Effects of auroral arcs on the neutral and the field-aligned ion motion

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Using data from the European Incoherent Scatter (EISCAT) radar (69.6 N, 19.2 E) and from all-sky camera at Kilpisjarvi (69.0 N, 20.9 E), we will discuss the relationship between the field-aligned ion motions and distance to the heat source using the dispersion relation of atmospheric gravity waves to investigate effects of auroral arcs on the neutral and the field-aligned ion motion.

In the polar ionosphere (100 - 200 km height), ion motions depend on the ExB drift, the pressure gradient associated with the solar EUV and auroral precipitation, and collisions with the neutrals. The collisions result in both momentum and energy transfer processes between ions and neutrals. In the vicinity of the auroral arc, the thermospheric heating due to the Joule/frictional and the particle energy dissipation is most likely to affect neutral motions. Strong vertical winds (50 - 100 m/s) have been observed with the Fabry-Perot Interferometers (630 nm) in the auroral region [e.g., Rees et al., Planet. Space Sci., 32, 667-684, 1984]. Using data from the European Incoherent Scatter (EISCAT) radar (69.6 N, 19.2 E) and from all-sky camera at Kilpisjarvi (69.0 N, 20.9 E), we will discuss the relationship between the field-aligned ion motions and distance to the heat source using the dispersion relation of atmospheric gravity waves to investigate effects of auroral arcs on the neutral and the field-aligned ion motion.

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