



Statistical study of relationships between high-altitude and high-latitude O⁺ ion outflow and solar/geomagnetic activity

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The terrestrial-origin O⁺ ion outflow, which is persistently observed by the Cluster CIS/CODIF instrument was statistically studied in the high-altitude (from 3 up to 11 Re), and high-latitude (from 70 to ~90 degrees invariant latitude, ILAT) polar region. We studied its occurrence and distribution in terms of the solar wind as well as the geomagnetic activity. We found the following: (1) Outflowing O⁺ ions with more than 1 keV are observed above 10 Re and near the pole (>85 degrees ILAT); (2) The velocity filter effect can explain all the energy dispersion of O⁺ outflow only below 8 Re but not above; (3) Neither the solar wind convection electric field nor the solar wind dynamic pressure seems to control the O⁺ outflow.