Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05308, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05308
EGU General Assembly 2008

The observation of polyphase faulting at rifted margins and implications for restoring extension

T.J. Reston (1), G. Booth-Rea (2), D. Klaeschen (3), V. Gaw (3)

(1) University of Birmingham, UK, (2) University of Granada, Spain, (3) IFM-GEOMAR, Kiel, Germany

t.j.reston@bham.ac.uk

The highly thinned crust at rifted margins are characterised by numerous fault blocks, many of which are topped with tilted sedimentary strata. Although these are commonly interpreted as prerift, in many cases they are relatively deep water deposits, and thus more likely to be synrift units deposited before the development of the latest faults. If so, they are evidence for polyphase faulting. Depth images also reveal hints of polyphase faulting in terms of intersecting surfaces. Here I present new reconstructions of profiles across the Porcupine Basin and the west Iberia margin invoking both single phase and polyphase faulting. Restorations made with only one phase demonstrate major space problems and cannot explain the crustal thinning, nor the distribution of deep crustal rocks at the present day surface. In contrast, invoking polyphase faulting both provides a tighter restoration, removes the space problem, and restores the crust toward reasonable pre-rift crustal thicknesses. However it is essential to carry out the restoration in the correct sequence.

Furthermore, analysis of the subsidence history of the west Iberia margin is shown to be completely compatible with polyphase faulting accompanied by the onset of mantle serpentinization which buffers late synrift and early postrift subsidence.

The remaining question is why polyphase faulting is not more widely recognised. Although many regions that may have undergone polyphase faulting are deeply buried by sediment or are under km of water, some regions of polyphase faulting are exposed on land and clearly demonstrate cross-cutting faults of various ages. .