Asteroid searchers take the high ground

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Everyone knows that if you want to see a great distance, getting up higher makes for a better view. University of Calgary researchers are following that principle to make ground-breaking discoveries of asteroids in near-Earth orbits.

The launch of NEOSSat (Near-Earth Object Surveillance Satellite) 800 kilometres above the Earth next Monday will enable University of Calgary researchers to undertake a comprehensive study of asteroids – and possibly comets – orbiting between the Earth and the Sun. These asteroids rarely or never make it into the night sky, so are a difficult target for conventional ground-based survey telescopes.

In orbit above the Earth, the suitcase-sized NEOSSat can search for these small, dim objects 24 hours a day, seven days a week, even in the "daylight" sky. The 15-centimetre Maksutov telescope on board NEOSSat is fitted with a specially designed baffle, which should block most stray sunlight and allow it to take hundreds of sensitive images every 24 hours. The satellite's focus will be on the areas of space between 45 and 49 degrees away from the Sun along the Earth's orbit; territory previously largely uncharted for researchers looking for asteroids.

Data will be downloaded via the Canada Space Agency to the University of Calgary's Department of Geoscience where, a science processing operations centre will search the images for moving tiny dots of light that represent asteroids.

"In the practical sense, we're contributing to our civilisation's effort to map the near-earth population of asteroids, and we want to know about that for different reasons," says Alan Hildebrand, associate professor in the Department of Geoscience.

"For example, an accurate survey of the number of near-Earth asteroids will allow the scientific community to re-examine impact rates (with planets). Impact rates and counting craters on Mercury and Venus built estimates of their age, so any marked change in our current knowledge would change our understanding of their surfaces' history. We will reduce the impact hazard by a few per cent with NEOSSat's discoveries, but our bigger contribution will probably be a greater understanding of the asteroids themselves."

Last week's pass of Earth by asteroid DA14 and the unrelated meteor fireball over Russia might imply this project is looking out for doomsday projectiles. Rob Cardinal – the Department of Geoscience research associate who designed the high-performance computers and some of the software to process the data received from NEOSSat – says this is an oversimplification.

"Some may say we are watching for objects that are going to destroy the planet, but the probability of that is so small," he says. "There are so many more realistic things you can do with the knowledge we will gain; like sampling, or even mining in the future. All the data we collect will eventually be made available publicly via the Global Virtual Observatory for other people to use in their research."

It is the quest for discovery that drives this project, and the Near-Earth Space Surveillance (NESS) project science team, led by Hildebrand, has a dozen internationally distributed planetary scientists active in asteroid research. It has taken the team 13 years to arrive at the point of Monday's launch from India. A successful launch into orbit will be

followed by a brief period of capability testing, and the search operations.

"One of the most fun things that would come out of this project would be if we do happen to find an asteroid that has an orbit very close to the Earth's orbit that would make it an easy target for exploration," Hildebrand says. "NASA is considering sending crews to an asteroid. The biggest candidate they have within their window is only approximately 100 metres diameter. If we found something like a 500-metre one that was close enough, that would be an instant exploration target."

Provided by University of Calgary

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