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HEAT FLOW AND CONTINENTAL BREAKUP: THE GULF OF ELAT (AQABA)

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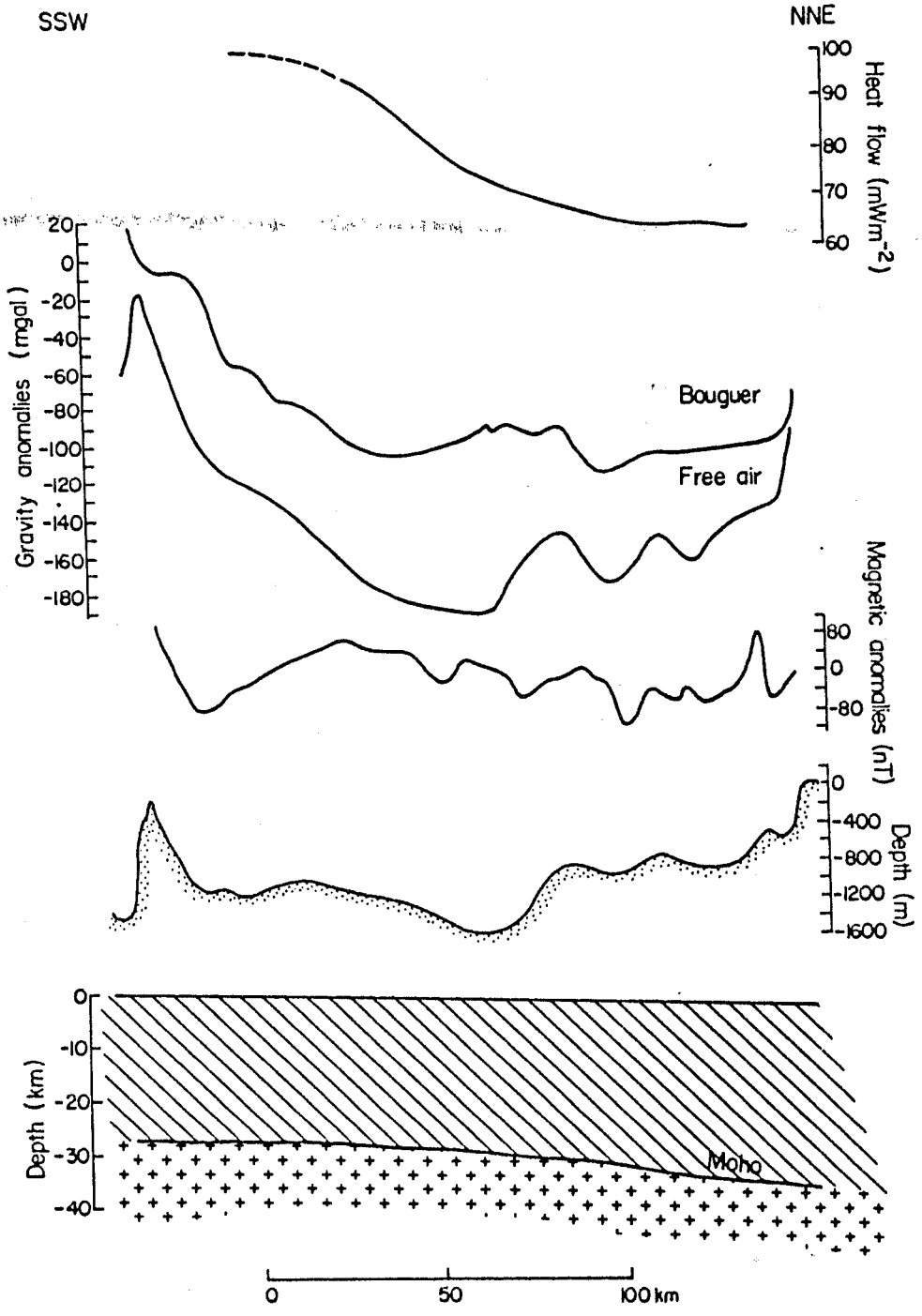
Heat flow measurements were made in the major basins of the Gulf of Elat (Aqaba), northern Red Sea. The gulf is located at the southern portion of the Dead Sea rift which is a transform plate boundary. Gradient measurements at each site were made with a probe which allows multiple penetration of the bottom during a single deployment of the instrument. Thermal conductivity was determined by needle probe measurements on sedimentary cores.

The mean heat flux, about 80 mWm^{-2}, is significantly above the continental mean, and probably also above that from the adjacent Sinai and Arabian continental blocks. The heat flow appears to increase from north to south. Such an increase may be related to the more advanced rifting stage of the Red Sea immediately to the south, which presently includes creation of an oceanic crust. This trend also corresponds to the general trend of the deep crustal structure in the gulf. Evidence from various geophysical fields suggest a gradual thinning of the crust towards the direction of the Red Sea where a normal oceanic crust exists. The heat flow data, together with other geophysical data, indicate a propagation of mature rifting activity from the Red Sea into the Gulf of Elat. This process is acting simultaneously with the transform motion along the Dead Sea rift.

Figure 1: Geophysical profile along the axis of the Gulf of Elat. From top to bottom: heat flow, Bouguer gravity anomaly, free air gravity anomaly, magnetic anomaly, bathymetry and depth of Moho on the western margin.


SSW
NNE
100
90
80
70
60
Heat flow (mWm⁻²)
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
Gravity anomalies (mgal)
Bouguer
Free air
80
0
-80
Magnetic anomalies (nT)
0
-400
-800
-1200
-1600
Depth (m)
0
-10
-20
-30
-40
Depth (km)
Moho
0
50
100 km