

Simulation studies of the thermosphere

Hiroyuki Shinagawa[1]; Hidekatsu Jin[1]; Yasunobu Miyoshi[2]; Hitoshi Fujiwara[3]

[1] NICT; [2] Earth and Planetary Sci, Kyushu Univ.; [3] Dept. of Geophysics, Tohoku Univ.

The Earth's upper atmosphere consists of the ionosphere and the thermosphere, and varies significantly by influences of the solar wind, magnetosphere and lower atmosphere. As for the ionosphere, a number of observations have been made, and basic understanding has been obtained. On the other hand, understanding of the thermosphere is still not sufficient because of difficulties of measuring the neutral atmosphere at high altitudes. However, recent progress of both ground and satellite measurements has made some important discoveries of the thermosphere phenomena. For example, considerable vertical and horizontal winds exist in the polar thermosphere, which cannot be explained simply by auroral heating or ion-neutral drag force. In the mid- and low-latitude ionosphere, it was found that the upper atmosphere is significantly affected by the atmospheric waves propagated from the lower atmosphere. Those observations indicate that the upper atmosphere is influenced both by the solar wind/magnetosphere and by the lower atmosphere. In order to investigate upper atmospheric processes quantitatively, many simulation models have been constructed by various research groups in the world. We will briefly review previous simulation models of the upper atmosphere, and present our ionosphere-atmosphere coupled model.