Setting up infrasonic propagation simulation using the latest real-time atmospheric specifications at the IDC

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The International Data Centre (IDC) of the Comprehensive Nuclear-Test-Ban Treaty (CTBTO) Preparatory Commission in Vienna is pursuing its automatic processing effort for the return of infrasound data processing into operations in 2009. Concurrently, work is also underway to further improve this process by enhancing the modeling of the infrasound propagation in the atmosphere and then by labeling the phases in order to improve the event categorization and location.

In 2008, the IDC acquired WASP-3D Sph (Windy Atmospheric Sonic Propagation) (Virieux et al., 2004) a 3-D ray-tracing based long range propagation software that accounts for the heterogeneity of the atmosphere. Once adapted to the IDC environment, WASP-3 Sph has been used to improve the understanding of infrasound wave propagation and has been compared with the 1-D ray tracing Taupc software (Garcés and Drob, 2007) at the IDC. In addition to performing the infrasound propagation simulation, different atmospheric models are available at the IDC, either real-time: ECMWF (European Centre for Middle-range Weather Forecast), or empiric: HWM93 (Horizontal Wind Model) and HWM07 (Drob, 2008), used in their initial format or interpolated into G2S (Ground to Space) model.

The IDC infrasound reference database is used for testing, comparing and validating the various propagation software and atmospheric specifications. Moreover all the performed simulations are giving feedback on the quality of the infrasound reference events and provide useful information to improve their location by refining infrasonic wave propagation characteristics.

The results of this study are presented for a selection of reference events and they will help the IDC designing and defining short and mid-term enhancements of the infrasound automatic and interactive processing to take into account the spatial and temporal heterogeneities of the atmosphere.