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Crustal seismicity of Southern Andes region affected by Maule 2010 megathrust earthquake

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It is suggested that after large magnitude earthquakes the region of the volcanic arc facing by the megathrust slip is marked by an increase of volcanic activity in the following years, decades and even centuries. The $M_w = 8.8$ Maule 2010 earthquake induced a rupture zone about 500 km long spanning from 33.5°S to 38.5°S. Additionally, InSar data show that several volcanic edifices in the Southern Andes underwent a rapid subsidence (from days to months) after the Maule earthquake.

To identify the post seismic deformation taking place in the volcanic arc after the Maule earthquake we deployed 21 seismic stations from November 2013 to March 2015 from 35.5°S to 37.5°S. We detected 372 seismic events, but only 30 were localizable at crustal depths (i.e. < 20 km depth and GAP ≤ 180). After a preliminary localization, the seismic events were relocated using an improved 1D velocity model. For the largest seismic events we obtained focal mechanism using P-wave polarities. A cluster of seismic events and seismic swarms ($> 60\%$) are concentrated between Longaví volcano and Nevados de Chillán volcanic complex within $5 - 10$ km depth, indicating the brittle-failure range and the possibility that fluids can reach the surface. Other studies propose that this segment of the main-arc is an accommodation zone of the Cenozoic basin striking NW-SE, that has acted as a weakened zone and enabled the volcanism and magmatism at Nevados de Chillán volcanic complex. We suggest that this system may have been reactivated by supra-lithostatic fluid pressures leading to the observed seismicity.