



Development of the Northern Caucasus GPS/GLONASS network: progress during 18 years (observations and results)

Vadim Milyukov, Vladimir Zharov, Alexey Mironov, Mark Kaufman, and Dmitry Duev

Moscow University, Sternberg Astronomical Institute, Moscow, Russian Federation (milyukov@sai.msu.ru, +7 495 9328841)

The Northern Caucasus is one of the most geodynamically active regions of Russia. It is a part of the complex Alpine-Himalaya tectonic belt, associated with the interactions of huge tectonic formations: the Eurasian, Arabian and African lithospheric plates. The general tendency of formation of geodynamic conditions in the Northern Caucasus is caused by movement of the African and Arabian plates in the direction of Eurasia (to the north). This collision zone is characterized by higher crust fragmentation, fold tectonics, slips, etc.

The first GPS and absolute gravity campaign in the Black Sea and Northern Caucasus regions was carried out between 1993 and 1994 as a part of the SELF project, which was led by the Institute of Applied Geodesy of Frankfurt am Main. During this campaign, the coordinates of more than 20 points were determined, including 3 points in the Elbrus volcano area (Teskol, Cheget, and Tyrnyauz). One of the points of the GPS measurements (Zelenchukskaya, Karatchay-Cherkessia Republic of the Russian Federation) was transformed in the stationary station and since 1997 this station has been part of EUREF GPS network with a code ZECK. Three new stationary GPS/GLONASS stations in the Northern Caucasus were put to work within the last few years. The first (site code TRSK) is located near the Elbrus volcano, in the Kabardino-Balkaria Republic. It began to operate in 2005. The second one is located in Karatchay-Cherkessia Republic (site code KISL). This station has been in operation since 2006. The third is located in Vladikavkaz, the capital of North Ossetia Republic (site code VLKK). The continuous GPS measurements began in 2008. These four stationary stations form the base for the regional Northern Caucasus GPS network, which can be called the Northern Caucasus Deformation Array (NCDA).

During 2009-2010 years a new GPS network was established for monitoring geodynamically active areas of the southern part of the Greater Caucasus. The network consists of 9 survey-mode sites and forms a linear profile which is oriented from the northeast to the southwest and crosses the basic tectonic structures of Transcaucasia: the Southern slope of the Main Caucasian ridge, Tibsky overlap fault, the North Caucasian step, Orkhevsky overlap fault, the Transcaucasian median massif (the Georgian block).

In this study results of GPS observations and rates of present-day deformation are presented.

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