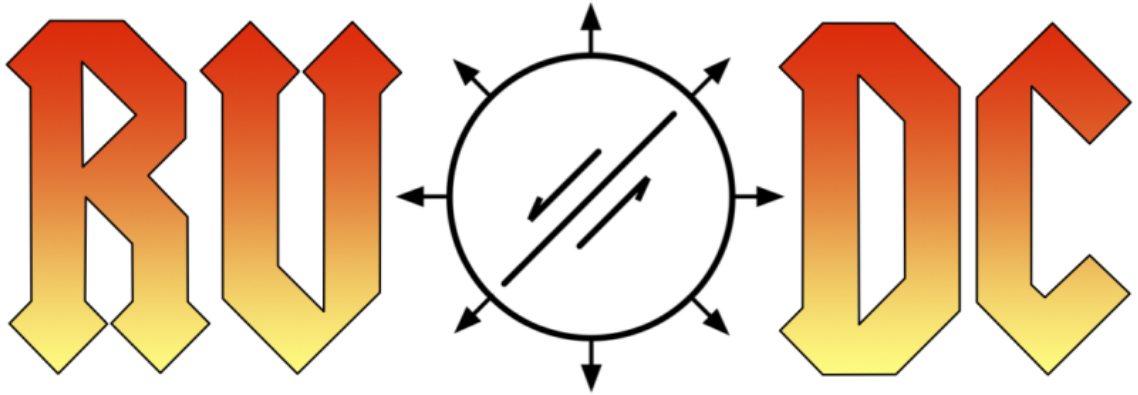
This paper describes objective technical results and analysis. Any subjective views or opinions that might be expressed in the paper do not necessarily represent the views of the U.S. Department of Energy or the United States Government.

SAND2023-02783C

# Source Physics Experiment Phase III
# Rock Valley Direct Comparison

## Manual Correlation of Seismic Arrivals to Improve Hypocenter Locations for the 1993 Rock Valley Sequence in Nevada




Cleat Zeiler[1], Michelle Scalise[1], Ken Smith[2], Ting Chen[3], Scott Phillips[3], Charlotte Rowe[3], Moira Pyle[4], and Leiph Preston[5]

[1]Nevada National Security Site
[2]University of Nevada Reno
[3]Los Alamos National Laboratory
[4]Lawrence Livermore National Laboratory
[5]Sandia National Laboratories

