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The influence of basement structures on the development of oblique passive margin segments: case studies from South Greenland and the South Atlantic.

R. Wilson (1), K. McCaffrey (1), R. Holdsworth (1), P. Japsen (2), J. Chalmers (2), M. Thompson (3) and S. Mattthews (3)

(1) Reactivation Research Group, Earth Sciences, Durham University, Durham, UK, (2) Geological Survey of Denmark and Greenland (GEUS), Copenhagen, Dk., (3) BP Sunbury, London, UK (robert.wilson@durham.ac.uk / Fax: +44 191 3342301)

Passive margins are commonly segmented along strike, giving rise to the development of orthogonal, oblique and transform rift margins. Such segmentation can also be seen in continental rifts that are the precursor to these passive margins. The origins of this segmentation and segment boundary zones are often attributed to the influence of basement structure. One possibility is that such segmentation reflects along-strike changes in the orientation of pre-existing structures in the underlying continental basement. A corollary of this model is that if such pre-existing structures undergo reactivation then they will often be significantly oblique to the direction of regional extension. In obliquely divergent settings, the record of break-up is complicated by their non-coaxial kinematics (i.e. continuous rotation of the incremental strain ellipse) in which transtensional fault zones accommodate oblique divergence.

In this study we use passive margin case studies from the South Atlantic (Santos-Campos-Espirito Santo basins, Brazil) and South Greenland (North Atlantic/ Labrador Sea). A variety of onshore (e.g. remote sensing, geophysical and geology maps) and offshore (e.g. 2D seismic) datasets are used to build 3D structural models up for rifting and underlying basement structure and the relationship between the two.

Our findings suggest the orientation of pre-existing basement structures relative to the regional divergence vector plays an important role in the development of passive margins. However, direct reactivation is generally localised to landward areas of a margin. The main inter-basin faults are likely to be dominated by extensional rifts

and the orientation of these faults reflect the influence of oblique boundary conditions (transtension).