



Characterization of basement highs in hyper-extended rift systems: examples from the Err nappe, SE Switzerland.

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Despite of the fact that many studies investigated magma-poor rifted margins, there are still open questions that are related to the nature of basement highs and the timing and processes related to their formation. While these questions are difficult to answer at present-day margins due to the lack of drill hole data, field analogues provide important insights and enable to find some answers to these questions. This is particularly true for the Err nappe in southeastern Switzerland, which is one of the world's few exposed and preserved rift-related hyper-extended domains. This nappe preserves a rift related extensional detachment system that is exposed over more than 200km², characterized by distinctive black gouges and green cataclasites and preserving the relation to its hanging wall and footwall rocks and the pre-, syn-, and post-tectonic sediments.

The aim of our study was to investigate the 3D architecture of the detachment system based on detailed mapping of this structure north and south of the Julier valley between Bivio and San Moritz in Central Grisons, SE Switzerland. Our results show the lateral variation of the morphology of the major detachment fault and its relation to extensional allochthons and the pre-, syn- and post-tectonic sediments. The main observation is that the architecture of the detachment system changes over very short distance across the Julier valley. While in the north the detachment is overlain by an allochthonous block (e.g. the Bardella block), to the south this block disappears and the detachment fault is exhumed at the seafloor. The mapping of the syn-tectonic sediments show that they are thick in the north and get thinner to the south where they are locally absent and the post-rift sediments directly overlie the detachment system. Furthermore the syn-tectonic sediments are locally characterized by basement clasts. These relationships suggest a rapid change from a domain where the detachment is overlain by allochthons and thick syn-tectonic sediments to a domain where the detachment is exposed. The lack of syn-rift sediments and the prominent hiatus suggest that the detachment formed a basement high south of the Julier valley.

The overall observations are reminiscent of either a core-complex type structure or a lateral ramp of a detachment fault marking the lateral transition from a hanging wall to a footwall controlled topography. In our presentation we will expose the field relationships and will discuss the tectonic processes and the timing of these structures as well as discuss the nature of the structure controlling the observed 3D geometry of the detachment system.