

4-D evolution of Detachment Folds in the South Portuguese Zone (SW Iberia) Linked to Thin-Skinned Tectonics

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The South Portuguese Zone (SPZ) is a fold-and-thrust belt related to thin-skinned tectonics. South-vergent structures are wide-spread in the region. Thrusts are rooted to the north at different detachment levels in the upper crust. These detachments are coeval to the development of several cleavages in a progressive deformation context. The geodynamic evolution of this region indicates a change from a compressive to a transpressive tectonic regime. Three successive detachment fold generations and their relative axial cleavages can be recognized. Its development is linked to the progressive deformation of a Variscan orogenic wedge. First phase detachment folds (320-330 Ma) were formed in relation to a subhorizontal detachment (not outcropping). They are isoclinal folds in the northern domain of the SPZ, which have been tilted to the north. They have an associated cleavage of continuous type. Second phase detachment folds (310 Ma) are linked to the development of brittle (and brittle-ductile) regional thrusts, showing a ramp-flat geometry characterized by the presence of frontal and lateral ramps. Upright to moderately inclined horizontal folds are linked to the frontal ramps, while upright to moderately plunging folds were developed near to lateral ramps. A discrete crenulation cleavage is associated to these second folds. Finally, third phase detachment folds (300 Ma) were generated under a sinistral transpressive regime, distributed along heterogeneous deformation bands where reclined fold trains formed. The most frequent interference patterns are Ramsay's Type-1 and Type-0. First and second detachment folds are distributed along bands parallel to the main structural pattern of the region. These bands are related to southward migration of the deformation front and to the propagation of a piggy-back thrust sequence. Third folding phase originated synthetic bands oblique to the main structural pattern of the orogenic belt.

Keywords: detachment folds, thin-skinned tectonics, transpression, progressive deformation