

Crustal deformation around the Laguna del Maule caldera detected by PALSAR/InSAR

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Local deformations around volcanoes associated with the 2011 Tohoku Earthquake were found in our previous study (Ozawa and Fujita, submitted to JGR). To investigate if the similar deformation has occurred for other earthquakes, we are analyzing InSAR data for several areas. In this presentation, we present a result of the Laguna del Maule, Chile. The Laguna del Maule is a caldera with 15*25km width, located to east of seismic area of the 2010 Maule Earthquake (Mw8.8, 2010/2/27). Although there is no historical record of eruption, large deformation had been detected by InSAR. Applying InSAR using PALSAR data, we investigated crustal deformation for preseismic, coseismic, and postseismic periods. Due to disturbance by snow cover, sufficient coherence for deformation investigation was limited to pair of summer data. Now, we finished analyzing four interferometric pairs, (1)2007/2/12-2009/2/17, (2)2009/2/17-2010/2/20, (3)2010/2/20-2010/4/7, and (4)2010/4/7-2011/1/8. Obtained interferograms showed slant-range contractions, indicating inflation of volcano. Estimating source parameters of Mogi's model from interferograms of (1), (2), and (4), the source location was estimated to 2700m depth (b.s.l.) under the caldera. Simulated slant-range changes from the estimated model well explain observed ones. Volume changes were estimated to 54, 44, and 24 million m³, corresponding to rates of 27, 43, and 32 million m³/yr. Calculating slant-range change in 46 days from the averaged inflation rate (34 million m³/yr), it is roughly consistent with that from interferogram of (3). It suggests that significant inflation change didn't occur in the 2010 Maule Earthquake. However, this is a preliminary result, and then more detailed analysis is necessary.

Keywords: volcano, earthquake, deformation, SAR, Laguna del Maule