

Study of High-to-Low Latitude Coupling Effects During Substorms Using Multi-Diagnostic Techniques

X Pi (Jet Propulsion Laboratory, California Institute of Technology,
M/S 238-600, 4800 Oak Grove Drive, Pasadena, CA 91109-8099;
818-354-4257; e-mail: xqp@lurleen.jpl.nasa.gov)

M Mendillo (Center for Space Physics, Boston University, 725
Commonwealth Ave, Boston, MA 02215; 617-353-2629; e-mail:
mendillo@buasta.bu.edu)

Perturbations in thermospheric dynamics and electric fields are two major driving forces that cause disturbances in the middle latitude ionosphere. During geomagnetic active times, these can include enhanced winds, travelling atmospheric disturbances (TADs), and the penetration of magnetospheric electric fields. Past studies have indicated that thermospheric circulation changes can drive a disturbance dynamo, and also that plasma motions driven by electric fields may cause wind changes, even at middle latitudes. These effects occur during geomagnetic storms and substorms, but identifying the origins of the perturbations and their effects on the ionosphere have not been an easy observational problem. A key requirement is the use of multi-diagnostic techniques that measure geophysical conditions in different latitude regions. One such effort was made in a coordinated campaign during October 27-28, 1992. The techniques include (1) magnetometers in the auroral zone for indications of geomagnetic activities, (2) three incoherent scatter radars (ISRs) from high to low latitudes near 75°W longitude for *F* region electron densities, plasma drifts, and meridional neutral winds, and (3) all-sky CCD cameras and a Fabry-Perot interferometer (FPI) for 6300A airglow and neutral winds at a sub-auroral site. Observational results obtained included periods of substorm effects in the middle latitude ionosphere for both daytime and nighttime conditions. Thermospheric dynamical sources gave the best framework for interpretation of most effects. The time dependent behavior of a stable auroral red (SAR) arc at a sub-auroral site was used to assess electric field perturbations (penetration and shielding) of magnetospheric origin.

1. 1997 AGU Spring Meeting
2. 008943052
3. (a) X Pi
Jet Propulsion Laboratory
M/S 238-600
4800 Oak Grove Drive
Pasadena, CA 91109-8099
(b) Tel: 818-354-4257
(c) Fax: 818-393-4965
(d) E-Mail: xqp@lurleen.jpl.nasa.gov
4. SA
5. SA-02
- 6.
7. 50% at 1995 IAGA Meeting
8. Charge \$50 to Visa ... expires ...
9. I (by T Killeen and J Salah)
10. None
11. No