

The Dynamics of Halite Precipitation in the Dead Sea: Seasonal and Spatial Variations

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The Dead Sea is a deep hypersaline terminal lake that actively precipitates halite as a response to the negative water balance of the lake (evaporation > inflows). From mass balance consideration, a uniform ~3 m thick halite sequence is expected to cover the lake floor following the ~30 m level drop; however such a massive layer does not exist in the shallow water. In this talk we present new insights on the dynamics of halite precipitation and dissolution in a seasonally stratified lake, based on field observations. In situ monthly observations include the depth profile of the following: (i) halite precipitation rate, (ii) temperature, (iii) salinity, (iv) halite saturation, and (v) underwater photography of the sea floor and the water column – documentation of active halite precipitation/dissolution. We found a clear relation between the thermohaline stratification of the water column and halite precipitation/dissolution. The epilimnion experiences seasonal dissolution/precipitation cycle, while the hypolimnion continuously precipitates halite. We discuss the seasonal variations of the atmospheric forcing – the heat and water fluxes, and the response of the lake – thermohaline stratification and the precipitation/dissolution of halite along the water column and lake floor. We also discuss the role of diapycnal flux on the precipitation of halite and the salt fluxes. Geological implications on the lateral extent and thickness variations of evaporitic layers in evaporitic environments are also discussed.