Session 15: Coronal Heating
Chair: Taalib Bai
Kresge Auditorium

15.01
Visible Fe X (6374 Å) Coronal Emission Line Profiles as a Function of Height Above the Limb in a Coronal Hole

D. M. Hassler (CfA), T. G. Moran (NASA/GSFC, NAS/NRC)

Line profiles of the visible Fe X (6374 Å) coronal emission line as a function of height above the limb were obtained out to 1.16 R_\odot in a coronal hole and a nearby streamer using the NSO/Sacramento Peak Observatory Coronagraph/Universal Spectrograph and a CCD camera. These are the first coronal line profiles obtained at a function of height in a coronal hole from the ground. Enhanced broadening with height would suggest the presence of hydromagnetic waves, which are thought to play an important role in the heating of the corona and the acceleration of the solar wind. Analysis of the line widths as a function of height suggests a large component of nonthermal broadening which increases with height ranging from 40 to 60 km/s, depending upon the assumed temperature or thermal component of the profile. These results appear to be in agreement with the UV line profile measurements of Hassler et al. (Ap. J. Lett., 348, L77, 1990). Time resolved 6374 Å Fe X line profile measurements at 1.04 R_\odot were also made as a part of our search for wave signatures in coronal holes. Time series measurements of the line width and line center wavelength show negligible fluctuations at periods between 30 and 3000 seconds, indicating that any wave-like motions along the line-of-sight must either have periods less than 30 seconds or greater than 3000 seconds or must be distributed over many (>500) independent regions.

15.02

R. C. Altrock (Phillips Lab. (AFMC), Geophysics Div., NOAO/NSO/SP), M. Rybarsky, V. Runia, P. Gaspar (Astronomical Institute, Slovak Academy of Sciences, Slovakia)

A description will be given of the Coronal Index of solar activity (CI), which is derived from ground-based observations of the green coronal line S30.3 nm (Fe XIV). Values of CI will be presented for the period 1988-1991. A comparison with other solar global parameters and evidence for periodicities will be presented. The maximum of CI coincided with the sunspot number in cycle 22, and no second maximum, sometimes seen two years after the first one, was observed in this cycle.

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15.03
Coronal Electron Density Irregularity Measurements

Steve Osterman and Gary J. Rottman (NCAR/HAO)

We present new observations of the coronal electron density and electron density irregularity factor, n_e^2/(n_i)^2. The irregularity factor is determined by comparing above limb EUV spectra obtained from a sounding rocket experiment with nearly cotemporal K-coronal brightness measurements from the HAO Mk III Coronameter. Analysis of the Mk III data is based on the recently reported correction to the Mk III instrument's calibration. Calibration of the rocket borne instrument will be briefly discussed.

15.04
Ultraviolet Coronal Spectrometer Observations During Spartan Mission 201-1

L.D. Gardner, S. Fineschi, D. Hassler, M. Romoli, L. Strachan, J. L. Kohl (CfA)

The Spartan Ultraviolet Coronal Spectrometer is an internally and externally occulted coronagraph and a dual spectrometer assembly designed to observe the solar corona up to heliographic heights of 3.5 solar radii. It measures the line profile of H I Ly-alpha with 0.5 by 3.5 arcminute spatial resolution and 0.25 Angstrom spectral resolution elements. It also measures the integrated intensities of H I Ly-alpha and the OVI doublet at 1032/1037 Angstroms with 6.0 by 5.0 and 2.5 by 5.0 arcminute resolutions, respectively. During Spartan Mission 201-1, it was used to obtain over 190 Ly-alpha profiles and a similar number of Ly-alpha and OVI intensities. Observations were made in a helmet streamer at a heliographic position angle of about 135 degrees and in coronal holes near the north and south poles. An active region near the west limb was also observed. This presentation will be an overview of the observations and a description of the instrument.

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15.05
The Locations of CMEs Compared With Coronal Streamers and the Large-Scale Magnetic Field

D.F. Webb (ISR, Boston Coll.), P.S. McIntosh (NOAA SEL), S.W. Kahler (AF Phillips Lab.)

CMEs involve large-scale restructuring of mass and magnetic fields in the corona. To understand their relationship to large-scale magnetic fields near the surface of the Sun, we have begun a program to study the source locations of CMEs. Near-surface fields are delineated on NOAA SEL Ha synoptic maps which, when stacked in time-series, reveal large-scale patterns of rearrangement and changes in coronal hole boundaries. Synoptic presentations of the average field and its source-surface extrapolation are shown on maps from the Wilcox Solar Observatory. Finally, the evolution of coronal streamers and other white light structures are observed on HAO synoptic maps of the white light emission from heights of 1.3 MLTS to 3.4 R_\odot (SMM).

We report on initial results of study of about 6 months of data covering Carrington rotations 1750 to 1756 in 1984. This period was chosen because of the relative simplicity of the global field. Our procedure is to map boxes delineating the locations of CMEs onto the synoptic maps, and to compare these positions with independently identified areas of large-scale rearrangements of the surface field and with white light structures. Areas identified as surface field rearrangements arise from the merging and splitting of large-scale unipolar areas, as evidenced by the disappearance or reorientation of the bounding neutral lines and the disappearance of overlying filaments. These patterns are governed by the convergence and divergence of unipolar areas observed over several consecutive rotations. As an example, our analysis of CR 1755 reveals 8 areas of significant rearrangements covering about 20% of the surface area, situated at latitudes 60 degree. All of the CME locations occurring on this rotation overlay the rearrangement areas, and 7 of the 8 areas overlap CME locations.

15.06
Properties of the Quiet Solar Corona up to 1.2 Solar Radii Derived from SERTS Observations

D.A. Falconer (University of Maryland, NASA/GSFC), J.M. Davila, R.J. Thomas, (NASA/GSFC)

EUV emission above the quiet solar limb up to 1.2R_\odot was studied using observations made from two different flights of the Goddard Solar EUV Rocket Telescope and Spectrograph (SERTS) covering three different spatial locations.

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