Geophysical Research Abstracts,
Vol. 11, EGU2009-1525, 2009
EGU General Assembly 2009

Modulation of galactic cosmic ray protons and electrons during an unusual solar minimum

B. Heber (1), J. Gieseler (1), A. Kopp (1), R. Müller-Mellin (1), H. Fichtner (2), K. Scherer (2), M.S. Potgieter (3), and S.E.S. Ferreira (3)

(1) Christian-Albrechts-Universität Kiel, Institut für Experimentelle und Angewandte Physik, Kiel, Germany (heber@physik.uni-kiel.de), (2) Theoretische Physik IV, Ruhr-Universität Bochum, Bochum, Germany, (3) Unit for Space Physics, North-West University, 2520 Potchefstroom, South Africa

During the latest Ulysses out-of-ecliptic orbit the solar wind density, its pressure and the magnetic field strength have been lowest ever observed in the history of space exploration. Since cosmic ray particles respond to the heliospheric magnetic field in the expanding solar wind and its turbulence, the weak heliospheric magnetic field and low plasma density and pressure is expected to cause the smallest modulation since the 1970's. In contrast to this expectation the galactic cosmic ray proton flux measured in 2008 at Ulysses and Earth does not exceed the one observed in the 1980's and 1960's significantly. In contrast to protons the flux of galactic cosmic ray electrons exceeds the one measured during the 1990's by 10% after correcting the data for Ulysses' latitude and radial distance. Although solar activity, as indicated by the Sunspot number, has been low the tilt angle of the magnetic field remained at intermediate values. Since current sheet and gradient drifts prevent the galactic cosmic ray flux to rise to real solar minimum values the observed galactic cosmic ray intensities at 2.5 GV should increase by a factor of 1.25 ± 0.05 if the tilt angle reaches values below 10 degree.