ICDP Dead Sea deep core pore fluids reveal linear global climate coupling with Levant hydrology

E. J. LEVY [1,2]*, B. LAZAR[3], M. STEIN[2,3], Y. YECHIELI [2,4], I. GAVRIELI [2], O. SIVAN [1]

[1] Department of Geological & Environmental Sciences, Ben-Gurion University of the Negev, Beer Sheva, Israel (*correspondance: elanl@post.bgu.ac.il)

[2] Geological Survey of Israel, Jerusalem, Israel

[3] The Fredy & Nadine Herrmann Institute of Earth Sciences, Givat Ram, Jerusalem, Israel

[4] Department of Hydrology and Microbiology, Zuckerberg Center, Ben-Gurion University of the Negev, Sede Boker, Israel

Pore fluids along a 450m core drilled at the bottom of the Dead Sea by the ICDP, provide an archive of chemical variations in the deep lake that responds to hydroclimate variations in the lake's watershed and the Levant region during the last 220 ky. The concentrations of the conservative ions: Br^- and Mg^{2+} reflect the secular variations in the lake volume. These variations, in turn mirror the glacial-interglacial cyclic patterns seen in CO_2 records (DOME C) and marine benthic $\delta^{18}O$ (LR04), indicating a linear response of the regional hydroclimate to global climate change. Two significant deviations from this behaviour coincide with the ages of Mediterranean Sapropel layers S1 and S5 at peak summer insolation at 65° N. These deviations indicate an increase in regional hydrological activity and lake level rises. The limnological response to lake volumetric change over time is reflected also in the non-conservative Na/Cl record. Lake level drops (reflected by a substantial increase in Br^- and Mg^{2+}) in the Dead Sea are marked by drops in the Na/Cl ratio due to halite (NaCl) precipitation while rises in lake level coupled with brine dilution are marked by significant halite dissolution and increase in the Na/Cl ratio.