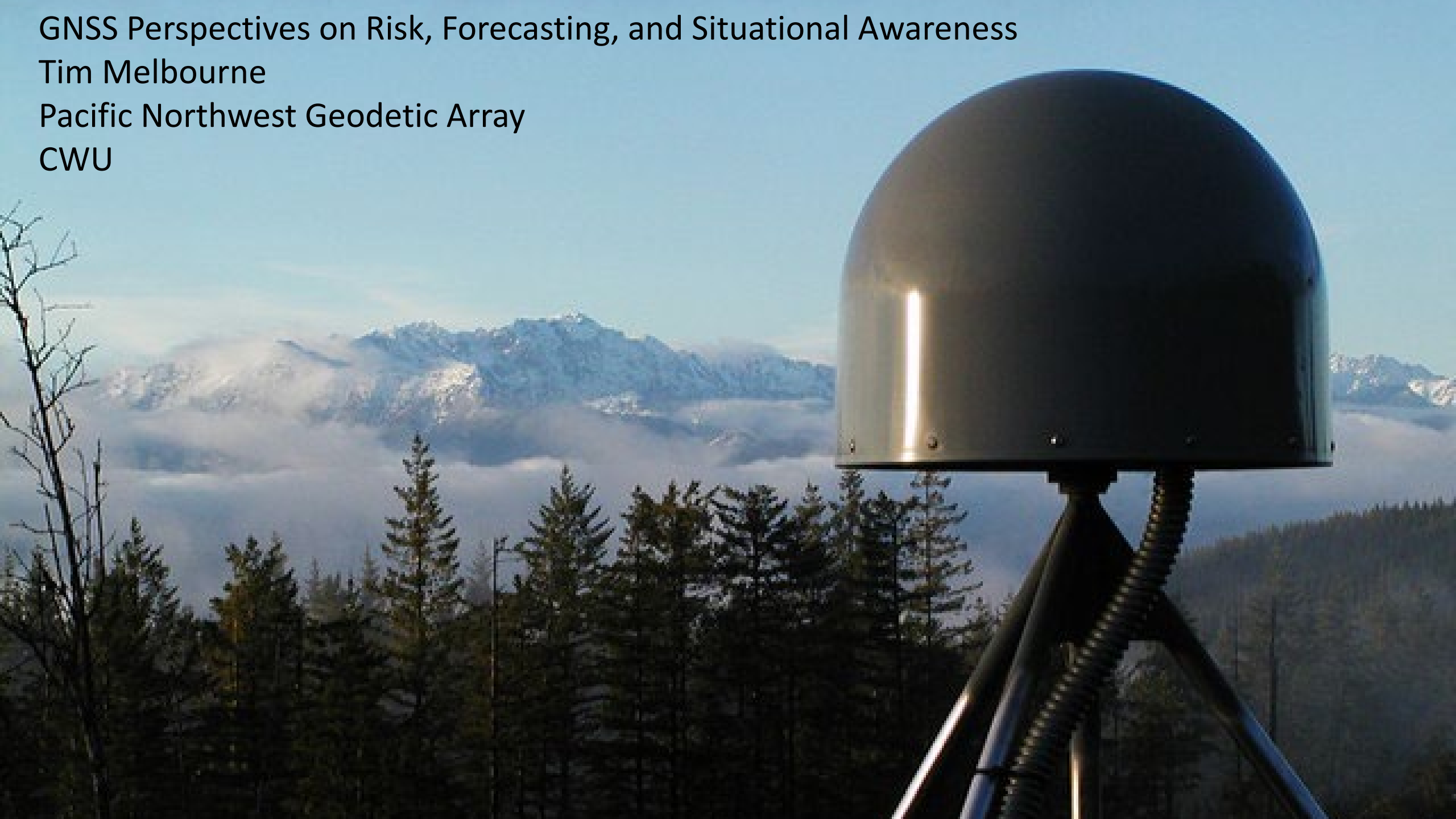
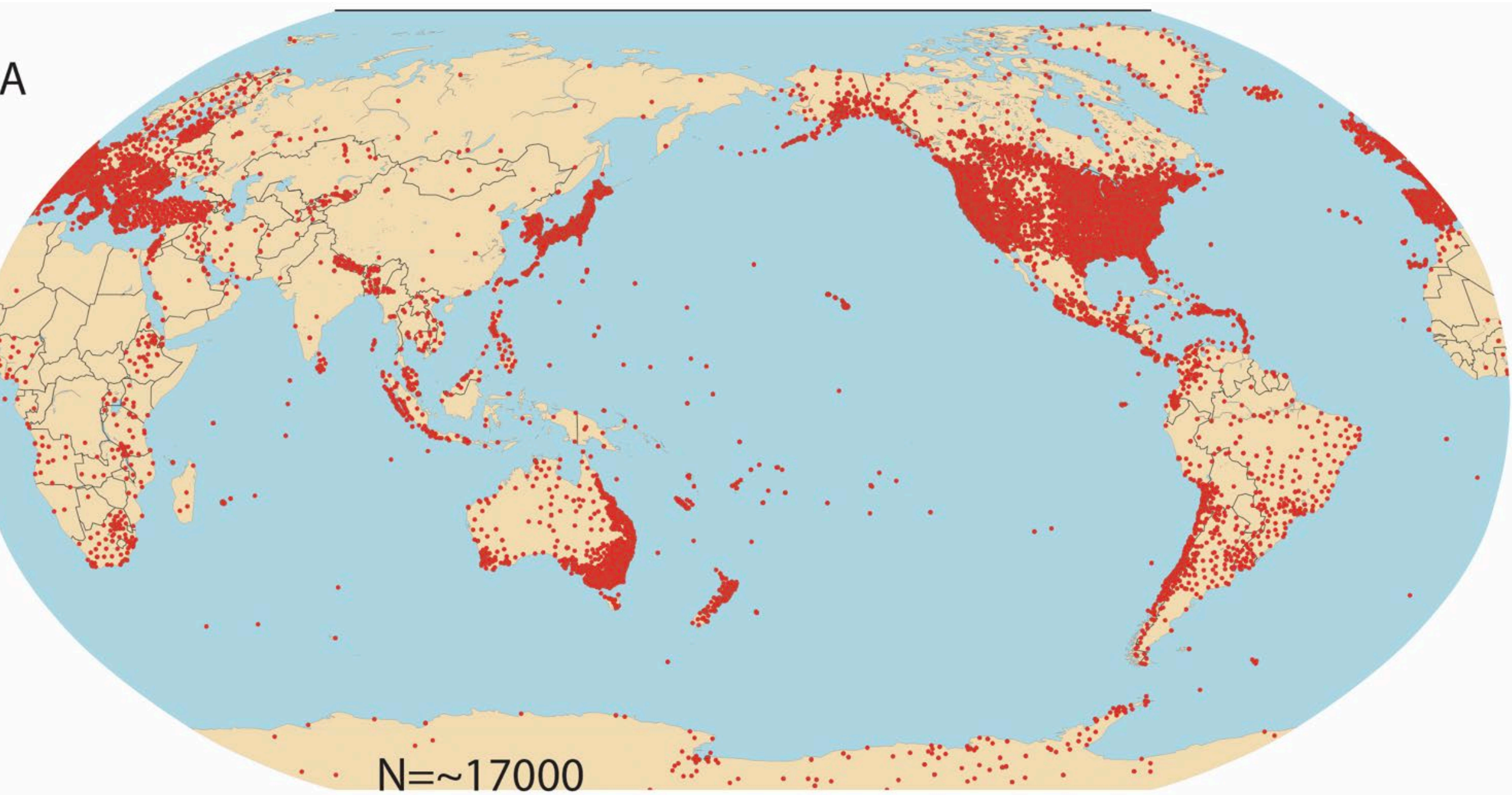
