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Lithospheric-scale folding in Iberia: Insights from analogue models

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The Iberian Peninsula is characterized by the presence of regularly spaced and generally E-W trending mountain ranges across the whole Peninsula. Intraplate deformation resulting from the convergence between the Africa and Europe plates during the Tertiary caused a regular distribution of the main topographic heights and is often related with lithospheric buckling. Consequently, basement structures were reactivated as fault corridors and the inversion of the Mesozoic rifts occurred. Analogue Modelling is used to gain insights into the interplay between different crustal and mantle layers in terms of their structural and topographic expression as well as the wavelength of deformation.

The first results show that upon changing the shortening velocity and hence the strength of the viscous lower crust and upper mantle results in an increasing wavelength and amplitude of the lithospheric folds. Folding is associated with the formation of narrow mountain ranges initiating at the inflexion point of the folds. The narrow mountain ranges, which represent upper crustal pop-ups form the main topographic reliefs. Shortening is accommodated within the viscous crust underneath the pops by homogeneous thickening leading to lateral thickness variations of the ductile crust.

The experimental results are in good agreement with the natural examples from Iberia, where wide basins are developed between wide mountain ranges. It is worth noticing that below the pop-up structures there is a homogenous thickening of the lower crust

as in the Iberian ranges in the Spanish Central System and Toledo Mountains which is well supported by seismic and gravity data.