



Recurrent modulation of galactic cosmic rays: A comparative study between IMP, SOHO, STEREO, and Ulysses

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It is well known that the galactic cosmic ray (GCR) flux is modulated by Corotating Interaction Regions (CIR) in the vicinity of Earth. When Ulysses first explored high latitude regions in 1996, it was found that the flux of GCRs was still modulated on the time scale of one solar rotation, although neither the solar wind nor the interplanetary magnetic field at these latitudes showed the characteristics of CIRs. This process led to the modification of our understanding of either the heliospheric magnetic field (HMF, Fisk field) or the transport of particles perpendicular to the HMF. 12 years later, Ulysses explored these high latitude regions again. From September 2007 to September 2008, the GCR flux at Earth showed a clear 27 day solar-rotation modulation. However, the GCR flux at Ulysses from 2.6 AU to 3.7 AU and 73° to 47° , respectively, did not show the same behavior as in the 1990's as discussed before. Unlike the first time period, the two STEREO spacecraft launched in 2006 allow for additional near-Earth orbit measurements at multiple heliographic longitudes in 2008, thus allowing not only to investigate the latitudinal structure with Ulysses and SOHO but also the longitudinal distribution using STEREO, SOHO, and Ulysses.