



## **The 2005 Tarapaca earthquake: a likely indirect trigger of the 2014 Iquique earthquake**

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Static stress change has been proposed as an integral earthquake triggering mechanism. Here we investigate the effect of 2005 Tarapaca earthquake on the occurrence of the 2014 M8.1 Iquique earthquake from the static stress change triggering perspective. The 2005 Mw7.8 Tarapaca earthquake occurred ~200 km to east of the Iquique earthquake and was identified as a result of normal faulting on a west-dipping plane at depths between 90 and 115 km within the subducting slab of northern Chile (Delouis and Legrand, 2007). It is supposed that the induced coseismic stress could be gradually released by any nearby weak layers. Before calculating the Coulomb stress changes associated with the coseismic slip and postseismic processes, we first need to constrain the subduction zone rheological properties.

We built a postseismic deformation rate map for the Tarapaca earthquake using 45 atmospheric noise corrected interferograms. The Envisat-recorded short-term postseismic deformation shows a broad pattern of uplift across the fault's surface projection. A semi-analytical three-dimensional model considering the vertical and horizontal rheological heterogeneities was tested with variable inputs to obtain a set of optimal rheological parameters.

With the optimal rheological parameters as input, we then compute the static Coulomb stress change on the megathrust interface caused by the coseismic slip and viscoelastic relaxation (VER) processes of the Tarapaca earthquake. It is found that the coseismic rupture and most aftershocks of the Iquique earthquake locate in a zone with negative stress loading. However, calculation of Coulomb stress change on nodal planes of the M6.7 preshock shows a positive loading on the shallow dipping fault plane, which indicates a likely triggering effect on the preshock. Based on the understanding that the preshock triggered the mainshock, we suggest that the 2005 Tarapaca earthquake may act as an indirect trigger of the 2014 Iquique earthquake.