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## Western Europe tectonic evolution : probing the relative role of inheritance and sub-lithospheric processes

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**Abstract :** The heterogeneous continental lithosphere of Western Europe inherits billion of years of tectonic evolution, mineral transformation and magmatic addition. Its deformation over broad regions form collisional orogens and large forelands basins, which tectonic evolution is controlled by the interactions between its inherited properties, large-scale plate convection and smaller-scale plate subduction. How these first-order interactions are connected through time and space to control collision evolution is however largely unknown. Here we explore the evolution of the Alpine collision along a transect stretching between northern Africa and Europe. We show that the complex patterns of Alpine deformation from the Rif-Betic, Pyrenean collision and Europe primarily reflects continental fragmentation and drastic weakening of the lithosphere that occurred during the Late Permian-Triassic. Subsequent rifting episodes from Jurassic to Early Cretaceous left imprints on the thermal evolution of sedimentary basins, together with significant increase of Iberia topography, asthenospheric flow, and plate-scale dispersion of terrigenous sediments. The lack of large oceanic domain, at the transition between Atlantic and western Tethys, resulted in the distributed of shortening over a broad region from north Africa, Iberia and Europe, in the upper Cretaceous (~70 Ma). Detailed constraints on the sequence of shortening throughout West Europe from Late Cretaceous to the Tortonian reveals that the overall evolution of the west-alpine orogenic domain is primarily controlled by the nature and architecture of the continental lithosphere but became progressively controlled by sub-lithospheric processes associated with late/post-orogenic tectonic evolution.