



Search for predictive anomalies of strong earthquakes according to monitoring of subsoil gases at Petropavlovsk-Kamchatsky geodynamic test site

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Abstract

Long-term monitoring (1997–2016) of volume activity of a subsoil radon (VA Rn) was carried out on the Petropavlovsk-Kamchatsky geodynamic test site for the purpose of searching the predictive anomalies of strong earthquakes. 8 events from 12 earthquakes of the region of Avacha Bay with $M > 5.5$ and focus depth of 0-90 km had the preceded anomalies in the field of subsoil Rn. Relative shifts in the times of appearance of synphasic anomalies at 3-5 points (type A anomalies) occurred in four cases. A type A predictive anomaly was also recorded for a deep (177 km) Zhupanovo earthquake (ZE) with $M = 7.2$. The arrival of a perturbation of the type of a solitary "deformation wave" is the possible reason of appearance of synphasic anomalies on network of a subsoil radon registration points. Such a deformation wave, presumably, can arise due to the quasi-viscous flow of the geomaterial at the last stage of the earthquake preparation. There were three predictive anomalies (type B), which form and computer modeling indicate that the mechanism of their occurrence is described by the model of transport of Rn in an aqueous medium with complete transverse mixing. The map of the boundaries within which earthquake preparation process corresponding magnitudes can cause anomalies in the field of the subsoil Rn with relative amplitude $\delta_{\min} \geq 20\%$ was proposed for estimates of the magnitude of the predicted earthquake.

Retrospective processing of five time series was carried out by method of aygenoscopy to reveal the general features in of the behavior of time series VA Rn for a six-month period (August 2015 – February 2016), which includes a temporary neighborhood of Z. One point from two allocated reference points of collective behaviour one is related to variations in atmospheric pressure, and another coincided in time with the predictive anomalies of ZE, detected in the manual mode. This allows us to talk about the possibility of applying the method of aygenoscopy to automatic processing of monitoring data for subsoil gases.

Keywords:

subsoil radon, predictive anomalies, deformation wave, earthquake forecast, aygenoscopy, Kamchatka.

References



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