Inter-annual study of the re-oxidative part of the sulfur cycle in Lake Kinneret

AVETISYAN K.[1], FINDLAY, A.[1], ECKERT, W.[2], KAMYSHNY JR., A.[1]

[1]*Department of Geological and Environmental Sciences, Faculty of Natural Sciences, Ben-Gurion University of the Negev, P.O. Box 653, 84105 Beer Sheva, Israel*

[2] *Israel Oceanographic & Limnological Research Ltd., Yigal Allon Kinneret Limnological Laboratory*

Water column of monomictic Lake Kinneret, Israel was sampled during two annual cycles of hydrographic conditions in order to understand a variability of annual conditions at the chemocline and hypolimnion of the Lake with a focus on the re-oxidative part of the sulfur cycle.

During the Lake stratification period (March 2014-January 2015) sulfate concentrations were 520-600 µM, high at the epilimnion and decreased with depth below the chemocline during stratification. Hydrogen sulfide concentrations increased to 322 µM during stratification period. Depth profiles of sulfide oxidation intermediates show similar trends during two annual studies. The highest concentrations of zero-valent sulfur increased from 3.6 µM in May to 6.6 µM in November. Concentrations of thiosulfate and sulfite were low in May (up to 0.11 µM and 0.54 µM) and increased in November up to 0.63 µM and 0.68 µM, respectively. During late spring to mid-autumn, there were two distinct peaks of sulfide oxidation intermediates: one 0.8-1.0 m below the chemocline and one at the benthic boundary layer.

During the early stages of stratification in May, the sulfur isotope fractionation between sulfate and hydrogen sulfide was 15.6‰ (2014) and 11.6‰ (2012). In autumn the sulfur isotope fractionation increased to the highest value of 30±4‰ and 35±2‰ in 2012 and 2014, respectively.

Concentrations of sulfate and hydrogen sulfide in the Lake as well as their isotopic composition were similar during two years. Concentrations of sulfur oxidation intermediates, especially of zero-valent sulfur showed higher variability.