The link between solar wind structures, geomagnetic indices, and energetic electron precipitation

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Energetic electron precipitation (EEP) into the Earth's atmosphere can collide with gases and deposit their energy there. The collisions between electrons and atmospheric gases initiate several chemical reactions which can reduce the ozone concentration. Ozone is critically important in the middle atmosphere energy budget as changes in the ozone concentration impact temperature and winds. EEP is not fully understood in terms of how much energy is being deposited and what the associated drivers are. An accurate quantification of EEP has limitations due to instrumental challenges and therefore imposes limitations of the associated EEP parameterization into climate models. A solution to this problem is a better understanding of the driver processes of energetic electron acceleration and precipitation, alongside optimized measurements. In this study the bounce loss cone fluxes are inferred from EEP measurements by MEPED on board NOAA/POES and EUMETSAT/METOP at tens of keV to relativistic energies. It investigates EEP in contexts of three different solar wind structures: high-speed streams, coronal mass ejections, and ambient or slow interstream solar wind, as well as geomagnetic activity. The study will focus on the year 2010 and aim to understand the context EEP is created in, which will allow a more accurate estimate of the EEP to be applied in atmospheric climate models.