

Geotechnical Aspects of the 20115 M-w 8.3 Illapel Megathrust Earthquake Sequence in Chile

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Resumen

The 2015 Illapel earthquake sequence in Central Chile, occurred along the subduction zone interface in a known seismic gap, with moment magnitudes of M-w 8.3, M-w 7.1, and M-w 7.6. The Main event triggered tsunami waves that damaged structures along the coast, while the surface ground motion induced localized liquefaction, settlement of bridge abutments, rockfall, debris flow, and collapse in several adobe structures. Because of the strict seismic codes in Chile, damage to modern engineered infrastructure was limited, although there was widespread tsunami-induced damage to one-story and two-stories residential homes adjacent to the shoreline. Soon after the earthquake, shear wave measurements were performed at selected potentially liquefiable sites to test recent Vs-based liquefaction susceptibility approaches. This paper describes the effects that this earthquake sequence and tsunami had on a number of retaining structures, bridge abutments, and cuts along Chile's main highway (Route 5). Since tsunami waves redistribute coastal and near shore sand along the coast, liquefaction evidence in coastal zones with tsunami waves is sometimes obscured within minutes because the tsunami waves entrain and deposit sand that covers or erodes evidence of liquefaction (e.g., lateral spread or sand blows). This suggests that liquefaction occurrence and hazard may be under estimated in coastal zones. Importantly, the areas that experienced the greatest coseismic slip, appeared to have the largest volumes of rockfall that impacted roads, which suggests that coseismic slip maps, generated immediately after the shaking stops, can provide a first order indication about where to expect damage during future major events.

Palabras clave

KeyWords Plus: TSUNAMI