

## Study of seismotectonic deformations of the Earth's crust in the Altai-Sayan mountain region. Part I

Naylya A. Sycheva, <https://orcid.org/0000-0003-0386-3752>, [ivtran@mail.ru](mailto:ivtran@mail.ru)

Schmidt Institute of Physics of the Earth of RAS, Moscow, Russia

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**Abstract.** Seismotectonic deformations (STD) of the Earth's crust in the Altai-Sayan mountain region were studied. The STD calculation was performed on the basis of the approaches proposed in the works of Yu.V. Riznichenko and S.L. Yunga. Estimation of seismicity distribution and calculation of the average annual STD velocity (STD intensity) were made on the basis of the catalog of earthquakes that occurred in 1997–2020 (15 669 seismic events). Areas of manifestation of intense seismotectonic deformations and seismic activity are identified. A high level of seismicity and the average annual STD velocity ( $10^{-7}$  year<sup>-1</sup>) is noted in the areas where strong seismic events occurred (Chuya earthquake on September 27, 2003, Tuva earthquakes on December 27, 2011 and February 26, 2012). The study of STD directionality is based on data on the focal mechanisms of earthquake sources (591 events) that occurred from 1963 to 2021. The classification of STD modes was used to construct the STD map. According to the STD maps, the direction of the shortening axes was determined, which changes from west to east from northwest to northeast. The study area is characterized by a variety of deformation conditions: compression, transpression, strike-slip, transtension, tension, etc. Based on the averaged strain tensors, the distributions of the Lode–Nadai coefficient, angle of generalized plane strain, and vertical component are calculated and plotted. The zones where various modes of deformation, such as simple compression, the predominance of simple compression, shear, the predominance of simple tension and simple tension are manifested, are distinguished in the study area. Both uplift and subsidence of the Earth's crust are noted in the study area depending on the deformation mode.

*Keywords:*

**earthquake, focal mechanism, STD modes, elongation and shortening of strain axes, STD intensity, Lode–Nadai coefficient, Altai-Sayan region**

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