

## Ionospheric weather in the dayside polar cap region

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Using European incoherent scatter radar (EISCAT) and EISCAT Svalbard radar (ESR), we have made simultaneous observations of the dayside polar cap ionosphere at Longyearbyen and Tromsø. Five year observation data show significant disturbances in the polar cap region northward the ESR site even during geomagnetically quiet periods. This suggests that the energy input from the magnetosphere would play a fundamental role for dynamics and energetics in the region all the time. In addition, some researchers suggest effects from the lower atmosphere on the thermospheric variations in the polar region. In order to understand variations of the polar ionosphere/thermosphere from hour to hour, we should understand energy flows from the above (magnetosphere) and below (lower atmosphere).

Numerical simulations with a GCM are also essential to do so. In particular, GCM simulations would reveal physical and chemical processes/mechanisms to produce the thermospheric variations while the thermospheric observations are very few in the dayside.

In the present study, we overview the EISCAT and ESR observations during 2011-2016. The recent progress of our understandings from comprehensive observations and GCM simulations are also shown.

Keywords: ionosphere, thermosphere, EISCAT, GCM, simulation