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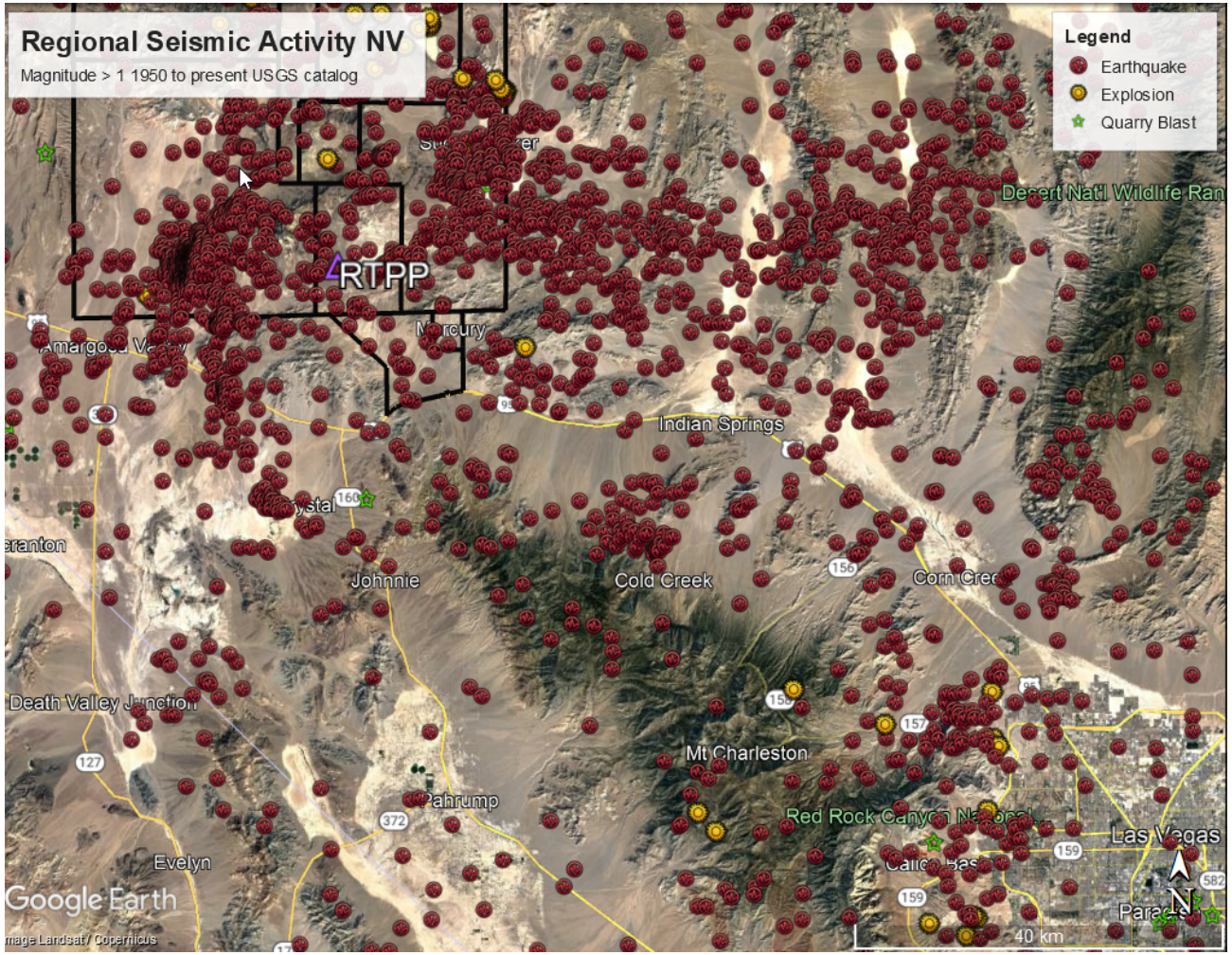
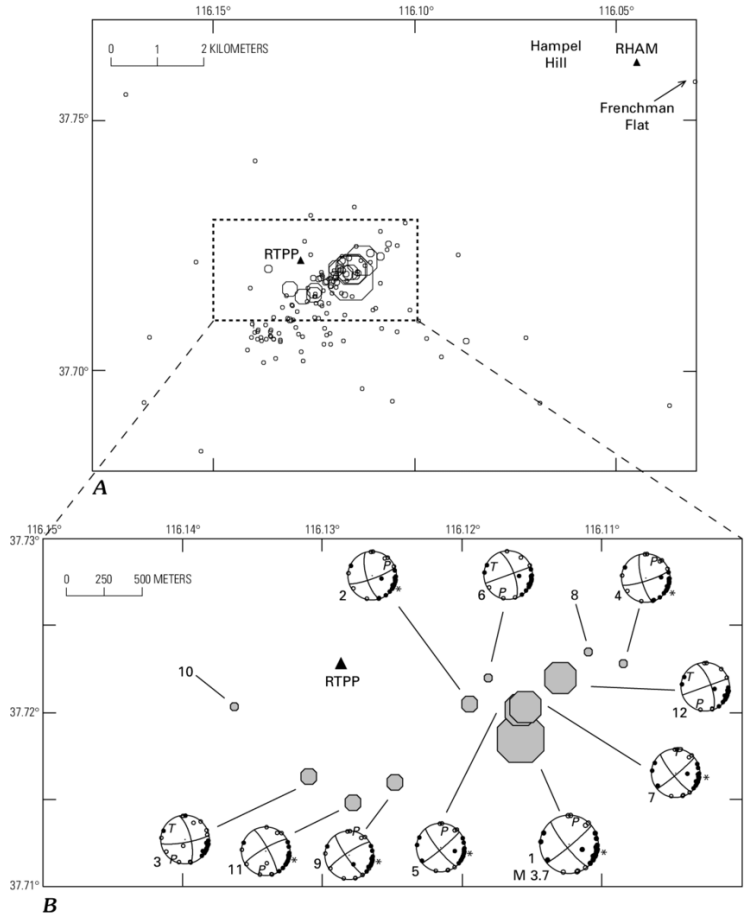
# BLUF

- Manually refining picks is a time consuming effort but ultimately gives the best assurance of repeatable picks across event/station pairs
- The manually refined picks aligned with predicted fault traces
- Historical metadata can be tricky to untangle between institutions
- A combination of normalizing amplitudes and set time windows can aid in improving the manual correlations
- To prepare for RV/DC planning and testbed development constraints on the hypocenter were requested

