

RELATIVISTIC SOLAR PROTONS ON BASTILLE DAY 2000

John W Bieber (1), Wolfgang Dröge (1), Paul Evenson (1), Roger Pyle (1), David Ruffolo (2), Udomsilp Pinsook (2), Paisan Tooprakai (2), Mani Rujiwarodom (2), Thiranee Khumlumlert (2), and Säm Krucker (3)

(1) Bartol Research Institute, University of Delaware, (2) Department of Physics, Chulalongkorn University, Thailand, (3) Space Sciences Lab, University of California, Berkeley

john@bartol.udel.edu

Relativistic protons emitted by the Sun on July 14, 2000 (Bastille Day) caused the count rate of high-latitude neutron monitors to increase by 25-40% relative to the pre-existing background of galactic cosmic rays. We use a 9-monitor network to derive the time profile of density and anisotropy, and fit these observations to numerical models based upon the Boltzmann equation. The parallel mean free path for scattering by turbulence was 0.27 AU in this event. We also fit WIND electrons and obtain mean free paths of similar size. To explain fully the observations, however, we invoke a barrier or magnetic bottle associated with an earlier CME that was located ~0.3 AU beyond Earth's orbit at the time of the event. This structure reflected a significant (~85%) fraction of the cosmic rays back towards Earth.

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