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Statistical Survey of Reservoir Phenomenon in Energetic Proton Events Observed by Multiple Spacecraft

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In this work, reservoir phenomenon in the decay phase of gradual solar energetic particle (SEP) events are investigated with two Helios and IMP 8 spacecraft from January 1976 to March 1980, and with two STEREO and SOHO spacecraft from January 2010 to September 2014. Using these data, sixty-two reservoir events of solar energetic protons were identified, and the effects of perpendicular diffusion and magnetic mirror on the formation of the reservoir phenomenon have been studied. We find that the reservoir events could be observed in almost all longitudes in the ecliptic at 1 AU, and thus the perpendicular diffusion in the interplanetary space is an important mechanism to explain the uniform distribution of SEPs. Furthermore, in the 1976 April 30 event, the effects of magnetic mirror associated with an interplanetary coronal mass ejection (ICME) were observed during the reservoir phenomenon. Therefore, the effects of magnetic mirror could also help to form the reservoir phenomenon. This study could improve the understanding of the propagation of SEPs in the interplanetary space.

Keywords

Particle emission ; Particle acceleration; Particle transport; Coronal mass ejections;

other Collaboration

STEREO; Helios; IMP 8

Collaboration

SOHO

Subcategory

Experimental Results

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