DAG-1 Infrasound Predictions

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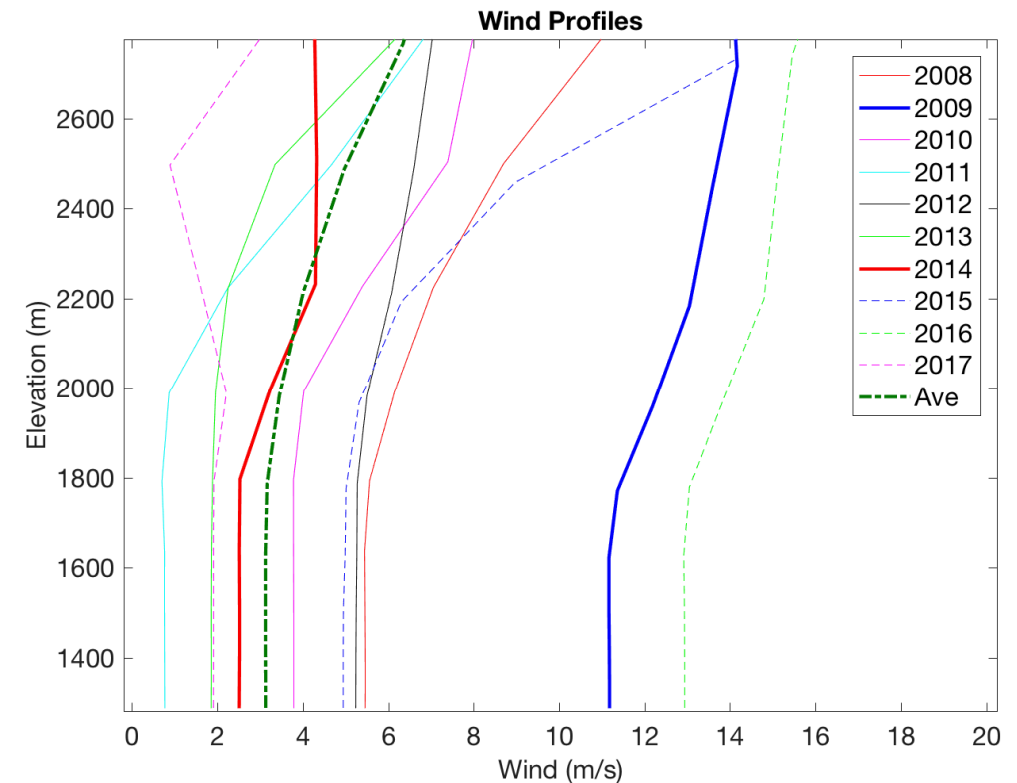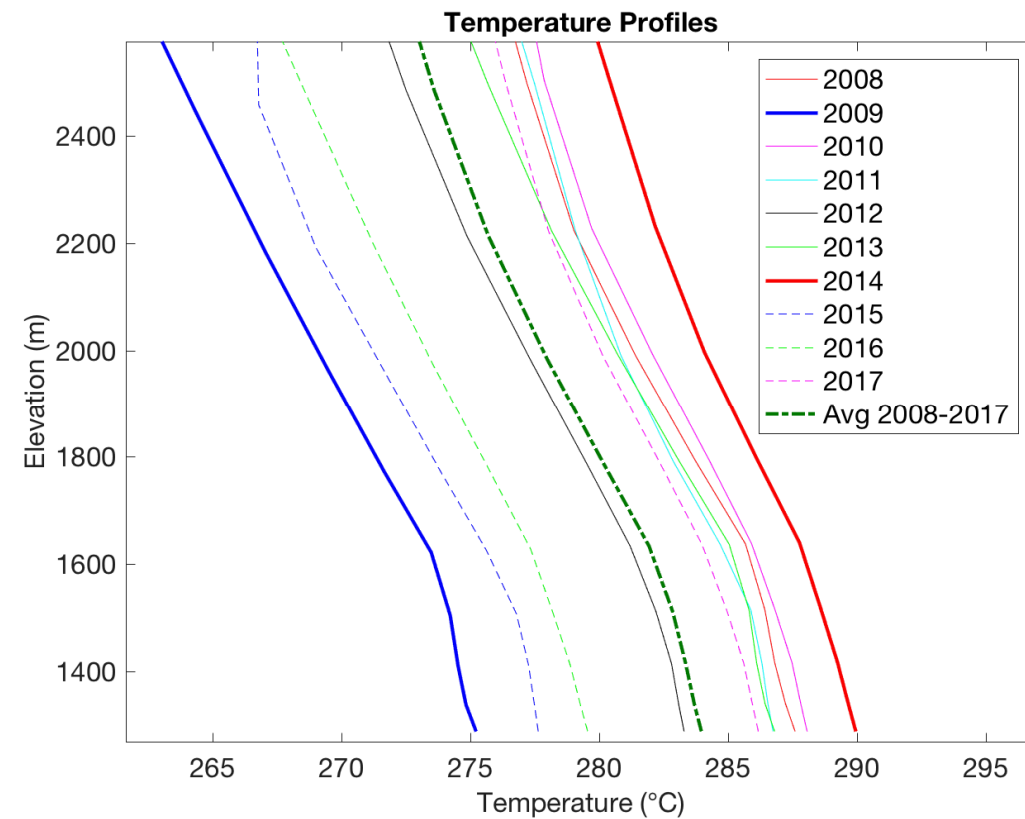
Weather

- Collected NARR (North American Regional Reanalysis) data from the National Center for Atmospheric Research data repository

- Chose mid April data from 2008-2017

- Ran WRF (Weather Research and Forecasting) suite for each year and for an average model over the 10 year period

- Selected outlier years and average to simulate DAG-1 shot

Weather Variations

Temperature Profiles

Wind Profiles

Wind Speed

- Mean 1-D profiles of temperature and horizontal winds provide an idea of weather variations

