Geophysical Research Abstracts, Vol. 8, 08617, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08617

Trishear fault propagation folding and faulting of growth strata in an extensional setting: clues to the geometry of a listric oblique-slip fault

K. Pelz, I. Rohrmoser and H. Seyfried
Institute of Geology and Palaeontology, University of Stuttgart
(klaus.pelz@geologie.uni-stuttgart.de)

Coarse-grained sediments exhibiting intraformational unconformities and growth strata steeply tilted towards the centre of a sedimentary basin are commonly related to syntectonic sedimentation above an active monocline. Slip on a buried fault results in a topographically active monoclinal ramp prone to erosion on the stable block and deposition on the subsiding block. Ongoing slip and/or propagation of the fault tip towards the surface results in the rotation of older sediments and angular onlap of subsequent deposits. In a case study from the Neogene intramontane Fortuna basin in the Betic Cordillera we applied trishear modelling to constrain the relationship between fault geometry, fault slip, fault propagation, as well as structural and sedimentological response. The Fortuna basin is bounded by two major strike-slip zones constraining a transtensional setting. The geometry of the border faults and the dip-slip to strike-slip ratio is largely unknown. Field data of growth strata with coarse grained marine sediments on the northern border fault and structural relations between faulting and deposition provide boundary conditions to determine the geometry of the master fault. Our results demonstrate that (1) the basinward extent of coarse-grained growth strata is controlled by the propagation to slip ratio of the fault as upward migration of the fault tip narrows the lateral extension of the monocline; (2) bedding angularity across unconformities and maximum thickness of growth strata increases during upward migration of the fault tip; (3) when increasing the dip angle of the buried fault the monoclinal ramp narrows and steepens producing thicker and coarser-grained growth strata; (4) a complex structural and sedimentological architecture starts to develop as splays of the master fault cut through syntectonic sediments. Drag along the faults leads to further basinward tilting of the hanging wall sediments increasing the angle of un-

conformities between stacked units. In our study area, slickensides, shearing of oyster reefs under significant confining pressure and striated pebbles in conglomerates at the fault are characteristic for this late stage of deformation. Observed tilting of sediments and variations in rotation across faults are consistent with predicted values. Predicted strain, however, is higher than supported field data, which may be due to restrictions in the detectability of micro-faults in coarse grained sediments. In combination with additional data on facies distribution and curvature of adjacent basinal marlstones, our model predicts a listric shape of the master fault. According to slickensides, slip on this fault ranges from pure strike-slip through abundant oblique slip to pure dip slip. Tilting of sediments is almost entirely caused by dip slip.