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Evaluating the performance of infrasound detectors

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Abstract

Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) has deployed more than 60 stations around the world to detect the presence of infrasound in the atmosphere and then measure their characteristics more particularly the direction of arrival (DOA) and the velocity. Many recent studies have been devoted to infrasound signal processing, more particularly to the detection problem. Let us cite R. H. Shumway in 2001, S. J. Arrowsmith in 2008, David J. Brown in 2008, W. B. Howard in 2010, K. Walker in 2010.

In 1995, Y. Cansi has been a pioneer in infrasonic signal processing with the PMCC method. In PMCC, the detection process is based on the sum of Time Difference of Arrivals around any triangle of sensors. More recently we have been presented GLRT approach and given comparative results with PMCC and Fisher statistic.

Here we propose to extend this comparison through the creation of a benchmark database. Based on simulation with a semi-realistic propagation model and observed signals from IDC (IRED), performance of the detection methods are compared by computing the Receiver Operating Characteristic (ROC) curves.

Keywords : PMCC, Generalized Likelihood Ration Test, Fisher's statistic.