SOLAR ENERGETIC PARTICLE OBSERVATIONS AND PROPAGATION IN THE 3-D HELIOSPHERE IN DECEMBER 2006

OLGA E. MALANDRAKI 1, Richard G. Marsden 2, David Lario 3, Cecil Tranquille 2, Bernd Heber 4, Richard A. Mewaldt 5, Christina M. S. Cohen 5, Louis J. Lanzerotti 6,7, Robert B. Forsyth 8, Heather A. Elliott 9, Athanasios Geranios 10

1. Institute for Astronomy and Astrophysics, National Observatory of Athens, Athens, Greece
   e-mail: omaland@astro.noa.gr
2. Research and Scientific Support Department of ESA, ESTEC, Noordwijk, The Netherlands
   email: Richard.Marsden@esa.int
3. Applied Physics Laboratory, Johns Hopkins University, Laurel, Maryland, USA
   email: david.lario@jhuapl.edu
4. Christian-Albrechts-Universität Kiel, Leibnistrasse 11, Kiel, D-24118, Germany
   email: heber@physik.uni-kiel.de
5. Space Radiation Laboratory, California Institute of Technology, Pasadena, CA 91125, USA
   email: rmewaldt@srl.caltech.edu
6. Center for Solar-Terrestrial Research, New Jersey Institute for Technology, USA
   email: ljl@adm.njit.edu
7. Bell Laboratories, Alcatel-Lucent, New Jersey, USA
8. The Blackett Laboratory, Imperial College of Science and Technology London, England
   email: r.forsyth@imperial.ac.uk
9. Space Science and Engineering, Southwest Research Institute, San Antonio, TX, USA
   email: heather.elliott@swri.org
10. Nuclear and Physics Department, University of Athens, Athens, Greece
    email: ageran@phys.uoa.gr

Ulysses is the first spacecraft to fly over the poles of the Sun. Although the Sun was again close to its activity minimum during the recently completed third polar orbit of Ulysses, solar activity has been more prevalent during the declining phase of solar cycle 23 than was the case in the declining phase of the 22nd solar cycle, when the first polar passes occurred (1994-1995). In December 2006, an unexpected rise of solar activity occurred. Active Region 10930 produced a series of major solar flares with the strongest one (X9.0) recorded on December 5, after it rotated into view on the east limb of the Sun. In this work, we present in detail energetic particle observations obtained by various instruments onboard Ulysses, located at > 70 degrees south heliographic latitude during this period and discuss their implications for particle propagation to solar polar regions. The observed events are also compared with high latitudes measurements obtained previously by Ulysses close to solar maximum. Furthermore, comparisons with data acquired by the STEREO and ACE spacecraft near the ecliptic plane are discussed.

Solar Energetic Particles, Coronal Mass Ejections, magnetic fields

Olga E. Malandraki, Institute for Astronomy and Astrophysics, National Observatory of Athens, I. Metaxa & Vas. Pavlou str., Pedeli, 15236, Athens, Greece, tel/fax: 0030-210-8109172, email: omaland@astro.noa.gr