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A New Approach to Seismic Monitoring Networks: Objects, Equipment, Temporal Processes

The experience of monitoring using 3D seismic array is discussed: devices, programming, data processing and geophysical results. The array was created for seismic monitoring purposes on Chirkey hydropower plant dam in Caucasus region, Russia. Chirkey dam is a reinforced concrete construction 235 m height built in seismic hazard region.

The aims are: 1) to control the stresses within the dam and 2) to investigate the relation between tectonic deformation and seismicity. Discussed seismic 3D array was built with up-to-date technologies to satisfy both these needs.

The idea is to apply large constructions bounded with rocks as the peculiar strain sensor. The seismic network placed on construction is able to record not only earthquakes but weak seismic technical vibrations. Vibrations caused by turbine rotation act may be regarded as a seismic sounding signal needed for an examination of the construction. The map of amplitudes of this sounding signals recorded in different points shows the spatial distribution of its stress-strain state. As technical vibrations are persistent ones it is possible to obtain stress-strain maps with the short time intervals. Deformation processes as tides, weather influence, tectonic processes can be studied by temporal behavior investigation of the set of such maps.

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