



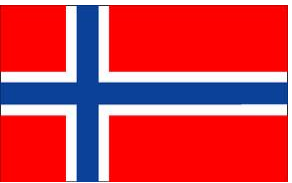
NansClim



Climate effects on biodiversity,
abundance and distribution of
marine organisms

A PROJECT FUNDED BY NORAD

Spatio-temporal trends in diversity of the demersal fish communities in the BCLME: a comparative approach



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Axelsen, Nsiangango, Cloete, Kainge, Johnsen



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BACKGROUND

Biodiversity is changing at an unprecedented rate on a global scale (Pimm *et al.*, 1995), as a complex response to several anthropogenic changes in the global environment (Vitousek, 1994).

However, most work on biodiversity change in relation to climate change has focused on terrestrial and freshwater ecosystems (Kinzig *et al.*, 2001, Loreau *et al.*, 2002), and very little work done in the marine ecosystem.

The effects of species loss in aquatic environments, in contrast, have received much less attention, yet the nature of these ecosystems and their biota differ markedly from those on land (Giller *et al.*, 2004).

AIMS

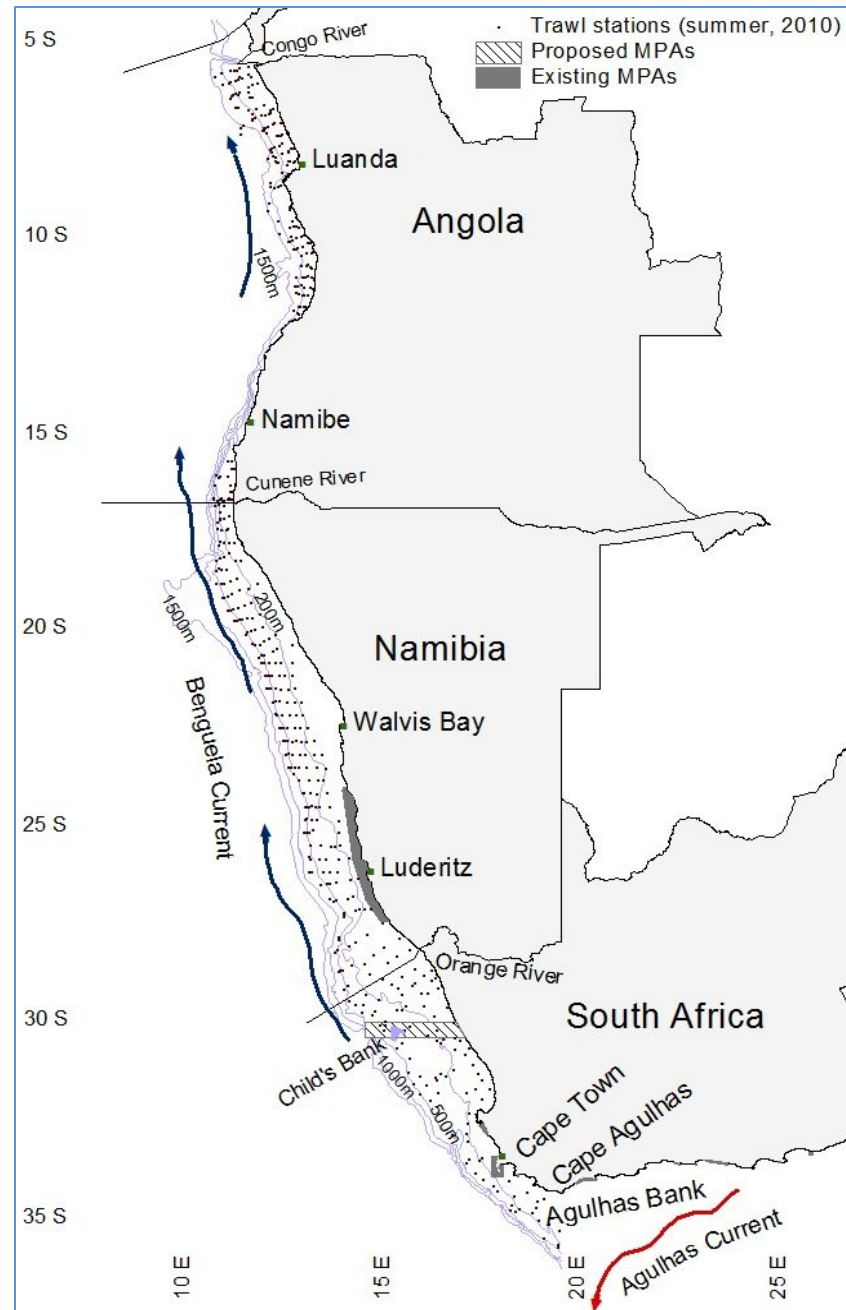
The primary aim of this study is:

- a) to assess and documents patterns in biodiversity within each country (Angola, Namibia, and South Africa) and relate these patterns to physical and environmental explanatory variables.

