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River incision, climate and vertical motions since the LGM in south-western Alps (France)

Carole Petit¹, Rolland Yann², Braucher Régis³, Bourlès Didier³, Cardinal Thibaut¹, Mariotti Apolline⁴, and Audin Laurence⁵

¹Université Côte d'Azur, CNRS, Observatoire de la Côte d'Azur, Géoazur, Valbonne Sophia Antipolis, France (petit@geoazur.unice.fr)

²Environment, Dynamics and Territories of the Mountain (Edytem), Université Savoie Mont Blanc, CNRS, Chambéry, France

³Aix Marseille Univ, CNRS, IRD, INRA, Coll France, CEREGE, Aix-en-Provence, France

⁴CRPG, CNRS - Université de Lorraine, Vandoeuvre-lès-Nancy, France

⁵Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, IRD, IFSTTAR, ISTerre, Grenoble, France

In South-Western European Alps, although scarce, evidences of recent vertical motions suggest a slow (~0.1 mm/yr) uplift of the northern Ligurian margin, which increases towards to East from the Var river mouth to the gulf of Genova. Whether this uplift is due to active compressional tectonics, to isostatic rebound or to a combination of both is still unclear. In addition, because of the large topographic gradient, rivers have carved deep gorges in the bedrock of the SW subalpine chains. However, neither the role of vertical motion nor that of climatic changes since the LGM on river incision rates is well established.

Over the last 10 years, a dataset of ¹⁰Be and ³⁶Cl based cosmic ray exposure (CRE) ages obtained on river and glacier polished surfaces in the SW French Alps has been gathered. This dataset covers several areas located in the Argentera crystalline massif, in the Nice and Castellane subalpine chains, and in the Provence domain.

We will present a compilation of these data in an attempt to answer the following questions: - what is the influence of the last glaciation on river incision rates? - Is there any evidence of a W-E gradient in incision rates that could reflect increasing uplift rates of the SW Alps and North Ligurian margin? First results tend to indicate that all river incision rates are remarkably similar since the Holocene glacial optimum, whereas two different tendencies arise before that time: catchments within the influence of Alpine glaciers tend to have larger incision rates during the last deglaciation, while at the same time catchments out of any glacial influence have slightly lower incision rates. This suggests that, at first order, the release of glacier meltwaters enhanced river incision rates downstream during the ~20-12 ka period.

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