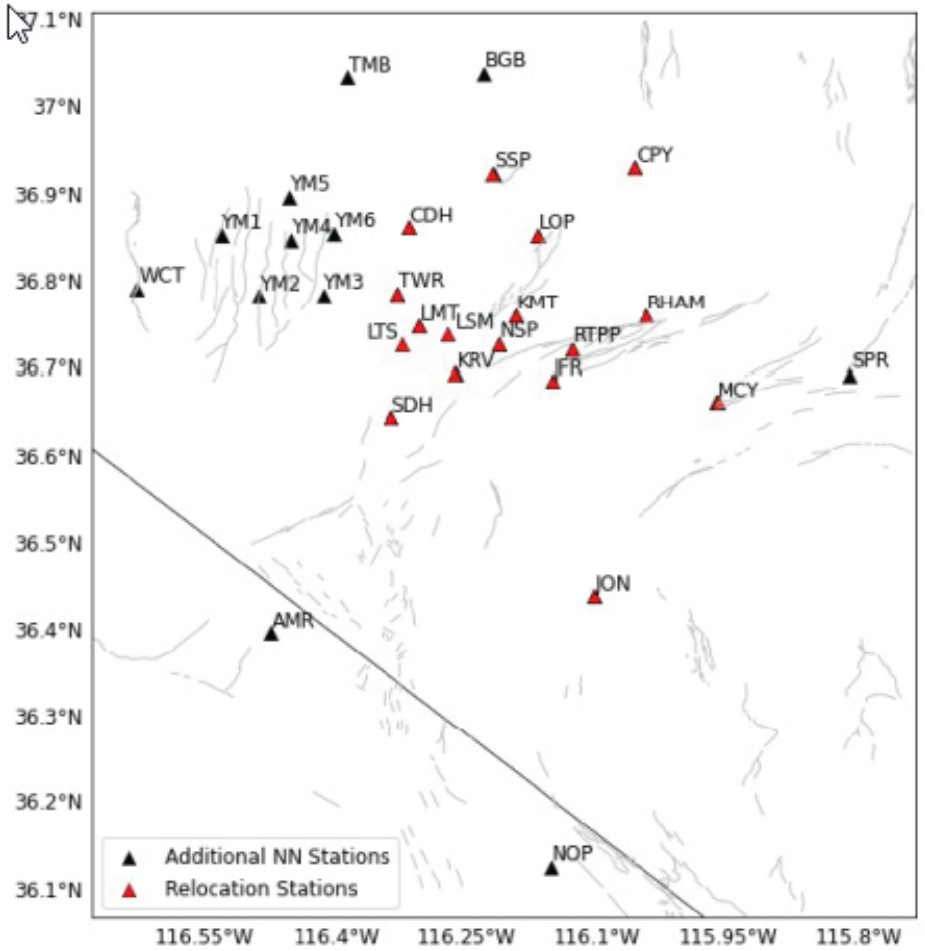
# 1993 Rock Valley Sequence

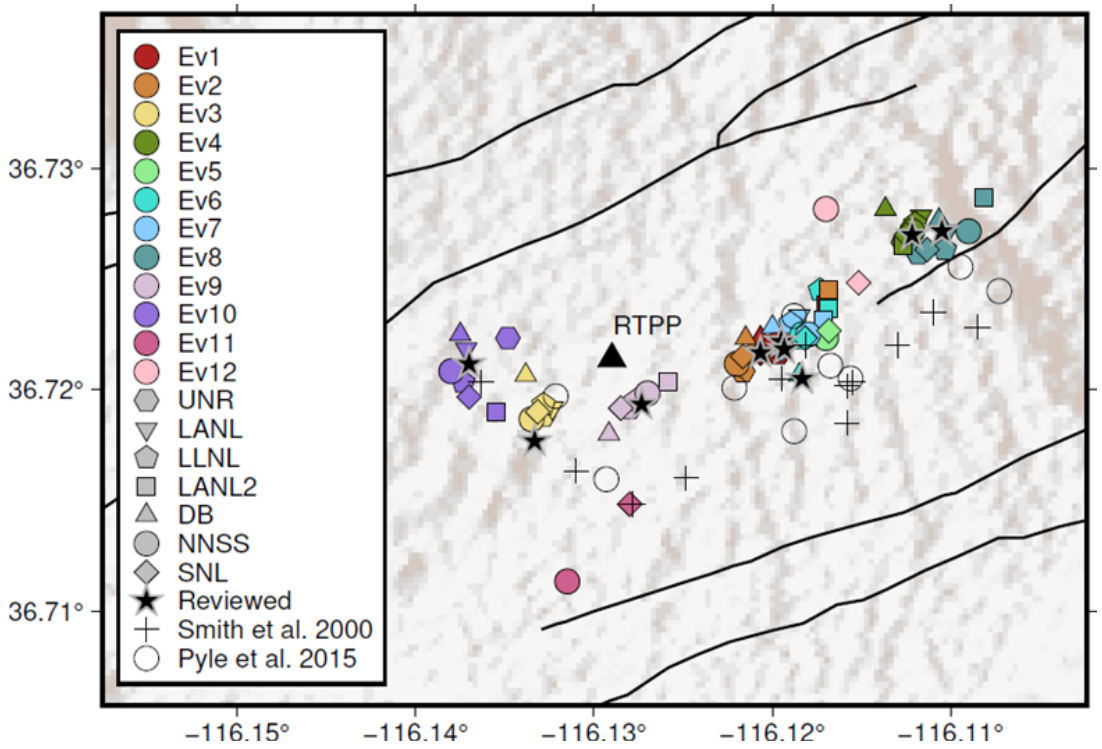