- **2009**: Coolest and windy, **2014**: Warmest
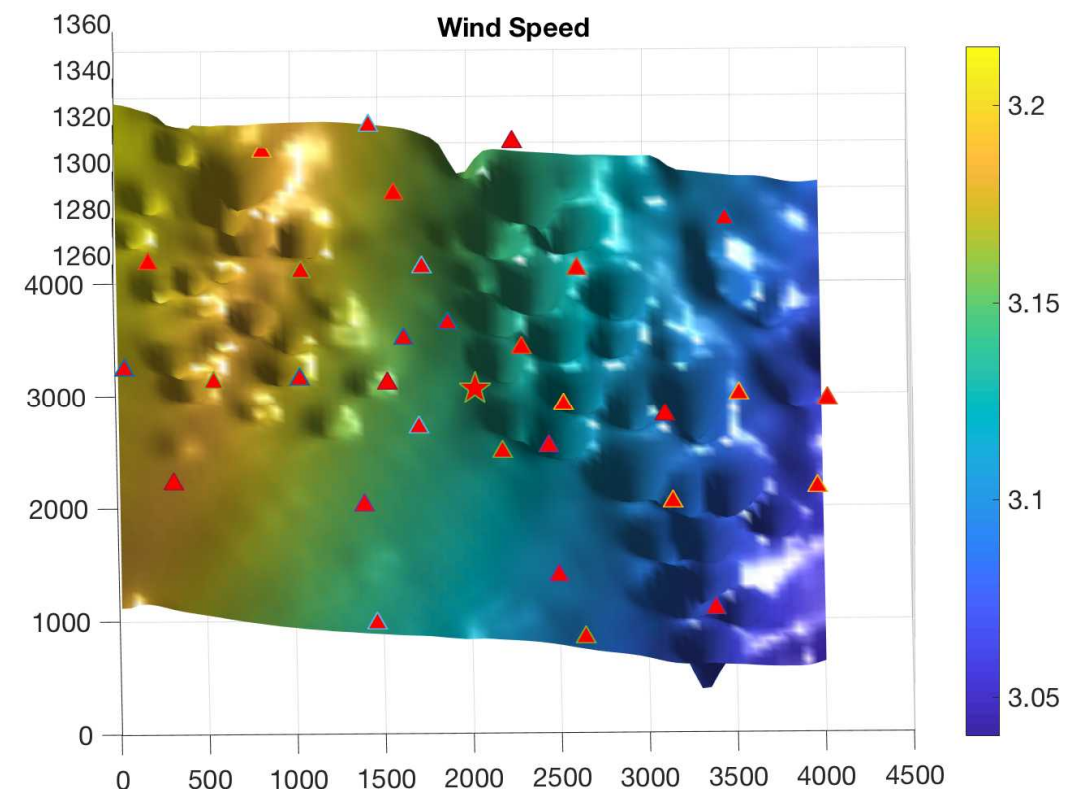
Modeling

- Used explosive source time functions derived from SPE-4' scaled for DAG-1. Does not account for shift in corner frequency from SPE-4' to DAG-1.

- Used TDAAPS (Time Domain Atmospheric Acoustic Propagation Suite) to obtain synthetic pressure traces at all SPE infrasound receivers

- Accounts for 3-D variations in atmospheric medium parameters, wind, and topography

