Geophysical Research Abstracts
Vol. 14, EGU2012-2903, 2012
EGU General Assembly 2012

Mechanical versus kinematical shortening reconstructions of the Zagros High Folded Zone (Kurdistan Region of Iraq)

M. Frehner (1), D. Reif (2), and B. Grasemann (2)

(1) Geological Institute, ETH Zurich, Switzerland (marcel.frehner@erdw.ethz.ch), (2) Department of Geodynamics and Sedimentology, University of Vienna, Austria

Our study compares kinematical and mechanical techniques for the palinspastic reconstruction of folded cross-sections in collision orogens. The studied area and the reconstructed NE-SW-trending, 55.5 km long cross-section is located in the High Folded Zone of the Zagros fold-and-thrust belt in the Kurdistan Region of Iraq. The present-day geometry of the cross-section has been constructed from field, as well as remote sensing data.

In a first step, the structures and the stratigraphy are simplified and summarized in eight units trying to identify the main geometric and mechanical parameters. In a second step, the shortening is kinematically estimated using the dip-domain method to 11%–15%. Then the same cross-section is used in a numerical finite-element model to perform dynamical unfolding simulations taking various rheological parameters into account.

The main factor allowing for an efficient dynamic unfolding is the presence of interfacial slip conditions between the mechanically strong units. Other factors, such as Newtonian vs. power-law viscous rheology or the presence of a basement affect the numerical simulations much less strongly. If interfacial slip is accounted for, fold amplitudes are reduced efficiently during the dynamical unfolding simulations, while welded layer interfaces lead to unrealistic shortening estimates. It is suggested that interfacial slip and decoupling of the deformation along detachment horizons is an important mechanical parameter that controlled the folding processes in the Zagros High Folded Zone.