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Why is the dynamic of the Jovian magnetosphere quasi-periodical? A possible intrinsic mechanism

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Most regions of the Jovian magnetosphere covered by the Galileo spacecraft undergo a quasi-periodic modulations of the particle energy spectra with a time period of several days. Similar periodicities are observed for the ion flow bursts and for the meridional component of the magnetic field in the Jovian magnetotail. Each individual cycle of the magnetotail features represents a global reconfiguration of the Jovian magnetosphere which resembles terrestrial substorms. We present a simple model for the periodical process. The ion mass-loading from the internal plasma sources and the fast planetary rotation at the Jovian magnetosphere could drive the periodical variation of the plasmasheet configuration. New ions from Io create an additional current which lead to plasma instabilities in the current sheet, reconnection and mass release in the form of plasmoids. The model shows that the suggested intrinsic mechanism can explain the observed periodicities (1 day to 1 week) of substorm-like processes.