NASA selects CubeSat, SmallSat mission concept studies

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Credit: NASA

NASA has selected ten studies under the Planetary Science Deep Space

SmallSat Studies (PSDS3) program, to develop mission concepts using small satellites to investigate Venus, Earth's moon, asteroids, Mars and the outer planets.

For these studies, small satellites are defined as less than 180 kilograms in mass (about 400 pounds). CubeSats are built to standard specifications of 1 unit (U), which is equal to 10x10x10 centimeters (about 4x4x4 inches). They often are launched into orbit as auxiliary payloads, significantly reducing costs.

"These small but mighty satellites have the potential to enable transformational science," said Dr. Jim Green, director of the Planetary Science Division at NASA Headquarters in Washington. "They will provide valuable information to assist in planning future Announcements of Opportunity, and to guide NASA's development of small spacecraft technologies for deep space science investigation."

NASA's Science Mission Directorate is developing a small satellite strategy, with the goal of identifying high-priority science objectives in each discipline that can be addressed with CubeSats and SmallSats, managed for appropriate cost and risk. This multi-disciplinary approach will leverage and partner with the growing commercial sector to collaboratively drive instrument and sensor innovation.

The PSDS3 awardees were recognized Monday at the 48th Lunar and Planetary Society Conference in The Woodlands, Texas. The total value of the awards is $3.6 million.

The recipients are:

Venus

Christophe Sotin, NASA's Jet Propulsion Laboratory, Pasadena,

California: Cupid's Arrow, a 30-kilogram probe to measure noble gases and their isotopes to investigate the geological evolution of Venus and why Venus and Earth have evolved so differently.

Valeria Cottini, University of Maryland, College Park: CubeSat UV Experiment (CUVE), a 12-unit CubeSat orbiter to measure ultraviolet absorption and nightglow emissions to understand Venus' atmospheric dynamics.

Moon

Suzanne Romaine, Smithsonian Astrophysical Observatory, Cambridge, Massachusetts: CubeSat X-ray Telescope (CubeX), a 12-unit CubeSat to map the elemental composition mapping of airless bodies such as the moon, to understand their formation and evolutionary history using X-ray pulsar timing for deep space navigation.

Timothy Stubbs, NASA Goddard Space Flight Center, Greenbelt, Maryland: Bi-sat Observations of the Lunar Atmosphere above Swirls (BOLAS), tethered 12-unit CubeSats to investigate the lunar hydrogen cycle by simultaneously measuring electromagnetic fields near the surface of the moon, and incoming solar winds high above.

Asteroids

Jeffrey Plescia, Johns Hopkins University Applied Physics Laboratory, Laurel, Maryland: Asteroid Probe Experiment (APEX), a SmallSat with a deployable seismometer to rendezvous with the asteroid Apophis and directly explore its interior structure, surface properties, and rotational state.

Benton Clark, Lockheed Martin Space Systems Company, Littleton,

Colorado: CubeSat Asteroid Encounters for Science and Reconnaissance (CAESAR), a constellation of 6-unit CubeSats to evaluate the bulk properties of asteroids to assess their physical structure, and to provide constraints on their formation and evolution.

Mars

David Minton, Purdue University, West Lafayette, Indiana: Chariot to the Moons of Mars, a 12-unit CubeSat with a deployable drag skirt to produce high-resolution imagery and surface material composition of Phobos and Deimos, to help understand how they were formed.

Anthony Colaprete, NASA Ames Research Center, Moffett Field, California: Aeolus, a 24-unit CubeSat to directly measure vertically-resolved global winds to help determine the global energy balance at Mars and understand daily climate variability.

Icy Bodies and Outer Planets

Kunio Sayanagi, Hampton University, Virginia: Small Next-generation Atmospheric Probe (SNAP), an atmospheric entry probe to measure vertical cloud structure, stratification, and winds to help understand the chemical and physical processes that shape the atmosphere of Uranus.

Robert Ebert, Southwest Research Institute, San Antonio, Texas: JUpiter MagnetosPheric boundary ExploreR (JUMPER), a SmallSat to explore Jupiter's magnetosphere, including characterizing the solar wind upstream of the magnetosphere to provide science context for future missions such as the Europa Clipper.

More information: For more information about NASA's CubeSat activities, visit www.nasa.gov/mission_pages/cubesats/index.html

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