



Decoupled crust-mantle accommodation of Africa-Eurasia convergence in the NW-Moroccan margin

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The extent of the area accommodating convergence between the African and Iberian plates, how this convergence is partitioned between crust and mantle and which is the role of the plate boundary in accommodating deformation are not well understood subjects. Here, we calculate the lithospheric structure along a 1360 km-long profile running from the Tagus Abyssal Plain to the Sahara Platform and crossing the Goringe Bank, the NW Moroccan Margin and the Atlas Mountains. The model is based on the integration of gravity, geoid, elevation and heat flow data and on a well constrained crustal structure across the NW Moroccan Margin derived from the reflection and wide-angle SISMAR04 seismic line. The most outstanding result is a lithospheric mantle thickening beneath the margin exceeding ~ 200 km depth followed by a prominent lithospheric mantle thinning beneath the Atlas Mountains. At crustal levels, the Iberia-Africa convergence is sparsely accommodated in a ~ 950 km wide area and localized in the Atlas and Goringe regions, with an inferred shortening of ~ 50 km. In contrast, lithospheric thickening accommodates in a 400 km wide region, thus advocating for a decoupled crustal-mantle mechanical response. A combination of 50-60 km of mantle underthrusting due to oblique convergence together with a viscous dripping fed by lateral mantle dragging can satisfactorily explain the imaged lithospheric structure. The proposed model is also consistent with crustal shortening estimates and with the absorption of $\sim 2/3$ of the Iberia-Africa convergence by right lateral transpressive tectonics across the plate boundary.