Preliminary data on the Geology of the Balearic Sea

by

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The spanish continental slope between Alicante and the islands of Ibiza and Formentera as well as the adjacent Balearic bathyal plain were investigated during a seismic reflection survey (Sparker, 30 kJoules) combined with a seafloor sampling program.

On the continental slope, between 2600 m and about 650 m depth, exist the following stratigraphic sequences (from lowermost to uppermost).

1. The acoustic basement, marked by a strong 2-cycle reflection, which can be followed throughout the area. It is fairly disturbed and probably associated with the Betic Chain rocks. Actually, 35 mls off Alicante, we dredged ultramafic rocks (peridotite and olivinic piroxenite) at a margin of a markedly large magnetic anomaly.

The internally faulted basement ends with Lower Miocene calcarenites, dredged from the hanging wall of a fault in a sill between Cabo de San Antonio and Ibiza.

2. The neogenic sedimentary cover is represented by a seismic interval with numerous continuous reflectors of a variable thickness (0 to over 1,5 secs). The sequence is absent near the lower margin of the continental slope, being truncated by great normal faults. It is also absent over a few highest elevations of the basement. This sedimentary cover can be divided into the following distinct sub-units :

2a. The lowermost, with weaker reflections, is present only in the deepest parts of the depressions in the basement. The maximum thickness does not exceed 0,5 secs. Its age ranges from Tortonian to Serravallian, though the base may be somewhat older.

2b. The Messinian Evaporites, marked by strong characteristic reflections of thickness varying from 0,1 to 0,15 secs, conformable with the adjacent sub-units. This sub-unit is very conspicuous in the small basins formed by depressions in the basement. Over the basement elevations, however, the sub-unit disappears or blends with the reflections of the basement.

2c. The Plio-Quaternary sequence yields clearly defined continuous reflections; its maximum thickness is of the order of 0,8 secs. This sub-unit covers and levels out all the irregularities of the basement, pinching out against their highest elevations. At two stations in the area were sampled gray clays of the Lower and Basal Pliocene, in the lowest part of this sub-unit. In about the middle or at the top of the lowermost one-third of the sub-unit appears a mild disconformity, probably corresponding to Middle Pliocene.

All these sub-units of the sedimentary cover are repeated in the Balearic bathyal plain. The sub-unit 2b, however, thickens steadily away from the base of continental slope to about 0.8 secs.

One can identify within this sub-unit two clear marker horizons Y1 and Y2 corresponding to the upper and lower Messinian evaporites. Between them lies the salt formation, characteristic by its strong absorptions of acoustic energy. The salt intrudes into the overlying Pleistocene formations creating large diapirs and anticlines.

Rapp. Comm. int. Mer Médit., **23**, 4a, pp. 113-114 (1975).

We conclude that, from the palaeogeographic and general point of view, the bathyal plain was occupied by sea continuously and persistently at least from Middle Miocene to present. On the continental slope, however, since the beginning of Miocene and after, existed numerous islands separated by small, interconnected basins. They enlarged gradually until the islands were totally submerged, probably in Pleistocene.

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Discussion

Biju-Duval : L'interprétation que donne M. ZARUDZKI me semble tout à fait raisonnable car nous savons qu'il existe des évaporites dans le golfe de Valence et même dans certains bassins suspendus; d'ailleurs elles sont connues à terre dans les bassins miocènes de Murcie (thèse de MONTENAT), de Sorbos, etc... C. MONTENAT a d'ailleurs montré les variations rapides de faciès dans le bassin de Murcie.

Vous avez montré sur le profil B4 un décalage important de la couche salifère dans la plaine abyssale. Pensez-vous qu'il s'agit d'accidents distensifs ou de traces d'une compression (que l'on connaît à terre dans les chaînes Bétiques ou Maghrébines).

Colantoni : The tectonic structures shown in our profiles can be mainly related to the distention due to the probable pliocene lowering of the area. Mouvements associated with the Betic Chain can be detected only in the acustic basement.

Said A. : « Les évaporites peuvent être suivies d'une façon quasi continue dans la Méditerranée occidentale ». J'en profite pour répondre à la question posée pour dire qu'elles peuvent être suivies sous des profondeurs d'eau allant de 60 à 80 m jusqu'à 2700 m d'eau et que leur épaisseur varie non seulement du Sud au Nord mais aussi de l'Ouest à l'Est (derniers forages effectués).

Colantoni : Thank you for your remark.

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