Geophysical Research Abstracts, Vol. 8, 09905, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09905

Several keV gyrating foreshock ion distributions in the absence of a solar wind seed population

M. Wilber (1), K. Meziane (2), G.K. Parks (1), A. Hull (1), R.P. Lin (1) and C. Mazelle (3)

(1) Space Sciences Laboratory, U. California, Berkeley, USA, (2) Department of Physics, U. New Brunswick, Canada, (3) CESR/CNRS, Toulouse, France (wilber@ssl.berkeley.edu / Fax: 510-643-8302 / Phone: 510-643-6896)

Very energetic (several keV) gyrating ion distributions have been reported in the strongly perpendicular ($\theta_{\rm Bn} \gtrsim 70^\circ$) terrestrial foreshock, and are also present upstream of interplanetary shocks. These are often observed to be non-gyrotropic, resulting from the remote sensing of thin layers of these populations. The majority of cases occur within co-rotating interaction regions, or during solar energetic particle events, at which times there is an obvious elevated seed population. Shock drift acceleration (SDA) theory, by which particles gain energy as they drift along the motional electric field during a mirroring process, accounts well for these observations. We have recently found that similar populations can be observed during times when no seed population is apparent, and straightforward application of SDA to the > 30 keV ambient plasma fails to account for them. This suggests that there may be an unknown process providing a localized seed population which is then accelerated by SDA. We present case studies detailing the characteristics of these anomolous energetic gyrating foreshock populations, and the results from application of acceleration modeling.