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-linear infrasound propagation in random atmospheres

Studying the propagation of a waveform throughout a given atmosphere, numerically or theoretically, requires knowledge of wind speed and temperature gradients. A consensus has emerged that the main part of small-scale fluctuations is filtered out of the available data, even though it is known that these fluctuations significantly alter the determined propagative path of the waveform. In most infrasound studies, fluctuations are often represented as a deterministic field that is superimposed on a given background state provided by the G2S-ECMWF climatology. Significant advances have been made in the investigation of linear wave propagation through a perturbed atmosphere, finding realistic application within the infrasound community. In this talk, we will quantify how random subgrid-scale perturbations within a stratified anisothermal atmosphere affects the overpressure and period of a propagating N-wave signal, with application to the propagation of infrasound generated by meteoric activity. Results presented will include bounds on the characteristics of the N-wave in terms of the variation within the given perturbed atmospheric profile. We will show that the cumulative effect of randomness along propagation paths may make the sensitivity of ground-based signals large, in that small changes in the atmospheric specifications can alter significantly the N-wave characteristics.

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