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Corotating Solar Wind Streams and Recurrent Geomagnetic Activity

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A review of the various facets of recurrent geomagnetic activity due to corotating solar wind streams in the declining phase of the solar cycle will be presented. We will show how fast solar wind streams collide with slow streams, creating intense field regions called "corotating interaction regions" or CIRs. CIR- created magnetic storms are substantially different from CME- created magnetic storms. The different storm phases, their characteristics and their interplanetary causes will be described. The extremely long "recovery phases" of CIR-related magnetic storms will be discussed. The interplanetary Alfvenic Bz fluctuations cause energy injection into the magnetosphere such that the annual average can be higher during solar minimum than during solar maximum. The energy injection is, however, not in the form of episodic substorms, but perhaps convection bays. We will show that both magnetospheric electromagnetic chorus and PC5 pulsations occur during intervals when the leading portion of high speed streams are impinging upon the magnetosphere. It will shown that relativistic electrons are accelerated in the magnetosphere during these high speed stream, Alfvenic, intervals. The electrons can be created in the absence of magnetic storms. We will conclude by indicating new areas of research for this important facet of space weather.