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Isostatic models and isostatic gravity anomalies of the Arabian plate and surroundings

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Isostaic anomalies represent one of the most useful “geological” reduction of the gravity field. With the isostatic correction it is possible to remove a significant part of the effect of deep density heterogeneity, which dominates in the Bouguer gravity anomalies. This correction is based on the fact that a major part of the near-surface load is compensated by variations of the lithosphere boundaries (chiefly the Moho and LAB) and by density variations within the crust and upper mantle. It is usually supposed that it is less important to a first order, what is the actual compensation model when reducing the effect of compensating masses, since their total weight is exactly opposite to the near-surface load. We compare several compensating models for the Arabian plate and surrounding area. The Airy model gives very significant regional isostatic anomalies, which can not be explained by the upper crust structure or disturbances of the isostatic equilibrium. Also the predicted “isostatic” Moho is very different from the existing observations. The second group of the isostatic models includes the Moho, which is based on existing seismic determinations. Additional compensation is provided by density variations within the lithosphere (chiefly in the upper mantle). In this way we minimize regional anomalies over the Arabian plate. The residual local anomalies well correspond to tectonic structure of the plate. Still very significant anomalies are associated with the Zagros fold belt, the collision zone of the Arabian and Eurasian plates.