



Factors controlling the tectonic inversion of the Pyrenean mountain belt : from observations to modelling

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Local inherited weaknesses and regional inherited crust and mantle lithosphere structure are expected to control the structural style of tectonic inversion of rift zones and passive margins. However it is still unclear to which extent structural inheritance plays a role during inversion tectonics and contributes to the structural style of inversion. Here we focus in the context of the Topo-Europe project PYRTEC on the Pyrenean-Cantabrian mountain belt, which is very well studied. The moderate inversion, the good preservation of both pre and syn-orogenic strata and the excellent geological and geophysical data set make this chain one of the best candidates to investigate these questions.

The influence of inherited crustal heterogeneities, denudation, subcrustal loads and crustal mechanical properties on the deformation style of the Pyrenean chain has been already investigated by Beaumont et al. [2000] with a comparison between observations and geodynamical models. The main conclusion of their study is that the asymmetry of the Pyrenean double wedge and its morphological evolution is a consequence of the asymmetric distribution of inherited crustal heterogeneity suggesting that the tectonic style of the Pyrenees is strongly controlled by the inversion of previous extensional features. Here we use lithosphere scale 2D numerical thermo-mechanical models to investigate the effect of rift inheritance on mountain building style with a procedure coined accordion tectonics. The formation of rift basin margin is explicitly modeled and the results are then used as initial condition for the lithospheric scale inversion. The purpose of our work is to explore to which extent local inherited weaknesses and regional inherited crust and mantle lithosphere structure play a role during inversion tectonics and contribute to the structural style of Pyrenean chain.