Hot polar cap and cool auroral oval deduced from the temperature measurements by the EISCAT Tromsoe and Svalbard radars

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Energetics of the high-latitude thermosphere/ionosphere is controlled by the Joule and particle heatings. When subsolar reconnection takes place, particle energy flux patterns conform to the shape of the auroral oval. By using the simultaneous measurements of the EISCAT UHF radars at Tromsö and Longyearbyen, we found that the ion and neutral temperatures at the low latitude boundary of the polar cap are higher than those at the auroral oval. The thermal structure over the polar cap and the auroral zone will be interpreted in terms of the magnetospheric convection and particle precipitation in relation to the orientation of the IMF by integrating the measurements of EISCAT radars, superDARN, and optical instruments.

Energetics of the high-latitude thermosphere/ionosphere is controlled by the Joule and particle heatings. When subsolar reconnection between the IMF and the geomagnetic field lines takes place, particle energy flux patterns conform to the shape of the auroral oval. In the case of lobe merging, the particle precipitation and resultant Joule heating are focused in the polar cap. By using the simultaneous measurements of the EISCAT UHF radars at Tromsoe and Longyearbyen, we found that the ion and neutral temperatures at the low latitude boundary of the polar cap are higher than those at the auroral oval. It is inferred that the heatings are confined to the polar cap in this particular case. From the point of view of the space weather, it is interesting to interpret the thermal structure over the polar cap and the auroral zone in terms of the magnetospheric convection and particle precipitation in relation to the orientation of the IMF by integrating various measurements of EISCAT radars, superDARN, and optical instruments.