Abstract Submitted for the DFD16 Meeting of The American Physical Society

Random coupling of acoustic-gravity waves in the atmosphere CHRISTOPHE MILLET, CEA, DAM, DIF, FRANCOIS LOTT, LMD, ENS, CHRISTOPHE HAYNES, University of Queensland — In numerical modeling of long-range acoustic propagation in the atmosphere, the effect of gravity waves on low-frequency acoustic waves is often ignored. As the sound speed far exceeds the gravity wave phase speed, these two types of waves present different spatial scales and their linear coupling is weak. It is possible, however, to obtain relatively strong couplings via sound speed profile changes with altitude. In the present study, this scenario is analyzed for realistic gravity wave fields and the incident acoustic wave is modeled as a narrow-banded acoustic pulse. The gravity waves are represented as a random field using a stochastic multiwave parameterization of non-orographic gravity waves. The parameterization provides independent monochromatic gravity waves, and the gravity wave field is obtained as the linear superposition of the waves produced. When the random terms are retained, a more generalized wave equation is obtained that both qualitatively and quantitatively agrees with the observations of several highly dispersed stratospheric wavetrains. Here, we show that the cumulative effect of gravity wave breakings makes the sensitivity of ground-based acoustic signals large, in that small changes in the parameterization can create or destroy an acoustic wavetrain.

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Date submitted: 03 Aug 2016

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