

SPACE AND COSMIC RAY PHYSICS SEMINAR

University of Maryland
Computer & Space Sciences Building, Rm 2400
4:30 PM Monday, November 10, 2003
Tea & cookies 4:00-4:30 PM

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Exploring the Upper Atmosphere with the NASA TIMED Mission

The upper atmosphere, the region above about 60 km in altitude, is one of the last frontiers in geospace. This region is inaccessible—balloons and aircraft can't fly there—spacecraft cannot go below about 130 km without suffering catastrophic amounts of atmospheric drag. Thus much of the region can only be explored via remote sensing techniques. Those techniques and what we learn about the atmosphere will be the subject of this talk.

The NASA Thermosphere Ionosphere Mesosphere Energetics and Dynamics (TIMED) mission, which was launched on December 7, 2001, has as its focus the region between 60 and 180 km in altitude. This region, the mesosphere lower thermosphere and ionosphere or MLTI, is a marvelous test bed of our understanding of the physical and chemical processes that shape the atmosphere (it lies at the juncture between the lower atmosphere which can force it from below and the solar wind driven magnetosphere which can drive it from above). The MLTI provides a natural laboratory for exploring issues in chemical physics, wave-wave interactions and collision processes. In addition, there are practical applications to the study of this region. The upper atmosphere is the region where ultraviolet radiation is absorbed giving rise to the ionosphere as well as heating. The ionosphere is important to communications and is known to demonstrate collective behavior over a great range of spatial and temporal scales. This behavior gives rise to irregularities that impact GPS navigation and HF communications. At high latitudes, electrons and protons that have been accelerated in the magnetosphere precipitate into the MLTI creating the aurora. In the auroral region the particle precipitation and the resultant currents that dissipate heat cause heating that exceeds the solar inputs. This can cause continent-scale changes in the ionospheric and thermospheric density. The changes in thermospheric density affect satellite orbits and can lead to satellites being "lost" to the surveillance community.

This talk will provide an introduction to spaceflight instrumentation, in particular the GUVI instrument on TIMED (see <http://guvi.jhuapl.edu/home.html>), what we observe and how we learn about the upper atmosphere.

Sponsored by: Department of Physics, University of Maryland, and the Institute for Physical Science and Technology, University of Maryland

For information call Matthew Hill at (301) 405-6209 or go to the following website:
http://space.umd.edu/seminars/Fall_2003_Seminar.html

(A PDF file of this abstract is available for download at this URL.)

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