

Recent Advances and Status of Generative Modeling for Network Processing at the CTBTO

NET-VISA is a physics-based generative model of global-scale seismology designed for network processing at the IDC, i.e. building an event bulletin based on waveform data. The model includes a probabilistic description of event formation in multiple media (underground, ocean, and atmosphere), the propagation of energy within and across the media along multiple paths or phases, the detection and mis-detection of these phases at the IMS stations, the detection of coda energy, and finally the false, or noise, detections at the stations. Further, the model is continuously trained on historical data using machine learning techniques, and an inference algorithm based on greedy heuristic search scans the incoming data stream to generate a continuous event bulletin. In this presentation, we will describe the ongoing efforts to make NET-VISA results available to the analysts and the measured improvements on standard IDC products such as the REB bulletin (+10% additional events). We will also describe some recent advances: inclusion of infrasound detections and the corresponding atmospheric medium in the model, modeling of oceanic explosions generating detections at seismic stations, improvements for regional seismic events (+10% overlap with the analyst-reviewed LEB bulletin), and real-time noise modeling to improve processing of large aftershock sequences (+5% overlap).

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