

SPACE EXPLORATION SYMPOSIUM (A3)

Solar System Exploration (5)

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INTERPLANETARY CUBESATS MISSION TO EARTH-SUN LIBRATION POINT FOR SPACE
WEATHER EVALUATIONS

Abstract

The paper deals with an interplanetary CubeSats mission to Earth-Sun Libration point. CubeSats are an interesting alternative to larger science satellites to accomplish both scientific and technological tasks in deep space, as proved by the growing interest in this kind of application within the scientific community and, most of all, at NASA. Indeed such systems allow less costly missions, due to their reduced sizes and volumes, and consequently less demanding launches requirements. The CubeSats mission presented in this paper is aimed at supporting space weather evaluations that represent quite a critical issue especially for what concerns the human exploration of space beyond Earth orbit where the protection of the Earth magnetic field is not available anymore. The mission envisages the deployment of 6U CubeSats system in one of the Earth-Sun Lagrangian Points, where solar observations for in situ measurements of space weather to provide additional warning time to Earth can be carried out. The proposed mission is also intended as a technology validation mission, giving the chance to test advanced technologies, as for example the solar sail, which is envisaged as propulsion system, and specific radiation dosimeters and advanced materials, foreseen to further investigate the space radiation environment and validate them in view of future implementation in human missions. One of the objectives of the work is to identify the required subsystems and equipment, needed to accomplish specific mission objectives and to investigate the most suitable configuration, in order to be compatible with the typical CubeSats (multi units) standards. The paper starts from the definition of the mission, in terms of objectives, requirements and mission analysis. Then it focuses on the CubeSats system, describing its configuration and analysing the subsystems composing it. Finally, the most advanced technologies (e.g. solar sails) implemented in the CubeSats design are discussed.