Study of IDC infrasound REB solutions using Egyptian National Seismic Network data

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Infrasound is one of three waveform technologies which are part of the Comprehensive Nuclear Test Ban Treaty (CTBT) verification regime. The International Monitoring System (IMS) of the CTBT consists of 337 monitoring stations and laboratories world-wide. These facilities include 45 infrasound stations, installed world-wide and transmitting data to the International Data Centre (IDC). Since early 2010, the IDC began routine automatic and interactive processing of infrasound data; the detected and located events are systematically included in the Reviewed Event Bulletin (REB). Infrasound events are frequently characterized by a small number of infrasound phase associations. This poses a challenge to obtaining high-confidence event solutions during routine processing of infrasound data.

This study focuses on six infragenic events from the REB, occurring between January 2011 and December 2014, which were thoroughly analyzed at the IDC. The selected events were characteristically seismo-acoustic, and corroborated by seismic recordings of the Egyptian National Seismic Network (ENSN) operated by the National Research Institute of Astronomy and Geophysics (NRIAG). Utilizing this additional local network data of ENSN enables sharper assessment of the IDC published event solutions. Notably, the events were recorded within Egypt and regional surroundings where infrasound waves were generated. The events were detected by IMS infrasound stations located up to 7000 kilometers away.

Additional analyses, beyond the six infragenic events from the REB, will also consider some valid infragenic events that fall short of stringent REB Event Definition Criteria. The events will primarily consist of two defining stations with lower-confidence event solutions. The selected events, when confirmed by the seismic observations at ENSN, provide a unique dataset for evaluating IDC infrasound event solutions. Further objectives of the study seek to measure the performance of the IMS network for infragenic sources within Egypt and regional surroundings, and benchmark the detection capability of the ENSN by its concurrence with IMS infrasound data.