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Infrasound Arrival Parameters Using Limited Sensor Pair Correlation

Estimating the direction of infrasound signals over arrays usually utilizes similarity between waveforms on neighbouring sensors to measure time-delays accurately. Estimate quality can suffer due to diminished coherence over the full array aperture and methods such as PMCC exploit the increased similarity between signals on the most closely-spaced instruments. It is often helpful to examine the coherence over the full slowness space. This allows measurement of the F-statistic and makes the arrival of signals from multiple directions easier to visualize. The correlation traces between channel pairs can form a virtual co-array in which the correlation between channels i and j, C(ij), is ascribed the coordinates x(j) − x(i). For the original data, with conventional processing, removal of a channel results in data loss. For the correlation co-array, we are at liberty to remove a given C(ij) for any sensor pair for which the correlation is poorer and which may diminish the quality of our direction estimate while still utilizing data from all sensors. We demonstrate examples of high frequency signals on IMS infrasound arrays for which classical direction estimates are poor but for which robust estimates are made using the virtual array of correlations between only the most closely-spaced sensors.

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