

FUTURE MISSION PROPOSAL OPPORTUNITIES: DISCOVERY, NEW FRONTIERS, AND PROJECT PROMETHEUS. S. M. Niebur¹, T. H. Morgan¹, and C. S. Niebur¹, ¹Solar System Exploration Division, NASA Headquarters (300 E Street SW, Washington, D.C. 20546-0001, Susan.M.Niebur@nasa.gov).

Introduction: The NASA Office of Space Science is expanding opportunities to propose missions to comets, asteroids, and other solar system targets. The Discovery Program continues to be popular, with two sample return missions, Stardust and Genesis, currently in operation. The New Frontiers Program, a new proposal opportunity modeled on the successful Discovery Program, begins this year with the release of its first Announcement of Opportunity. Project Prometheus, a program to develop nuclear electric power and propulsion technology intended to enable a new class of high-power, high-capability investigations, is a third opportunity to propose solar system exploration. All three classes of mission include a commitment to provide data to the Planetary Data System, any samples to the NASA Curatorial Facility at Johnson Space Center, and programs for education and public outreach.

Discovery: NASA's Discovery Program provides regular opportunities to conduct planetary system(s) science investigations that require free-flying missions launched on the space shuttle or expendable launch vehicles. These are complete missions, directed by a single Principal Investigator (PI), with participation from a number of scientific Co-Investigators, Participating Scientists, and Collaborators, as well as the engineering project team and industry partners. Post-mission scientific value is enhanced by the availability of mission data in the Planetary Data System, samples at the Curatorial Facility, and funding available from the Discovery Data Analysis Program, Sample Return Laboratory Instruments and Data Analysis Program, and a number of other programs available through the annual NASA Research Announcement entitled Research Opportunities in Space Science (ROSS NRA). There have been six Discovery missions launched to date: NEAR, Lunar Prospector, Pathfinder, Stardust, Genesis, and Contour. The next opportunity to propose a Discovery mission is planned to occur late in 2003. Discovery missions are cost-capped missions, with a current total NASA Office of Space Science (OSS) cost of up to \$350 M. Missions typically launch three years after confirmation.

New Frontiers: The New Frontiers Program has recently been introduced in order to further enable PI-led missions to explore the solar system and/or return samples for study. The National Academy Decadal

Survey (*New Frontiers in the Solar System*, National Research Council, 2002) has recommended five medium-class mission investigations as an initial target set: Comet Surface Sample Return, South Pole Aitken Basin Sample Return, Venus In Situ Explorer, Jupiter Polar Orbiter with Probes, and a Kuiper Belt/Pluto mission. The first New Frontiers mission will be New Horizons, a mission to Pluto and the Kuiper Belt. The other four investigations will comprise the possible target set for mission proposals in 2003. The NASA OSS cost for these missions can be up to \$650 M. These missions may therefore employ radioactive power sources and Evolved Expendable Launch Vehicles, such as the Atlas V or Delta IV, enabling an expanded opportunity to explore the solar system, including the return of samples. Missions should launch within four years of confirmation.

Project Prometheus: The newly created Project Prometheus Program will develop nuclear electric power and propulsion technology to allow a new era of scientific investigation with capabilities far beyond those available today. These missions will utilize on-board nuclear fission reactors and high power ion engines to provide revolutionary capabilities such as high power levels for instruments (10 – 45 kW), high data rates for acquisition and telecom (10 Mbps), large payload mass, multi-target rendezvous and orbits, and extended observation time. The first Project Prometheus mission is the Jupiter Icy Moons Orbiter, which has recently begun formulation. Since Project Prometheus is planned as a recurring mission line, NASA will soon release a request for studies of future high capability missions. A list of possible future missions includes, but is not limited to, Titan explorer, comet chaser, interstellar probe, and Neptune/Triton missions.

Conclusion: The Discovery, New Frontiers, and Project Prometheus mission lines provide opportunities for small, medium, and high-powered missions to explore the Solar System and return valuable data and extraterrestrial samples. The Office of Space Science welcomes your ideas, proposals, and participation in these three exciting mission lines.