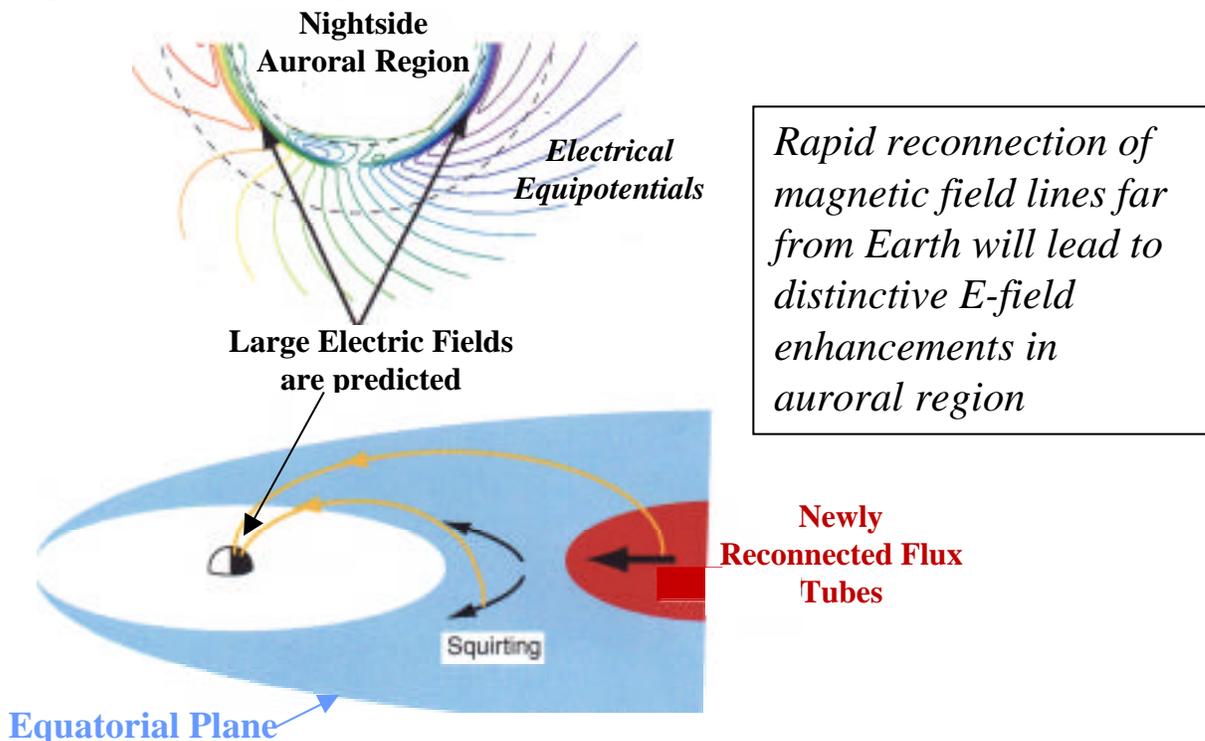


Title: *Test for a Magnetospheric Substorm Onset Mechanism*
 Cluster: *Cross-Theme Theory and Data Analysis/SECTP*
 Contributor: *R. Wolf/Rice U.*

▪ **Unique Near-Earth Electric Fields Predicted for a Geomagnetic Substorm Process**

The Rice Convection Model (RCM), which describes plasma dynamics in the Earth’s inner magnetosphere, has newly incorporated a self-consistent calculation of the magnetic field. It is now being applied to explore the enigmatic source mechanism for geomagnetic substorms. It has been recently used to simulate the implications of the Near-Earth-Neutral Line hypothesis for the substorm onset. In this process energy release occurs because of magnetic reconnection about 25 Re behind the Earth. The simulation shows that magnetic flux tubes Earthward of the reconnection site must squirt east and west to get out of the way of newly reconnected flux tubes racing toward the Planet. This produces large electric fields in the auroral region. Observers are being encouraged to look for this effect from low-altitude polar-orbiting satellites and ground-based radar. It provides a new direction for experimentally investigating the physics behind substorms.

Such model predictions provide guidance for the planning and execution of spacecraft and ground-based space plasma experiments. It is an excellent example of the synergy between SEC Theory Program research and the planning of NASA missions seeking to complete our understanding of the Sun-Earth connections.



Publication: “Computer Experiments on Substorm Growth and Expansion”. Toffoletto, F. R., Spiro, R. W., R. A. Wolf, J. Birn and M. Hesse, in Proceedings of 5th International Conference on Substorms, St. Petersburg Russia, 2000.