



Holocene evolution of a montane lake catchment inferred from multiproxy sediment analysis : climatic and anthropic impacts in french prealps

Manon Bajard (1), Pierre Sabatier (1), Jérôme Poulenc (1), Fernand David (2), Fabien Arnaud (1), Anne-Lise Develle (1), Jean-Louis Reyss (3), Bernard Fanget (1), Emmanuel Malet (1), and Christian Crouzet (4)

(1) EDYTEM, Université de Savoie, CNRS, bat. Pôle montagne, 73376 Le Bourget du Lac, France (manon.bajard@univ-savoie.fr), (2) CEREGE, Aix-Marseille Université, CNRS, IRD, Collège de France, Europôle de l'Arbois, BP 80 13545 Aix en Provence, France, (3) LSCE, UVSQ, CNRS, CEA, avenue de la Terrasse, 91110 Gif-sur-Yvette, France, (4) ISTerre, Université de Savoie, CNRS, bat. Belledonne, 73376 Le Bourget-du-Lac, France

Lake La Thuile in the Massif des Bauges (874 m a.s.l. French Alps) provides a 18 meters sedimentary sequence. Due to its mid-altitude position, this lake is one of the first to be formed through the glacial retreat and documents the evolution of its catchment since the Late Glacial Maximum. The first 6 meters of the core cover the last 12 000 years, and allowed to study human/climate/environment interactions in a carbonated environment. This study is the first one to investigate a mid-altitude lake in the French Alps for paleoenvironment reconstruction from lake sediment archive. Its altitudinal position presents the advantage to be very accessible to human activities and allows more developed agriculture than in higher altitude. This study aims to determined how and when is expressed the erosive response of such an environment to human settlement.

High resolution multiproxy analysis of the first 6 meters including sedimentological, palynological and geochemical data associated to a well-constrained chronology over the Holocene period allows us to understand the respective impacts of both climate and human on the evolution of Lake La Thuile environment.

Five major phases of evolution have been highlighted over this period. From 12 000 to 10 000 yr cal. BP, the vegetation is developing with the onset of hardwood species and the disappearance of Pinus. From 10 000 to 4500 yr cal. BP the warmer climatic conditions of the middle of the Holocene allows the forest to densify and the very low sedimentation rate indicates that the forest stabilizes slopes and prevents from the erosion on the watershed. The climate cooling of the Neoglacial period triggers a first erosive phase with a decreasing of the forest around 3300 cal. BP. Human settlements are suggested at La Thuile from 2500 yr cal. BP by palynological evidence of anthropic taxa. The triggered clearing is accompanied by a second erosive phase related to anthropic activities during the Roman period. Erosion intensified from 1600 cal. BP in a third erosive phase corresponding to agriculture intensification during the Middle Ages. At the end of the Middle Ages, human footprint seems to decrease but the reason of this change is not resolved between social determination or/and climate forcing.

These three erosive phases may have completely changed the catchment behavior until the agricultural abandonment in the middle of the 20th century. Lake La Thuile sedimentary infill shows a landscape evolution first controlled by climate and progressively, since 2500 years ago, human activities came to superimpose. The role of human seems to be more important with abrupt and maybe irreversible modifications of the landscape.