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# Magma-tectonic interaction at Laguna del Maule, Chile

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The Laguna del Maule Volcanic Field (LdM), Chile, the largest concentration of rhyolite <20 ky globally, exhibits crustal deformation at rates higher than any non-erupting volcano. The interaction of large magmatic systems with faulting is poorly understood, however, the Chaitén rhyolitic system demonstrated that faults can serve as magma pathways during an eruption. We present a complex fault system at LdM in close proximity to the magma reservoir. In March 2016, 18 CHIRP seismic reflection lines were acquired at LdM to identify faults and analyze potential spatial and temporal impacts of the fault system on volcanic activity. We mapped three key horizons on each line, bounding sediment packages between Holocene onset, ~870 y BP, and the present date. Faults were mapped on each line and offset was calculated across key horizons. Our results indicate a system of normal-component faults in the northern lake sector, striking subparallel to the mapped Troncoso Fault SW of the lake. These faults correlate to prominent magnetic lineations mapped by boat magnetic data acquired February 2016. We also imaged a vertical fault, interpreted as a strike-slip fault, and a series of normal faults in the SW lake sector near the center of magmatic inflation. Isochron and fault offset maps illuminate areas of growth strata and indicate migration and increase of fault activity from south to north through time. We identify a domal structure in the SW lake sector, coincident with an area of low magnetization, in the region of maximum deformation from InSAR results. The dome experienced ~10 ms TWT (~10 meters) of uplift throughout the past ~16 ky BP, which we interpret as magmatic inflation in a shallow magma reservoir. This inflation is isolated to a ~1.5 km diameter region in the hanging wall of the primary normal fault system, indicating possible fault-facilitated inflation.