

Monitoring of Tropical Cyclones Using Seismic and Infrasonic Stations Surrounding the South-Western Indian Ocean

In the South-West Indian Ocean, tropical cyclones occur from December to April. As they move over the ocean, cyclones generate strong swells that may represent large sources of microseismic noise (secondary peak at 0.1-0.35Hz) and infrasound noise (microbaroms at 0.2Hz). A dominant source of noise in the oceans is indeed generated by standing waves, issued from the interaction of two swells in opposite directions. Such standing wave create Rayleigh waves that propagate in the oceanic crust and recorded by seismic stations (Longuet-Higgins, 1950). In the meantime, these stationary waves generate microbaroms' sources that travel in the atmosphere and well recorded by infrasound stations (Benioff & Butenberg, 1939). We combined these two independent observables of stationary waves for tracking Bingiza tropical storm (February 2011). We used seismic stations from the Volcano Observatory of the Piton de la Fournaise (OVPF) on La Réunion Island and IMS infrasound data from CTBTO. The azimuths of the microseismic source regions are determined by polarization analyses (Schimmel et al., 2012). The microbarom sources are analyzed with WinPMCC4.3 software (CEA/DASE2010) based on Correlation Method (Cansi, 1995). As result, we observed a clear signature in both seismic and infrasound noise sources that show good agreement with the cyclone track.

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