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# GPS velocities for the Central part of the Greater Caucasus and their relationship to tectonics and deep crustal structure

Vadim Milyukov (1,3), Eugeny Rogozhin (2), Alexey Mironov (1), Andrey Gorbatikov (2), Alexander Ovsyuchenko (2), Valery Drobishev (3), and Hariton Hubaev (3)

(1) Moscow State University, Sternberg Astronomical Institute, Moscow, Russian Federation (vmilyukov@yandex.ru), (2) Institute of Physics of the Earth of Russian Academy of Sciences, Moscow, Russian Federation (ovs@ifz.ru), (3) Vladikavkaz Scientific Center of Russian Academy of Sciences, Vladikavkaz, Moscow, Russian Federation (noovnc@yandex.ru)

The Central part of the Greater Caucasus, as a part of the Alpine-Himalayan mobile belt, is a zone of complex tectonics associated with the interaction of the two major tectonic plates, Arabian and Eurasian.

The velocities of the contemporary movements are estimated based on the data of the regional GNSS network of continuous and survey-mode sites along the geophysical profile crossing all major geological structures of the Greater Caucasus. The profile is located in the area of maximal contraction of all tectonic zones of the Greater Caucasus. The projections of the horizontal velocities were extrapolated to a combined structural-geomorphological and geophysical profile. Geophysical surveys were performed by the microseismic sounding method (MSM), which allows to identify the configuration as subvertical and subhorizontal boundaries in the microseismic field to a depth of 60 km. Geological objects with relatively high seismic velocities appear in the microseismic field as the zones with reduced amplitudes, and vice versa. In conjunction with data on tectonic processes in the Quaternary period, the depth MSM profile gives an idea about the sources of contemporary orogenic movements.

Interpretation of the measurement results was made in comparison with the neotectonic studies results and data on the deep structure. High velocities of the horizontal compression along the profile (3-4 mm/year) reflect the convergence of the Dzirulsky massif and the crystalline core of the Greater Caucasus in the zone of the Kakheti–Lechkhumi fault. The maximal decreasing of contemporary velocities of the transverse compression (up to 0-1 mm/year) was defined in the most elevated part of the Greater Caucasus. This region corresponds also to the near- surface low-seismic-velocity volume providing arching effect on the all mountain construction. The presence of significant transverse displacements of the surface reflects the shear component on the major faults of the Caucasus stretch. The significant decreasing of the horizontal velocities after the aftershock processes of a catastrophic 1991 Racha earthquake on the southern slope of the Greater Caucasus, which was previously predicted, are completely confirmed.

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