Geophysical Research Abstracts
Vol. 18, EGU2016-13030, 2016
EGU General Assembly 2016

Impact of mountain gravity waves on infrasound propagation

Florentin Damiens (1,2), François Lott (1), and Christophe Millet (2)

(1) Laboratoire de Météorologie dynamique du CNRS, Ecole Normale Supérieure, Paris, France (fdamiens@lmd.ens.fr), (2) Commissariat à l'Energie Atomique, DAM, Arpajon, France (florentin.damiens@cea.fr)

Linear theory of acoustic propagation is used to analyze how mountain waves can change the characteristics of infrasound signals. The mountain wave model is based on the integration of the linear inviscid Taylor-Goldstein equation forced by a nonlinear surface boundary condition. For the acoustic propagation we solve the wave equation using the normal mode method together with the effective sound speed approximation. For large-amplitude mountain waves we use direct numerical simulations to compute the interactions between the mountain waves and the infrasound component.
It is shown that the mountain waves perturb the low level waveguide, which leads to significant acoustic dispersion. The mountain waves also impact the arrival time and spread of the signals substantially and can produce a strong absorption of the wave signal. To interpret our results we follow each acoustic mode separately and show which mode is impacted and how. We also show that the phase shift between the acoustic modes over the horizontal length of the mountain wave field may yield to destructive interferences in the lee side of the mountain, resulting in a new form of infrasound absorption. The statistical relevance of those results is tested using a stochastic version of the mountain wave model and large enough sample sizes.