ON THE RELATIONSHIP BETWEEN HIGH SPEED SOLAR WIND STREAMS AND RADIATION BELT ELECTRON FLUXES

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Both past and recent research results indicate that solar wind speed has a close connection to radiation belt electron fluxes [e.g., Paulikas and Blake, 1979; Reeves et al., 2011]: a higher solar wind speed is often associated with a higher level of radiation electron fluxes. But the relationship can be very complex [Reeves et al., 2011]. The study presented here provides further corroboration of this viewpoint by emphasizing the importance of a global perspective and time history.

We find that all the events during years 2010 and 2011 where the >0.8 MeV integral electron flux exceeds 10^5 particles/cm^2/sr/s (pfu) at GEO orbit are associated with the high speed streams (HSS) following the onset of the Stream Interaction Region (SIR), with most of them belonging to the long-lasting Corotating Interaction Region (CIR). Our preliminary results indicate that during HSS events, a maximum speed of 700 km/s and above is a sufficient but not necessary condition for the > 0.8 MeV electron flux to reach 10^5 pfu. But in the exception cases of HSS events where the electron flux level exceeds the 10^5 pfu value but the maximum solar wind speed is less than 700 km/s, a prior impact can be noted either from a CME or a transient SIR within 3-4 days before the arrival of the HSS - stressing the importance of time history. Through superposed epoch analysis and studies providing comparisons with the CME events and the HSS events where the flux level fails to reach the 10^5 pfu, we will present the quantitative assessment of behaviors and relationships of various quantities, such as the time it takes to reach the flux threshold value from the stream interface and its dependence on different physical parameters (e.g., duration of the HSS event, its maximum or average of the solar wind speed, IMF Bz, Kp). The ultimate goal is to apply what is derived to space weather forecasting.