

EXECUTIVE SUMMARY

Multiparametric monitoring between 1997-2000 in the Kos-Yali-Nisyros-Tilos volcanic field (South Aegean volcanic island arc) within European IST project indicates a possible reactivation of the dormant Nisyros volcano. The spatial distribution of the earthquakes since the seismic crisis 1995-1997 and the surface deformation ranging from 27-56 mm registered by DGPS and Differential Radar Interferometry represents a high stage of geodynamic activity.

The Magmato-Tectonic Model of the eastern sector of the Aegean volcanic arc

A magmato-tectonic model is presented to demonstrate the close relationship between magmatism/volcanism, seismicity and structural configuration in the eastern sector of the Aegean volcanic arc. The increase of geodynamic activity can only be understood if the processes of magma generation, emplacement, fluid behavior and tectonic environment are known. Deep mantle earthquakes are interpreted as strain release due to subduction mechanism as well as to fluid ascent and expansion. It appears that the mantle earthquakes and magma ascent are the responsible key-mechanism inducing major geodynamic changes in the crust:

- weakening the crust and extensional movements and
- triggering Raleigh-turnover of instable layered magma chambers at deep crustal levels.

The latter gives rise to magma and fluid ascent into higher crustal reservoirs. As result, the observed crustal deformation may have been caused not only by tectonic extensional processes but also by the emplacement of magma.

Site characterization of possible volcanic eruptions and hazard zonation

Evaluation of volcanic hazard assessment and site characterization has been performed using all monitored data during 2000 and 2001. This includes mainly volcanic eruptive scenarios, a first possible site characterization and hazard zonation. The positions of the submarine locations result from a combination of the seafloor morphology, the geometry of the observed fault systems and from the spatial distribution of the micro-earthquake hypocenters.

In the Kos-Yali-Nisyros-Tilos volcanic field four areas of possible reactivation of volcanic activity emerge as result of queries and correlation analysis:

- Within the central crater of Nisyros volcano;
- From a submarine location north of Pali between Nisyros and Yali;
- From a submarine location northeast of Strongyli;
- From a submarine location north of Yali between Kos and Yali;

However, according to all monitored data sets, no precursory evidence exist to assume a magmatic and volcanic reactivation in the near future. Probabilistic modeling cannot be performed due to the lack of precise age determination of prehistoric eruptions within the entire volcanic field.

The volcanic eruption of the Soufrière Hills Volcano eruption 1995-1999 -an actualistic comparison with Nisyros volcano

The 1995-1999 volcanic eruption of the Soufrière Hills Volcano on the Caribbean island of Montserrat has been chosen as a comparison to the Nisyros volcano. Both volcanoes are very similar in terms of geotectonic environment (active volcanic arc due to subduction above "Alpine" continental crust), magma composition, eruptive scenarios (hazards), and radii of devastation.