Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02760, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02760
EGU General Assembly 2008

First results of the Ocean-Bottom-Seismometer and -Tiltmeter experiment at Columbo submarine volcano (Aegean Sea, Greece)

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The Columbo submarine volcano is part of the Santorini volcanic complex, located in the center of the Hellenic volcanic arc, Aegean Sea, approximately 8 km north-east of Santorini islands.

The Columbo has attracted attention since island based monitoring indicated high seismicity rate and possible crustal deformation which both might be related to fluid migration in the subsurface. Within the Columbo experiment between June 2006 and March 2007, 4 Ocean-Bottom-Seismometers (OBS) and 4 newly developed -Tiltmeters (OBT) have been deployed on top and in the vicinity of the seamount. Aim of the local experiment was to close the azimuthal gap between the islands and to get precise depth locations of the events as well as measuring tilt signals directly in the epicentral region. OBTs were additionally equipped with hydrophones to measure seismic signals and absolute pressure gauges to observe possible uplift or subsidence.

A STA/LTA trigger applied to the seismic data delivered over 14.000 triggers for local and regional events over the whole deployment. At least 4 earthquake swarms with event rates of up to 230 events/day occurred during the experiment. Preliminary location results estimate a depth range between 5 and 15 km for the seismic swarms. The center of the seismic activity is not directly located beneath the Columbo caldera

but slighty shifted towards SW in direction of Santorini volcano.

Purpose of the studies is to find evidences for swarm triggers, such as possibly fluid migration, by precisely relocating the events by means of multiple events methods. In a second step, we compare observed short- and long-period tilt signals with the behavior of the earthquake swarms (cluster migration, focal mechanisms etc.) to find possible relations between crustal deformation and seismicity. Results of active measurements, such as reflection seismic and magnetic profiling will be parallely discussed to support our preliminary conclusions.