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East-West and Radial Anisotropy in Cosmic Ray Modulation

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Abstract: The cosmic ray (CR) data observed with the Deep River neutron monitoring station has been harmonically analyzed for the period 1964--95 to obtain the diurnal and semi-diurnal components of cosmic ray intensity on geomagnetically 60 quiet days. The annual diurnal anisotropy vectors have been resolved into two components: one along the 12-Hr direction, the radial anisotropy component; and the other along 18-Hr direction, east-west anisotropy component. It is observed that when the polarity of solar poloidal magnetic field (SPMF) in northern hemisphere (NH) is positive, the radial anisotropy component increases; whereas, the east-west anisotropy component decreases. This results in shifting the diurnal anisotropy vector towards earlier hours during the positive polarity epoch. During the negative polarity epoch, the east-west anisotropy component attains its maximum and the radial anisotropy component attains its minimum, which results in shifting the anisotropy vector gradually towards later hours. For semi-diurnal anisotropy, it is found that the magnitude of the 3-Hr component is larger than the 6-Hr component during the positive polarity epoch; which results in shifting the anisotropy vector towards earlier hours, but the same does not hold good for the negative polarity epoch i.e., the magnitude of 6-Hr component is not always found to be greater than the 3-Hr component.

Key Words: Cosmic rays, diurnal, semi-diurnal, anisotropy and solar poloidal magnetic field.