Asteroid expert says surveillance is key to survival, planning is key to defense

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Illustration of an asteroid impact. Credit: NASA.

(Phys.org) —For the threat of meteor strikes large or small, early detection is key, and evacuation may be the only defense needed within the next 1,000 years, according to an asteroid impact expert.

The best investment in asteroid defense is not in weapons to deflect them, but in telescopes and surveys to find them, said H. Jay Melosh, co-author of the 2010 National Research Council report "Defending Planet Earth" that explored the feasibility of detecting all Earth-crossing asteroids greater than 140 meters in diameter and ways to mitigate their hazard.

"At this point we've found more than 90 percent of the large, civilization-

ending asteroids that cross the Earth's orbit and none are threatening us, which lets us breathe a little easier for the next 1,000 years or so; but there are limits to this search," said Melosh, a distinguished professor of earth, atmospheric and planetary sciences and physics at Purdue University. "We need to invest in telescopes that can find asteroids on Earth's sunward side, our current blindspot, and in programs to find and track the smaller asteroids, which are less devastating but far more likely to strike us."

Strikes along the lines of the Chelyabinsk meteor, which hit Russia in February, are of the greatest concern for the time being, he said.

"If we could have detected the Chelyabinsk asteroid and had tools in place to quickly assess the impact scenario, an evacuation of the area would have prevented many injuries," Melosh said. "Much like we do for hurricanes, the best option is often to get people out of harm's way and prepare for the impact."

Melosh is currently working to refine an asteroid impacts effects calculator he developed so that it could be used in such situations. The calculator, "Impact: Earth!" estimates the damage that an asteroid strike would cause if it hit the Earth. It accurately estimated most aspects of the Chelyabinsk impact in a retroactive test, including strike zone, atmospheric blast wave and ground shaking, but was slightly off in estimates of how far the air blast would reach and shatter windows within the city, he said. Melosh is working to better understand and calculate this effect in a city environment and to improve the precision of other calculations.

"It wouldn't take a large amount of money to create civil defense plans for the unlikely event of a small meteor strike," he said. "For larger meteors that would require a more proactive defense, improved surveillance could give us a century of advance notice and plenty of time

to create and deploy a deflection tool."

In addition to his expertise in the effects of asteroid impacts, Melosh has been involved in asteroid deflection research for years. He was a co-investigator on NASA's 2005 Deep Impact mission, which successfully targeted and hit a comet with a spacecraft. He also developed an approach to deflect an asteroid through the evaporative effects of focused sunlight in 1993. A paper detailing this work was published in the Nov. 4, 1993 issue of *Nature*.

Provided by Purdue University