- b) to compare regional patterns of diversity and hypothesize on the potential drivers of biodiversity across the BCLME region.

Study Area

- Trawl stations (points)
- Period 1985-2010



Source: Kirkman *et al.*

METHODS

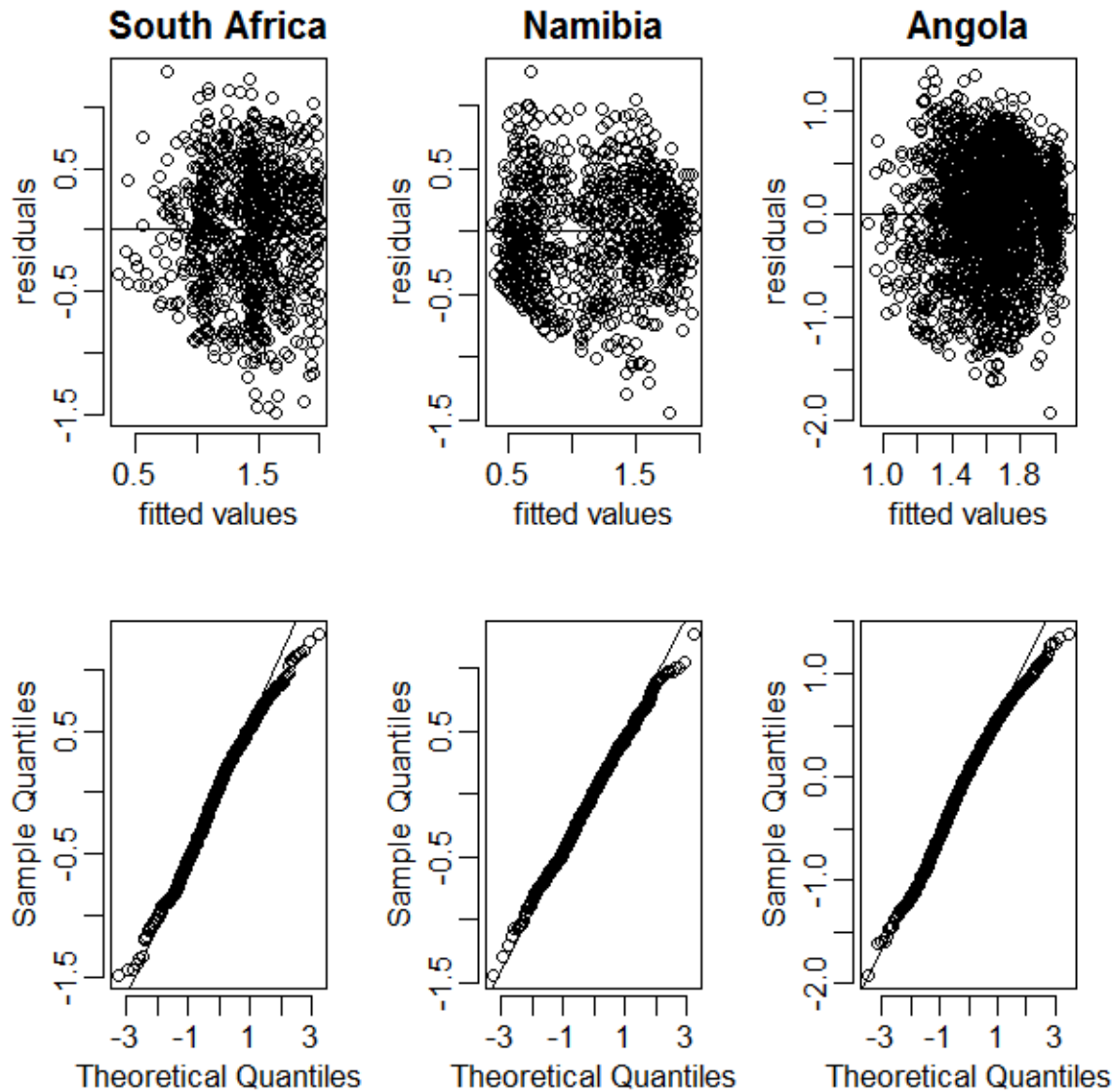
Data used: Demersal survey data ranging from 1985 to 2010

Diversity as measured by three common diversity indices:

- Species richness S
- Pielou's evenness index J' , &
- Shannon-Wiener index H'

Were calculated using *PRIMER v6* (Warwick and Clarke, 1994) and were modelled as a function of the physical and temporal explanatory variables using GAM (Hastie and Tibshirani, 1995) (all analysis done in *R* (*mgcv* package (Wood, 2006, 2009)).