- Earth model is homogeneous but has topography with 3 variations: no shaft, open shaft, and covered shaft
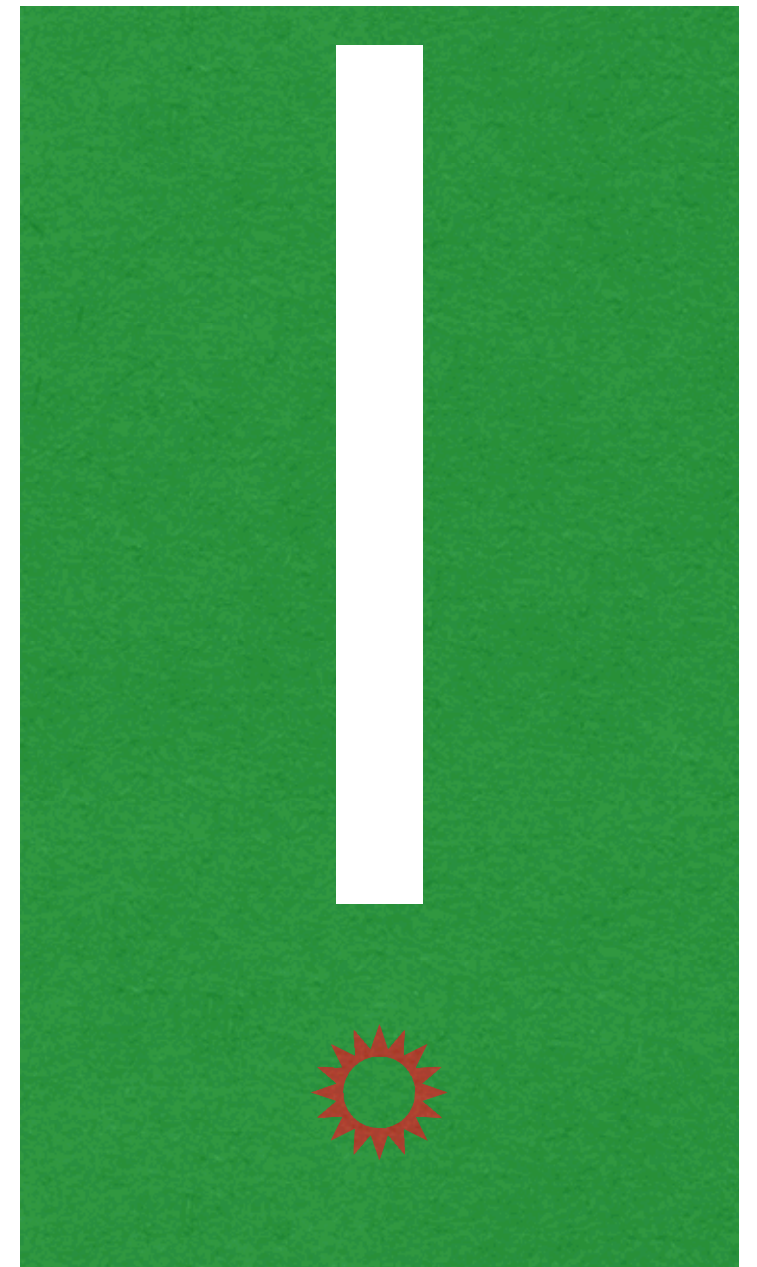