Solar Illumination Dependence of the Auroral Electrojet Intensity: Interplay between the Solar Zenith Angle and Dipole Tilt

This study reports that the westward auroral electrojet (WEJ) tends to be more intense when the ionosphere is dark than when it is sunlit, possibly because of more intense diffuse electron precipitation. It also demonstrates, for the first time, that the solar zenith angle and the tilt of Earth's dipole axis affect the local WEJ intensity in distinct ways.

- The nightside westward electrojet (WEJ) is more intense when the ionosphere is dark, and the eastward electrojet (EEJ) when it is sunlit.
- Both WEJ and EEJ are more intense when the dipole tilt is smaller, and this effect is comparable to the effect of solar illumination.
- The preference of the WEJ intensity for the dark ionosphere likely reflects that of diffuse e-precipitation and ionospheric conductance.

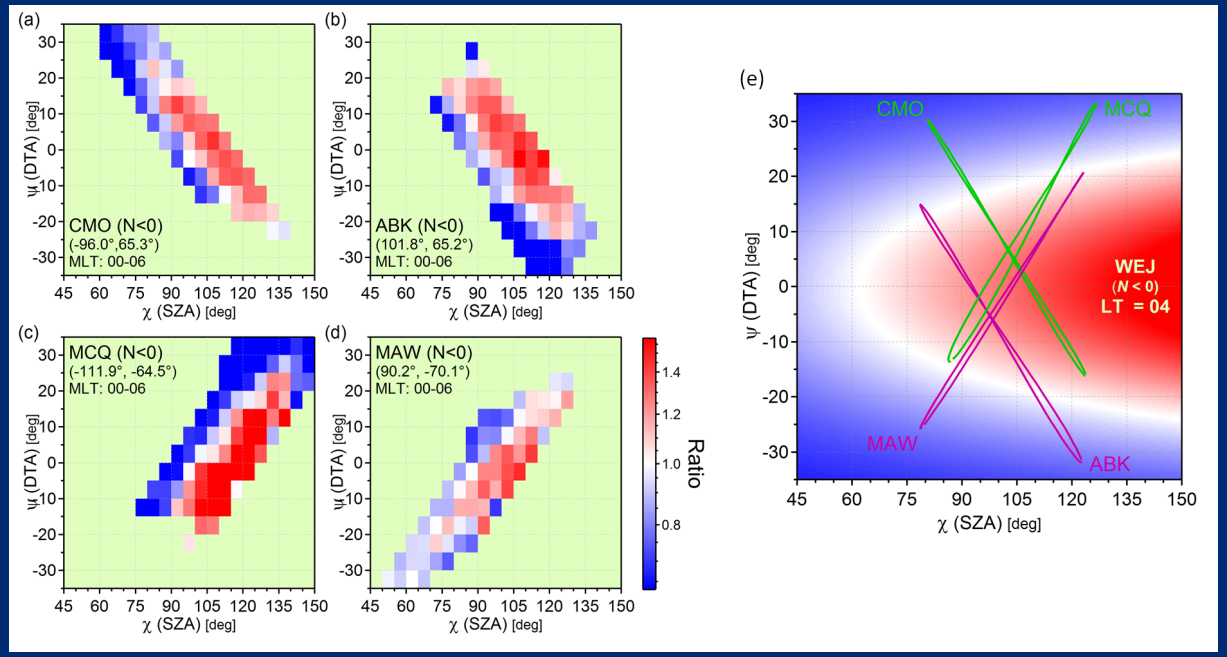

Figure. (left) Normalized intensity of the westward auroral electrojet (WEJ) at four high-latitude ground stations, College(CMO), Abisko(ABK), Macquarie Island (MCQ) and Mawson (MAW), in the frame of dipole tilt angle (DTA) vs. local solar zenith angle (SZA). (right) Schematic explanation of the dependence of the WEJ intensity on the DTA and SZA in reddish and bluish colors for more intense and weaker WEJ, respectively.

The westward auroral electrojet is more intense, probably because of higher ionospheric conductance due to more intense auroral precipitation, when the ionosphere is dark than when it is sunlit.

Ohtani, S., Gjerloev, J. W., Johnsen, M. G., Yamauchi, M., Brändström, U., & Lewis, A. M. (2019). Solar illumination dependence of the auroral electrojet intensity: Interplay between the solar zenith angle and dipole tilt. *Journal of Geophysical Research: Space Physics*, *124*. https://doi.org/10.1029/2019JA026707