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The tectono-sedimentary record of hyper-extended rift basins: new observations from the Samedan basin (Central Alps) and Mauléon basin (Western Pyrenees)

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The discovery of hyper-extended domains in deep water rifted margins challenged the way of thinning about how lithosphere deforms and oceans form. Indeed, many present-day magmatic as well as magma-poor rifted margins show evidence for extremely thin crust overlain by thick sediments that cannot be subdivided into the classical pre-, syn- and post-rift sequences. These hyper-extended domains, commonly referred to as "sag-basins", are, however, very difficult to investigate. At present-day rifted margins, only few drill holes penetrate into deeper parts of these basins and in many places, seismic imaging of these sequences is hampered by thick salt sequences. From places where drill hole and good seismic data and/or dredged samples are available (e.g. western Iberia and southern Australia margins), it appears that exhumation of mantle rocks and detachment faulting are linked to the formation of "sag basins" in hyper extended margins. However, at present, the tectono-sedimentary record of hyper-extended deep-water rift basins remains almost unexplored.

In this study, we propose to use new field observations coming from two basins, the Samedan basin in the Central Alps and the Mauléon basin in the Western Pyrenees. We use these two basins as analogues to constrain the tectono-sedimentary evolution of hyper-extended deep-water rift basins. Both basins have been investigated in the past, however, in both examples, the structural and sedimentary evolution have not been linked. The major new input provided by our work is to investigate the interaction between exhumation of basement rocks along detachments simultaneous to deposition of sediments during final rifting. Our observations show that detachment systems strongly control the sourcing, routing and deposition of sediments in hyper-extended deep water rifted margins. In our presentation we will show examples of the two basins that show the evolutionary steps of the two individual basins in 3D and discuss how these observations may help us to better understand and interpret sag basins in hyper extended present-day rifted margins such as the South Atlantic.