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Propagation of a fold-and-thrust belt over a basement graben

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We demonstrate the mechanical feasibility of the propagation of a thin-skin deformation front on a décollement previously cut and lowered by a normal fault. Using a numerical implementation of the limit analysis theory, we confirm the common understanding that any discontinuity of the décollement layer will trigger the formation of a ramp conducting the slip to the surface. Upon further remotely applied shortening, we show with both numerical and analogue models that the growing relief created by the ramp will reach a height and a horizontal extent such that the *lower* portion of the décollement will eventually be activated, and the belt will resume its growth further along its initial décollement layer even though it is deeper. The required extra-relief depends mainly on the friction angles of the bulk material and of the existing faults. The analogue experiments show that the step in the décollement acts as a temporary catching point in the propagation of the deformation front, resulting in a caracteristic tectonic style composed of a stack of faults above the step separated from the following structures by a long and flat, partially burried syncline. The thin-skin Jura fold-and-thrust belt developed during Mio-Pliocene times on a triassic décollement locally lowered by Oligocene grabens. With a dedicated mechanical prototype we show that realistic friction values are compatible with the propagation of deformation across these grabens, along the depressed zones of the triassic décollement, without having recourse to a thick-skin hypothesis.