



GPS-derived crustal deformation in Azerbaijan

Rafiq Safarov, Samir Mammadov, and Fakhraddin Kadirov

Geology and Geophysics Institute of Azerbaijan National Academy of Sciences, Geodynamics and Seismology, Baku, Azerbaijan (rafiqsafarov@gmail.com)

Crustal deformations of the Earth's crust in Azerbaijan were studied based on GPS measurements. The GPS velocity vectors for Azerbaijan, Iran, Georgia, and Armenia were used in order to estimate the deformation rates. It is found that compression is observable along the Greater Caucasus, in Gobustan, the Kura depression, Nakhchivan Autonomous Republic, and adjacent areas of Iran. The axes of compression/contraction of the crust in the Greater Caucasus region are oriented in the S–NE direction. The maximum strain rate is observed in the zone of mud volcanism at the SHIK site (Shykhlar), which is marked by a sharp change in the direction of the compression axes (SW–NE). It is revealed that the deformation field also includes the zones where strain rates are very low. These zones include the Caspian–Guba and northern Gobustan areas, characterized by extensive development of mud volcanism. The extension zones are confined to the Lesser Caucasus and are revealed in the Gyadabei (GEDA) and Shusha (SHOU) areas. The analysis of GPS data for the territory of Azerbaijan and neighboring countries reveals the heterogeneous patterns of strain field in the region. This fact suggests that the block model is most adequate for describing the structure of the studied region. The increase in the number of GPS stations would promote increasing the degree of detail in the reconstructions of the deformation field and identifying the microplate boundaries. It is concluded that the predominant factor responsible for the eruption of mud volcanoes is the intensity of gas-generation processes in the earth's interior, while deformation processes play the role of a trigger. The zone of the epicenters of strong earthquakes is correlated to the gradient zone in the crustal strain rates.