

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
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COMMERCIAL NEO PRECURSORS LEADING TO AN EXPLORATION AND UTILIZATION
ARCHITECTURE WITH INFRASTRUCTURE COSTS SHARED BY PUBLIC AND PRIVATE
ORGANIZATIONS

Abstract

Precursor missions to near Earth objects (NEOs) that space agencies are considering for later crewed expeditions can be accomplished at low cost by exploiting new commercial services offered by Deep Space Industries and Planetary Resources Inc. DSI's cubesat-based spacecraft, launched as tertiary ride-along payloads, will be able to return multi-kilogram samples from targeted NEOs. They incorporate new ion engines of great efficiency, advanced Ka-band communications units, and operate largely autonomously. In addition to returning samples to assist space agencies' analysis of potential targets, retrieved material will be feedstock to test DSI's prototype asteroid processing technologies such as the MicroGravity Foundry, which uses a new 3D printing technique to transform raw asteroid powder directly into high-strength nickel parts. The MicroGravity Foundry is a closed-cycle process requiring only energy to run continuously, serving in-space markets for fabricated components. DSI is developing additional processing technologies to extract volatiles from asteroids to produce propellant, also to be sold to in-space users such as communications satellites. DSI will outline a new space exploration and utilization architecture, where commercial markets in space for asteroid material and propellant complement the demands of space agencies, so that the infrastructure costs are spread across a wide market, reducing costs for both private and public users.