Modelling of the stress field and buckling in the Black Sea-Caucasus-Caspian region

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We present computer model of the stress field and buckling in the Black Sea-Caucasus-Caspian region. The model was calculated with "Earth Stress 1.0" software (Koptev, Ershov, Physics of the Earth, in press). The model is consistent with our global stress model: boundary conditions for current local model were extracted from the global modeling results. Besides boundary forces the second major lithospheric stress source was gravitational force derived from difference in the gravitational energy stored by the lithosphere. Quantitative estimation of these so-called «topographical» forces was done by calculating of the difference of the integrated lithostatic pressure of laterally spaced lithospheric columns. Lithosphere rheology was considered nonlinear elastico-plastic. Elastic modules and lithospheric strength were calculated from "yield-strength envelopes" computed in each grid cell. Major input parameters of the model were: topography, composition and the structure of Earth crust and lithosphere, thermal regime and the gravity anomalies. Thickness and density of the layers of the Earth crust were derived from global model Crust 2.0. Depth of lithosphere-asthenosphere boundary was determined from local isostatic constraints and thermal model of the lithosphere.

The calculation results were compared with existing stress-field measurements. The coincidences and discordances are considered and interpreted.