

**Zamora, O.S. 1988. Crustal Structure and Thermal Gradients of the Northern Gulf of California determined using spectral analysis of magnetic anomalies. Ph.D. Dissertation. Oregon State University.**

Geophysical surveys in the Gulf of California provided the data to construct contour maps of bathymetry, free-air anomalies and total field magnetic anomalies for the area north of 27°N. Major faults such as the Ballenas-Salsipuedes, Tiburón, Guaymas, and the South Cerro Prieto are clearly observable on these maps.

Spectral analysis, using 2-D Fast Fourier Transform methods, of the magnetic anomalies north of 29°N, allowed the identification of at least three distinct magnetic source horizons. The shallowest depth magnetic horizon, with an average depth to the top of 3.1 km below sea level, is interpreted as the top of the magnetic basement. The intermediate depth magnetic horizon, with an average depth to the top of 5.3 km below sea level, may represent either a lithological discontinuity in continental crust, or a transition zone characterized by the intrusion of igneous rocks, faulting, and fracturing associated with rifting processes. Some lineaments observed in the contour map on this horizon are oriented about 15° counterclockwise from the expected orientation of faults. Other lineaments are almost perpendicular to those faults. The deepest magnetic horizon is not apparent at all locations.

Computed depths to the bottom of the magnetized crust average 11.5 km below sea level. The depth to the bottom of the magnetic crust is interpreted as the depth of the Curie-point isotherm. Assuming a Curie-point temperature of 580°C and a thermal conductivity of 2.2 W/m °C, the calculated heat flow averages 114 mW/m<sup>2</sup>.

Using a two-dimensional Maximum Entropy Method (2DMEM) to obtain the power spectrum of the magnetic anomalies increased the horizontal spatial resolution of the depth determinations by a factor of 4. This method when used to compute the depth to the top of the intermediate horizon, shows an improvement in the delineation of structures. However, the other magnetic horizons and the depth to the bottom of the magnetic crust were not clearly observable using this technique.