ID: Type: **Oral**

the influence of flow-topography interactions on infrasound propagation

The accuray of propagation modeling depends in large part on the reliability of both the medium and the boundary conditions. In order to incorporate topography effects in infrasound propagation, high-resolution terrain models are used through approximating the lower boundary by a sequence of up and down stair steps. This simplified approach may also be viewed as applying a “mask” onto the atmospheric specifications, and ignoring the direct influence of the topography on the local wind and temperature fields. This is an extremely serious limitation, given that even small mountains can produce intense phenomena, like downslope winds, Foehn, or trapped lee waves. In this study, we use a combined approach, based on a mesoscale atmospheric model and the range-dependent normal mode technique, to examine the conditions that causes a low-level acoustic duct to be affected by topography-induced disturbances. It is shown that during statically stable situations, situations that are common during night over land and winter, topography can induce a strong Foehn effect, which shrinks the waveguide significantly. This yields a new form of infrasound absorption, that can largely outweigh the direct effect of the obstacle on the low level waveguide.

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Track Classification: Modelling & Network Processing