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5,000 years of water level changes infered from ostracod assemblages in a lowland lake in Romania (Central Eastern Europe)

Sanda Iepure (1,2), Simon Hutchinson (3), Tadeusz Namiotko (4), and Angelica Feurdean (5)

(1) Madrid Institute for Advanced Studies, Madrid, Spain (sanda.iepure@imdea.org), (2) Emil Racoviţă Institute of Speleology, Romanian Academy, Cluj Napoca, Romania, (3) School of Environment and Life Sciences, University of Salford, Manchester, UK, S.M.Hutchinson@salford.ac.uk, (4) University of Gdansk, Gdansk, Poland (tadeusz.namiotko@biol.ug.edu.pl), (5) Senckenberg Research Institute and Natural History Museum and Biodiversity and Climate Research Centre (BiK-F), Frankfurt am Main, Germany

Oscillations of lake levels in Central Eastern Europe during the Holocene are crucial records of past regional climatic conditions reflecting the balance between evaporation and precipitation in their catchment. Lake Stiucii (38 ha, 10 m depth) is located in Transylvanian Plain (NW Romania) at 296 m asl. A recently extracted sediment core from the central part of the lake provides the first ostracod sediment record of the lake water level fluctuations in this region covering the last 5000 cal years BP.

The sediment sequence yielded approximately 1600 valves of 18 freshwater and halophile ostracod species of 11 genera. The most abundant and frequent in the entire record were Heterocypris salina (Brady 1868), Limnocythere inopinata (Baird 1843) and Plesiocypridopsis newtoni (Brady & Robertson 1870) (abundance range between 16-25%). The ostracod assemblages also show a marked variability in diversity and abundance over the past 5000 years, which appear to closely follow water level oscillations.

The assemblages indicate three periods of low diversity and density of ostracods primarily represented by Candonidae between (i) 3800 and 3150 cal yr BP, (ii) 2900 and 2400 cal yr BP and (iii) 1600 and 1200 cal yr BP and probably reflect a response to low lake water levels. This inference is supported by the deposition of gyttja and low Zr concentrations. The dominance of Cyclocypris ovum (Jurine, 1820) and Candoninae in a ostracod community of otherwise poor density and diversity between 2200 and 1800 cal yr BP probably reflects littoral environments in the central, deepest part of the present lake. The ostracod assemblages diversified (up to 10 species) between 1100 and 250 cal yr BP and are dominated by co-occurrences of halophile species e.g. Heterocypris salina and Plesiocypridopsis newtoni until 700 cal yr BP, suggesting increased supply of salty water into the lake by salt springs. Thereafter Limnocythere inopinata, a typical shallow water species (<10 m) is dominant indicating the onset of falling lake water levels. The high diversity and density of ostracod assemblages during this period corresponds to a transition from peaty gyttja to detritus gyttja and increased Pb and Zr concentration, all indicative of increased run off and a rise in water-levels.

Overall, the ostracode assamblages appear to respond sensitively to oscialltions of water level and changes from freshwater to salinity condition, indicating the potential for use as an important proxy in the evaluation of the palaeohydrological changes in the region.