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trends and features in deep-ocean noise determined from the CTBTO hydroacoustc stations

This paper describes the results of applying a statistical method for long term and seasonal trend analysis and uncertainty evaluation from deep-ocean noise data. The analysis method uses a flexible discrete model that incorporates terms that capture seasonal variations in the data together with a moving-average statistical model to describe the serial correlation of residual deviations, with uncertainties validated using bootstrap resampling. The measured data originate from a number of the CTBT hydro-acoustic monitoring stations and span up to a maximum of 15 years. The analysis focuses on data from Cape Leeuwin, Wake Island, and Ascension Island, but also looks at Juan Fernandez and Diego Garcia. The features of the data are described, including differences observed in the seasonal variation and long-term trends, with the latter often exhibiting negative gradients. A tentative discussion is initiated of the potential causes of some of the variations, including changes in the acoustic output of individual anthropogenic sources (such as ships and seismic surveys), drift in the sensitivity of the sensing technology, changes in the sound transmission paths due to changing environmental conditions (for example, sea temperature), and changes to natural sound sources such as ice (especially in the Southern Ocean) and baleen whales.

Primary author: ROBINSON, Stephen (National Physical laboratory)

Presenter: ROBINSON, Stephen (National Physical laboratory)

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