

Data Handling

(multiple paths, buffering,
packet loss, etc)

- Use multiple paths for increasing redundancy
- possibly use cloud resources
- EEW considerations for buffering and recovering from telemetry outages
- data completeness after telemetry loss
- data inspection tools for determining data quality. Looking at time series and statistics.
- data quality with respect to signal noise types and statistics

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USGS/CVO

Data Handling

- Data Telemetry – Currently have some networks with multiple data paths, however not currently utilized
- Data and Telemetry loss – hoping to improve data recovery by submitting missing data captured on cards to PNSN
 - Not all CVO digitizers can store data
- Station Metrics – CVO will be evaluating and implementing station Metrics this fall.

Data Handling at the Alaska Earthquake Center

- Multipath telemetry: No comprehensive plan, mostly due to budgetary constraints.
- Data buffering: On site buffering up to several hours via Q330 dataloggers or longer term via Q330S or Marmots. Data from Q330S only retrieved upon site visits. Q330 buffers are uploaded as soon as the telemetry is restored.
- Data quality control: Via diagnostic channels (clock quality, mass positions), visual inspection of data and MUSTANG system (provided by IRIS DMC).

Data Handling

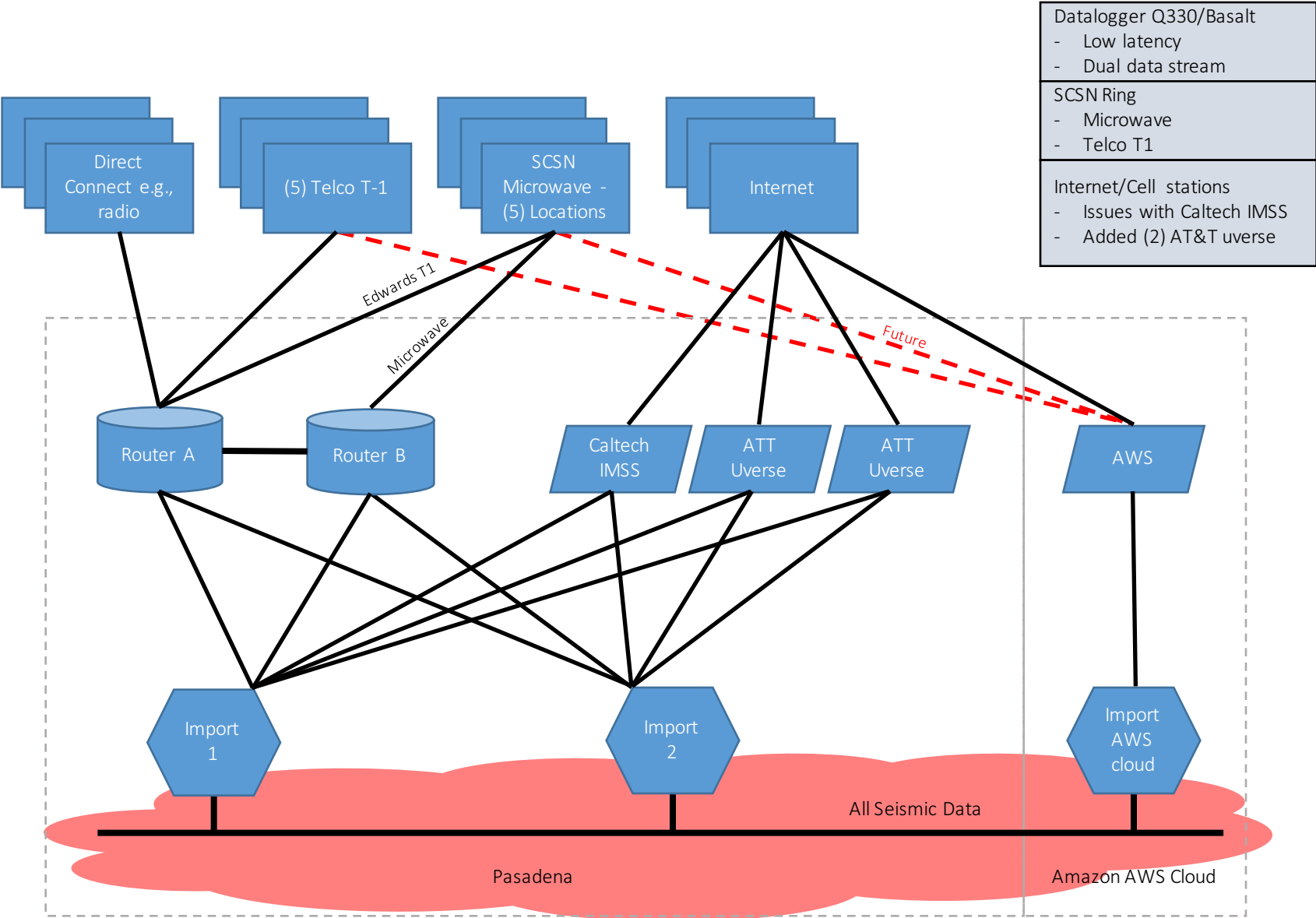
SCSN

- Multiple data paths including direct connections to AWS cloud
- wavenet - single point of failure
- EEW considerations – reduce buffer to recover from telemetry outage faster
- Gaps recovery - CWB fetcher
- PQLX - data inspection tools for determining data quality with respect to signal noise types and statistics. Looking at time series and statistics.

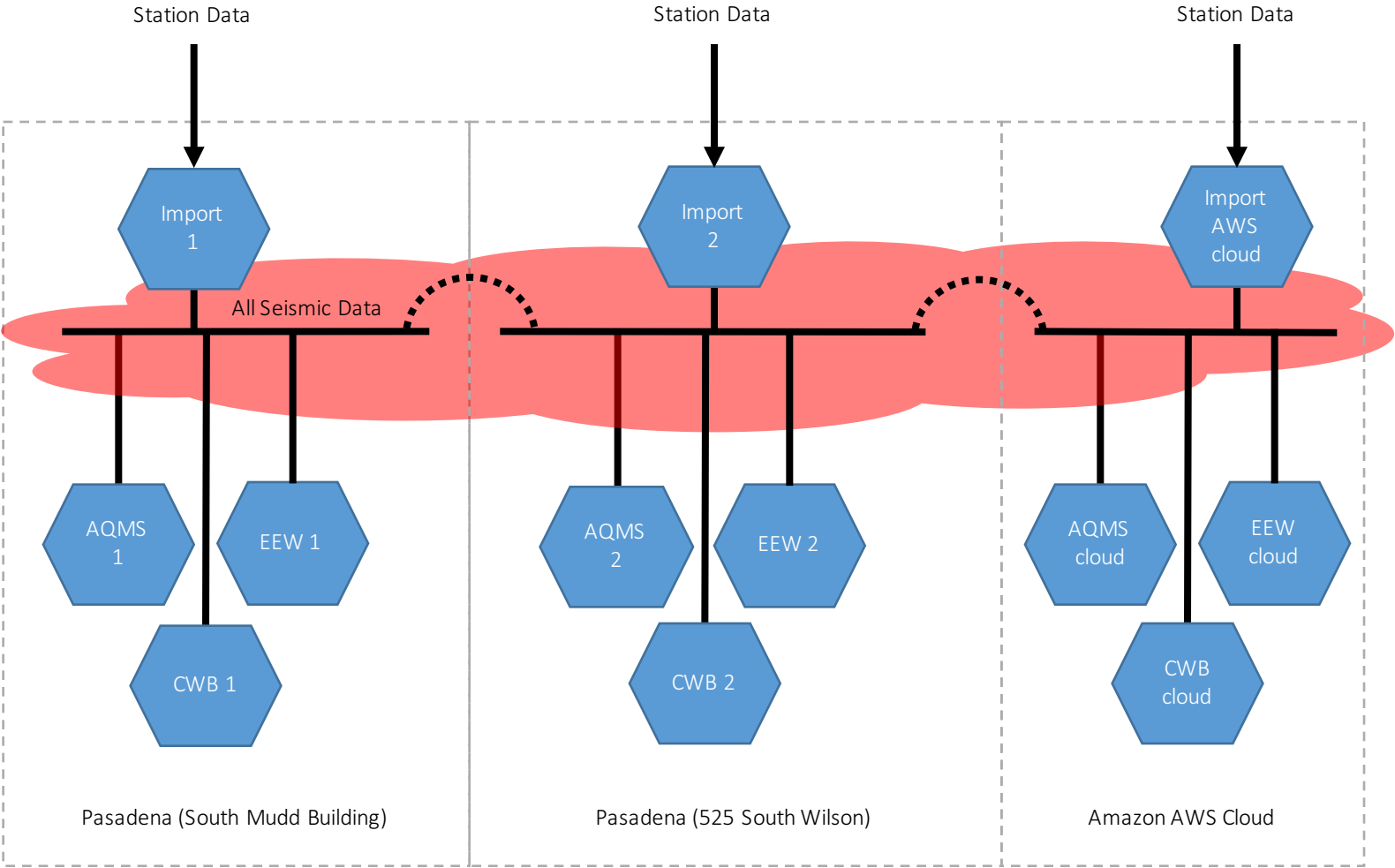
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SCSN - Telemetry and Communication

