CLAY MINERALOGY OF THE <0.2μm ROCK FRACTION IN THE MI-1 DRILL HOLE OF THE GEOTHERMAL FIELD OF MILOS (GREECE).

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Very fined grained mineral fractions (<0.2 μm) of cuttings comming from three drill-holes of the active geothermal field of Milos (Greece) have been investigated by X-ray diffraction in order to determine the vertical distribution of both dioctahedral and trioctahedral hydrothermal sequences of phyllosilicates. The extraction of >0.2μm clay fraction has been realised using continuous ultra-centrifugation of the >5μm clay fraction in which the accurate identification of the hydrothermal minerals was strongly obscured by important quantities of inherited metamorphic phyllosilicates (muscovite, chlorite and sometimes talc). Among the clay minerals which have been recognized at Milos, the sequence of trioctahedral phyllosilicates dominates and consists of the following assemblages:

Saponite at depths between 100 and 250 m and temperatures between 130° and 185° C;

Corrensite+saponite between 250 and 350 m and temperatures between 185° and 220° C;

12Å unexpandable mixed layer (talc/chlorite or mica/chlorite)+ chlorite±saponite between 400 and 600m and temperatures between 235° and 280°C;

clorite±saponite/talc mixed layers between 650 and 850 m and temperatures between 285° and 300°C;

actinolite+saponite/talc mixed layers±saponite±talc between 903 and 1180m and temperatures between 300° and 320°C.

Such a vertical distribution allows to differentiate two major altered zones: (1) the altered formations overlying the reservoir (with low permeability) with a classical saponite to chlorite conversion sequence as the function of increasing temperatures;(2) the reservoir (with high permeability) in wich coexist expandable clays (saponite and saponite/talc random mixed layers) actinolite and talc. The coexistance of these inferred incompatible minerals at temperatures higher than 300°C is interpreted as the result of a kinetic control on the mineral reactions which presently occur in the geothermal reservoir. Saponite is considered as a discharge product of oversaturated sea water in boiling zones which rapidly reacts to be transformed in more stable phases at the present temperatures (talc, actinolite) via various metastable saponite/talc random mixed layers. At Milos, the presence of these mixed layers saponite/talc appears as a

good indicator of the high fracture permeability zones which constitutes the geothermal reservoir.

NORMAL FAULTS ASSOCIATED WITH VOLCANIC ACTIVITY AND DEEP RUPTURE ZONES IN THE SOUTHERN AEGEAN VOLCANIC ARC

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Volcanic centers (volcanoes, fumarolae or solfatara fields), epicenters of strong shallow eartquakes (with focal depths up to 20 Km) and epicenters of intermediate depth strong earthquakes (with focal depths between 120 Km and 160 Km) in the southern Aegean volcanic arc are spatially grouped in five well defined linear clusters trending in an about N59°E direction. This delineations of the shallow earthquakes and volcanic activity is attributed to five corresponding normal faults which are named, here, according to the five corresponding volcanic centers (Sousaki, Methana, Milos, Santorini, Nisyros). This is supported by similar trending of geomorphological features (grabens, islands) and of geophysical features (Bouguer anomalies) as well as by other seismological data (fault plane solutions, tsunamogenesis) and geological information on the caldera of Santorini. The higher volcanic activity in the eastern volcanic centers (Santorini, Nysiros) in respect to this activity in the western volcanic centers (Sousaki, Methana, Milos) is attributed to the higher rate of extensional crustal deformation in the eastern part of the volcanic arc (26mm/yr) in respect to the western part of this arc (2 mm/yr). The delineation of the epicenters of the intermediate depth earthquakes along the same five lines indicate the existence of five corresponding rupture zones in the lower (leading) part of the descending lithospheric slab (at depths 120 Km-180Km). These deep zones are probably the sources of hot material which is ascending vertically upwards and is intruded in the crust along its fracture zones. The orientation of these zones explains well the focusing of the macroseismic results of these shocks at narrow regions of the sedimentary arc (Peloponnesus, Crete, etc).

ORIENTATION AND TYPE OF ACTIVE FAULTING IN THE AEGEAN AND THE SURROUNDING AREA

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Reliable fault plane solutions of shallow earthquakes and information on surface