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Modulation cycles of GCR diurnal anisotropy variation

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Abstract content

The diurnal variations of GCR intensity observed by the ground NM stations represent the anisotropic GCR flow at 1 AU. It is generally believed that the variation of the local time of the GCR maximum intensity (phase) has 22-year period of two sunspot cycles. However, there even exists doubt on such anisotropy variation cycle. Those different interpretations come from the lack of enough data since determining the cycle of variation in precision requires data archived over long time of at least two cycles.

In order to determine the cycle of GCR anisotropy variation, we carried out the statistical study on the diurnal variation of phase. We examined the 52 years data of Huancayo (Haleakala), 38-year data from Rome, 42-year data from Oulu NM stations. We used new method in determining the yearly mean phase. We applied the F-test to determine the statistically meaningful period of anisotropy phase variation.

We found that the coupling coefficients indicating the differences in phase between the NM stations are not constant but dependent on the solar cycle. The phase variation has two components of 22-year and 11-year cycles. The NM station in the high latitude (low cut-off rigidity) shows mainly the 22-year cycle in phase controlled by the diffusion effect with the solar polar magnetic field reversal. However, the lower the latitude of NM station is, the higher contribution from 11-year cycle associated with the solar sunspot cycle. This additional phase variation might be regulated by the drift effect.

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

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 1 (SH), pages 509-512

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