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Crust-mantle coupling in foreland basin systems

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The style of tectonic deformation at the front of orogenic belts primarily reflects the large-scale effect of mechanical coupling at the crust-mantle boundary. A global-scale investigation suggests the main driver is the age-dependent properties of the sub-continental mantle and crust. The last main tectonic and/or thermal event recorded by the lithosphere (e.g. rifting, plume-lithosphere interactions) will leave an imprint in the evolution of both the orogenic and foreland basin systems. Because the lithosphere is structurally inhomogeneous, much less is known on how these characteristics affect the orogenic evolution and foreland basins when collision initiates. A few recent studies on inverted rifted margins suggest that the original architecture of the margin determines the nature of mountain roots and isostatic compensation in the foreland. In addition to these factors that are related to tectonic inheritance, the far-field effect of mantle convection, lithosphere delamination, and surface processes complicate the temporal and spatial evolution of the crust-mantle interactions in the foreland systems. In this contribution I will explore the temporal and spatial coincidence of several of these features based on results from new geophysical imaging techniques, as well as field-based studies, combining tectonics, thermochronology, geochronology and geochemistry.