THE MORPHOLOGY AND THE TECTONIC STYLE OF TYRRENIAN BASIN

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We studied the morphology of the Tyrrhenian floor on privately made plastic relief model and on available bathymetric maps, mainly Morelli's map at scale of 1:750.000 (1970). Analysis of such topographic features as submarine valleys, troughs, basins, slopes and seamounts led us to recognize the fundamental traits of bottom morphology and, consequently, the basic elements of the geologic structure.

Physiographic features shown by bathymetry exhibit a geometrical regularity that reveals two fundamental trends: rectilinear lineaments and circular structures. Both continue into the adjacent continental regions.

Linear features. Are represented by intersecting sets of straight parallel or sub-parallel lineaments arranged along meridional (N-S), latitudinal (E-W) and diagonal (NW-SE or Apenninic and SW-NE or Tunisian) directions. Characteristic nearly N-S fault ridges and troughs are in the sector north to latitude 41° N, a submarine region of intermediate depths (1,000 - 1,600 m) and relatively high relief. N-S trend directions are present in the central Tyrrhenian area (Vavilov volcanic seamount zone). The nearly E-W directions characterize the three Sicilian bathymetric slopes and are evident in the southern Italian and Sardinian margins (e.g. submarine canyons). A possible set of normal faults and perhaps strikeslip faults (?) runs across the Tyrrhenian near lat. 41° N and separates the northern from the southern area. The set that strikes nearly SW-NE characterizes important topographic structures like the escarpment subdividing in two parts the Tyrrhenian plain: the northwestern upper plain and the southeastern lower plain.

The three structural lineaments converge in the central Tyrrhenian area (Vavilov) the form a "Y"-shaped junction. All the lineaments give thus rise to a general radial pattern.

Circular structures. In the Tyrrhenian Basin we noted peculiar circular features, previously not described. They were identified by the presence of peaks, slopes or valleys along parts of their circumferences and by presence of various sedimentary basins inside. Some peripheral rim is marked by manifestations of geologic activity (volcanic and /or seismic). Larger structures show a roughly constant diameter between 1° to 2°, averaging 1°.1-1°.2 (70-80 nautical miles). These equidimensional 1-degree "microplates" are subdivided by bathymetry into minor structural units of different size. In many sites the component units exhibit dimensions between 10 to 15 minutes of arc. Morphological observations led us to infer a progressive increase with time in size of minor units.

Main conclusions. The morphology expresses basically a "basin and rim" structure. In the areas not masked by the large basins, a number of circular structural units of similar size and shape are recognizable in different physiographic zones and depths. Fragmentation pattern of the floor of the Tyrrhenian Basin is probably related to tectonic processes of differential subsidence of crustal blocks of the floor. The tectonic style of the Tyrrhenian (post-orogenic collapse) Basin is one of differential vertical movement of the basement. Subsidence may occur as a result of crustal stretching (normal faults and distension fissures) causing thinning of the crust. The results are in disagreement with the simplist model proposed by several authors of generation of new Tyrrhenian crust by behind the Eolian arc spreading.