



Present-day seismicity and crustal deformation of Egypt

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This study addresses present-day seismicity and crustal deformation of Egypt based on comprehensive earthquake catalog from 1900 to 2004, focal mechanism stress inversion and recent GPS observations. Spatial distribution of earthquake epicenters indicates that Egypt has been suffered from both interplate and intraplate earthquakes. Most earthquakes activity (more than 70%) has been concentrated in northern Egypt along the geologically documented borders of Sinai subplate (northern Red Sea and its two branches Suez rift and Aqaba –Dead Sea transform). The majority of inland earthquake focal mechanisms in Egypt are normal with strike-slip component or strike-slip faulting events. Only a small minority, namely four events, exhibits reverse faulting.

The inversion method of Gephart and Forsyth (1984) was applied to calculate the orientation of the principle stress axes and the shape of the stress tensor. The best fitting tensor in Egypt shows homogeneity stress field spectrum between tension and strike-slip stress regime. The stress directions are well resolved in the means of the 95% confidence limit and the relative stress magnitude has value of about 0.3 indicating some homogeneity for the whole dataset and northern Egypt as well. However, along southern Egypt the strike-slip regime has dominated. The shape factor (R-value) is 0.5, which means that the deviatoric components of σ_1 and σ_3 are of the same magnitude, but in opposite signs.

The average horizontal velocities of GPS stations in Egypt is 5.15 ± 1.1 mm/year in mostly NW direction. The results of deformation analysis indicate that the northern Egypt is locally deformed more than the southern part. Only the Egyptian-Mediterranean coastal –Nile Delta zone dominates as a compression deformation area. However, an extensional deformation has been observed throughout the rest of coun-

try. This means that the relative motion of African plate with respect to both Eurasian and Arabian has highly controlled the deformation processes in Egypt.