



Deformation of fault zones according to linear-angle measurements at the Bishkek geodynamic test site

S. I. Kuzikov

Research Station of the Russian Academy of Sciences
in Bishkek City, Kyrgyzstan

Abstract

At the Bishkek geodynamic test site (Central Tien Shan) 3 geodesic sites are located in the east-west direction along the active fault zone, at 5–13 km distance each from other. Four types of pulsed (elastic) deformation events have been detected on 44 baselines of these geodesic sites as a result of weekly linear-angular measurements for 2012–2016. First, it is isotropic type in terms of short-period (6–7 days) synchronous elongations of all baselines in all geodesic sites up to 4 cm and strain up to 2.3×10^{-4} . The second is that the lengths of baselines anisotropically changes within 3–4 months: the north direction lines are extended to 11 mm (7.3×10^{-5}) and the east direction lines are shortened to –8 mm (-4.4×10^{-5}). In all cases there is a smooth increase or decrease in the length of the lines to the extremum and then a relatively sharp decline to the background values, in the latitudinal direction there is a delay of the deformation event by 1–3 weeks. In the third type, the north direction lines are extended to 9 mm and the east direction lines are extended to 2 mm. For all directions of the baselines within 4–5 months extremes of length changes are shifted to the beginning of the event in time and then there is a smooth transition to background values. The fourth type is that the length of only one baseline of any direction changes noticeably over time. The rates of steady elongation or shortening of baselines to 1–2 mm/year have been calculated using the straight-line approximation method for the values of background variations of their lengths over 5 years of measurements. This corresponds to a strain rate of 10^{-6} – 10^{-7} year⁻¹ and is in good agreement with GPS data.

Keywords

modern movements, linear-angular, length measurements,
base lines, deformation events

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