

# Indicators of changes in the stress-strain state of the geoenvironment in the preparation and realization of strong tectonic earthquakes according to long-term measurements with underground electric antennas

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We present the results of the retrospective analysis of continuous long-term monitoring data on changes in the resistivity of rocks in the Petropavlovsk-Kamchatskii geodynamic testing site. Monitoring has been carried out since 2005 on the basis of electromagnetic measurements with underground electric antennas. The physical basis of the method is the relationship between changes in the moisture content of a large volume of rocks and tectonic stresses affecting the geoenvironment. The main structural elements of the antennas are casing pipes of the boreholes. Measurements are carried out in the range of 25-1200 Hz on four frequency channels. The calculated values of the monitoring depth range from 50 m to 2250 m, depending on the frequency range of measurements and the location of the measurement site.

The main task of the research is the formation of a package of indicators of changes in the stress-strain state (SSS) of the geoenvironment. Indicators are the most informative parameters, their changes are associated with the preparation of nearby strong tectonic earthquakes. We assume that such package of SSS indicators for the Petropavlovsk-Kamchatskii geodynamic testing site will be formed on the basis of long-term complex borehole measurements data including measurements with underground electric antennas. We demonstrate the results of a comparison of monitoring data on variations in the resistivity of rocks with the results of other types of measurements carried out in the Petropavlovsk-Kamchatskii geodynamic testing site.