



GPS constraints on velocity field and uplift of the Northern Caucasus

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The northern part of the Greater Caucasus is one of the most geodynamically active regions of Russia. From the standpoint of modern geodynamics, the features of this region are a typical example of collision tectonics resulting from interaction between Scythian plate and Alpine-Himalaya tectonic belt. The GPS observations in the Northern Caucasus area began in 1993 as a part of the WEGENER project. One of the points of the GPS measurements was transformed in the stationary station, side code ZECK in EUREF. Within the last few years we have established three new stationary GPS/GLONASS stations in the Northern Caucasus (site codes TRSK, KISL and VLAD). Currently, four stationary GPS/ GLONASS stations located in this area form the base of the regional Northern Caucasus Deformation Array (NCDA).

Based on the results of first observations we find constraints on the velocity field and uplift of the Northern Caucasus. The striking aspect of the velocity field of the Northern Caucasus is the rapid motion in the north-east direction with almost equal velocities of about 28 mm/yr. The motion of the fiducial site MDVJ (Moscow region) is characterized by a similar velocity value (≈ 25 mm/yr) in the same direction. This means that the motion of the Northern Caucasus region is mainly defined by the general tectonic movement of the Eurasian plate with respect to ITRF.

With respect to the uplift of the Northern Caucasus region, the situation is ambiguous. The uplift of the ZECK site derived from the GPS data coincides with an estimation obtained on the basis of absolute gravity measurements over a thirteen-years period (2 mm/yr). Apparently this is a real uplift value. The greatest uplift (8.8 mm/yr) is observed for station TRSK. This station is situated near to the volcano Elbrus (3 km from the top). The local effect connected with inflation of magmatic chambers of the Elbrus volcano may be one of the possible explanations of the uplift value of the TRSK site. A similar uplift (8.1 mm/yr) is defined for the KISL site too. However, it is necessary to regard this estimation with a certain amount of care. In 2007 the antenna of this station was moved and this shift was probably not completely compensated for in the data processing.

We plan to increase the number of stationary GPS stations in the Northern Caucasus and to spread the NCDA in a southeast direction. This work is supported by the Russian Foundation for Basic Research under Grants No 07-05-00786 and No 07-05-13573.