

Stable Carbon ($\delta^{13}\text{C}$) and oxygen ($\delta^{18}\text{O}$) isotopic compositions of the evaporate mineral associated recent and shallow core sediments of hypersaline Lake Acı göl Denizli, Turkey

Murat Budakoğlu and Muhittin Karaman

Geochemistry Research Group and JAL Laboratories, Department of Geological Engineering, Faculty of Mines, Istanbul Technical University, Maslak, 34469 Istanbul, Turkey

Carbon ($\delta^{13}\text{C}_{VPDB}$) and oxygen ($\delta^{18}\text{O}_{VPDB}$) isotopic ratios of recent lake sediments (n=33) and lithological samples (n=6) were obtained to investigate of carbon source and hydro climate changes in Lake Acı göl Basin. Recent lake samples were collected as surface (n=15), core (n=13) and shallow core samples (n=5). Discrete samples, totally 13 samples, were collected every 5cm of core from recent lake sediments. The $\delta^{18}\text{O}_{VPDB}$ values of 33 samples from different sediments and lithology (n=6) varied between -9.7‰ and 6.2‰. $\delta^{13}\text{C}_{VPDB}$ values of all samples ranged between -5.1‰ and 2.1‰. Lithology samples have negative oxygen isotope values changing between -9.7‰ and -1.3‰ and carbon isotope values varying between -5.1‰ and 2.1‰. $\delta^{13}\text{C}_{VPDB}$ and $\delta^{18}\text{O}_{VPDB}$ isotope core data are positive ranging between 0.9‰ and 0.8‰ and 2.8‰ and 6.2‰ respectively. Lithology samples have negative $\delta^{18}\text{O}_{VPDB}$ isotope values due to their calcite contents. Recent surface lake sediments samples collected different location of lakes and classified as covered always (CAbLW) or covered seasonally (CSbLW) by lake waters. The $\delta^{18}\text{O}_{VPDB}$ and $\delta^{13}\text{C}_{VPDB}$ values of CSbLW sediments vary between -1.9‰ and 4.9‰, -2.0‰ and 0.6‰ respectively. In contrast to, CAbLW sediments have negative $\delta^{13}\text{C}_{VPDB}$ values ranged between -3.7‰ and -0.9‰ and positive $\delta^{18}\text{O}_{VPDB}$ values changed between 1.3‰ and 2.8‰. The positive $\delta^{18}\text{O}_{VPDB}$ values of CAbLW sediments indicate that carbonate precipitation occurs under evaporation effect. The strong positive correlation identified between $\delta^{18}\text{O}_{VPDB}$ and $\delta^{13}\text{C}_{VPDB}$ for each distinct group of sediment sample. The correlation coefficient between the $\delta^{18}\text{O}_{VPDB}$ and $\delta^{13}\text{C}_{VPDB}$ is 0.67, 0.87, and 0.78 for CSbLW, CAbLW and core samples, respectively. The strong correlation for each sediment group indicates that lake basin has a closed basin system and carbonate precipitation occurred from saturated lake water. The extreme $\delta^{18}\text{O}_{VPDB}$ and $\delta^{13}\text{C}_{VPDB}$ anomaly were obtained at 4-6cm and 30-32 cm, and 18-22cm and 22-26cm range of the core samples, respectively. The positive $\delta^{18}\text{O}_{VPDB}$ anomaly along the core samples indicates that lake basin has always semi arid-arid climate. However, the extreme anomaly of $\delta^{18}\text{O}_{VPDB}$ in core samples reveals that in this sedimentation range lake basin has a severe drought climate and high saline environment.

Keywords: Hypersaline Lakes, Stable Carbon ($\delta^{13}\text{C}$) and oxygen ($\delta^{18}\text{O}$) isotope