 15 during the entire passage.

#### News from the risk list

No objects in the top-10 of our risk list had any changes during the month of August, and none of those discovered during the month reached a cumulative Palermo scale higher than  $-4$ .

\*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

- This month marks the 30-year anniversary of the 1<sup>st</sup> International Conference on Space Protection of the Earth, an early meeting on planetary defence which was held in September 1994 in Chelyabinsk, Russia. It is an interesting coincidence that, 19 years later, the most impressive asteroidal impact of our lifetimes happened exactly on that city.
- The Hera spacecraft and its CubeSats have been prepared for shipping to the launch site, and will leave for Florida in early September.

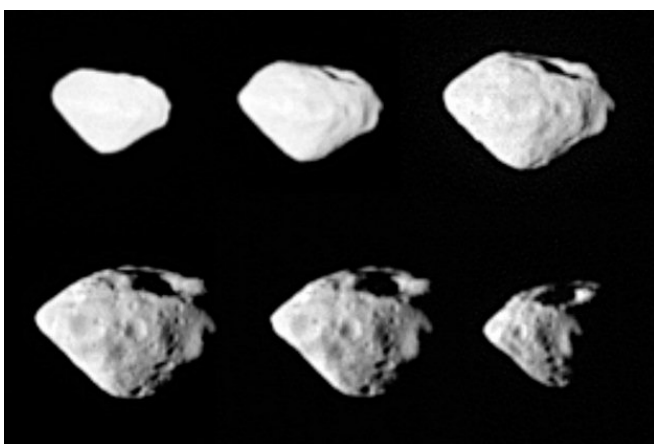
## Upcoming events

- Europlanet Science Congress (EPSC) 2024, 8-13 September 2024, Berlin, Germany  
<https://www.epsc2024.eu/>
- 43<sup>rd</sup> International Meteor Conference, 19-22 September 2024, Kutná Hora, Czech Republic  
<https://imc2024.imo.net/>
- 56<sup>th</sup> Annual Meeting of the AAS Division for Planetary Sciences (DPS), 6-10 October 2024, Boise, USA  
<https://aas.org/meetings/dps56>

## List of NEAs visited or scheduled to be visited by spacecraft

This table includes all NEAs that have been visited or are planned to be visited by a spacecraft.

Object name	Spacecraft	Arrival year	Agency	Mission status	Mission type
(433) Eros	NEAR Shoemaker	1998	NASA	Completed	Rendezvous, landing
(25143) Itokawa	Hayabusa	2005	JAXA	Completed	Rendezvous, sample return
(4179) Toutatis	Chang'e 2	2012	CNSA	Completed	Fly-by
(162173) Ryugu	Hayabusa2	2018	JAXA	Completed	Rendezvous, sample return
(101955) Bennu	OSIRIS-REx	2018	NASA	Completed	Rendezvous, sample return
(65803) Didymos	DART	2022	NASA	Completed	Impact
	Hera	2026	ESA	Ready for launch	Rendezvous
(98943) 2001 CC21	Hayabusa2#	2026	JAXA	In cruise	Fly-by
(469219) Kamo'oalewa	Tianwen-2	2027	CNSA	In preparation	Rendezvous, sample return
(99942) Apophis	OSIRIS-APEX	2029	NASA	In cruise	Rendezvous
	RAMSES	2029	ESA	In preparation	Rendezvous
(3200) Phaeton	DESTINY <sup>+</sup>	2029	JAXA	In preparation	Fly-by
1998 KY26	Hayabusa2#	2031	JAXA	In cruise	Rendezvous



These days mark the 15-year anniversary of the fly-by of ESA's Rosetta mission with main belt asteroid (2867) Steins, returning exquisite images of the 5 km asteroid and discovering a very large crater on the object.

The images to the left, taken around close approach, show the change of appearance of the asteroid when seen at different phase angles, ranging from 2° to 84°. They exemplify very well why the phase angle is extremely important to model the brightness of an asteroid.

[Credit: ESA ©2008 MPS for OSIRIS Team  
MPS/UPD/LAM/IAA/RSSD/INTA/UPM/DASP/IDA]

## 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>

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