



PALEOENVIRONMENTAL CHANGES IN LAKE VAN DURING THE LAST GLACIAL-HOLOCENE

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INTRODUCTION

Lake Van, located in East Anatolian Plateau, Turkey, is the largest soda lake in the world having a volume of 607 km³ and a maximum depth of 461 m (Fig. 1). It is a closed lake with a 9.2 of pH and salinity of 22‰ (Reimer et al., 2009). We studied ICDP sediment cores from a water depth of 245 m in the Northern Basin using multi proxy analysis, including MSCL, total organic carbon (TOC), total inorganic carbon (TIC) and δ¹⁸O and δ¹³C of bulk carbonate. The age model is based on three AMS radiocarbon determinations, tephra ages (Landmann et al., 1996) and varv counting.

The main objective of the study to decipher past climate conditions in Eastern Anatolian Plateau over the last 27 ka.

RESULTS AND DISCUSSION

• The lithology of the composite section in the Northern Basin includes banded and laminated mud, homogeneous grey mud, tephra, turbidite -homogenite mass flow, and deformed sediment units (Fig. 2). Multi-proxy analyses were mainly conducted on the banded and laminated mud and homogeneous grey mud that are the autochthonous lake sediments.

• δ¹⁸O and δ¹³C values are closely correlated (r=0.88-0.95; Fig. 3), indicating that Lake Van has been a closed lake over the last 27 ka. High amplitude oscillations (4-5 ‰) in δ¹⁸O and δ¹³C values, suggesting climatically driven lake level oscillations during the period.

• Very low δ¹⁸O values (<-4‰) are observed at 4-2, 17-14, 21.3 and 27-26 ka cal BP, which probably correspond to relatively high lake levels. The highest δ¹⁸O value (+4.2 ‰ VPDB) is found at 10.75 ka BP, corresponding to a low lake level. At this time TOC and TIC values show opposite trends.

• TOC and TIC profiles are positively correlated for the Holocene (r=0.44) and show no significant correlation for Oxygen Isotope Stage-2 (OIS) (r=-0.08), with both variables being higher for the Holocene than OIS-2 (Fig 2).

• For the OIS-2 (excluding the Younger Dryas), TOC and TIC values are relatively lower (TOC<2 wt% and TIC<4 wt%) and detrital input are higher (as shown by magnetic susceptibility profile) than those for the early Holocene values; the low organic productivity during the former period is associated with cold climate conditions and relatively high lake levels.

• The highest TOC values (>4 wt%) are observed during 9-6.5, 5.7 and 5-4 ka cal BP. Significant positive correlations between TOC, TIC, δ¹⁸O and δ¹³C values during these periods suggest that the high TOC and TIC values may be related to high organic productivity, probably associated with relatively low water levels and effective nutrient cycling in the lake.

