



Gravity Investigation of the Tendaho Graben, Afar, Ethiopia

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The Tendaho graben, the largest graben within the Afar Depression, lies at the intersection of the East African, Red Sea and Gulf of Aden rifts. The Tendaho Graben lies within the southern portion of the Red Sea propagator which is the landward extension of the Red Sea spreading center. The region has been highly extended resulting in thinned crust and portions of the Red Sea propagator may be transforming into oceanic crust. To investigate the crustal structure of the Tendaho Graben, several geophysical studies have been performed in the area since the 1970s, including a detailed gravity and magnetic survey for geothermal resources. We performed additional detailed gravity and magnetic surveys across the graben to aid in determining the crustal structure. Bouguer gravity anomaly maps of the Afar indicate a regional gravity maximum in comparison to the Ethiopian and Somalian plateaux. Additionally, smaller wavelength gravity maxima occur over both the Red Sea and Gulf of Aden propagators. Initial wavelength filter gravity maps show that the maximum of the Red Sea propagator terminates in the south-central portion of the Tendaho graben. To further investigate the crustal structure, four gravity models will be constructed across and parallel to the graben axis. Initial modeling constrained by magnetic modeling and drill hole data, indicate that the graben is 1.6 km thick with a 10 km wide high density zone correlating to recent volcanic activity. These models will be analyzed to better understand the mechanics of the current extension forces within the Afar Depression.