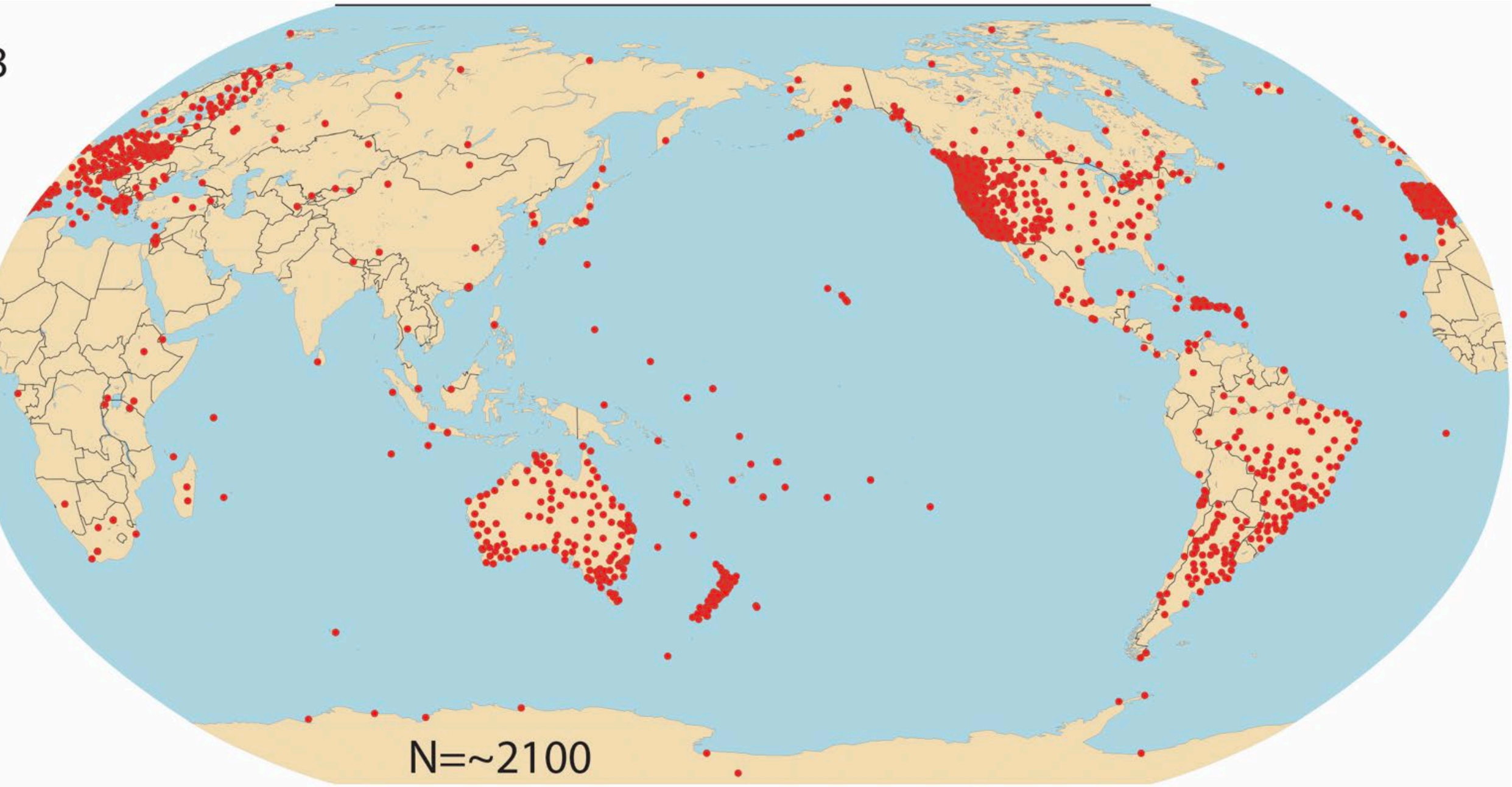
# GNSS Perspectives on Risk, Forecasting, and Situational Awareness

