being carried out over a complete solar magnetic cycle. Data obtained at two stations have been used in the initial analysis: Deep River, Canada (neutron monitor, median primary rigidity = 16 GV), and Embudo, N.M. (underground vertical muon telescope, median primary rigidity = 134 GV). The time period of observation extends from 1969 through 1988, covering a complete solar magnetic cycle. Previous analyses of these harmonics, covering a shorter time frame, have revealed a possible solar cycle dependence (Ahluwalia, 1977). Our preliminary results are discussed. Ahluwalia, H.S., and Singh, S., 1973. Thirteenth Intern. Conf. Cosmic Rays, Denver. Conf. Papers, 2, 953.


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2.07

Diffusion Coefficients For High Energy Cosmic Rays

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To understand the transport of high energy primary cosmic rays in the heliosphere, containing turbulent electromagnetic fields, one needs to know the rigidity-dependence of the applicable diffusion coefficients. Elsewhere, we have shown that the data on the diurnal variation, observed with the worldwide network of neutron monitors and underground muon telescopes, can be used for this purpose (Ahluwalia and Riker, 1987). It appears that heliosphere exists in two distinct physical states (Ahluwalia, 1988), during the period 1957–80. One of the states is characterized by the appearance of an invariant east–west anisotropy in primary cosmic rays of energy ≤ 100 GeV. We have shown that the standard model which allows for the diffusion of cosmic rays from local interstellar medium into the heliosphere and their convection radially outwards by the magnetized solar plasma (solar wind), is largely adequate to explain the observed characteristics of the invariant east–west diurnal anisotropy. This insight is useful in undertaking some preliminary calculations to gain information about the diffusion coefficients. Our preliminary results are discussed.


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3.02

The Relation between Irradiance Excess and Magnetic Field for the Sun

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Observations of solar active regions and their surroundings during July 1988 are used to derive a quantitative relation between magnetic flux and irradiance excess. Full disk photometric images of the sun produced at the San Fernando Observatory with a 2.5 cm telescope in a passband of 10 Å centered on the calcium K-line (3933 Å) are registered with NBO full disk magnetograms. The relation between magnetic flux and irradiance excess is:

$$E_{\text{pseudo-flux}} = 2250 \text{ Contrast} - 42.$$  

The relation is for 5 arc-second pixels. The intrinsic scatter about the relation is large, possibly due to the 5-minute solar oscillation or sub arc-second magnetic flux mixing.

The SPO contrast image is also used to infer solar irradiance fluctuations due to faculae. The typical irradiance excess for this period was 2900 ppm above the quiet sun irradiance.

3.03

An ultraviolet spectral atlas of a sunspot and an active region 1190 - 1730 Å

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We present a spectral Atlas of a sunspot with high spectral and spatial resolution in the wavelength region 1190 - 1730 Å. The sunspot was observed with the High Resolution Telescope and Spectrograph (HRTS) on a rocket flight in 1978. Three different areas in the sunspot have been selected for the Atlas including a light bridge. An active and quiet region are included for reference. In the light bridge the continuum radiation is enhanced and a number of lines appear which do not occur in the regular sunspot spectrum or in the spectrum from average active or quiet regions. The absolute intensities are determined to ± 30% and the wavelength scale is accurate to better than 0.01 Å. The transition region lines in the Atlas show the most extreme example known of downflowing gas above a sunspot, a phenomenon which seems to be commonly present in sunspots (Kjeldseth-Moe et al. 1988, Ap. J. 334, 1066). The Atlas is also available in a machine readable form together with an IDL program to interactively measure linewidths, total intensities and solar wavelengths.

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