Geophysical Research Abstracts
Vol. 14, EGU2012-10085, 2012
EGU General Assembly 2012

Sandbox analogue modeling of strike-slip crustal shear zones involving structural inheritance

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Structural inheritance is widely recognized as an important factor that contributes to determine the architecture of newly developing tectonic systems, including the possibility to trigger otherwise unexpected intraplate deformations. This has important implications for seismic hazard, for plate tectonic reconstructions, and for the possible occurrence of new petroleum plays. Properly scaled analogue models provide a useful tool to investigate geological processes by simulating their dynamic and kinematic evolution. We present results of a sandbox experimental programme designed to investigate the influence of structural inheritance on the evolution and tectonic architecture of crustal-scale strike-slip fault systems. Two layers of quartz sand and silicon putty were used to simulate the rheological behavior of the upper and lower crust, respectively. Different pre-deformational configurations of inherited, mechanically weaker zones were tested by inserting silicone stripes in the lower half of the upper sand layer. Results indicate a significant impact of inherited weakness zones on the 3D geometry and time evolution of experimental strike-slip fault systems.