

Mineral Magnetic and Geochemical Properties of Kucukcekmece Lagoon (Western Anatolia)

Özlem Makaroğlu^{1,2}, Norbert R. Nowaczyk², Namık Çağatay³, Naci Orbay¹, Sena Akçer Ön⁴, Umut Barış Ulgen³, Dursun Acar³

¹ Istanbul University, Department of Geophysics, Istanbul, Turkey

² Helmholtz Center Potsdam, GFZ, Section 5.2, Potsdam, Germany

³ Eastern Mediterranean Centre for Oceanography and Limnology – EMCOL. Faculty of Mines, Istanbul Technical University, Istanbul, Turkey

⁴ Mugla Sıtkı Kocman University, Department of Geology, Mugla, Turkey

Corresponding author: ozlemm@istanbul.edu.tr

Abstract: We present the results of mineral magnetic measurements and geochemical XRF Core Scanner elemental analyses from three cores (KCL12P1/P2/P3) recovered in water depths of 20-17 m in different parts of Kucukcekmece Lagoon (40.98° N, 28.76° E), located at northern shoreline of the Sea of Marmara, west of Istanbul. The lagoon is connected to the Sea of Marmara via a 2 km long natural narrow channel depth 1.5 m. Mineral magnetic measurements include κ_{LF} (bulk magnetic susceptibility), IRM (isothermal remanent magnetisation), ARM (anhysteretic remanent magnetisation) and thermomagnetic analyses. S-ratio and HIRM were calculated. μ -XRF-ray fluorescence (XRF) Core Scanner analysis were made at 1 mm resolution using an Itrax XRF Core scanner equipped with XRF-EDS, X-Ray radiography, and RGB colour camera. The cores lithologically include grey to brown colored laminated and homogenous sediments, intercalated by homogenous black layers. Downcore profiles of magnetic susceptibility and S-ratio are correlatable between the four cores. Here we present the detailed results from the 512 cm length Core KCL12P2, recovered from the deepest basin of the lagoon. Downcore variation of magnetic properties and some geochemical elemental profiles (e.g., Ca/Ti, Sr, K/Ca) show good correlation through the core. According to the mineral magnetic properties, core KCL12P2 visually consists of three different magnetic units. Unit A shows relatively moderate and stable values through the core. It is composed of grey to brown colored laminated sediment. The normalized parameters (Zr+Rb)/Sr and Ca/Ti were used as proxies of terrigenous input and carbonate production, respectively. During the deposition of Unit A there was relatively humid period and high terrigenous input. Unit B consists of homogeneous black sediments that have high magnetic susceptibilities ($15 - 223 \times 10^{-5}$), high S-ratios (0.95 - 0.99), and high HIRM ($90 - 2 \times 10^3$) values. The SIRM/ κ_{LF} values vary between 20 and 100 kAm^{-1} . The thermomagnetic and mineral magnetic parameters support that Unit B is dominated by greigite, causing characteristic distinctive peaks, varying

between 10 and 5 cm in thickness throughout the core. Unit C consists of homogeneous grey sediment. Low S-ratio values indicate an increase in high coercivity (or decrease in low coercivity) magnetic minerals in Unit C. HIRM, Sr and Ca/Ti profiles which have relatively high values indicate there was a low terrigenous input and dry periods during the deposition of Unit C sediments.

Keywords: Kucukcekmece Lagoon (Istanbul), magnetic properties, geochemistry.