→ CAFS FOR 2021 PDC - DAY 1

ESA's NEO Coordination Centre

This document does not describe a real potential asteroid impact. The information here is fictional and provided only to support an emergency response exercise conducted during the International Academy of Astronautics (IAA) 2021 Planetary Defense Conference (virtually) in Vienna, Austria, 26-30 April 2021. This is only an exercise.

Close approach fact sheet for asteroid 2021PDC

Status as of: 2021 April 26 14:30 UTC.

A large asteroid has ~ 5% probability to impact the Earth in 20 October. NEOCC is providing this CAFS as this case fulfils the criteria of both ESA and IAWN for generating an *impact warning message*.

Possible impact date	2021-10-20
Possible impact time	~ 17:11 UTC
Velocity at entry interface point	~ 15.43 km/s
Size range	76-226 m
Discovery date	2021-04-19
Discovery site	PDC EXERCISE

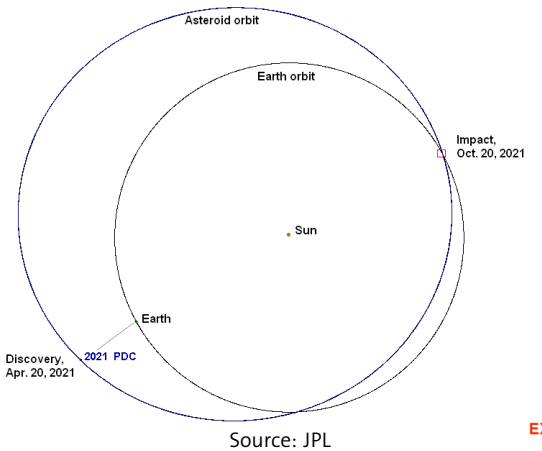
All error bars quoted in this table correspond to one standard deviation.

Orbit information

All orbital elements in this table are referred to the ecliptic reference system at J2000.0 epoch and to the pre-impact conditions.

Date before the possible impact	Orbital period (years/days)	Aphelion distance (au)	Perihelion distance (au)	Eccentricity	Inclination (deg)
2021-09-19	1.41/515	1.596	0.923	0.2673	15.73

EXERCISE



EXERCISE

Source: JPL

Physical and mitigation information

Days to closest approach	Impact probability	Composition	Rotation period (hours)
~ 177	0.05	Unknown	Unknown

Observational information

Asteroid 2021 PDC will remain continuously observable over the entire time from now until the potential impact in October, although it will be fainter than 23rd magnitude from June through September, requiring large-aperture telescopes such as the 4-meter Canada-France-Hawaii Telescope (CFHT). The asteroid will not get brighter than 22nd magnitude until just a few weeks before the potential impact in October.

Other information

Encounter peculiarities	Previous encounter	Next encounter
Possible impact	2014-06-06	Unknown

Only encounters within 0.05 au are considered.

Links

NEO information:
https://neo.ssa.esa.int/pdc-2021-impact-exercise
Close approaches page:
https://neo.ssa.esa.int/close-approaches

