Geophysical Research Abstracts, Vol. 9, 04003, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04003

Volcanic hazard risk assessment of Columbo Seamount (Aegean Sea, Greece)

M. Hensch (1), C. Hübscher (1), A. Dehghani (1), T. Dahm (1), M. Hort (1), I. Dimitriadis (2), T. Taymaz (3)

(1) Institute of Geophysics, University of Hamburg, Germany; (2) Aristotle University of Thessaloniki, Greece; (3) Istanbul Technical University, Turkey; contact: martin.hensch@zmaw.de

The Columbo submarine volcano is part of the Santorini volcanic complex, situated about 7 km northeast of Thera island and inside the Santorini-Amorgos-Zone (SAZ). The SAZ marks a major structural boundary in a dextral transtensional regime which subdivides the Hellenic Volcanic Arc into a seismically and volcanically quiet western and an active eastern part. Seismicity mainly occurs along the Santorini-Amorgos-Ridge and beneath Columbo seamount, whereas activity around the volcano is thought to be linked to a magma reservoir in the subsurface, including magma and fluid migration towards the surface. The Columbo seamount itself has a well defined caldera with one single basin of 500 m depth. Its summit reaches up to 17 m below seasurface and up to now, one underwater explosion has been reported in 1650 A.D.

During a first cruise with RV Poseidon in May and June 2006, 1500 km of multichannel reflection seismic and magnetic as well as 2500 km of gravity profiling have been performed inside the SAZ, i.e. mainly in the vicinity of Columbo volcano and a wider cross-section over the Santorini-Amorgos-Ridge. While the presence of magnetic anomalies are suggested to result from solidified magma bodies, seismic data allows the identification of possible tectonics and deposits of previous eruptions. Also, they may allow the detection of fluid migration paths and reservoirs associated to magma intrusions.

In a second phase, four Ocean-Bottom-Seismometers (OBS) and four Tiltmeters (OBT) have been deployed in a dense network around Columbo seamount, which aims on the understanding of possible relations between seismic and volcanic

activities. As reported by other authors, the crustal uplift at Cape Columbo (north-eastern part of Thera island, Santorini) and a high seismicity rate in the vicinity of the Columbo caldera suggest the occurrence of offshore volcanic activity, such as dike intrusions accompanied by micro-earthquake clusters. The newly developed Hamburg OBT contains a two-component tiltmeter with a resolution of 10 nrad and an absolute pressure sensor to detect uplift or subsidence. Additionally, each OBT observes seismic signals with a 0.3-25 Hz hydrophone. We have deployed four OBTs on a profile perpendicular to the largest principle stress axis σ_1 near the summit of Columbo. Focal mechanisms will be calculated and we will closely examine the tilt data to find correlations between seabottom tilt and seimicity.