RING-SHAPED SEISMICITY STRUCTURES IN THE AREAS OF SAREZ AND NUREK RESERVOIRS (TADJIKISTAN): LITHOSPHERE ADAPTATION TO ADDITIONAL LOADING

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Abstract. We have been studying seismicity characteristics in the areas of Sarez lake and Nurek reservoir. Ring-shaped seismicity structures in two depth ranges (0–33 and 34–70 km) have been formed prior to the Pamir earthquake of 07.12.2015 ($M_w = 7.2$). Seismicity rings cross near Usoi dam, which had led to a formation of the Sarez lake since 1911, and epicenter of the Pamir earthquake. Besides, three of four strongest events ($M \ge 6.0$), recorded in the Pamir region at depths of more than 70 km since 1950, occurred near the Sarez lake. A totality of data obtained allows us to conclude that the Pamir earthquake, despite of very big energy, relates to events connected with induced seismicity. Ring-shaped seismicity structures in two depth ranges have been formed also in the Nurek reservoir area. It is supposed that ring structures formation is connected with processes of geological system self-organization, which result in deep-seated fluids ascending. For this reason lithosphere is adapting gradually to the additional loading, connected with reservoir filling. A distinction of the Nurek dam (and also many other hydro-electric power stations) from the Usoi dam consists in permanent vibration due to water fall from big height (more than 200 m). Such an effect can lead to gradual stress dissipation, for this reason events much weaker than the Pamir earthquake of 07.12.2015 occur in the areas of artificial reservoirs.

Keywords: Sarez lake, Nurek reservoir, induced seismicity, ring-shaped structures, deep-seated fluids.