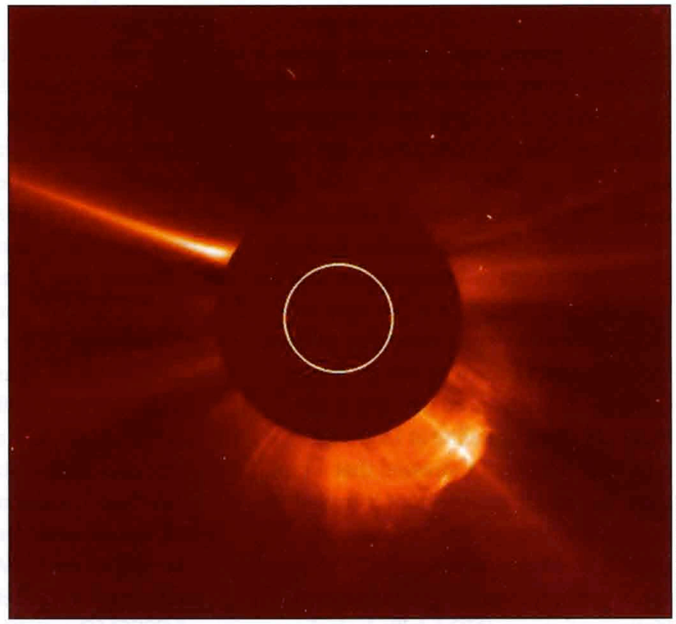
Selected new articles on the topic of space weather from AGU journals

Solar Wind Streams Heat Earth's Ionosphere

Corotating interaction regions (CIRs) are formed in the solar wind at the interface between high- and low-speed solar wind streams. The conditions that form these regions occur most often during the declining phase of the solar cycle and are known to cause moderate increases in geomagnetic activity. *Sojka et al.* [2009], using more than 1 year of ionospheric observations from the Poker Flat Incoherent Scatter Radar and the European Incoherent Scatter (EISCAT) Svalbard Radar, present a comprehensive study that demonstrates that ionospheric heating occurs in the auroral zone and polar regions when CIRs pass Earth. The ionospheric heating they describe can affect communications systems that rely on ionospheric conditions. Because new models are providing space weather forecasters with predictions of CIRs several days before they are observed at Earth, the results reported in this paper show that forecasters will also be able to predict changes in the high-latitude ionosphere and thermosphere caused by CIRs.

Sojka, J. J., R. L. McPherron, A. P. van Eyken, M. J. Nicolls, C. J. Heinselman, and J. D. Kelly (2009), **Observations of ionospheric heating during the passage of solar coronal hole fast streams,** *Geophys. Res. Lett., 36,* L19105, doi:10.1029/2009GL039064.



NASA/SOHO

Image of the 13 December 2006 coronal mass ejection as seen by the Solar and Heliospheric Observatory (SOHO)/Large Angle and Spectrometric Coronagraph (LASCO).

Craig Heinselman

Observations made using the Poker Flat Incoherent Scatter Radar (pictured above) were used to show that ionospheric heating occurs when corotating interaction regions pass Earth.

Modeling Coronal Mass Ejections

A major challenge to modelers is predicting the time of arrival, intensity, and duration of geomagnetic disturbances at Earth caused by coronal mass ejections (CMEs). Perhaps the most difficult part of this problem is to predict the variation in time of the north-south component (called B_z) of the interplanetary magnetic field, which is crucial for determining the amount of energy transferred from the solar wind to Earth's magnetosphere and ionosphere. Although they adjusted input parameters to improve the match between their model output and observations in the upstream solar wind, *Kataoka et al.* [2009] provide encouraging results, especially at capturing B_z, through representing a CME with a spheroid in their three-dimensional magnetohydrodynamic (MHD) model of the solar wind.

Kataoka, R., T. Ebisuzaki, K. Kusano, D. Shiota, S. Inoue, T. T. Yamamoto, and M. Tokumaru (2009), **Three-dimensional MHD modeling of the solar wind structures associated with 13 December 2006 coronal mass ejection,** *J. Geophys. Res., 114,* A10102, doi:10.1029/2009JA014167.