

## ORGANIC GEOCHEMICAL EVIDENCE FOR PALEO-ENVIRONMENTAL CONDITIONS IN MARMARA LAKE, WESTERN TURKEY

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It is well known that changes in climatic, hydrologic, tectonic or volcanic processes are recorded in lake sediments. Although there are a number of recent lake systems in Western Turkey, only a few of them have been studied in detail to investigate this kind of paleo-environmental and paleo-climatic changes during the Holocene. One of the less studied lake systems is the Marmara Lake (Manisa).

The characteristics of organic matter in a 1.5 m long sediment core from Marmara Lake were investigated by bulk organic geochemical methods and analyses of *n*-alkanes and fatty acid distributions in selected samples.

Variation of the bulk organic geochemical properties, such as amount and type of organic matter and carbon isotopic composition was used to differentiate four intervals (0-95 cm, 95-108 cm, 108-119 cm, 119-140 cm). The two upper intervals contain relatively high amounts of total organic carbon (TOC: 1.2%-2.6%; 2.8%-3.67%) of terrestrial to mixed organic matter type (Hydrogen Index HI: 95-300 mg HC/ g TOC; 229-266 mg HC/ g TOC). The third interval with a decreasing trend of TOC from 2.51% to 0.45% contains predominantly terrestrial organic matter (HI: 40-117 mg HC/ g TOC). The deepest interval is characterized by low TOC ( $\leq 0.5\%$ ) and HI values of 40-80 mg HC/ g TOC. These four intervals have also distinct carbon isotopic signatures of the organic matter, lithological and sedimentological characteristics, supporting the differentiation based on bulk organic geochemical properties (Figure 1).

These intervals were also investigated from a molecular biogeochemical point of view in terms of *n*-alkane and fatty acid distributions. The upper most 63 cm thick part of the section is characterized by an *n*-alkane distribution, which has its maximum at C<sub>23</sub>, typical for aquatic macrophytes. Samples from the lower parts of this interval contain a high amount of C<sub>29</sub> *n*-alkanes and show a strong odd over even predominance, both typical for terrestrial organic matter transported into the lake from the catchment. Samples from the second interval show a bimodal *n*-alkane distribution with maxima at C<sub>13</sub> and C<sub>29</sub> which indicates mainly terrestrial organic matter input. The following interval at 108-119 cm exhibits a similar bimodal *n*-alkane distribution with two maxima at C<sub>23</sub> or C<sub>29</sub> indicating two different organic

matter sources, respectively aquatic (macrophyte) and terrestrial. The deepest interval includes mainly terrestrial organic matter.

The lowermost two intervals of the core contain also short chain length even numbered *n*-alkanes in significant amounts. It has been proposed that high amounts of such compounds ( $C_{14}$  and  $C_{16}$ ) may possibly be the product of reductive diagenetic transformation of the corresponding *n*-fatty acids (Welte and Ebhardt, 1968; Elias et.al., 1997). The fatty acid distribution with maxima at the range of  $C_{16}$  to  $C_{28}$  also shows obvious variations, which are in accordance with the *n*-alkane distribution.

Bulk organic geochemical, biogeochemical and geological properties indicate that, autochthonous organic/inorganic matter supply into and bio-productivity within the lake has changed through time. Such variations will be discussed based on local geology, tectonics and climate induced hydrologic conditions in the catchment area.

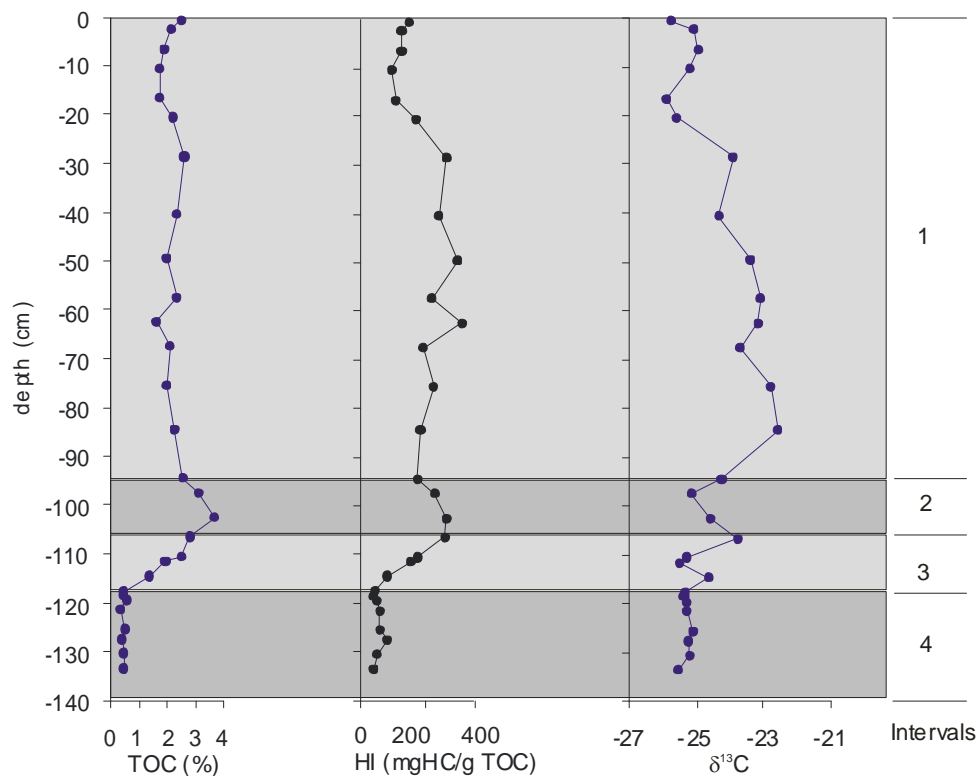


Figure 1. Variation of the amount, type and carbon isotopic signature of the organic matter along the sediment core from Marmara Lake.

## REFERENCES

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