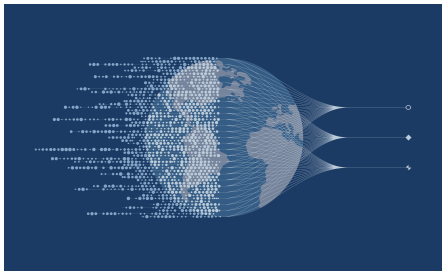

ID: **O2.2-257** Type: **Oral**

Atmospheric propagation model validation using empirical infrasound data from ground-truth explosive events

Thursday 11 September 2025 16:45 (15 minutes)

Model validation and uncertainty quantification using empirical data is imperative for gaining and maintaining confidence in any model designed to represent physical reality. In this study, we utilize the open-source Sandia INfrasound Ground-Truth Signals (SINGS) database to validate and quantify uncertainty in atmospheric propagation models. The SINGS database houses infrasound arrivals at regional distances from explosive ground-truth events in the Southwestern US and is compatible with the CSS3.0 data table format. We evaluate the performance of propagation modelling softwares against SINGS ground-truth event data, and compute uncertainty parameters for each model output. Once uncertainty parameters are constrained, these values inform the selection of geographic locations across the Southwestern US for which to build transmission loss models using G2S atmospheric specifications. Once built, these new transmission loss models are incorporated into the propagation modelling software, uncertainty quantification on model outputs is recalculated, and improvement in model performance vs. ground-truth is assessed against the initial run. By improving accuracy and reducing uncertainty in our ability to model how infrasound signals propagate through the atmosphere at regional scales, we are better able to leverage existing data and technologies in modelling source parameters such as explosive yield.

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