SEDIMENTOLOGICAL AND GEOLOGICAL STUDIES AT THE CENTRAL PART OF THE SOUTHERN AEGEAN VOLCANIC ARC-PRELIMINARY RESULTS

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The central sector of the Southern Aegean Volcanic Arc was investigated in the last two years in the framework of an E.E.C. sponsored program (MAST). The program included sedimentological, stratigraphic and tectonic investigations the preliminary results of which are cited here.

The area investigated is between the islands of Anafi and Folegandros where the sea bottom morphology and the subbottom stratigraphy and structure is quite variable. The volcanic Arc has a sigmoidal shape and consists of the islands of Anafi, Santorini, Ios, Sikinos and Folegandros which are connected with submarine ridges having variable depth and a general NW - SE orientation. Santorini in particular is connected with the small islands of Christiana to the SW and Anydros to the NE with a deeper ridge that continous to Amorgos isl. The shelf, more developed around Anafi and Ios where the shelf break was distinguished between 110 and 150 m associated with faulting is covered by sands, silty sands and locally gravel. The slopes are smooth, locally precipitous, and are either uncovered of loose sediments or are covered by sand/silt/clay units. The deep morphological features include to the west the circular Christiana Basin (500 m deep) and Folegandros basin (400 m deep), and to the east the elogate Santorini - Anafi Valley and Anydros Basin (both 500 m clays to the west except at the folegandros Basin where they are coarser (sand/silt/clay). This variability of sediment types reflects proximity to islands and ridges combined with action of sediment mass moving processes. From the coarse fraction constituents, the distribution of quartz and heavy minerals is depented from the presense of the relevant island formation, while the volcanic rock fragments are almost everywhere present transported both by the mass moving processes and the wind. Of perticular interest was the presence and distribution of the authigenic iron oxides which are considered as an indication of the hydrothermal action. Their distribution shows a trend both along the Santorini-Anafi and Santorini-Ios ridges, as well as along the Santorini-Anydros-Amorgos ridge.

Below the thin holocene layer, three stratigraphic units, A,B and C were recognized. Unit C, the lowest has a chaotic character, is intensively folded and faulted, and is believed to represent the Atticocycladic massif. On its erosional surface, lies unit B, which is a well layered faulted and slightly, folded formation with a suggested upper Miocene age. Finally the uppermost unit A, rests on the eroded B and C units and represents the Plio-Quaternary sedimentary filling of the basins and valleys. it is consisted of parallel horizontal horizons, affected by synsedimentary faulting.

Two main structural trends were recognized, having NW-SE and NE-SW orientation from which the latter seems to be particularly active at present.

GEOCHEMICAL AND ISOTOPIC CHARACTERISTICS OF PRESENT-DAY AND PAST GEOTHERMAL SYSTEMS OF MILOS ISLAND (AEGEAN ARC)

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The present-day geothermal system of Milos (Aegean arc) only develops in the eastern part of the island. It is characterized by warm springs, fumaroles and an aquifer whose termperature reaches 315°C at 1150-1200 m. The manganese oxides, Pb-Zn sulfides and barite deposits that are present in the western part are the evidence of a past hydrothermal activity. Additional concentrations of kaolinite, bentonite and barite occur throughout the island.

Oxygen and hydrogen isotopes indicate that the fluids from the deep reservoir is derived from seawater and undergoes subsurface liquid-vapor phase separation within the aquifer. The study of the chemical composition of the residual liquid and the vapor sampled at well-head allows to specify the relative affinity of several elements for each phase and discuss the importance of this phenomenon in the genesis of the mineral deposits.

The other fluids sampled on the island are derived from the mixing between seawater, meteoric water, vapor and the residual liquid. The contribution of each of these fluid end-members has been investigated using 18O/16O, 2H/1H, 87Sr/86Sr ratios and Cl and Sr concentrations. Sr isotopic compositions and concentrations, Na/K ratios point out the contribution of a rock end-member in several samples.

Sr isotopes also show that Sr in the mineralizing fluids was derived from the same source through time: the greenschist basement of the island. Lead isotopes suggest that the lead in the modern geothermal system results from the mixing of two sources, the volcanics and the metamorphic basement, whereas in the older system the contribution of a third more radiogenic component is suggested by the isotopic composition of the manganese oxides.