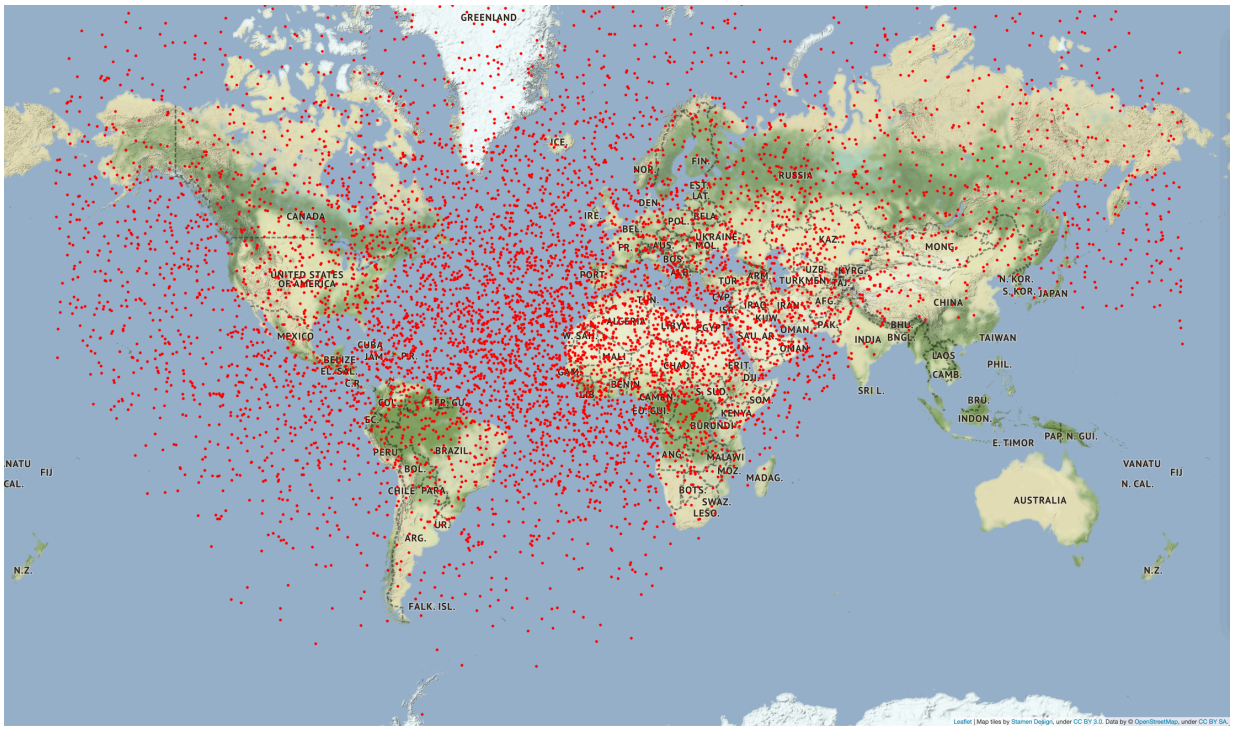
Impact risk information sheet for asteroid 2021PDC

Impact information

Size (m)	Impact date (UTC)	IP	TS	Velocity (km/s)	Angle (°)	Expected energy (Mt TNT equiv.)
76-226	2021-10-20 17:11:50	0.05	4	15.43	0-90	35-237

Impact corridor plot

The red dots on the following Earth image show some of the possible impact points. This diagram was produced by filling the uncertainty region with thousands of random-sample cases and computing where those cases would impact when the Earth sweeps through the region. They cover not only the entire hemisphere of the Earth to which the asteroid is approaching but also extend further because gravity will cause trajectories that might otherwise miss to curve towards an impact. Note that while there are gaps between the dots in this image, the region at risk is actually a continuum that covers a large part of the planet.



Impact effects

The asteroid's position uncertainty region at the time of the potential impact is much larger in both length and breadth than the size of the Earth. Impact could occur anywhere on the forward hemisphere when the Earth crosses the asteroid orbit and sweeps through the uncertainty region. Therefore the potential impact could occur in most regions of the Earth (with the exception of Australia, Indonesia and the easternmost part of Asia near the pacific coast.)
The predominant hazard is an airburst causing blast overpressures possibly reaching unsurvivable levels. The size of the potential blast damage area could range from local (a few kilometers) at the small end at the possible range of asteroid sizes, to regional (several tens of kilometers) at the large end.
Owed to uncertainties in the measurements, the real object diameter and density might even vary more than accounted for in the standard assumptions. The full possible diameter range is 35 to 700 m and the full range of potential impact energies ranges from 1.2 Mt TNT equivalent up to 13 Gt TNT equivalent.