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Propagation of infrasound in the atmosphere and effects on mesopause temperatures

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Several natural and artificial sources produce acoustic waves with sub-audible frequency, so called infrasound. Detecting and recognizing this sound can be used to monitor man-made signals (e.g. nuclear tests, explosions) or geo-hazards (e.g. earthquakes, volcano eruptions). Knowledge of the propagation of infrasonic waves is important to trace a signal to its origin and to define the right location for detecting it.

The propagation of infrasound in the atmosphere follows certain laws of physics and depends on local atmospheric temperature and influences of wind. Basic propagation patterns of infrasound can be described by acoustic ray-tracing methods (using scientific calculations and numeric software for regarding and solving the physical background). Atmospheric conditions as local wind and temperature are enclosed using global climatologies and/or regional weather information. A combination of propagation and atmospheric modelling is presented and the basic features of infrasound in the atmosphere are explained.

An infrasonic signal has a certain intensity and transports energy from its source into the atmosphere. Parabolic equation methods are used to calculate the changes of infrasonic intensity with increasing range and altitude. The resulting amplitudes can be regarded as pressure variations to the ambient atmospheric state. These variations can be converted in temperature fluctuations and express atmospheric heating by acoustic waves.

Emphasis is on the influence of infrasound on temperatures in the mesopause region (around about 87 km height).