# About possibility of monitoring the deformation processes in earth's crust using GPS observations

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Baseline data are presented by measurements of modern geodynamic movements of the seismically active territory of the Northern Tien Shan by methods of space geodesy, since 2009. Horizontal velocities of the land surface are determined by superposition for the corresponding components of the linear trend velocity vectors and seasonal (periodic) displacements by monitoring of GPS stations.

Surface displacement velocities are interpreted as components of the strain tensor. Crust is approximated by the simplest model of a continuous homogeneous environment. For calculating the stress-strain state, the mathematical theory of mechanics of a deformable body is applied without time factors of time and temperature. The relationship between stresses and strains is assumed to be linear, i.e. corresponding to Hooke's law.

It is established that orientation of operating deformations coincides with extension of the main tectonic breaks of the region, identified by geological and geophysical methods and currently active. The areas of uniaxial compressive stresses of sublatitudinal extension that cause the deformation shortening of Kungei and Zailiysky Alatau mountain ranges from south to north are identified. Against the background of regional movements, seasonal variations in displacements significantly (twice) change the amplitude of deformations of uniaxial compression in certain areas. At the same time, the sublatitudinal orientation of the compression axis is retained.

Spatial correlation between characteristics of the deformation field according to GPS monitoring and the distribution of strong earthquakes has been established. It is shown that, taking into account seasonal variations in the deformations, the epicenters of strong earthquakes spatially coincide with extension extremes, i.e. with zones of stress lowering the shear strength of rocks. At the same time, the deformation of earth's crust and seismicity are manifestations of uniform geodynamic cyclic process.

Dynamics deformations traced by periodic seasonal variations of horizontal displacements can form a basis for developing a predictor of a possible earthquake. Application of GPS observations for the movements of the earth's crust is an informative method for estimating the stress-strain state and can be used for seismic zoning and seismic risk assessment.