Chinese researchers look at possibility of capturing asteroids in Earth orbit

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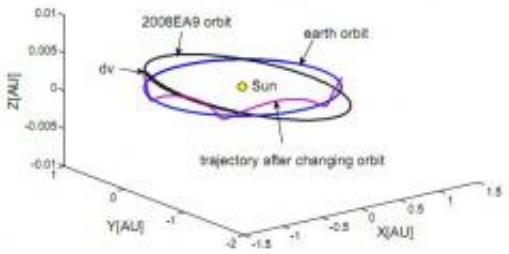

Trajectory of 2008EA9 before and after orbit maneuver. Image from arXiv:1108.4767v1 [astro-ph.EP]

(PhysOrg.com) -- In an interesting twist regarding the study of asteroids and what happens when they come close to our planet, Hexi Baoyin and his two colleagues, Yang Chen and Junfeng Li at Tsinghua University in Beijing, China have been looking into the possibility of nudging one or more Near Earth Objects (NEOs) into an orbit around the Earth, initially for study, but later on, for the financial windfall that might be had if such an asteroid could be mined for its precious metals. The team has published their results on the pre-print server, *arXiv*.

For as long as man has been aware of the danger of asteroids or comets hitting our planet, there have been ideas put forth as to ways in which they could deterred or destroyed. As technology has improved, the ideas have become ever more feasible. But until now, it appears no one has

thought seriously about turning what could be a problem for us, into a goldmine, so to speak.

In their paper, the team writes about how they've been studying how an occasional asteroid has been known to be naturally captured in an orbit around Jupiter, where it stays for a while until it is eventually flung back out into space. The comet, Oterma, for example did just that in 1936. This got them to wondering if any such NEO might be lurking around out there all set to do the same for our planet. Unfortunately, their search turned up empty. Undaunted they then began looking into whether there might be an NEO or two that might come awfully close, and found that indeed there were.

One in particular caught their eye, an asteroid called 2008EA9; at just ten meters across it seems a perfect candidate. Not only is it small enough that if efforts to snag it went asunder and the thing instead plunged into the Earth, it would likely burn up in the atmosphere, but it also just happens to have an orbital velocity near to that of Earth's. In doing the math, the team found that if they were to speed it up by just 410 meters per second, they could give it just enough of a nudge to cause it to go into an orbit around the Earth, at about a distance twice that of the moon. Close enough to study it, and perhaps bring back samples.

The team, and everyone else presumably, has plenty of time to consider the practicalities and dangers of such a mission, however, as 2008EA9 won't come around again until 2049.

More information: Capturing Near Earth Objects, Hexi Baoyin, Yang Chen, Junfeng Li, arXiv:1108.4767v1 [astro-ph.EP]
arxiv.org/abs/1108.4767

Abstract

Recently, Near Earth Objects (NEOs) have been attracting great attention, and thousands of NEOs have been found to date. This paper examines the NEOs' orbital dynamics using the framework of an accurate solar system model and a Sun-Earth-NEO three-body system when the NEOs are close to Earth to search for NEOs with low-energy orbits. It is possible for such an NEO to be temporarily captured by Earth; its orbit would thereby be changed and it would become an Earth-orbiting object after a small increase in its velocity. From the point of view of the Sun-Earth-NEO restricted three-body system, it is possible for an NEO whose Jacobian constant is slightly lower than C1 and higher than C3 to be temporarily captured by Earth. When such an NEO approaches Earth, it is possible to change its orbit energy to close up the zero velocity surface of the three-body system at point L1 and make the NEO become a small satellite of the Earth. Some such NEOs were found; the best example only required a 410m/s increase in velocity.

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