



The MILO Space Science Institute: Enabling New, Science-Focused Deep Space SmallSat Missions

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What is the MILO Institute?

- Non-profit collaboration among Arizona State University, Lockheed Martin, and GEOShare, formed in 2018
- Formed to test the hypothesis that science-driven deep space robotic missions could be organized, conducted, and led by a consortium of U.S. and foreign universities and space agencies, rather than only by the world's largest space agencies
- See <http://miloinstitute.org> for details

Mission Overview

- Initial activity: Design and development of inaugural mission concepts to achieve Decadal Survey-quality science relatively quickly to serve as a proof-of-concept for the MILO funding and management model
- Inaugural mission costs significantly lower than those of NASA Discovery missions
- Three inaugural smallsat missions are being developed: two to explore Near-Earth Objects and one to explore the Moon
- In discussions about MILO membership with more than 150 entities in 40 countries

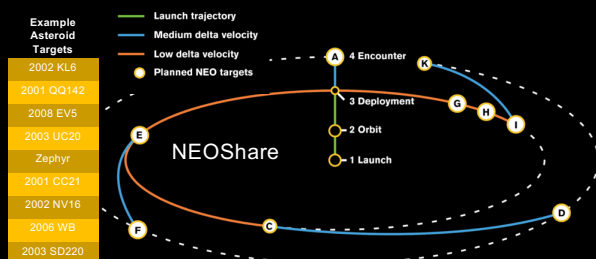
Near-Earth Object (NEO) Missions

“NEOShare”

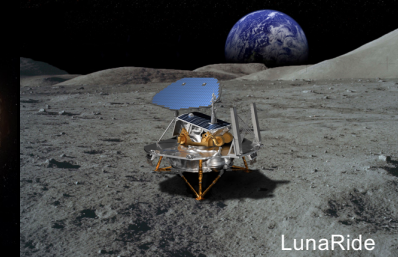
- Overview: A cluster of six smallsats equipped with cameras, spectrometers, and other high-heritage instruments designed to characterize small asteroids and comets that come close to Earth's orbit
- Goal: Characterize the geology, composition, and properties of at least eight new NEOs to supplement the five NEOs currently characterized by spacecraft

“Apophis Pathfinder”

- Overview: A dual-spacecraft mission designed to conduct a preliminary flyby of the 370-meter diameter PHA (99942) Apophis well before its 2029 extremely close encounter with the Earth
- Goal: Provide initial science and planetary defense data (geology, composition, mass, etc.) to influence planning for eventual 2029 missions by others



Apophis Pathfinder



LunaRide

Lunar Mission

“LunaRide”

- Overview: a mission that leverages the Lockheed Martin Commercial Lunar Payload Services (CLPS) McCandless Lunar Lander, allowing MILO members to access volume, mass, power, and data transfer capabilities of the lander to send either passive or active science payloads to the lunar surface
- Goal: Conduct a wide variety of Decadal-quality science experiments to advance our understanding of the geology, composition, resources, origin, and evolution of the Moon

References

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 Bell, J., “The MILO Institute: A new model for deep space exploration,” (Op-Ed) SpaceNews, Dec. 21, 2018.