Kolloquium:

Folding, fracturing, stress and fluid flow above basement thrusts in the BigHorn basin (Laramide belt, Wy, USA)

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The Laramide belt consists of the deformed and disrupted foreland of the former Sevier orogeny. It developed at the expense of the North American craton as a result of a deformation continuum driven by the long-lasting subduction of the Farallon plate. The Sevier belt formed first as a thin-skinned wedge, which propagated eastward during Cretaceous to early Paleocene times. Thick-skinned Laramide deformation initiated by Late Cretaceous until Paleogene times and is overlapping with final stages of Sevier deformation.

The Laramide belt exhibits a network of anastomosing thick-skinned, basement-cored anticlines and uplifts separated by broad basins. These basement uplifts resulted from inversion of pre-existing (Proterozoic?) normal faults and topographically compartmentalized the former marine Sevier foreland basin into continental, endorheic basins since the late Cretaceous.

The talk summarizes part of several years of structural fieldwork and petrological and geochemical investigations of fracture systems within basement-cored structures of the BigHorn basin. It addresses several questions, among which: how do stress orientations and magnitudes evolve during thrust-related folding? How do fluids flow and fluid pressure evolve during thick-skinned folding? Is the sequence of deformation as simple as in thin-skinned fold-and-thrust systems? How did stress build-up occur in the sedimentary cover during the transition from thin-skinned (Sevier) to thick-skinned (Laramide) structural style of deformation?

This kind of study allows for a more comprehensive understanding of how changes in P-T-X conditions (fluid composition and flow, fluid (over)pressure), stress and strain within folded sedimentary strata are linked to the geometric/kinematic evolution of folding and timing of underlying basement thrusting, and emphasizes the potential of combining structural investigations at all scales.