Geochemical evolution of Lake Lisan from interstitial soluble salts in cores of Dead Sea Deep Drilling Project

O. KHALIFA[1,2*], B. LAZAR[1], M. STEIN[1,2]

[1]Institute of Earth Science, The Hebrew University of Jerusalem, Jerusalem 91904, Israel (*correspondence: omri.khalifa@mail.huji.ac.il)

[2]Geological Survey of Israel, 32 Yesha'ayahu Leibowitz, Jerusalem 9371234, Israel

Located on the transition between the climatic belts of the hyperarid Sahara to the subtropical Mediterranean, and being a terminal lake, the hypersaline Lake Lisan, the last glacial precursor of the Dead Sea has been in the focus of extensive paleoclimate research during the past 2 decades [1,2]. The sediments deposited from the lake comprise the Lisan Formation that consists mainly of sequences of laminated primary aragonite, silty detritus and gypsum. The primary aragonite was precipitated from the lake epilimnic solution and the silty detritus comprises mobilized particles of the lake's watershed surface cover [1].

Here, we report on chemical compositions of primary aragonite laminae and interstitial soluble salts in the adjacent laminae. The soluble salts represent the lake's brine solution comprising the hypolimnic solution. Samples were taken from the marginal terraces of the modern Dead Sea where the Lisan Formation is exposed and from sediments cores recovered during the Dead Sea Deep Drilling Project[3] held by the ICDP. Thus, the sampling provides information on the lake solutions in the deep and shallow limnological environments. The measured ions are: Ca^{2+}, Mg^{2+}, K^{+}, Cl^{-}, Na^{+}, Sr^{2+}, SO_4^{2-}, Fe^{2+}, Br^{-}, Mn^{2+}. Among these ions we emphasize here the temporal changes in the Sr/Ca ratio that declines in the primary aragonites and soluble salts of the marginal sections from ~0.009 to ~ 0.0049 and 0.0137 to 0.0065, respectively. This decline reflects the continuous freshening of the lake during the last glacial period, a process that is also evident from the ions concentraions in porewaters extracted from sediments of the same cores. The secular changes in the Sr/Ca ratio as well as the temporal behavior of other ions will be discussed in the presentation.

[1] Stein et al. (1997) GCA **61**, 3975-3992. [2] Lazar et al. (2014) EPSL **400**, 94-101. [3] Neugebauer et al. (2014) QSR **102**, 149-165.