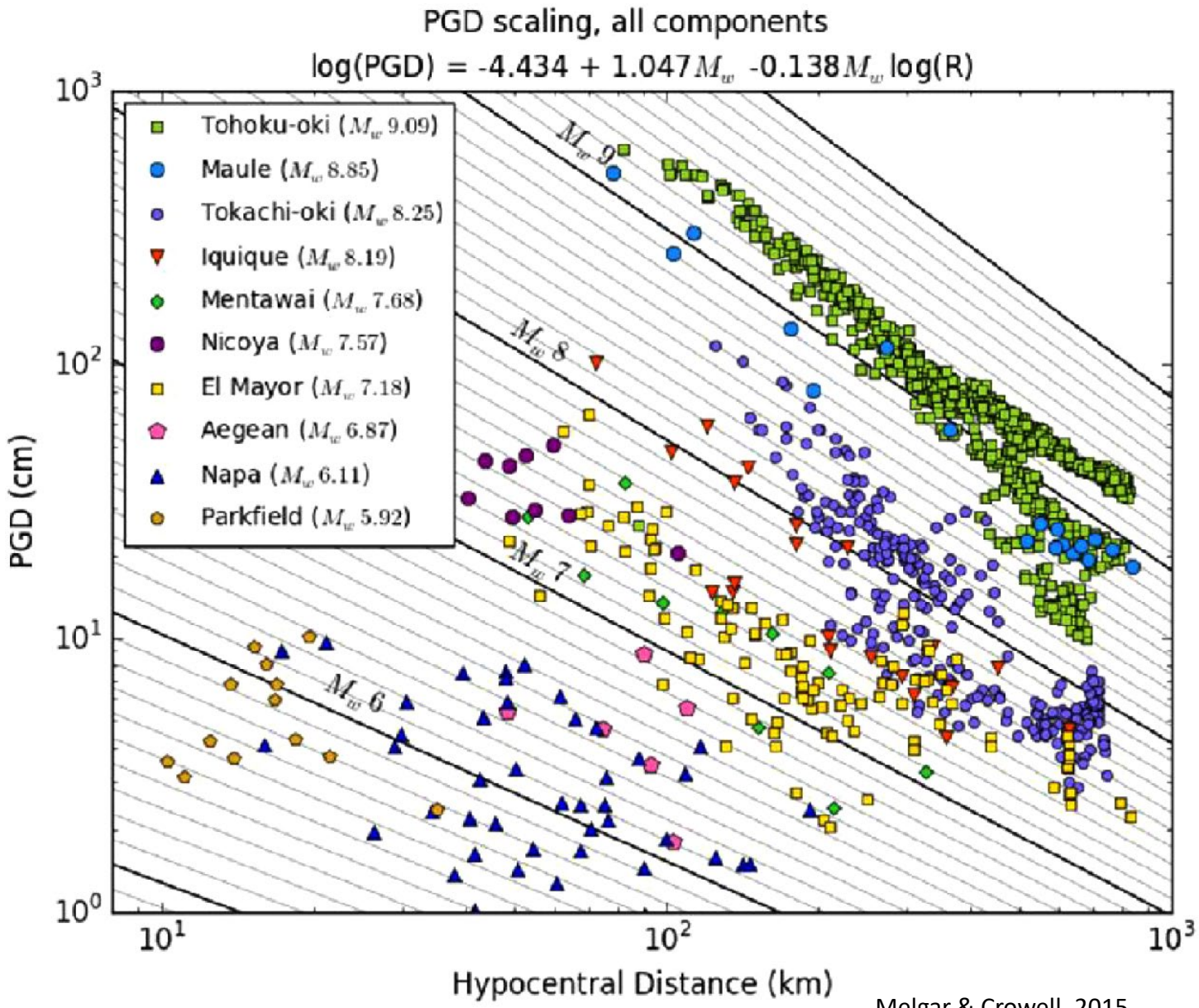
Tim Melbourne
Pacific Northwest Geodetic Array
CWU




