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Relating actual with subfossil chironomid assemblages. Holocene habitat changes and paleoenvironmental reconstruction of Basa de la Mora Lake (Central Pyrenees)

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Analyses of subfossil and actual macroinvertebrate fauna and Chironomidae larvae (Insecta: Diptera) assemblages of Basa de la Mora Lake (Central Pyrenees, Spain, 1914 m a.s.l.) improves the environmental calibration for lake paleoreconstruction and allow to infer lake habitat changes throughout the Holocene.

The results of the actual Chironomidae community are consistent with other mountain lake studies (either in the Pyrenees or other regions), with a few mismatching due to lake specific conditions. The actual and the subfossil Chironomidae taxa present in Basa de la Mora Lake are the same, which is an essential requirement to apply the analogue methods. Although we could not find habitat-specific taxa, significant differences between the different habitats present in the lake were found. This circumstance allowed applying the Modern Analogue Technique (MAT) to infer lake habitat changes.

The MAT method relates the actual community, defined from the species abundance matrix and an environmental variable (which is the object of the inference), and the past community, defined from the species abundance matrix downcore. Because the first axis of DCA carried out for the study of the actual Chironomidae larvae explained the assemblage changes between the different habitats, the scores of this first axis were used as representative of the environmental variable (dominant habitat type) to be inferred.

The application of the MAT has allowed identifying two periods of lake productivity increase through the Holocene: i) around 2800 cal. yrs BP, which coincides with the first documented human occupation of the area, and ii) the last four centuries, synchronous to the maximum population of mountain areas in the Pyrenees and development of stockbreeding activities.