

International joint study of EEP effects on the atmospheric minor components during pulsating aurora

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In recent years, variations of the atmospheric minor component (NO_x, H₂O, O₃, etc) due to energetic electron precipitation (EEP) have been widely studied by many researchers. There are several sources to cause EEP, such as solar proton event, electron precipitation during pulsating aurora, and relativistic electron precipitation. This study focuses on pulsating-auroral (PA-) EEP, which is an almost daily occurrence in the morning sector of the auroral ionosphere. EISCAT measurements and GEMSIS-RBW simulation reveal that energy range of the PA-EEP is higher than 10 keV to a few hundred keV [Saito et al., 2012; Miyoshi et al., 2015]. Such energetic electrons can cause ionization in the mesosphere and upper stratosphere, resulting in forced modifications in the chemical equilibrium of the atmospheric minor components. This process is essentially important for understanding solar-climate relationships.

Japanese and Finnish researchers organize an international joint team, and conduct observation campaigns with the EISCAT radars, optical instruments, KAIRA riometer, and VAPs satellites in order to understand generation mechanism of PA-EEP and its impact on the ionosphere and atmosphere. Additionally we will analyze the archived data sets to understand EEP features. These scientific objectives will be accomplished by collaborations with the GEMSIS-RBW model and Sodankyla Ion Chemistry (SIC) model. In this presentation we will introduce some case studies of measurements and model calculations.

[References]

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