Geophysical Research Abstracts
Vol. 20, EGU2018-6288-2, 2018
EGU General Assembly 2018

Hemispheric differences of Earth's magnetic field and their implications for the magnetosphere-ionosphere-thermosphere (M-I-T) coupling

Matthias Förster (1,2) and Stein Haaland (1,3)

(1) Max-Planck-Institute for Solar System Research, Göttingen, Germany, (2) GFZ German Research Centre for Geosciences, Helmholtz Centre Potsdam, Section 2.3, Potsdam, Germany, (3) Birkeland Center for Space Science, Bergen, Norway

Disturbances in the solar wind and interplanetary magnetic field (IMF) affect the Earth's high-latitude thermosphere and ionosphere via coupling with the magnetosphere. Recent observations have shown that the upper thermospheric and ionospheric response to solar wind/IMF dependent drivers of the M-I-T system can be very dissimilar in the Northern (NH) and Southern Hemisphere (SH). Statistical studies of both ground- and satellite-based observations show hemispheric differences in the average high-latitude electric field patterns, associated with magnetospheric convection, as well as hemispheric differences in ion drift and neutral wind circulation patterns. The cross-polar neutral wind and ion drift velocities are generally larger in the NH than the SH, and the hemispheric difference shows a semi-diurnal variation. The vorticity of the upper thermospheric horizontal wind is also larger in the NH than in the SH, with larger differences for higher solar activity. In contrast, the spatial variance of the neutral wind is considerably larger in the SH polar region. These hemispheric differences can be explained at least to some extent by asymmetries in the Earth's magnetic field, both in magnetic flux density and in the offset between the geographic and invariant magnetic poles.