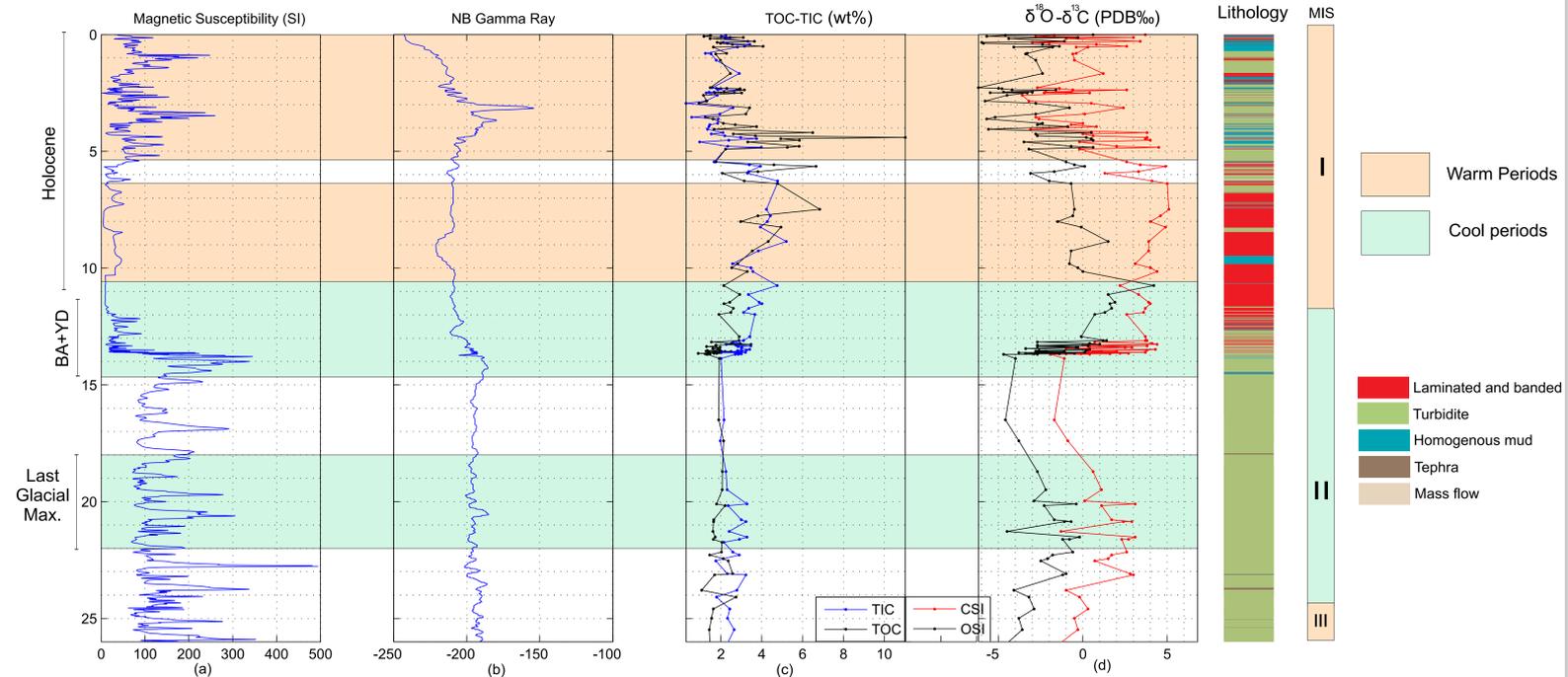


Fig 2: Lithostratigraphy and proxy profiles of: (a) magnetic susceptibility, (b) Gamma Ray, (c) TOC/TIC values and (d) δ¹⁸O and δ¹³C values of bulk carbonate in Northern Basin stratigraphic section covering last 26-27 ka calBP

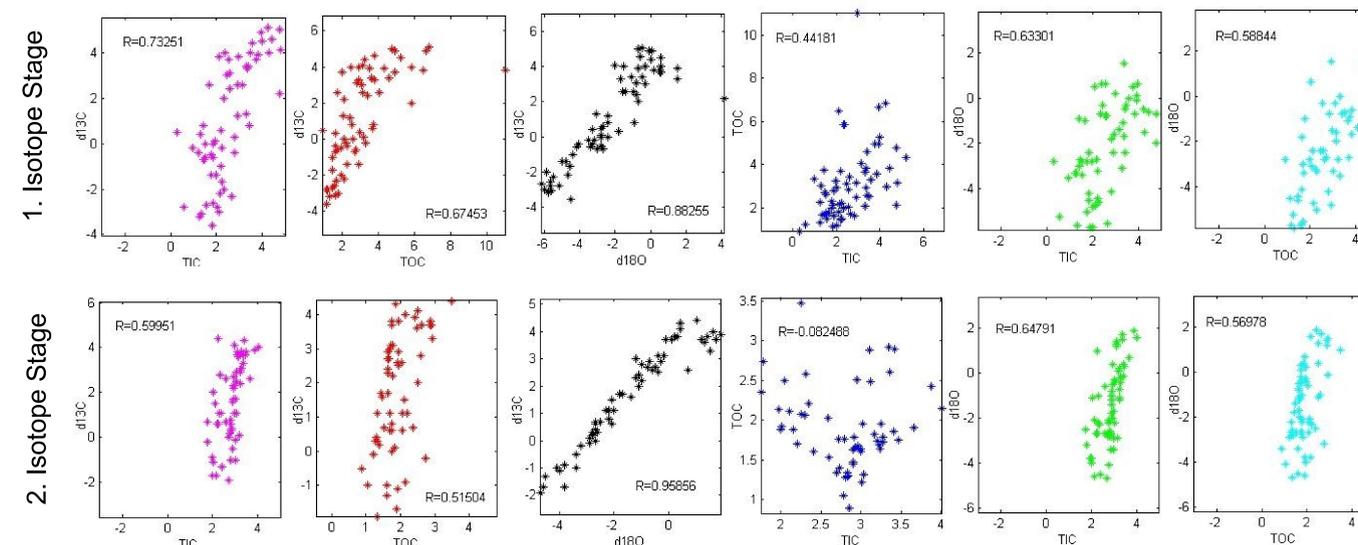


Fig 3: Cross-plots of proxy parameters for OIS-1 and OIS-2 in Northern Basin stratigraphic section.

STUDY AREA

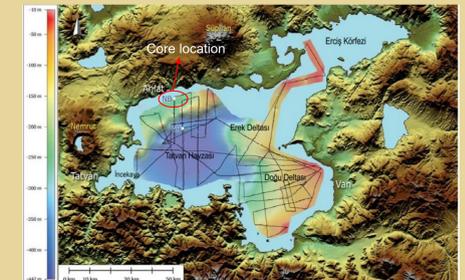


Fig 1. Bathymetry of Lake Van-Eastern Anatolia, showing the location of the ICDP Drill site in Northern Basin (NB)

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