Lithospheric transfer zones driving the non-cylindrical shape of the Pyrenean orogen (Mauléon hyperextended basin)

Cécile Allanic[1*], Nicolas Saspiturry[2], Philippe Razin[2], Thierry Baudin[1], Gabriel Courrioux[1], Benjamin Le Bayon[1], Benoit Issautier[1], Olivier Serrano[1] and Abdeltif Lahfid[1]

[1] Bureau de Recherches Géologiques et Minières (BRGM) - France
[2] ENSEGID – Institut polytechnique de Bordeaux - France

Despite Tertiary Pyrenean orogenesis, the Early Cretaceous Mauléon hyperextended basin remains preserved in the heart of a lithospheric pop-up structure. A multidisciplinary approach combining Raman spectroscopy of carbonaceous material, paleostress reconstructions, seismic interpretations and 3D implicit geological modeling yields evidence, from the outcrop to the lithospheric scale, for the presence of N20°-oriented transfer zones. The thrust segments of the N120°-oriented Lakhoura and North Pyrenean Frontal thrust systems, defining the edges of the Mauléon basin pop-up, branch into these transfer zones and define corridors with differing amounts of shortening. This overall structural pattern defines drawer-like structures allowing the closure, by stages, of the former rift domain. This concept can be applied at both the crustal and the lithospheric scale. This study clarifies the role of inherited lithospheric autochthonous transfer zones in the reactivation of a hyperextended rift basin and bears upon the origin of the non-cylindrical shape of the Pyrenean belt.