

BASIN INVERSION BY ORTHOGONAL COMPRESSION: ANALOGUE EXPERIMENTS WITH WEAK FAULTS

C. R. Nogueira ^(1, 2)

⁽¹⁾ *Departamento de Geologia, Faculdade de Ciências, Universidade de Lisboa (Portugal)*

⁽²⁾ *LATTEX-IDL, Universidade de Lisboa (Portugal)*

Summary

Linear frictional failure criteria predict that normal faults form dipping around 60°, and reverse faults around 30°, depending on dry rock properties. Therefore, it is unlikely that normal faults be reactivated as reverse faults, unless the stress conditions are favourable, or the intrinsic properties of the intact rock or of the precursor fault (PF) are modified. Work focused on friction (strength) of the PF proved that inversion of high angle PF by orthogonal compression is possible (Marques & Nogueira, 2008).

The present study focuses on symmetric basin inversion with high angle boundary PFs by orthogonal compression. Following their work, sandbox experiments were used with initially embedded weak PFs dipping 60° to the basin centre, filled with a thin film of silicone putty that lubricated the (weak) fault. The results show that: (1) the basin can be inverted if the boundary PFs are weak during compression; (2) after inversion initiation, the shortening accommodation is made through the reverse movement on the PFs; (3) the reactivated PFs prevent internal basin deformation, until an amount of shortening that depends on basin width (distance between PFs).

The viscous material used to weaken the fault is scalable to salt in nature. However, the great decrease in friction due to lubrication with a viscous material can simulate many other weakening mechanisms observed in nature.

REFERENCES

Marques, F.O. & Nogueira, C.R., 2008. Normal fault inversion by orthogonal compression: Sandbox experiments with weak faults. *Journal of Structural Geology*, 30, 761-766.