



## **A 4D sedimentological approach to reconstruct the flood frequency and intensity of Rhône River (Lake Bourget, NW European Alps)**

Bruno Wilhelm (1,2), Jean-Philippe Jenny (2,3), Fabien Arnaud (2), Pierre Sabatier (2), Charline Giguet-Covex (2), Alain Mélo (2), Bernard Fanget (2), Emmanuel Malet (2), and Marie-Elodie Perga (3)

(1) Institute of Geological Sciences and Oeschger Centre for Climate Change Research University of Bern, Baltzerstrasse 1+3, 3012 Bern, Switzerland, [m\\_bruno@yahoo.fr](mailto:m_bruno@yahoo.fr), 00 33 [0] 4 79 75 87 77), (2) EDYTEM, Université de Savoie, CNRS, 73376 Le Bourget du Lac Cedex, France, (3) INRA, UMR CARTELE, Université de Savoie, 74203 Thonon-les-bains Cedex, France

A high-resolution sedimentological study of the large Lake Bourget (French Alps, 231m a.s.l., 45°45'55N, 5°51'45E) was conducted to reconstruct the flood frequency and intensity (or magnitude) in the area over the last 350 years. Particular emphasis was placed on investigating the spatio-temporal distribution of flood deposits in this large lake basin. The thicknesses of deposits resulting from 30 flood events of the Rhône River were collected over a set of 24 short sediment cores. Deposit thicknesses were compared with instrumental data for the Rhône River discharge for the period from 1853 to 2010. The results show that flood frequency and intensity cannot be reliably reconstructed from a single core because of the inhomogeneous flood-deposit geometry in such a large lake. From all documented flood-deposit thicknesses, volumes of sediment brought into the lake during each flood event were computed through a kriging procedure and compared with the historical instrumental data. The results show that reconstructed sediment volumes are well correlated to maximal flood discharges. This significant correlation suggests that the increase of embankment and dam settlements on the Rhône River during the last 150 years has not significantly affected the transport of the smallest sediment fraction during major flood events. Hence, assessment of the flood-sediment volumes deposited in the large Lake Bourget allowed to reliably reconstruct the flood frequency and intensity of the past Rhône River floods.