Geophysical Research Abstracts
Vol. 17, EGU2015-6360, 2015
EGU General Assembly 2015

Flat-ramp vs. convex-concave thrust geometries in a deformable hanging wall: new insights from analogue modeling experiments

Pedro Almeida (1,2), Ricardo Tomas (1), Filipe Rosas (1,2), Joao Duarte (3), and Pedro Terrinha (4)

(1) Science University of Lisbon, Portugal (prsalmeida@fc.ul.pt), (2) Instituto Dom Luiz, Science University of Lisbon, Portugal, (3) School of Earth, Atmosphere and Environment, Monash University, Melbourne, Australia, (4) Instituto Português do Mar e da Atmosfera, Lisbon, Portugal

Different modes of strain accommodation affecting a deformable hanging-wall in a flat-ramp-flat thrust system were previously addressed through several (sandbox) analog modeling studies, focusing on the influence of different variables, such as: a) thrust ramp dip angle and friction (Bonini et al, 2000); b) prescribed thickness of the hanging-wall (Koy and Maillot, 2007); and c) sin-thrust erosion (compensating for topographic thrust edification, e.g. Persson and Sokoutis, 2002).

In the present work we reproduce the same experimental procedure to investigate the influence of two different parameters on hanging-wall deformation: 1) the geometry of the thrusting surface; and 2) the absence of a velocity discontinuity (VD) that is always present in previous similar analogue modeling studies.

Considering the first variable we use two end member ramp geometries, flat-ramp-flat and convex-concave, to understand the control exerted by the abrupt ramp edges in the hanging-wall stress-strain distribution, comparing the obtain results with the situation in which such edge singularities are absent (convex-concave thrust ramp).

Considering the second investigated parameter, our motivation was the recognition that the VD found in the different analogue modeling settings simply does not exist in nature, despite the fact that it has a major influence on strain accommodation in the deformable hanging-wall. We thus eliminate such apparatus artifact from our models and compare the obtained results with the previous ones.

Our preliminary results suggest that both investigated variables play a non-negligible role on the structural style characterizing the hanging-wall deformation of convergent tectonic settings were such thrust-ramp systems were recognized.

Acknowledgments
This work was sponsored by the Fundação para a Ciência e a Tecnologia (FCT) through project MODELINK EXPL/GEO-GEO/0714/2013. Pedro Almeida wants to thank to FCT for the Ph.D. grant (SFRH/BD/52556/2014) under the Doctoral Program EarthSystems in IDL/UL.

References
Bonini, M., Sokoutis, D., Mulugeta, G., Katrivanos, E. (2000) - Modelling hanging wall accommodation above rigid thrust ramps. Journal of Structural Geology, 22, pp. 1165-1179.
Persson, K. & Sokoutis, D (2002) - Analogue models of orogenic wedges controlled by erosion. Tectonophysics, 356, pp. 323– 336.
Koy, H. & Bertrand, M. (2007) - Tectonic thickening of hanging-wall units over a ramp.Journal of Structural Geology, 29, pp. 924-932.