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Temporal variability of Enceladus' gas jets

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Abstract

In this presentation we review the currently available evidence for temporal variability of Enceladus gas jets. We demonstrate, in particular, activity changes of Enceladus' gas jets based on a joint investigation of Cassini spacecraft magnetic field data obtained during the first three flybys E0, E1 and E2 and neutral density measurements during the E2 flyby. In this joint investigation, Enceladus' magnetic field environment is described with a plasma interaction model, which includes individual jets. Model comparison with the observations imply a total plume content of $\sim 7 \times 10^{32}$ H_2O molecules corresponding to a mass loss rate of $\sim$1600 kg/s for the E0 flyby and $\sim 9 \times 10^{31}$ H_2O molecules corresponding to a mass loss of $\sim$200 kg/s for the E1 and E2 flybys. The magnetic field measurements support upstream/downstream changes of the plume activity locations. We also discuss potential reasons for the time variability and their implications for Enceladus and the Saturnian system.