Geophysical Research Abstracts
Vol. 18, EGU2016-17689, 2016
EGU General Assembly 2016

Pyrenean Erosion fluxes over the Neoglacial period: From local meteorological climate dynamics to global ones

Anaëlle Simonneau (1), Didier Galop (2), Emmanuel Chapron (2), Hervé Guyard (3), Kazuyo Tachikawa (4), Florence Mazier (2), and Edouard Bard (4)

(1) ISTO, UMR 7327 CNRS, Université d'Orléans, BRGM, Orléans, France (anaelle.simonneau@univ-orleans.fr), (2) GEODE, UMR 5602 CNRS, Université Fédérale de Toulouse, Toulouse, France, (3) IPGP, UMR 7154 CNRS, (4) CEREGE, UMR 7330 CNRS, Université Aix-Marseille, IRD, Collège de France, Aix-en-Provence, France

Enhanced erosive phases reconstructed from lake sediments from the Eastern Pyrenees (Ariege, France) have been related to past meteorological to climate variations over the Neoglacial period, and more particularly to the impact of snowmelt processes enhancing erosion of mountainous drainage basins (1, 2, 3). The distinctive feature of this study is to perform integrative source to sink approaches, classically developed for diachronic climate reconstructions, on five lacustrine sedimentary infills, both sensitive to extreme meteorological events and located within a radius of only 20 km, in order to distinguish local meteorological from global climatic dynamics, and further discuss the influence of westerlies and North Atlantic Oscillation on clastic supply in contrasted lake basins. For each site, age-depth models are based on radionuclides and radiocarbon dating, and the minerogenic properties of the sediment have been characterized combining X-ray imaging, magnetic susceptibility, grain size, X-ray microfluorescence and laser ICP-MS, in order to document clastic sediment source areas. For instance, titanium and potassium are particularly relevant to track metamorphic rocks erosion, whereas rubidium is specific of the granite one. Combined with the grain texture results, such characterization allowed us to order different types of deposits over the Neoglacial period, interpreted as reflecting enhanced local hydrological events, and more particularly the impact of local snowmelt processes. 13 main phases of enhanced erosion associated with climate deterioration phases have been identified and dated to 4715, 4455, 3875, 2620, 1670, 1380, 1035, 845 (AD1105), 620 (AD1330), 430 (AD1520), 215 (AD1735) et 105 (AD1845) cal BP, and to AD1955 et AD1985. Beyond local meteorological fluctuations, the inter-sites comparison of the five lacustrine sequences studied makes the discussion of global climate dynamics possible, performing wavelets analysis, and identifying characteristic frequencies. We therefore demonstrated that the regional Pyrenean meteorological signal is contemporaneous to Alpine deterioration phases, and remarkably matches negative North Atlantic Oscillation phases and solar minima over the Mid-Late Holocene (4, 5).
(1) Simonneau et al., 2013, Climate of the Past, 9: 825-840.
(2) Simonneau et al., 2013, The Holocene, 23: 1764-1777.
(3) Vannière et al ;, 2013, Climate of the Past, 9: 1193-1209.
(4) Olsen et al., 2012, Nature Geoscience, 5 : 808-812.
(5) Delaygue and Bard, 2011, Climate Dynamic, 36: 2201-2218.