Abstract Submitted
for the 4CS19 Meeting of
The American Physical Society

Topology of Earth's Magnetic Shield: Modeled Properties and Applications DAVID SMITH, JAN SOJKA, Center for Atmospheric and Space Sciences, Dept. of Physics, Utah State University, Logan, UT — The open-closed boundary (OCB) defines the region where geomagnetic field lines transition from being closed to open. A closed field line has both foot points at or near Earth in opposing hemispheres. An open field line has one foot point at Earth while the other maps to the interplanetary magnetic field (IMF). Charged particles are able to follow these open field lines into Earth's upper atmosphere. The altitude to which these charged particles penetrate is a function of particle energy and latitude and is known as the energy cutoff latitude (CL). Given sufficient energy, these charged particles may reach the D-region of the ionosphere (about 100 km), causing increased absorption of HF radio signals, especially over polar regions. So-called polar cap absorption (PCA) events can, therefore, wreak havoc on HF communications near the polar cap boundary. It has been estimated that in excess of 7000 transpolar commercial flights occur each year. Hence, it is an important public safety issue that reliable means exist to anticipate HF communication conditions. Using the Tsyganenko model of the geomagnetic field (T96) we were able to show that the OCB experiences a UT-dependent variation. We are now prepared to demonstrate that this same UT-effect is inherent in the CL. Understanding this UT-dependent variability is critical to being able to accurately model HF communications disruptions due to PCA events.

David Smith
Dept. of Physics, Utah State University

Date submitted: 19 Sep 2019 Electronic form version 1.4