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LUNAR MAPPER AND INSPECTOR (LUMI): SMALL MISSION FOR SOUTH POLE EXPLORATION

**Abstract**

Lunar Mapper and Inspector (LUMI) is a mission study under ESA's Small Missions for Exploration program. LUMI is intended to capture high-resolution views of the lunar surface from multiple viewing angles to generate improved digital elevation models (DEMs) of South Pole regions to aid landings, mission planning, and surface operations for ESA, NASA, and other institutional and commercial missions. Deploying a multimodal propulsion system, the S/C will leverage the low-altitude passes at 20km perilune for its Narrow-Angle Camera (NAC) suite to produce a sub-meter resolution DEM. The planned intensive Lunar exploration requires more advanced remote sensing, which is similar to single-payload Earth Observation satellites. As an easily and quickly replicable mission based on COTS components, LUMI will address this demand.

The mission concept is based on piggyback delivery of a microsatellite to a Lunar orbit from which it will insert itself into its operational orbit. The microsatellite of 100 kg will carry only one payload, the NAC suite with a roughly 20-cm aperture. Improved lunar DEMs of 3-4m vertical resolution are only available for areas covering latitudes within 60 as the fast-changing illumination conditions of the polar region make NAC-based stereo image pairs difficult to produce. Further, LOLA-based DEM is providing data in only 10

LUMI is another mission study led by a group of scientific and industrial entities from small European countries that have previously worked on other Lunar orbiters together. The mission will represent the power of small countries and actors coming together to unlock the potential of the Lunar economy.