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Simulation of acoustic-gravity waves from atmospheric pressure variations and their influence on the high atmosphere.

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The processes of heating/cooling gas during phase transitions of water are one of the most important energy sources of acoustic-gravity waves in the atmosphere. Meteorological wave sources are very diverse and have complex, evolving spatial structure. The available experimental data are usually not enough for a detailed description of these wave sources. Therefore, modeling of acoustic-gravity waves from meteorological sources is challenging. The waves propagated from meteorological sources affect the atmospheric pressure. The atmospheric pressure variations with frequencies of acoustic-gravity wave spectrum are well recorded with microbarographs. It is interesting to use these experimental data, atmospheric pressure variations, for simulation of acoustic-gravity waves in the atmosphere.

The hydrodynamic problem of propagation of acoustic-gravity waves from atmospheric pressure variations given on the Earth's surface is set and studied. It is shown that the solution of this boundary problem is completely determined by the pressure field. The numerical method for solving the problem is suggested. The program is tested by comparison of numerical simulations with known analytical solutions.

The simulation of acoustic-gravity waves propagated from atmospheric pressure variation experimentally observed with microbarographs is performed. The effects of waves generated by atmospheric pressure variations in the atmosphere are investigated.