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Sediment sources, denudational processes and sedimentary budgets in three Mediterranean catchment systems in eastern Spain

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Climate change, human activities and other perturbations (like, e.g., fires, earthquakes) are influencing existing patterns of weathering, erosion, transport and deposition of material across defined landscape components and units. While it is still a challenge to develop an improved scientific understanding of how such changes interact and affect hillslope and fluvial processes, the connectivity between hillslope and fluvial systems and within landscapes, as well as contemporary denudation rates, source-to-sink fluxes and sedimentary budgets, this kind of quantitative analyses promise to be an efficient framework to assess the impact of environmental changes and disturbances to sediment dynamics and to evaluate landscape sensitivity. Our current knowledge on drivers and quantitative rates of contemporary sediment dynamics and denudation forms the basis for understanding and predicting the consequences of ongoing and accelerated environmental changes.

Ongoing GFL research activities on the current morphoclimate, on sediment sources, sediment storage, and on drivers, the spatiotemporal variability and rates of chemical and mechanical hillslope and fluvial denudation in three selected Mediterranean catchment systems in eastern Spain are presented. The Quisi, Pou Roig and Mascarat catchment systems in the Calpe region in eastern Spain are located in a mostly mountainous and/or anthropogenically affected environment. The three selected catchment system have a similar lithology (mostly limestone) but show significant differences with respect to catchment morphometry, sedimentary covers and the degree of anthropogenic modification. The activation of relevant sediment sources, sediment transfers, the intermittent runoff, and fluvial processes and transport are almost entirely controlled by pluvial events. During pluvial events of defined magnitudes, defined parts of the catchment areas and defined sediment sources are activated. Our year-round investigations include detailed geomorphological mapping combined with detailed statistical analyses of existing meteorological high-resolution data and the continuous observation and monitoring of atmospherical inputs, runoff events, and of sediment mobilisation and transfers on slopes and in stream channels using a combination of different automatic and manual observation, monitoring and sampling techniques. Our quantitative results on drivers and the spatiotemporal varianility of atmospheric solute and sediment inputs, of chemical and mechanical denudation, and on sediment storage and sedimentary budgets within the three different catchment systems

contribute to an advanced understanding of key drivers and rates of contemporary sediment dynamics and denudation in this Mediterranean environment, and provide the basis for improved predictions of possible effects of climate change and anthropogenic impacts on contemporary denudation rates and hazardous earth surface processes in this morphoclimatic region.