

Diabologic: Asteroids

by Frank Dolinar

The late Robert A. Heinlein was among a handful of the best known science-fiction authors of the twentieth century. One of his early short stories, "Misfit", introduced the idea of moving an asteroid into orbit around the Earth. Interesting concept. Why would you want to?

The asteroids are, for the most part, quite far away. They are usually – but not always – found between the orbits of Mars and Jupiter, at an average of 279 million miles from the sun or approximately twice the distance from the sun as the orbit of Mars.

One theory suggests that the asteroids exist where there was once a fifth planet split into debris by some unknown cataclysm and another suggests that asteroids are actually the raw materials of a planet that never formed. We're not likely to answer that riddle anytime soon.

Although the average orbit of the asteroids is well beyond Mars, there are quite a number of them that have what is known as eccentric orbits which come close enough to the sun to cross Earth's orbit. These are called near Earth objects (NEO), and they are more common than most people believe. As an example, on September 8, 2010, NASA reported that two asteroids (2010 RX30 & 2010 RF12), each about 15 meters in diameter and in unrelated orbits, passed by the Earth at distances less than the moon's orbital radius. Asteroid RX30 at 0.6 lunar distance (154,000 miles) and RF12 at 0.2 lunar distance (49,000 miles).

Relatively small rocks and close flybys, but no real danger.

The Perseid meteor shower, particles of rock the size of grains of sand or possibly as large as pea gravel, produce intermittent fireworks as they are caught by Earth's gravity well and dive into its atmosphere.

The tiny size of these objects make them no danger at all, and they put on a nice show.

On the other hand, we don't really want big rocks falling out of our sky.

Why not? A popular and well supported theory suggests that the impact of a 10 kilometer diameter meteor – possibly a near Earth object – was responsible for the demise of the dinosaurs about 65 million years ago. A 10 kilometer diameter rock is pretty big. And, if it gets caught by Earth's gravity, it can do an enormous amount of damage on its way down and when it "lands". Just ask the dinosaurs.

Perhaps the most important reason for paying attention to asteroids is to find ways to safeguard Earth from asteroid impacts. We need to identify NEO asteroids, determine whether they pose a danger, intercept the ones that do before they get close to Earth, and nudge them into paths that are safer for the planet.

Recent discussions about a manned mission to Mars have captured the public's attention. In addition, on April 16 of this year, President Obama set a goal for Americans in space of visiting an asteroid by 2025. It didn't get much attention. Why should it when Mars lives in our imaginations?

This trip won't be to the asteroid belt, but to an NEO object. It should have gotten more attention.

If taken seriously, developing technologies to deal with NEO asteroids will provide workable and reliable tools for building near-earth orbital infrastructure, more advanced satellites and habitats in geosynchronous orbit, and the permanent return of humans to the moon.

Making the decision to spend the money and the time for missions to the NEO asteroids will actually speed our missions to Mars and beyond. Here are some other reasons for the trips:

- Asteroids contain materials thought to be the building blocks of the planets. These will tell us about the origins of the solar system.
- Asteroids such as 2 Pallas and 10 Hygiea appear to have organic compounds on them. Studying them may help us understand more about the origin of life on Earth.
- Near Earth asteroids may be sources of valuable metals, from iron to gold. There's a lot of interest in going to the asteroids to mine its resources. Before we can do that, however, we need to know much more about asteroid composition and the technical aspects of traveling to them.

Finally, there's one more thing.

John Grunsfeld, Ph.D., an astrophysicist and former NASA astronaut, suggested sending humans to purposely move an asteroid. The ability to deflect an asteroid on an impact trajectory with Earth has implications for the entire human race.

Dr. Grunsfeld said, "By going to a near-Earth object, an asteroid, and perhaps even modifying its trajectory slightly, we would demonstrate a hallmark in human history. The first time humans showed that we can make better decisions than the dinosaurs made 65 million years ago."

Sounds like a good idea to me.