

## **4-D Evolution of Fold and Thrust Belts**

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New three-dimensional analogue sandbox modelling experiments have been used to simulate the 4-D evolution of thrust belts both in delta toes and in accretionary wedges. High-resolution digital photography, digital laser scanning and 3-D reconstructions have been combined to produce quantitative models of thrust belt systems. This paper focuses upon the initiation, growth and linkage of faults at the early stages of thrust evolution as well as segmentation and curvatures within thrust belts. In all models Colomb thrust wedges were developed with the internal geometries strongly controlled by the nature of the basal detachment layers.

Low taper wedges were formed where ductile polymer and low friction basal detachments were used whereas high taper wedges formed where sand detachment layers were used. Along-strike segmentation and curvatures in thrust belts were induced where basal detachment characteristics varied across the model and also where syntectonic erosion and sedimentation occurred. Along-strike changes in thicknesses of layers across lateral and oblique ramps induced fold plunge terminations and transfer/accommodation zones within the model thrust belts. The results of the analogue models are compared to segmentation and along strike changes in natural thrust and fold systems such as those found in deepwater fold belts offshore northern Borneo or in terrestrial fold belts such as the Canadian Rocky Mountains and the Zagros fold belt of Iran.