

Escape of high-energy oxygen ions through magnetopause reconnection under northward IMF

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During a storm recovery phase on 15 May 2005, the Geotail spacecraft repeatedly observed high-energy (>180 keV) oxygen ions in the dayside magnetosheath near the equatorial plane. We focused on the time period from 11:20 UT to 13:00 UT, when Geotail observed the oxygen ions and the interplanetary magnetic field (IMF) was constantly northward. The high-latitude magnetic reconnection occurrence is indicated by the Walen analysis and convective flows in the magnetopause boundary layer. Anisotropic pitch angle distributions of ions suggest that high-energy oxygen ions escaped from the high-latitude region along the reconnected magnetic field lines. From the low energy particle precipitation observed by DMSP, which is consistent with magnetic reconnection between the magnetosheath field lines and the magnetospheric closed field lines, we conclude that these oxygen ions are of ring current origin. This result suggests a new escape route of oxygen ions during northward IMF. In the present event, this escape mechanism is more dominant than the leakage via the finite Larmor radius effect across the dayside equatorial magnetopause.