3.8 Atmospheric signatures of REP

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Energetic particle precipitation couples the solar wind to the Earth's atmosphere and indirectly to Earth's climate. Ionisation and dissociation increases, due to particle precipitation, create odd nitrogen (NO_x) and odd hydrogen (HO_x) in the upper atmosphere, which can affect ozone chemistry. The long-lived NO_x can be transported downwards into the stratosphere, particularly during the polar winter. Thus the impact of NO_x is determined by both the initial ionisation production, which is a function of the particle flux and energy spectrum, as well as transport rates.

In this talk I will review results from the Sodankylä Ion and Neutral Chemistry model (SIC) which was used to simulate the production of NO_x from examples of the most realistic particle flux and energy spectra available today of solar proton events, auroral energy electrons, and relativistic electron precipitation. I will also review the observational evidence for the energy spectra and fluxes used, based on the Antarctic-Arctic Radiation-belt Dynamic Deposition VLF Atmospheric Research Konsortia (AARDDVARK) radio wave data. Large SPEs are found to produce higher initial NO_x concentrations than long-lived REP events, which themselves produce higher initial NO_x levels than auroral electron precipitation. Only REP microburst events were found to be insignificant in terms of generating NO_x.

Type of presentation: **Invited** in Session **3**.