SUBMARINE VOLCANOES IN THE STRAIT OF SICILY

Edward F.K. Zarudzki, Istituto di Geologia, Urbino, Italy (*)

Some 50 Quaternary submarine volcanic sites exist in the central Strait of Sicily. Mostly they are fissure volcanoes caused by distensive tectonics which permitted the basic Mantle magmas to arrive rapidly at the surface. Another large group of older (Mesozoic?) volcanic plugs lies, deeply buried, along the eastern, strongly tectonised margin of the Strait.

Ca. 50 volcans sousmarins quaternaires étaient individué dans la zone centrale du Canal du Sicile (SoS) par leur anomalies magnétiques, par sismique à réflexion et l'échantillonnage. Les dernières éruptions ont eu place en 1831 et 1891. Ces volcans fissurales suivent grosses failles de distension sur les flancs des fosses orientées WNW - ESE. Leurs laves, fortement sodiques, dérivent de fractionnement rapide des magnes alcali-olivine-basaltiques du Manteau. Un autre groupe (ca. 50) des pitons volcaniques, bien plus anciens, s'étend le long de limite orientale du SoS au-dessous de la couverture sédimentaire importante. Ils forment une chaine entre les volcans de Libie et de Sicile suivant l'orientation NNE-SSW du tectonisme profond.

Almost all volcanic sites in the Strait of Sicily (SoS) are found under the present sea level. While the more accessible subaerial volcanoes (Pantelleria and Linosa) were investigated in detail, the submarine sites have remained virtually unknown. They occur in two areas: central (C) and eastern (E). The Quaternary volcanoes of the (C) area (35°30'N to 37°30'N and 11°30'E to 13°30'E) were active until recently i.e. 1831 (Graham) and 1891 (Foerstner). The long-extinct volcanoes of the (E) area (33°00'N to 37°00'N and 14°00'E to 16°00'E) are strung out northward along the eastern boundary of the SoS.

The volcanoes of the central SoS. About 50 submarine volcanic sites consist of seamounts, extrusive forms, very numerous dykes, sills and lava flows. The volcanism in this area is strongly related to large (up to 1000 gamma) and characteristic anomalies

(*) c/o Laboratorio Geologia Marina, Via Zamboni 65, Bologna

of the Earth's magnetic field which, often, are the sole external indications of its presence. It is also restricted to an area of pronounced (50 to over 90 mgal) Bouguer gravity anomaly reflecting a high Mantle topography, confirmed by a deep refraction seismic profile which showed Moho nearly 18 km deep at Pantelleria, dipping NE to a 35 km depth under Sicily. The volcanism occurs mainly in the zones affected by major post-Pliocene distentional crustal tectonics trending WNW-ESE. The volcanoes populate the flanks of the three strongly-faulted grabens. The lavas of the SoS belong to a strongly sodic group. They are products of rapid fractionation of the alcali-olivine-basalt magmas of the upper Mantle and show little crustal, sialic contamination.

The relationship of the Recent volcanism with a high Mantle topography, the deep crustal tectonics and with the uncontaminated basal material of the lavas suggests that it occurred following a strongly distensional episode in an anomalously thin crustal area. Such conditions may have been created by dextral shear stresses along the northern margin of the African lithospheric plate.

The volcanoes of the eastern SoS. These are known mainly by their characteristic magnetic anomaly signatures. The circular form and the areal size of these strongly positive anomalies suggest their cause to be groups of deeply-buried large volcanic plugs. About 50 sites have been individuated. The sedimentary cover above them varies from ca 4 km to ca 12 km in calculated thickness. Nevertheless, possibly due to differential compaction effect, they are related to mild sea floor highs e.g. Medina Bank. The volcanoes of this group appear to follow ancient deep tectonics of the North Africa extending under the present Mediterranean. They trend NNE-SSW, following the fault lines along which, long after the cessation of volcanic activity, occurred the foundering of the Ionian sea floor. The volcanoes form a link between the Mesozoic ones of Libya and the Tertiary volcanism of southeastern Sicily (Ragusa and Iblei Mts).