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ESA'S FUTURE MOON MISSION STUDIES

**Abstract**

In line with growing lunar exploration efforts around the world, ESA is engaged in sustained endeavours to shape future Moon missions. This paper describes the next steps in utilizing the lunar surface capabilities created by the proposed landing capability. In the near term, ESA's European Exploration Envelope Programme focuses on implementing commitments to the European Service Module of the NASA Orion vehicle, to the iHab and the ESPRIT modules of the Gateway. If approved by its member states at a ministerial conference, apart from in cis-lunar space, ESA will also play a leading role on the lunar surface by means of the European Large Logistic Lander (EL3). This lander will enable Europe to land approximately 1.5 metric tonnes on the lunar surface, either for ESA-led payloads or in the frame of a partnership. Candidates for the first utilisation of this capability are cargo landing missions in the frame of the NASA Artemis programme and a mission to explore the lunar pole (Polar Explorer). Since the EL3 is designed to be sustained (and sustainable) landing system, a series of 3 or more missions per decade need to be assessed and selected for the missions after the maiden flight. Guided by considerations of the European science community and in coordination with international partners within the International Space Exploration Coordination Group, ESA studies scientific missions, while also contributing to the international surface architecture. Early industrial studies of potential missions and architecture include a solar power plant (European Charging Station for the Moon, ECSM) and a multi-mission European Moon Rover System (EMRS). Further studies regarding the possibility of an Astrophysics Lunar Observatory (ALO), a bio-science mission (BioMoon) and a dedicated lunar geology mission are under way.