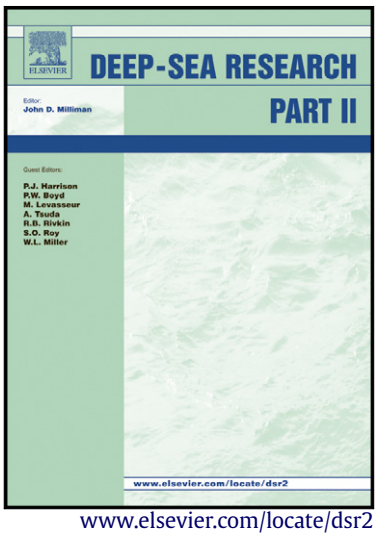

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PII: S0967-0645(15)00138-1
DOI: http://dx.doi.org/10.1016/j.dsr2.2015.04.021
Reference: DSRII3870

To appear in: *Deep-Sea Research II*

Cite this article as: Bramley J. Murton, Peter A. Rona, Carlsberg Ridge and Mid-Atlantic Ridge: comparison of slow spreading centre analogues, *Deep-Sea Research II,* http://dx.doi.org/10.1016/j.dsr2.2015.04.021

Carlsberg Ridge and Mid-Atlantic Ridge: comparison of slow spreading centre analogues

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ABSTRACT
Eighty percent of all mid-ocean spreading centres are slow. Using a mixture of global bathymetry data and ship-board multibeam echosounder data, we explore the morphology of global mid-ocean ridges and compare two slow spreading analogues: the Carlsberg Ridge in the north-west Indian Ocean between 57°E and 60°E, and the Kane to Atlantis super-segment of the Mid-Atlantic Ridge between 21°N and 31°N. At a global scale, mid-ocean spreading centres show an inverse correlation between segment length and spreading rate with segmentation frequency. Within this context, both the Mid-Atlantic Ridge super-segment and Carlsberg Ridge are similar: spreading at 22 and 26 mm/yr full rates respectively, being devoid of major transform faults, and being segmented by dextral, non-transform, second-order discontinuities. For these and other slow spreading ridges, we show that segmentation frequency varies inversely with flank height and ridge axis depth. Segments on both the Mid-Atlantic Ridge super-segment and Carlsberg Ridge range in aspect ratio (ridge flank height/axis width), depth and symmetry. Segments with high aspect ratios deeper axial floors, often have asymmetric rift flanks, and are associated with indicators of lower degrees of melt flux. Segments with low aspect ratios have shallower axial floors, symmetric rift flanks, and evidence of robust melt supply. The relationship between segmentation, spreading rate, ridge depth and morphology, at both a global and local scale, is evidence that rates of melting of the underlying mantle and melt delivery to the crust play a significant role in determining the structure and morphology of slow spreading mid-ocean ridges.

1. Introduction

1.1 Background