



Paleoenvironmental significance of the Serravallian-Tortonian Tuğlu section, Çankırı Basin, Central Anatolia

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Sediments from the Tuğlu section provide one of the reference sequences for the Middle-Late Miocene of the Çankırı basin, in Central Anatolia. The section has been sampled for micropalaeontological (ostracods, foraminifera, pollen, characeae), palaeontological (molluscs, small mammals, fish remains) and stable C and O isotope analyses of ostracod valves. The integrated study of the section has led to a detailed palaeoenvironmental reconstruction.

From the bottom to the top, the over 20-m-thick section represents a marginal marine palaeoenvironment evolving from a shallow lake to a slow flowing lotic environment passing through a shallow lake stage. Palaeosalinities estimated from the ostracod assemblages are quite high, ranging from hyperhaline in the lower part of the section to oligohaline in the upper part. A peculiar assemblage, of foraminifers, dominated by the cosmopolitan shallow-water euryhaline benthic miliolids occurs at the base of the section. Stable isotope geochemical analyses have been performed on bulk samples from a selected interval of the section. For ostracod work, about four adult valves of the species *Cyprideis pannonica* Mehes have been analysed per sample, from 20 samples. The typical euryhaline dweller genus *Cyprideis* is today abundant on tidal mudflats of salt marshes and estuaries. The paleobotanical data yield further evidence of an open grassland with local swamps and riparian forests, herbs and shrubs. The small mammal association suggests a dominant open woodland environment (Mazzini et al., 2010).

$\delta^{18}\text{O}$ of ostracod valves vary in a rather restricted range of 2.5 ‰ mostly between -5.1 and -2.6 ‰ (PDB). $\delta^{13}\text{C}$ values are surprisingly low, varying mostly between -9.2 and -6.4 ‰ (PDB). The isotopic data suggest a temperate, relatively humid environment of deposition. The $\delta^{18}\text{O}$ of the valves display a vital offset of approx. +2‰ based on the isotopic composition of the host marls analysed along with the valves. Assuming that calcification of the valves took place in isotopic equilibrium with the water, reconstructed lake water isotopic compositions likely range between -5.5 and -2.5 ‰ (SMOW). These values are significantly, 3 to 10 ‰ more positive than those of the recent surface waters in Central Anatolia, but agree well with those in the Eastern Mediterranean area, S of the Anatolian Plateau. The modern difference in isotopic patterns of the two regions is controlled by a marked orographic rainout at the Tauride Mountains (Mikes & Mulch, 2010).

The paleoenvironmental signal retained by the fossil assemblage suggests that for the recorded salinity no primary climatic drivers (such as aridity) can be accounted for on the Central Anatolian Plateau, and allows two competing scenarios to be proposed:

- 1., Increased salinity of the lake waters is connected to the dissolution of Palaeogene evaporites and their persistence in the water budget of the internally drained Central Anatolian basin system.
- 2., The water budget of the Çankırı Basin represented a branch of the Paratethys, with the uplift of the Central Anatolian Plateau thus post-dating deposition in the Tuğlu section.

References

Mikes, T. & Mulch, A. (2010). Variations in hydrogen and oxygen isotope composition of meteoric waters across the Central Anatolian Plateau. Geophys. Res. Abstracts 12, EGU2010-14204.

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