Long-term aquatic dynamics of alpine lakes (L. Allos and Petit ; 2200 m a.s.l) during the Holocene and their close links with terrestrial ecosystems

Rosine Cartier*[1,2], Elodie Brisset[1], Florence Sylvestre[2], Frédéric Guiter[1], Christine Paillès[2], and Cécile Miramont[1]

[1]Institut méditerranéen de biodiversité et d'écologie marine et continentale (IMBE) – Aix Marseille Université, CNRS : UMR7263, Université d'Avignon, Institut de recherche pour le développement [IRD] : UMR237 – Aix Marseille Université, Campus Etoile, Faculté St-Jérôme case 421 Av. . escadrille Normandie-Niemen 13397 MARSEILLE CEDEX 20, France

[2]Centre européen de recherche et d'enseignement de géosciences de l'environnement (CEREGE) – Aix Marseille Université, INSU, Institut de recherche pour le développement [IRD], CNRS : UMR7330 – Europôle Méditerranéen de l'Arbois - Avenue Louis Philibert - BP 80 - 13545 Aix-en-Provence cedex 4, France

Abstract

Lacustrine sediments in mountains represent valuable archives for reaching long-term insight of past mechanisms which led to present-day alpine ecosystems. Palaeolimnological studies also offer the opportunity to identify "boundary conditions" within which an ecosystem may change in response to external forcing (i.e. climate and/or human activities) leading to a variety of responses (ranging from gradual to sudden changes).
We studied within a multidisciplinary framework long-term ecological dynamics of two alpine lakes (Lake Allos and Lake Petit ; 2200 m a.s.l) located in the Southern Alps using the analysis of aquatic bioindicators (diatoms and ostracods) contained in sediment cores covering the last 13500 years for Lake Allos and the last 4800 years at Lake Petit.
Our results highlight the major influence of several factors controlling the past lacustrine ecosystem such as watershed, water chemistry, and changes of land-use: development of soils and vegetation during the early Holocene led to a lowering of calcium input into the lake followed by the disappearance of ostracods to the benefit of diatoms (ca. 7000 cal. BP). After an optimum for silicified organisms (ca. 7000 -3000 cal. BP), first human impact on vegetation and a recovery of erosive activity on slopes were concomitant to a change in aquatic assemblages towards more eutrophic species.

Keywords: Lacustrine sediments, Holocene, palaeolimnology, Mediterranean Alps, diatoms

*Speaker