A
N=~17000

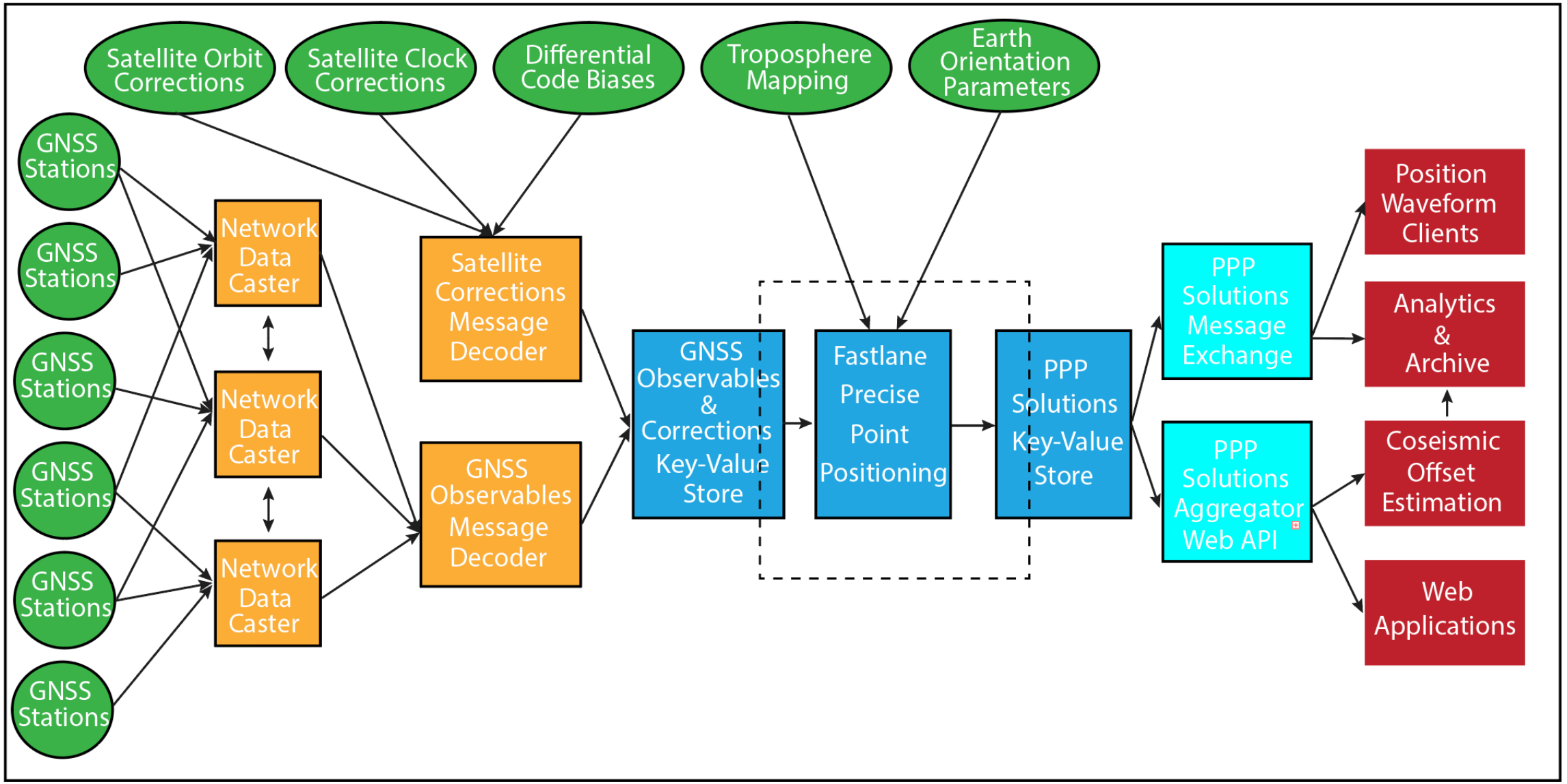

N=~2100

Coseismic Deformation as a function of distance is very diagnostic of Moment



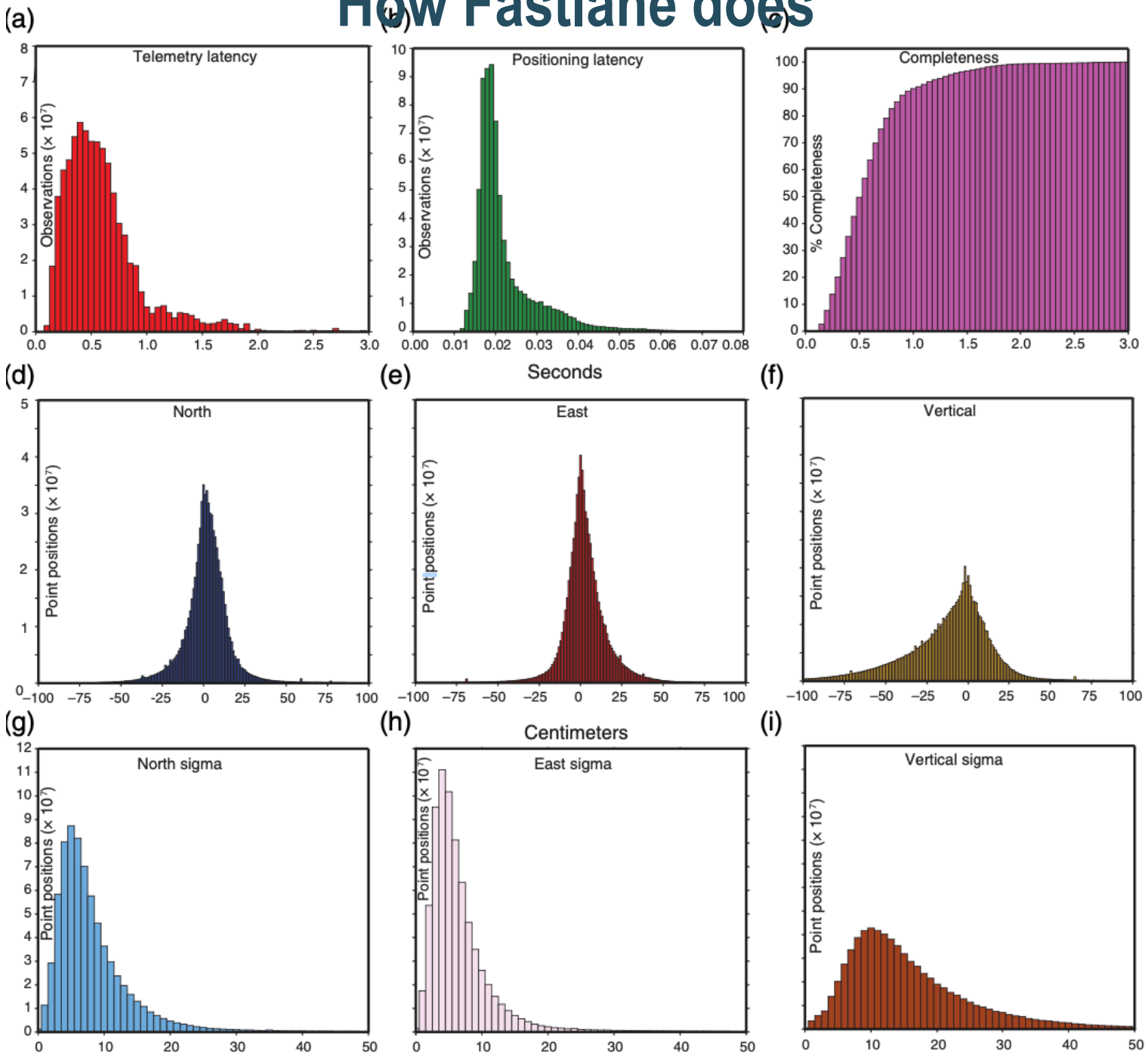

Melgar & Crowell, 2015

# How Fastlane works

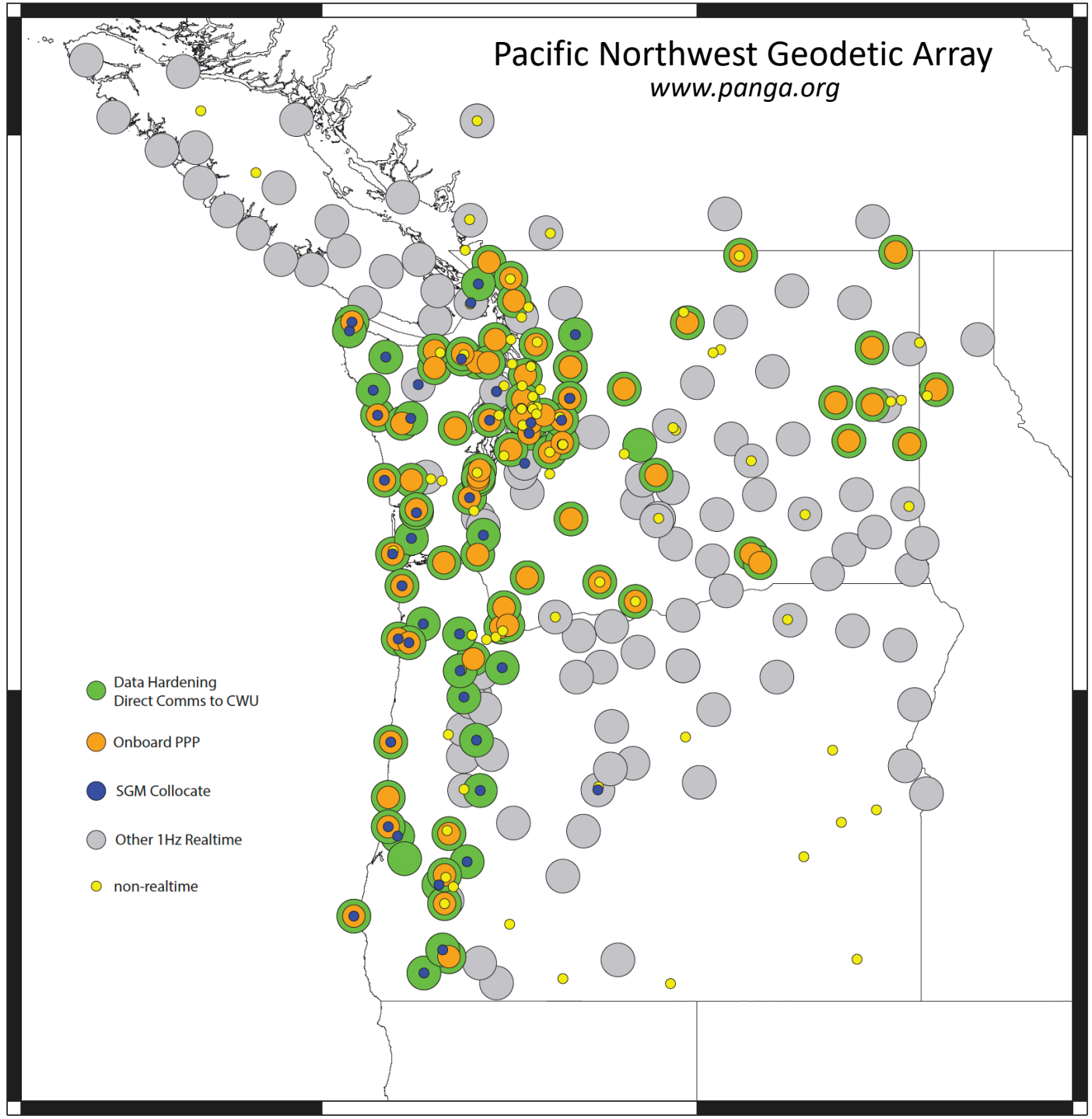



www.panga.org/realtime/data
