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Ongoing seismological investigations around Villarrica Volcano, Southern Chile

Y. Dzierma (1), M. Thorwart (1), W. Rabbel (1), D. Comte (2), D. Legrand (2), K. Bataille (3), P. Iglesia (4), and C. Prezzi (4)

(1) Christian-Albrechts Universität Kiel, Inst. of Geosciences, Kiel, Germany (ydzierma@geophysik.uni-kiel.de), (2) Universidad de Chile, Santiago, Chile, (3) Universidad de Concepcion, Chile, (4) Universidad de Buenos Aires, Argentina

As part of the collaborative research centre SFB 574, the Chilean subduction zone is being investigated by a seismological subproject conducted by Chilean and German partners. The general goal of the SFB 574 is to study the origin and influence of volatiles and fluids in subduction zones. The seismological subproject constitutes the structural and seismotectonic framework of these investigations.

In the past years, the SFB 574 investigations focussed on the Central American subduction zone. For the next four years, the SFB 574 has moved to the Chilean subduction zone, where the subduction setting is different. In addition to presenting a continental end-member of subduction zones - vs. a transitional setting in Central America - seismicity and volcanism in Chile are influenced strongly by sediment input into the trench, oblique convergence and resulting strain partitioning, and pre-Andean characteristics of the overriding plate.
Furthermore, the occurrence of the largest instrumentally recorded earthquake, the Valdivia 1960 earthquake, close to the very active Villarrica volcano, makes this region ideally suited for subduction-related hazard investigations.

The seismological studies will be concentrated around Villarrica Volcano, linking it with the area around the epicentre of the 1960 Valdivia earthquake. A network of 60 seismological stations will be installed in October/November 2008 for a full year of continuous data recording: A transect of 20 broad-band seismometers will run across Villarrica Volcano, extending from the coast to the back-arc in Argentina. This is complemented by 40 short-period stations covering a region of some 60 km to the North and South of the Villarrica transect (39-40 deg S).

The data collected by this network will serve for local and teleseismic tomography, seismicity, receiver function studies and further analyses of anisotropy. In addition to exploring the deep structure and geometry of this part of the subduction zone, these studies will provide insight into the presence of fluids, fluid pathways, and the stress field. In combination with geochemical and volcanological studies also performed by the SFB 574, these investigations will contribute to a better understanding of subduction zone characteristics in a region of extreme coseismic stress, slab-arc fluid processes, volcano dynamics and hazards.