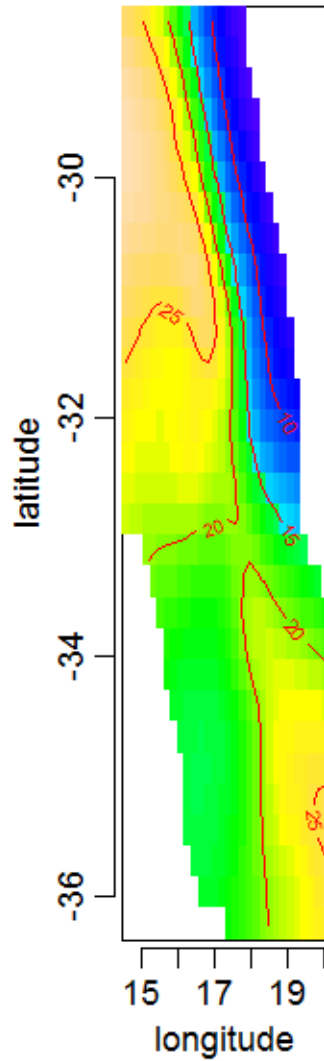
RESULTS



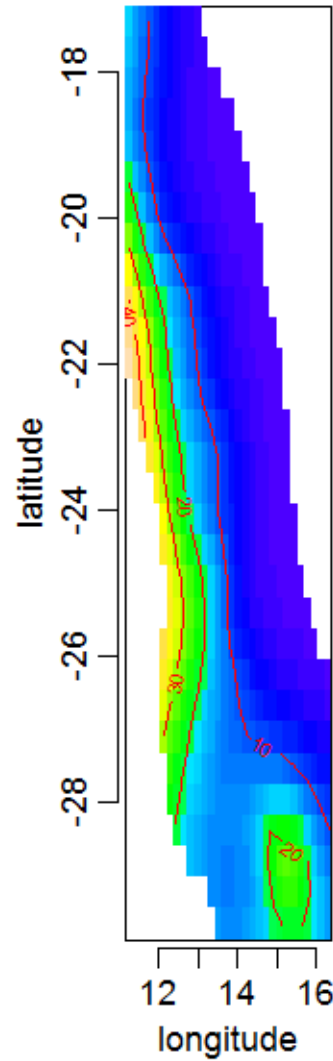
GAM Diagnostic Test Results

Results

