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# Potential salinization mechanisms of drinking water due to large-scale flow of brines across faults in the Tiberias Basin

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The Lake Tiberias (LT) located in the Kinneret basin is one of the most important freshwater resources for the area. Several hydrothermal springs discharging along the shoreline of LT are the main sources of salinity and thermal pollution of the lake. The pressure and geothermal regime controlling the upward movement of brines along the faults are still debated. Furthermore, the discovery of the buried salt structure of Zemah (e.g. Inbar 2012), located south of LT, raised additional questions as to whether the observed salinities could also be the result of density-driven flow in the vicinity of deep-seated salt bodies. In this respect, faults play an important role as they determine the structural features of the basin and can be either permeable or impermeable to fluid flow. Over the regional scales considered here, rock properties (e.g. porosity, permeability, and diffusivity), fluid properties (i.e. density and viscosity) as well as temperature and solute concentration may vary strongly. Therefore, within the same system, several forces interact and drive groundwater flow. The resulting hydrologic regime can display complex dynamical behavior such as convective cells.
In this presentation, numerical models of heat and brine flow are carried out to study the outflow of deep fluids that endanger the LT. The observed thermal springs within the basin are caused by several hydrologic regimes, controlled by faults and hydraulic permeability distribution. Different scenarios are presented. The results indicate that faults enhance upward migration of hot fluids which mix with recharge flow of colder freshwater. These findings are supported by hydrochemical analyses and temperature data used as dataset to calibrate the numerical calculations and to constrain possible fluid migration.
The presented study provides an example of the conjoint use of numerical and hydrochemical methods as well as geological and structural studies to infer the mechanisms that link basin features with environmental issues, such as upsurge thermal brines endangering freshwater resources.

Reference

Inbar, N. (2012), The Evaporatic Subsurface Body in Kinnarot Basin: Stratigraphy, Structure, Geohydrology, 131 pp, Tel Aviv University.