

→ NEWSLETTER JUNE 2021

ESA's NEO Coordination Centre

Current NEO statistics

Average NEO discovery rate is about 250 new objects per month since start of the year.

- Known NEOs: 25 899 asteroids and 114 comets
- NEOs in risk list*: 1169
- Number of NEOs designated during last month: 239
- NEOs discovered since 1 January 2021: 1246

Focus on

The table on the next page of this newsletter gives us the opportunity to introduce the concept of "completeness limit", frequently used in the field of impact monitoring. Impact probabilities, such as those presented in our risk list, are computed with mathematical algorithms. These procedures are designed to find impacting orbits that are compatible with the existing observations of each object. In simple terms, the algorithms "scan" a grid of possible orbits, and determine the impact probability by "counting" how many of them have an impact in the future. However, due to computational limitations, it is not feasible to test every possible orbit. The algorithms scan orbits with a very fine but discrete grid, designed to guarantee that all impact configurations with a probability higher than a certain value, called "completeness limit", are detected. If an impact is possible, but with a probability lower than that threshold, it might still be found, but it is not certain since it depends on how the algorithm chooses the sampling. With the algorithm currently implemented at our Centre, this limit corresponds to a probability of 2×10^{-7} , or a 1 in 5 million chance of impact. However, if an impact with lower probability is found, just by chance, it is still published in the list. That is why we can see many impact solutions (about 79% of the total) with smaller impact probabilities than the completeness limit. Most of them are of course for low-ranked objects, as clearly shown by our table and figure.

Upcoming interesting close approaches

A new risk list object is also having a close approach at the beginning of June.

- 2021 KT2 is the only known object expected to come closer than the Moon in June. It is also in our risk list, with a cumulative Palermo Scale value of about -5 .

Recent interesting close approaches

Two objects came to a similarly close distance in May.

- 2021 JU6 and 2021 JQ2 both came to about 60 000 km from the Earth's surface in May. The former reached magnitude 12, while the latter only became as bright as 16, due to a difference in diameter (about 12 metres vs. 4 metres).

News from the risk list

An object reached the top of the list for a few days in May and was later removed.

- 2021 GX9, the new object announced last month, is still in the list and it is now unobservable. It should be recoverable in the fall with 10 m-class telescopes.
- 2021 JF4 also reached a Palermo scale of -3 , but was removed thanks to follow-up.

* 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

- On May 10, the asteroid sample-return mission OSIRIS-REx started its two-year journey back to Earth.
- Asteroid Day TV goes live on June 1, 12:00 CEST, virtual. Watch it at: <https://asteroidday.org/watch/>
- 2021 Asteroid Day LIVE airs June 30, 18:00 CEST, virtual. Watch it at: <https://asteroidday.org/asteroid-day-live/>

Upcoming events

One event in the list of relevant international meetings over the next months.

- 53rd Annual Meeting of the AAS Division for Planetary Sciences, 3-8 October 2021, virtual
<https://dps.aas.org/meetings/current>

Distribution of Palermo Scale values

Distribution of the virtual impactors in different Palermo Scale ranges as computed by the NEOCC. In the third column only the VIs above the completeness limit are counted. Bare in mind that a given asteroid can have several virtual impactors, thus presenting impact probabilities at different epochs.

Palermo Scale range	Total number of virtual impactors	Total number of virtual impactors above the completeness limit	Palermo Scale range	Total number of virtual impactors	Total number of virtual impactors above the completeness limit
[-3.5, -3.0]	4	4	[-9.0, -8.5)	5395	892
[-4.0, -3.5)	10	10	[-9.5, -9.0)	5415	313
[-4.5, -4.0)	40	37	[-10.0, -9.5)	4774	64
[-5.0, -4.5)	75	71	[-10.5, -10.0)	3688	27
[-5.5, -5.0)	169	158	[-11.0, -10.5)	2681	0
[-6.0, -5.5)	357	316	[-11.5, -11.0)	1876	0
[-6.5, -6.0)	658	560	[-12.0, -11.5)	1405	0
[-7.0, -6.5)	1299	1024	[-12.5, -12.0)	866	0
[-7.5, -7.0)	2079	1306	[-13.0, -12.5)	485	0
[-8.0, -7.5)	3365	1805	[-13.5, -13.0)	268	0
[-8.5, -8.0)	4497	1611	[-14.0, -13.5)	0	0

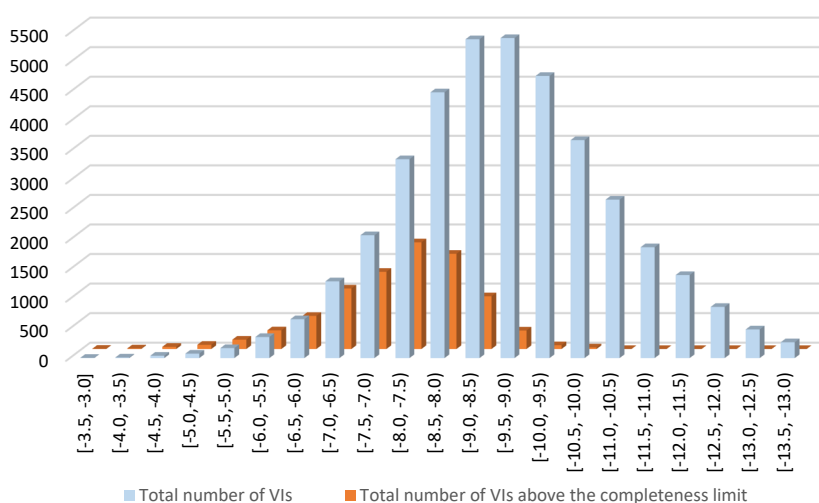
Links for more information

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

Close Approaches List: <https://neo.ssa.esa.int/close-approaches>

Risk List: <https://neo.ssa.esa.int/risk-list>

Palermo Scale distribution



Distribution of the number of virtual impactors in different Palermo Scale intervals, compared to the number of virtual impactors above the completeness limit.

[Credit: ESA/NEOCC]

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