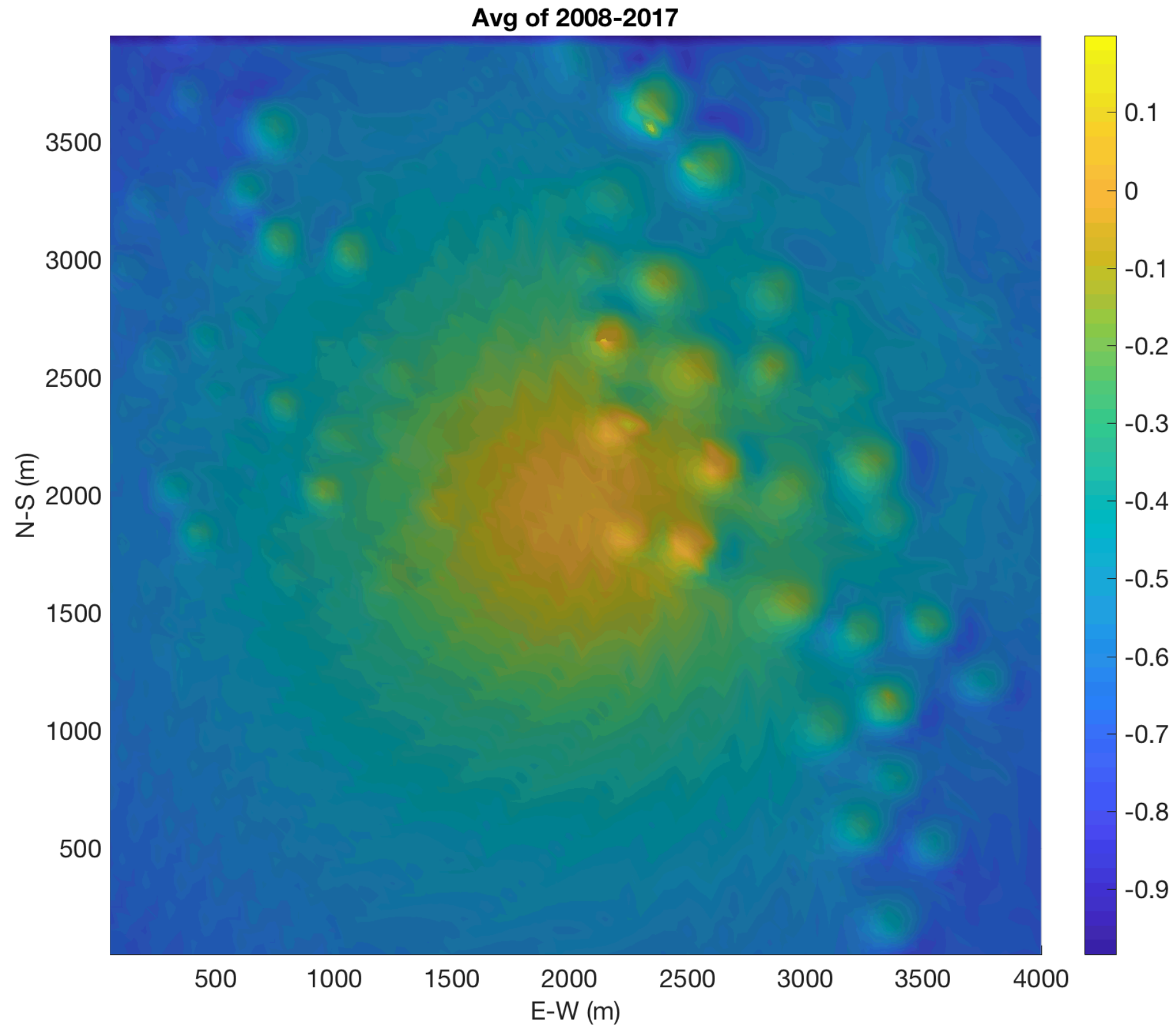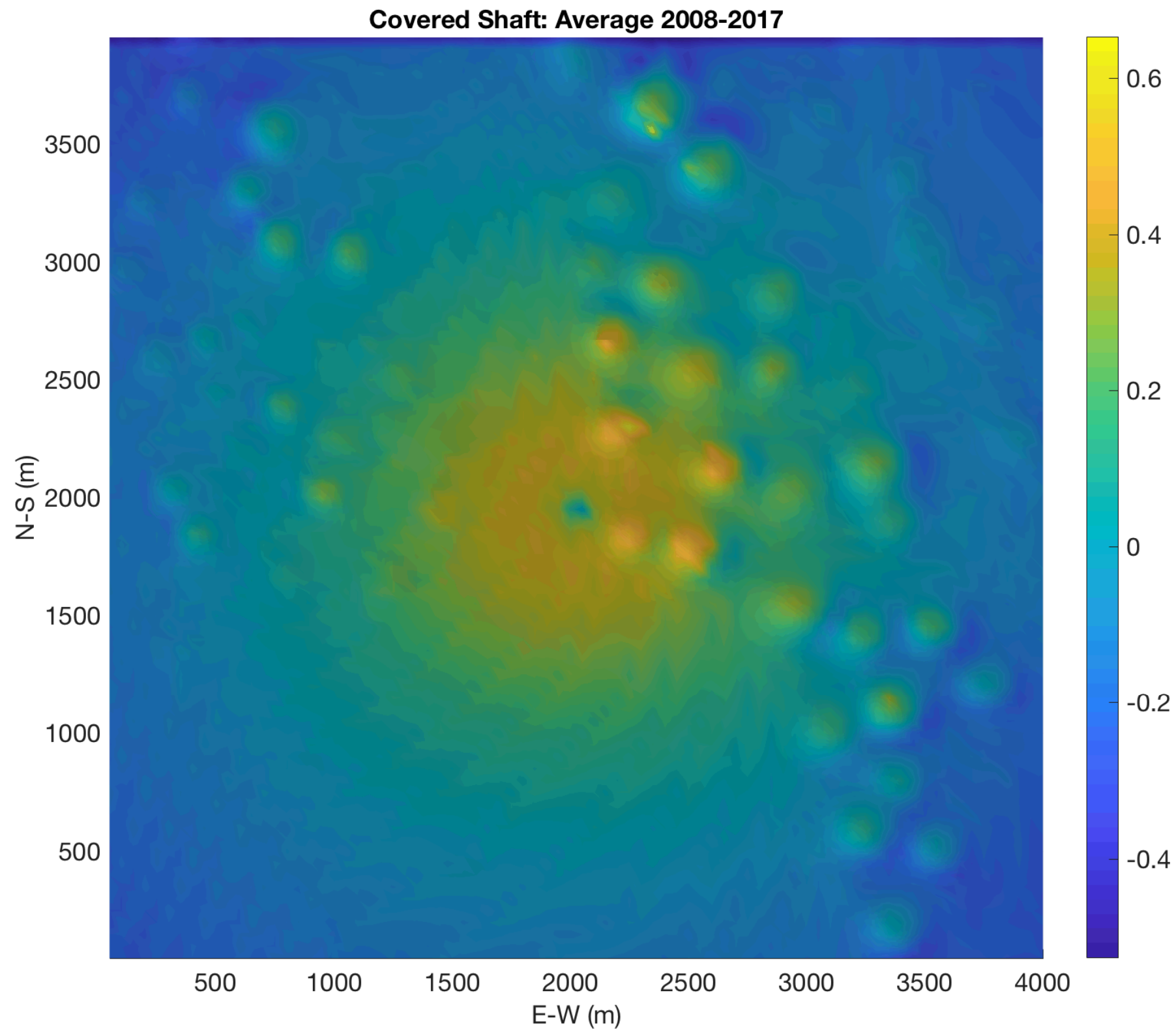
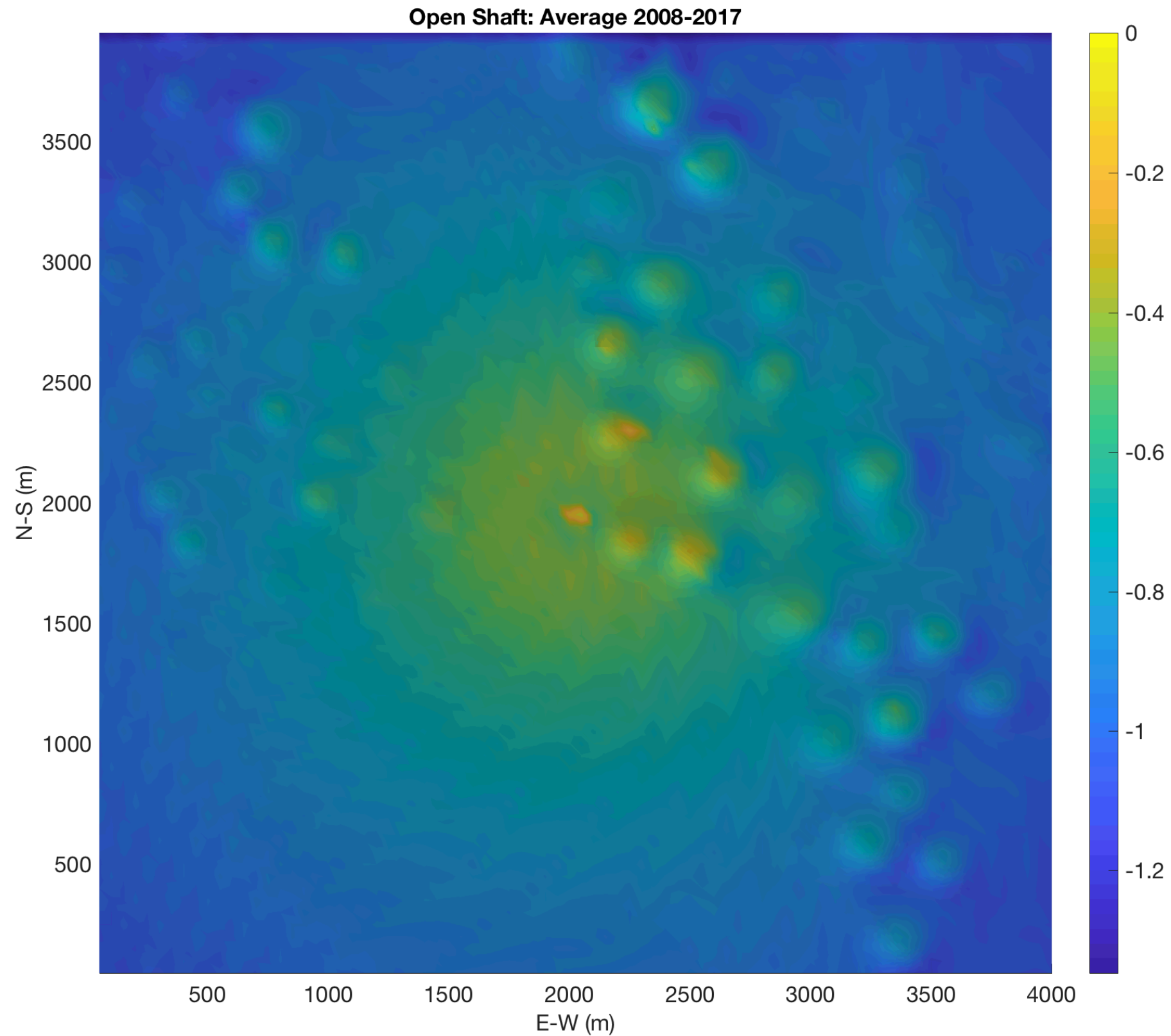# Earth Models

