Geophysical Research Abstracts
Vol. 15, EGU2013-5881-2, 2013
EGU General Assembly 2013

Infrasonic interferometry applied to synthetic and measured data

Julius T. Fricke (1,2,3), Läslo G. Evers (1,3), Elmer Ruigrok (3), Kees Wapenaar (3), and Dick G. Simons (2)

(1) Royal Netherlands Meteorological Institute (KNMI), seismology division, De Bilt, Netherlands (fricke@knmi.nl), (2) Delft University of Technology (TU Delft), Acoustic Remote Sensing, Delft, The Netherlands, (3) Delft University of Technology (TU Delft), Department of Geoscience and Engineering, Delft, The Netherlands

The estimation of the traveltime of infrasound through the atmosphere is interesting for several applications. For example, it could be used to determine temperature and wind of the atmosphere, since the traveltime depends on these atmospheric conditions (Haney, 2009). In this work the traveltime is estimated with infrasonic interferometry. In other words, we calculate the crosscorrelations of data of spatially distributed receivers. With this method the traveltime between two receivers is determined without the need for ground truth events.
In a first step, we crosscorrelate synthetic data, which are generated by a raytracing model. This model takes into account the traveltime along the rays, the attenuation of the different atmospheric layers, the spreading of the rays and the influence of caustics. In these numerical experiments we show that it is possible to determine the traveltime through infrasonic interferometry.
We present the results of infrasonic interferometry applied to measured data. Microbaroms are used in the crosscorrelation approach. Microbaroms are caused by ocean waves and are measured by 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 consists currently of around twenty receivers (microbarometers) with an aperture of around 100 km, allowing for several inter-station distances. Here, we show the results of crosscorrelations as a function of receivers distance, to assess the signal coherency.

This research is made possible by the support of the 'Netherlands Organization for Scientific Research' (NWO).

Haney, M., 2009. Infrasonic ambient noise interferometry from correlations of microbaroms, Geophysical Research Letters, 36, L19808