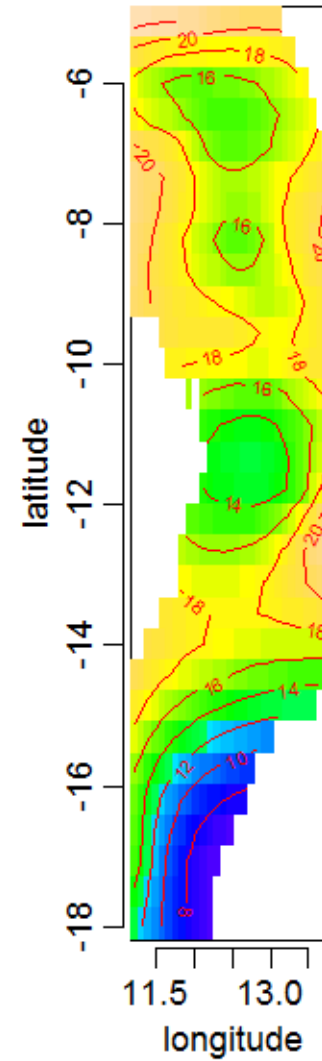
South Africa



Namibia

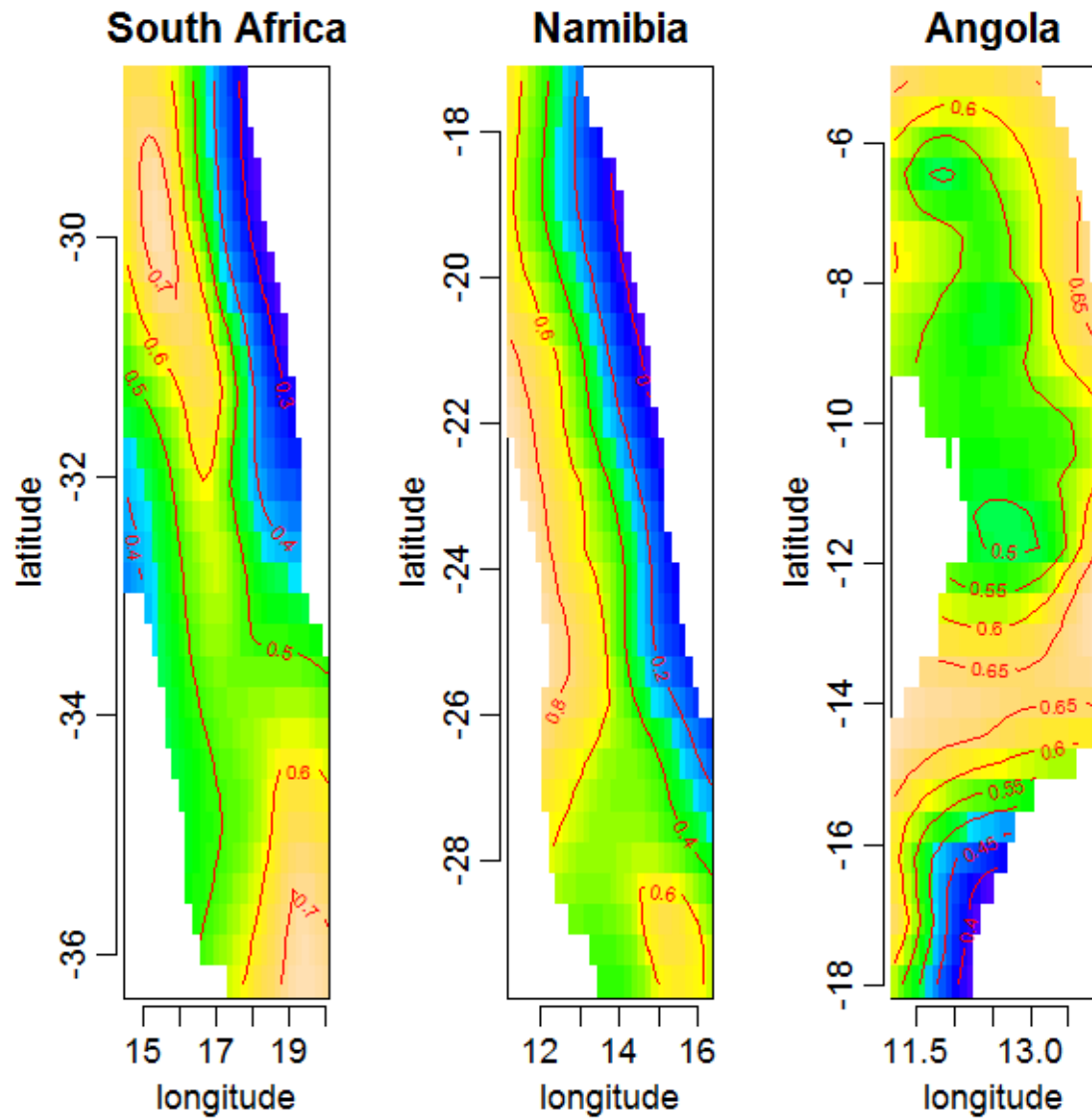


Angola

