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Transfer Faults and associated volcanic province in the Valencia Basin: consequences on crustal thinning.

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The role of NW-SE transfer fractures zones during the opening of the North western Mediterranean basins has been evidenced since long, mostly from seismic-reflection and magnetic data. Each of these features corresponds to basement steps controlling the progressive deepening toward the center of the Liguro-Provencal basin (LP), from NW to SE in the Gulf of Lion and from SW to NE in the Valencia basin. The most important one, the North-Balearic-Fracture-Zone (NBFZ), accounts for the counterclockwise rotation of the Corsica-Sardinia block and separates the Valencia continental basin from the LP oceanic basin. The Central Transfer Zone in the Valencia basin separates the SW part characterized by a huge Mesozoic basin from the NE part with volcanic basement (Mauffret et al., 1992, Maillard and Mauffret, 1999; Etheve et al., 2015; Pellen et al., 2016). Northward, the Catalan Transfer Zone corresponds to the large scale limit between Eastern Pyrenees relatively thick crust and the Gulf of Lion highly thinned crust.
New observations on deep seismic lines show the huge magmatism linked to the transfer zones and confirm a “volcanic-type crust” around the NBFZ. This “volcanic-type crust” is characterized by a reflection free top magmatic layer 1 to 3 km thick overlying a highly reflective lower crust that thins below the transfer zones. Faults, deep reflections and thinning at the base of the crust draw shear-zones along the transverse fracture that, together with the huge extension of syn-rift volcanism in the area, suggest ductile deformation of a weak continental crust. The “volcanic-type crust” disappears in the distal prolongation of the Catalan Transfer Zone. Here a thin crust with flat top consists of westward dipping reflections in the upper part, rooted in reflective layers. This crust passes laterally to the type II crustal domain of the LP basin already well shown (Moulin et al., 2015; Jolivet at al., 2015). Structures (faults, variations in seismic facies and reflectors), thickness and depth of the crust appear then clearly offset and different on each segment limited by the transfer zones. Three crustal domains could thus be distinguished and illustrates a SW to NE thinning different from the NW to SE thinning of the LP basin, which must be considered to understand the 3D complex deformation of the area. This study is part of the
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