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Hydro-isotopic ($^{234}\text{U}/^{238}\text{U}$) zoning of groundwaters in the seismically active southern margin of the Siberian craton, Russia

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The southern margin of the Siberian craton, which experienced severe tectonic deformations in the Neoproterozoic-Cambrian and Jurassic, is currently a part of the Baikal seismic belt. In groundwater budget of the area, the main contribution is provided by the homogeneous South Baikal reservoir (SBR) with $^{234}\text{U}/^{238}\text{U}$ activity ratio (AR) 1.95–1.99 and U concentration 0.44–0.46 $\mu\text{g}/\text{L}$. Lateral penetration of the SBR water from the hydrostatically loaded deeper part of the lake (1000 m and more) to the adjacent Siberian craton area is promoted by gentle ruptures of the Angara thrust fault and sub-vertical shear fissures of the Main Sayan suture zone. In order to predict the time and place of a strong earthquake, AR are determined in groundwater from craton basement and sedimentary cover in an area from Lake Baikal to Irkutsk. AR values associated with deformational (Cherdyntsev–Chalov) effect vary from 1.0 to 3.5. Chemical impacts in evaporates result in AR values as high as 16. Data of a 7-year monitoring show key points in AR variations that might be used for prediction of a future strong earthquake.

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