Geophysical Research Abstracts, Vol. 8, 02232, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02232

Energetic Particle Observations by Ulysses during the declining phase of Solar Cycle 23

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In the present work, we analyze recent energetic particle data observed by the Ulysses spacecraft during the declining phase of the current solar cycle. Ulysses-the first spacecraft ever to fly over the poles of the Sun- has began its third orbit during the period under study, starting its ascent to high southern latitudes. This phase of the Ulysses mission provides a unique opportunity to study the effects of solar activity from a near-ecliptic vantage point at intermediate heliocentric distance, some 5 AU from the Sun. Energetic particle observations in the 1-20 MeV/nucleon range as measured by the COSPIN/LET instrument onboard Ulysses are reported in the context of the changing heliospheric state. We focus, in particular, on the origin of the complex particle increases observed at the location of the spacecraft. Composition analysis can provide useful clues in this regard, allowing distinction between particles accelerated in transient events associated with Coronal Mass Ejections (CMEs) (referred to as Solar Energetic Particles, SEPs) and particles accelerated at Stream Interaction Regions (SIRs) or Corotating Interaction Regions (CIRs). It is emphasized that our investigation also incorporates the study and interpretation of the composition signatures observed at ˜5 AU during periods of CME/CIR combinations (e.g. January 2005 events).