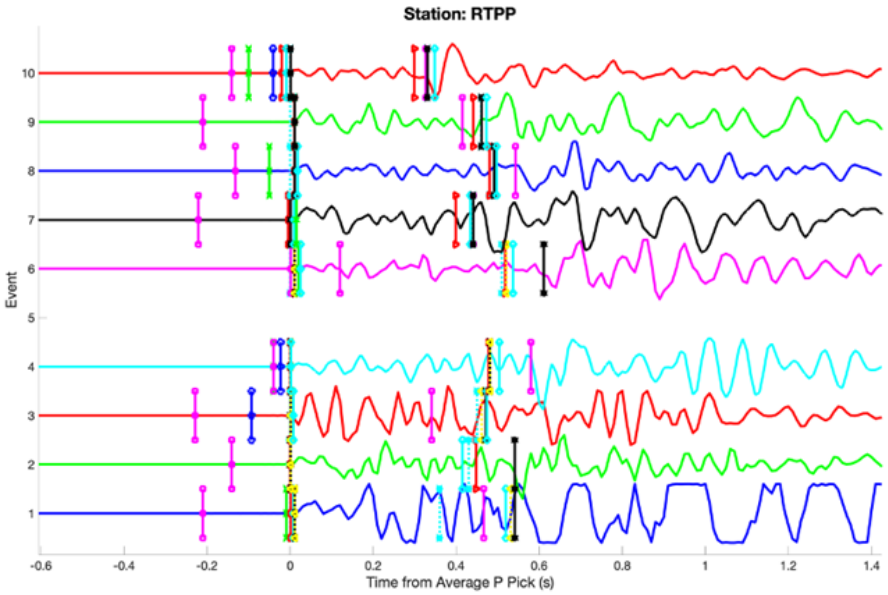

Smith et al, 1993

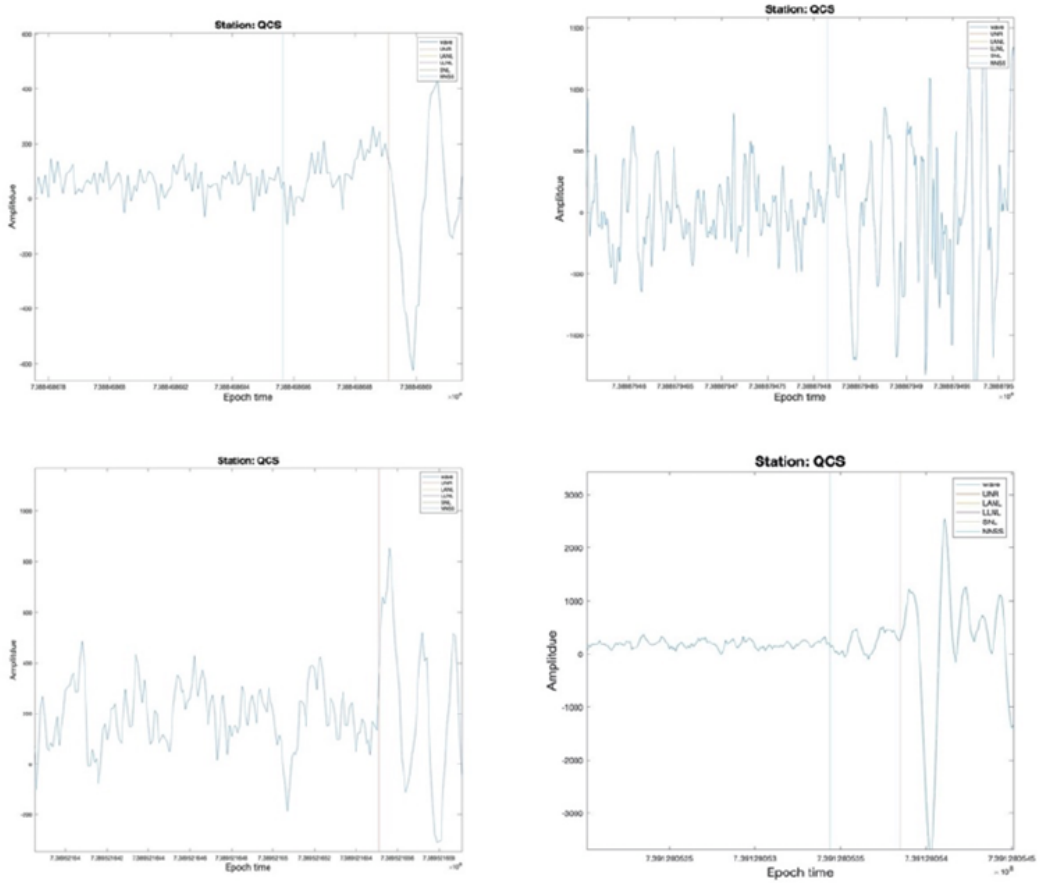
# 1993 Rock Valley Sequence Historic Data Used



