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Asteroid impact risks 'underappreciated'

A graphic representation by the B612 Foundation showing asteroid impacts

More from Jonathan

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A visualisation showing where sizeable asteroids have hit the Earth in recent years has been released by the B612 Foundation.

The US-based group, which includes a number of former Nasa astronauts, campaigns on the issue of space protection.

It hopes the visualisation will press home the idea that impacts are more common than we think.

The presentation leans on data collected by the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO).

The CTBTO operates a network of sensors that listens out for clandestine atom bomb detonations.

Between 2000 and 2013, this infrasound system catalogued 26 major explosions on Earth.

None were caused by A-bombs; they were all the result of asteroid strikes.

They ranged in energy from one to 600 kilotons. By way of comparison, the bomb that destroyed the Japanese city of Hiroshima was a 15-kiloton device.

Fortunately, most of these space rocks disintegrated high up in the atmosphere and caused few problems on the ground.

A few, people will have heard about, such as the 20m-wide object that ripped across the sky above the Russian city of Chelyabinsk last year.

But many will have gone unseen because they occurred far out over the oceans.

And just one of the 26 events was detected in advance, and then by only a matter of hours.

The Chelyabinsk impactor was small compared with some asteroids known to have struck the Earth

The advocacy group uses the frequency and size range of the impacts to say something about the probability of larger strikes in the future.

Because although Chelyabinsk was a terrifying experience for those caught up in it, the event itself was quite small compared with some of the incomers recorded through Earth history.

The foundation says the CTBTO data would suggest that Earth is hit by a multi-megaton asteroid - large enough to destroy a major city if it occurred over such an area - about every 100 years.

Remembering the Tunguska event of 1908 - it was fortunate that that object, thought to be about 45m wide, struck a very remote part of the globe.

"This is a bit like earthquakes," explains Ed Lu, former shuttle astronaut and CEO of the B612 Foundation.

"In the cities that have a major danger - Tokyo, Los Angeles, San Francisco - they know the odds of big earthquakes by observing how many small earthquakes there are. Because there's a known distribution of earthquakes, meaning that earthquakes come in all sizes, small to large - if I can measure the small ones, I know how many big ones they're going to be. And you can do this with asteroids.

"These asteroid impacts in the last decade have been ones that we haven't had much data on until recently, and they tell us that in fact asteroid impacts are more common than we thought," he told BBC News.

B612 is pushing its Sentinel telescope concept as a way to better quantify and mitigate the risks.

Projected to be ready for launch in 2018 and costing some $250m, the venture is being funded privately through donation.

The observatory would be sited in a Venus-like orbit, looking out towards Earth.

This would help pick up those inner-Solar-System rocks that go unseen by current telescopes at Earth because they are hidden in the glare of the Sun.

Sentinel would also operate in the infrared - the best part of the spectrum to go look for dark grey asteroids.

Previous surveys have suggested that we have probably found a little over 90% of the true monsters out there - the objects that could lead to extinction if they struck the Earth. And the good news is that none look like they will hit us anytime soon.

But data from Nasa's Wise telescope suggests that the population of objects in the 100-1,000m size range may number close to 20,000, and the vast majority of these have yet to be identified and tracked.

Time is precious in this business. The sooner an Earth-bound rock is detected, the easier it is to deal with it.

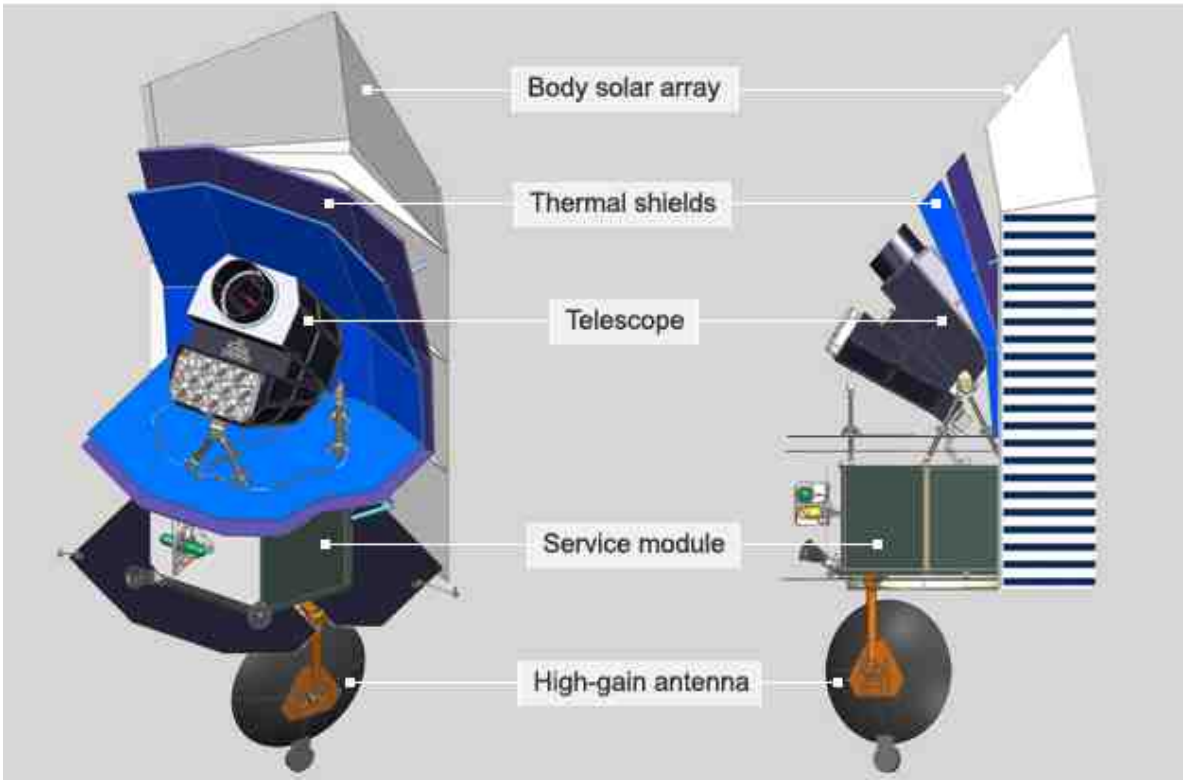
Mitigation might be as simple as hitting the asteroid with a heavy block. This nudge would change the velocity of the rock ever so slightly, but if it is done way ahead of time, it should be just enough to make the object arrive "at the crossroads" sufficiently early or late to miss Earth.

Another "simple" approach being talked about is the so-called "gravity tractor". This involves positioning a spacecraft close to a target object and using long-lived ion thrusters to maintain the separation between the two. Because of the gravitational attraction between the spacecraft and the asteroid, it is possible to pull the rock off its trajectory. Relatively straightforward but, again, it requires time to work.

"These types of mission are arguably less difficult than building Sentinel. The hard part is finding these things," says Lu.

"Picture trying to spot something that's only the size of a small apartment building, that's tens of millions of miles from Earth, and that's black against a black background. That's incredibly hard. That's what requires the technological advances of Sentinel."

B612 Foundation's Sentinel Infrared Space Telescope



- Sentinel would track 90% of Earth-orbit-crossing asteroids larger than 100m, and 50% of the 30m rocks
- Its observation orbit would be close to that of Venus; it would lap the Earth every 2.2 years
- B612 says it would give years/decades of notice before any potential impacts with Planet Earth