3-3 - REPORT on DEEP SEA DRILLING in the MEDITERRANEAN

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The results of the DSDP drilling Leg 13, are being published in the Initial Cruise Reports of the Deep Sea Drilling Project, volume 13, which can be obtained from the US Government Printinf Office, Washington, D.C. This abstract outlines some of the highlights.

Age of Oceanic Bedrocks on Iberian Plate West of Portugal.

Site 120 was drilled into the Gorringe Bank in the Atlantic. Basement rocks, including spilitic basalt and gabbro, were enccuntered beneath pelagic marls and radiolarian chert of early Barremian

age. The uncored section between the lowest sediment-sample and the basement is 14 meters thick. We have thus estimated the minimum age of the basement to be about 120 m.y. Since this site lies 120 km west of Iberian continental margin we could extrapolate an 130 m.y. age for the initial rifting of the Iberia from North America and Europe, an event which created the northeastern Atlantic Ocean west of Portugal and the Bay of Biscaye.

Age of Bedrocks in western Alboran Basin.

Site 121 was targeted over a buried basement ridge at the base of the Spanish continental rise in the western Alboran Basin. Drilling recovered metamorphic basement rocks, which are petrologically similar to those in Rif and those near Malaga. Isotope-dating of biotite in a cordierite-gneiss sample yielded a 16.0± 1.0. m.y. K/Ar age. The oldest sediment penetrated by the the drillhole is Upper Miocene (Tortonian), or some 11 m.y. in age. However, this is not the oldest of the basin. Available evidence points thus to a Middle and/or early Miocene age for the Alboran.

Age of Bedrocks in Valencia Trough.

Drilling at Site 122 in Valencia Trough encountered a gravel, which was deposited during the Late Messinian desiccation. The gravel includes clasts of pelagic limestone of middle Miocene (Langhian) age. The acoustic basement at the nearby Site 123 is a dacite ash, dated by K/Ar and by fissiontrack methods to yield a concordant age of 20-23 m.y. The drill results suggest to us an early Miocene (Burdigalian) age as the time of initial opening of the Valencia Trough.

Age of Basement in Balearic Basin.

Drilling at Sites 133 and 134 penetrated metamorphic basement, which is correlated to the Paleozoic phyllites of southwestern Sardinia. The oldest sediments on the edge of the Balearic Abyssal Plain is Late Miocene. Comparisons of the seismic velocities of the thick sequences (some 3 km) beneath the M-reflector with those of anhydrite and halite measured at the Laboratory suggest to us that the sub-M sediments are mainly evaporites, although some middle and lower Miocene marine sediments might be present in the basin. Our deduction is in agreement with other lines of evidence which indicate an episode of early to middle Miocene rifting to the Balearic Basin through the rotation of Corsica and Sardinia (see Alvarez, 1972; de Jong, et al., this symposium).

Evidence of compressional Tectonics southwest of Crete.

Four holes were drilled in the Hellenic Trench southwest of Crete, three at Site 127 were located near the inner trench-wall and the other (Hole 128) near the outer wall. All three Site 127 holes encountered Lower Cretaceous carbonate rocks after penetrating 427, 165 and 80 meters of Quaternary sediments respectively. In Hole 127 a horizontally bedded Upper Pliocene ooze is present 8 meters below the Cretaceous/Quaternary contact. This ooze is a normal deep-sea pelagic sediment and contains no exotic elements. In Holes 127A and 127B, a similar ooze was encountered, but it was lithified.

The intimate association of the Cretaceous rocks with the Neogene oozes is a clear proof that we have drilled into a zone of mixed rocks. Numerous colleagues, including some of our shipmates, favor the hypothesis of mixing by olistostrome-deposition. However, neither drilling at Site 128 nor seismic evidence could support this assumption. The alternative is to wiew the mixture as a tectonic melange. This latter interpretation gives credence to the geophysical theory that the Mediterranean floor is underthrust under the Aegean arc.

Age of the Mediterranean Salts and their Origin.

Drilling clearly established that the top of the most prominent sub-bottom reflectors of the Mediterranean - termed M-reflector by RYAN and al., (1969) - is the top of an Upper Miocene evaporite formation. Seismic and Paleoecological evidence indicates that the Late Miocene Mediterranean was a deep basin, whose floor lay thousands of meters below the Atlantic sea-level. Sedimentological and geochemical evidence, on the other hand, clearly proves that the evaporites were on the whole deposited under shallow waters or even subaerially. Deep incisions of the Mediterranean continental margins during the Late Miocene and the drowning of those gorges during the earliest Pliocene afford further evidence in favor of the model of evaporite-deposition in a partially or wholly desiccated deep basin. Detailed discussions are given in Chapter 43 of our forthcoming report (HSU and al., 1972).

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Questions après 3-3 -

R. BYRAMJEE - Il y aurait beaucoup à dire au sujet de votre reconstruction mais ce serait trop long maintenant. Je voudrais juste vous demander comment vous accordez le déplacement relatif de l'Afrique et de l'Europe et la rotation de l'Espagne avec la continuité de l'Arc Alpin à travers le détroit de Gibraltar.

ANSWER by K. HSU - After Bullard's and Talwani's reconstructions, our model is a third order reconstruction introducing the Alboran block. In Mesozoic and Early Tertiary, plate bounday of Africa was in Maroccan Atlas and not in Gibraltar. Deep water jurassic sediments in Central Morocco are a good indication. The Alboran basin would be 16 or 18 millions years old.

HINZ - Below the evaporite series there is a low velocity channel (2.0 km/s). Two explanations may be proposed: one is unconpacted shallow sediments : in that case the Ionian sea was a shallow water sea up to Miocene time. The other one is Pelagic unconpacted sediments; it means that isolation closed the strait of Gibraltar or that there was an uplifting after the sedimentation of the pelagic series. So, we have to drill the low velocity channel below the Miocene evaporite series.

HSU - We hope to do so. Our first results would more likely indicate pelagic sediments and a pre-evaporite deep bassin.