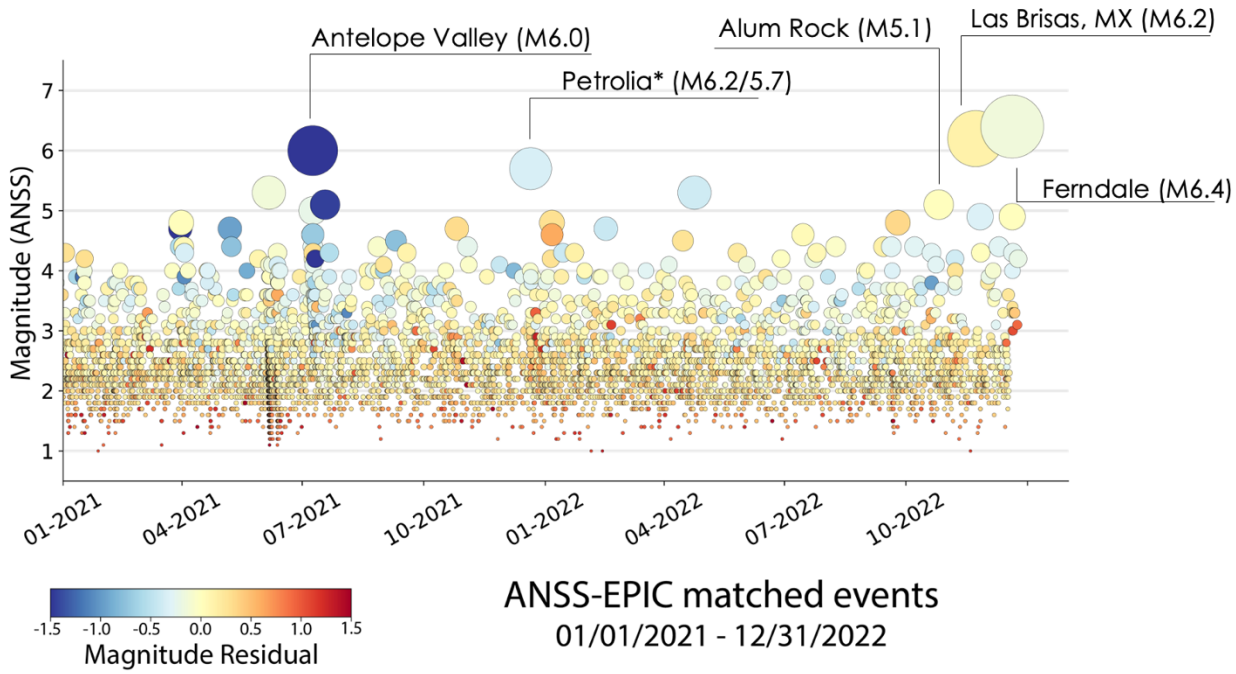
Earthquake early warning along the US west coast: improving detection and characterization of offshore events with limited data

Amy L. Williamson, Angela Lux, Richard Allen

The development and growth of earthquake early warning (EEW) programs globally have allowed participating regions to provide timely alerts prior to damaging ground shaking during moderate to large earthquakes. ShakeAlert, the EEW program on the US West Coast has provided alerts for a handful of recent and felt earthquakes including the October 2022 M5.1 Alum Rock event and the 2022 M6.3 Ferndale earthquake. In addition to providing alerts, the expansion of seismic networks along the West Coast, enabling a faster detection of earthquakes, also increases the data that can be leveraged for a myriad of different research goals. Along with this expansion is an understanding of current detection limitations, particularly our ability to accurate detect and characterize earthquakes occurring offshore under the time constrains of EEW. While some ShakeAlert algorithms produces low-latency and low error solutions for many events originating within the seismic network on land, numerous recent small earthquakes rupturing offshore of northern California have location solutions with high error (> 50 km compared to USGS locations). To better constrain location solutions in this region, we propose to include information about contemporary past seismicity into the location algorithm through a weighting scheme. This proposed addition lowers the mean location error offshore northern California from 58 km to 14 km.



Above: Recent earthquakes characterized under EEW data and temporal limitations.