RED SEA MIOCENE EVAPORITES: A DISCUSSION ABOUT THEIR POSSIBLE RELATIONSHIPS WITH THE MEDITERRANEAN ONES.

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As shown by seismic and drilling data, a thick Miocene evaporitic sequence with an important salt component is present almost everywhere in the main trough of the Red Sea where at places it attains a thickness of ca. 5 km (LOWELL & GENIK, 1972). Miocene evaporites are also widely distributed on the coastal plain of the Red Sea as far south as 14°N (COLEMAN, 1974).

In 1972 the drilling vessel Glomar Challenger sailed for the Red Sea in its 23d cruise of oceanic perforation. One of the aims of the Shipboard Staff was to reach and to date Reflector S, supposedly a Late Miocene to Early Pliocene unconformity. The target was reached at Sites 225, 227 and 228 where evaporites were encountered (WHITMARSH, WESER, ROSS et al., 1974). At Site 227 the total penetration within the evaporitic sequence (anhydrite and halite with interbedded black shales) was about 130 m. The presence of Discoaster quinqueramus allowed to date this part of the evaporitic sequence to the Late Miocene (about 5 m.y.: SHIPBOARD SCIENTIFIC STAFF, 1974).

Two years before, the widespread presence of Upper Miocene (Messinian) evaporites on the bottom of the Mediterranean Sea was discovered through DSDP perforations (RYAN, HSÜ et al., 1973) leading to the formulation of the theory of the complete desiccation of this basin.

The consideration that the topmost evaporites of the Red Sea were late Miocene in age like those of the Mediterranean basin, probably led STOFFERS & KÜHN (1974, p.845) to conclude that "the waterfall descending from the the Strait of Gibraltar must be held responsible not only for the up to two kilometer thick evaporite sequence in the Mediterranean but also for the three to four kilometer thick evaporites in the Red Sea ". That is, the Red Sea evaporites are a direct consequence of the evaporitic regime undergone by the Mediterranean Sea at the end of the Miocene.

Such an interpretation is however debatable.

The deposition of evaporites during the Messinian salinity crisis in the Mediterranean Sea was "an unusual event" (HSÜ et al., 1978, p.1076) related to global tectonic event other than a continental break-up.

There is general agreement that the Red Sea is a good model of the evolution of passive Atlantic-type margins at its earlier stages. A comparison between the geological and sedimentary history of the evolution of the Atlantic Ocean in Jurassic time and that of the Miocene Red Sea show striking similarities. Thick evaporites deposited during the erliest phases of rifting are present on both sides of the Atlantic Ocean. According to PAUTOT et al. (1970) a continuous salt layer is almost ubiquitous along the margins of the North Atlantic.

The geodynamic aspects of the evaporitic deposition at passive margins, modeled considering the opening of the Atlantic Ocean, have been discussed by RONA (1982). HUMPHRIS (1977) recognizes the recent evolution of the Red Sea as a suitable model for the salt deposition in the Gulf of Mexico during the Jurassic. Also, as observed by LOHMAN & GENIK (1972: p.258) "the situation is analogous to several salt basins that formed during continental breakup along the west coast of Africa".

Thus, the Red Sea evaporitic deposition during the Miocene is likely to have been controlled by the classical parameters active at passive margins rather than to have been intimately connected to the "unusual" salinity crisis of the Mediterranean Sea.

It is a recurrent assumption, mostly based on relatively old paleontological arguments (e.g., MONTANARO, 1941; SAID & BASIOUNI, 1958) that, during the Miocene, the Red Sea had faunal affinity with the Mediterranean basin. The direct connection between the two basins lasted throughout the entire Miocene; during the Pliocene, the uplift of the northern isthmus cut the hydrological exchanges with the Mediterranean Sea (AHMED, 1972). Later, the Red Sea opened south to the Indian Ocean and normal marine conditions prevailed since that time.

It is useful to note that the claimed connection of the Red Sea with the Mediterranean can be confirmed (paleontologically) until the pre-evaporitic Miocene but, although possible, not beyond that time. The micropaleontology of the intraevaporitic shales recovered by DSDP is neither contradicting nor confirming the alternative possibility that the Red Sea was in connection with the Indian Ocean beginning from the Late Miocene.

In conclusion, a basic dicothomy about the origin of the Red Sea Miocene evaporites does exist. Were they directly connected to the Messinian salinity crisis of the Mediterranean? Or, were they a normal step of the evolution of passive Atlantic-type margins? The latter hypothesis enjoys a much wider credibility than the former one. However, any conclusive interpretation is biased by the imperfect knowledge still existing regarding the details of the late Neogene-early Pliocene events in the Red Sea.

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