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SOLAR PROTON FLUENCE FOR 31 SOLAR CYCLES DERIVED FROM NITRATE ENHANCEMENTS IN POLAR ICE

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Abstract content

Using nitrate enhancements in the polar ice as a proxy for solar proton events, we have determined the proton fluence above 30 MeV for 31 solar cycles between 1610 and 1954 (cycle -12 through cycle 18). Our results show a wide range of solar proton fluences over these 31 solar cycles, from three cycles with no significant proton events above 10**9 protons/cm to a high of 38 x 10**9 protons/cm. In a comparison of the two cycles with the highest solar proton fluence, we find that cycle 10 was dominated by one major event (the Carrington event in 1859) while cycle 13 had 7 major events contributing to the total fluence. While the total fluence for most cycles is within a factor of 2 of the fluence measured by spacecraft since 1965, the fluence for cycles 10 and 13 is a factor of 4 greater than present day spacecraft measurements. Until new deep ice cores are available for both calibration with known fluences and for verification of the original results, these derived solar proton fluences over a solar cycle represent the only available values as upper limits for space exploration experiments.

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 725-728

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