



**2148-30**

**Fifth ICTP Workshop on the Theory and Use of Regional Climate  
Models**

*31 May - 11 June, 2010*

**Influence of lateral boundary forcing on regional model simulations of mean and  
extreme climates over Southern Africa**

SYLLA Mouhamadou Bamba, Giorgi Filippo

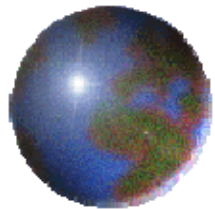
*International Centre for Theoretical Physics  
Earth System Physics Section, Physique of Weather and Climate Group  
Strada Costiera 11, 34100  
Trieste  
ITALY*

Stordal Frode

*University of Oslo, Geofag/MetOs Matematikkbygningen  
11 et. Moltke Moes vei 35, 0851  
Oslo  
NORWAY*



**SOCOCA Meeting: Trieste, 26-27th May  
2010**



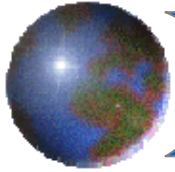
# Regional climate model simulations over Southern Africa

**Bamba Sylla and Filippo Giorgi**

**The Abdus Salam ICTP, Trieste, Italy**

**Frode Stordal**

**University of Oslo, Oslo, Norway**



# Outline

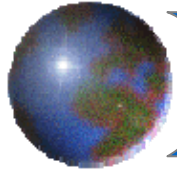
## I/ Introduction

## II/ Model and simulations design

## III/ Results

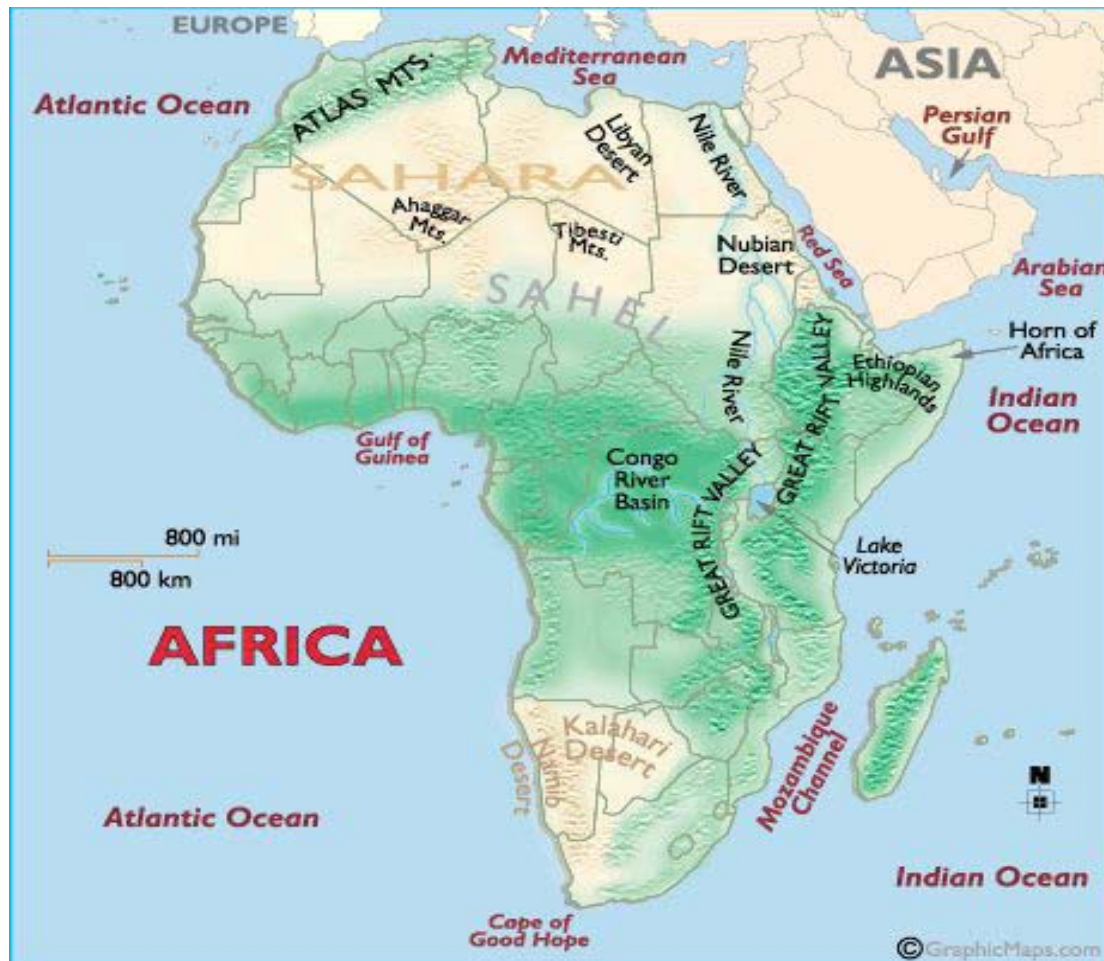
- Precip, temp, low-level winds ...
- Synoptic variables
- Surface radiation
- Extremes

