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BLUE RING: A HIGHLY CAPABLE ORBITAL MANEUVERING VEHICLE TO ENABLE SMALL SATELLITE SCIENCE MISSIONS

Abstract

Today's deep space missions are largely conducted with large, bespoke, and costly spacecraft developed over many years by civil space agencies and their industry partners. Once considered a novelty and largely only useful for technology demonstrations, small satellites (smallsats, <600kg) are increasingly utilized for important missions including remote sensing, communications, and space exploration. The well-known benefits of smallsats include their lower cost to develop, shorter manufacturing timelines, and modularity to enable diverse missions. Such systems help provide more affordable access to space for all, stimulate domestic space economies, and increase mission cadence. As smallsats continue to gain sophistication, their ability to serve complex space science and exploration missions is perhaps only limited by opportunities to access the right orbits.

The international space community can enable small spacecraft to perform deep space science missions by leveraging Blue Origin's Blue Ring, a highly capable orbital maneuvering vehicle (OMV). Blue Ring is designed for in-space hosting and dispensing of small satellites and payloads for missions to geostationary orbit (GEO), cislunar space (Lunar and Lagrange-points), and beyond. Blue Ring enables the international space community to transition from the status quo of one satellite per mission, to a future of many satellites per mission. By flying regular missions to GEO, cislunar, and beyond, Blue Ring offers the economies of scale that can drive down overall mission cost. A lightly modified Blue Ring adapted for missions to near earth objects (NEOs) and between the corridors of Venus to Mars missions would meet the international space community's growing needs by increasing the operational capabilities of hosted and deployable payloads. It would provide launch, power, propulsion, advanced communications, and telemetry, tracking, and control (TT&C) for a varied set of commercial, civil, and international customers. Blue Ring data and network mission capabilities can reduce the cost of bespoke science and exploration missions by providing hosted scientific instruments with data services (on top of launch and power). This capability allows principal investigators to focus on science rather than infrastructure.