

Preliminary Results from Quake-Catcher Network Rapid Aftershock Mobilization Program (QCN-RAMP) Following the 27 February 2010 M8.8 Maule, Chile Earthquake

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The Quake-Catcher Network (QCN) is a collaborative initiative to develop a dense, low-cost strong-motion seismic network by exploiting recent advances in sensing technologies and distributed computing techniques. Micro-Electro-Mechanical Systems (MEMS) triaxial accelerometers are very low cost (\$30-\$100) and interface to any desktop computer via USB cable enabling dense strong motion observations. Following the 27 February 2010 M8.8 earthquake in Maule, Chile, the QCN Rapid Aftershock Mobilization Program (RAMP) was developed and 100 USB sensors were installed to record aftershocks.

On 3 March, the Chile RAMP website was created allowing the public to volunteer to install a QCN sensor on their computer. Following local media interviews, the response was overwhelming and the signup was suspended on 15 March after over 700 requests were received. Colleagues from the University of Concepción organized the sensor installation logistics with support from Stanford and UC Riverside graduate students who traveled to Chile on 8 March. The 100 USB accelerometers were deployed mainly in regions directly affected by the mainshock and were densely concentrated around Concepción. Sensors were installed in homes, police stations, health centers and other institutions in coordination with the national emergency authority (ONEMI).

The sensors were configured for continuous recording to ensure maximum data recovery and to allow us an opportunity to improve and test our distributed computing event triggering and earthquake detection algorithms. Using this data, we refined our triggering and event detection algorithms and tested, retrospectively, whether the network can rapidly and accurately identify the location and magnitude of the moderate to large aftershocks ($M > 4$). Data from these tests show that a relatively dense, low-cost QCN network can provide very accurate aftershock location and magnitude estimates. In addition, we use the data collected to investigate the spatial variability of site amplification in the Biobío region, near Concepción.

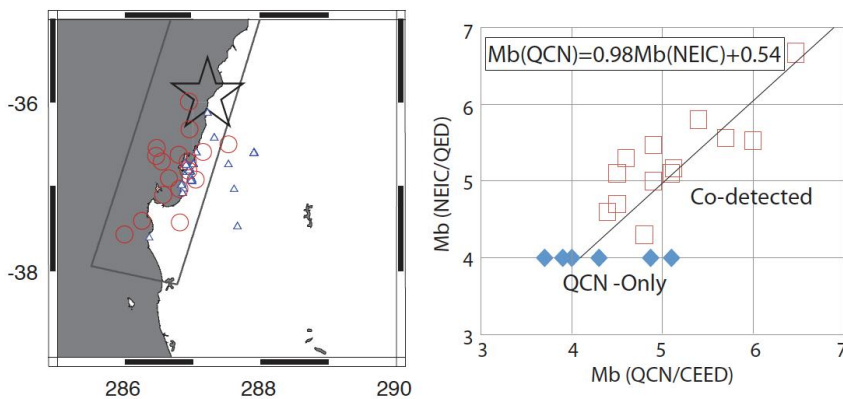


Figure 1: (Left) Aftershock locations (red circles) using triggers from QCN stations (blue triangles). Star and rectangle indicate mainshock epicenter and slip region, respectively. (Right) Event magnitudes detected by QCN only (blue) and NEIC and QCN (red). Magnitudes calculated with data received within 40 seconds of the earthquake origin time.