

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 2 (2B)

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ISPACE'S POLAR ICE EXPLORER: A COMMERCIAL ISRU EXPLORATION MISSION TO THE
SOUTH POLE OF THE MOON.

Abstract

ispace is a company whose vision is to expand and sustain humanity's presence in space by utilizing resources available on the Moon. In order to accomplish this vision, ispace set a 3-step roadmap where the first step is the technology demonstration of ispace's rover as part of the Google Lunar XPRIZE. ispace, a finalist in the Grand Prize, developed and flight qualified the SORATO rover and won the mobility milestone award. For Step 2, ispace intends to build-upon the rover technology to perform missions that will prepare the establishment of in-situ resource utilization (ISRU) on the Moon. With proven technologies (Step 1) and a solid understanding of the lunar environment and distribution of resources (Step 2), ispace will be ready to execute the processing and utilization of lunar resources in Step 3. The company is headquartered in Tokyo, Japan and has subsidiaries in the NASA Ames Research Park, California and in Luxembourg. The topic of this abstract is on the Step 2 and the Polar Ice Explorer mission that is being developed by ispace Europe in order to better understand the distribution of hydrogen on the lunar surface. Orbital imagery and analyses of lunar samples have indicated the presence of H₂ molecules that could form potential water ice deposits on the lunar poles. However, the relatively low spatial resolution of the current remote sensing datasets (tens of km) together with the uncertainties about the lunar polar environment, the properties of the regolith and the deposits themselves, does not make possible to start water extraction right away. The first goal of the PIE mission is to increase knowledge of the potential water ice deposits by determining the local distribution and abundance of H in the subsurface regolith of an H-enhanced area in the South Pole of the Moon. A secondary goal is to provide with information to help future lunar ISRU missions by gathering information on the geotechnical properties of the polar regolith that affects rover trafficability and the contamination produced by the lander's exhaustion plume. The most unique aspect of the PIE project is that it is run by a private space company. The company is responsible for formulating the vision and high-level goals and for tracing the success for particular objectives for the PIE project. In addition, the company must develop new and innovative ways to cover the costs associated with the mission.