Geophysical Research Abstracts, Vol. 7, 04043, 2005 SRef-ID: 1607-7962/gra/EGU05-A-04043 © European Geosciences Union 2005



Numerical Modelling of Oceanic Crust Formation: The Sheeted-dyke Complex

D. Kühn, T. Dahm

Institute of Geophysics, University of Hamburg, Germany (daniela.kuehn@dkrz.de)

Most models dealing with oceanic crust formation are qualitative and tend to neglect stress fields arising from dyke opening. Hence, they loose sight of the self-induced stress field of dykes, which can locally surmount the effect of regional stress fields. In this model, heterogeneities of the stress field are calculated quantitatively. Oceanic crust is composed of repeated dyke intrusions. Dyke interaction is modelled by summation of stress fields, which assumes that the time span of solidification is much shorter than the recurrence time, and that this in turn falls below the time of viscoelastic relaxation. Numerical models for slow-, intermediate- and fast-spreading ridges are presented.

Fundamental problems treated here are:

- Oceanic crust from fast-spreading ridges is thick, with a continuous and coherent stratigraphy, whereas exposure of lower crust and mantle may occur at slow-spreading ridges. Is this dissimilarity caused by inherently different volcanic processes or is it due to the low magma supply at slow-spreading ridges which cannot keep pace with spreading?
- Dyke interaction leads to focussing and crossing of dykes rather than parallelity. How to produce a sheeted-dyke complex in spite of the self-induced stress field of dykes?
- Are there indications that a magma reservoir evolves out of overlapping dykes at the level of neutral buoyancy?

Acknowledgments: Project supported by German Research Foundation (DFG).