3D LITHOSPHERIC STRUCTURE AND REGIONAL/RESIDUAL BOUGUER ANOMALIES FROM ARABIA-EURASIA COLLISION IN IRAN

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Introduction

The aim of this work is to propose a first order estimate of the crustal and lithospheric mantle geometry of the Arabia-Eurasia collision zone and to separate the measured Bouguer anomaly into its regional and local components (Jiménez-Munt et al., 2012). The methodology used in our analysis consists of two steps:
1) In the first step we calculate the depth to Moho and depth to base of the lithosphere by means of fitting elevation and geoid anomaly data combined with thermal analysis. The method used in this first step has already been applied in the Gibraltar arc system and Atlas Mountains and it is described in Fullea et al. (2007). It assumes local isostasy and that the density of crust increases linearly with depth between predefined values at surface and at the base of the crust. The density of the lithosphere mantle is considered to be temperature-dependent. We compare and discuss the obtained lithosphere structure with available data.
2) In the second step we calculate the 3D Bouguer gravity anomaly associated with this lithosphere structure that by definition will correspond to the regional Bouguer anomaly. The residual gravity anomaly is obtained by subtracting from the measured Bouguer anomaly the calculated regional field.

Results and conclusions

The resulting crustal and lithospheric mantle structure calculated from the geoid height and elevation data combined with thermal analysis is shown in Figure 1. Our results show that Moho depth varies from ~ 42 km at the Mesopotamian-Persian Gulf foreland basin to ~ 60 km below the High Zagros. The lithosphere is thicker beneath the foreland basin (~ 200 km) and thinner underneath the High Zagros and Central Iran (~ 140 km). Most of this lithospheric mantle thinning is accommodated under the Zagros belt coinciding with the suture between two different mantle domains on the Sanandaj-Sirjan Zone.

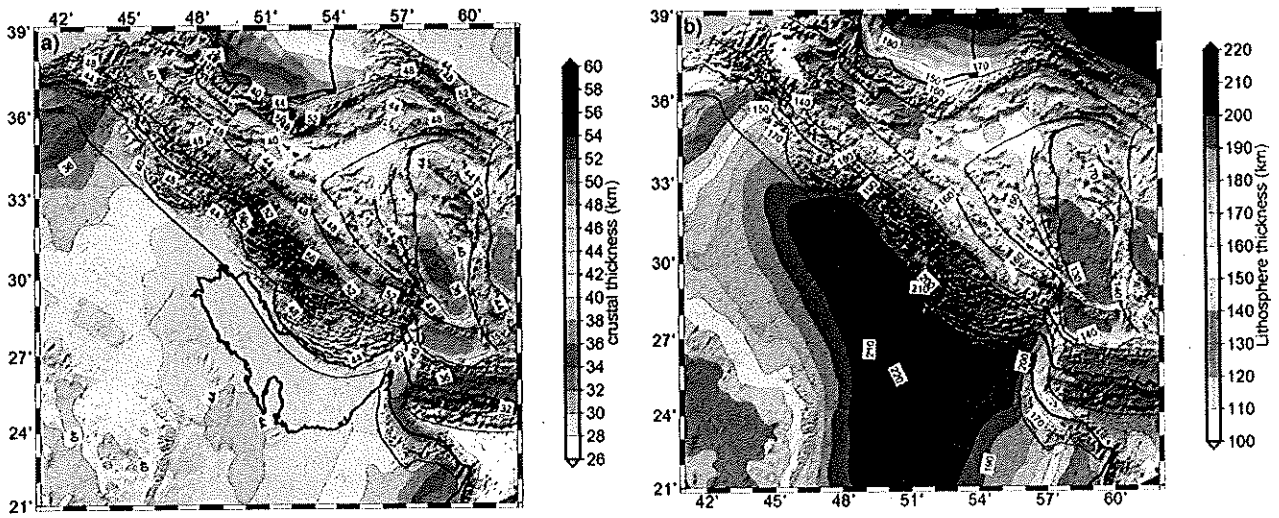

Fig. 1. Resulting crustal (a) and lithospheric (b) thicknesses (contours every 2 and 10 km respectively) obtained from combining elevation and geoid data. Grey lines correspond to the main structural boundaries (see Figure 1), shading indicates elevation.

The regional gravity field is obtained by calculating the gravimetric response of the 3D crustal and lithospheric mantle structure obtained by combining elevation and geoid data. The calculated regional Bouguer anomaly differs noticeable from those obtained by filtering or just isostatic methods. The residual gravity anomaly (Figure 2), obtained by subtraction of the regional components to the measured field, is analyzed in terms of the dominating upper crustal structures. Deep basins and areas with salt deposits are characterized by negative values (~ -20 mGal), whereas the positive values are related to igneous and ophiolite complexes and shallow basement depths (~ 20 mGal).

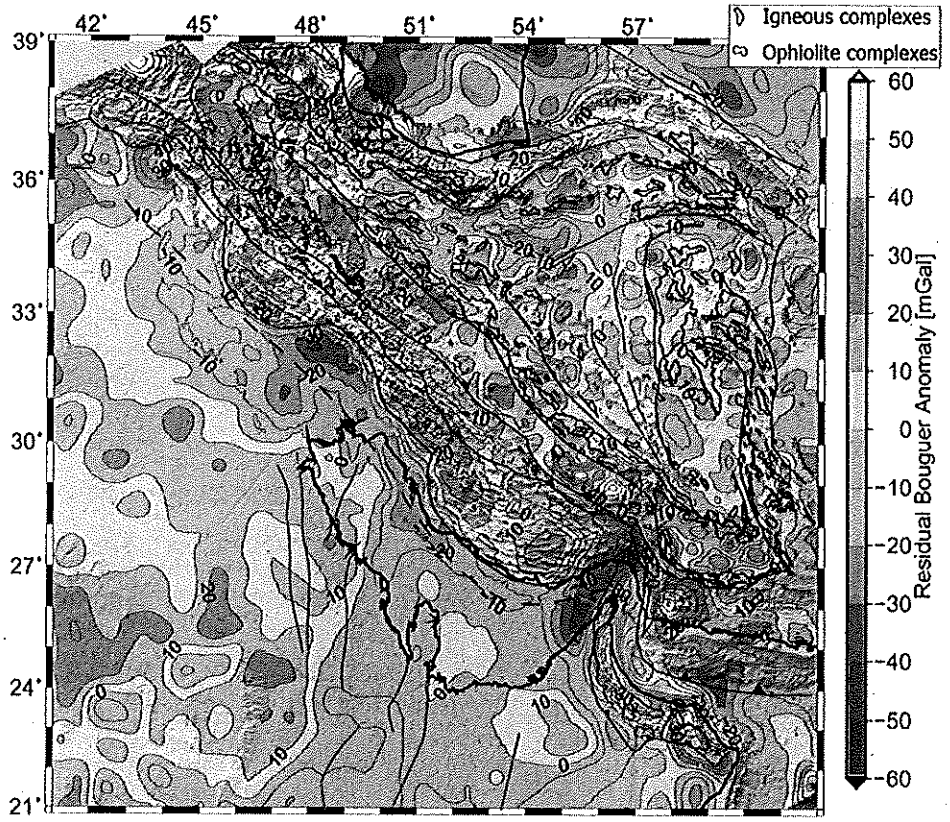

Fig. 2. Residual Bouguer anomaly (contours every 10 mGal) resulting from subtracting the regional gravity to the measured. Grey lines correspond to the main structural boundaries and shading indicates elevation. Red contours show the igneous complexes and green contours the ophiolite complexes.

Acknowledgements

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References

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