Khair, K., Khawlie, M., Haddad, F., Barazangi, M., Seber, D., and Chaimov, T., *Bouguer gravity and crustal structure of the Dead Sea transform fault and adjacent mountain belts in Lebanon*. Geology, 21, 739-742, 1993.

Abstract:

The northern extension of the Dead Sea transform fault in southern Lebanon bifurcates into several faults that cross Lebanon from south to north. The main strand, the Yammouneh fault, marks the boundary between the Levantine (eastern Mediterranean) and Arabian plates and separates the western mountain range (Mount Lebanon) from the eastern mountain range (Anti-Lebanon). Bouguer gravity contours in Lebanon approximately follow topographic contours; i.e., positive Bouguer anomalies are associated with the Mount Lebanon and Anti-Lebanon ranges. This suggests that the region is not in simple isostatic compensation. Gravity observations based on 2.5-dimensional modeling and other available geological and geophysical information have produced the following interpretations. (1) The crust of Lebanon thins from 35 km beneath the Anti-Lebanon range, near the Syrian border, to 27 km beneath the Lebanese coast. No crustal roots exist beneath the Lebanese ranges. (2) The depth to basement is 3.5-6 km below sea level under the ranges and is 8-10 km beneath the Bekaa depression. (3) The Yammouneh fault bifurcates northward into two branches; one passes beneath the Yammouneh Lake through the eastern part of Mount Lebanon and another bisects the northern part of the Bekaa Valley (i.e., Mid-Bekaa fault). The Lebanese mountain ranges and the Bekaa depression were formed as a result of transtension and later transpression associated with the relative motion of a few crustal blocks in response to the northward movement of the Arabian plate relative to the Levantine plate.

Figure 3. Crustal models based on modeling Bouguer gravity anomalies along profiles A-A', B-B', and C-C'. Exaggerated topography and observed (dotted line) and calculated (solid line) Bouguer gravity values are also shown. Density values are in g/cm^3. See Figures 1 and 2 for locations of profiles.