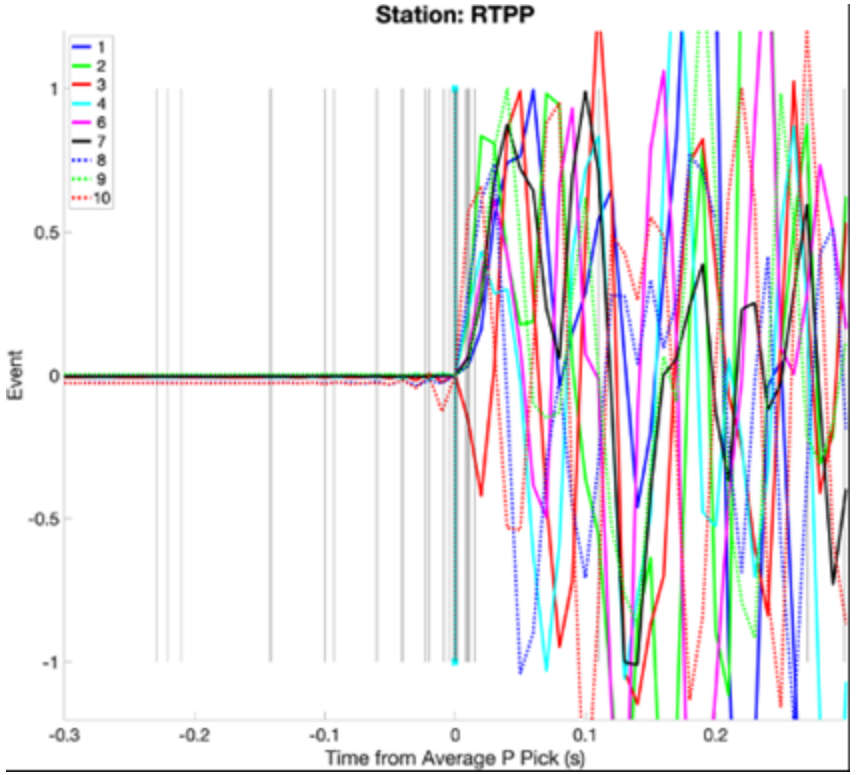



# Waveforms

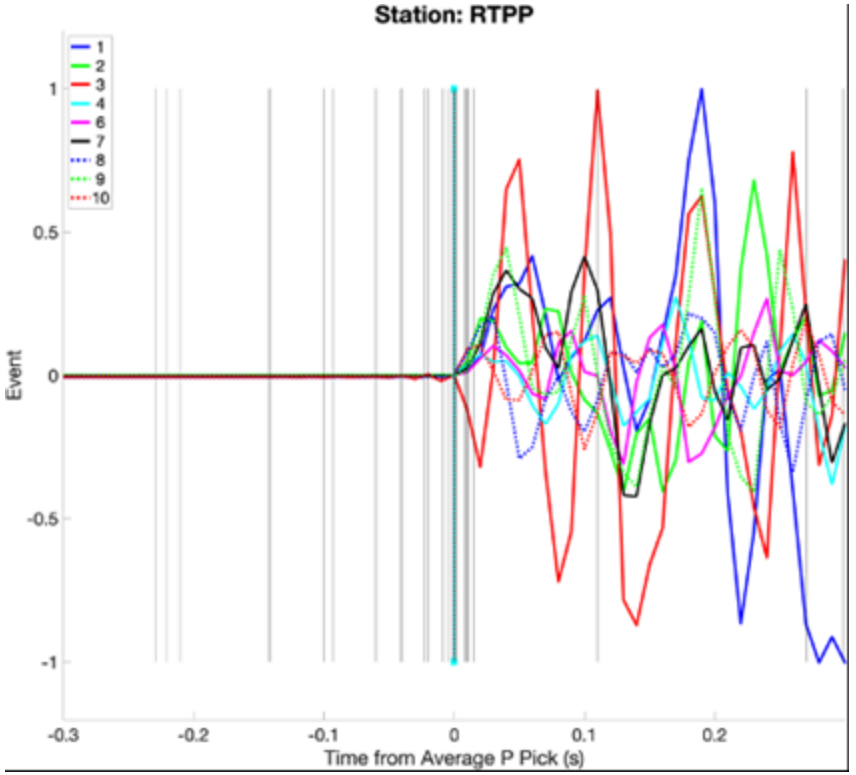

Station: RTPP
Event
Time from Average P Pick (s)


