

The evolution characteristics of polar patches in the nightside ionosphere: multi-instrument observations

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We present continuously monitorings of eight polar cap patches from nightside polar cap to subauroral regions by multi ground-based instruments, including the all sky imagers (ASI) at Chinese Yellow River Station, EISCAT Svalbard and Tromso UHF radars, GPS ground-based receivers and SuperDARN radars, during the substorm recovery phase on 4th December 2013. The observation features of the patches from multi datasets are consistent with each other and confirmed that patches evolved equatorward along the convection streamlines and entered the nightside aurora oval modulated by particle precipitations associated with the nightside tail reconnections. The airglow imagers from ASI showed that the patches appeared fine-scale structures and steeper gradient in the leading edge during their evolution. The evolution speeds of the patches calculated both from the ASI and EISCAT observations are ranged about 350-520 m/s and consistent with the convection speed measured by SuperDARN radars. The HmF2 at the trail edges of some patches seem to be lower than the leading edges, indicating that the altitude of some patches may decrease during their evolutions.