Long-range hydroacoustic observations of the Monowai Volcanic Centre as a proxy for seasonal variations in sound propagation

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Hydroacoustic activity of the submarine Monowai Volcanic Centre (MVC) is repeatedly observed at two distant triplet hydrophone stations, south of Juan Fernandez Islands (H03S, 9,159km) and north of Ascension Island (H10N, 15,823km). $T$-phase converted energy recorded at the broadband seismic station Rarotonga on Cook Island (RAR, 1,845km) is used as a reference for the cross-correlation analysis. A detailed processing scheme for the calculation of the daily cross-correlation functions (CCF) of the hydroacoustic and seismic data is provided. Preprocessing is essential to account for the non-identical measurements and sensitivities as well as the different sample rates. Further postprocessing by systematic data selection has to be applied before stacking CCFs in order to account for the non-continuous activity of the MVC source. Daily volcanic activity is determined for the period from 2006 until 2018 using the signal-to-noise ratio of the CCFs assuming sound propagation in the SOFAR channel. Monthly stacked CCFs with clear volcanic activity are used to study seasonal variations in sound propagation between the MVC and the hydrophone stations. In winter, however, a faster than expected signal is observed at H10N which is hypothesized to (partial) propagation through the formed sea ice along the path near Antarctica.