IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Launch Vehicles in Service or in Development (1)

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REIMAGINING SCIENTIFIC DISCOVERY WITH SPACE LAUNCH SYSTEM UNIQUE LAUNCH CAPABILITY

Abstract

The scientific community updates their respective decadal surveys every ten years, reflecting on the community's consensus opinion of the most compelling scientific enigmas and associated missions. These missions have always faced challenges of unique designs, cost constraints, and long development times, and have traditionally been limited to a probe with orbiter, or rover, or lander launched on a single rocket. This model, until now, has necessarily limited the number of important scientific investigations that can be accomplished within traditional launch capability constraints.

As investigations become increasingly more complex, to achieve increased levels of scientific return, Discovery, Flagship and New Frontier missions must depend on a new paradigm for the mission/launch model to increase the opportunities for mission content and mission deployments while optimizing common trajectories and final destinations within celestial neighborhoods. Space Launch System's (SLS) lift and volume capabilities can now enable new alternatives to undertake missions within the solar system and beyond compared to the traditional LEO commercial rocket operational paradigm. For example, SLS's high energy design for Human exploration is well suited for missions such as scientific exploration, discovery and planetary defense as this super heavy lift vehicle enables co-manifested and ride sharing missions, a multi-payload Carrier Concept, Ultra High Departure Energy (C3), and super heavy lift direct injection capabilities with in-space propulsion not previously possible.

SLS also offers increased mission flexibility, including reduced transit times, larger launch windows, and multiple science missions in a single launch. These new capabilities should not be overlooked. Innovative mission concepts enabled by the SLS super heavy lift capabilities offer new opportunities to reduce the cost of scientific exploration and accelerate the pace of discovery with these missions. Opportunities exhibiting these benefits will be presented, such as the trade study for Icy Giant missions - where a two planet, two spacecraft mission on a single launch would not only reduce flight times to either giant but increase delivered mass, as well as opportunities for science from the moon and asteroid deflection.

By offering these previously unconventional options for operations, SLS will empower unprecedented opportunities for scientific discovery, mission success and increased value to the science and astronomy communities, and ultimately humankind.