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AXIAL JUMP OF INCIPIENT SPREADING CENTER IN THE NORTHERN RED SEA

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Evidence for the occurrence of an arcuate system of rifts and diapirs in the northern Red Sea was recently encountered. The system changes its trend northward from NNW-SSE to N-S to NNE-SSW, and extends from the Red Sea into the Gulf of Elat ('Aqaba), the southern segment of the Dead Sea rift. These rifts and diapirs are interpreted as products of the extensional tectonic regime in the northern Red Sea. Their trend is presumably normal to the extensional tectonic stress and parallel to the axis of the incipient spreading center there. The extensional tectonic regime is also indicated by a series of rifts and diapirs in the Dead Sea rift, oriented NNE-SSW, as well as by a series of systematic jointing of similar orientation, encountered along the western margin of the rift. All of these features are combined to indicate an extensional tectonic regime across the Dead Sea rift.

The described findings suggest a new interpretation to the tectonic history of the seafloor spreading along the Red Sea. The evolution of the marine basin of the Red Sea started during the early middle Miocene. It was a rifted basin, associated with the separation between the Arabian plate and Africa and with the crustal thinning underneath the seafloor. The marine axial basin extended northwestwards to the Suez rift. During the early Pliocene, as oceanic crust started to accrete in the central Red Sea, the intensive tectonic activity of the Suez rift was terminated and the Dead Sea rift started to evolve, due to an axial jump of the incipient spreading center in the northern province of the Red Sea. Consequently, structures of Plio-Pleistocene age obtained an arcuate orientation, changing from the Red Sea - Suez trend to the Dead Sea trend. The recently encountered structures indicate that the extensional tectonic regime prevailing in the northern Red Sea has been effective in the Dead Sea rift as well since the Pliocene. Therefore we suggest that an incipient spreading center propagates northward from the Red Sea to the Dead Sea rift.

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POST-MIOCENE RIFTING AND DIAPIRISM IN THE NORTHERN RED SEA

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Rifts and diapirs are the dominant structures in the bathyal zone of the northern Red Sea, where commonly the diapirs ascend along normal faults associated with the rifts. The diapirs, in this manner, form elongated features exceeding lengths of 30 km and widths of 4 km. They also penetrate a sedimentary sequence of about 1000 m thickness or less, thicknesses generally considered to be barely adequate for the gravity conversion required to initiate diapiric motion. We suggest that the development of diapirs under these minimal overburden conditions was made possible by the high thermal gradients in the area, resulting from the underlying attenuated continental crust and the ascending mantle that prevail in the rift system of the northern Red Sea. Diapiric evolution was also dependent on the extensional tectonic regime, with its numerous normal faults, forming weaknesses along which the diapirs could move upwards.