## IV/ Conclusion and perspectives

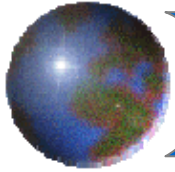


# I/ Introduction

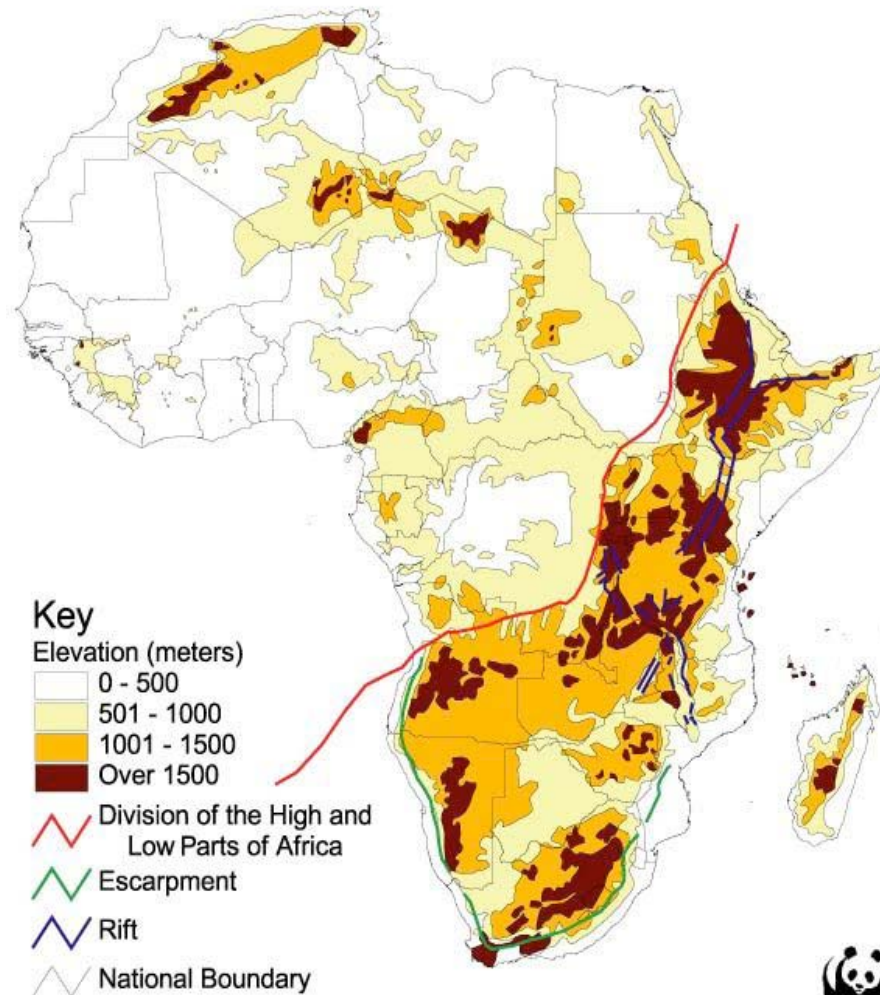
## □ Land features



- ❖ Namib and Kalahari Deserts
- ❖ Great Rift Valley
- ❖ Lake Victoria
- ❖ Congo River Basin



## □ Elevation

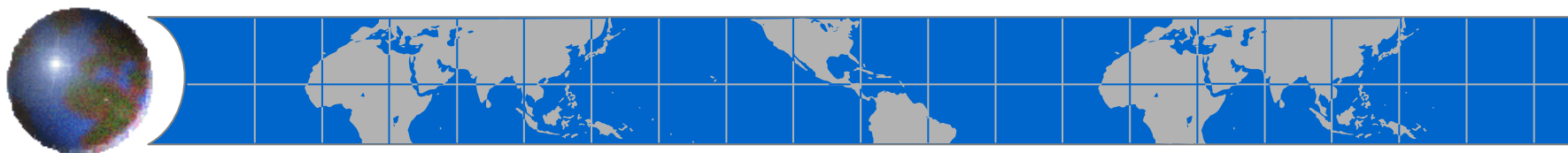


❖ Uplands everywhere

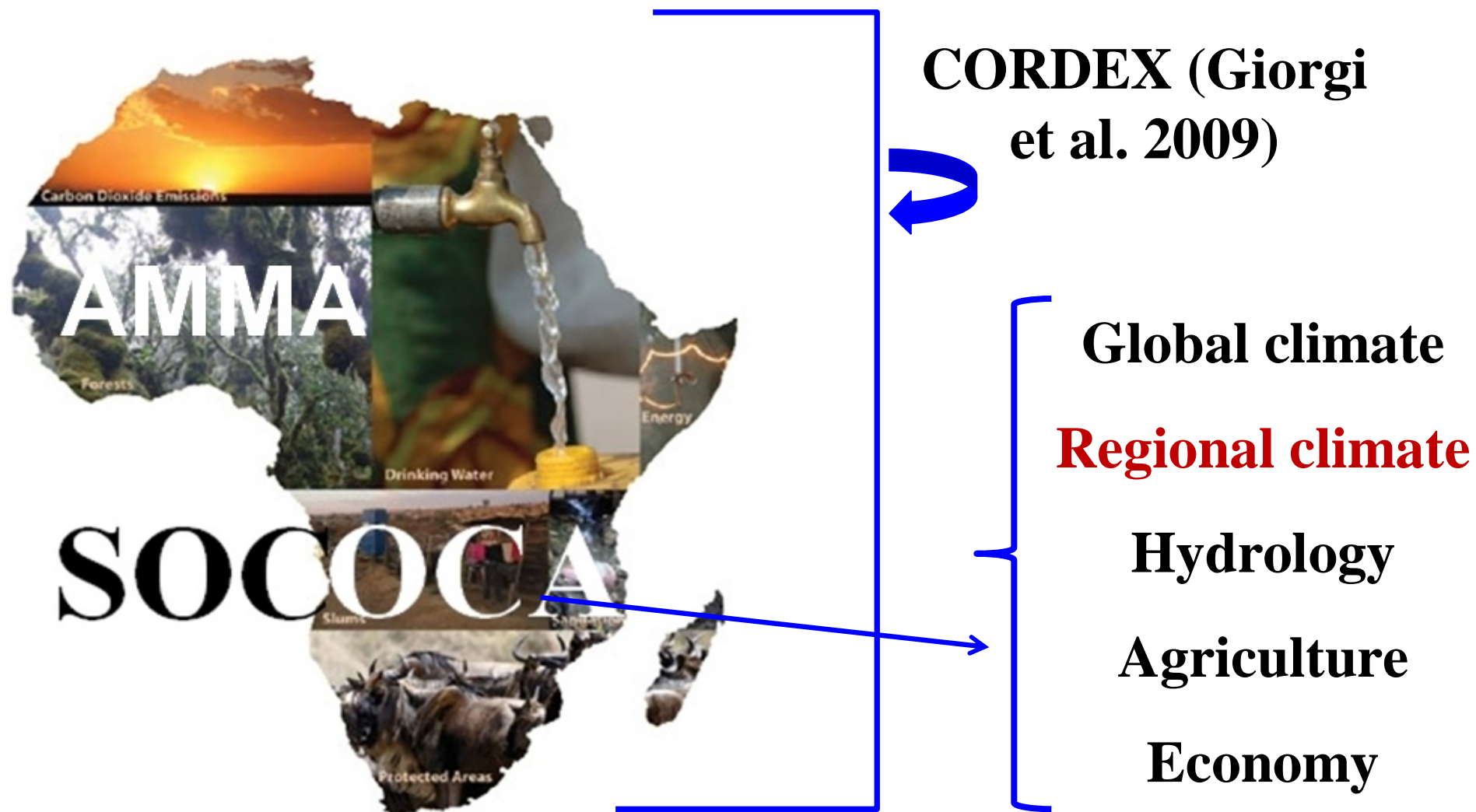
❖ Elevation boundary

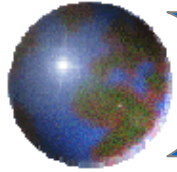
❖ Escarpment





## ❑ Rational for SOCOCA





## **II/ Model description and simulations**

### **□ RegCM3: Limited area model (Pal et al. 2007)**

- Grell convection scheme**

- Fritch and Chapel closure**

### **□ 2 Simulations: 10 years**

- NCEP**

- ERA-Interim**



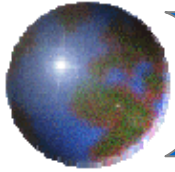
**Boundary forcings: Basic comparisons**



