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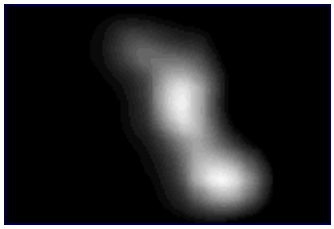

Asteroid Hunters Downgrade Overall Threat to Earth

By Michael Paine
Special to *space.com*
posted: 12:21 pm ET
12 January 2000

A handful of professional astronomers regularly search the night skies for asteroids or comets that may eventually slam into Earth. Their main quarries are objects about 1,000 yards (one kilometer) or more across -- rocks capable of severe destruction.

Until recently most scientists thought there were about 2,000 of these Near Earth Objects (NEOs). Now the astronomers who operate the Near Earth Asteroid Tracking (NEAT) project have come up with a lower estimate: 700.

If accurate, the new number would reduce the odds of a civilization-destroying impact in any one year from about one in 100,000 to about one in 300,000, something still more likely than being dealt a royal flush in five-card poker.

"I think the new estimates are plausible and that many colleagues are accepting them," said the Minor Planet Center's Brian Marsden, who was not involved in the research but who collates and analyses information about known asteroids and comets.

In the study, David Rabinowitz of Yale University and Eleanor Helin and her colleagues, who operate NASA's telescope in Hawaii, analyzed results for the amount of sky covered by their project. The results are described in the January 13 issue of the journal *Nature*.

Uncertainty remains

Like all NEO estimates, the new one is an educated guess based on the amount of sky searched so far and backed up by counts of craters on the Earth, as well as on the moon, Venus and Mars, where the scars of past impacts do not erode so quickly.

"The real comfort is that we are on track to finding most of the hazardous asteroids before they find us."
David Rabinowitz - Yale University

The actual number of 1-kilometer NEOs could range from about 500 to 900, Rabinowitz said.

These objects are so small and distant that their size cannot be measured directly -- the task is equivalent to using a telescope to gauge the girth of ant a hundred miles away. Instead, scientists consider the brightness of the object,

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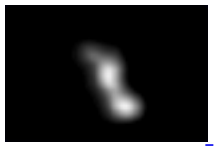

Asteroid Braille proved in August to be an elusive target for Deep Space 1, illustrating how difficult it is to monitor space rocks.

Image Credit: NASA

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assuming that the larger objects will appear brighter in the sky.

The NEAT team, like most other groups, assumes a typical space rock reflects 10 percent of the sunlight that hits it. This is based mainly on the characteristics of meteorites and a few large asteroids that are well studied.

A trap with this method is that space rocks come in different shades of gray -- some reflect more sunlight than others.

In the dark

Last summer NASA scientists who operate the Deep Space 1 spacecraft were taught a lesson about dark asteroids. Their pioneering spacecraft was supposed to spot and photograph asteroid Braille which, coincidentally, was discovered by Helin and a colleague in 1992.

Braille is some 1.5 miles (2.4 kilometers) end to end, and the spacecraft passed within 10 miles of it -- a brilliant feat of auto-navigation.

But the elation of the scientists was dampened when no close-up pictures were beamed back to Earth. It turned out Braille was much darker than anticipated, and the imaging system of Deep Space 1 could not lock onto the asteroid. It's possible that these dark objects are more common than previously thought and they have eluded Earth-based asteroid search programs.

Other threats

Researchers study Near Earth Objects that are 1 kilometer and larger because they pose the most significant risk to the planet for global devastation. There are other threats that this study does not consider, such as long-period comets that return to the inner solar system only rarely and could only be detected a couple of years before impact.

"Comets are also a significant global hazard, and we are fortunate that they impact less frequently, presumably about 10 times less frequently," Rabinowitz said in an e-mail interview. "Smaller NEOs don't have a global effect. Though hazardous on a local level, they are not as important in the long run."

A subclass of objects, called Potentially Hazardous Asteroids, includes 200 rocks in space that are expected to pass within 5 million miles (about 8 million kilometers) of Earth and are estimated to be more than about 600 feet (183 meters) across.

More sensitive equipment will be needed to detect a reasonable proportion of these objects, experts say.

"The real comfort is that we are on track to finding most of the hazardous asteroids before they find us," Rabinowitz said.

Another search effort

In the early 1990s an international group of scientists proposed the Spaceguard Survey -- a global search that would find 90 percent of the potential civilization destroyers over ten years. Current efforts have fallen far short, but the NEAT scientists point out that their reduced estimates mean the Spaceguard goal will be easier to reach.

Marsden, of the Minor Planet Center, agrees, but he cautions

that there is much more to the task than just finding an object. Follow-up observations are needed to pin down the orbit, he said.

At the current rate of discovery -- about 50 to 110 per year -- it will take about two decades to find all the 1-kilometer NEOs, Rabinowitz and his colleagues calculate.

space.com's *Robert Roy Britt contributed to this report.*

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