Geophysical Research Abstracts
Vol. 15, EGU2013-3426, 2013
EGU General Assembly 2013

The use of burial imprint in eroded fold-bend-fault: Example from the Hsuehshan Range, Taiwan.

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In exposed fold and thrust belt, the magnitude of thrusting is difficult to quantify because the hanging-wall cut-off is removed by the erosion. In this work, we propose a thermo-geometrical model to quantify fault-bend-fold (FBF) (Total shortening, slip rate and the age of the initiation of the fault) with eroded cut-offs. The FBF model implies the emplacement of the hanging-wall over the footwall and as a result a tectonic contribution in the maturation of rocks in the footwall. For our model, we use burial data (reflectance of vitrinite and Raman spectroscopy) in the footwall and hanging-wall in addition to the geometrical data. The model provides a minimum slip rate and minimum displacement needed to reconstruct a minimum overriding thrust sheet and reproduce the thermal anomaly in the footwall. The model allows also estimating an age of the initiation of the thrust and the decollement depth.

We apply our model on the eroded hanging-wall cut-offs of the Shuilikeng and Tili thrusts in the Hsuehshan range in Taiwan. The Shuilikeng and Tili thrusts are exposed to the surface and the thrust sheet emplaced over the footwall is eroded. Our measured vitrinite reflectance data and previously thermal data document a thermal anomaly in the footwall of these thrusts. We interpret these thrusts as fault-bend fold. We suggest a simultaneous evolution of the fold and the erosion for estimating a minimum thickness of the hanging-wall sheet emplaced over the footwall.

A total shortening of 21 ± 1 km and 28 ± 1 km is proposed on the Shuilikeng and Tili thrusts respectively and a decollement depth of 14.5 ± 1 km is consistent with elevated burial temperature in the hanging-wall of these thrusts. The age of the initiation of the Shuilikeng and Tili thrusts is 3.4 Ma and 3.8 Ma respectively.