



The Jovian Minisat Explorer Technology Reference Study

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The Jovian Minisat Explorer Technology Reference Study (TRS) concerns the exploration of the Jovian system, and especially Europa, the smallest of the four Galilean moons orbiting Jupiter. This moon has been selected, as it is one of the few places where liquid water may be found in the solar system, making it one of the prime candidates for the search for life outside Earth.

As a result of a study, performed with EADS Astrium and other partners, a scenario has been identified that foresees two small Jovian spacecraft (~ 600/400 kg dry mass): one will act as a relay spacecraft (Jupiter Relay spacecraft (JRS)) in a highly elliptical orbit around Jupiter, outside the high radiation zones, while the other (Jupiter Europa Orbiter (JEO)) will orbit Europa in an extreme radiation environment. The relay spacecraft will carry all subsystems not directly required for the Europa observation mission, as it will be subjected to less radiation than the Europa orbiter. It will carry the communication system providing the link between Earth and the JEO, data processing and data storage units as well as a small, highly integrated scientific payload suite dedicated to the study of the Jovian system. The Europa orbiter will include a highly integrated remote sensing payload suite and a communication system for communications with the JRS and a limited link to Earth. The feasibility of a compact microprobe to perform in-situ measurement of the ice crust has also been assessed.

The identified technological challenges include 1 Mrad radiation hardened components, solar cells compatible with the extreme radiation environment as well as the low intensity and temperature. Should the solar cells prove to be unfeasible, alternative power sources such as RTGs will have to be considered. As a result, the implication of this alternative power source is currently being investigated. Other challenges

are encountered in the fields of low resource subsystems, including payloads and telecommunications, autonomy, AOCS, planetary protection and high speed impact for penetrator probes.

The study has provided a feasible mission profile for a low resource study of Europa and the Jovian system, provided that the identified technology developments can be achieved.