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Interactive comment on "Stress field sensitivity analysis in a sedimentary sequence of the Alpine foreland, Northern Switzerland" *by* T. Hergert et al.

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1) Horizontal displacement boundary condition A certain state of stress in the model can be attained by both, stress and displacement boundary conditions. We applied displacement boundary conditions rather than stress boundary conditions because they are technically more easily to handle than stress boundary conditions. However, the main reason why we've chosen displacement boundary conditions is founded in the regional tectonics. The pile of sedimentary formations above the pre-Mesozoic basement is thought to be shifted to the north following the Alpine orogenesis. Although the siting area Nördlich Lägern is situated immediately to the north of the detached sediments it is nevertheless reasonable to assume that all formations have been shifted and shortened by the same amount horizontally. In contrast, if we would apply constant

N-S compressional stress over all formations stress would be similar in the individual formations and deformation would be different. Likewise, if we want to model the state of stress in the future (Fig. 15) it is reasonable to assume a certain amount of additional N-S shortening of the region rather than dealing with stressing rates.

In the manuscript we introduce the following sentence on page 12 line 21: Uniform displacement boundary conditions rather than stress boundary conditions are applied over the whole depth range of the sediments as the individual formations can be assumed to have experienced the same horizontal deformation.

2) We agree that there is some stress perturbation in the initial stress state due to the faults*. Displacements arising from these stress perturbations are reduced to very small values (< 1 cm) during iterative incorporation of the perturbed stress field into the original undeformed finite element mesh while gravity acts on the model volume. This means that the initial stress state in the model is at the same time in equilibrium with gravity and essentially strain free. In other words the displcements associated with the initial stress state are negligibly small with respect to the displacements arising from tectonic loading which are shown in a new Figure. Model results nearby faults are mainly affected by the coefficient of friction on the faults (Fig. 14). *In Fig. 9c this stress perturbation looks somewhat dramatic. This is because the principal stress components of the initial stress state differ not much from each other which implies that small changes in either stress component may change the stress regime.

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