



Dynamics of thin-skinned fold and thrust belts with a tilted detachment

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The formation of the Jura fold and thrust belt is linked to the Alpine orogeny. However, it is still a matter of debate why the Jura was formed tens of kilometres far away from the active deformation front while the Molasse basin that lies in between remained mostly undeformed.

Progressive thickening of the Molasse basin due to its infill with sediments, and the existence of a tilted potential detachment level at the Triassic evaporitic units, have been pushed forward as the main causes for the detachment of the Molasse basin and the consequent jump of the deformation front from the Alpine front to the position of the Jura at around 22 Ma or later (e.g Willett and Schlunegger, 2010).

In order to better understand the dynamics of a thin-skinned fold and thrust belt with a tilted detachment we have performed systematic forward numerical simulations with the 2D thermo-mechanical finite element code MILAMIN_VEP. The modelled setup consists of a tilted detachment, overlain by a sedimentary cover of constant thickness and a wedge shaped basin infill that makes the initial surface slope of the system to be zero.

In this study we have tested the importance of the following factors in the dynamics of such a fold and thrust belt evolution: 1) the applied boundary conditions 2) the angle of a uniformly tilted detachment 3) the end displacement of a curved detachment with a flexural foreland basin profile.

The implications of the studied factors are discussed for the case of the Jura-Molasse system.

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References

Willett, S.D. and Schlunegger, F. 2010, The last phase of deposition in the Swiss Molasse Basin: from foredeep to negative-alpha basin. *Basin Research* 22, 623-639, doi: 10.1111/j.1365-2117.2009.00435.x