

Thermospheric Fe Layers Up to ~200 km in Antarctica and Their Coupling with the Atmosphere, Ionosphere and Magnetosphere

Xinzhao Chu¹, Zhonghua Xu², Jian Zhao¹, Cao Chen¹,
Zhibin Yu¹, and Ian F. Barry¹

¹ *University of Colorado Boulder, Boulder, USA*

² *Virginia Polytechnic Institute and State University, Blacksburg, USA*

Several new discoveries from lidar observations at McMurdo, Antarctica will be reported, especially on the studies of neutral Fe layers at thermospheric altitudes up to nearly 200 km. These phenomena are likely driven by metallic ion transport, Joule heating and ion drag due to atmosphere-ionosphere-magnetosphere (AIM) coupling, along with terrestrial waves from below. Comparisons to geomagnetic, solar wind, and ionospheric data reveal a close correlation between the thermospheric Fe layers and geomagnetic storms. We will categorize the thermospheric Fe layers with various forms and explore the driving mechanisms for the formation of these layers and their correlation to geomagnetic storms and ionospheric conditions.

Key words: Thermospheric Fe layers, geomagnetic storms, AIM coupling, atmospheric waves, Antarctica