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-VISA Progress and Enhancements

NET-VISA (NETwork processing Vertically Integrated Seismic Analysis) is a generative probabilistic model of global-scale seismology, as well as an inference algorithm for deducing the most probable seismic bulletin. The overall model has the following main parts: a prior for seismic event locations and magnitudes, a forward model for the transmission and attenuation of seismic waves, a probabilistic model for the detection of various seismic phases at a global network of seismic stations, as well as a model for false and coda detections. In this work we describe various enhancements to the NET-VISA model. Some of these enhancements are designed to ensure that the model corresponds better with seismological knowledge, for example the order of seismic phases and the correlation between their attributes. Other enhancements are designed to more efficiently detect weak seismic events in seismically actively regions using, for example, typical seismic energy radiation patterns. We also present results of the ongoing evaluation at the IDC (International Data Center), where NET-VISA has been running continuously since June 2012. These results indicate that NET-VISA can reduce the number of missed events by a factor of 2 to 3 while keeping the same rate of false events as the existing network processing.

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