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Auroral conductance estimated from Polar and FAST satellites

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We estimated auroral conductance using Polar satellite global auroral images. We then compared the estimated conductance with FAST satellite observations of electrons at 3500 km altitude. Polar satellite observed a westward traveling surge at 21 MLT at 0301UT on February 23, 1997, when FAST satellite travelled across the northern auroral oval to the north at 20 MLT from 0255-0305 UT. Intense auroras concentrated in the poleward half (65-68 deg LAT) of the oval, where FAST observed the inverted-V signatures. In the inverted-V regions, the average energy of precipitating electrons was estimated as 7 and 8 keV from Polar auroral images and from FAST particle observations, respectively. The ionospheric conductance was estimated as Pedersen=12 and 15 (Z) and Hall=30 and 35 (Z) from images and particles, respectively. These results indicate that the estimation of conductance from auroral images agreed with particle observations better than the typical instrumental ambiguity (30 %) in spatial scales larger than 3 degree in latitudes. On the other hand, FAST observed localized (0.5 deg in LAT) enhancements in the conductance at the both edges of the inverted-V structure. These localized enhancements were not reproduced from auroral images, presumably because of the wider spatial resolution of images (0.5-2 deg in LAT).

Keywords: aurora, substorm, conductance, conductivity, geomagnetic field