Simultaneous Analysis of Recurrent Jovian Electron Increases and Galactic Cosmic Ray Decreases

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Since the early 1970's the magnetosphere of Jupiter is known to be a strong source of relativistic electrons. These Jovian electrons are released quasi-continuously from the magnetosphere. Due to Jupiter's favorable orbit, they offer a unique opportunity for studies of the transport of energetic particles in the heliosphere, in which the Jovian magnetosphere acts as a source of "quiet time" electron increase. Of central importance for the propagation of Jovian electrons is the solar wind flow and the structure of the embedded heliospheric magnetic field. The solar wind defines the transport environment for the particles as soon as they have left the Jovian magnetosphere. They enter the solar wind flow close to the ecliptic plane and are immediately subject to the processes of spatial diffusion, convection, and adiabatic deceleration in the expanding solar wind plasma. On the time-scale of a solar rotation, especially during the rising and declining phases of the solar cycle the variability is caused mainly by corotating interaction regions. Due to the changing propagation conditions in the intermediate heliosphere, corotating interaction regions, however, can cause recurrent galactic cosmic ray modulation. A detailed analysis of recurrent Jovian electron events and galactic cosmic ray decreases measured by SOHO EPHIN is presented here, clearly showing a change of phase between both phenomena during a year. This phase shift has been analyzed by calculating the correlation coefficient between the galactic component and the Jovian electrons. Furthermore, the data can be ordered such that the 27-day Jovian electron variation vanishes in the sector which does not connect the Earth with Jupiter using observed solar wind speeds.