

Relation between the location of ionospheric current and the lower thermospheric winds in the polar region

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Joule heating of neutral atmosphere in the polar thermosphere has become one of the most popular concerns. We have been observing vertical winds in the polar thermosphere with a Fabry-Perot interferometer installed at Poker Flat Research Range, Alaska. In this study, the vertical wind variations are compared with peak location of ionospheric current deduced from magnetic field measurements on the ground. The initial results are generally consistent with previous studies, namely, upward (downward) flows were often observed when the center of ionospheric current was equatorward (poleward) of the observatory.

Joule heating in the polar thermosphere has become one of the most popular concerns. We have been observing vertical winds in the polar thermosphere with a Fabry-Perot interferometer installed at Poker Flat Research Range, Alaska. The following results are obtained from some previous observations. (1) Vertical upward (downward) flows in OI630.0 nm measurements are often observed when auroras are in the equatorward (poleward) of the observatory. (2) Temporal variations of vertical winds in the lower thermosphere (estimated from OI557.7nm observation) are much similar to the temporal variation of horizontal magnetic field.(3) A quantitative analysis of the vertical winds and the magnetic perturbations shows that there are no time lag between them until expansion phase of magnetic substorm, while magnetic perturbation leads to vertical winds during recovery phase. In this study, the vertical wind variations are compared with peak location of ionospheric current deduced from magnetic field measurements on the ground. The magnetometer data were obtained at Kaktovik, Fort Yukon, Poker Flat, and Gakona. The estimating method of ionospheric current was refereed from Luhr et al. [1994]. The initial results are generally consistent with previous studies, namely, upward (downward) flows were often observed when the center of ionospheric current was equatorward (poleward) of the observatory.