www.panga.org/realtime/gpscockpit

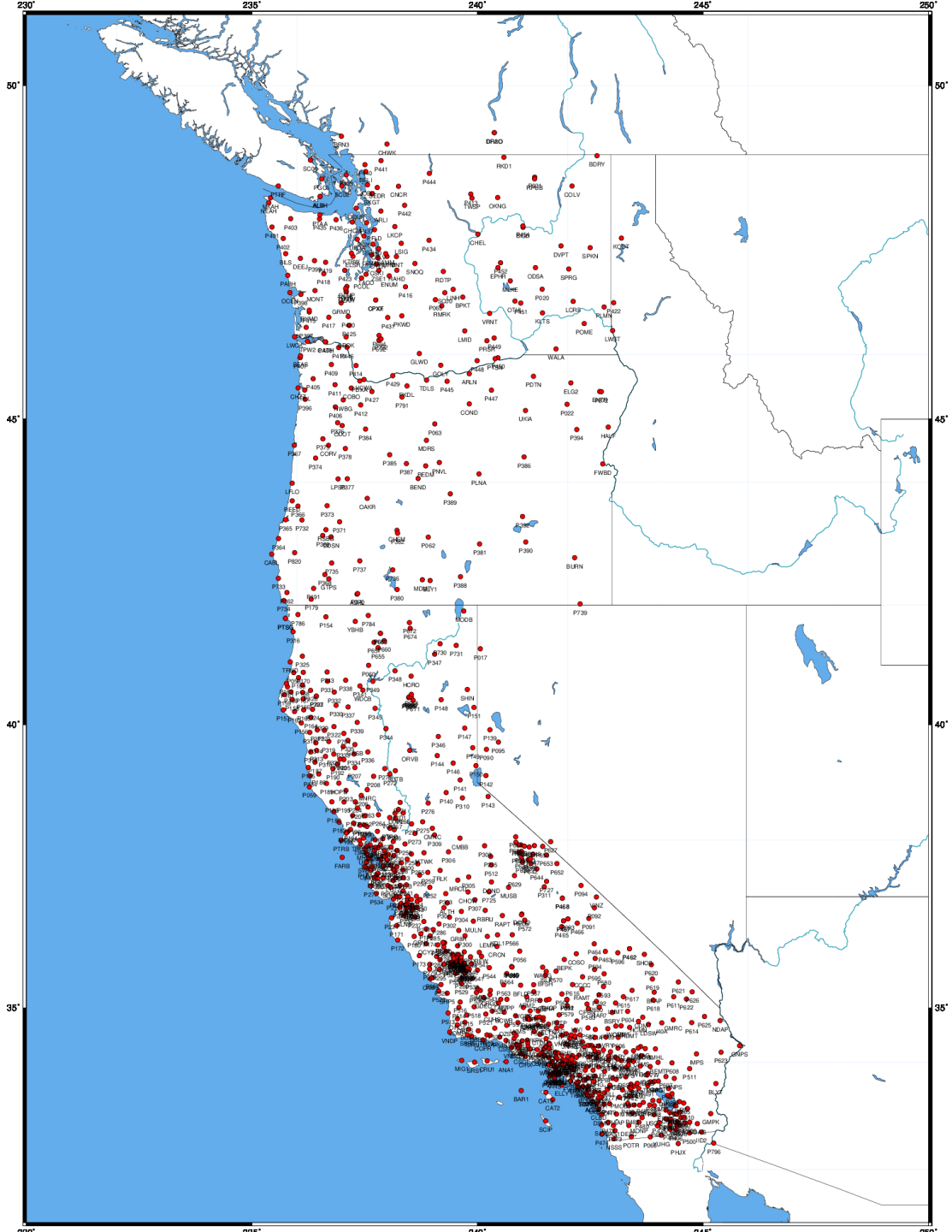
# How Fastlane does




1 week, Jul 2020
1300 Stations
~750 million solutions


Pacific Northwest Geodetic Array
www.panga.org
Data Hardening
Direct Comms to CWU
Onboard PPP
SGM Collocate
Other 1Hz Realtime
non-realtime