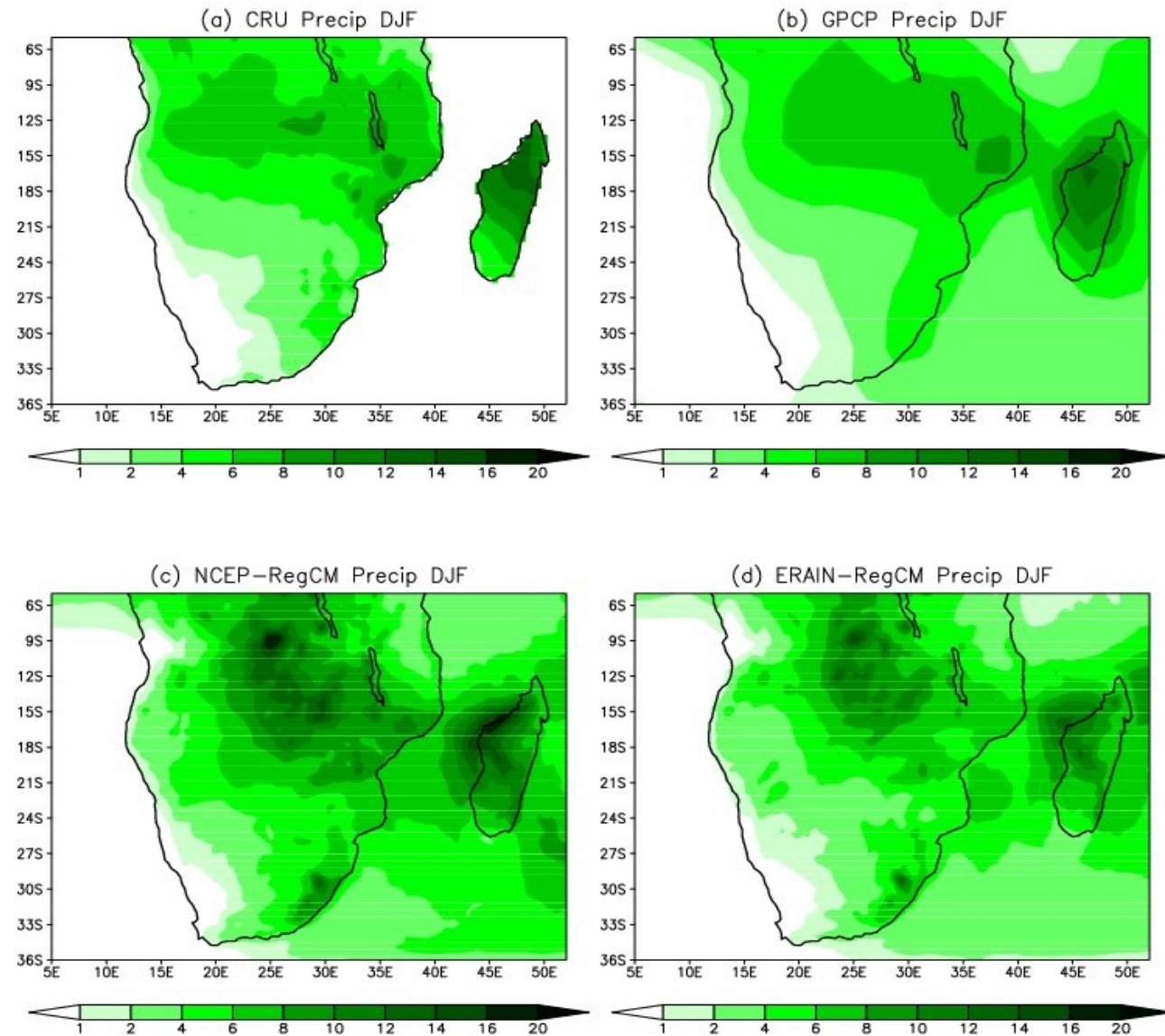
## III/ Results

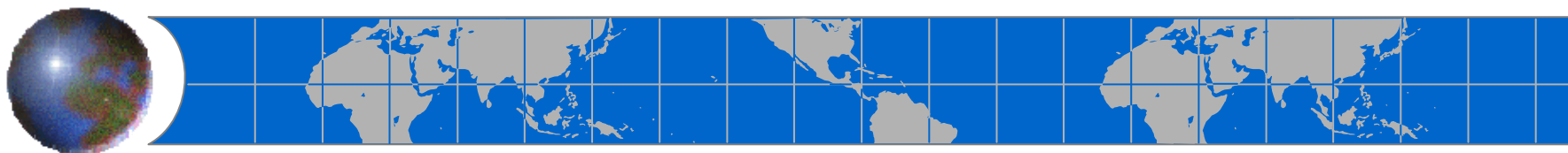
- **Precip, temp, low-level winds ...**
- **Surface radiation**
- **Synoptic variables**
- **Extremes**