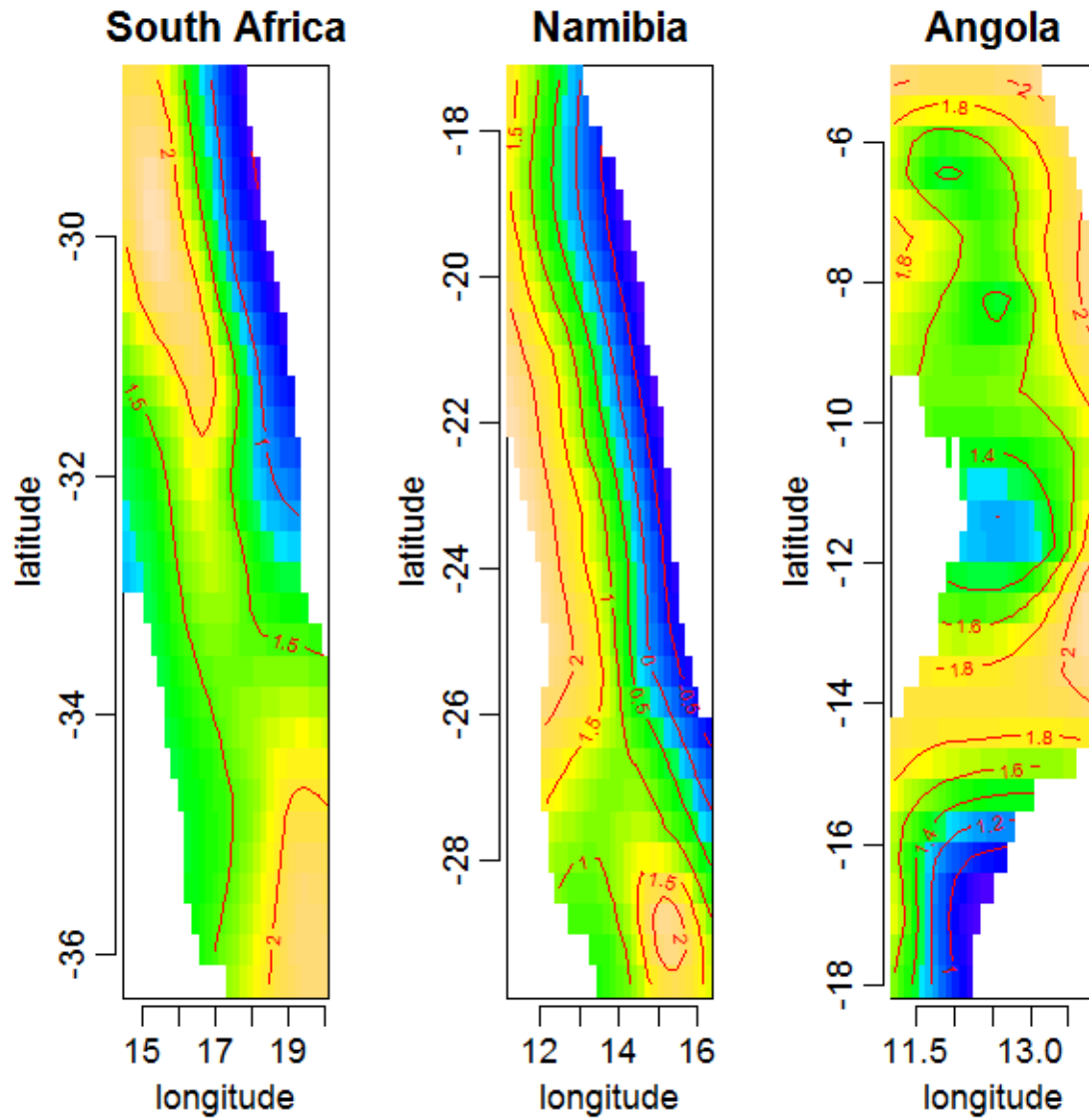


Spatial trends:

Species richness S

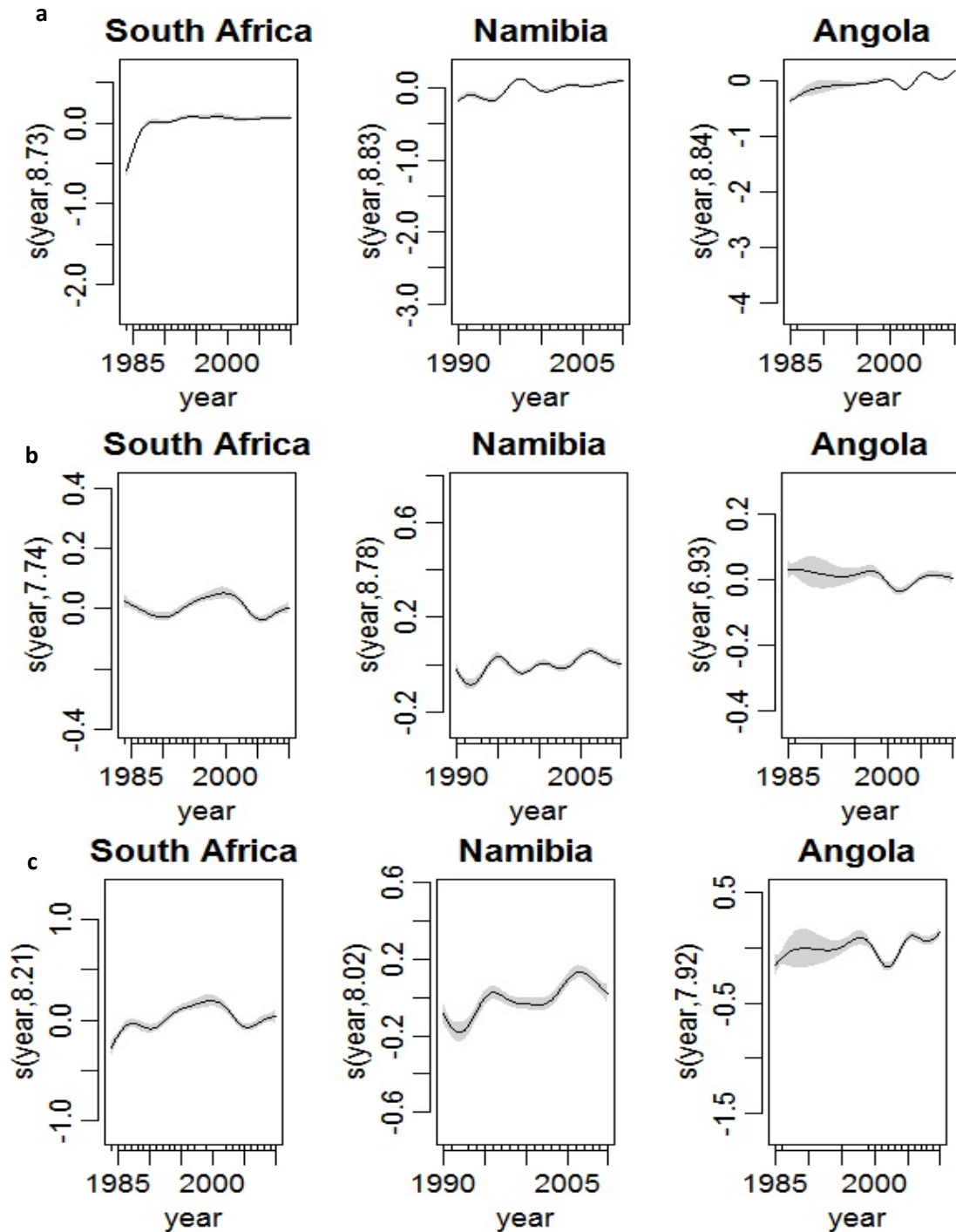


Pielou's evenness index J'