No Shaft
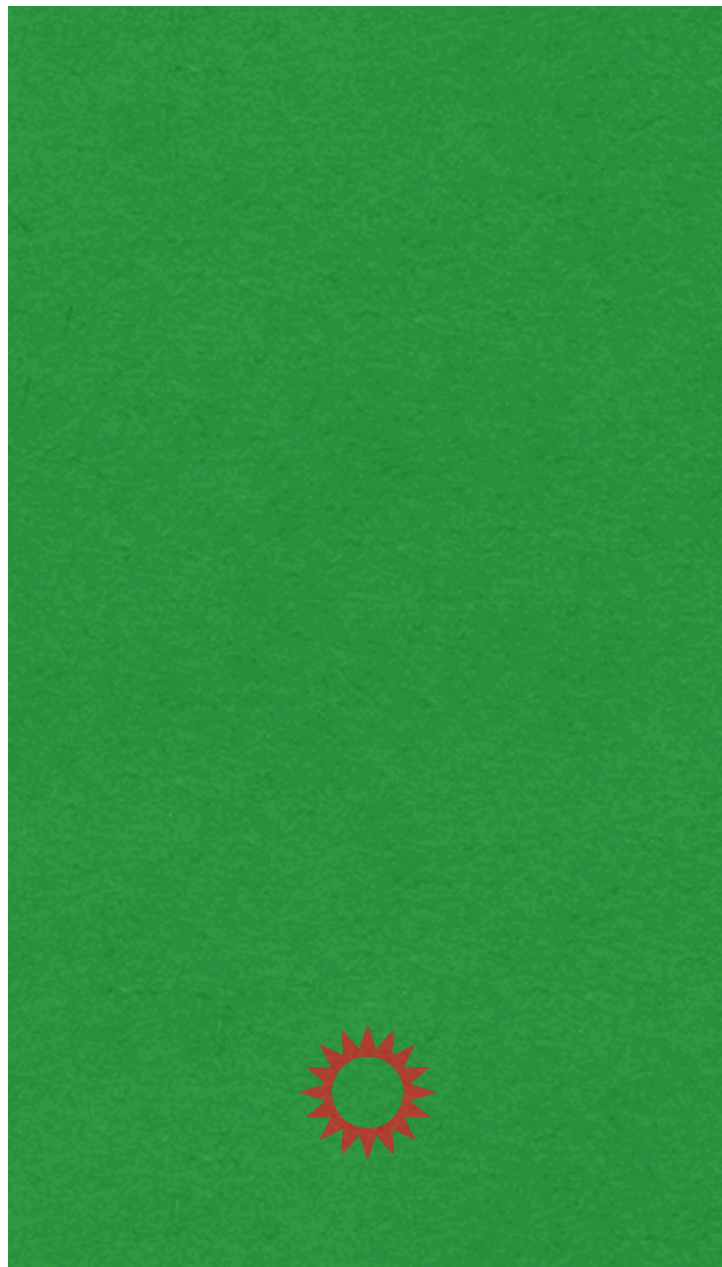
Open Shaft
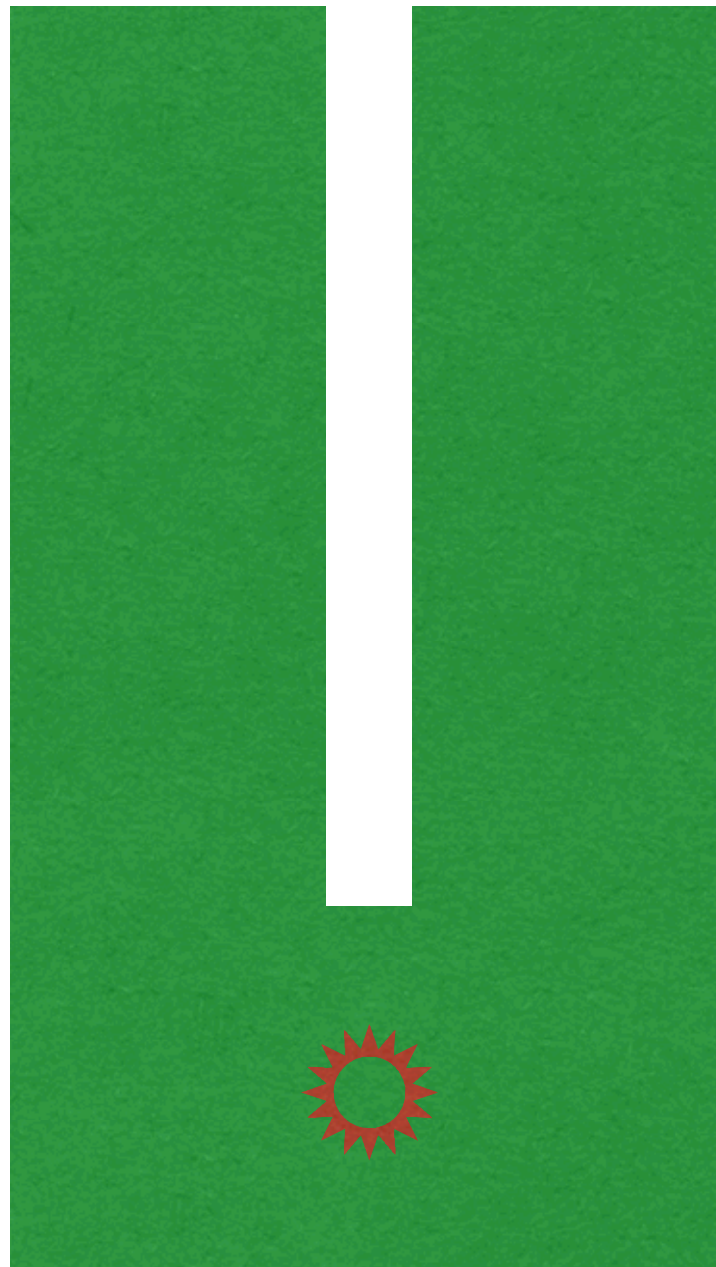
Covered Shaft