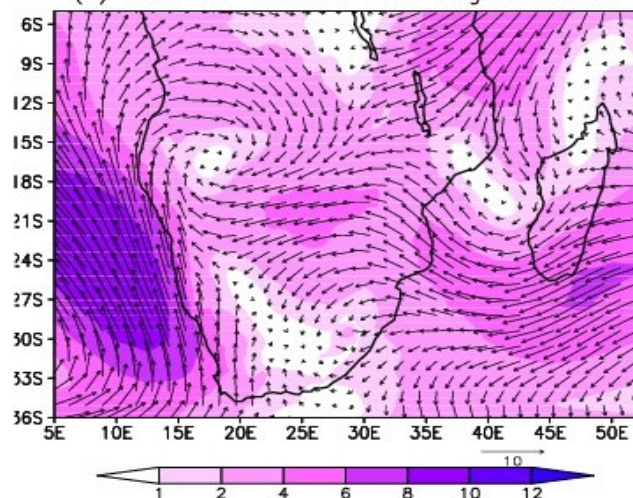
## ❖ Precip



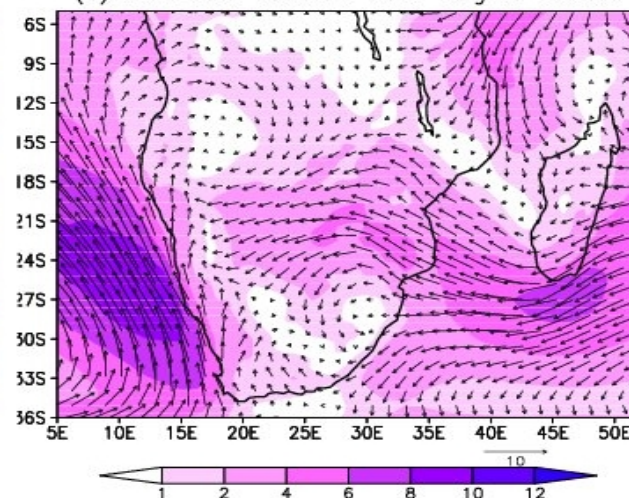


# ❖ Wind magnitudes and vectors

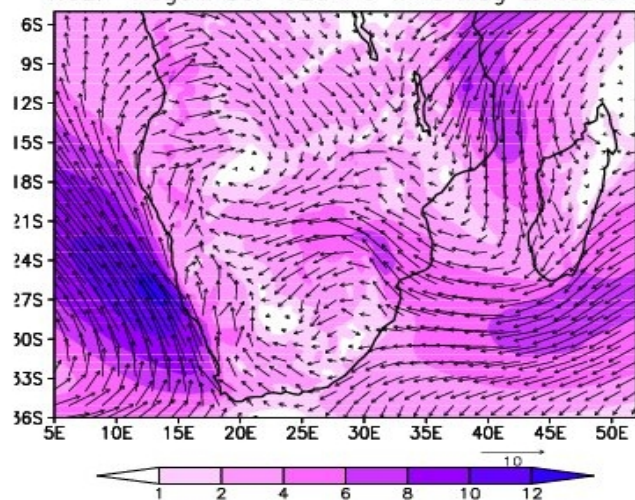
(a) NCEP DJF 925hPa Wind Mag & Vectors



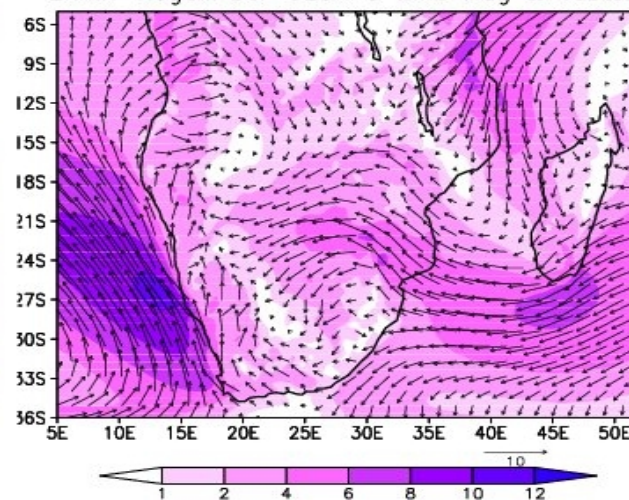
(b) ERAIN DJF 925hPa Wind Mag & Vectors



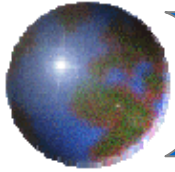
NCEP-RegCM DJF 925hPa Wind Mag & Vectors



