

The Bastille Day 2000 Cosmic Ray Ground Level Enhancement: Insights into Proton Acceleration Processes

DANIEL J. BOMBARDIERI¹, MARC L. DULDIG², KELVIN J. MICHAEL¹ and JOHN E. HUMBLE^{3, 2}

¹Institute for Antarctic and Southern Ocean Studies, University of Tasmania, Hobart, Australia ²Australian Antarctic Division, Kingston, Tasmania, Australia

³School of Mathematics and Physics, University of Tasmania, Hobart, Tasmania, Australia

The relativistic proton arrival at Earth of the Bastille Day 2000 GLE has been modelled. Our technique [1] determines the spectrum, arrival direction and anisotropy of high energy protons that produce increased neutron monitor responses. We fit theoretical shock [2] and stochastic acceleration [3] spectra to satellite and neutron monitor data to investigate the acceleration process. We find evidence of substantial particle scattering en route or near the Earth following the GLE onset. The best fit spectral form, between a few MeV and about ten GeV, changes during the event and at times a simple analytical spectral form (a modified power law) provides a better fit than either theoretical form. The implications for acceleration processes that produced this event are discussed.

References

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