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On the relation between particle precipitation and heat flux in the polar ionopshere

Yasunobu Ogawa[1*], Yoshimasa Tanaka[1], Tetsuo Motoba[1], Hiroshi Miyaoka[1], Akira Kadokura[1]

[1]National Institute of Polar Research

We have investigated characteristics of particle precipitation and heat flux based on the European Incoherent Scatter (EISCAT) radar data. The soft particle precipitation is often accompanied by electron heating due to the heat flux from the magnetosphere, and both can be a trigger of ionospheric ion upflow. However, little is known about the relation between the particle precipitation and heat flux (for example, relative locations between them). In this paper, we show their characteristics and relations to auroras using data obtained with EISCAT and optical measurements in November 2008 and February 2011, and discuss the plausible mechanisms determining the relative locations between electron heating and auroras in the polar ionosphere.

Keywords: polar ionopshere, particle precipitation, heat flux, EISCAT