

## CSI 662/ASTR769 Spring 2007 Introduction to Space Weather

### Project: The Sequence of Sun-to-Earth Activities of Intense Geomagnetic Storms Phase 4: Processes in the ionosphere and thermosphere, and space weather impact

Assignment Date: April 24, 2007

Due Date: May 1, 2007

The purpose of this phase of the project is to understand the thermosphere and ionosphere conditions during the storm time.

### Requirements

**1. Thermosphere.** Calculate the atmospheric  $N_2$ ,  $O_2$ , and  $O$  number densities and temperature during and before the geomagnetic storm that you have been studying. The calculation can be made by the MSIS 90 empirical model atmosphere, which can be run on line at: <http://modelweb.gsfc.nasa.gov/models/msis.html>.

Geomagnetic Latitude = 70 deg  
Geomagnetic Longitude = 0 deg  
Altitude = 100 km, 200 km, 1000 km  
Optional inputs: default

- (1) at the time of storm peak (UT time)
- (2) at the same UT time but in the quiet day before the storm arrival
- (3) compare the results in (1) and (2), and briefly discuss the differences and/or similarities.

**2. Ionosphere.** Calculate the ionospheric  $N_e$ ,  $T_n$ ,  $T_i$ ,  $T_e$ , and percentages of  $O^+$ ,  $N^+$ ,  $H^+$ ,  $O_2^+$  and  $NO^+$  ion densities during and before the geomagnetic storm that you have been studying. The calculation can be made by the International Reference Ionosphere (IRI)-2001 model, which can be run on line at: <http://modelweb.gsfc.nasa.gov/models/iri.html>

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Geomagnetic Longitude = 0 deg  
Altitude = 100 km, 200 km, 1000 km  
Optional inputs: default

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**3. (Optional) Space Weather effects.** Find out the technological and societal impacts of the space weather caused by the geomagnetic storm you are studying. You may look for the publicly available online resources.