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The business logic of asteroid mining

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Rainer Zitelmann | July 7, 2026



Beyond Earth, there are abundant resources on the Moon and, more significantly, on asteroids. The asteroid belt between Mars and Jupiter alone is estimated to contain between 700,000 and 1,700,000 asteroids with diameters of at least 0.6 miles. In addition, there are over 30,000 known near-Earth asteroids (NEAs), and about 2,000 to 3,000 more are discovered each year.

A common objection to asteroid mining is that it would cost too much to transport raw materials from an asteroid to Earth, rendering mining economically unviable. The fact that transporting materials is expensive is partly true, but the argument still misses the point. Experts such as John S. Lewis, who raised the issue as early as 1997 in his book *Mining the Sky*,

argued above all that the raw materials extracted from asteroids should primarily be used in space.

Lewis maintained that the resources most urgently needed for a space civilization were those required in large quantities to meet its material and energy demands. Because transportation from Earth was so expensive, he argued that any material needed in substantial amounts in space should, whenever possible, be produced from resources found in space rather than launched from Earth. He further contended that only materials with a very high market value per kilogram on Earth would justify the cost of transporting them back from space.

Lewis wrote this in 1997, when the cost of transporting payloads into space was much higher, but the basic principle still applies. For example, in many cases it will make more sense to use raw materials from asteroids in space to build space stations or large solar panels than to transport them there from Earth.

In particular, water can be extracted from many asteroids. Astrophysicist Martin Elvis even believes that water extraction could eventually become more important than mining valuable metals such as platinum. Transporting water from Earth into space remains prohibitively expensive, even with reduced launch costs, yet it is an essential resource for activities such as rocket fuel production. Water can be split into oxygen and hydrogen and then used as fuel.

In future, spaceships will have to be refueled in space. Just as motorized vehicles on Earth rely on filling stations, space travel will depend on refueling stations. Running a rocket fuel station could prove to be a lucrative business opportunity. This fuel could be used for a number of purposes, including repositioning large and expensive communications satellites or clearing hazardous space debris.

Water can also be used as an excellent shield against cosmic radiation in space. Research indicates that water offers similar or better protection than many other materials of comparable mass. Moreover, water is an essential resource on spacecraft anyway (e.g. as drinking water, a coolant, or as a component of life support systems). Water could be stored in walls and tanks, simultaneously providing radiation protection.

This is the crucial point: I have found in many discussions with people who had never really explored the subject (but nevertheless held firm opinions on it) that one basic assumption was fundamentally wrong, namely that the primary purpose of extracting raw materials from asteroids is to bring them back to Earth. While this may be the case for exceptionally valuable platinum-group metals, which are believed to occur on some asteroids in concentrations far higher than on Earth, the vast majority of raw materials will actually be utilized for production in space.

Even with further potential reductions in launch costs from Earth, it will often be more cost-effective to utilize raw materials obtained from asteroids in situ. In years to come, space-based production will play a significant role. Why should we transport raw materials from Earth into space when ample resources are available on planets, moons, and asteroids?

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