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Role of solar wind and interplanetary magnetic field in cosmic ray modulation.

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Galactic cosmic rays are modulated through their propagation in interplanetary medium by the effect of large scale disturbances in sun related interplanetary medium. Often the interplanetary parameters used in modulation are solar wind velocity V and interplanetary magnetic field B . For this study, we have used the monthly, quarterly, half yearly and yearly mean values of solar wind velocity and IMF B for the period of 1996 to 2011, covering the solar cycle 23 and ascending phase of solar cycle 24. The analysis brings out the long-term characteristics of changes in galactic cosmic rays. A negative and normal correlation exists between cosmic rays and solar wind velocity on long-term basis. Correlative analysis has been done for these two data series (CRI and V_{sw}) for different phases of solar activity cycle. All the epochs of solar activity cycles show normal and negative correlation. Product values of $B.V$ for different periods show better correlation than for only for solar wind velocity or IMF alone. It is also investigated that product $B.V$ is more important in producing enhancement in geomagnetic field variations. Analysis indicates a significant role of IMF B along with solar wind velocity in cosmic ray modulation process. It is suggested that electric drift is the basic cause of the observed solar modulation of cosmic rays on long-term basis.

Collaboration

VERITAS

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