Geophysical Research Abstracts
Vol. 20, EGU2018-256, 2018
EGU General Assembly 2018

Earth Crust Velocity and strain field in Caucasus, inferred from GPS measurements

Rafig Safarov, Fakhraddin Kadirov, and Samir Mammadov

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

Azerbaijan is located in the zone of active collision between two continental lithospheric plates: the African and Eurasian plates. The plates' tectonic reconstructions show that the collision between the Arabian and Eurasian plates has been in progress during the last 10– 30 Ma. The velocity of the northward motion of the Arabian Plate relative to the Eurasian Plate is more or less constant since the onset of the collision and approximately equal to 20 mm per annum.

This continuing "invasion" of the Arabian Plate into the Eurasian Plate determines the lithospheric shortening along the Main Caucasian Thrust, which extends in the meridional direction, and horizontal displacement of the lithosphere. Being responsible for crustal deformations, these regional tectonic processes cause earthquakes, which are historically documented throughout the entire Caucasus. This work is dedicated to the investigation of the rate of crustal deformations in Caucasus based on the GPS measurements and its relationship with seismicity and mud volcanism.

Crustal deformation investigated in Caucasus territory on the basis of GPS-measurement results using Shen method (1996). Velocity vectors obtained from Azerbaijan, Iranian, Turkey, Russian, Georgian and Armenian GPS networks for the period of 1998-2016 years were used in order to evaluate the strain rates. The compression regime is observed in the Greater Caucasus, Gobustan, Kura depression, Nakhchyvan Autonomous Republic, and adjacent areas of Iran. The compression axes indicate that crust shortening within the Greater Caucasus is oriented in the S–NE direction. Maximum strain rates (approximately 200 $\times$ 10-9/year) observed in area between KHID (Khidirly) and SHIK (Shikhlar) points, and here the contraction axes sharply changes its direction and oriented in SW-NE direction. Extension observed in Lesser Caucasus: Gedabey (GEDA), Shusha (SHOU) regions where the dilatation rate reaches up to 100 $\times$ 10-9/year. The spatial distribution of the earthquakes with M $\geq$ 5 indicates that they are largely confined to the gradient zones of the crustal strain field. 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. This work was supported by Science Development Foundation under the President of the Republic of Azerbaijan Grant № EİF-KETPL-2015-1(25)-56/27/2.