



## **Seismo-volcanic activity and active tectonics of the Santorini – Coloumbo volcanic center using data from a dense temporary seismic array**

I. Dimitriadis (1), E. Karagianni (1), D. Panagiotopoulos (1), C. Papazachos (1), P. Hatzidimitriou (1), M. Bohnhoff (2), M. Rische (3) and T. Meier (3)

(1) Geophysical Laboratory, Department of Geology, Aristotle University of Thessaloniki, Thessaloniki, Greece, (2) GeoForschungsZentrum, Telegrafenberg D424, Potsdam, Germany, (3) Department of Geosciences, Ruhr-University Bochum, Germany

(iordanis@geo.auth.gr / Tel.: +30-2310998535 / Fax: +30-2310998528)

The volcanic center of Santorini Island is one of the most active volcanoes of the southern Aegean volcanic arc. A dense seismic array consisting of fourteen portable broadband seismological stations has been deployed in order to monitor and study the seismo-volcanic activity at the broader area of the Santorini volcanic center between March 2003 and September 2003. Additional recordings from a neighbouring larger scale temporary network (CYCNET) were also used for the relocation and processing of more than 240 earthquakes recorded by both arrays. A double-difference relocation technique was used, in order to obtain optimal focal parameters for the best-constrained earthquakes. The obtained seismicity distribution and the corresponding fault plane solutions for these earthquakes allowed the detailed study of the seismo-tectonic setting of the study area.

The results indicate that the seismic activity of the Santorini volcanic center is strongly associated with the volcanic processes, as well as with the seismo-tectonic regime of the broader area of Santorini Islands. The main cluster of the epicenters is located near the north-eastern edge of the Santorini Island, beneath the Coloumbo Reef, which is a submarine volcano at the volcanic system of Santorini Islands, in agreement with earlier studies. In contrast, the main Santorini Island caldera is characterized by the al-

most complete absence of seismicity, in agreement with previous studies. This contrast is in agreement with the volcanological findings which suggest that the Coloumbo and Santorini magmatic reservoirs are not only independent but have different geochemical characteristics, with the Coloumbo volcanic center showing a younger magmatism, derived directly from the mantle. The intense activity at Coloumbo is confirmed by recent marine surveys which show a high-temperature (fluid temperatures  $> 200^{\circ}$ ) and intensity hydrothermal activity in Coloumbo, in comparison to the corresponding low-level activity of the Santorini caldera (fluid temperatures  $\sim 15\text{-}20^{\circ}$ ).

The high-resolution hypocentral relocations present a clear view of the volcanic submarine structure at the Coloumbo Reef, showing that the main seismic activity is located within a very narrow vertical column at depths, mainly between 6 and 9 km. Local seismicity and focal mechanisms of the best-located events show that the cluster at the Coloumbo Reef is associated with the “Kameni – Coloumbo Fracture Zone” (NE – SW direction), which corresponds to the western termination of the major ENE-WSW Santorini – Amorgos Fault Zone, while a  $\sim 30^{\circ}$  rotation of the local stress field is observed with respect to the NNW-SSE regional extension field of the southern Aegean Sea. the NNW-SSE regional extension field of the southern Aegean Sea.