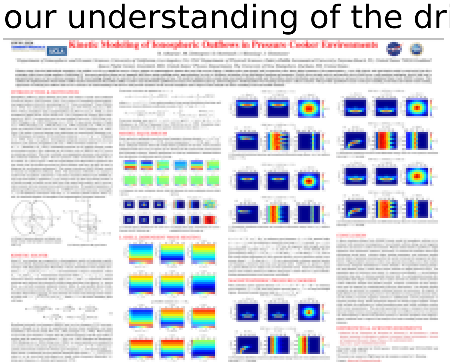
Robert
Albarran
University of California, Los Angeles
Matthew Zettergren, Department of Physical Sciences, Embry-Riddle Aeronautical University, Daytona Beach, FL, United States
Doug Rowland, NASA Goddard Space Flight Center, Greenbelt, MD, United States
Jeff Klenzing, NASA Goddard Space Flight Center, Greenbelt, MD, United States
James Clemmons, Physics Department, The University of New Hampshire, Durham, NH, United States
Poster
Plasma escape from the high-latitude ionosphere (ion outflow) serves as a significant source of heavy plasma to the magnetospheric plasma sheet and ring current regions. Outflows alter mass density and reconnection rates, hence global responses of the magnetosphere. A new fully kinetic and semi-kinetic model, KAOS (Kinetic model of Auroral ion OutflowS), is constructed from first principles which traces large numbers of individual O+ ion macro-particles along curved magnetic field lines, using a guiding-center approximation, in order to facilitate calculation of ion distribution functions and moments. Particle forces include mirror and parallel electric field forces, a self-consistent ambipolar electric field, and a parameterized source of ion cyclotron resonance (ICR) wave heating, thought to be central to the transverse energization of ions. The model is initiated with a steady-state ion density altitude profile and Maxwellian velocity distribution and particle trajectories are advanced via a direct simulation Monte Carlo (DSMC) scheme. This outlines the implementation of the kinetic outflow model, demonstrates the model's ability to achieve near-hydrostatic equilibrium necessary for simulation spin-up, and investigates L-shell dependent wave heating and pressure cookers scenarios. This paper illustrates the model initialization process and numerical investigations of L-shell dependent outflows and pressure cooker environments and serves to advance our understanding of the drivers and particle dynamics in the auroral ionosphere.

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