SEISMIC MONITORING OF THE SANTORINI VOLCANO

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The Cyclades region in Southern Aegean was characterized by low seismic activity until 2000. However, the recorded seismicity during this period was mainly concentrated NE of Santorini, between Santorini and Amorgos islands, where an active fault system is present.

Since 2000 moderate events are located NE of Santorini island, close to the Columbo volcano. The 24 June 2003 (Mw=4.1) event and its aftershock sequence were recorded by a local temporary seismological network. Another moderate event (Mw=4.9) occurred on 26 June 2009 in the area. The source parameters of this event were determined using regional modeling and the obtained focal mechanism revealed normal faulting with a low percentage of CLVD component. During 2010 and until January 2011 low seismic activity was recorded. It is worth noting that all the above mentioned events were located in the surrounding area of Santorini Island and mainly along the active fault system between Santorini and Amorgos islands. This seismicity pattern changed completely in February 2011. Since then the seismicity is mainly concentrated within the caldera. This almost continuous activity culminated by the end of 2011. Furthermore, at the beginning of 2012, an area, located approximately 45 km SW of Santorini was also activated. The source parameters of the major events were determined by modeling, using data in regional distances.

An important aspect in volcano-tectonic regions is the frequency content of the recorded waveforms. High frequencies are related to tectonic events, whereas low frequencies, as well as volcanic tremors, can be related to magma activity. Spectrograms related to events or volcanic tremors will be presented.

During the analysis of the events located in the Santorini region, the existence of shear-wave splitting was observed. Events that fulfill the selection criteria, being within the S-wave window, were selected to perform an anisotropy study. For each event the anisotropy direction, the time delay between the two split shear waves and the source polarization direction were determined. Different mean polarization directions were calculated for stations located in various sites of the island.

Finally, the tomographic study which has been performed revealed the existence of a magmatic chamber at a depth of 5 km inside the caldera, north of Kameni.