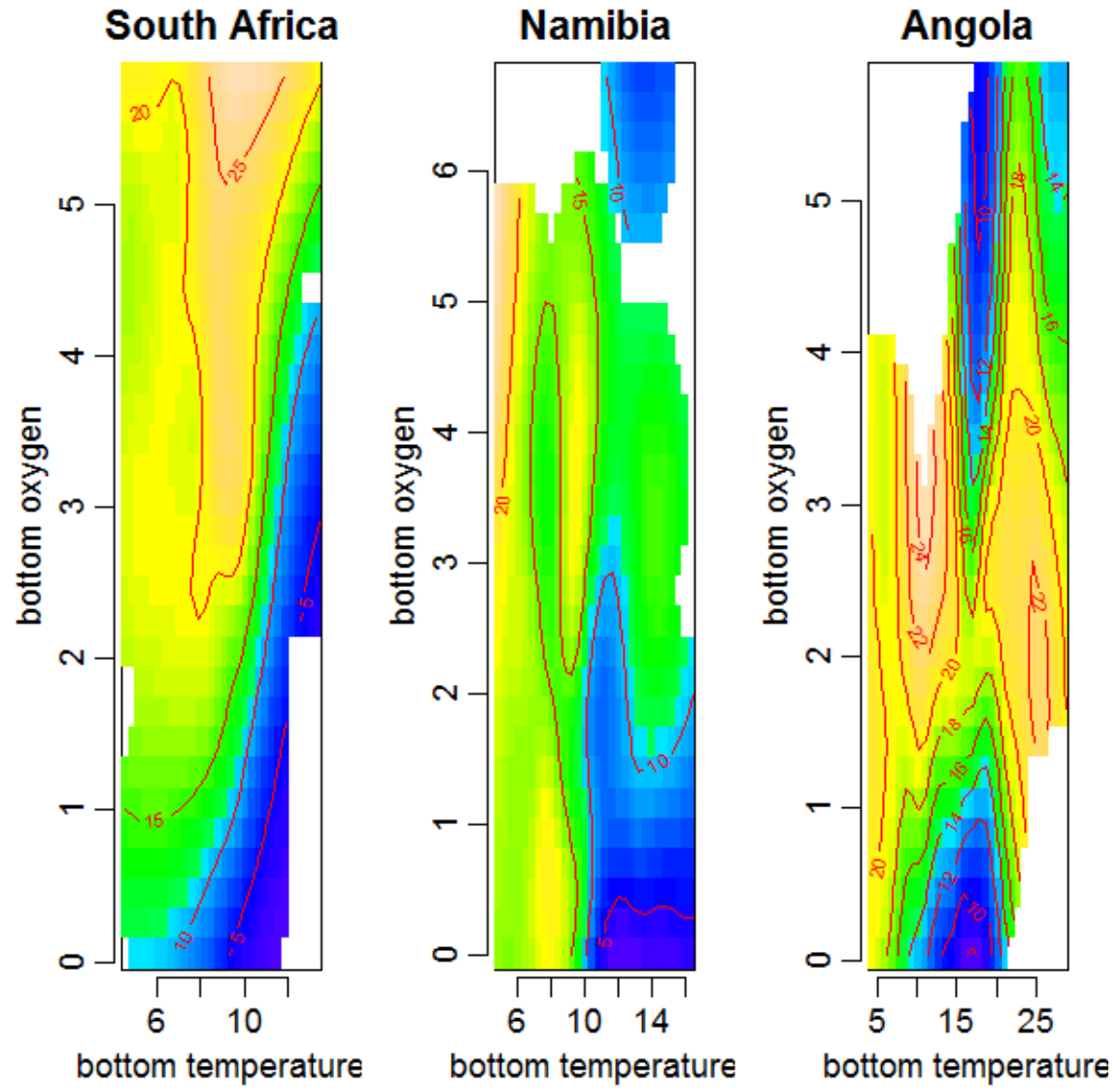


Shannon-Wiener index H'