ERAIn-RegCM DJF 925hPa Wind Mag & Vectors

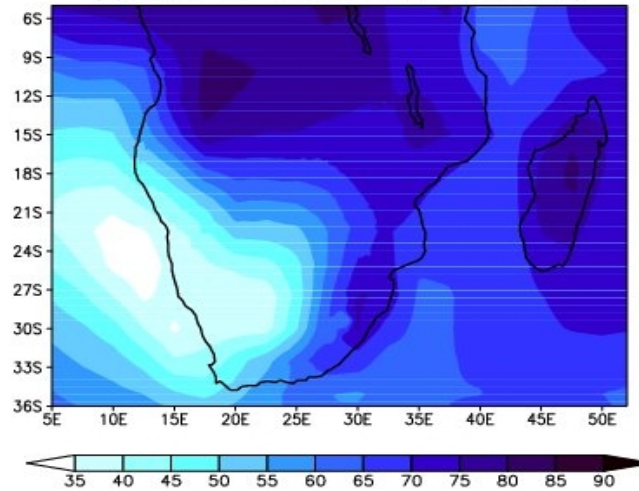




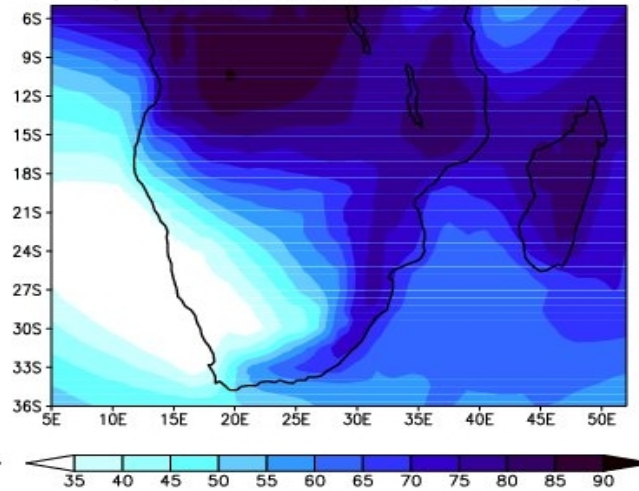


## ❖ Relative Humidity

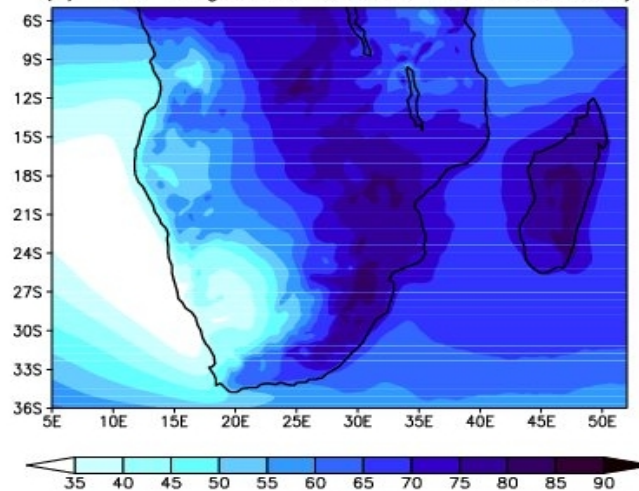
(a) NCEP DJF 850hPa Relative Humidity



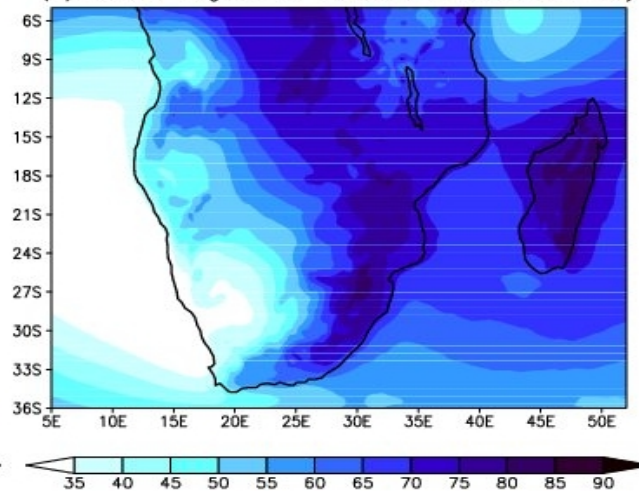
(b) ERAIN DJF 850hPa Relative Humidity

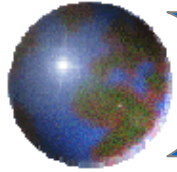


(c) NCEP-RegCM DJF 850hPa Relative Humidity



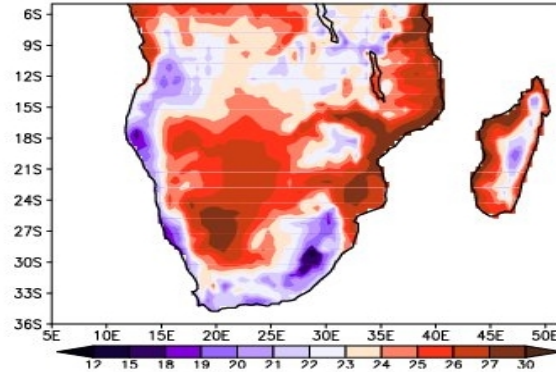
(d) ERAIN-RegCM DJF 850hPa Relative Humidity



