**BACKGROUND**

The use of paleoliquefaction evidence to assess seismic hazards has become increasingly common, particularly in regions of infrequent but potentially damaging seismicity.

This technique involves locating liquefaction features induced by prehistoric or pre-instrumental earthquakes and using quantitative back-analysis methods to estimate the causative ground motion and earthquake magnitude.

**DATA AND METHODOLOGY**

The Canterbury earthquakes present a unique opportunity to assess the accuracy of paleoliquefaction back-analyses. Towards this end, simulated paleoliquefaction studies of the Darfield and Christchurch earthquakes are performed. Following a summary of the Canterbury earthquakes, the “site-specific geotechnical analysis” is outlined, and its application to the Canterbury sequence is discussed.

**RESULTS AND DISCUSSION**

**1. Assuming known rupture location & mechanism (Fig. 2)**

- Used published source models for each earthquake

**2. Assumming unknown rupture locations & mechanisms**

- While the site-specific analysis performed very well with known earthquake source locations/models, these are often unknown in paleoseismic investigations.

**OBJECTIVE**

- This study aims to evaluate our capacity for estimating earthquake magnitudes from liquefaction data by back-calculating the magnitudes of the 2010 Darfield and 2011 Christchurch (NZ) earthquakes and comparing with the actual magnitudes; a novel analysis framework for paleoliquefaction interpretation is proposed & assessed.

**CONCLUSIONS**

1. Paleoliquefaction back-analyses can be very accurate if earthquake source location & mechanism are known.

2. Accurate analysis is more difficult if source location is unknown, but index E allows more intelligent estimate of causative earthquake’s location and magnitude.

3. Framework using site-specific geotechnical analysis shown to be effective and proposed for use in paleoliquefaction studies worldwide.