Model without Shaft

Avg of 2008-2017

Model with Covered Shaft

Covered Shaft: Average 2008-2017

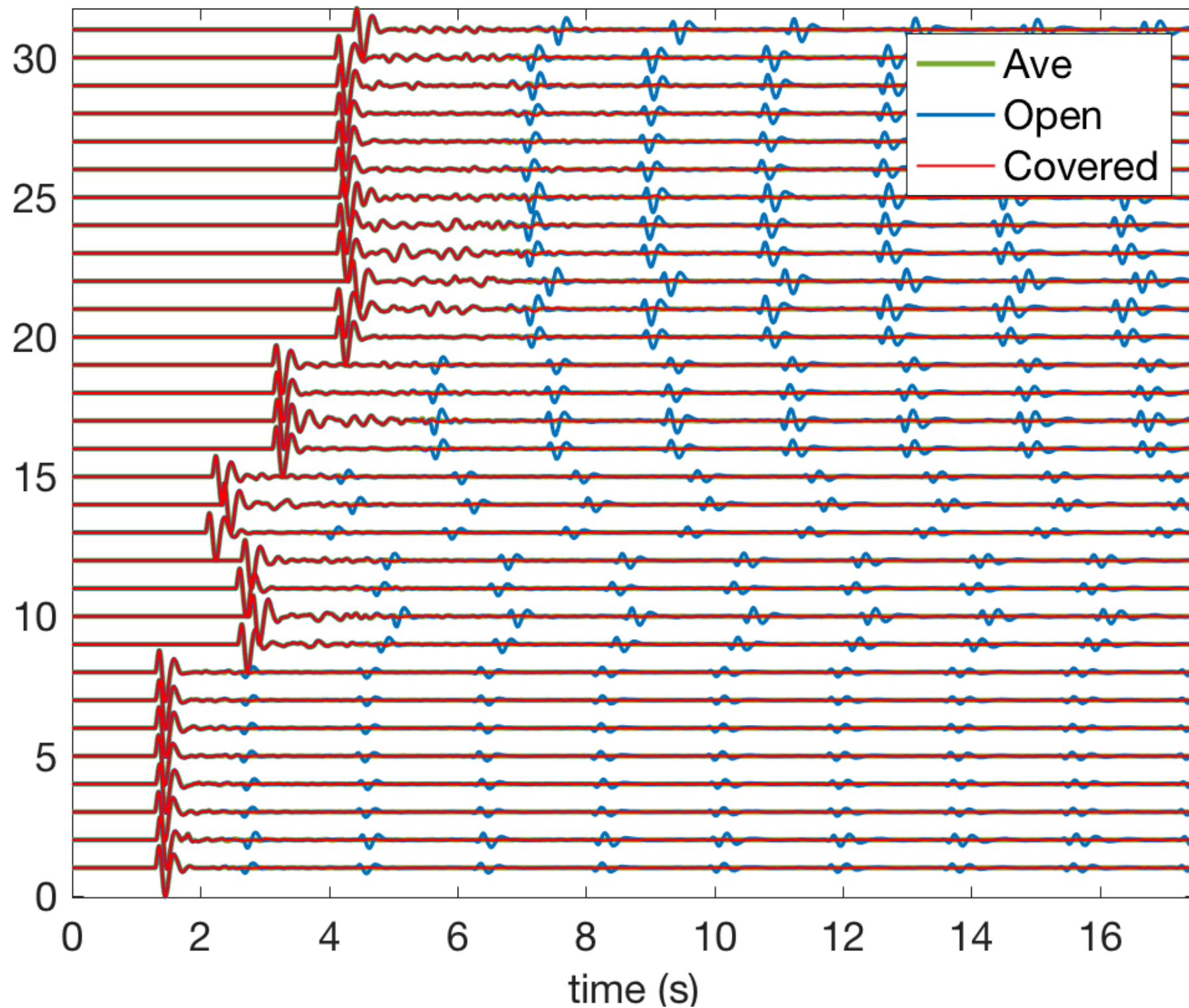# Model with Open Shaft

Open Shaft: Average 2008-2017

Results Without Shaft
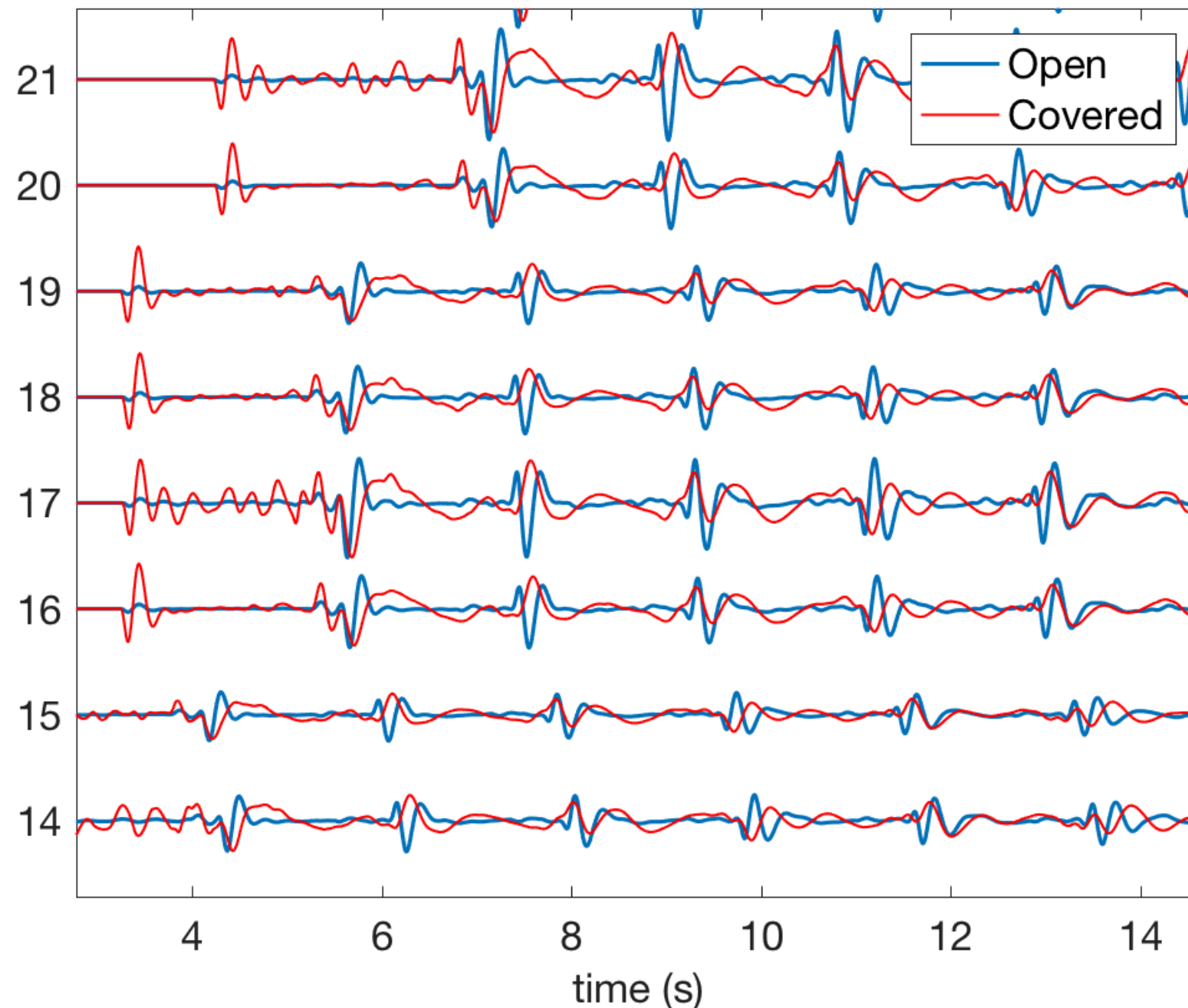## Variations due to weather
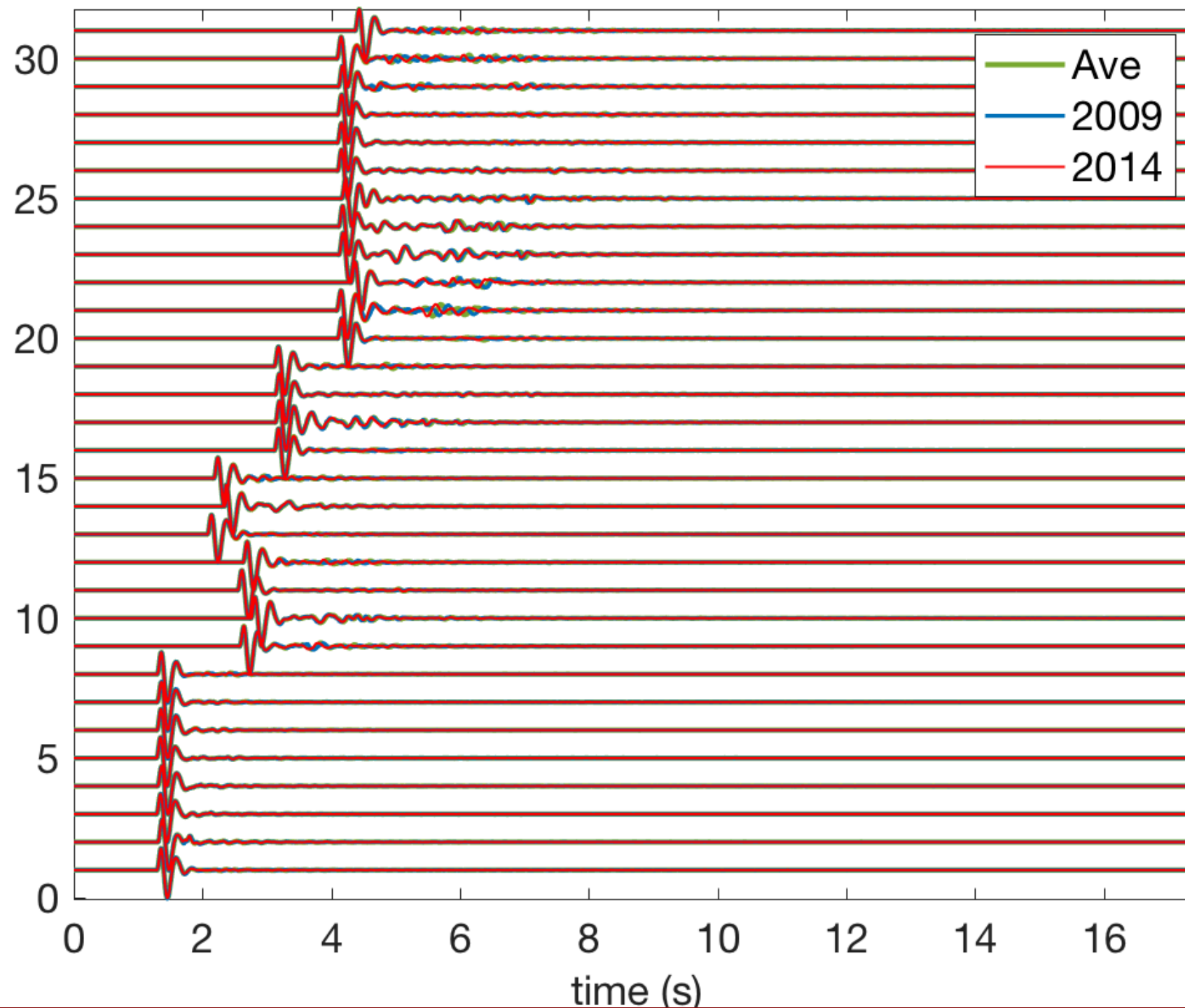
