

Abstract Submitted
for the APR16 Meeting of
The American Physical Society

Modeling Energetic O^+ Ions Interacting with Titan's Atmosphere

MICHAEL SMITH, THEODORE JIMSOM, DARCI SNOWDEN, Central Washington University — Energetic particles from Saturn's magnetosphere enter Titan's atmosphere where they heat, ionize, and dissociate neutral atoms. This process affects the chemistry of Titan's atmosphere, and is related to the energy deposited by incident energetic particles. Unfortunately, the various ways in which energetic particles, and in particular, O^+ ions, enter and interact with the atmosphere have been largely unexplored by computational models despite a plethora of measured data from Cassini flybys. In an effort to investigate energetic particle behavior, a 3D model of O^+ ions in Titan's magnetosphere was created to simulate how ions might enter the atmosphere. Using these simulations, we were able to measure power flux across the surface of Titan's atmosphere. Ions that entered the atmosphere, characterized by their initial energy and angle of incidence, were tracked as they deposited their energy into the atmosphere through interactions with neutral N_2 molecules. Initial results indicate approximately 5% of starting particles passed into the atmosphere, achieving an average energy flux of approximately $2 \cdot 10^9 \text{ eV} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$. Further, a maximum energy deposition between 10-50 eV occurs at an altitude of 1300 km, with the distribution of particles' incident angles centered around 50-60.

Michael Smith
Central Washington University

Date submitted: 07 Jan 2016

Electronic form version 1.4