The NASA New Millennium Program: Advanced Technologies For Future Science Missions. D. Crisp and C. Raymond, [1]MS 180-404, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109, David.Crisp@jpl.nasa).

Introduction: NASA has ambitious plans for space science and Earth observations during the next decade. Several new spacecraft and measurement technologies are needed to support these plans within existing budget and schedule constraints. The New Millennium Program (NMP) supports these efforts by identifying and flight-validating revolutionary spacecraft and instrument technologies that could enhance the science return of future missions, while reducing their cost and risk. NMP currently has two Deep Space (DS) missions in flight, and two Earth Orbiting (EO) missions in their implementation phases The first Deep Space mission, DS1, was launched on October 24, 1998. This flight will validate a suite of technologies designed to facilitate rapid access to small bodies and other targets in the inner solar system. DS1 will validate a solar-powered ion propulsion system and 9 other advanced spacecraft technologies for communications, autonomous operations and navigation, multifunctional structures, and microelectronics. DS1 also includes two advanced instruments: the Miniature Integrated Camera and Spectrometer (MICAS), and the Plasma Experiment for Planetary Exploration (PEPE). To provide a realistic test of these technologies, DS1's nominal flight path includes a close (<10km) flyby of asteroid 1992KD. An extended mission will would allow encounters with up to two comets (Wilson-Harrington and Borrelly).

The second NMP mission, DS2, consists of a pair of micro penetrators that were launched on January 3, 1999 as a piggyback payload on the cruise stage of the Mars Surveyor '98 Lander. DS2 will demonstrate a set of technologies that will enable future Mars surface networks. These technologies include a single-stage, passive atmospheric entry system and a high-impact landing system designed to deliver the science payload up to 1 meter below the Martian surface. This mission will also validate a miniaturized telecom system, low-temperature batteries, a suite of miniaturized in-situ scientific instruments, and other innovative packaging technologies.

Three additional NMP space science missions are currently seeking NASA approval. If approved, DS3 will validate a series of technologies needed for separated spacecraft interferometry. This mission will enable the ambitious Terrestrial Planet Finder (TPF), which is planned as a follow-on to the Space Interferometer Mission (SIM) and the Next Generation Space Telescope (NGST). DS4 will deliver the Champollion Lander to the surface of comet Tempel-1 to validate a suite of technologies needed for future small body rendezvous and sample return missions. The DS5 mission is currently in its initial design stage. This flight will validate advanced technologies needed by the space physics and astrophysics communities, which are supported through the NASA Office of Space Sciences "Sun-Earth Connection" and "Structure and Evolution of the Universe" themes.

The first NMP Earth Orbiting Mission, EO1, is scheduled for a December 1999 launch. This mission will demonstrate an advanced land imaging system that yield substantial cost savings for future Landsat Orbiters. The second NMP Earth Orbiting mission, EO2, will provide the first opportunity to validate a space-based coherent lidar system for measuring winds throughout the Earth's troposphere. This low-cost mission will be carried to orbit as a Hitchhiker payload on the Space Shuttle. For the third Earth Orbiting flight, a NASA Research Announcement (NRA) was issued to solicit ideas for advanced measurement concepts that can exploit orbits other than conventional low Earth orbits. These orbits include L1, L2, geostationary, or highly elongated elliptical orbits. Proposals submitted in response to this NRA are currently being evaluated.

Science Participation: Even though the NMP focuses on the validation of technologies for future science missions, NMP flights are also designed to return valuable scientific data. There are a number of ways that planetary scientists can participate in this program. Like many space science programs, the NMP gathers input from the space and Earth science communities through a Science Working Group (SWG). The NMP SWG is chosen primarily from NASA's science advisory and roadmapping committees. This group helps to identify and prioritize the spacecraft and instrument capabilities needed to accomplish the science goals described in the Space Science and Earth Science road maps. The SWG and other members of the space science and technology communities work with the NMP to identify candidate technologies that might address these capability needs. An Integrated Project Development Team, which includes scientists, technologists, and mission planners, then integrates these technologies into candidate validation flights. Finally, these mission concepts are submitted to NASA Headquarters for approval. Once an NMP flight has been approved, scientists can participate in the planning, acquisition, validation, and archiving of scientific data from that flight by competing for membership on the instrument technology validation team. This is done by submitting a proposal in response to an Announcement of Opportunity (AO) or NRA released by NASA Headquarters. Each of these processes will be described in greater detail in our poster.