2012 Workshop: Thermosphere and Exosphere Hydrogen

Long title
Neutral Hydrogen in the Earth's Thermosphere, Exosphere, and Plasmasphere
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Description

This tutorial will review the current knowledge of hydrogen aeronomy as well as the ongoing work in the areas of model improvement.

Possible talks include
Hydrogen Sources and Loss (Escape) Mechanisms
Existing Models and Available Measurements: A Historical Perspective
Hydrogen Climatology in the Upper Thermosphere and Geocorona
Adding Hydrogen to GCM's

Justification

Water in the Earth's stratosphere is the primary source of upper-atmospheric hydrogen which is transported upward through the mesosphere and thermosphere, eventually reaching the exosphere/plasmasphere where some of the material (approximately 10E8 per square centimeter per second) escapes to interplanetary space. Downward flux and various chemical processes provide a two-way exchange of hydrogen between some of the atmospheric regions. In this way, Atmospheric hydrogen constitutes a coupling mechanism between the troposphere, thermosphere, ionosphere and exosphere. Phenomena such as eddy and molecular diffusion, ballistic trajectories, charge exchange, solar radiation pressure, and hydrogen loss to the solar wind impact the global hydrogen budget and our understanding of both the upper thermosphere and geocorona.

The tutorial will emphasize interaction regions (thrmosphere-exosphere), the linkages between the lower atmosphere and near-space regions (diffusion and hydrogen flux between regions), boundary exchange processes (hydrogen source and loss mechanisms), neutral plasma coupling (hydrogen charge exchange and photoionization), and further development of physics based models (ongoing work to include hydrogen in TIME-GCM, and the Exocube cubesat mission). These components are part of the CEDAR strategic plan and the subject emphasizes the coupling of atmospheric regions.

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