Geophysical Research Abstracts
Vol. 18, EGU2016-11672, 2016
EGU General Assembly 2016

Steps toward quantitative infrasound propagation modeling

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Realistic propagation modeling requires propagation models capable of incorporating the relevant physical phenomena as well as sufficiently accurate atmospheric specifications. The wind speed and temperature gradients in the atmosphere provide multiple ducts in which low frequency sound, infrasound, can propagate efficiently. The winds in the atmosphere are quite variable, both temporally and spatially, causing the sound ducts to fluctuate. For ground to ground propagation the ducts can be borderline in that small perturbations can create or destroy a duct. In such cases the signal propagation is very sensitive to fluctuations in the wind, often producing highly dispersed signals. The accuracy of atmospheric specifications is constantly improving as sounding technology develops. There is, however, a disconnect between sound propagation and atmospheric specification in that atmospheric specifications are necessarily statistical in nature while sound propagates through a particular atmospheric state. In addition infrasonic signals can travel to great altitudes, on the order of 120 km, before refracting back to earth. At such altitudes the atmosphere becomes quite rare causing sound propagation to become highly non-linear and attenuating. Approaches to these problems will be presented.