1038 GNSS stations inside ShakeAlert Footprint



# 2019 M7.1 Ridgecrest Earthquake

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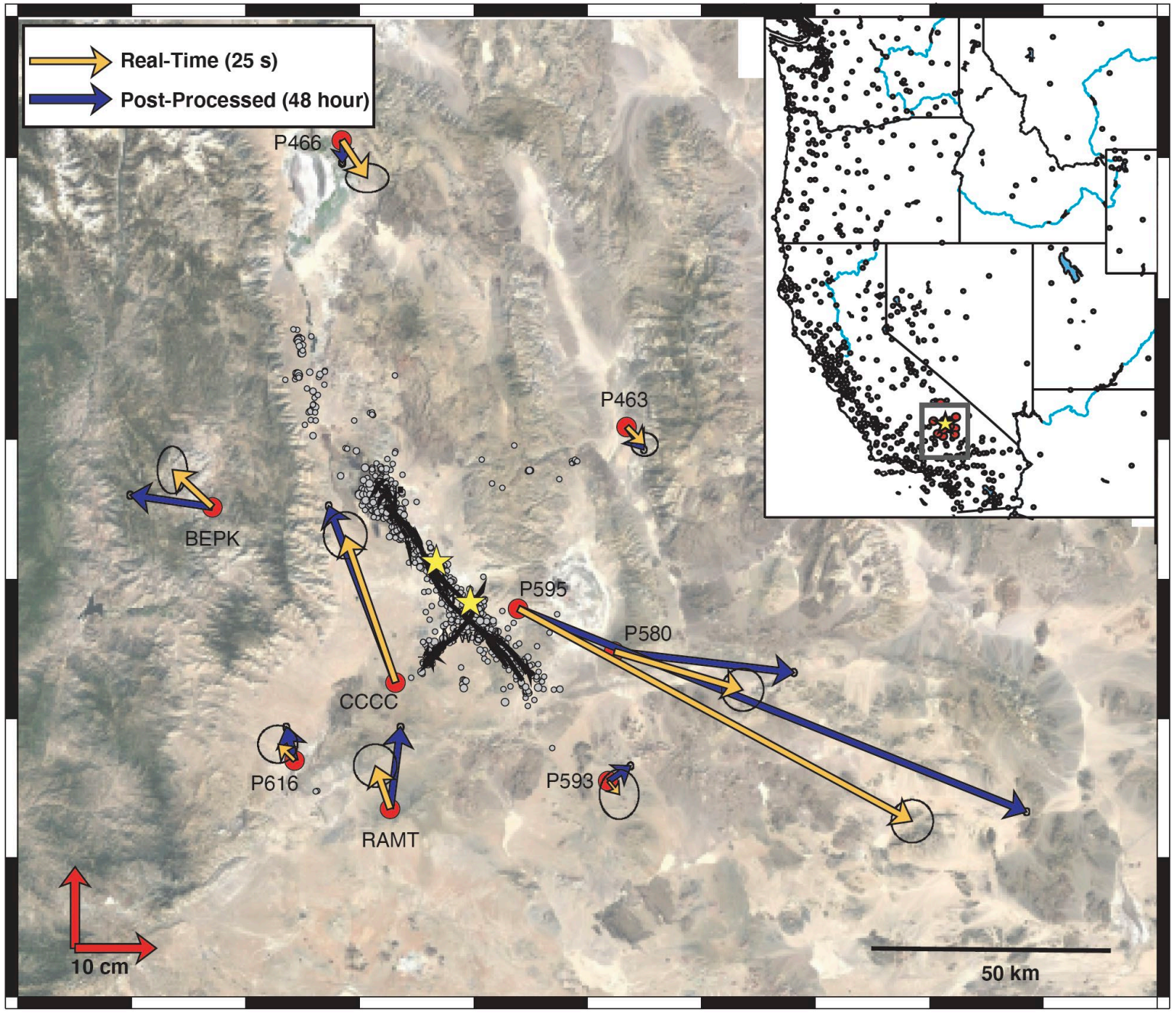
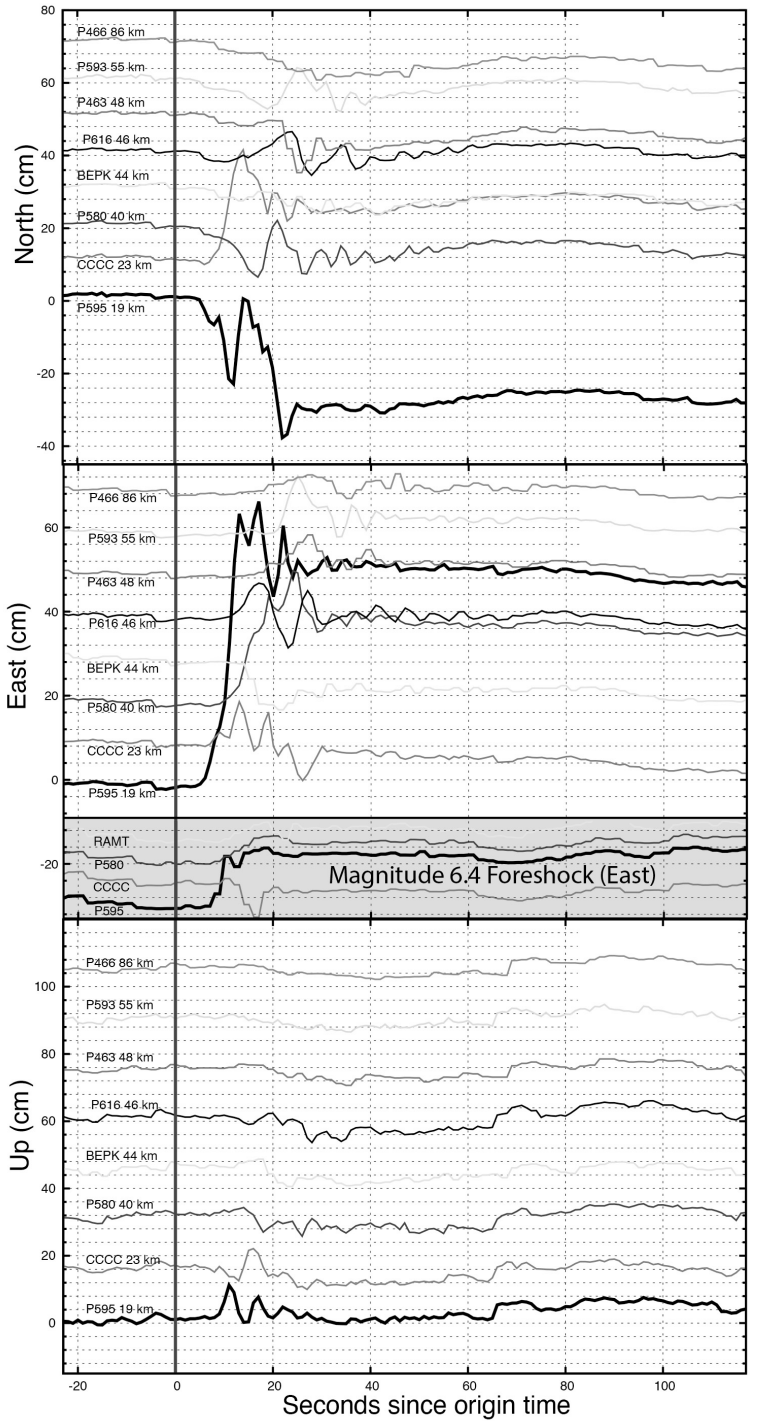
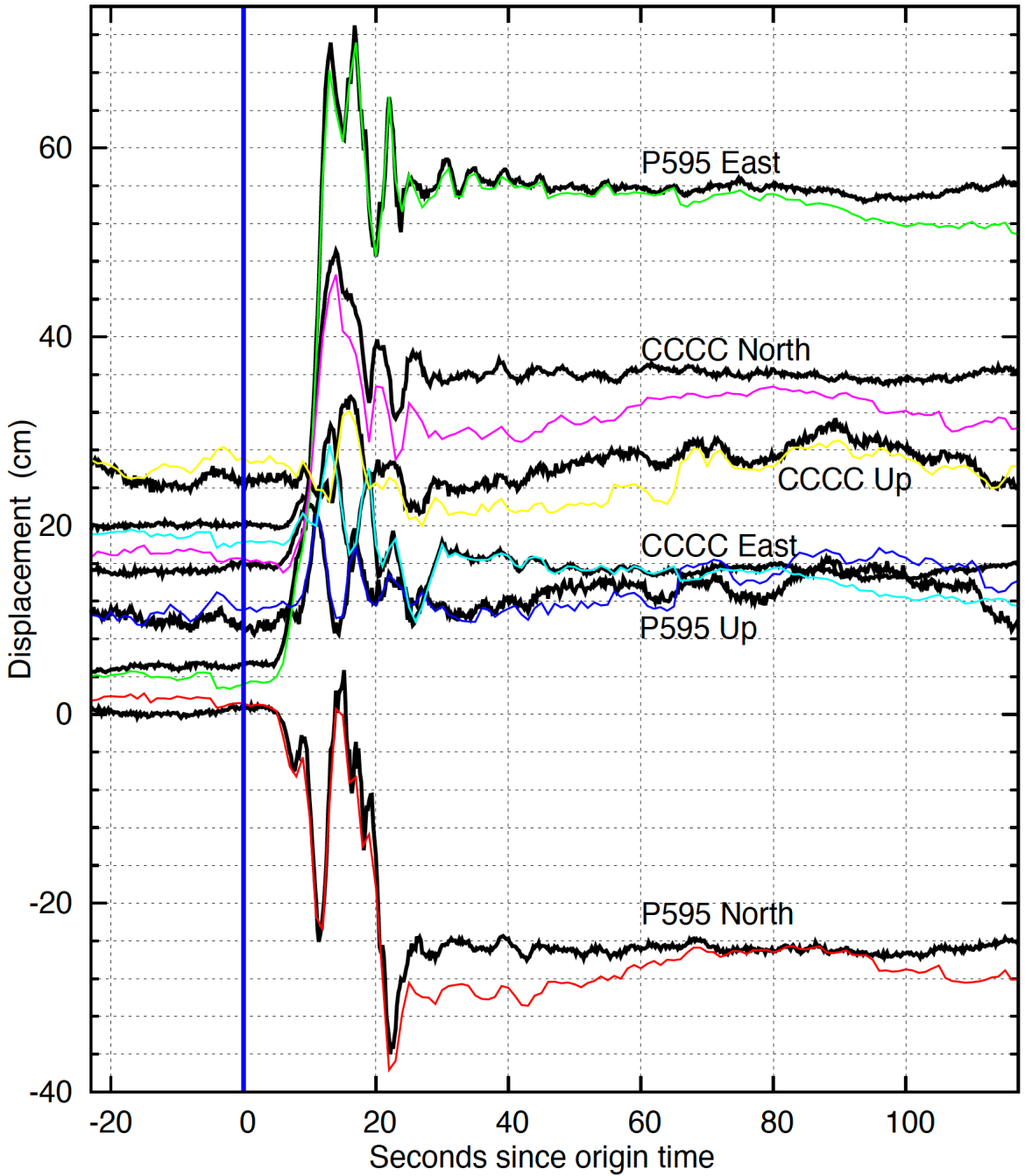


