



Generation of Large-scale Thermospheric Disturbances and Thermosphere Heating by Infrasonic Waves Propagated from Tropospheric Sources

Sergey Kshevetskii (1), Nikolay Gavrilov (2), Ivan Karpov (1), and Yuliya Kurdyeva (1)

(1) I.Kant Baltic Federal University, Russia, Physics, Kaliningrad, Russian Federation (renger@mail.ru), (2) Saint-Petersburg State University, Russia, Physics, Saint-Petersburg, Russian Federation

Meteorological processes in the lower atmosphere are the sources of excitation of acoustic gravity waves (AGWs). Fluctuations of atmospheric pressure within a wide range of frequencies, including infrasonic frequencies are evidence of these tropospheric wave sources.

We simulate numerically the propagation of waves from tropospheric infrasound sources, and our study concerns the influences of these waves on the atmosphere. Numerical experiments have shown that the small-amplitude infrasound waves can propagate without striking manifestations up to the heights of about 100 km.

Only waves propagating with a rather small angle to the vertical, penetrate the thermosphere and heat the thermosphere and generate internal gravity waves. Numerical experiments have revealed that tropospheric sources with spatial scales of several kilometers, are able to create wave disturbances in the thermosphere with spatial scales from tens to one thousand kilometers.

The heating effect and generation of gravity waves is significant due to the fact that it accumulates. During one hour, the thermospheric temperature may change due to heating by infrasonic waves more than by 10 degrees. The simulations have shown that the infrasonic waves propagated upward may be a significant source of thermosphere heating.