



Dating of saline groundwater from several Israeli aquifers, indication for paleo seawater intrusion

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This study deals with dating of saline groundwater, with salinity closed to that of seawater (mostly >75% seawater), in order to estimate the timing of past events of seawater intrusion. Such dating was seldom conducted before since, in most cases, even the most saline water samples have a significant component of fresh water.

Dating of saline groundwater was conducted in two of the main aquifers in Israel (the Coastal Aquifer and the Mountain Aquifer). In the Coastal Aquifer, most of the saline water was found to be young (>50 years, tritium containing, ~60 PMC) indicating recent seawater intrusion. However, in some of the deeper sub-aquifers, older saline water was found (5-10 PMC, i.e. older than ~10,000 years), implying penetration of seawater at older time. Complementary age determinations were conducted on the fresh groundwater, some of which were found to be very old.

In the Mountain Aquifer, old saline water bodies were found in several locations. Estimation of the age of the different end members (fresh and saline) showed that the seawater component is older than 30,000 year, probably beyond radiocarbon dating. The isotopic values of this old seawater component is similar to that of the present seawater (e.g. $\delta^{18}O$ of ~1.5‰ and 1.8‰ in old and recent seawater) which implies that the intrusion took place in similar sea conditions to that of the present ones. An attempt to determine the age of this old seawater will be done with noble gases.

Numerical simulations were conducted with FEFLOW in order to examine the flow regime in the different parts of the coastal aquifer. The preliminary steady state simulations fit quite well with ages of saline groundwater. Transient simulations are planned to be conducted in the next stage in order to simulate the effect of sea level changes (e.g. the rise of 120 meters at the end of the glacial period) on the rate of seawater intrusion into the coastal aquifers.

Due to the limitation of the radiocarbon methods, samples were taken for analysis of ^{81}Kr and ^{39}Ar in November 2005 and some results are planned to be given in this presentation.