Geophysical Research Abstracts
Vol. 15, EGU2013-7715, 2013
EGU General Assembly 2013

Postglacial erosion rates from the Western Alps inferred from cosmogenic nuclides measurements

Jean-Daniel Champagnac (1), Romain Delunel (2), Peter Kubik (1), Anne-Sophie Mériaux (3), and Flavien Beaud (4)

(1) ETH Zürich, Switzerland, (2) University of Bern, Switzerland, (3) Newcastle University, UK, (4) Simon Fraser University, Canada

Based on the inventory of in situ produced cosmogenic 10Be from river-borne sand, we derived catchment-wide denudation rates of a large portion (∼3000 km˜2) of the Western Alps. Our samples have been taken from moderate to large river basins (i.e. 25-500 km˜2, n = 16) that drain into the Arve, the Rhone (upstream Lake Geneva) and the Dora Baltea Rivers. These basins show a strong glacial imprint in their topography and significant glacier remnants remain in most of the headwaters (glacial extent = 17±11%). They all have similar quartz-rich lithologies (Hercynian granite and gneiss) and have a high mean elevation (2500 ± 200 m a.s.l.).
Cosmogenic 10Be in situ produced have been extracted using standard procedure and were analysed at the AMS facility of ETH Zürich. The 10Be concentration measured for these samples are very low (10˜3 -5.10˜4 at. / g SiO_2). These values are interpreted as a combination of intense erosion processes and reduced production rates due to both geomorphic, glacier and snow shielding. As a result, the apparent denudation rates are in the range of 0.5-3 mm/yr (i.e. they integrate <1 kyr timescale), and do not show any evidence of geographical trend. We then expect that the highest rates obtained for some catchments could be related to a significant contribution of glaciogenic and/or debris flow materials to the sediment load, which lead to the violation of the cosmogenic steady-state equilibrium criteria.