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Reconstruction and Infrasound Propagation Modeling Using AVO-G2S for Explosive Sources in Alaska

Long-range infrasound propagation is greatly affected by winds and temperature gradients in the atmosphere. To understand these effects and accurately determine acoustic source information, detailed characterization of the spatial and temporal variability of the atmosphere is vital. Alaska Volcano Observatory Ground-to-Space (AVO-G2S) is an open source atmospheric reconstruction model that smoothly characterizes atmospheric conditions using multiple numerical weather prediction models and reanalysis products as well as empirical models for the upper atmosphere. We present on the implementation of AVO-G2S both as a reanalysis and forecasting tool for the Alaska Volcano Observatory (AVO). High temporal and spatial resolution atmospheric models are automatically generated in real time every 12 hours for volcanoes with elevated activity in relation to each of AVO's six dedicated infrasound arrays. We use a combination of array processing and propagation modeling to refine interpretations of infrasound detections, differentiate between possible atmospheric propagation paths, and understand detection performance at each array. We show an example for the 2016-2017 eruption of Bogoslof Volcano, where model simulations were consistent with observations from the six arrays (either a detection or lack of detection) on more than half of the 70 explosions, with long range detections aligning well with seasonal propagation variability.

Primary author: IEZZI, Alexandra (University of Alaska Fairbanks)

Presenter: IEZZI, Alexandra (University of Alaska Fairbanks)

Track Classification: Modelling and Network Processing