Station: QCS
Station: QCS
Station: QCS
Station: QCS
Amplitude
Epoch time

# Manual Correlation

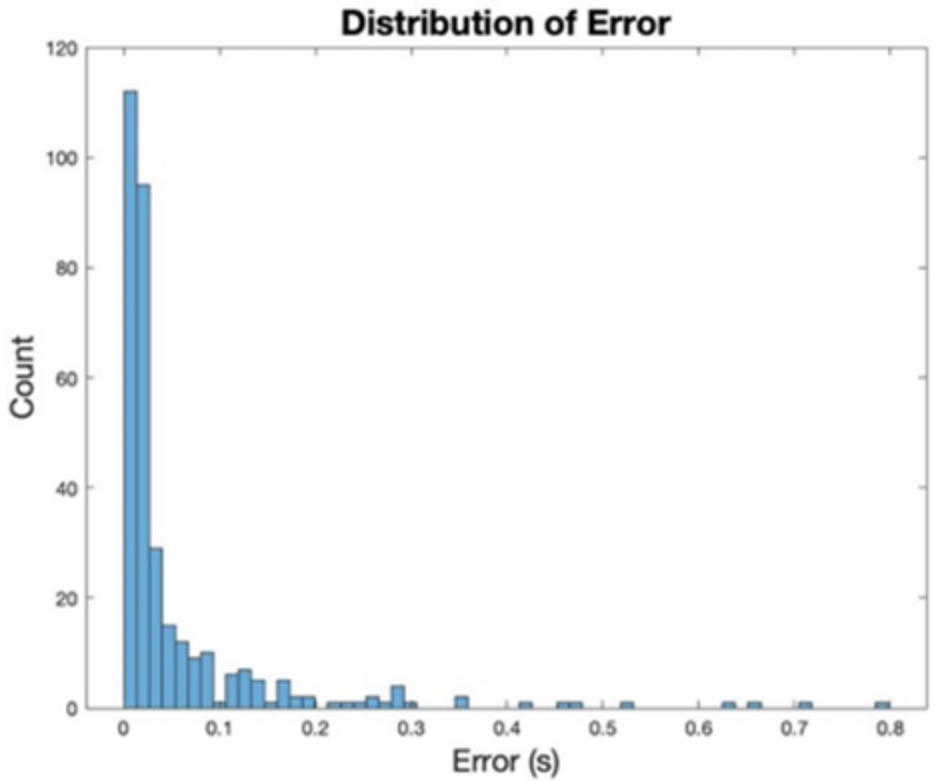


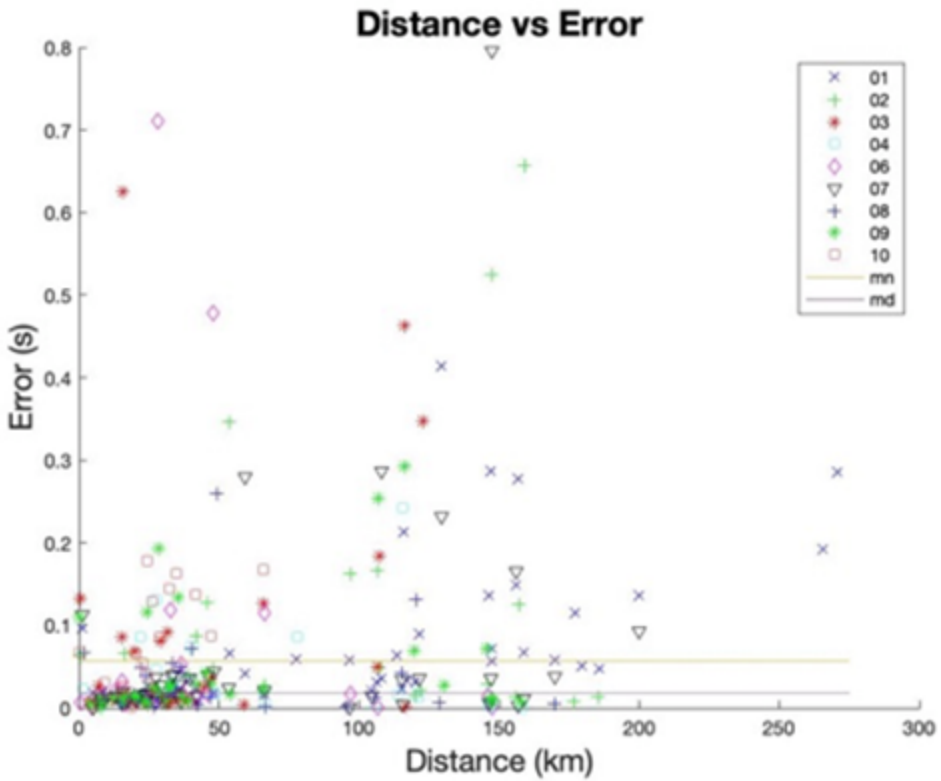

Normalized to max value in first 0.25 s.



