Contribution ID : **1182** Type : **Oral**

A parameterized neutron monitor yield function for space weather applications

Friday, 6 July 2007 11:42 (0:12)

Abstract content

To determine the characteristics of galactic and solar cosmic ray flux near Earth by using neutron monitor measurements, the observation data are usually submitted to analysis procedures involving extensive calculations and expert knowledge. For space weather applications an equally valid method is desirable that is straightforward, fast, and simple, to allow quasi-automatic data analysis in near real-time. For this procedure, a parameterized neutron monitor yield function is needed. The Geant4 software package allows to simulate the interactions of cosmic ray particles with the atmosphere and the matter of the neutron monitor by the Monte Carlo method and therefore offers the possibility to determine the specific neutron monitor yield in function of rigidity, altitude, and type of neutron monitor. The paper presents the results of such simulations and a comparison with previously determined yield functions. The new yield function is parameterized and can therefore easily be adapted for any neutron monitor at any geographic location and altitude. The application of the newly generated yield function is demonstrated with the analysis of the neutron monitor data of the worldwide network during the maximum phase of the ground level enhancement during the solar flare on 13 December 2006.

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 289-292

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Session Classification : SH 1.8

Track Classification : SH.1.8