

**From 6000 m below sea level to 6000 m above sea level**

Collaborative Research Center SFB574 is investigating role of fluids and volcanic gases on the Earth's climate and natural hazards, such as earthquakes, volcanic eruptions, submarine landslides and tsunamis, along a 1000 km long portion of the Southern Chilean subduction zone, located between the Chilean cities of Santiago and Puerto Montt. Both submarine (deep-sea trench and the forearc) and subaerial (volcanic arc) portions of the subduction zone are being studied. During February and March of this year, Kaj Hoernle, Paul van den Bogaard, Heidi Wehrmann and Guillaume Jacques of SFB574 subproject C2 carried out on land studies within the main volcanic arc in Chile and also of volcanism behind the volcanic arc in Argentina. In order to access young volcanic centers on top of Tupungatito and San Jose Volcanoes that are surrounded by glaciers and snow, two helicopter expeditions were carried out, reaching elevations of 5800 m, at the limit of elevations that can be reached by helicopter. On the R/V SONNE 209 cruise (scheduled for September and October 2010), SFB574 scientists plan to sample the seafloor in the forearc portion of the subduction zone and the deep-sea trench, representing the boundary between the subducting (sinking) and overriding plates with the Kiel 6000 remotely operated vehicle (ROV), reaching depths approaching 6000 m in the deep sea trench. SFB574 is one of the few groups that can carry out research covering depths and elevations to 6000m.



On top of the world. Helicopter expedition to the top of Tupungatito Volcano (5400 m), Chile. From right to left Kaj Hoernle (IFM-GEOMAR), Heidi Wehrmann (SFB574), Daniel Selles (SERNAGEOMIN, Chile) and Guillaume Jacques (SFB574). Photo taken by helicopter pilot Eduardo.

### *1000 km of Backarc Volcanism, Northern Patagonia, Argentina*

Subproject C2 also carried out sampling over a more than 1000 km length swath through the backarc in Argentina, following much of the Rally Dakar-Argentina route backwards. The northern part of Patagonia is desert, providing excellent exposures of volcanic rocks and views of wildlife. The landscape is generally flat grass lands with low bushes with abundant volcanic structures ranging from small cinder cones, no more than several meters high, to 4000 m high strato volcanoes, some with giant calderas in them. Armadillos, nandus (similar to ostriches), guanacos (similar to llamas), skunks, snakes, hawks, falcons, opossums were commonly seen in the desert. Unfortunately nasty thorn bushes make working in the desert very difficult, since they can not only penetrate sturdy hiking boots but also truck tires. It was necessary to carry out tire repairs eight times on one vehicle, with a total of 21 holes needing to be repaired (19 from thorns, 1 from a nail and 1 from a screw). Luckily Gomeria's (tire repair shops) were abundant and the price of repairing a flat tire generally about 1 Euro.



Cerro Payun, a nearly 4000 m high strato volcano, with a bowl-shaped cinder cone of the Pampas Negra shield volcano in the foreground. Northern Patagonia, Argentina. Photo taken by Kaj Hoernle



Herd of guanacos in northern Patagonia, Argentina with a variety of volcanic structures (all hills) in the background, such as the the line of red volcanic cinder cones that formed along a fracture in the ground. Photo taken by Kaj Hoernle



One of the many visits to a Gomeria to have flat tires repaired. During the five week field season, a total of 21 holes in eight tires needed to be repaired, mainly due to thorns such as the ones sticking in tire in the photo. Photo taken by Kaj Hoernle.



A common site in northern Patagonia (Argentina) an armadillo on the run. Photo taken by Kaj Hoernle.



Heidi Wehrmann collecting a tephra sample from Volkan Diamante in northern Patagonia, Argentina. Photo taken by Kaj Hoernle.

### *The Active Chaiten Volcano, Chile*

Studies and sampling were also conducted on the northern and southern flanks of the active Chaiten Volcano in southern Chile that explosively erupted in May 2008 covering much of South America with volcanic ash. A mud flow resulting from collapse of part of the lava dome now growing in the crater of the Chaiten Volcano destroyed most of the town of Chaiten located on the river banks in December of 2008. Since then the town has been evacuated. During our fieldwork in this area we got excellent views of the smoking lava dome and some smaller collapses of the dome generating mud and block and ash flows.



Chaiten Volcano, Chile a degassing lava dome. The small dark column of dust to the right was formed by collapse of part of the dome down the valley leading to Chaiten town. Photo taken from the ferry going to Puerto Montt. Photo by Kaj Hoernle.



Degassing lava dome on the active Chaiten Volcano with truck and houses partially destroyed by a mud flow coming down the river going through Chaiten town. The mud flow (consisting largely of volcanic ash) was triggered by the partial collapse of the dome in December 2008. Photo by Kaj Hoernle.



Flank of the active Chaiten Volcano, Chile. Trees have been killed by toxic volcanic fumes. Photo by Kaj Hoernle.

### *Horse-back Expedition to the Top of Nevado de Longavi, Chile*

In order to carry studies on the youngest volcanism on the top Nevado de Longavi, Chile, it was necessary to use horses to reach a base camp on a beautiful lagoon from which the ascent to the top of the volcano could be carried out. We were accompanied on our expedition by two Chilean ranchers and a pack horse and mule to carry supplies. Over a period of three days, we spent 22 hours riding on saddles consisting of a bowl-shaped piece of steel on two boards, overlain by a sheep skin. The landscape was beautiful but very rugged.



Kaj Hoernle crossing a river on expedition to the top of Nevado de Longavi, Chile. Photo taken by Heidi Wehrmann.



Rugged terrain that needed to be crossed on the expedition to the top of Nevado de Longavi (peak in the background). Pablo, one of the two local guides, and the pack horse and pack mule are shown in the foreground. Photo by Kaj Hoernle.



Idyllic campsite at lagoon, which served as the base camp for ascending the highest peak of Nevado de Longavi, Chile. Photo by Kaj Hoernle.