l). The contents of oxygen depends from *PT*-conditions and inflow of deep" gases. Values of atmospheric pressure during gauging were practically identical a temperature mode is characterized about zero values and has no significant distinctions. Thus, there is only an increase inflow deep' gases, first of all CO_2.

Our data testify to presence of influence of tectonic infringements on Environment due to occurrence induced currents, deep decontamination and change of structure atmospheric fields. The counter system "influence — response" is observed, i. e. not only change of a geomagnetic field and atmospheric pressure influence on is intense — deformed a condition of the geological Environment, but also the Environment influences sun-meteorological parameters. I. e., in area of tectonic units vertical through channels difficult geospheres interactions, fascinating lithosphere, hydrosphere, biosphere and an atmosphere are formed. The model of lithosphere, hydrosphere, atmosphere and biosphere interactions in areas of fault-crossing is developed (Fig. 1, 2).

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References

Akhundov I. D., Guseinov M. A., Solodilov L. M. Magnetic storms, variations geomagnetic and magnitotelluric fields at electromagnetic radiation from focus of earthquake // Razvedka i okhrana nedr. — 2007. — № 2. — P. 34—38 (in Russian).

Kutinov Y. G., Chistova Z. B. A hierarchial number of displays alcaline-ultrabasic magmatism of Arkhangelsk adamantine province. Their reflection in geological and geophysical data. — Arkhangelsk: OAO "IPP "Pravda Severa", 2004. — 283 p. (in Russian).

Geodetic estimations of the modern motions on Tien Shan

© ***S. Kuzikov, 2010***

Scientific Station, RAS, Bishkek, Kyrgyzstan
ksi@gdirc.ru

We can obtain information about formation and a posterior transformation of crust, in particular, from geological and structurally-tectonic researches or maps. More often we have only final result of change of geological objects and we do not know how this result has been reached in the course of time. Absence of such data has led to occurrence of extreme opinions about mode of intra-continental deformation of lithosphere. According to one of them, the prevailing part of movements realize through sliding of blocks on faults [e. g., Peltzer, Saucier, 1996; Replumaz, Tapponnier, 2003]. The alternative notion is based on the prevalence of plastic deformations and properties of a nonlinear-viscous liquid in crust [e. g., Flesch et al., 2001]. Long time the Research station of RAS (RS RAS) realizes geodetic researches of different scale, which allow to estimate quantitatively modern near-surface movements of Tien Shan crust and partially to understand the geodynamic problem designated above.

In Central Asia the regional GPS researches are in progress from 1992, by present time ~550 sites of periodic measurement are dispersed on ~1.7 million km^2 in territory of Kyrgyzstan, Kazakhstan, Uzbekistan, Tajikistan and China. The kinematic-statistical analysis of horizontal velocities measured for last 10—15 years, testifies about presence here quasi-rigid areas of crust (domains) in the size from ~30×50 to ~600×800 km^2 in which modern velocity of deformation is negligibly small [Kuzikov, Mukhamediev, 2010]. The inter-domain space (IDS) separate the quasi-rigid domains (QRD). IDS has width from first km to several hundreds km, in which velocity of displacement (to ~10 mm/year) can considerably exceed deviations from rigid whole in QRD (on the average — 0.35 mm/year). Total area of QRD

concedes a little of IDS territory as ~46 and ~54 % accordingly. In structure of IDS the spatially-kinematical regularity in 4 steady directions is allocated: NE (on the average ~54°) has left-hand component of shift; Latitudinal (~88°) has mainly cross-section shortening; SE (~116°) has elements of the right-hand shift; Meridional (~165°) has cross-section extension. The spatial analysis has shown absence of correlation between modern IDS and the active faults of Tien Shan, though on separate segments spatial and kinematic coincidence can be found. Thus, within IDS there can be both displacement on planes of faults, and elastic and-or plastic deformations.

In ~20—25 km to the southeast from Bishkek, in foothills of the Kirghiz range, RS RAS perform regular (1 time in 2 weeks) linear-angular (tacheometric) measurements from 2006 for detailed studying of deformation variations on 2 local sites. Tacheometric researches are combined with geodetic levelling, GPS measurements and other geophysical works. Each of these local sites occupies less then 0.75 km^2 and between them of ~5 km in direction W-E. Measured baselines between fundamental geodetic benchmarks have length from ~150 to ~1400 m. Since December 2007 to April 2008 on both local sites some northern benchmarks were anomalously displaced and then have returned almost on former places. Maximums of change of lengths on both local sites are fixed to the middle of March 2008 and have on a longitude ~ −18 mm on ~403 m (~ -4.5×10^{-5}) and on latitude ~14 mm on ~150 m (~9.3×10^{-5}). Thus, there was synchronous and approximately identical size of an elastic deformation for northern parts of the two local sites removed from each other on ~5 km. Probably, it is result of influence of neotectonic thrust located in ~500—1000 m to the north.

Approximately in the same area foothills of the Kirghiz range two profiles of northern directions have lengths ~14 and ~17 km for tacheometric observations on fundamental geodetic benchmarks are located. Since 1992 to 2009 on some segments of these profiles are lengthening and shortening the baselines with linear deformations to $|\sim6.8\times10^{-5}|$ on ~115 m and more. On some segments of profiles the change of directions of linear deformation is observed. The movements on some base lines it is possible to explain by displacement on planes of neotectonic faults, however on more base lines have elastic and plastic deformations, most likely.

At building of the dam by powerful explosion (~3 thousand tone of an explosive) has been made for the hydropower station Kambarata-2 on the river Naryn (near of Toktogulsky water-storage basin) on December, 22nd 2009. There was a probability of motions on the fault located in ~ of 300—500 m from epicenter of explosion. RS RAS exercised the geophysical observations within 2 days before explosion, during day of explosion and 2 days after. During this time 8 GPS stations on 4 sites exercised the continuous measurements around the explosion epicenter on distance from ~1.4 to ~5.3 km. As have shown the GPS data at daily averaging, almost on all investigated base lines immediately after explosion the increase in distances on 0.6—1.6 mm (on the average — 1.1 mm) was observed. Next day after explosion the same base lines have decreased on 0.2—0.9 mm (on the average — 0.5 mm). By the end of measurements the minimum of measured lengths of base lines for all time of supervision has been reached. Thus, around of epicenter there was elastic stretching immediately after explosion which after was replaced with shortening of all base lines as a result on 0.4—2.3 mm (on the average ~1.4 mm). Thus, the powerful industrial explosion has not essential influences on displacement of crust around hydropower station Kambarata-2.

References

Flesch L. M., Haines A. J., Holt W. E. Dynamics of the India-Eurasia collision zone // J. Geophys. Res. — 2001. — **106 (B)**. — P. 16,435—16,460.

Kuzikov S. I., Mukhamediev Sh. A. Structure of the Present-Day Velocity Field of the Crust in the Area of the Central-Asian GPS Network // Izv. Physics of the Solid Earth. — 2010. — **46**, № 7. — P. 584—601.

Peltzer G., Saucier F. Present-day kinematics of Asia derived from geologic fault rates // J. Geophys. Res. — 1996. — **101 (B)**. — P. 27,943—27,956.

Replumaz A., Tapponnier P. Reconstruction of the deformed collision zone between India and Asia by backward motion of lithospheric blocks // J. Geophys. Res. — 2003. — **108 (B6)**. — P. 2285. — DOI: 10.1029/2001JB000661.