



## Modulation of polar patches in the high-latitude nightside ionosphere by substorm activity

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Results are presented from a multi-instrument study showing the influence of geomagnetic substorm activity on the spatial distribution of the high-latitude ionospheric plasma. Incoherent scatter radar and radio tomography measurements were used to directly observe the remnants of polar patches in the nightside ionosphere and to investigate their characteristics. The patches occurred under conditions of IMF Bz negative and IMF By negative. They were attributed to dayside photoionisation transported by the high-latitude convection pattern across the polar cap and into the nighttime European sector. The patches on the nightside were separated by some  $5^\circ$  latitude during substorm expansion, but this was reduced to some  $2^\circ$  when the activity had subsided. The different patch separations resulted from the expansion and contraction of the high-latitude plasma convection pattern on the nightside in response to the substorm activity. The patches of larger separation occurred in the antisunward cross-polar flow as it entered the nightside sector. Those of smaller separation were also in antisunward flow, but close to the equatorward edge of the convection pattern, in the slower, diverging flow at the Harang discontinuity. A patch repetition time of some 10 to 30 min was estimated depending on the phase of the substorm.