



Geomorphological, chronological and sedimentological evidence for a high stand of Lake Lisan of at least 100 m higher than previously reported.

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Along the eastern escarpment of the Dead Sea rift, Middle Cambrian unconsolidated siltstones outcrop repeatedly in Wadi Al-Tayan due to branches of the Dead Sea Transform Fault. On these siltstones lake terraces have been preserved at altitudes of -150 to -56 m, ca. 100 m higher than the previously reported high-stand of glacial Lake Lisan. The altitudes of the terraces were determined with DGPS and remains of calcareous stromatolitic crusts were U/Th dated and analysed for their microstructures, mineral composition (XRD), and Mg/Ca ratios.

According to the new data, the history of Lake Lisan can now be reconstructed much more precisely: the lake stood at -56 m at ~80 ka BP and at -66 m at 76 ka BP, reflecting an extraordinary humid climate during MIS 5a in the southern Levant. In two profiles, terraces up to -19m occur suggesting that the lake stood even up to this level prior to 80 ka BP. After this high stand period the lake level dropped dramatically until it reached -350 m at ~63.6 ka BP, implying a cold and dry climate of the Jordan valley during H6 and MIS 4. Following a low level period between ~63 and 57 ka BP, the lake recovered again, reaching a high stand of > -137 m just before 32 ka BP. This suggests a once again more humid climate and a high water input to Lake Lisan during MIS 3.

By the beginning of MIS 2, the lake receded from its high stand of -137 m at 32 ka BP to -148 m at ~30 ka BP associated with H3. The lake level continued to drop to -152 m at ~27 ka BP and to -154 m at ~23 ka BP. Then, the lake level dropped sharply to -200 m at ~22.5 ka BP, consistent with the dry cold climate of H2. During the LGM, Lake Lisan recovered again to a high stand of -160 m at ~ 19 ka BP, implying a return to a positive water balance. The correspondence of Lake Lisan regressions to the cold MIS 4 and 2, as well to Heinrich events 6, 3 and 2 implies a cold, dry climate of the Levant during these periods. On the other hand, the lake high stands during MIS 5a and the sharp transgression of the lake during MIS 3 suggest a warm, wet climate of the Jordan valley during these periods, most likely caused by an invasion of the Monsoon from the south.