Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08691, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08691
EGU General Assembly 2008

A Green's function-based semi-analytical approach to the forward flexure problem in Eastern Anatolia

M. Sinan Özeren (1), Nazmi Postacioglu (1), A. M. Celâl Şengör (1), Ali Deger Özbakir (2)

(1) Istanbul Technical University, Istanbul, Turkey, (2) University of Utrecht, The Netherlands (ozerens@itu.edu.tr)

Eastern Anatolia is a high plateau of average 2 km elevation, undergoing N-S shortening as a result of the convergence of the Arabic plate. The region as a whole is primarily dominated by the criss-crossing conjugate faults to the north of the Bitlis suture. Recent seismological evidence suggests that the average crustal thickness is around 45 km, at least 10 km less than previously thought. Further, observations of the Pn and Sn phases imply such a thermal setting that would possibly indicate that the lithospheric mantle lid underneath Eastern Anatolian High Plateau is either very thin or non-existent. The geological evidence suggests that the slab break-off occured around 11 million years ago. The advective heating effects brought in by the low-viscosity asthenosphere probably inhibited the forming of a new mantle lithosphere by diffusive cooling since the break-off. The geochemical evidence provided by the Pliocene to recent volcanism suggests a high probability of the lower crust being exposed to asthenospheric temperatures.

Recent calculations suggest that the deviatoric stresses in the region are largely dominated by the Arabic convergence, cancelling the stress contributions by the lateral variations of the gravitational energies almost completely. Elastic thickness is an important parameter that can potentially help us to better understand the flexure-related topographic contributions to the tectonics of the region. To this end, we designed a Green's function-based 2-D flexure algorithm that treats the lithosphere as an elastic plate foating on an inviscid fluid. The Green's function is composed of modified Bessel.As the Eastern Anatolia is a domal structure very similar, in terms of the shape

and aspect ratios, to plume-related features elsewhere in the world such as the Ethiopean High Plateau, we did our loading convolutions with the Green's function by low-pass filtering the topography at 125 km and 100 km respectively. We then compared our results with the published gravity anomaly maps for the region. We seem to be fitting the main features of the anomaly maps if we use an elastic thickness of around 8-10 km in the biharmonic problem that governs the flexure. 10 km is also the upper bound for the length of the tension fractures in the region.