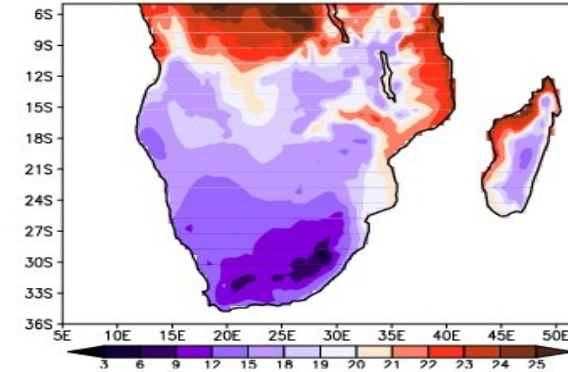


## ❖ Mean Temperature

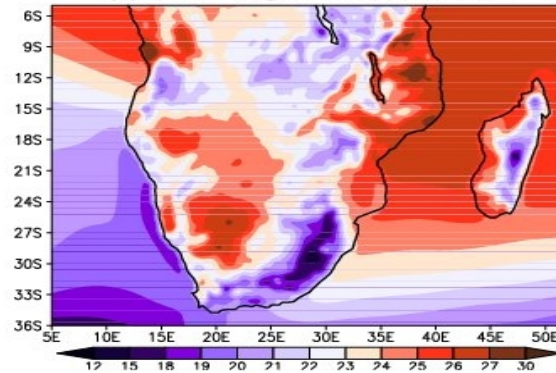
(a) CRU Temp Mean DJF



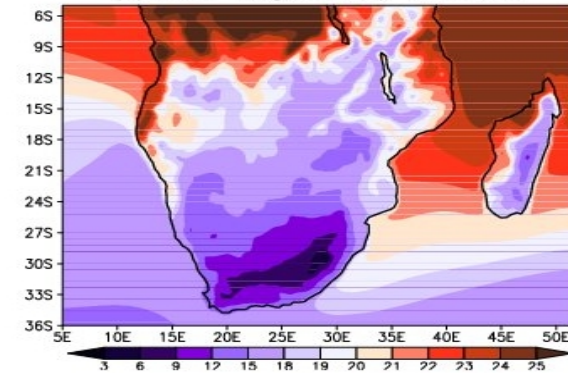
(b) CRU Temp Mean JJA



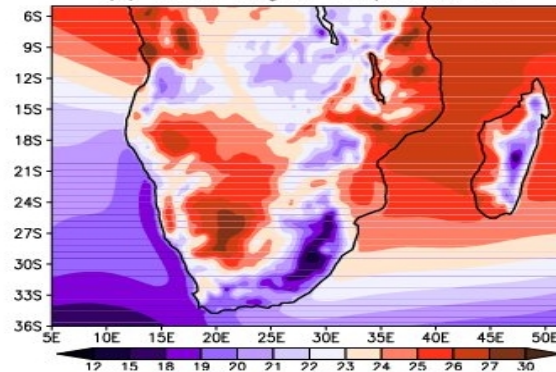
(c) NCEP-RegCM Temp Mean DJF



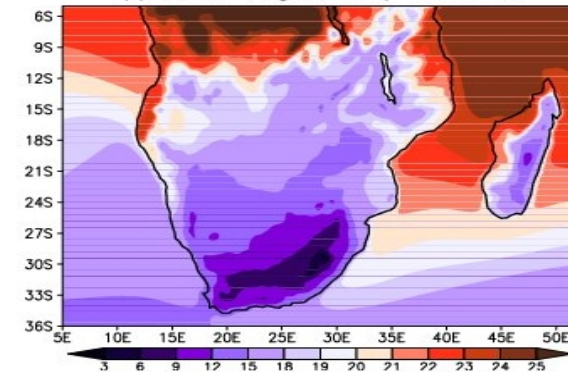
(d) NCEP-RegCM Temp Mean JJA



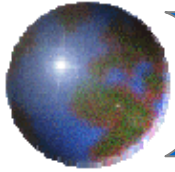
(e) ERAIN-RegCM Temp Mean DJF



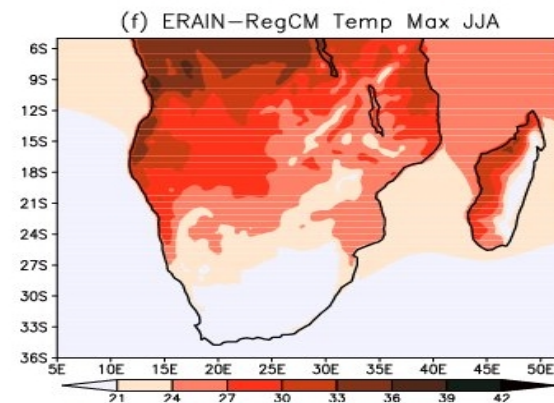
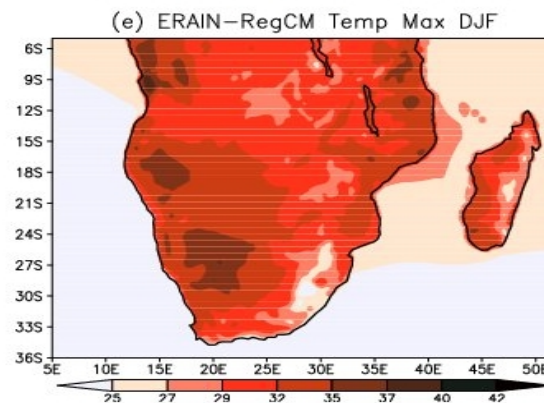
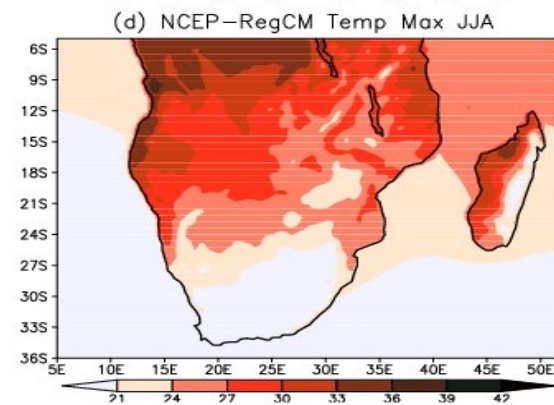
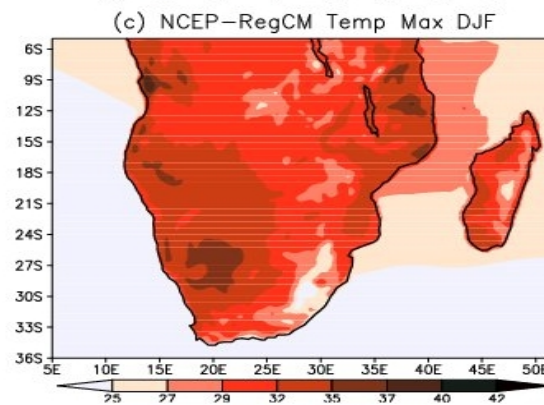
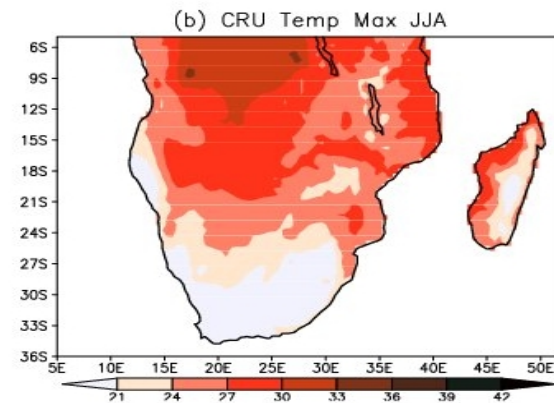
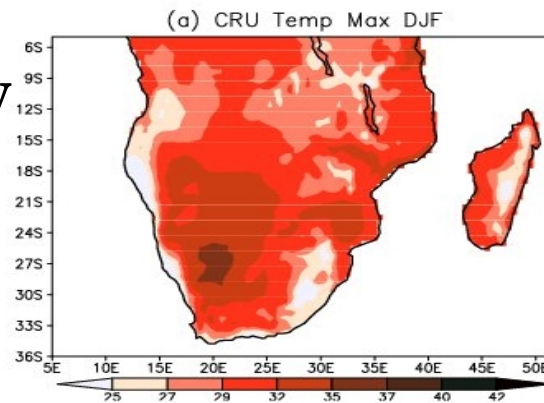
(f) ERAIN-RegCM Temp Mean JJA

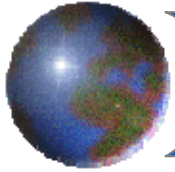




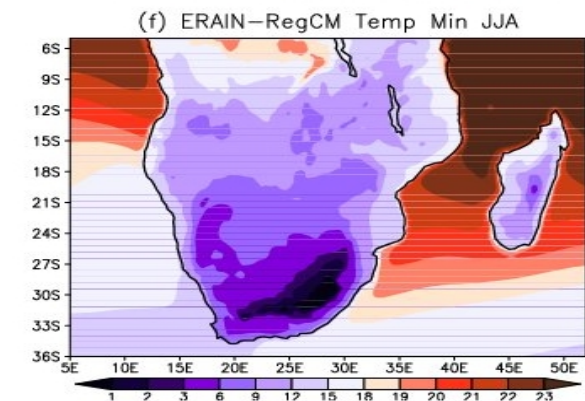
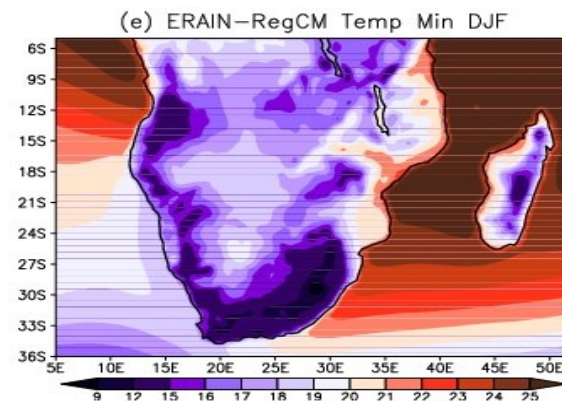
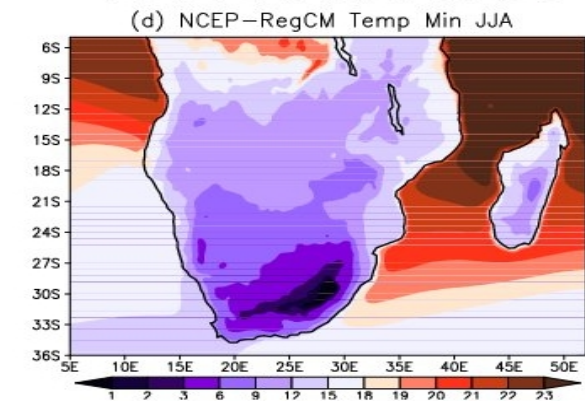
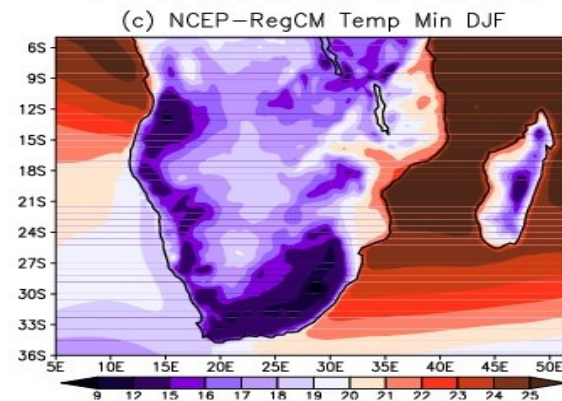
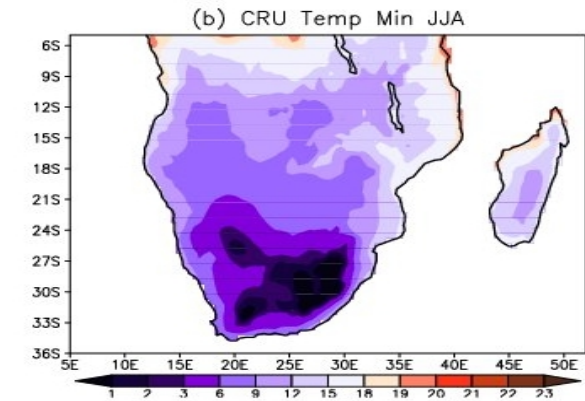
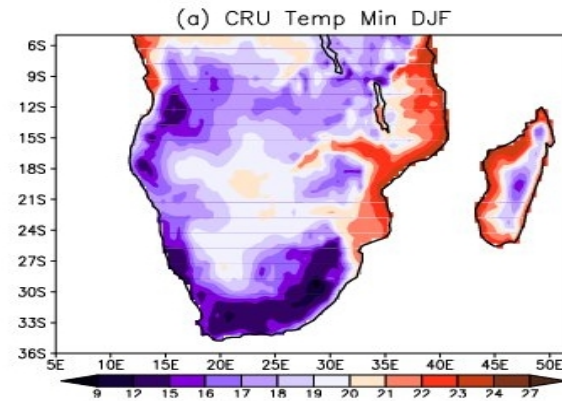