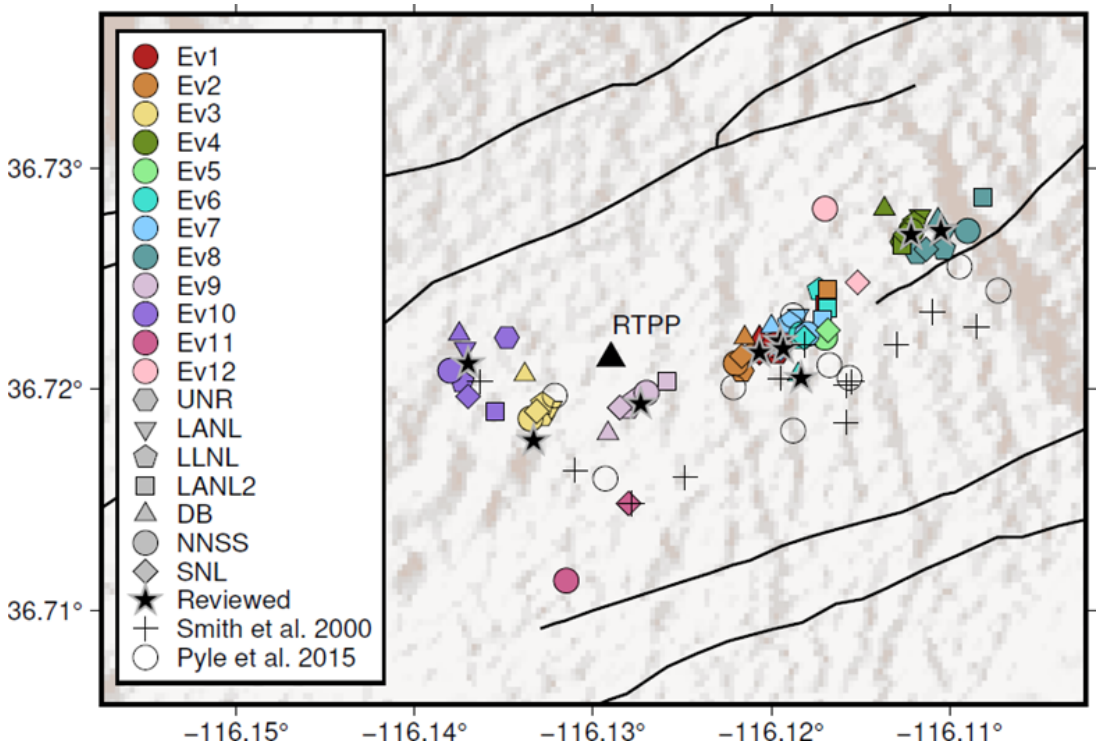

Normalized to max amplitude of trace.

