



Cosmogenic in-situ ^{10}Be derived denudation rate of the Var catchment, southern French Alps.

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Knowing denudation rates at the catchment scale is fundamental to constrain the mechanisms driving the landscape evolution and stability over short term as well as over geological scales. The development of a mountain range is indeed the result of complex interactions between erosion, tectonics and climate. Quantifying denudation rates is thus key to understand and characterize the interactions at play in a mountainous setting and predict their future stability in a changing environment.

The denudation rates of the Southern French Alps are yet poorly known. In this mountainous region, the Var catchment (drainage area of 2 800 km², mean elevation of 1 250 m, max elevation of 3 200 m and mean slope of 23°) is relatively small with a short transfer zone, thus providing a good setting to characterize denudation rates. The geology of the northeast part of the Var catchment consists of Paleozoic crystalline quartz-bearing rocks while the southwest part is composed of Mesozoic and Cenozoic sedimentary rocks with variable quartz contents.

A total of 11 present-day sediment samples have been collected from active riverbeds of the Var River and its main tributaries (Tinée, Vésubie, Estéron and Coulomp), and their in-situ ^{10}Be concentration were measured to assess basin average denudation rates.

In order to test the impact of grain size on ^{10}Be concentrations, samples have been sieved in two fractions: 50-100 μm and 100-250 μm and their respective quartz contents isolated. Quartz samples have then been processed to extract their in situ ^{10}Be nuclides following the standard protocols used at CRPG and CEREGE. $^{10}\text{Be}/^9\text{Be}$ ratios have been then measured by the ASTER CEREGE LN2C AMS.

We also compare the relative fluxes of each sub-catchment with respect to the whole catchment area in order to better understand the sediment transfer within the Var basin.

The spatially average denudation rate of the Var catchment is 0.23 (± 0.05) mm/year whatever the grain size fraction considered.

The Coulomp and Estéron catchments mainly drain the downstream part of the Var catchment and present the lowest denudation rates of the study area with 0.10 (± 0.02) mm/year and 0.14 (± 0.03) mm/year respectively. The Vésubie and Tinée catchments mainly drain upstream part of the Var catchment and have higher denudation rates in the order of 0.57 (± 0.19) mm/year and 0.34 (± 0.07) mm/year respectively.

The fluxes between the subcatchments and the whole drainage basin are in average balanced. This suggests that the concentration measured in the river sediments is not biased neither by reworking of transitory stored deposits nor by landslides.

Both studied granulometries present similar results at the river outlet: 0.23 (± 0.03) mm/year and 0.22 (± 0.03) for the 50-100 μm granulometry and 0.23 (± 0.04) mm/year, 0.24 (± 0.05) mm/year for the 100-250 μm granulometry.