Lunar, Mars, Near-Earth Asteroids, Deep Space Exploration (2)
Lunar, Mars, Near-Earth Asteroids, Deep Space Exploration - Session 1 (1)

Author: Mr. Rogelio Morales
Bolivarian Agency for Space Activities (ABAE), Venezuela

Mr. Jesus Camacho
Bolivarian Agency for Space Activities (ABAE), Venezuela
Prof. Hermin Sosa
Bolivarian Agency for Space Activities (ABAE), Venezuela

STRATEGY FOR THE SUSTAINABLE DEVELOPMENT OF LUNAR INFRASTRUCTURE BASED ON THE USE OF IN-SITU RESOURCES

Abstract

In 2023, the Bolivarian Agency for Space Activities (ABAE) was invited by the China National Space Administration (CNSA) to participate in the International Lunar Research Station (ILRS) project. Since then, the ABAE has been developing a long-term strategy to improve Venezuela's space research capabilities, with the goal of contributing to a viable, sustainable and fully autonomous development of lunar critical infrastructure, such as launch and lunar landing sites, tracks, habitats, etc. In this regard, In-Situ Resource Utilization (ISRU) is a viable method to collect, process, and utilize lunar regolith for lunar infrastructure, thereby ensuring the sustainability of long-term lunar operations and providing essential resources for the survival of lunar explorers, rather than relying on resources brought from Earth. Finally, lunar construction and operations in extreme environments will require the implementation of autonomous robotic platforms to support future manned and unmanned space exploration. In that sense, autonomous multi-agent systems are proposed for prospecting, reservoir exploration, processing and production of building blocks for lunar infrastructure construction, as well as logistics operations and facility operations. This strategy aims to ensure Venezuela's permanent, proactive and autonomous participation in the international space arena. The vision and objectives of this strategy are described in detail.