ID: **P3.5-891**   Type: **E-poster**

Injection in Model Training for Better Calibrated Estimates of Origin Error in NET-VISA

Thursday, 22 June 2023 09:44 (1 minute)

NET-VISA is a Physics-Based Generative Model of global scale seismology. The model includes a description of the generation of events which include underwater and atmospheric events, the propagation of waveform energy from the events in multiple phases, and the detection or mis-detection of these phases at the network of stations maintained by the International Monitoring System as well as a model of noise processes at these stations. The model and its associated inference algorithm has been deployed by the International Data Center to generate a bulletin of events known as VSEL3. We recently introduced the ability in NET-VISA to estimate the origin error by using the model directly rather than by relying on other software such as Libloc (a derivative of LocSat). In this work we show that by injecting noise in the model training we get error ellipses that are much more representative of the location uncertainty. We have evaluated our work on a ground truth data set to confirm that the uncertainty estimates are much better calibrated than the existing Libloc software as well as the NET-VISA model without noise injection.

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Promotional text

We need to add noise to the training data to calibrate true uncertainty.

Oral preference format

in-person

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Session Classification: Lightning talks: P3.5, P5.1

Track Classification: Theme 3. Monitoring and On-Site Inspection Technologies and Techniques: T3.5 Analysis of Seismic, Hydroacoustic and Infrasound Monitoring Data