

IAF SPACE POWER SYMPOSIUM (C3)
Space Power Systems for Ambitious Missions (4)

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META-LUNA: DISRUPTIVE ISRU FOR BUILDING FUTURE SOLAR POWER SATELLITES

Abstract

In situ utilisation (ISRU) of space resources is increasingly becoming a central consideration for long-duration space missions. The efficient and sustainable use of these resources must play a prominent role in our discussion of space exploration and development. Regolith represents the largest and most accessible solid resource on the Lunar, Martian and Asteroidal surfaces. Regolith is one of the most abundant resources, and multiple use cases have been proposed from water or oxygen generation to its use in building materials. In response to these challenges, Metasat presents a novel approach to designing and building solar power satellites utilizing space resources for the construction of solar power satellites based on the Multi-domain Operations using Rapidly-responsive PHased Energy Universally Synchronized (MORPHEUS) Solar Power Satellite architecture, a Sandwich Type SPS solution providing an alternative energy source for sustainable energy. The proposed commercial SPS solution leverages advancements in photovoltaic and wireless power transmission technologies, enabling the collection of solar energy in the sunlit regions of space without the constraints of atmospheric interference or nighttime limitations, to deliver clean, abundant, affordable and secure energy. A sustainable approach to space-based energy harvesting is provided, addressing the need for in-space manufacturing, with the aim of reducing the reliance on Earth-based resources, decrease launch costs, and minimizing the environmental impact associated with traditional space missions. This presentation will update prospective paths forward for the MORPHEUS SPS architecture and introduces leveraging disruptive ISRU for building future solar power satellites.