Crustal shortening and structural inheritance in the superimposed Pyrenean-Provence and Subalpine foreland thrust wedges

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Deciphering how crustal shortening is accommodated in fold-thrust belts is a major issue for understand the spatial and temporal evolution of orogenic systems. In this study, structural data, syn-orogenic sediments, fault slip analysis, and the construction of a 150 km-long sequentially restored balanced cross section across the upper Cretaceous-Eocene Arc-Rians and Neogene Valensole foreland basins have been used to reconstruct the history of thrust propagation and crustal shortening in the superimposed Pyrenean-Provence and southwestern Subalpine fold-thrust belts. Although the Pyrenean-Provence and Subalpine fold-thrust belts grew at different geological times and durations (Latest Santonien-Campanian to Eocene, i.e., 50 m.y. for the Pyrenean-Provence compression; Oligocene to present, i.e., ~28 m.y. for the Subalpine compression) and with opposite vergences, our evolutionary tectonic model shows that the structure and kinematics of both thrust wedges are closely similar: inner basement-cover thrust sheets inverting rift system and early halokinetic structures (inversion of Beausset basin for the Pyrenean-Provence compression, and Digne-Barles basin for the Subalpine compression), establishment of a foreland basin system (Arc-Rians and Valensole, respectively) associated with the propagation of the deformation toward the foreland, and late distal basement-involved shortening related to far-field transmission of the contractional stress. We conclude that the vertical partitioning of the shortening has been strongly influenced by a pre-existing large-scale extensional structural arrangement of the basement established during the Late Paleozoic to the Mid Cretaceous, the Valensole horst, and by other factors as compressional inheritances (such as Variscan foliation and Pyrenean-Provence thrusts), nature and spatial distribution of the Triassic décollement level and pre-existing halokinetic structures, and syn-orogenic sedimentation.

Mots-Clés : Pyrenean-Provence; Subalpine; Balanced cross section; Structural inheritance

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