# 2019 M7.1 Ridgecrest Earthquake

Colored:
Fastlane in Real-time

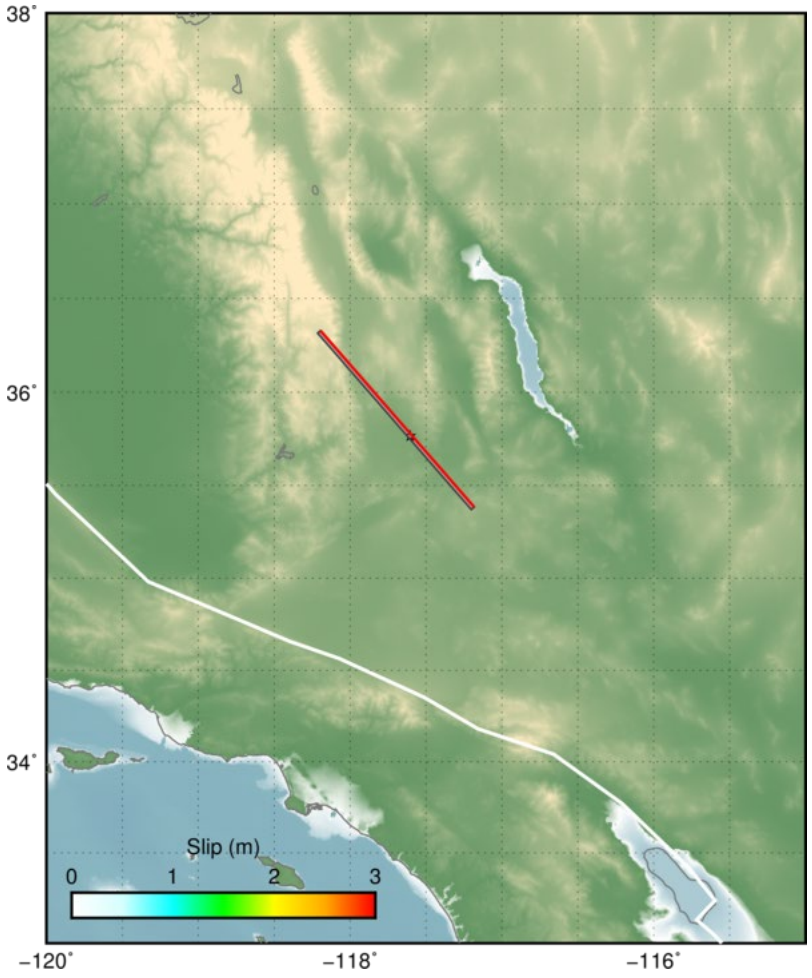
Black:
GIPSYX Postprocessed

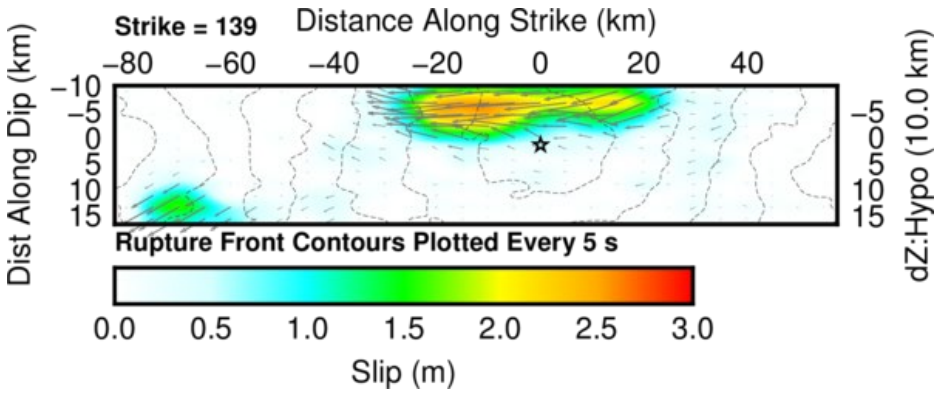


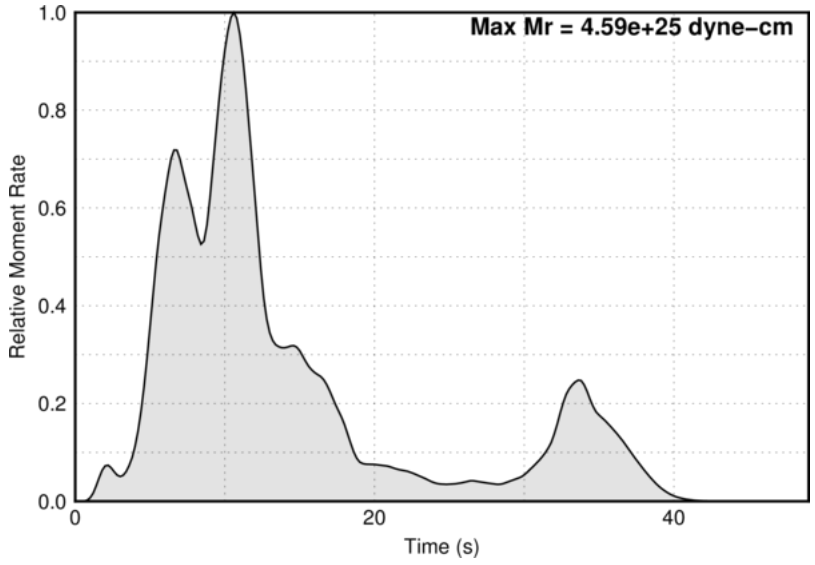
Fastlane (black)

