



Cities on Volcanoes 9
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'Understanding volcanoes and society: the key for risk mitigation'

Active tectonics and volcanism along the Southern Andes: bridging scales in time and space

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The Southern Andean margin is perhaps the best natural laboratory on Earth to study the relationship between volcanism and active tectonics. Convergence between Nazca and South American plates is relatively rapid (66 mm/yr) and slightly oblique (15-20°) with respect to the continental margin. The trench-normal component of oblique convergence is mainly released along the megathrust fault by great subduction earthquakes, which can take huge dimensions like the 1960 Valdivia Mw 9.5 or the 2010 Maule Mw 8.8 events. At the time scale of millions of years, the trench-parallel component of convergence is related to dextral (northward) strike-slip motion of the forearc sliver along the Liquiñe-Ofqui Fault Zone (LOFZ). This is a long-lived (Eocene-Recent) crustal-scale structure more than 1,000 km long that is intimately related to the Southern Volcanic Zone (SVZ) of the Andes. Volcanic systems of the SVZ are clustered near intersections of the LOFZ with oblique and inherited basement structures. In contrast with this clear spatial relationship between crustal tectonics and volcanism at long time-scales, little is still known at the time scale of earthquakes and eruptions about the mechanisms by which these processes actually interact. With the main aim of bridging the gap between these scales, we are acquiring, compiling, processing and interpreting structural geological data at different spatial scales, along with published and new geodetic and seismological data. At the scale of volcanic complexes we are focusing our structural mapping efforts at those that have presented unrest or eruptions, for which more local geodetic and seismological information is also available. This contribution will summarize all these observations in a first attempt to perform an integrated interpretation, relating patterns of seismicity and vorticity (which parameterizes the surface velocity field



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computed from GPS observations) with regional and local structural
models for selected study cases (some of them also presented in this meeting).