

## **(U-Th)/He and U-Pb double dating constraints on the interplay between thrust deformation and basin development, Sevier foreland basin, Utah**

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Despite several decades of evolving concepts of thrust belt mechanics and foreland basin evolution as either isolated or coupled systems, an in-depth understanding of process linkages and dynamic connectivity between foreland basins and thrust belts are not fully developed. Moreover the temporal aspects of thrust deformation, clastic progradation, distinct sediment sources, flexural basin subsidence, thermal history and stratigraphic architecture, remain hotly debated. This study aims to develop an unprecedented systematic U-Pb and (U-Th)/He detrital zircon double dating provenance record in the classic Sevier fold-thrust belt and foreland basin with the objective of spatially and temporally framing the Sevier foreland sedimentary successions in a detailed stratigraphic context as a function of thrust progression and hinterland exhumation by means of detailed isotopic provenance information based on crystallization ages and source area thermal histories. In addition, data from pre-Mesozoic units exposed in the thrust sheets will be collected to provide a geo- and thermochronometric reference database that will provide crucial benchmarks for sediment source fingerprints and will improve detrital source-to-sink linkages to better understand larger-scale foreland basin evolution and refine exhumational lag-time constraints. These data will better constrain the onset and magnitude of thrusting and its impact on flexural loading and foreland basin sediment dispersal. This double-dating campaign in a detailed stratigraphic and structural context will help (1) elucidate the linkage between thrust deformation, hinterland unroofing, and foreland basin sedimentation through improved isotopic provenance analysis, (2) allow for correlation of thrust sheets to proximal and distal basin deposits, and (3) provide novel insights into the dynamic linkage between thrust tectonics, foreland subsidence and sequence stratigraphic architecture in the evolving Sevier foreland basin system in central and east-central Utah. The integration of these data should help improve conceptual models that relate temporal, thermal, and spatial aspects of thrust activity and basin flexural responses to tectonic unroofing and erosion, sediment removal and dispersal, and foreland basin sedimentary architecture, and ultimately help differentiate between tectonic, climatic and eustatic forcing factors.

**Keywords:** Foreland basin dynamics, thrusting, (U-Th)/(He-Pb) double dating