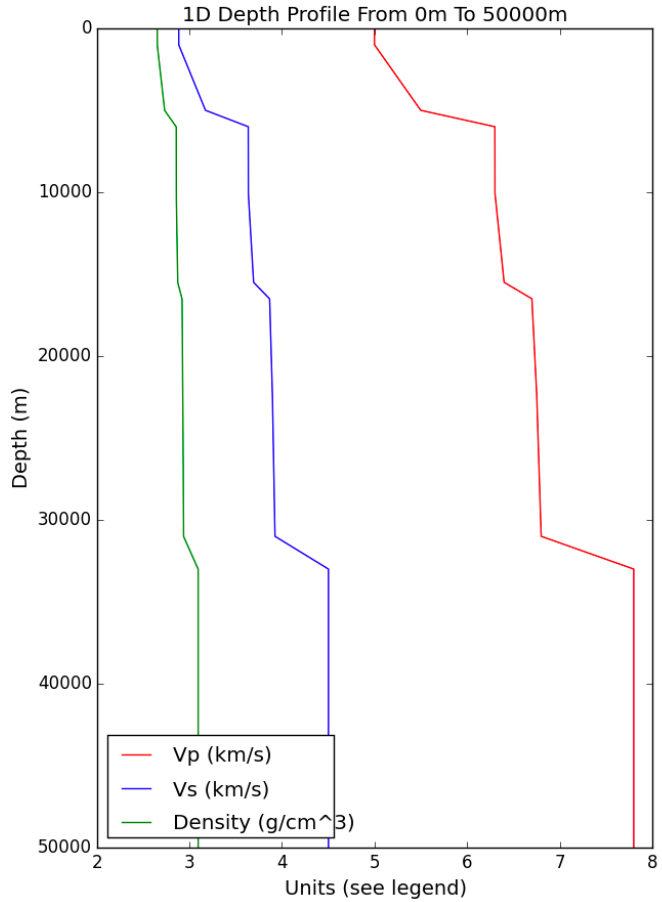
vs

FK synthetics (blue; USGS finite fault rupture & SCSN 1D model)



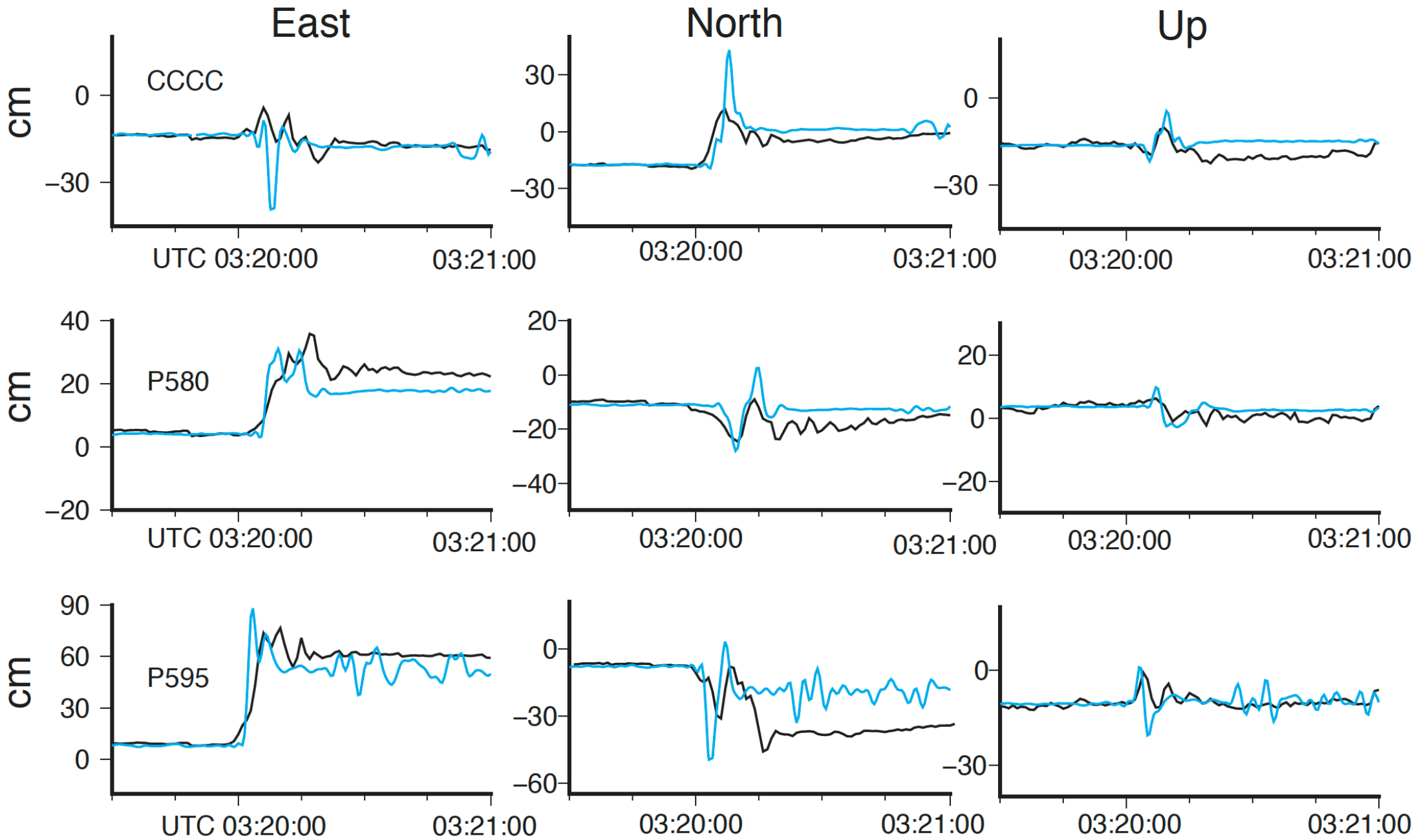



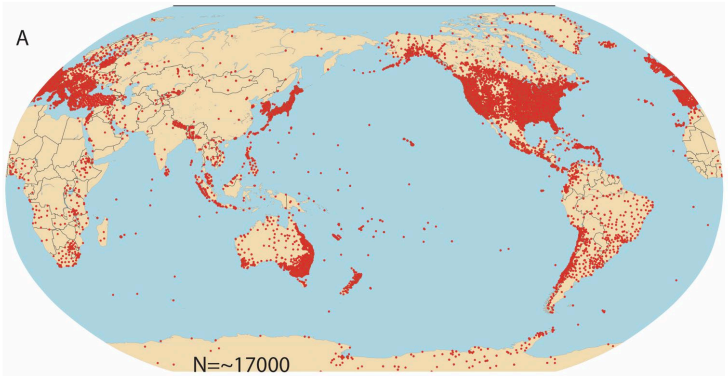




*Hadley & Kanamori, 1977*

# Fastlane (black) vs FK synthetics (blue)



# GNSS Risk, Forecasting & Situatitonal Awareness Takeaways




- Thousands of stations in most subduction zones w/ significant populations
- Positions with a few cm accuracy available with sub-second latency anywhere
- For M7+  earthquakes, GNSS likely to provide best magnitude estimate for the first ~15 min