Geophysical Research Abstracts, Vol. 8, 05149, 2006
SRef-ID:

Tectonic control on the Holocene volcanism north of the Southern Volcanic Zone (S35° - S38°, Argentina)

G. Backé, **E. Pajot**, D. Dhont, Y. Hervouët

M.I.G.P. UMR 5212, Universit4e de Pau et des Pays de l'Adour, I.P.R.A, Avenue de l'Université, 64000 PAU, France./ Phone: +33 559 407417/ mail:guillaume.backe@univ-pau.fr

Volcanism in the Andes is a direct consequence of the subduction of the Nazca oceanic plate under the South American continental plate. Along strike variation in the geometry of the subducted slab is correlated to the occurrence of the volcanism. Flat-slab subduction is associated to a lack of volcanism and intense folding whereas steeply dipping slabs cause intense magmatism and less compressive strain in surface. In addition, variations of the geometry of the Wadati-Benioff plane occurred since at least the Oligocene. Between lat. S31° and S34°, shallowing of the Nazca plate started in the Miocene as the result of the subduction of the Juan Fernandez ridge under the South American plate. The southern region - between lat. S35° to S38° - corresponds to the southern tip of the transitional zone between a flat-slab subduction to the north and a steeply inclined slab to the south referred to as the Southern Volcanic Zone (SVZ).

Our aim is to study the relationships between tectonic and volcanic features in the northern part of the SVZ, i.e. to describe the deformation regime during the Quaternary and its relation with the emplacement of volcanic vents. Our methodology is based on a morphostructural analysis of remote sensing data (satellite imagery and digital elevation model), implemented by field observations. We show that the Holocene arc magmatism in the SVZ is closely associated to motion along the Liquiñe-Ofqui right-lateral strike-slip fault. Most of the volcanoes are located in releasing bends of the fault, such as for instance the Copahue volcano located at the Argentina/Chile border. This area is characterized by a NW-SE striking extension, which is deduced from the NE-trending elongation of the volcanoes if we assume that they are rooted upon tension fractures. Such NW-SE extension is consistent either with an extensional tectonic regime, with σ 3 trending NW-SE and with σ 1 being vertical, or with a strike-slip tectonic regime characterized by a NW-SE σ 3 and a NE-SW σ 1. The /Holocene

back-arc volcanism is located further east in the Andean foothills. The alignment of Holocene craters at the summit of the Tromen volcano also characterizes a NW-SE σ 3 which is consistent with a strike-slip regime of deformation deduced from the inversion of fault plane striations collected in Holocene basalts that spread out from the Payun volcano. Many back-arc volcanoes are located along N-S axes of Miocene to early Quaternary ramp-related folds, which have been cut in the late Quaternary by normal faults. Orientation of the normal faults ranges from N20°E to N60°E, and may be related either (1) to the opening of small releasing bends along strike-slip faults whose mean directions is N-S, or (2) to a stress relaxation along the fold ramps at depth.

The emplacement of the volcanic vents in the the Southern Andes may therefore be constrained by two main processes: (1) the geometry of the Nazca oceanic plate slab as previously proposed, and (2) a strain partitioning related to the oblique convergence between the Nazca and the South American plates. In the SVZ, the σ 3 and σ 1 stress components trend respectively NW-SE and NE-SW during the late Quaternary, which is consistent with a strike-slip tectonic regime allowing right-lateral movement along N-S strike-slip faults forming the northern prolongation of the Liquiñe-Ofqui fault system.