



Impact of summertime troposphere planetary wave activity on mesopause temperature-fluctuations through infrasound

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Mesopause temperature fluctuations with a 3-6 day modulation are frequently observed in OH*-airglow measurements. The northern hemisphere wintertime appearance of these fluctuations is often explained by tropospheric planetary wave activity (4- and 5-day-wave) propagating up to the mesopause, but the summertime appearance is still under discussion. Planetary waves are strongly influenced by stratospheric winds. Therefore, the westward winds in northern hemisphere summertime normally prevent the propagation through the stratosphere.

One possible explanation for the phenomenon of summertime temperature fluctuations in the mesopause could be acoustic heating. Infrasound, which is for example produced by a low pressure area or thunderstorm cell, propagates unhindered into the upper atmosphere and deposits heat energy in this region. The oftentimes about weekly variation of low pressure areas due to planetary wave activity in the troposphere can therefore be a potential source mechanism for mesopause temperature fluctuations through infrasound as a transporting mechanism.

The modeling structure of infrasound propagation as well as of acoustic heating is presented. It leads to the modeling of an expected temperature fluctuation in the mesopause height, which is compared to OH*-airglow measurements of mesopause temperatures. The effect of acoustic heating on OH*-temperature fluctuations is quantified.