

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Solar System Exploration including Ocean Worlds (5)

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EUROPA RECONNAISSANCE ORBITER- A COMPREHENSIVE SPACECRAFT
INSTRUMENTATION STUDY FOR EXPLORATION OF JUPITER'S ICY MOON EUROPA**Abstract**

'Recherche de vie' or search of life beyond Earth has been holding an abundance of unraveled lingering questions since the birth of mankind. Atop ocean candidate Europa, the Jovian icy moon has water plumes above its surface. Ocean finding beneath the surface of icy crust at the moon's surface was suggested by Galileo spacecraft and further confirmed by the most recent, Juno spacecraft. Liquid water is one of the essential elements difficult to find beyond Earth that may be harnessed by condensing via in-situ resource technology. The geologically interesting astronomical body may be studied closely by an orbiter that gives the finding of Europa's surface, spatial atmosphere, deep interior, subsurface ocean, and potentially even glacial creatures. This paper discusses the spacecraft instrumentation and working of an Orbiter designed to study Jupiter's frigid moon. As evaluated by previous missions, there is a high concentration of heavy ions (O^+ , N^+ , S^+) in the atmosphere which needs to be studied closely to understand the influence on the atmosphere by the Jovian magnetosphere along with surface emissions. Further, thermal imaging and spectroscopy will aid in imaging the topological layer to reinforce the findings and study the degradation of the surface layer due to radiation interaction. A ground-penetrating radar system accompanied will be used in detecting the thickness of the icy surface and finding the layer from where water presence onsets. As current state-of-the-art technology facilitates the in-depth study of Europa's space environment, this paper details the Europa Reconnaissance Orbiter's aero-structure, power subsystem, propulsion subsystem, control and the trajectory followed by the payload system onboard the spacecraft which collect all the necessary topological information of Europa that may be further studied for implication on the presence of biotic life in the time between the Galileo Mission and the arrival of the Europa Clipper spacecraft.