

How the Enceladus Plume Stirs the Global Circulation in Saturn's Magnetosphere

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Abstract

The intensity of the Enceladus plume has been studied using our self-consistent BATS-R-US MHD simulations constrained by plasma and field data. By achieving the best fit to each of the seven flybys in 2005 and 2008, we have found up to 30% variation of the plume intensity between different flybys. In 2009, Cassini penetrated the Enceladus plume twice from a distance of 1.4 and 7.3 Enceladus radii, respectively. In contrast with previous flybys, in 2009 Cassini travels parallel to the equatorial plane, and primarily in the radial direction of Saturn. In this study we add these new observations to our past studies, and attempt to include new physics that has been suggested by recent model-data comparisons. This simulation goes beyond just the local simulation of the Enceladus interaction and attempts to simulate the circulation of plasma in the neighborhood of the Enceladus orbit.