



Energetic Electron Precipitation into the Middle Atmosphere through Chorus-Wave Particle Interactions

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1. Extended Abstract

Relativistic electrons of the outer radiation belt precipitate into the middle atmosphere. In this presentation, we report on events of wide energy electron precipitations of multi-hundred keV electrons of the outer radiation belt associated with the pulsating aurora, which are identified by the satellite and EISCAT radar. As an example event, the satellite observed rising tone emissions of the lower band chorus (LBC) waves near the equatorial plane during the pulsating aurora [Miyoshi et al., 2015]. During the time, EISCAT detected significant electron density enhancement at the middle atmosphere, indicating that a few hundred keV electron precipitations associated with the pulsating aurora. A computer simulation of the wave-particle interactions showed simultaneous precipitation of electrons at both tens of keV and a few hundred keV through resonant interactions between LBC and electrons, which is consistent with the EISCAT observations. The precipitation causes significant enhancement of NO_x and HO_x and subsequent depletion of O₃ in the mesosphere [Turunen et al., 2016], so that relativistic electron precipitations caused by LBC are important for the ion chemistry at the middle atmosphere. In the presentation, new observations from the Arase (ERG) satellite that was launched in December 2016 and a campaign observation between the Arase satellite and ground-based observations including EISCAT will be reported.

References

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