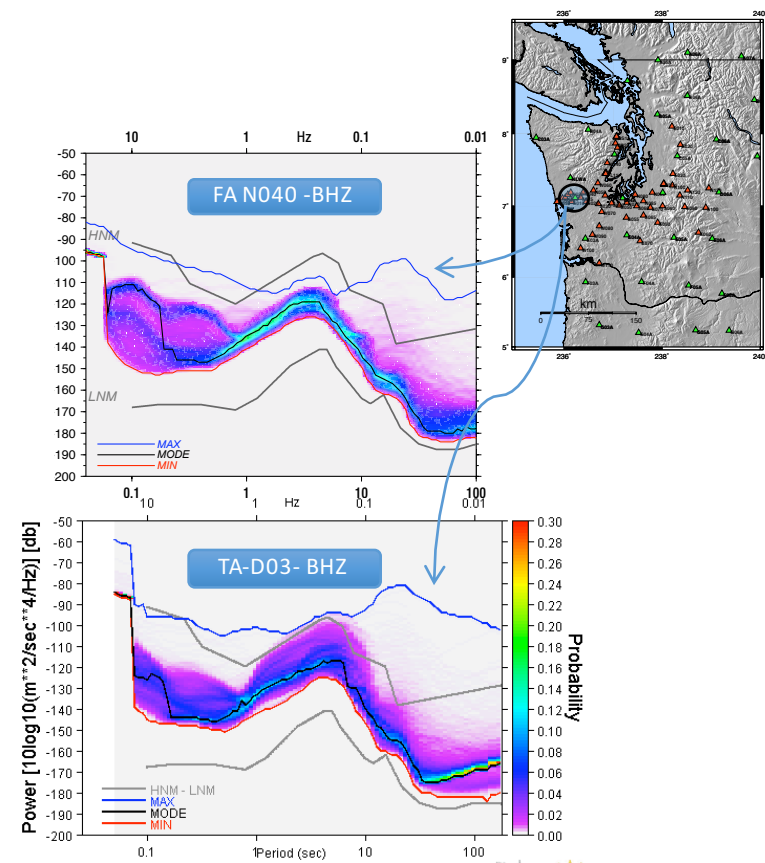


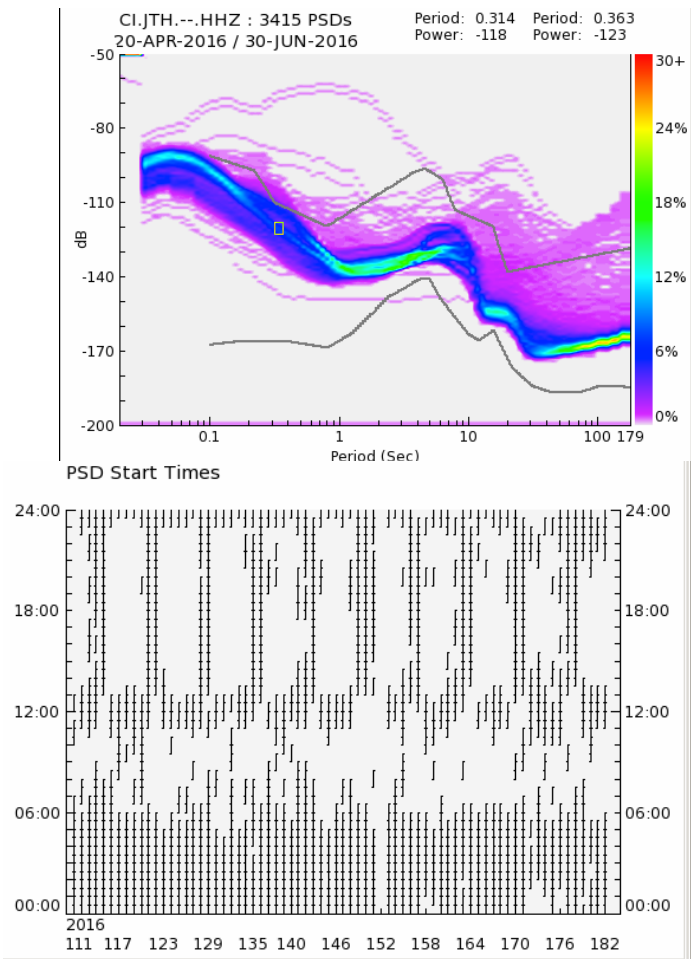
SCSN - Telemetry and Communication



Data Quality Monitoring Using Statistical Methods; Power Spectral Density

- Evaluates seismic station performance and calculates trace statistics. (Linux, MacOS), means, modes, max, min, percentiles. Extractible using scripts.
- Using McNamara, Buland (BSSA, Sept. 2003) Probability Density Function (PDF) analysis
- Power spectral densities (PSD) for 1 hour continuous segments are calculated in full octave averages over 1/8 octave intervals then binned in 1 dB power intervals
- All data is processed, earthquakes map into background, noise features stand out
- PQLX is open-source software available by the USGS Earthquakes Hazard Programs at; earthquake.usgs.gov/research/software/pqlx.php





