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Gravity and magnetic data inversion for 3D topography of the Moho discontinuity in the northern Red Sea area, Egypt

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The main goal of our study is to investigate 3D topography of the Moho boundary for the area of northern Red Sea including Gulf of Suez and Gulf of Aqaba. For potential field data inversion we apply a new method of local corrections. The method is efficient and does not require trial-and-error forward modeling. To separate sources of gravity and magnetic field in depth, a method is suggested, based on upward and downward continuation. Both new methods are applied to isolate the contribution of the Moho interface to the total field and to find its 3D topography. At the first stage, we separate near-surface and deeper sources. According to the obtained field of shallow sources a model of the horizontal layer above the depth of 7 km is suggested, which includes a generalized density interface between light sediments with a mean density value of 2300 kg/mˆ3 and crystalline basement with density of 2750 kg/mˆ3. Its depressions and uplifts correspond to known geological structures. At the next stage, we isolate the effect of very deep sources (below 100 km) and sources outside the area of investigation. After subtracting this field from the total effect of deeper sources, we obtain the contribution of the Moho interface. We make inversion separately for the area of rifts (Red Sea, Gulf of Suez and Gulf of Aqaba) and for the rest of the area. In the rift area we look for the upper boundary of low-density, heated anomalous upper mantle with density of 3100 kg/mˆ3. In the rest of the area the field is satisfied by means of a topography for the interface between material with densities 2900 kg/mˆ3 (lower crust) and 3250 kg/mˆ3 (normal upper mantle). Both algorithms are applied also to magnetic field. The magnetic model of the Moho boundary is in agreement

with the gravitational one.