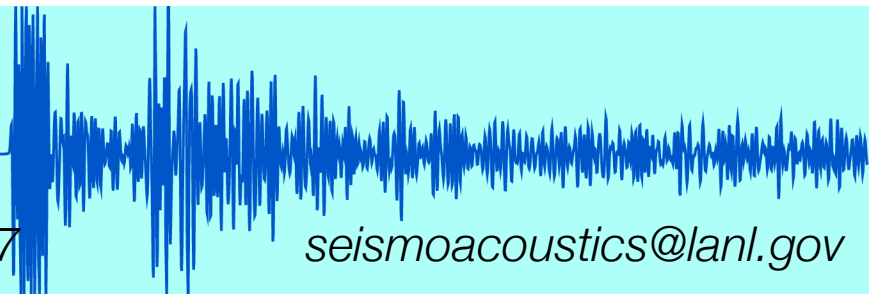


Special Event Analysis

Seismoacoustics Team, EES-17

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The LANL Seismoacoustics Team includes expertise on the geophysical tools required to rapidly analyze seismic events of interest using a variety of phenomenologies. This analysis focuses on answering the following questions:

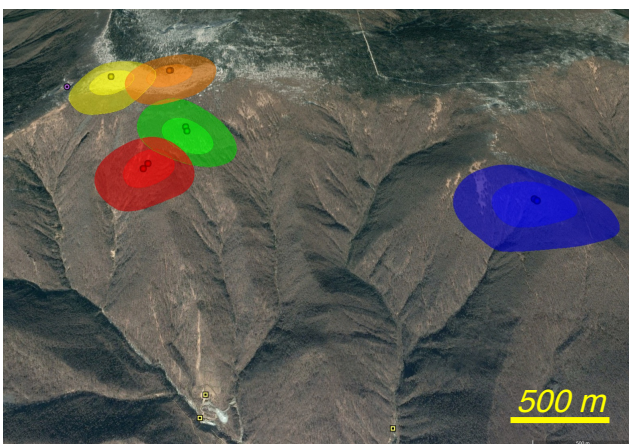
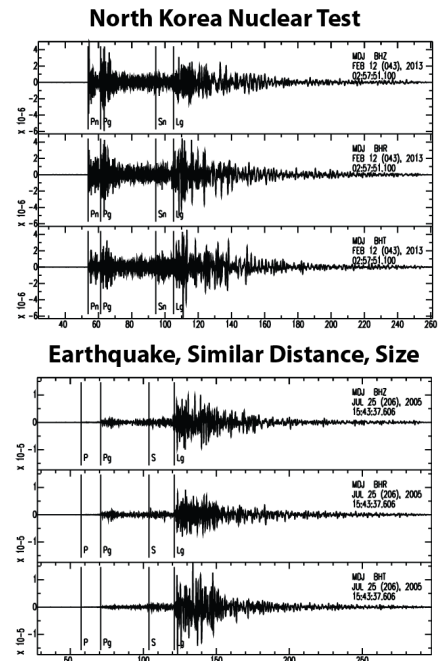
What was it?

- Build a catalog of background events in the region, with or without information on prior events, using a range of signal detection techniques
- Exploit additional types of data to determine nature of the event
- Determine if event of interest is distinct from background (natural or anthropogenic) activity

Where was it?

- Seismic absolute or relative location and associated uncertainties
- Event location and associated uncertainties, based on multiple data types such as seismic, infrasound, or electro-magnetic signals
- Sophisticated propagation model building to further enhance location accuracy

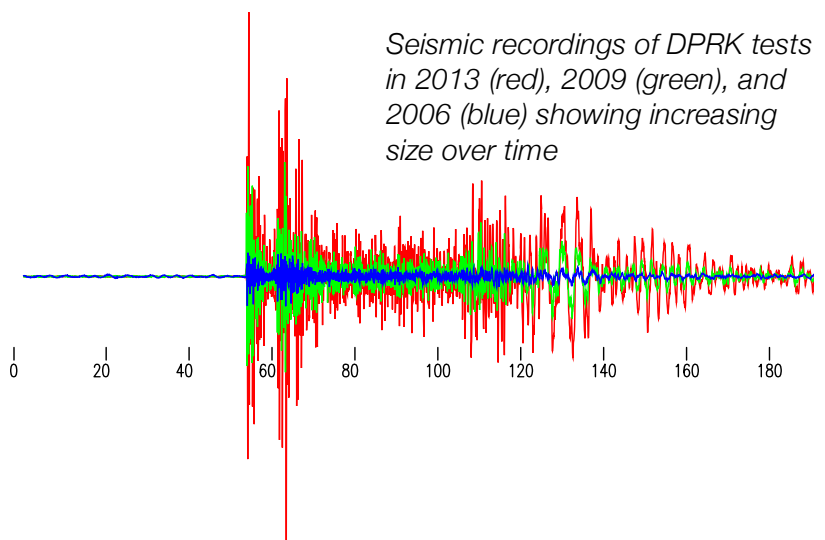
A comparison showing the distinct waveforms for the 2013 DPRK nuclear test and an earthquake of a similar size and distance, recorded at the same station



Locations and associated uncertainty ellipses of five reported DPRK nuclear tests, 2006-2016.

How big was it?

- Amplitude- and spectral-based techniques for both absolute and relative magnitudes and yields



Seismic recordings of DPRK tests in 2013 (red), 2009 (green), and 2006 (blue) showing increasing size over time



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Recent Publications

Arrowsmith, S., **G. Euler, O. Marcillo, P. Blom, R. Whitaker**, G. Randall (2015), Development of a robust and automated infrasound event catalogue using the International Monitoring System, *Geophys. J. Int.*, 200, 1411-1422, doi:10.1093/gji/ggu486.

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Carmichael, J. (2016), A waveform detector that targets template-decorrelated signals and achieves its predicted performance, Part I: Demonstration with IMS data, *Bull. Seismol. Soc. Am.*, 106, 1998-2012, doi:10.1785/0120160047.

Cleveland, K. M., T. F. VanDeMark, C. J. Ammon (2015), Precise relative locations for earthquakes in the northeast Pacific region, *J. Geophys. Res.*, 120, doi:10.1002/2015JB012161.

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Marcillo, O., S. Arrowsmith, R. Whitaker, **D. Anderson**, A. Nippres, D. N. Green, D. Drob (2014), Using physics-based priors in a Bayesian algorithm to enhance infrasound source location, *Geophys. J. Int.*, 196, 375-385, doi:10.1093/gji/ggt353.