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Sedimentary basins and continental topography: an integrated approach

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Sedimentary basins provide a great source of information on the evolution of the underlying lithosphere. At the same time, their sedimentary record and structural habitat is strongly controlled by the thermo-mechanical structure of the lithosphere and its interplay with thermal perturbations and variations in stress fields.

The mode of basin formation is directly linked to the bulk rheology of the lithosphere, displaying major variations in time and space. Many basins have experienced a poly-phase history, hampering straight forward application of standard basin modeling concepts. For example, compressional reactivation of rifted margins is far more common than till recently realized, whereas the role of pre-orogenic extension in foreland basins is frequently overlooked in comparisons of retro- and pro-arc foreland basins.

Lithospheric folding is another prime mechanism of basin formation, with important consequences for basin stratigraphy vertical motions and thermal evolution, distinctly different from, for example, extensional basins and foreland basins.

An integrated approach, linking closely basins to their lithospheric context and coupling sedimentary basins to continental topography, allows a quantitative assessment of sediment source-sink relationships. In this context a close coupling is also realized between numerical and analog tectonic modeling.

This approach is illustrated by presenting examples from studies carried out in the Pannonian basin/Carpathian system, the North Atlantic rifted margins and intraplate basins of Iberia.

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