LOCATION AND PETROCHEMICAL DATA OF THE SUBMARINE VOLCANIC AREAS OF THE SICILY CHANNEL

by N.Calanchi(1),P.Colantoni(2),P.L.Rossi(1),M.Saitta(3),G.Serri(3)

(1)Istituto di Mineralogia e Petrografia,University of Bologna
(2)Istituto di Geologia Marina,CNR, Bologna
(3)Dipartimento di Scienze della Terra,University of Pisa

The important extensional-transcurrent tectonic regime which affected since Upper Miocene the Sicily Channel and adjacent Iblean Plateau areas is widely considered to be the foreland reaction to strong compressive Neogene events along the Tunisian - Sicilian - Calabrian collisional front (1)(2).
During the Quaternary up to the present most of the tectono-magmatic activity occurred in the Sicily Channel which is a NW-SE trending continental rift system with three main tectonic depressions (Pantelleria, Linosa and Malta basin). The major volcanic edifices, Pantelleria and Linosa Islands and Bannock Seamount, were partly certainly built up in connection with the formation of these grabens.
Out of the 13 submarine volcanic areas described by (3) as the "Phlegrean Fields" of the Strait of Sicily (4), 11 of which also reported in the "Carta Tettonica d'Italia" (1981), only 3 were ascertained during geological and geophysical marine research of the last decade (tab.1). Most of the volcanic banks indicated by (3), were either not geophysically identified or were recognized as costituted by calcareous rocks (tab.1). In the area 5 new volcanic seamounts were found (tab.1).
Two of them (Tetide and Anfitrite), the well-known Graham Bank (6) and Unnamed Bank (7) volcanoes were sampled (tab.2).
On the basis of the petrographical and chemical data 4 main rock-types were distinguished:

ALKALI BASALTS (CS76/2-2A and 3A, Anfitrite; M.VULCANO.,Linosa Is.)
Ol+Pl+Ca/cpx+-Chr phenocrysts set in microcrystalline groundmass with Pl+Ca/cpx+Ol+Mt+Ilm+Ap.
HAWAIITES (CS72/45-1, CS81/16-2A-I and II, Graham Bank)
Pl+Ca/cpx+Ol phenocrysts set in a microcrystalline or glassy groundmass. Few resorbed Opx megacrysts rimmed by Ol and Ca/cpx were identified.
Ne-BASANITES (CS81/19-3, Unnamed Bank)
Ca/cpx+Ol phenocrysts set in a microcrystalline groundmass with Ca/cpx+Pl+Ol+Ne+Mt+Ap.
THOLEIITES (CS75/28 SMZT and 1A, Tetide V.)
Opx phenocrysts rimmed by Pigeonite and rare strongly resorbed (iddingsitized) Ol phenocrysts with Pig. coronas set in an interstitial to microcrystalline groundmass with Pl+Ca/cpx+Pig+Op+Ap+-altered glass.

All the analyzed samples show a within-plate character in the Ti-Zr-Y diagram in accordance with the known geotectonic setting. All the rocks, but those from the Tetide volcano (tholeiites), have a clear alkalic affinity (see petrographically determined alteration trends; fig.1). In a diagram based on incompatible alteration resistant elements (fig.2) the petrographically recognized range of alkalinity from

tholeiites to alkalibasalts up to ne-basanites is confirmed. The first recognition of magmatism with tholeiitic, alcalic and ne-basanitic affinity in the continental shelf area of Sicily Channel analogous and partly temporally overlapping that found in the Iblean Plateau (8), allows to hypothesize a similar tectonic behaviour of the two areas (9). A more complicated and pronounced tectonic evolution characterizes the central part of the Sicily Channel where, by contrast with the Iblean Plateau, the extensional and transcurrent tectonism produced a rift system with associated major volcanoes.

TAB.1-SUBMARINE VOLCANIC AREAS IN THE SICILY CHANNEL, BY ZARUDZKI (1972), MODIFIED BY THE AUTHORS.

name	Lat N	Long E	notes
TALBOT Bank	37°29.50'	11°41.00'	DOLOMITE (Jurassic).
SMYTH Bank I	37°32.00'	12°04.50'	NOT FOUND.
SMYTH Bank II	37°12.00'	11°57.00'	NOT FOUND.
PANTELLERIA B.	37°10.25'	12°07.00'	CALCARENITE (Middle-Upper Miocene).
FOERSTNER V.	36°51.00'	11°54.00	HAWAIITE (5).
GRAHAM Bank	*37°09.80'	12°43.12'	HAWAIITE (6) and this paper.
TERRIBLE Bank	37°09.75'	12°53.50'	LIMESTONE (Eocene).
NERITA Bank	37°04.35'	12°50.00'	CALCARENITE (Middle-Upper(?) Miocene).
PINNE MARINE B.	37°06.00'	13°06.00'	NOT FOUND.
MADREPORE Bank	36°42.00'	13°38.00'	NOT FOUND.
GIRGENTI	37°13.50'	13°33.00'	NOT FOUND.
UNNAMED Bank	*36°49.80'	13°03.15'	ALK-BASALTS(9.5my)(7) Ne-BASANITE,this pap.
HECATE Patch	37°46.00'	10°50.50'	LIMESTONE (Middle-Upper Miocene).
	new data		
ADVENTURE Bank			
TETIDE V.	37°16.30'	12°16.70'	THOLEIITE, this paper
ANFITRITE V.	37°14.94'	12°20.19'	ALK-BASALT,this paper
GALATEA V.	37°12.50'	12°23.70'	Geophysically identified, not sampled.
CIMOTOE V.	36°59.00'	12°39.00'	
BANNOCK Smt.	36°28.80'	12°56.30'	Geophysically identified, not sampled.

