Session 5

TALKS:

MyShake: Harnessing personal smartphones for early warning, building safety and ground motion modeling

R. Allen, U. Kumar, and S. Marcou

MyShake is a free smartphone app for iOS and Android phones that provides users access to earthquake early warning alerts while also collecting acceleration data for research. As a citizen science app active on over 2 million phones in California, it both provides users with a service that they value (earthquake early warning alerts) while contributing data about earthquakes and their impacts. In this talk I will review the value provided in terms of alert timeliness, and also some of the applications of the data. Current uses of the data include ground motion modeling with the potential to provide detailed site effects and building response, and also building health monitoring where ambient vibrations are used to characterize building over months and years, allowing for the detection of building damage during catastrophic events.

Closing the Offshore Gap: Integrating Distributed Acoustic Sensing into Operational EEW Networks

R. N. Nof, Y. Gou, A. Williamson, R. M. Allen, B. Pardini, I. Henson, A. Lux, W. Zhu, T. Taira, and J. Marty

Earthquake Early Warning (EEW) systems rely on dense seismic networks to rapidly characterize events, yet their effectiveness is often limited in offshore regions where instrumentation is sparse. Distributed Acoustic Sensing (DAS) offers a novel capability by converting existing subsea fiber-optic cables into dense seismic arrays. We present dEPIC (DAS-Earthquake Point-source Integrated Code), the first operational framework designed to integrate DAS arrays into EEW systems. Deployed on a submarine cable in Monterey Bay, California, dEPIC utilizes an edge-computing architecture to process high-volume strain rate data in real time. The system employs a GPU-accelerated, machine-learning-based phase picker adapted for DAS, coupled with a grid-search location algorithm and empirical magnitude estimator. To address the azimuthal ambiguity inherent in linear cable geometries, we developed real-time location quality metrics— prominence and distribution scores—that effectively suppress unstable solutions. Performance evaluations using archived event replays and continuous real-time data demonstrate that dEPIC successfully detects both onshore and offshore events with sub-second processing times. The system operates both autonomously and in coordination with ShakeAlert's EPIC algorithm, improving detection speed for offshore seismicity. While developed in California, this modular framework is highly adaptable and particularly relevant for the Mediterranean. Applying dEPIC to existing telecommunications infrastructure could significantly enhance early warning capabilities for offshore hazards.

Leveraging a multi-task deep learning model to enhance the California statewide earthquake focal mechanism catalog

J. Song, W. Zhu, B. Rong, and R. M. Allen

Earthquake focal mechanisms, particularly those from smaller-magnitude events that occur more frequently, can provide valuable information on subsurface fault geometries and stress fields. They are now better constrained with the development of dense seismic networks, but this also creates a need for more efficient processing methods for data mining and timely monitoring. In previous work, a well-developed multi-task deep-learning model (Zhu et al., 2025) specialized in both phase-arrival and polarity picking successfully enhanced focal mechanism solutions for the 2019 Ridgecrest earthquake sequence. In the present work, we extend the application from the local scale to the statewide scale in California. We applied the model to continuous records from the public NCEDC and SCEDC dataset. We associated P- and S-phase arrivals with individual events and derived the absolute locations of well-recorded events using adaptive 1D velocity models. The double-couple focal mechanisms were then computed from first-motion polarities and S/P amplitude ratios. We successfully retrieved the majority of the earthquakes listed in the routine catalog and extended focal mechanism solutions to lower-magnitude earthquakes—for example, to M0 near the Geysers area and M1.5 near the Mendocino Triple Junction. Our results are also consistent with existing refined catalogs (e.g., Cheng et al., 2025), which incorporate additional constraints such as relative amplitude ratios. Our deep-learning-based workflow can be applied to both long-term archived seismic datasets of other similar regions and real-time stress field monitoring.

POSTERS:

Recent Performance of the ShakeAlert Earthquake Early Warning System

A. Lux, I. Henson, A. Williamson, and R. Allen

ShakeAlert is the Earthquake Early Warning system for the US West Coast, operated by the United States Geological Survey in cooperation with university partners including University of California Berkeley, Caltech, ETH Zurich, University of Oregon, and University of Washington. ShakeAlert has been delivering public alerts in California since October 2019, and in Oregon and Washington since 2021. ShakeAlert uses three algorithms to detect and characterize earthquakes: EPIC, FinDer, and GFAST-PGD. EPIC is a network-based point-source algorithm. It is often the fastest algorithm to detect earthquakes, but it saturates around ~M7. FinDer is a finite-fault algorithm, using peak ground motions to estimate the length of the fault rupture for more accurate large-magnitude estimations. GFAST-PGD is the newest ShakeAlert algorithm. Unlike EPIC and FinDer, which use seismic data, GFAST-PGD uses geodetic data, which does not saturate during large ground motions. During this presentation we will give an overview of ShakeAlert, and discuss recent improvements to and performance of the system.

A systematic analysis of directional site amplification effects at stations of the seismic network (NZ), to test the relation with local geological and morphological proxies.

M. Pischiutta, A. Kaiser, R. Puglia, and E. Manea

We conducted a systematic study of site amplification at 279 New Zealand seismic stations, including 203 permanent broadband stations of the GeoNet network and 76 temporary weak motion stations from regional networks. The amplification characteristics at each station are retrieved through calculating the horizontal-to-vertical spectral ratios (HVSR) based on ambient vibrations. We find that a high portion of the stations sampled (66%) are affected by significant amplification, with HVSR amplitudes exceeding a factor of 2. This is a crucial issue considering that these stations are employed for seismic surveillance and magnitude estimation of regional seismicity. We define the amplification characteristics at each station by using a quantitative criterion finding that almost half of the amplified stations (43%) are affected by amplification in a broad frequency band or, rather with a multipeak pattern, increasing complexity in further interpretations. We have tried to establish a relation between the amplification pattern and geological and morphometric proxies, without retrieving satisfactory correlations. Therefore, this study highlights: (i) the unexpected wide occurrence of site amplification effects at locations chosen for permanent seismic network; (ii) the importance of considering the local geological pattern as well as site-specific characteristics to interpret the site response.