Geophysical Research Abstracts
Vol. 14, EGU2012-12241, 2012
EGU General Assembly 2012
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A multi-fluid MHD Model for the dusty plasma environment around Enceladus

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The Cassini observations at Enceladus have largely improved our understanding of this small icy world. Yet more problems emerged as we acquire more details. Among these, the time variation of the plume intensity has been under debate for years. Some instruments have found large variability but others have found the plume stable. In the past we have constructed a MHD model to determine the plume variability constrained by the magnetometer observations. Recently, charged dust was found to be important in the plasma interactions in the plume center. In this study we upgrade our previous single-fluid model into a multi-fluid MHD model by incorporating the charged dust as a fluid component to investigate the plume variability.