LATITUDINAL GRADIENTS AND CHARGE SIGN DEPENDENT MODULATION OF GALACTIC COSMIC RAYS

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Ulysses, launched in October 1990, began its second out-of-ecliptic orbit in September 1997 and its second fast latitude scan in November 2000. In contrast to the first orbit with the Sun declining to low acticity, we are now at solar maximum conditions. According to drift dominated modulation models the intensity of galactic cosmic rays depends on the latitudinal extension of the heliospheric current sheet. The latidudinal gradient ($\sim$0.3 %/degree for $>$100 MeV protons) as well as the charge sign dependent variation of 2.5 GV protons and electrons observed during the previous Ulysses solar minimum orbit can be understood in terms of these models taking into account larger perpendicular diffusion to the mean heliospheric magnetic than previously thought. In this paper we investigate these two quantities (the latitudinal gradient and the e/p ratio) along the present orbit, by using measurements from Ulysses, IMP 8, and SOHO. The electron to proton ratio and the latitudinal gradient of galactic cosmic ray protons is discussed with respect to the reconfiguration and the current reversal of the heliospheric magnetic field. Up to fall 1999 the count rate ratio between Ulysses and the 1 AU measurement indicates a positive latitudinal gradient, albeit smaller than for the first latitude scan as expected because of the reconfiguration of the heliospheric magnetic field. This is also reflected in the variation of the e/p-ratio. The most recent increase in the e/p-ratio indicates the imprint of the heliospheric magnetic field reversal.