**The Promise and Perils of Mining Asteroids**

A new company has joined the ranks of entrepreneurs looking to space for their next economic opportunity.

Marc Kaufman, [National Geographic News](http://news.nationalgeographic.com/)

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**Encouraged by new space technologies, a growing fleet of commercial rockets, and the vast potential to generate riches, a group of entrepreneurs announced Tuesday that they planned to mine the thousands of near-[Earth](http://science.nationalgeographic.com/science/space/solar-system/earth.html)**[**asteroids**](http://science.nationalgeographic.com/science/space/solar-system/asteroids-comets-article/)**in the coming decades.**

The new company, Deep Space Industries (DSI), is not the first in the field, nor is it the most well-financed. But with their ambition to become the first asteroid prospectors, and ultimately miners and manufacturers, they are aggressively going after what Mark Sonter, a member of DSI's board of directors, called "the main resource opportunity of the 21st century." (Related: ["Asteroid Hunter to Be First Private Deep-Space Mission?"](http://news.nationalgeographic.com/news/2012/06/120628-first-private-asteroid-mission-sentinel-b612-nasa-space-science/))

Prospecting using miniaturized "cubesat" probes the size of a laptop will begin by 2015, company executives announced. They plan to return collections of asteroid samples to Earth not long after.

"Using low cost technologies, and combining the legacy of [the United States'] space program with the innovation of today's young high tech geniuses, we will do things that would have been impossible just a few years ago," said Rick Tumlinson, company chairman and a longtime visionary and organizer in the world of commercial space.

"We sit in a sea of resources so infinite they're impossible to describe," Tumlinson said.

There are some 9,000 asteroids described as "near-Earth," and they contain several classes of resources that entrepreneurs are now eyeing as economically valuable.

Elements such as gold and platinum can be found on some asteroids. But water, silicon, nickel, and iron are the elements expected to become central to a space "economy" should it ever develop.

Water can be "mined" for its hydrogen (a fuel) and oxygen (needed for humans in space), while silicon can be used for solar power systems, and the ubiquitous nickel and iron for potential space manufacturing. ([See an interactive on asteroid mining.](http://news.nationalgeographic.com/news/2013/01/130122-interactive-asteroid-mining-metal-abundance/)) Sonter, an Australian mining consultant and asteroid specialist, said that 700 to 800 near-Earth asteroids are easier to reach and land on than the moon.

DSI's prospecting spacecraft will be called "FireFlies," a reference to the popular[science fiction television series](http://www.imdb.com/title/tt0303461/) of the same name. The FireFlies will hitchhike on rockets carrying up communication satellites or scientific instruments, but they will be designed so that they also have their own propulsion systems. The larger mining spacecraft to follow have been named "DragonFlies."

It all sounds like science fiction, but CEO David Gump said that the technology is evolving so quickly that a space economy can soon become a reality. Providing resources from beyond Earth to power spacecraft and keep space travelers alive is the logical way to go.

That's because the most expensive and resource-intensive aspect of space travel is pushing through the Earth's atmosphere. Some 90 percent of the weight lifted by a rocket sending a capsule to Mars is fuel. Speaking during a press conference at the Santa Monica Museum of Flying in California, Gump said that Mars exploration would be much cheaper, and more efficient, if some of the fuel could be picked up en route. (Related: ["7 Ways You Could Blast Off by 2023."](http://news.nationalgeographic.com/news/2013/01/pictures/130114-space-tourism-spacecraft-moon-mars/))

Although there is little competition in the asteroid mining field so far, DSI has some large hurdles ahead of it. The [first company to announce plans for asteroid mining was Planetary Resources, Inc.](http://www.wired.com/wiredscience/2012/04/planetary-resources-asteroid-mining/) in spring 2012—the group is backed by big-name investors such as Google's Larry Page and Eric Schmidt, filmmaker James Cameron, and early Google investor Ram Shriram. DSI is still looking for funding.

While these potential space entrepreneurs are confident they can physically lay claim to resources beyond Earth, there remain untested legal issues.

The [United Nations Space Treaty of 1967 expressly forbids ownership of other celestial bodies](http://www.unoosa.org/oosa/SpaceLaw/outerspt.html) by governments on Earth. But American administrations have long argued that the same is not true of private companies and potential mining rights.

While an American court has ruled that an individual cannot own an asteroid—as in [the case of Gregory Nemitz, who laid claim to 433 Eros](http://www.sfgate.com/news/article/Final-frontier-for-lawyers-property-rights-in-2564610.php) as a NASA spacecraft was approaching it in 2001—the question of extraction rights has not been tested.

Moon rocks brought back to Earth during the Apollo program are considered to belong to the United States, and the Russian space agency has sold some moon samples it has returned to Earth—sales seen by some as setting a precedent.

Despite the potential for future legal issues, DSI's Gump said his group recently met with top NASA officials to discuss issues regarding technology and capital, and came away optimistic. "There's a great hunger for the idea of getting space missions done with smaller, cheaper 'cubesat' technology and for increased private sector involvement." Everyone involved acknowledged the vast challenges and risks ahead, but they see an equally vast potential—both financial and societal.

"Over the decades, we believe these efforts will help expand the civilization of Earth into the cosmos, and change what it means to be a citizen of this planet," Tumlinson said.