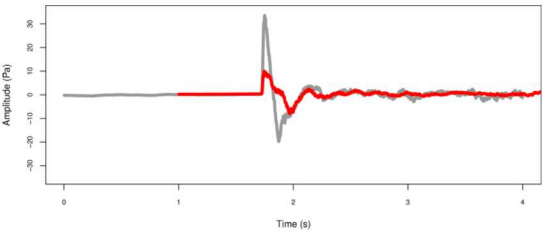
LYNM LOCAL Infrasound

SAND2020-2853C

Impacts of minute-scale atmospheric variability on acoustic signals from surface explosions

Background/State of the Art



Infrasound amplitudes vary on short time scales

How short is short?

Innovation

Three 1-ton explosions

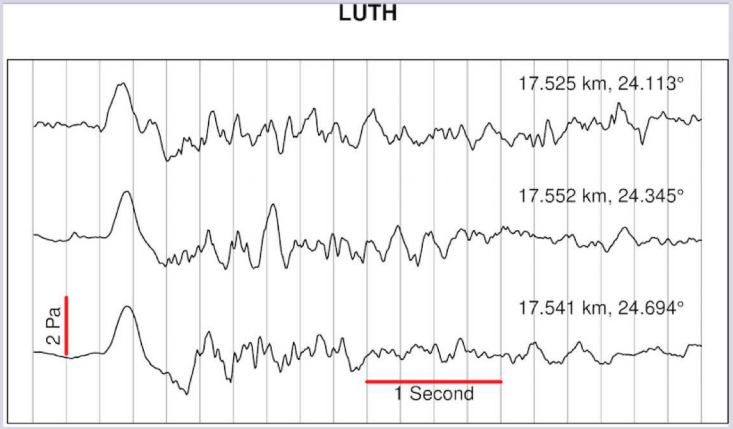
- 90 seconds apart
- ~100 m apart

- **Record locally (<25 km)**
- **Record regionally (150-300 km)**

Approach, Metrics and Outcomes

MAIN ACHIEVEMENT

- Demonstrated minute-scale variability
- Noted impact from near-source topography



HOW IT WORKS

- Three 1 ton TNT equivalent explosions at EMRTC in Socorro, NM
- Six stations within 23 km of source
- Two subarrays at 177 and 259 km range

RESULTS

- Near-source topography affects peak amplitude and influences coda
- Major signal variability starting between 10 and 17 km
- Each shot at 170 and 259 km range appears very different

Impact

- Deterministic infrasound waveform modeling is impossible beyond 10 km
  - No sufficiently accurate atmospheric model is likely to ever exist
  - Propagation modeling across topography can reduce misfit
- Characterization methods should focus on features that are better preserved
  - Frequency content
  - Energy
- If full waveform information is important, need different recording geometries

Goals/Action Plan

- Continue modeling using topography and atmosphere
- Publish results of overflight
  - GRL or similar
- Develop follow up experiment
  - Prefer location with less local topography
  - Reduce shot time span (10 or 20 seconds)

Team

Daniel C. Bowman
dbowma@sandia.gov

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