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Bayesian Calibration of Ground-Truth Events from Stochastic Models

In infrasound propagation modelling, we face a large number of models with only a limited number of recorded signals to conduct statistical inference. Typically, standard practice consists of selecting atmospheric and propagation models from a class of models and then proceeding as if the selected models (or slightly perturbed versions of them) had generated the recorded signal. Such an approach ignores the uncertainties in model selection. While prediction of acoustic signals is a complex issue due to the random nature of atmospheric conditions, it turns out that sound propagates through a particular atmospheric state that can be somehow different that the retained atmospheric specification. In this work, we resort on atmospheric and propagation reduced models provided by platform FLOWS and use a bayesian approach as a basis for inference. This approach offers a systematic method for checking the robustness of energy estimates to alternative atmospheric and propagation models. The overall performance of this method is demonstrated using several ground truth events of specific concern for the verification regime. In addition, our results show that the use of stochastic reduced models in combination with a bayesian approach provides posterior distributions of event characteristics at low cost.

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