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Importance of rift inheritance in Alpine type orogens

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More then a century ago, Alpine geologists started to understand that mountains are the descendents of “oceans” a discovery that eventually became an integral part of the plate tectonic paradigm. Since this discovery, studies in collisional orogens contributed to the description and understanding of rift basins and oceanic domains, long time before they were seismically imaged and/or drilled. With the advent of marine geology and geophysics and thanks to the Ocean Drilling Program, research activities shifted offshore. As a result, many new discoveries were made, which considerably changed the way we interpret ophiolites. However, many of the newest discoveries, such as the discovery of exhumed continental mantle and hyper-extended crust devoid of significant brittle deformation directly overlain by sediments commonly observed in present-day rifted margins, have not yet been fully integrated in the understanding of collisional orogens. It is important to understand if and how hyper-extended rift systems are recorded in collisional orogens, and if yes, how they may control the structural and rheological evolution and final architecture of collisional orogens.

In our presentation we will show, based on careful mapping of rift structures in the Alps, that hyper-extended rift systems can be found and described in collisional orogens. We will also explain, based on examples, how these structures were reactivated and how they may have controlled the strain distribution during Alpine convergence. We belief that the close relationship between Alpine and pre-Alpine structures is fundamental for understanding the tectonic and rheological evolution of orogenic systems and that orogenic structures can not be fully understood without considering a realistic pre-collisional history.