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Plasma convection jets near the poleward boundary of the nightside auroral oval and their relation to Pedersen conductivity gradients

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In this work, we have shown that the ionospheric azimuthal plasma velocity jets near the open-closed field line boundary on the nightside can be associated with the peak in the ionospheric conductivity gradient. Both model and DMSP observations have been utilized to conduct this investigation. The model tests show that when the gradient of conductivity in the poleward boundary becomes sharper, convection peaks appear around the poleward edge of the aurora. The model results have been confirmed by DMSP observations. Hundreds of large ion flow events are identified from one year DMSP observations, with flow speed larger than 500 m/s that occurred poleward of the aurora. Among them, 280 (74%) events are found to be associated with conductivity gradient peaks. Most of the convection jets occur in winter when conductivity gradients are expected to be large. The convection jets tend to occur at later local times (21:00-22:00MLT) at 70^o-72^o MLat. These events are preceded by increasing of the merging electric field suggesting that they occur after the expansion of the polar cap. Both observation and model results show that the conductivity gradient at the polar cap boundary are one of the important elements in establishing the convection jets.