A 45 kyr laminae record from the Dead Sea: Implications for basin erosion and floods recurrence

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Recording and analyzing how climate change impacts flood recurrence, basin erosion, and sedimentation can improve our understanding of these systems. The aragonite-detritus laminae couplets comprising the lacustrine formations that were deposited in the Dead Sea Basin are considered as faithful monitors of the freshwater supply to the lakes. We count a total of \textasciitilde5600 laminae couplets deposited in the last 45 kyr (MIS3-MIS1) at the Dead Sea depocenter, which encompass the upper 141.6 m of the ICDP Core 5017-1. The present study shows that aragonite and detritus laminae are thinner and occur at high frequency during MIS 3-2, while they are much thicker and less frequent during MIS 1. By analyzing multiple climate-connected factors, we propose that significant lake-level drops, enhanced dust input, and low vegetative cover in the drainage basin during the last deglaciation (22-11.6 ka) have considerably increased erodible materials in the Dead Sea watershed. We find a decoupling existed between the significant lake-level drop/lake size reduction and lamina thickness change during the last deglaciation. We argue that during the last glacial and the Holocene, the variation of lamina thickness at the multiple-millennium scale was not controlled directly by the lake-level/size change. We interpret this decoupling implying the transport capacity of flash-floods is low and might be saturated by the oversupply of erodible materials, and indicating a transport-limited regime during the time period. We suggest that the observed thickness and frequency distribution of aragonite-detritus laminae points to the high frequency of small-magnitude floods during the last glacial period, in contrast to low frequency, but large-magnitude floods during the Holocene.