

## Monitoring the dynamics of seismicity within the Kemin-Chilik zone, generating $M \geq 8$ earthquakes

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**Abstract** Dynamics of seismic processes at the junction of the Tien Shan mountain building area and the Kazakh shield is presented in the paper. It is noted that the Tien Shan's lithosphere over thrusts the Kazakh Shield's lithosphere, and the Kazakh Shield's lithosphere under thrusts beneath the Tien Shan's lithosphere based on the seismic tomographic and seismotectonic data. Low-velocity heterogeneity is distinguished at the junction of these lithospheres, under where a low-velocity anomaly flow is assumed in the mantle. Marginal (active structures of the Ili basin, Zaili mountain range), and middle (active structures of the Kemin, Chilik basins, Kungei mountain range) subzones with characteristic seismicity and seismic regimes are formed in here. Seismogenic zones are distinguished (from north to south): Predzaili, Kemin-Chilik, Predkungei. Powerful earthquakes with  $M > 8$  occur in the Kemin-Chilik seismogenic zone (about 250 km long and up to 25 km wide), and earthquakes with  $M = 7-8$  - in the Predzaili and Predkungei seismogenic zones. Dynamics of the earthquakes' sequence is predetermined by the dynamics of the hierarchy of faults and blocks in the junction zone. The sequence of earthquakes is expressed by the hierarchy of seismic cycles. Seismic activation period, a peak of seismic activation, period of seismic activation's decay and seismic calm period are distinguished in every cycle. Strong earthquakes take place in a first-order cycle with long period, significant and small earthquakes - in cycles with corresponding short periods. Seismicity level of the study area is determined by the trajectory of the seismic cycles' association. Dynamic segmentation and dynamic sectorization, vectors of seismic activity directed from the east and west to the highly compressed central part of the region are noted in the spatial and temporal distribution of earthquakes at the junction of the Tien Shan and the Kazakh shield.

**Keywords** Under thrusting and over thrusting of the lithosphere, low-velocity heterogeneity, earthquake, dynamics of seismicity, seismicity level, hierarchy of seismic cycles, vector of seismic activation, dynamic segmentation, dynamic sectorization.

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