IAF SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Architectures (2)

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RESEARCH AND OBSERVATION IN MEDIUM EARTH ORBIT (ROMEO) WITH A COST-EFFECTIVE MICROSATELLITE PLATFORM

Abstract

This paper is summarising the promising phase A study results of the University of Stuttgart's research satellite ROMEO operating in the challenging Medium Earth Orbit (MEO), using a novel and cost-effective space system architecture.
The proposed mission scenario is a launch of a 60 kg satellite into a sun-synchronous Low Earth Orbit with an altitude of 600 km, while the apogee will be raised above 2000 km employing a water electrolysis propulsion system. This system is a new development and separates water into its chemical components by electrolysis to ignite the gases in the thruster.
Furthermore, the ROMEO platform intends to show that MEO can be an operational field for small satellite missions using commercial components. In contrast to the relatively protected lower Earth orbits, the MEO environment is particularly problematic for electronic components. The Total Ionizing Dose (TID) is much higher and there is a significantly higher probability of Single Event Effects (SEE). This shall be achieved through the use of smart radiation mitigation technologies that ensure an appropriate resilience of the satellite.
Due to the special orbit, the satellite is highly interesting for scientific analysis, thus the phase A study covered also a payload examination: The mission hosts a radiation and magnetic field monitoring sys-tem developed by the European Space Agency ESA. Additionally, ROMEO supports the study of climate change by carrying a telescope for observing the reflected Earth Albedo on the Moon. This Earthshine Telescope is designed by the Danish National Space Institute DTU Space and the Danish Meteorological Institute DMI. A spaceborne instrument can increase the accuracy of the albedo data by one magnitude

to 0.1%