
Characterizing variabilities of Callisto's magnetospheric orbital environment with the Galileo and Juno missions

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Résumé

Callisto, the outermost Galilean moon, orbits within Jupiter's dynamic magnetosphere, traversing highly variable plasma and magnetic conditions. Despite its interest, Callisto remains the least understood Galilean satellite, with no dedicated flybys since the Galileo mission ended in 2001. To bridge this knowledge gap and accurately characterize the moon's interaction with Jupiter, this study focuses on describing the pristine electron (Le Liboux et al., 2025) and heavy ion (Le Liboux et al., submitted) environment and its variability by combining measurements taken by two particle detectors onboard Juno (JADE, JEDI) and one onboard Galileo (EPD). Juno's JADE and JEDI observations showcase a high electron and heavy ion intensity variability depending on magnetic position, varying by a factor of

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4 to 60. Based on these observations, we provide empirical models of the energy spectra of electron and heavy ion intensity at various magnetic positions, along with electron density, and pressure. Galileo's EPD observations reveal a modulation of intensity variability according to local time, with increased variability on the dawnside. These results establish critical inputs for modeling and experimentation in preparation for the upcoming JUICE and Europa Clipper missions in the 2030s.