New data on Western Mediterranean salt structures (South of Balearic Islands)

by

AUGUSTO FABBRI and EDWARD F.K. ZARUDZKI

Laboratorio per la Geologia Marina, C.N.R., Bologna (Italy)

This note discusses detail survey of a group of diapiric structures in the southern Balearic basin, 100 km SW of the island of Ibiza. It was done with acoustic instrumentation (12 kHz E/S, 3.5 kHz Sub-bottom Profiler and 30 kJoule Sparker) and a magnetic sensor (Varian). The seismic profiles, spaced about 1.7 km, show a variety of diapiric structures, i.e. broad and narrow anticlines, piercement domes, etc. The Plio-Quaternary and the evaporitic Messinian sequence give rise to reflections of similar character to that described and identified by ALLA *et al.* [1972] in the northern Balearic basin. Our zone of research lies furthermore within limits of Zone " A " of GLANGEAUD *et al.* [1967] where the large salt domes are very numerous. Finally, our diapirs are free of any magnetic signature. Consequently we believe that the structures studied by us are most likely caused by salt diapirism. The diapiric group chosen for our study lies under the abyssal plain (over 2700 m deep) close to the spanish continental rise. Up to 600-800 m of typical Plio-Quaternary sediments overlie the well-bedded Messinian evaporitic sequences about 500 m thick. The top of salt below shows characteristic arcuate, discontinuous reflections. The base of salt is visible only in places; it appears as a sub-horizontal reflector 300 to 500 m below the salt top.

The Plio-Quaternary sediments are distorted by the salt tectonics. They are folded in gentle anticlines and differentially subsiding basins, as well as in the steeply-flanked diapirs where the upheaving salt masses pierce and truncate them. Many such strong structures arrive to within 100 m below the seafloor, uplifting its surface muds in mounds up to 70 m above the abyssal plain. They are clearly seen in the 3.5 kHz sub-bottom profiles. Some diapirs sunk slightly forming wide, 2-3 m deep depressions in the seafloor. Numerous micro-faults occur near or at the surface proving that the salt tectonics are still active. This evidence is further supported by sedimentation patterns near the emergent mounds suggesting that the diapir growth rate exceeds that of sedimentation.

Most remarkable feature of the area is a seemingly uninterrupted salt wall rising over 1000 m from the surrounding salt level and running from WNW to SSE through the center of the survey area for over 15 km. It changes direction in its middle. Immediately to the NE and parallel to it is a deep sediment-filled syncline, perhaps fault-controlled. Further to NE lies the area of long gentle anticlines in echelon suggesting less intense salt tectonics. Behind the salt wall, i.e. to the SW, the salt surges up in a number of shorter sharp anticlines forming a complex diapiric structure. Nevertheless even here the plan of these features, always in echelon, is elongated.

Some evidence of the base of salt dropping down and being truncated when approaching the zone of strong diapirism, suggests that it is mainly controlled by deep tectonics, perhaps by fault blocks. Along the spanish continental slope the seismic profiles reveal blocky, down-stepping structures. The area studied may be associated with some of these blocks now buried under the preevaporitic and later sediments. In southern Spain Messinian salt forms extensive deposits which however are not affected by diapirism probably due to lack of sufficiently thick overburden.

References

ALLA & *al.*, 1972 — Données du sondages sismique continu concernant la sédimentation plio-quaternaire en Méditerranée Nord-occidentale, *in : The Mediterranean Sea*, ed. by D.J. Stanley pp. 471-487. Dowden, Hutchinson and Ross Inc., Stroudsburg.

GLANGEAUD & *al.*, 1967 — Les phénomènes ponto-plio-quaternaires dans la Méditerranée occidentale d'après les données de GEOMÈDE I. *C.R. Acad. Sci. Paris*, **264**, pp. 208-211.

Rapp. Comm. int. Mer Médit., **23**, 4a, p. 149 (1975).