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Halite precipitation from double-diffusive salt fingers in the Dead Sea: Numerical simulations RAPHAEL OUILLON, University of California, Santa Barbara, NADAV LENSKY, VLADIMIR LYAKHOVSKY, ALI ARNON, Geological Survey of Israel, ECKART MEIBURG, University of California, Santa Barbara — Thick, extensive salt layers are commonly found in the Earths geological record and formed as a result of a negative water balance in hypersaline lakes saturated in salt. Today, the Dead Sea is considered to be the only modern analog to these deep hypersaline lakes. Recent field work conducted by the Geological Survey of Israel showed that during the dry summer season, the top layer of the Dead Sea is warmer, saltier and undersaturated in salt, and that double-diffusive convection is responsible for delivering dissolved salt from the top layer to the bottom layer, resulting in continuously supersaturated bottom layer and seasonally undersaturated top layer. We present numerical simulations of this double-diffusive process directly based on measurements from the field work. The simulations account for the phase change from dissolved to crystalline salt, and for the settling of the salt crystals. We show that no other physical mechanism than double-diffusion is required in order to generate sufficient transport of salt and obtain the salinity and temperature profiles measured in the summer in the Dead Sea. The combined field measurements and numerical simulations paint a novel and promising picture for the mechanisms of salt deposition in the historical record.

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