STABLE ISOTOPIC STUDIES OF HYPERSALINE SHALLOW GROUNDWATER ON THE ISLAND OF LÆSØ, DENMARK

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Hypersaline shallow groundwaters have patchy occurrences in superficial postglacial marine sediments beneath coastal meadows and salt marshes on the southern shores of the Island of Læsø, Denmark. The postglacial sequence consists of 1 to 2 meter of marine sands and gravels resting on a slightly undulating platform of practically impermeable interglacial marine clay which makes up a confining layer or aquiclude. The hypersaline brine primarily occurs beneath the vegetated fringe. The salinity varies from 2% to a maximum of approximately 17% and hydrochemical analyses of major cations and anions indicate a prevailing marine composition. However, stable isotopic analyses reveal a significant positive correlation with the local groundwater-seawater mixing line indicating a significant mixing of freshmeteoric groundwater with seawater in the proportion from 0% up to 50%. In contrast, the stable isotopic compositions show no correlation to the wide range of salinities recorded. Thus, it is believed that the thin aquifer forms a relatively closed system in which the interstitial water has been concentrated by evapotranspiration. The spatial distribution of the hypersaline groundwater most likely depends on the microtopography of the undulating clay platform. The dense high-saline shallow groundwater emerging from the vegetated fringe and flows towards the depressions in the clay platform and percolates downward displacing lower-saline seawater and groundwater.