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Cosmic Rays and Space Weather: Direct and Indirect Relations.

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Abstract content

There are two kinds of relations between cosmic ray research and investigations of space weather effects. Since energetic particles in space and low energy cosmic rays interact with materials of the satellite and airplane systems as well as with the atmosphere, monitoring of the changes of flux of cosmic particles especially during solar flares, space storms and geomagnetic disturbances is important. We list some of available data bases of satellite/space probes particle measurements inside and outside the magnetosphere useful for description of the variability of particle radiation near Earth. Selected current experiments are listed too. The availability of data of ground based neutron monitor measurements provided in real time, especially those with high temporal resolution, is summarized. Cosmic ray particles due to their relatively large gyroradius and mean free path in interplanetary space and due to their high velocity in comparison with velocity of CME propagation, are checked, especially during the past decade, for their relevance in forecasting of geomagnetic disturbances. The change of cosmic ray anisotropy observed on the surface of Earth, due to the change of IMF structures, is seen in many cases few hours before the onset of geomagnetic disturbance. Cosmic ray variability and anisotropy depends on the geometry, speed, direction of propagation and magnetic field structures of the IMF inhomogeneities and discontinuities propagating in interplanetary space. Onset of high energy particles, if observed with good temporal resolution, is a tool for alert of space storms. During the intervals with enhanced geomagnetic activity the magnetospheric transmissivity of low energy cosmic rays is changing. There exist network installations, especially those by neutron monitors and by muon directional telescopes, providing cosmic ray anisotropy in real time. Another new experiments are under development. High temporal resolution of the measurements and using several experimental data simultaneously in real time is important for space weather alert signals. An attempt to summarize the status of cosmic ray research relevant for space weather events description and for the forecast, is presented. The questions and problems to be solved in future studies of cosmic ray relations to space weather are discussed. The work was supported by the Slovak Research and Development Agency under the contract No. APVV-51-053805.

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

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