New way to predict sediment production and deposition: integrated Source to Sink maps at pluri-basisns-scale

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The knowledge acquired on the exhumation of the Pyrenean chain and the evolution of the adjacent foreland basins makes this Alpine-type domain a good laboratory to better constrain a full sediment routing system in a compressive context and to apprehend the driving processes controlling the sediment routing in space and time. This integrated approach aims at enhancing our basin mastering approach as well as improving our predictions of reservoir properties.

This Source-to-Sink study seeks to understand the evolution of sedimentary routing from the Source (orogenic relief, craton, basin recycling) through the transfer zone (peripheral or internal to the basin) to the final sink (flexural basin, deep turbiditic margin). Within this new cartography, we propose to compile the data over the entire peri-Pyrenean domain. We produced large scale quantitative and qualitative maps to better observe and interpret the tectonic, climatic and surface processes impacts of the SRS behavior.

The maps include kinematic reconstructions of the Iberian-European-Mediterranean system, restored sequential cross-sections, history/magnitude of exhumation by thermochronology, source tracking, characterization of weathering and erosion surfaces, synthesis of the major structural accidents activity, paleogeographic reconstructions, analysis of sedimentary geometries and transport directions as well as the quantification of volumes preserved in the basins. Their interpretation is combined with a time representation along the routing system, linking classical basin wheeler diagram representation to source erosion and lithologies to obtain a continuous view on the sediment journey.

The time steps chosen for these 5 maps account for the different stages of tectono-sedimentary evolution of the peri-Pyrenean system at the early-, syn- and post-orogenic stages. The compilations carried out compare exhumed domains and sedimentation zones in terms of fluxes and volumes and make it possible to map the routing systems and discuss the drivers for the surface evolution during the construction/destruction cycle of an orogen.

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