be made with in-situ measurements. Similarly, comparisons of in-situ plasma density irregularities will be made with the locations of scintillation predicted by the model. These studies are part of a validation campaign for the forecast models prior to launch of the C/NOFS satellite.

SA31A MCC: 2002-2004 Wednesday 0900h

Van Allen Lecture *(joint with SH, SM)*

Presiding: **D Baker,** Laboratory for Atmospheric and Space Physics, University of Colorado**; R Strangeway,** Institute of Geophysics and Planetary Physics, University of California, Los Angeles

SA31A-01 0910h INVITED

New Insights Into Magnetospheric Physics From Recent Multi-Spacecraft Observations

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Please see abstract paper number SM31D-01 for the complete abstract.

SA31B MCC: 2006 Wednesday 1020h

Energy and Momentum Balance in the Mesosphere and Lower Thermosphere: Results From the TIMED Mission I *(joint with A)*

Presiding: **J Yee,** Applied Physics Laboratory, Johns Hopkins University

SA31B-01 1025h INVITED

Solar Ultraviolet and X-ray Energy Deposition and Partitioning in the MLT

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Solar irradiance in the far-ultraviolet, extreme-ultraviolet, and soft X-ray regions of the spectrum is the primary energy source for the mesosphere and lower thermosphere (MLT). Recent measurements from the solar EUV experiment on the TIMED satellite, from the UARS, SOHO, SNOE, and SORCE satellites, and from various rocket flights, have greatly increased our knowledge of the intensity and variability of the solar spectrum. In this paper, model calculations are combined with measured solar irradiances to produce a description of ionization, dissociation, excitation, and heating rates in the MLT. Key issues and uncertainties are discussed, and a method for efficient computation of these rates in general circulation models is described.

SA31B-02 1045h

Solar Ultraviolet Variability During the TIMED Mission

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The TIMED satellite was launched in December 2001 near solar cycle maximum. The solar activity remained at solar maximum conditions during 2002 and has declined to moderate activity during 2003. As part of the TIMED mission objective to study the energetics of the upper atmosphere, the Solar EUV Experiment (SEE) aboard TIMED measures the solar extreme ultraviolet (EUV) energy input. The SEE instrument is measuring the solar UV irradiance with a spectral resolution of 0.4 nm between 27 and 194 nm and with 7-10 nm resolution shortward of 27 nm. The solar UV irradiance varies on all time scales, seconds to years, and this variation is very dependent on wavelength. During the TIMED mission, the SEE instrument has observed over 90 flares which last from minutes to hours, over 24 solar rotations which have a period of about 27 days, and maximum to moderate conditions during the current 11-year solar cycle. The coronal emissions, such as the Fe XVI 33.5 nm emission and X-rays, vary the most, with variations of a factor of 10 for the larger flares, a factor of 2 for solar rotation, and a factor of 4 during the TIMED mission (2 years). The transition region emissions, such as the H I 121.6 nm and He II 30.4 nm emissions, vary less, with variations of a factor of 1.2 for solar rotation and a factor of 1.4 during the TIMED mission. The chromospheric and photospheric emissions vary even less. The variations of the solar UV irradiance shortward of 194 nm and its effects on the upper atmosphere above 60 km will be discussed in the context of the TIMED mission.

URL: http://lasp.colorado.edu/see/

SA31B-03 1100h

Comparisons of Solar EUV Irradiance Variations from Measurements, Models and GUVI Terrestrial Far Ultraviolet Dayglow Observations

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During mid 2002, solar EUV irradiance changed slowly as the Sun rotated on its axis, and increased episodically in association with multiple solar flares. As the TIMED/SEE and SOHO/SEM instruments monitored the solar EUV irradiance changes directly, TIMED/GUVI observed concurrent fluctuations in the Earth's far UV dayglow. An integrated measure of solar EUV electromagnetic energy shortward of 45 nm, called QEUV, is derived from the GUVI dayglow measurements and compared with the directly measured EUV energy and estimates from four different variability models, each summed shortward of 45 nm. The values derived from the GUVI dayglow observations agree well with both the absolute values and solar rotation modulation of the NRLEUV model, and do not support recent suggestions that the solar EUV irradiances estimated by the model of Hinteregger et al. be increased by a factor of four, nor even a factor of two. High resolution (hourly) temporal structure present in QEUV tracks closely the increase in EUV energy during solar flares, monitored by SOHO/SEM, and documents a highly radiatively coupled solar-terrestrial system.

SA31B-04 1115h INVITED

High-latitude Energy and Momentum Balance in the Lower Thermosphere

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The high-latitude lower thermosphere is significantly influenced by energy and momentum forcing associated with magnetosphere-ionosphere coupling. Electric currents produce a force on the air and dissipate energy through Joule heating. The precipitation of energetic electrons and ions into the auroral regions produces additional direct heating, and also influences the energy balance through production of stored chemical energy, through modification of the concentrations of radiatively active species, and through modification of the electrical conductivity. We examine the resulting energy and momentum balance of the lower thermosphere with the aid of a thermosphere-ionosphere-electrodynamics general circulation model.

SA31B-05 1135h

Observations of High Latitude Magnetospheric Energy Deposition

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At polar latitudes, the highly variable magnetospheric energy sources, which manifest themselves as Joule and particle energy, complicate the energy balance of the lower thermosphere. The deposition rate of magnetospheric energy can, at active times and in specific altitude regimes, rival the deposition rate of solar VUV energy. The local heating produced by magnetospheric sources leads to a divergent wind circulation and the redistribution of composition over extended regions of the globe. The response of the mesosphere and lower thermosphere/ionosphere (MLTI) region depends not only on the magnitude of the magnetospheric energy source, but also on the altitude and type of energy deposited. Here, we investigate the vertical distribution of Joule and particle energy deposition rates as observed simultaneously with the Sondrestrom incoherent scatter radar. These observed rates will be compared with solar deposition rates determined from SEE observations of the solar VUV flux. The concurrent measurements in time and space of the two magnetospheric energy sources will also be used to investigate whether Joule energy and particle energy occur concurrently or illustrate any mutual dependence.

SA31B-06 1150h

Space Weather in the ITM: The May-June 2003 Storm and NASA TIMED/GUVI Observations and TIMEGCM Model Results

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The NASA TIMED mission samples all local solar times every 60 days. As such the coverage of any particular geophysical event could be at any local solar time. The May-June 2003 storm occurred when TIMED was in a near a 10AM LST at the ascending node when the storm began and precessed towards 8AM LST by the end of the storm. The Global Ultraviolet Imager (GUVI) on TIMED obtains images at 5 individual wavelength intervals simultaneously. From the TIMED vantage point at 625 km the instrument must scan from horizon to horizon (about 120 deg) to form an image. The integration period for any pixel is about 68 msec - this gives us an instantaneous picture of the auroral features. The May-June 2003 event was notable for the magnitude of the high latitude energy inputs - we see more than 100 ergs/cm2 at times in the GUVI images. We also report the observations of the southern hemisphere inputs. GUVI is able to track the response of the thermosphere to this energy input. We see large changes in the O/N2 ratio in the dayside images. We also note significant changes in the nightside electron density profiles.

URL: http://guvi.jhuapl.edu