

# Relationship between two recent New Zealand earthquakes

26 September 2011



Medway footbridge over the Avon River after the earthquake. Credit: Schwede66

The relationship between two earthquakes that took place near Christchurch, New Zealand, in September 2010 and February 2011 is examined in a paper published in *Scientific Reports*. The findings suggest that the first earthquake contributed to the occurrence of the second by loading the fault along which the second event occurred with stress, bringing it closer to failure.

In September 2010, a magnitude-7.1 [earthquake](#) occurred in Darfield, about 30 miles west of Christchurch, along the previously unrecognised Greendale fault. A second, magnitude-6.3 earthquake took place near Christchurch city centre in February 2011. According to the Coulomb Stress Triggering theory, once an earthquake occurs, the stress does not dissipate but it propagates in the surrounding area, potentially increasing the occurrence of further earthquakes. But it has remained unclear whether the mainshock of the September 2010 event induced a stress redistribution that triggered the February 2011 event.

Using the Differential [Synthetic Aperture Radar](#)

Interferometry (DInSAR) technique, Salvatore Stramondo and colleagues analyzed the relationship between the two earthquakes. The results show that the rupture of the September 2010 earthquake loaded a large portion of the crust with stress values exceeding 1 bar, which was sufficient to trigger the second earthquake.

Some [seismologists](#) have suggested that the second event may have been the largest of the 4,000 [aftershocks](#) recorded over the Greendale fault and the surrounding area between September 2010 and February 2011. Further research is needed to determine whether this is the case or whether the second event is indeed a mainshock that occurred along a second fault, promoted by the stress build-up of the first earthquake.

## More information:

[www.nature.com/srep/2011/11092...98/pdf/srep00098.pdf](http://www.nature.com/srep/2011/11092...98/pdf/srep00098.pdf)

Provided by Nature

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