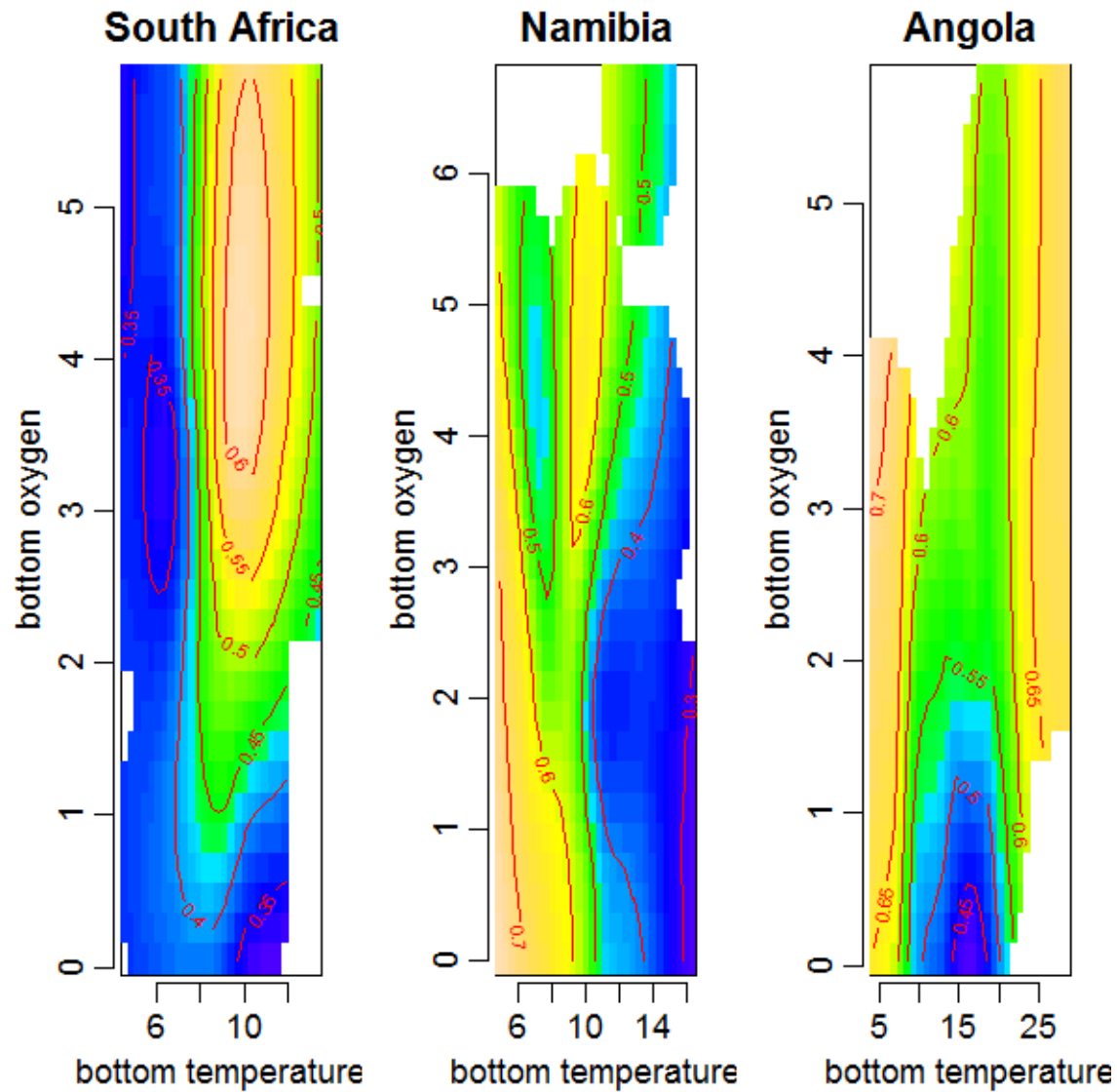
Effect of year on a) species richness S , b) Pielou's evenness index J' , and c) Shannon-Wiener index H' for Angola, Namibia, and South Africa.



