

Paper No. 13-12

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DECONSTRUCTING FOLDS IN THE DEPTH AND THICKNESS DOMAINS: EXAMPLE OF THE ACTIVE YAKENG ANTICLINE, XINJIANG CHINA

[SUPPE, John](#), Department of Geosciences, Princeton Univ, Princeton, NJ 08544, suppe@princeton.edu, HUBERT-FERRARI, Aurélia, Institut de Géologie, Université de Neuchâtel, rue Emile Argand 11, Neuchâtel, 2007, Switzerland, and WANG, Xin, Department of Geosciences, Zhejiang Univ, Hangzhou, China

Now-a-days some large folds are essentially completely imaged seismically allowing us to literally deconstruct their structural meaning. Completely imaged folds contain a great deal of information. Here we discuss some key issues of this deconstruction process and demonstrate the surprising twists of insight that can be obtained, even with an apparently boring anticline with only 6 degree limb dips.

Our example is the actively growing Yakeng detachment fold of the south Tianshan thrust belt of Xinjiang, western China. We analyze quantities such as area of structural relief, bed length and layer thickness for 28 stratigraphic horizons, based on measurements obtained in both the depth and thickness domains. We show that all layers of the lower half of this 5 km thick structure have shortened by 1.2 km in pure shear above a basal detachment that roots to the north in the great Quilitak anticline. In marked contrast, the upper half of the structure has only shortened 90 m by flexural slip above the deeper pure-shear anticline, conserving layer thickness. A zone of detachment with 1.1 km slip must exist between the pure-shear and flexural-slip levels of the structure, sending slip back to the north into the great Quilitak anticline.

Furthermore, this deconstruction shows that a quarter of the structural relief of Yakeng anticline (1 sq. km) was produced by diapiric flow of the evaporitic basal detachment layer into the core of the anticline. Also the history of growth is recorded in the uppermost layers and in the geomorphology, including the folding of preexisting drainage networks. Finally the basement was also deforming under Yakeng anticline providing further challenges and joys of deconstruction. Even a seemingly boring anticline with 6 degree limb dips has a great deal to tell us.

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