

Solar wind ? radiation belt coupling during the high-speed solar wind

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We investigate the solar wind-radiation belt coupling process during high speed solar wind streams (HSS). Flux enhancements of the outer belt depend on the IMF Bz; the large flux enhancements tend to occur during the HSS with the predominantly southward interplanetary magnetic field (IMF). We consider the internal acceleration process by whistler mode wave-particle interactions as a working model. We show clear differences of key parameters of the internal acceleration process between the southward and northward dominant IMF in HSS; hot electrons for the free-energy source for whistler mode waves, thermal plasma distribution, sub-relativistic electrons for the seed population of MeV electrons, and convection/substorms. Considering these observational results, a model of solar-wind radiation belt coupling is proposed, in which whistler mode wave-particle interactions driven by continuous hot electron injections play an important role for the flux enhancements.

Keywords: outer radiation belt, solar wind - magnetosphere coupling, High speed streams