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An example of cyclic seismic swarms triggered by static stress transfer from a sustained volcano deformation: Laguna del Maule Volcanic Complex – Chile.

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Two important geological processes have been detected recently at the Laguna del Maule Volcanic Complex (LMVC): 1) one of the world's highest known rates of non-eruptive surface uplift (> 210 cm in ~9 yeras) related to a rhyolitic magma body at 5 km depth, and 2) cyclic swarms of distal volcano-tectonic earthquakes on faults surrounding the actively deforming region. These swarms are occurring (a) along the rim of the LMVC, (b) at two of the most active Holocene volcanic centers, (c) at the intersection between the rim of the volcanic basin and an active regional strike-slip fault, and (d) at the SW edge of the InSAR-modeled source of the surface uplift. We present a study that combines seismicity and GPS modeling to show how the sources of both processes could be connected. First there seems to be a temporal connection between both processes because periods of increasing then decreasing uplift rates correlate well with periods when greater then smaller numbers of seismic swarms occurred. Second the seismic energy released by the swarms shows a tendency to increase then decrease with increasing then decreasing number of swarms with time. Coulomb stress transfer models of the inflation source indicate that resulting changes to the local stress field are sufficient to promote failure on neighboring faults. However deformation source location and geometry, fault location and geometry, the current local state of stress, and magnitude of the stress change play an important role in explaining exactly how this process works and their connection.