AOGS 2005

Five Solar Cycles of Significant Solar Proton Events

M.A. SHEA and D.F. SMART

Emeritus, Air Force Research Laboratory (VSBX), 29 Randolph Road, Hanscom AFB, Bedford, MA 01731, USA

Solar proton events have been recorded at the earth in an "almost" homogeneous fashion since the start of solar cycle 19 in 1954. At the present time we are in the ninth year of solar cycle 23 and thus have a reasonably accurate record of solar proton events over five solar cycles. Using a criterion of identifying each event with a >10 MeV flux above 10 protons $(cm^2\text{-sec-ster})^{-1}$ we find that each cycle has approximately the same number of events and the percentage of ground-level events remains about 15% of the total number of events. However, the total solar proton fluence for the five cycles differs by a factor of two. In addition, there is a vast difference in the distribution of events over each solar cycle. While we cannot offer any explanation for the differences in the distribution of the events or the consistency in the number of events for each solar cycle, we offer an explanation for the difference in solar proton fluence observed at the earth. At the present time (January 2005), solar cycle 23 has both the largest number of events and the largest fluence of solar cycles 19-23 (1954-present).

Keywords: Solar Proton Events, Solar Cycles, Solar Proton Fluence