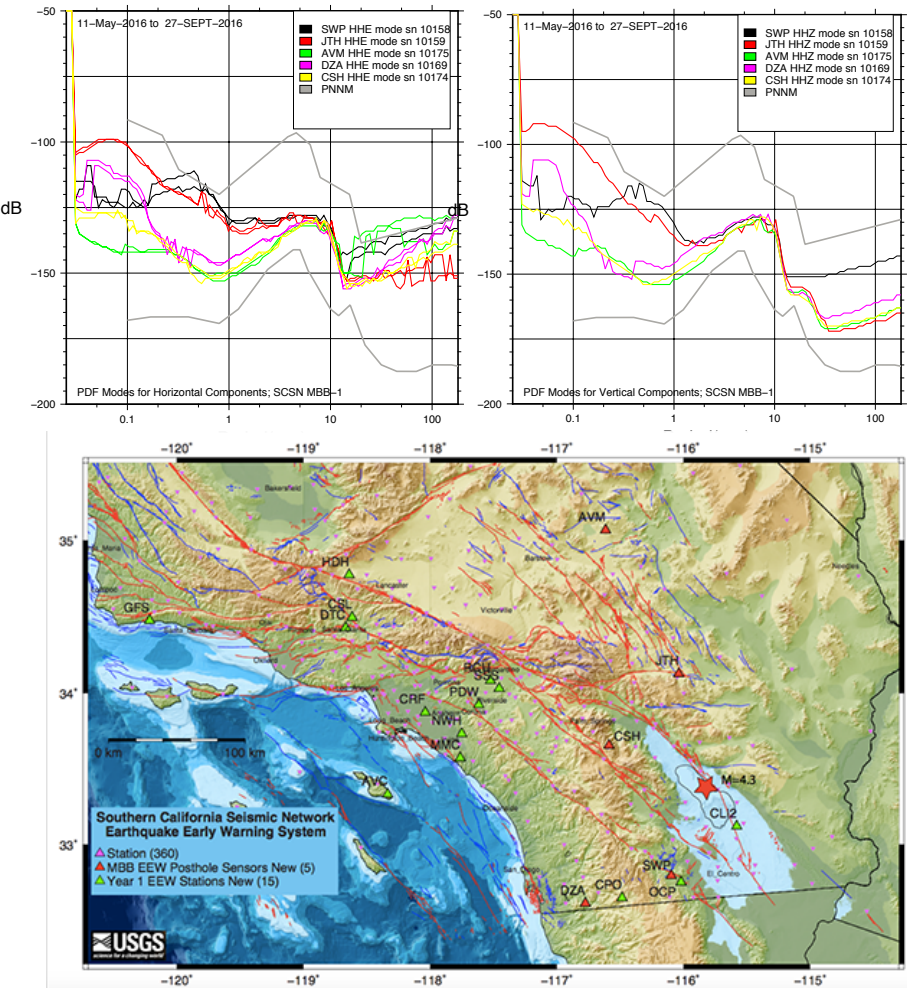
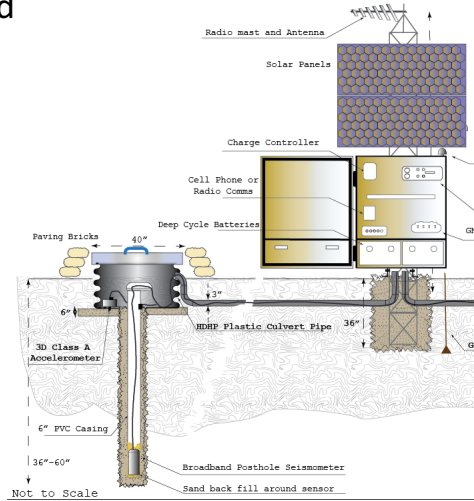
Interactive Graphical Tool

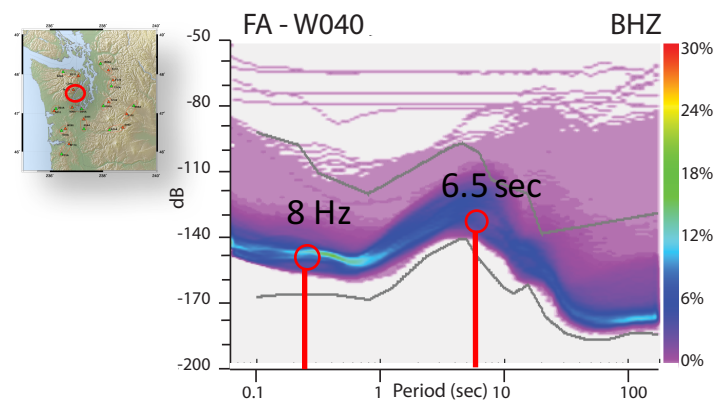
- Select PDF area and view PSD windows that were used
- In this case, you can see weekly traffic patterns around 8 Hz, weekends and hollidays



Comparing Modes for Multiple Stations

- For 5 newly installed stations in the SCSN
- Plot modes for each station for long periods of time (3 months)
- Comparison of station performance can be evaluated





Daily Modes Time Series; Observation of Natural Phenomena

- Microseismic signal at P=6.5 sec
- Seasonal noise variations seen on both P=6.5 seconds and 8 Hz
- Episodic Tremor seen on two co-located stations at 8 Hz mode.
- One station is better at detecting ETS signal than the other (Blue)