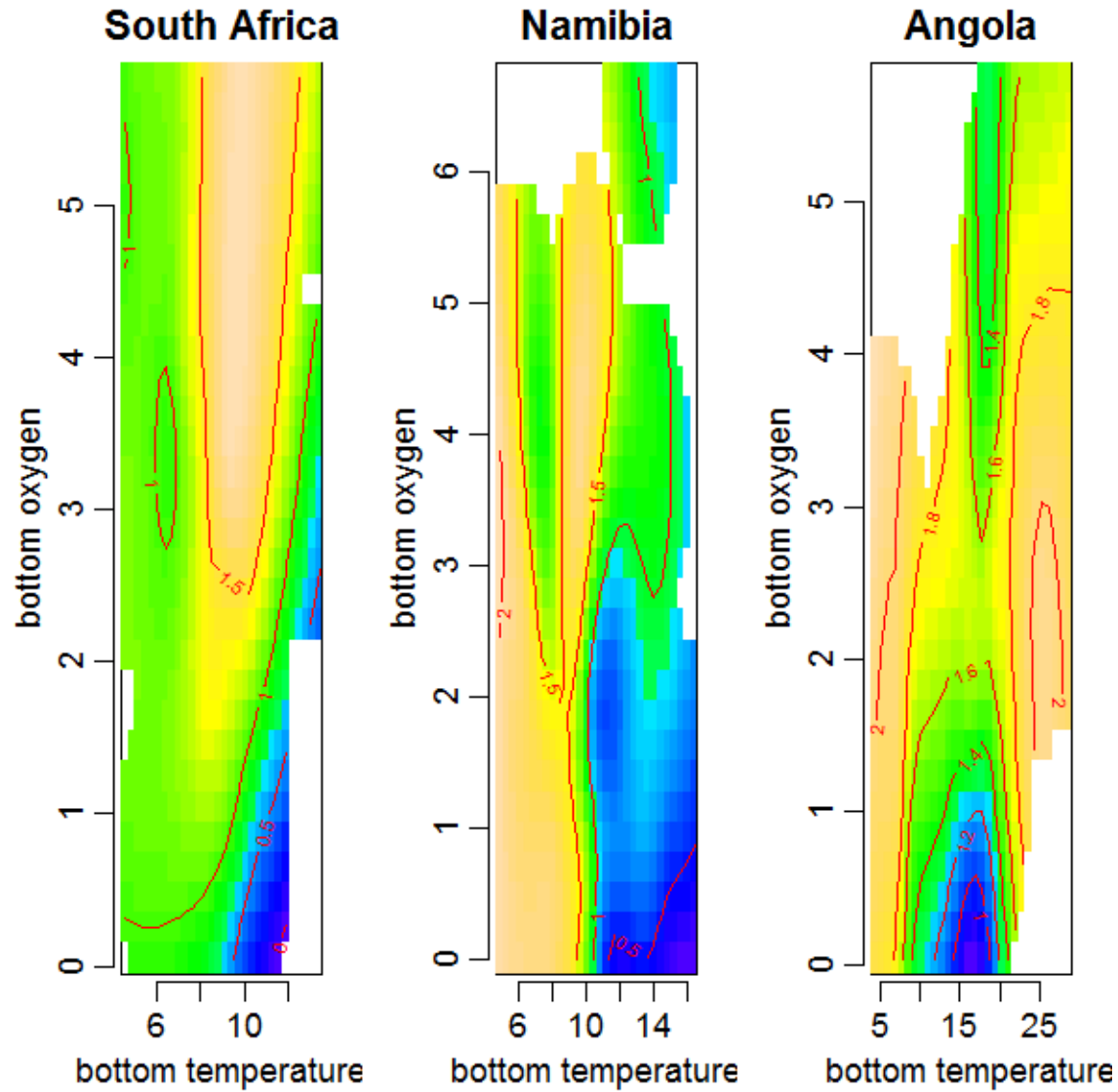
Effects of bottom temperature and oxygen



Species richness S



Pielou's Evenness index J'



Shannon-Wiener index H'



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SUMMARY

GENERAL SPATIAL-TEMPORAL TRENDS

Diversity indices	Factors	Angola	Namibia	South Africa
Species richness S	Depth:	Increase	Increase	Increase
	Latitude:	Increase with decrease in lat	Decrease with increase in lat	Stable, decr@33degS
	Longitude:	V-shape (12degS)	Decrease with Increase in longi	V-shape @18degE
	Year:		Stable	Increase stable
	Temperature:	5-15degS & 20-25degS	4-10degS	<10degS
	Oxygen:	1-4 ml/l	1-6 ml/l	0.3-6 ml/l
Pielou's evenness index J'	Depth:	Increase	Increase	M-shape
	Latitude:	Increase	Decrease with decreasing lat	Stable @33degS decrease
	Longitude:	Decreasing with increasing Longitude	Decrease with increasing longitude	Decrease 18degE increase
	Year:	Slight decrease with year (lowest 2003)	Slight increase	Slight variation but stable
	Temperature:	5-10degS & 20-25degS	4-10degS	8-11degS
	Oxygen:	0-4 & 1.5-6ml/l	0-6 ml/l	2-6ml/l

Diversity indices	Factors	Angola	Namibia	South Africa
Shannon-Wiener index H'	Depth:	Increase	Increase	Fluctuates
	Latitude:	Increase	Decrease with decreasing lat	Stable, decrease @ 33degS
	Longitude:	U-shaped	Decrease with increasing longi	V-shape @18degE
	Year:	Stable but 2003 low	Stable	Increase stable @1996
	Temperature:	5-10 and 20-25degS	4-10degS	8-11degS
	Oxygen:	0-4 & 1.5-6ml/l	0-6 ml/l	2-6ml/l

WAY FORWARD

- ✓ **Complete the MS and submit for publication**
- ✓ **Looking forward to NansClim II**

THANK YOU

