



## Response of the activation of seismic processes in temporary and spectral characteristics of electric field on Tien-Shan

Valentina Antonova and Beibit Zhumabayev

Kazakhstan (valanta@rambler.ru)

We present results of the atmospheric electric field monitoring at the high-altitude Tien-Shan station (43.02 N, 76.56 E, 3340 m above sea level, 20 km from Almaty) and the analysis of its temporal and spectral characteristics during the activation of seismic processes in the vicinity of Almaty since 2007 till 2014. During this period the most considerable seismic activity was observed on May 1-2, 2011 and January 28, 2013.

Eight events for 2 days with a magnitude of more than 4.0 occurred on May 1-2, 2011. The main shock of magnitude 5.4 occurred on May 1st at 02:31 UT, 76 km North East of Almaty. Unusual temporal variations of the electric field with amplitude achieving the values of 6-7 kV/m were recorded as during series of earthquakes, and before them (April 28, 30). The duration of the electric field disturbances were 5-12 hours (5 hours on 28.04.2011 and 12 hours on 30.04.2011). Another characteristic of the anomalous variations of the electric field was their positive polarity. The analysis of meteorological and cosmophysical conditions was carried out for the purpose of identification of disturbance sources. It is shown that characteristics of temporal anomalous variations of the electric field don't correspond to these sources of disturbances. It was concluded that the cause of anomalous variations can be sources of the lithospheric origin only. Respectively, anomalies of the electric field can be considered as precursors of earthquakes.

We also registered anomalous duration temporal variations of the electric field with the amplitude achieving  $\pm 2$  kV/m before of the earthquake on January 28, 2013. The main shock of magnitude 6.1 occurred at 16:38 UT, 230 km. to the East from Almaty. The earthquake was felt in Almaty with intensity 4-5 points. In this event as positive variations and with the change of the polarity were recorded. Anomalous variations of electric field before of weaker earthquakes (magnitude  $< 4$ ) are recorded only for events with coordinates of the epicenter in close proximity to the detector (08.04.2009 and 27.09.2010).

Spectral components of anomalous variations of electric field and features of their dynamics before earthquakes were studied. The dominating spectral peaks differing from the background were established.

Thus we consider that the atmospheric quasi-static electric field variations are useful for a prediction of earthquakes.