Geophysical Research Abstracts
Vol. 21, EGU2019-12085, 2019
EGU General Assembly 2019

Detecting geophysical signals and sources with large-scale network data

Catherine de Groot-Hedlin and Michael Hedlin

University of California, San Diego, Scripps Institution of Oceanography, Institute of Geophysics and Planetary Physics, United States (chedlin@ucsd.edu)

Massive datasets can be used to examine geophysical phenomena in more detail than ever before but require analytical methods that are both efficient and capable of extracting useful information from faint signals immersed in noise. We have developed the AELUMA (Automated Event Location Using a Mesh of Arrays) method, which recasts any dense network of sensors as a distributed mesh of triangular arrays. Each array provides a local estimate of signal properties such as propagation direction, phase velocity and time of arrival. Machine learning techniques are used to combine signal characteristics observed at arrays across the network to estimate the origin time and location of the source. An advantage of this method is that little information about the propagation medium is required.

The AELUMA method has been highly successful at detecting a variety of geophysical phenomena recorded at the USArray Transportable Array (TA) such as gravity wave signals excited by convective storms, faint gravity waves associated with the solar terminator, both natural and anthropogenic infrasound and seismic sources. This method is applicable to networks that are sufficiently dense such that signals, or their envelopes, may be correlated between adjacent stations, but does not require the signal to be observable across the entire network. Here we report on preliminary work on extending AELUMA to data from very sparse networks, including global scale networks.