



The impact of energetic electron precipitation on the distribution of OH and O₃ in the mesosphere during weak to moderate recurrent storms in 2008

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We investigate the direct impact of Energetic Electron Precipitation (EEP) on the mesosphere constituents, OH and O₃, during 2008 using data measured by the NOAA Polar Orbiting Environment Satellites (POES) and the Aura satellite. In 2008 a sequence of weak to moderate geomagnetic storms occurred triggered by high speed solar wind streams from coronal holes. OH enhancement of up to 80%/60% due to EEP is seen in the mesosphere poleward of 55°N/S CGM latitude with local maxima (hotspots). Not all hotspots appear, however, to be related to the EEP impact alone. The hotspot over North America seem to be strongly influenced by dynamical effects, whereby winter-time downwelling brings down atomic oxygen and atomic hydrogen which are important for the formation of OH at mesospheric altitudes. O₃ depletions of up to 40%, due to odd hydrogen catalytic cycles were seen in both hemispheres. Our findings suggest that even during solar minimum, the EEP driven OH production can be an important driver for the O₃ reduction in the mesosphere.