



Solar Energetic Particles and their effects on the chemistry of the middle and upper atmosphere

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This presentation will give an overview of what we have recently learned about the impact of Solar Energetic Particles (SEP), Solar Proton Events (SPE) and the more general Energetic Particle Precipitation (EPP) on the polar middle and upper atmosphere, the area of the Earth's atmosphere covered by altitudes from about 20 upwards (stratosphere, mesosphere). Much new information of the particle impact on the polar middle and upper atmosphere has been gained in the recent years thanks to large data sets from atmosphere monitoring satellites becoming available. Of key role have been especially the observations made from satellite platforms such as the European Space Agency's Envisat satellite, e.g. observations from the GOMOS (Global Ozone Monitoring by Occultation of Stars) instrument.

The focus of this presentation will be particularly on observations of the effects of particle precipitation on the chemical composition, such as ozone, NO_x , and HO_x of the polar middle and upper atmosphere. In addition to observations, results from modelling the effects of SEP events using a detailed ion and neutral chemistry model of the atmosphere will also be shown. Long term effects on the atmosphere and possible links to climate variability will be discussed.