## ❖ Maximum daily Temperature





## ❖ Minimum daily Temperature

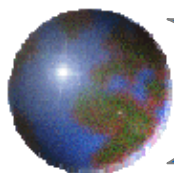




## III/ Results

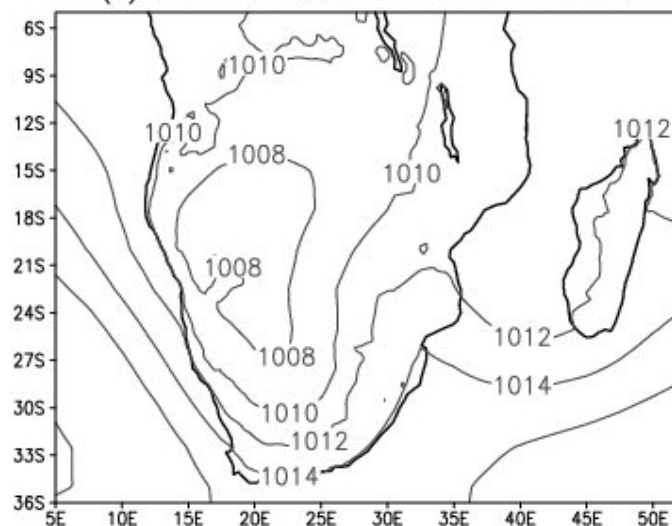
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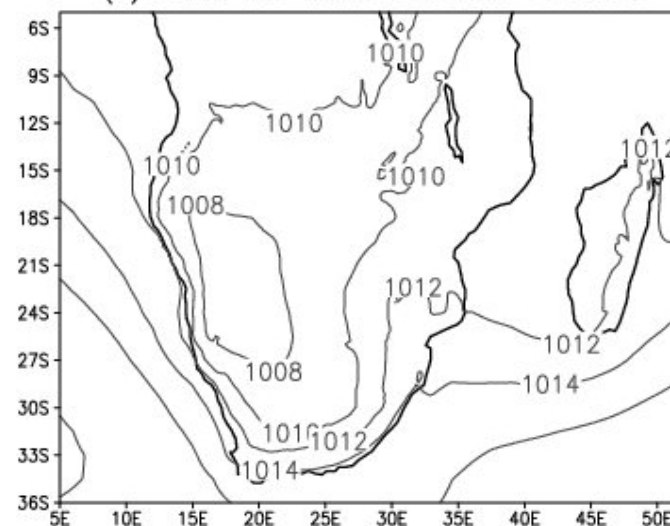


