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Sedimentary basin evolution and the link with the deformation of surrounding orogens in European case-studies

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Intra-plate contractional deformation and far-field transmission of strain generated at active deforming plate boundaries play a crucial role in inverting extensional basins and the kinematics of thrust belts in Mediterranean orogens (e.g., Ziegler et al., 1995; Ziegler et al., 1998). At the same time, the structural evolution of rifts is significantly controlled by the lithospheric rheology, the availability of inherited crustal weak zones with potential to be re-activated, the mode of extension and the type of crustal material being deformed (Ziegler and Cloetingh, 2004; Ziegler et al., 2006). These critical inferences has proven of major importance for the study of sedimentary basins, in particular relevant for the evolution of Central and SE European mountain chains and associated sedimentary basins. Far-field transmission of contractional strain has proven to be of important for the geometry of both foreland and back-arc basins, such as the Carpathians or Dinaridic forelands and the Pannonian Basin or Black Sea back-arcs. Crustal scale weak zones and rheological contrasts such as inherited nappe stacks or major plate boundaries have been proven recently to be of major importance in conditioning subsequent basin formation and associated footwall exhumation in extensional domains such as the Aegean, Rhodope or the transition from the Dinarides to the Pannonian basin. At a regional level, areas characterized by changes in contractional polarity have proven to efficiently transmit the strain at large distances and condition the localization of major structures, such as the change from the Alpine to the Dinaridic polarity or the change from the Carpathians to the Dinaridic polarity. The same areas were prone to the first order localization of major extensional structures during the subsequent back-arc evolution. In all these areas, understanding the quantitative evolution of sedimentary basins means critically the understanding of the exhumation of surrounding mountains and subsequent sediment routing. All these findings demonstrate that the legacy of defining strain localization and rheological contrast at regional level driven by orogenic activity or activation of extensional basins is larger that commonly thought.

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