Geophysical Research Abstracts
Vol. 20, EGU2018-13808-1, 2018
EGU General Assembly 2018


# Assessing the influence of rift-inheritance on the structural style and strain partitioning evolution during convergence: the Bay of Biscay and Pyrenean system

Julie Tugend (1,2) and Emmanuel Masini (1)

(1) Total SA, CSTJF, Avenue Larribau, 64000 Pau, France, (2) Sorbonne Université, CNRS-INSU, Institut des Sciences de la Terre Paris, ISTeP UMR 7193, F-75005 Paris, France

Knowledge of mountain building processes controlling the structural style of orogens greatly improved over the past decades thanks to cross-disciplinary studies and high-resolution geophysical imaging techniques. Different processes are commonly recognized as fundamental in building an orogen, including oceanic subduction, inversion of former rifted margins, and continent-continent collision. Notably, more and more studies show the importance of the pre-convergence rift history in controlling the final architecture of the orogen. In this contribution, we aim to investigate how far the fate of an orogen can be influenced by rift-inherited parameters, including the spatial distribution and timing of the former rift basins, their crustal architecture, the presence or absence of serpentinized exhumed mantle, and the thermal state of the rift systems.

We focus on the Bay of Biscay and Pyrenees representing one of the best natural laboratories to study the influence of rift-inheritance during distinct stages of orogeny. There, remnants of Late Jurassic to mid Cretaceous rift systems that were part of the diffuse and polyphase Iberian-European plate boundary are exposed. The area included oceanic and hyperextended rift domains that were variably inverted during the Late Cretaceous to Cenozoic convergence.

The identification and mapping of the spatial distribution of the rift systems from the Bay of Biscay margins to their fossil analogues preserved in the Pyrenees and Iberian Range rely on a combination of geological and geophysical diagnostic criteria. Constraints on the temporal evolution of the different rift systems come from the subsidence histories recorded in the different sub-basins.

Based on this onshore/offshore map of the rift systems, we investigate reactivation processes in the former rift basins as well as the spatial and temporal evolution of strain distribution during the Late Cretaceous to Cenozoic convergence. Preliminary results suggest that the heterogeneous strain partitioning evidenced and the variable degrees of inversion of the former rift basin is at least partly related to the complex pre-convergence architecture of the rift systems. Notably, the occurrence of exhumed mantle seems to facilitate reactivation processes and the subduction initiation of former hyperextended domains. In the Pyrenees, the progressive coupling between Europe and Iberia resulting from the involvement of former necking and proximal domains (corresponding to thicker crust) resulted in the southward migration of the plate boundary in the Iberian Range.

More generally, we believe that this work may help to further understand how the complex 3D architecture of rift systems may strongly control the style and the timing of orogeny.