

ORIGIN OF THE TYRRHENIAN ABYSSAL PLAIN: EVIDENCE FROM DSDP  
LEG 42A BASALTS

by

F. Barberi<sup>1</sup>, H. Bizouard<sup>2</sup>, G. Capaldi<sup>3</sup>, G. Ferrara<sup>4</sup>, P. Gasparini<sup>3</sup>, F. Innocenti<sup>1</sup>, J.L. Joron<sup>5</sup>, B. Lambret<sup>5</sup>, M. Treuil<sup>5</sup>  
and C. Allégre<sup>5</sup>.

Although all basalts from 373A site are affected by sea water alteration, reliable age and petrochemical data have been obtained. Geochemical data consistently indicate that Tyrrhenian Abyssal Plain basalts are oceanic tholeiites unaffected by contamination with continental crust. The occurrence in the Tyrrhenian Abyssal Plain of rocks with these geochemical characteristics has important implications.

This basin cannot be a portion of foundered continental crust partly "oceanized" by injection of hybridized magmas. The most convincing structural model is, therefore, that of a back-arc basin formed by spreading. The 7.5 ( $\pm 1.3$ ) m.y age for the oldest recovered basalts obviously implies that oceanic crust formation was already active du-

---

<sup>1</sup> Istituto di Mineralogia e Petrografia dell'Università - Centro di Geologia Strutturale e Dinamica dell'Appennino, Pisa (Italy)

<sup>2</sup> Laboratoire de Pétrographie et Volcanologie - Université de Paris XI, Orsay (France)

<sup>3</sup> Osservatorio Vesuviano - Istituto di Geologia e Geofisica dell'Università di Napoli, Napoli (Italy)

<sup>4</sup> Laboratorio di Geocronologia e Geochimica Isotopica del C.N.R., Pisa (Italy)

<sup>5</sup> Laboratoire de Géochimie - Institut de Physique du Globe de Paris - Groupe des Sciences de la Terre, Laboratoire Pierre Sue, Gif sur Yvette (France)

ring Messinian times. This means that subsidence related to continental break-up and consequent establishment of the back-arc basin occurred in pre-Messinian time, in agreement with data from LEG Site 132.

The rate of oceanic crust accretion inferred by K/Ar data suggests a low rate of spreading. This is also confirmed by the occurrence of evolved products probably formed by fractionation of basalts during their ascent to the Tyrrhenian floor.

The distribution of large ion lithophile elements, as well as the Sr isotopic composition, suggest that the mantle source which fed these basalts had not been depleted in these elements by previous extraction of magma. These rocks show a close similarity to tholeiites occurring near supposed centers of deep mantle plume activity. However the occurrence of a subducting lithospheric slab which would tend to obstruct flow of material from deep in the mantle as well as the topography of the Tyrrhenian Abyssal Plain suggest that the Tyrrhenian tholeiites are unlikely to be related to plume activity.