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Scientists Advance Asteroid Detection, Deflection, Detonation Research

by Suzanne Presto

Amateur and professional skywatchers all over the world send observations to the [Minor Planet Center](#), which collects information about near-Earth objects. The clearinghouse is just one way people are working to protect us from asteroid strikes. Scientists also are developing innovative ways to detect, deflect and possibly destroy dangerous asteroids in Earth's neighborhood.

Asteroid Alert

It sounds like something out of a Hollywood blockbuster. But it's real, and, it's getting \$5 million from the U.S. space agency.

The Asteroid Terrestrial-Impact Last Alert System - ATLAS for short - is being developed with NASA support by a team of astronomers at the University of Hawaii. As the name implies, their goal is to find asteroids that are just about to make their final plunge and strike our planet.

ATLAS is envisioned as a network of as many as eight ground-based telescopes, armed with cameras, that would scan the visible sky twice each night. The aim is for ATLAS to provide at least a day's warning for an asteroid that could wipe out a town, a week for one that could devastate a city, or three weeks' notice for one that could wipe out a larger area.

"We really aren't going to be able to deflect these asteroids as they're coming in on their last plunge. There's just no chance of that," said astronomer John Tonry, who leads the ATLAS project. "The thing that we can do is provide warning, and the thing that is remarkable about the warning we can provide for asteroid impact is that it's not like hurricanes or tsunamis or earthquakes. It's really accurate. We can say exactly where and when this thing is going to come down."

Detection

ATLAS is designed for a shallow and wide search of the sky, which Tonry says would complement other projects that are searching deep into narrow slivers of sky to find objects still decades away.

The system would be sensitive enough to spot a match flame from across the United States. Tonry says there would be a better-than-50/50 chance of providing a day's warning for an object like the meteor that exploded over Russia in February, if copies of ATLAS were spread around the world.

"What we really want to do is get diversity around the planet," he said. "Hawaii can't see the southern sky, and if we really want to cover the whole sky, we need to get units in the southern hemisphere, like Australia or Chile or South Africa."

Space-Based Sentinel

Other scientists focus on space-based assets that aren't hindered by Earth's weather conditions, atmosphere or bright skies.

A former NASA astronaut, Ed Lu, heads a non-profit organization called the B612 Foundation. Earlier this year, he told lawmakers about efforts to privately raise \$450 million to build and operate an infrared space telescope called Sentinel. Lu says the goal is planetary defense.

"As Sentinel moves around the Sun, faster than the Earth does, it will scan Earth's orbit, so it's going to find about 100-times more asteroids than all other telescopes combined," he said.

Deflection and Detonation

Detecting dangerous asteroids is one step. Aerospace researchers such as Brent Barbee, a flight dynamics engineer at NASA's Goddard Space Flight Center in Maryland, focus on asteroid deflection.

"If we know that the asteroid is coming, say, 20 years in advance, then that opens up a wide range of possibilities," he explained. "In those cases we could conceivably knock the asteroid off course with a kinetic impactor spacecraft or we could gradually nudge it off course with a gravity tractor spacecraft, things like that."

Such spacecraft would, theoretically, divert an asteroid.

Barbee considers an even more dramatic scenario. He looks at very short warning-times, less than 10 years' notice of a major impact, and he researches the idea of quickly deploying a nuclear-armed, two-body vehicle to an incoming asteroid.

"One part of the vehicle is a kinetic impactor that excavates a shallow crater on the surface of the asteroid, and the follower vehicle contains a nuclear explosive device that follows the lead impactor vehicle into that shallow crater and detonates the explosive device," he said.

The nuclear bomb would shatter the asteroid, and Barbee said simulations indicate that only a fraction of a percent of the original mass of the asteroid might hit the atmosphere.

While pieces of the necessary technology do exist, Barbee says the guidance-navigation technologies needed to precisely strike the speeding asteroid are still under development.

Advice

So, if there is a large, dangerous asteroid that is about to crash into our planet, you might want to consider NASA chief Charles Bolden's advice. He told lawmakers earlier this year, "the answer to you is, if it's coming in three weeks, pray."

<http://www.voanews.com/content/scientists-advance-asteroid-detection-deflection-detonation-research/1653599.html>