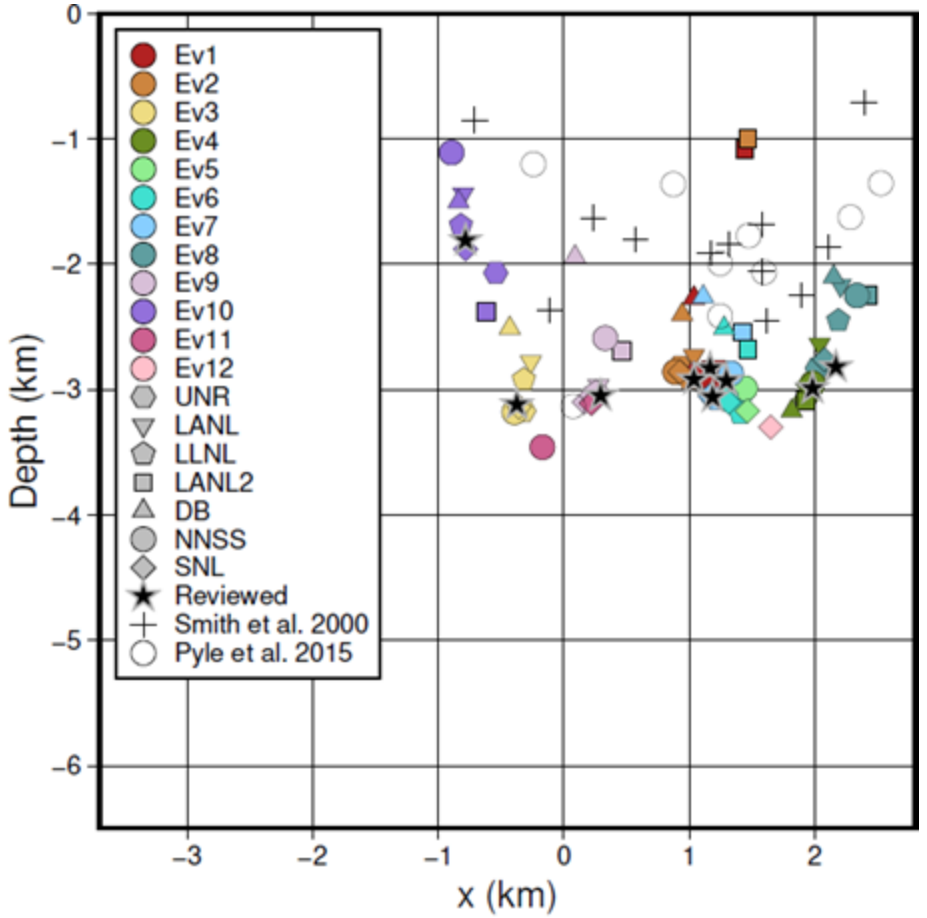
# Pick statistics



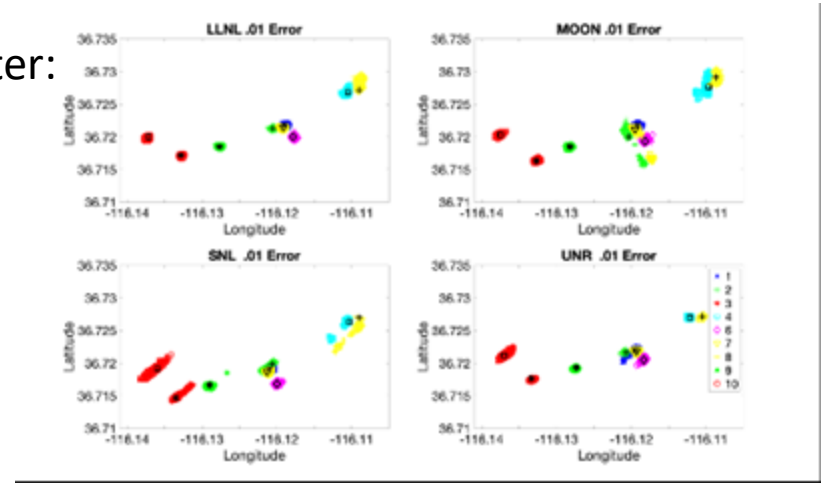
# Improved Locations



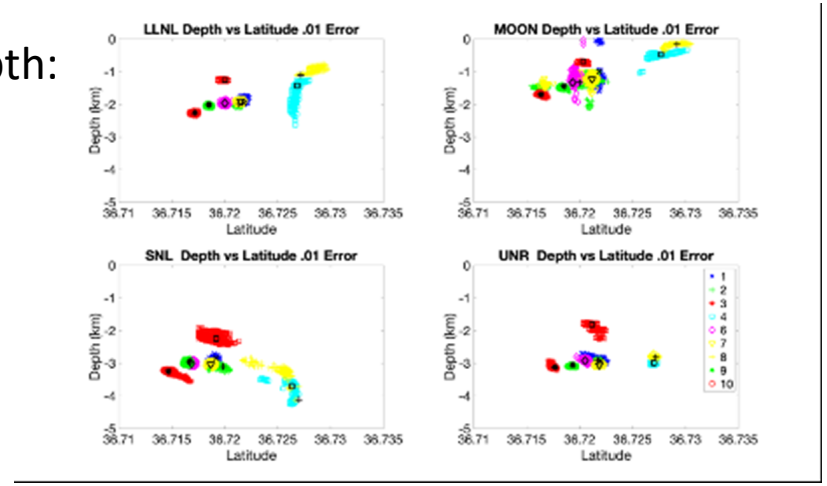



# Picking error influence on Location

Epicenter:




Depth:



# Conclusions

- The majority of the events align better with known faults when picked consistently
- Revisiting historical sequences is a nontrivial endeavor, especially when you are working cross multiple contributors
- Simulating random error in the picks, the locations trended along the fault

- Future work
  - Add additional stations
  - Train automated process to replicate/correct picks based on these features
  - Use dense geophone deployments to help constrain depths and locations of ongoing seismicity