THE INFLUENCE OF DENSITY INDUCED FLOW ON GROUND WATER FORMATION IN SEDIMENTARY BASINS

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Density convection is one of the main factors that lead to origin of thick deep zone of chloride brine in sedimentary basins with halogen deposits. The largest scale of evaporation sedimentation took place at Russian Platform in the Perm Time. Gravitationally unstable system with anomalous density distribution of water in a vertical crossection originated that time and endured during tens millions of years. In that time upper part of groundwater under the see basin level was a origin evaporation brine with total dissolved solids (TDS) up to 500 g/l, moistly the magnesium-chloride composition. Deeper part of groundwater in carbonate-terrigenous formations had TDS about 30 - 150 g/l. That is why vertical density gradients (0.1-0.3) were the main driven forces for penetration of upper dense water from evaporation surface to basin bottom. We developed a basin-scale density induced flow model to simulate these effects on example of Solikamsk Depression (Western Ural, Russia). The model has shown that density driven flows under the salt formation had relatively high velocities and they formed regional scale complicate sell-like structures of diffluence with lateral flow direction above surface of aquitards and narrow zones of vertical penetration. Penetration of magnesium-chloride brines into deep formations was accompanying by process of brine-water-rock interaction. The results of geochemical and lithological studies and thermodynamics modeling show that the main process is metamorphosic transition of limestone into dolomites with changing of brines composition from magnesium-chloride to calcium-chloride. This work was done