

Geodynamics and Stress State of the Earth's Crust in the Greater and Lesser Caucasus (Azerbaijan) collision region

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The current study researches the present-day stress state of the Earth's crust within the territory of Azerbaijan by using the database of the international research project "World Stress Map" (WSM). The present stress state was also assessed by exploring the effects of the contemporary topographic properties of Caucasus in three-dimensional frame. Aiming to explore the relative roles of regional tectonic conditions in the definition of stress state of Greater and Lesser Caucasus, stress distribution model was developed by the earthquake data (1998-2016) and by the standard techniques of stress field calculation. The results show that the stress orientations are influenced also by the combination of topography and crust thickness distribution even at very large depth. Stress data and earthquake focal mechanisms indicate that the stress state of the Earth's crust of the Greater and Lesser Caucasus is characterized by the compression predominantly oriented across the regional strike. The model results suggest that the Lesser Caucasus and Kur depression are rotating coherently, with little or no internal deformation in a counter-clockwise rotation located near the north-eastern corner of the Black Sea. Orientation of stress axes well consistent with earthquake focal mechanisms revealed that within Upper and Lower Crusts, earthquakes are predominantly thrust-faulting with a number of normal-faulting and some strike-slip faulting. The map of the focal mechanisms and stress distribution suggests that the research area is characterized by the thrust of horizontal compression trending north-north-east in the western part of the southern Caucasus. In the western part of Azerbaijan, the compression takes place between the Main Caucasus Fault and the Kur depression, which strikes south along the northern margin of the mountain range. In addition, a clear transition from the left-lateral strike slip to the predominantly right-lateral strike slip is observed in the southern of the Greater Caucasus Mountain Range. Reverse dip slips in the north-north-eastern direction are predominant along Main Caucasus Fault, which results in the crustal contraction along that Fault.