AGU FALL MEETING
San Francisco | 12–16 December 2016

S23A-2738: INTEGRATING LOW-COST MEMS ACCELEROMETER MINI-ARRAYS (MAMA) IN EARTHQUAKE EARLY WARNING SYSTEMS

Tuesday, 13 December 2016
13:40 - 18:00
Moscone South - Poster Hall

Current operational Earthquake Early Warning Systems (EEWS) acquire data with networks of single seismic stations, and compute source parameters assuming earthquakes to be point sources. For large events, the point-source assumption leads to an underestimation of magnitude, and the use of single stations leads to large uncertainties in the locations of events outside the network. We propose the use of mini-arrays to improve EEWS. Mini-arrays have the potential to: (a) estimate reliable hypocentral locations by beam forming (FK-analysis) techniques; (b) characterize the rupture dimensions and account for finite-source effects, leading to more reliable estimates for large magnitudes. Previously, the high price of multiple seismometers has made creating arrays cost-prohibitive. However, we propose setting up mini-arrays of a new seismometer based on low-cost (<$150), high-performance MEMS accelerometer around conventional seismic stations. The expected benefits of such an approach include decreasing alert-times, improving real-time shaking predictions and mitigating false alarms.

We use low-resolution 14-bit Quake Catcher Network (QCN) data collected during Rapid Aftershock Mobilization Program (RAMP) in Christchurch, NZ following the M7.1 Darfield earthquake in September 2010. As the QCN network was so dense, we were able to use small sub-array of up to ten sensors spread along a maximum area of ~1.7x2.2 km^2 to demonstrate our approach and to solve for the BAZ of two events (Mw4.7 and Mw5.1) with less than ±10° error. We will also present the new 24-bit device details, benchmarks, and real-time measurements.

Authors

Ran Novitsky Nof *
Berkeley Seismological Lab

Angela I Chung
Berkeley Seismological Lab

Horst Rademacher
Berkeley Seismological Lab

Richard M Allen
University of California Berkeley

View Related Events

Session: S23A Advances in Earthquake Early Warning Research II Posters

Program: Seismology

Day: Tuesday, 13 December 2016