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Micro Asteroid Prospector Powered by Energetic Radioisotopes: MAPPER

The solar system is an almost limitless store-house of resources. As humanity begins to expand into space, we can greatly reduce the cost and effort of exploration by using the resources from other orbiting bodies. The ability to extract volatile gases or structural materials from moons and other planetesimals will allow smaller ships, faster missions, and lower costs. Part of the problem, however, will be to locate the desired deposits from the billions of square miles of surface area present in the solar system.

The asteroid belt between Mars and Jupiter is perhaps the most valuable and most overlooked of resource deposits in the solar system. The total mass of the Belt is estimated to be 1/1000 the mass of the Earth. Unfortunately, the Belt has millions of objects to explore. We propose to design a new exploration architecture that will allow all of the asteroid belt to be catalogued. By mapping out the locations of metal deposits along with the concentrations of water, we can make exploration of the solar system take a quantum leap.

The ultimate goal of this project is to identify and investigate an exploration architecture that would allow hundreds of light-weight instrument packages to be sent to the Asteroid Belt. Each package will be able to identify mineral deposits and water by passing within a minimum distance of each asteroid. Upon analysis, the elemental content of each asteroid will be transmitted back to Earth for cataloguing. In addition, each asteroid will be implanted with a marker from which future explorers can immediately know the content of the asteroid. Each package will be able to land periodically to extract propellant from the water bearing asteroids. Using a revolutionary power supply, each package will function for over 20 years, hopping from asteroid to asteroid and transmitting the location and element inventory to the Earth.