*new top coordinates, this paper.

TAB.2 - LOCATION OF ANALYZED SAMPLES

sample	location	Lat N	Long E	depth (m)	note
CS72/45-1A	GRAHAM BANK	37°10.30'	12°43.10'	9	diver
CS81/16-2A-I		37°09.80'	12°42.80'	168	dredge
CS81/16-2A-II		37°10.10'	12°43.00'	50	
CS81/19-3	UNNAMED B.	36°52.50'	13°05.50'	570	dredge
		36°51.90'	13°05.00'	162	
CS75/28 SMZT	TETIDE VOLC. (ADVENTURE B.)	37°16.30'	12°16.70'	24	diver
CS75/28-1A					
CS76/2-2A	ANFITRITE V.	37°14.94'	12°20.19'	45	diver
CS76/2-3A					

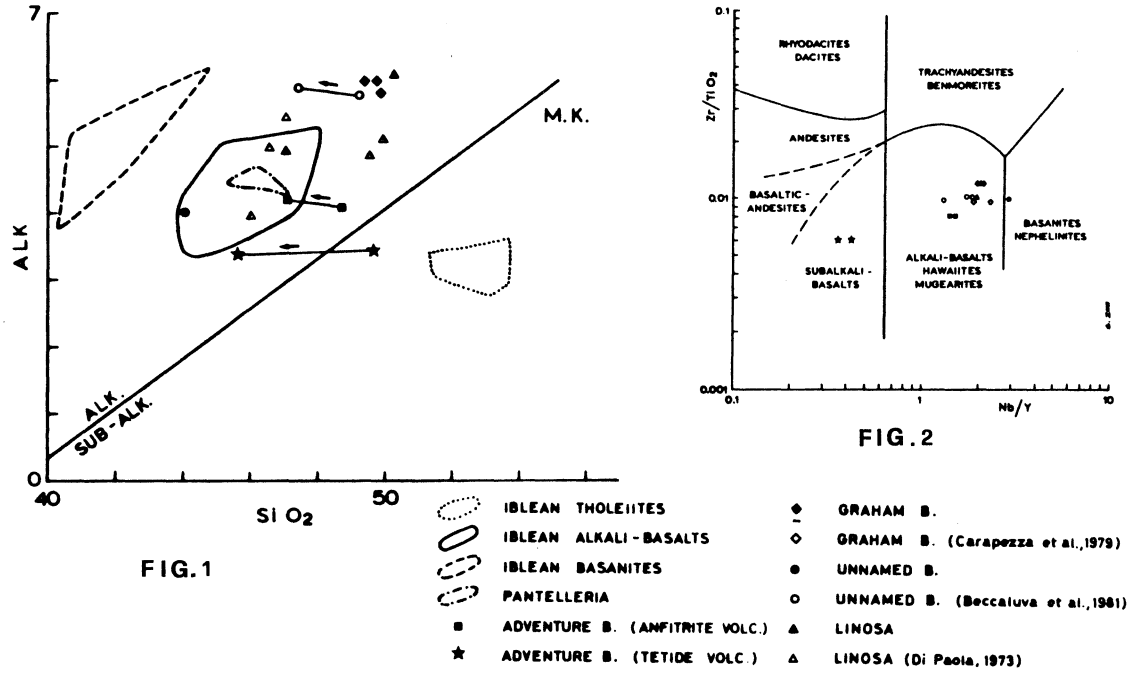

FIG.1

FIG.2

References

1) ILLIES J.H.(1981): Tectonophysics, 73, 151-168.
2) CATALANO R., D'ARGENIO B.(1982): Soc.Geol.It., Guida alla geologia della Sicilia Occid., 9-36.
3) ZARUDZKI E.F.K.(1972):Rev.Geograph.Phys. et Geol.Dynam.(2), XIV, 1, 11-28.
4) IMBO' G.(1965):Intern. Assoc. of Volcanol., 70pp, Rome.
5) WASHINGTON H.S.(1909):Am.Journ. of Science, 27, 131-150.
6) CARAPEZZA M.,FERLA P.,NUCCIO P.M.,VALENZA M.(1979):Rend. S.I.M.P., 35(1),377-388.
7) BECCALUVA L.,COLANTONI P.,DI GIROLAMO P.,SAVELLI C. (1981): Bull. Volcanol., 44-3, 573-581.
8) CRISTOFOLINI R.,ALBINI A.,DI GIROLAMO P.,STANZIONE D. (1981): Bull. Volcanol., 44-1, 95-107.
9) GHISETTI F.,VEZZANI L.(1981):Journ. of Structural Geol.,3(4), 371-381.