EGU22-2745
https://doi.org/10.5194/egusphere-egu22-2745
EGU General Assembly 2022

Solar Wind Structures and their Effects on the High-Energy Tail of the Precipitating Energetic Electron Spectrum

Josephine Salice, Hilde Nesse Tyssøy, Christine Smith-Johnsen, and Eldho Midhun Babu
University of Bergen, Birkeland Centre for Space Sience, Physics, BERGEN, Norway (josephine.salice@student.uib.no)

Medium energy electron (MEE) (>30 keV) precipitation into the Earth's atmosphere is acknowledged as a relevant part of solar forcing as collisions between electrons and atmospheric gasses initiate several chemical reactions which can reduce ozone concentration. Ozone is critically important in the middle atmosphere energy budget as changes in ozone concentration impact temperature and winds. There is an ongoing debate to which extent the existing geomagnetic parameterizations represent a realistic precipitating flux level, especially when considering the high energy tail of MEE (>300 keV). An improved quantification might be achieved by a better understanding of the driving processes of MEE acceleration and precipitation, alongside optimized data handling. In this study, the bounce loss cone fluxes are inferred from MEE precipitation measurements by the Medium Energy Proton and Electron Detector (MEPED) on board the Polar Orbiting Environmental Satellite (POES) and the Meteorological Operational Satellite Program of Europe (METOP) at tens of keV to a couple hundred keV. It investigates MEE precipitation in contexts of different solar wind structures: corotating interaction regions (CIRs) associated with high-speed solar wind streams (HSSs), and coronal mass ejections (CMEs), during an eleven-year period from 2004 – 2014. The objective of this study is to explore general features of the MEE precipitating spectrum in the context of its solar wind driver: the intensity of MEE alongside the intensity and delayed response of its high energy tail.