STRUCTURAL FEATURES OF MUD VOLCANOES AND FOLD SYSTEM OF THE MEDITERRANEAN RIDGE, SOUTH OF CRETE

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New information about the geometry of mud volcanoes, folds, and fractures located in the central part of the Mediterranean Ridge is provided by images from long-range and deep-towed sidescan sonar systems, profiles from high resolution seismic and deep-towed subbottom profiler, and by gravity cores obtained during the 1993 UNESCO-ESF Training Through Research cruise of R/V Gelendzick. Mud volcanoes are formed by domes of intercalated pelagic sediments and mud breccias containing clasts as old as Upper Cretaceous. The mud breccias are extruded mainly from point sources, although some fissural emissions are also observed. Mud volcanoes have an irregular to elliptical shape with diameters up to 16 km. The distribution of the mud volcanoes in the area is irregular, but there appear to be local concentrations along the ridge crest. Our survey was restricted to the area around the Olimpi Field.

The Pliocene-Quaternary sediments in this area, and probably also the Messinian sediments, are deformed by symmetrical very open folds, with mean wavelength of 750 m. The hinge lines of the folds are curved around the area where the mud volcanoes are concentrated. Some of the folds show an intrusive nucleus and, in some cases, mud breccia is inferred from the sidescan sonar images to be flowing from the limbs of the folds into the synclinal areas in between.

Fractures in the uppermost part of the Mediterranean Ridge are rare. Most of the faults are normal and subparallel to fold limbs. Furthermore, subvertical fractures with orientations of N20E and N100E are found controlling the shape of the mud volcanoes.

In most areas of the Mediterranean Ridge, fold hinge lines are subparallel to the elongation of the ridge. In the study area, however, mud volcano emplacement may modify the regional stress and strain field related to the NNE-directed subduction of the African plate below the Eurasian plate along the Hellenic arc, resulting in the arcuate fold system observed. Elongated mud volcanoes can grow from anticlinal folds. In the first stages, mud breccia intrudes the axis of the folds, and later, flows of mud breccias develop where the sides of the anticlines are breached.