



Mesospheric production of odd hydrogen during a solar proton event

P. T. Verronen, A. Seppälä, E. Kyrölä, and J. Tamminen

Finnish Meteorological Institute, Earth Observation, Helsinki, Finland
(pekka.verronen@fmi.fi)

Among the most striking phenomena affecting ozone in the middle atmosphere are solar proton events (SPE). During SPEs, precipitation of energetic particles into the polar atmosphere results in production of odd hydrogen (HO_x) and odd nitrogen (NO_x) species. Enhancements of HO_x and NO_x lead to depletion of ozone through the well-known catalytic reaction cycles.

Although the effects of SPEs on atmospheric minor constituents have been studied for over forty years, there has been lack of HO_x observations. Thus, the theory of HO_x production, involving quite complex hydrate ion chemistry, has not been validated by direct measurements.

MLS/EOS-Aura observed substantial increase in mesospheric HO_x during the January 2005 SPE. We use HO_x measurements from MLS and ozone measurements from GOMOS/Envisat together with a 1-D ion and neutral chemistry model to study the production of HO_x during the SPE and the subsequent effects on ozone. These unique observational data allows us to test the HO_x production theory.