

The importance of cold ion outflow for magnetospheric dynamics

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Abstract

Ionospheric outflow can significantly affect the dynamics of planetary magnetospheres. Recent observations from Earth suggest that cold ions constitute a significant part of the total outflow. In this paper, we have used in-situ measurements of cold ions in the Earth's magnetosphere to determine the source regions and fate of cold ions. Our results indicate that the polar cap region, magnetically coupled to the open solar wind, is the dominant source region. However, despite starting out on open magnetic field lines, convection will cause the majority of the cold ion population to be transported to the near Earth plasma regions where they eventually contribute to the formation of the hot plasma sheet, radiation belts and ring current regions.