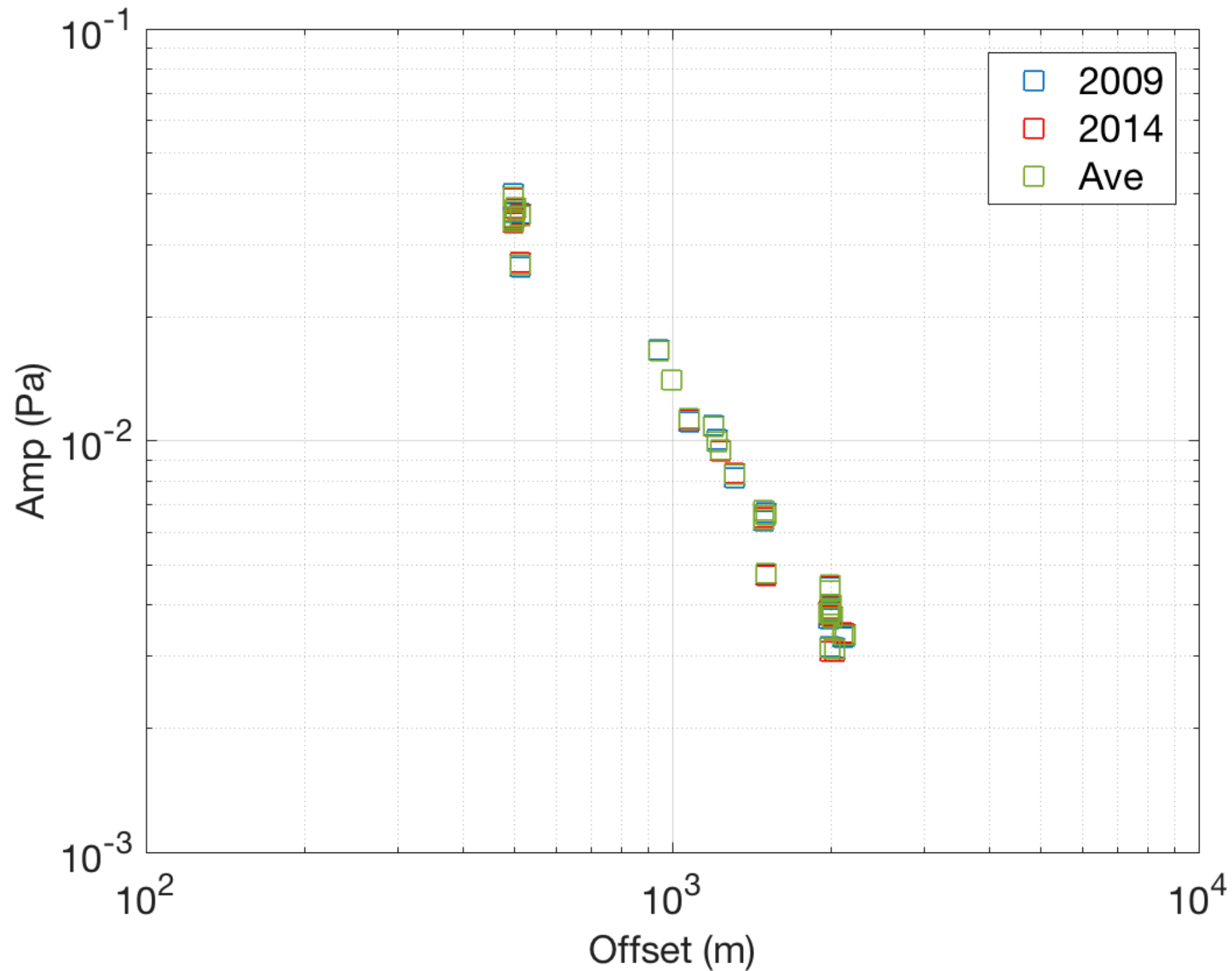# Effect of Shaft Models

Covered vs. Open Shaft

Differences with Model without Shaft. Covered shaft traces are multiplied by 10

Amplitude Estimates

Summary

- Predicted peak amplitudes nearest the source are in the few hundreths of a Pascal range due to excitation of seismo-acoustic wave from the direct P-arrival

- Weather variations are small over the ~2 km range of the receivers causing amplitude variations of up to ~10% of peak

- Clear variations in acoustic coda among the models without a shaft, with a covered shaft, and with an open shaft, especially in the open shaft model

- The larger source size of DAG-1 compared to SPE-4' will shift the corner frequency and change the source time function