Keywords

- corotating interaction regions
- cosmic noise absorption
- electron precipitation
- high speed streams
- riometers
- superposed epoch analysis

Index Terms

- Ionosphere: Auroral ionosphere (2704)
- Ionosphere: Particle precipitation
- Magnetospheric Physics: Energetic particles: precipitating
- Magnetospheric Physics: Solar wind/magnetosphere interactions
- Magnetospheric Physics: Magnetic storms and substorms (4305, 7954)

Abstract

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Key features of >30 keV electron precipitation during high speed solar wind streams: A superposed epoch analysis

Key Points

- HSS enhances precipitation for several days across a range of L-shells
- Level of precipitation is highly dependent on IMF pointing direction
- Precipitation is increased at all magnetic local times following HSS arrival

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We present an epoch analysis of energetic (>30 keV) electron precipitation during 173 high speed solar wind streams (HSS) using riometer observations of cosmic noise absorption (CNA) as a proxy for the precipitation. The arrival of the co-rotating interaction region (CIR) prior to stream onset, elevates the precipitation which then peaks some 12 h after stream arrival. Precipitation continues for several days following the HSS arrival. The MLT distribution of CNA is generally consistent with the statistical pattern explained via the substorm process, though the statistical deep minimum of CNA/precipitation does change during the HSS suggesting increased precipitation in the 15–20 MLT sector. The level of precipitation is strongly controlled by the average state of the IMF B_Z component on the day prior to the arrival of the stream interface. An average negative IMF B_Z will produce higher CNA across all L-shells and MLT, up to 100% higher than an average positive IMF B_Z.

Figure **1** of **9**
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