

LAIA - A LARGE APERTURE INFRASOUND ARRAY FOR INTERFEROMETRIC STUDIES

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The traveltime of infrasound through the atmosphere depends of the temperature and the wind. Is it possible to estimate these atmospheric conditions just by measuring the traveltime between to microbarometers? In order to measure the traveltime we can use the ambient noise. Ambient noise is caused by the waves of the oceans, i.e, microbaroms, and has the advantage that it almost everywhere available. The traveltime can be determined by crosscorrelating the ambient noise of two or more microbarometers.

To estimate the temperature and the wind of the atmosphere with the traveltime we implemented a model of the infrasound propagation. With this model, we calculated synthetic barograms for arbitrary distributed microbarometers and sources. The synthetic barograms take into account the traveltime along the raypath, the attenuation of the different atmospheric layers, the spreading of the rays and the influence of caustics. By calculating the crosscorrelation of the barograms, we could show that it is possible to determine the traveltime this way.

In the near future, we are going to simulate the microbarometer positions of the 'Large Aperture Infrasound Array' (LAIA). LAIA is being installed by the Royal Netherlands Meteorological Institute (KNMI) in the framework of the radio-astronomical 'Low Frequency Array' (LOFAR) initiative. LAIA will consist of thirty microbarometers with an aperture of around 100 km. The in-house developed microbarometers are able to measure infrasound up to a period of 1000 seconds, which is in the acoustic-gravity wave regime. The results will directly be applicable to the verification of the 'Comprehensive Nuclear-Test-Ban Treaty' (CTBT), where uncertainties in the atmospheric propagation of infrasound play a dominant role. This research is made possible by the support of the 'Netherlands Organisation for Scientific Research' (NWO).