

## Relationship between auroral substorm and ion upflow in the polar ionosphere

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We have studied the relationship between ionospheric ion upflow and auroral substorm, using the EISCAT radar and IMAGE satellite data on September 25, 2001. Simultaneous data obtained from the EISCAT UHF and VHF radars located at Tromsø (Invariant latitude of 66 deg) and the EISCAT Svalbard radar located at Longyearbyen (Invariant latitude of 75 deg) allow us to investigate temporal and spatial developments of the upward ion flux in the polar ionosphere during the substorm. The upward flux at about 600 km altitude at Tromsø increased from  $1.0 \times 10^{13}$  to  $2.5 \times 10^{13}$  m<sup>-2</sup> s<sup>-1</sup> approximately 2.5 minutes after the initial brightening of the substorm occurred near Tromsø. At Longyearbyen, the upward flux at the same altitude increased from  $1.3 \times 10^{12}$  to  $5.0 \times 10^{13}$  m<sup>-2</sup> s<sup>-1</sup> at almost the same time when the auroral emission intensity increased at Longyearbyen due to the poleward expansion of auroras. The increase in ion flux was associated with an increase of upward ion velocity, and electron density did not change significantly at the altitude. We will discuss what causes the changes of the upward ion flux during the substorm.