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Seasonal variations of halite saturation in the Dead Sea

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Thermohaline stratification in hypersaline lakes expected having influence upon the brine's degree of saturation, due to the dependency of halite solubility on temperature and salinity. Spatio-temporal variations of halite degree of saturation is unknown, thus, a systematic field study is requires in order to quantify super and under-saturation of the brine.
The Dead Sea is a hypersaline terminal lake, experiencing a continuous level drop since the mid-20th century. Transition to monomictic conditions at the beginning of the 1980's caused supersaturation of the brine and initiated precipitation of halite.
Evaporation from the brine surface results in an upper warmer-saltier layer (epilimnion), separated from the lower colder-less salty layer (hypolimnion) by a 20-30m deep thermocline. However, linkage between limnologic seasonal cycle and halite degree of saturation is unclear.
Direct evidence of brine density and temperature, halite crystallization rates and photography of Dead Sea floor reflect limnological conditions and halite crystallization pattern, and were therefore used in this study.
Here we show simultaneous existence of opposite evaporitic environments, governed by depth, in the Dead Sea. During summer, the epilimnion is under-saturated with respect to halite, and halite dissolution dominates, while the hypolimnion is super-saturated with respect to halite, thus, precipitation dominates. During winter continuous halite precipitation is evident along the water column.
Our results show that non-uniform vertical halite precipitation can occur in a compositional homogeneous water body, controlled by the limnologic conditions. These findings can be used for interpretation of depositional environment of halite sequences.