## ❖ Mean sea level pressure

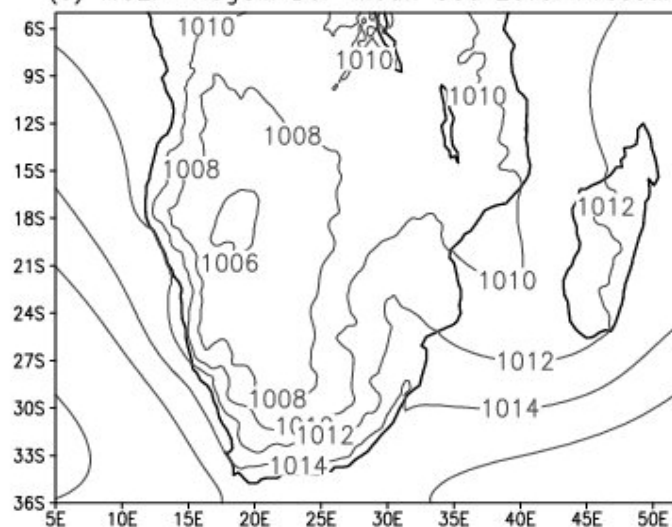
(a) NCEP DJF Mean Sea Level Pressure



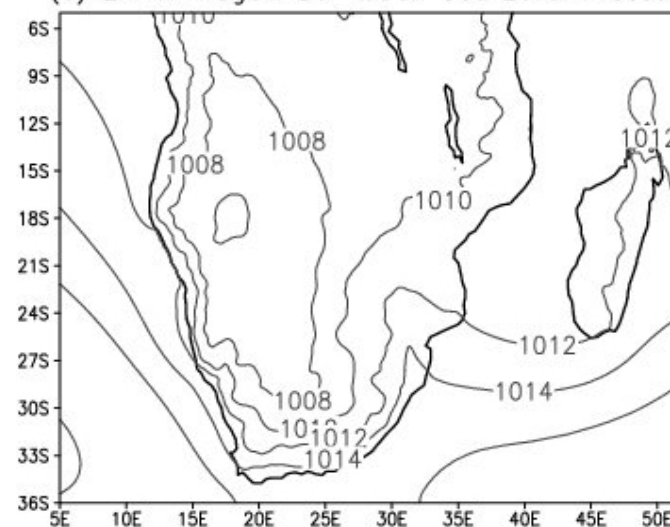
(b) ERAIN DJF Mean Sea Level Pressure

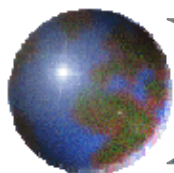


(c) NCEP-RegCM DJF Mean Sea Level Pressure



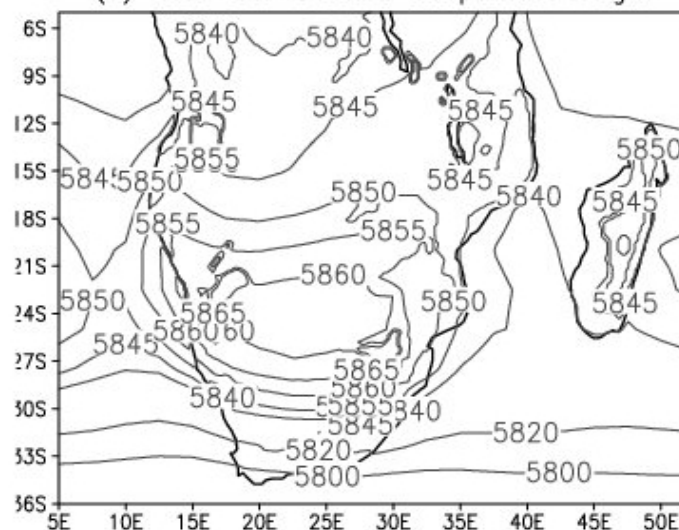
(d) ERAIN-RegCM DJF Mean Sea Level Pressure



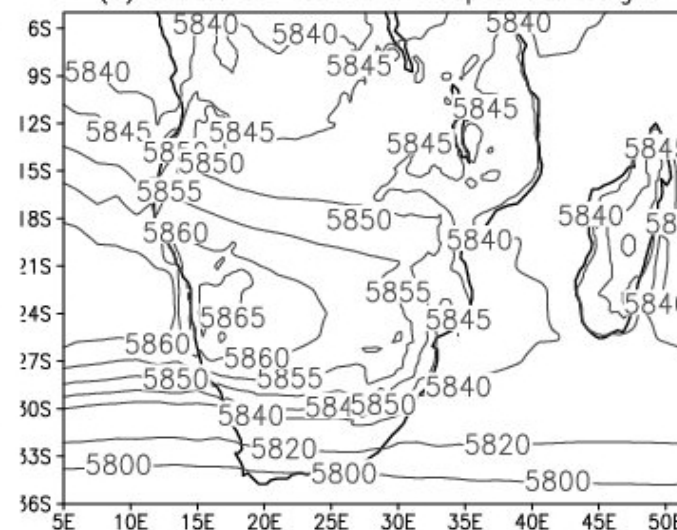


## ❖ Mean geopotential height

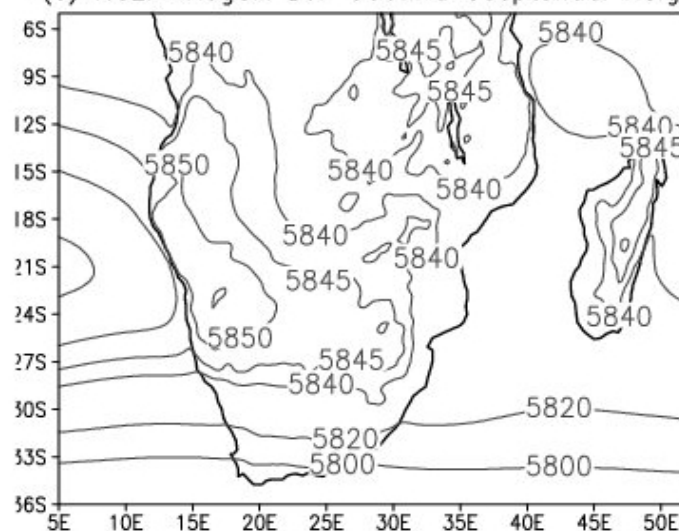
(a) NCEP DJF 500hPa Geopotential Height



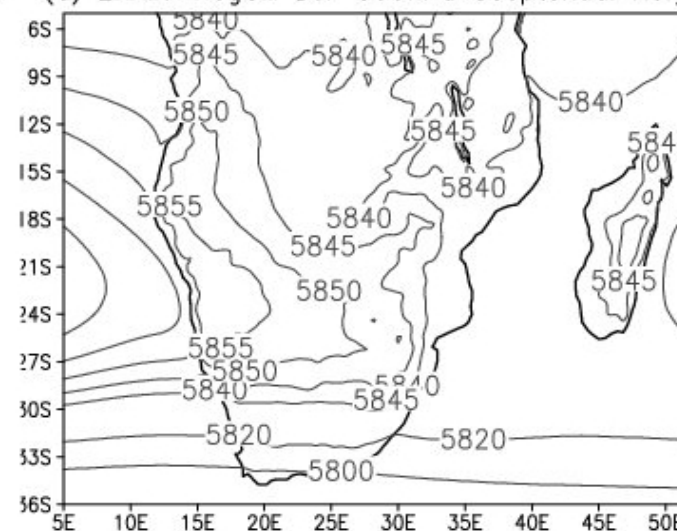
(b) ERAIN DJF 500hPa Geopotential Height



(c) NCEP-RegCM DJF 500hPa Geopotential Height



(d) ERAIN-RegCM DJF 500hPa Geopotential Height

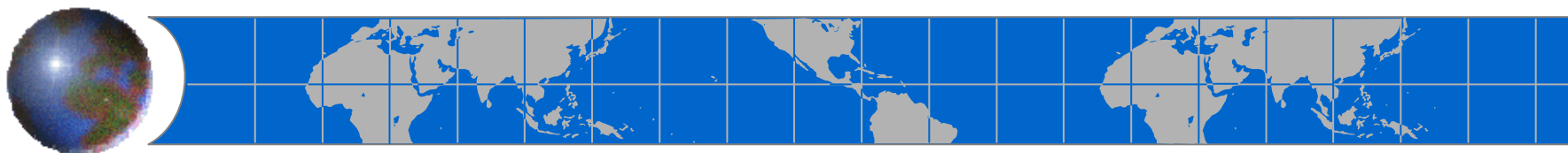




## III/ Results

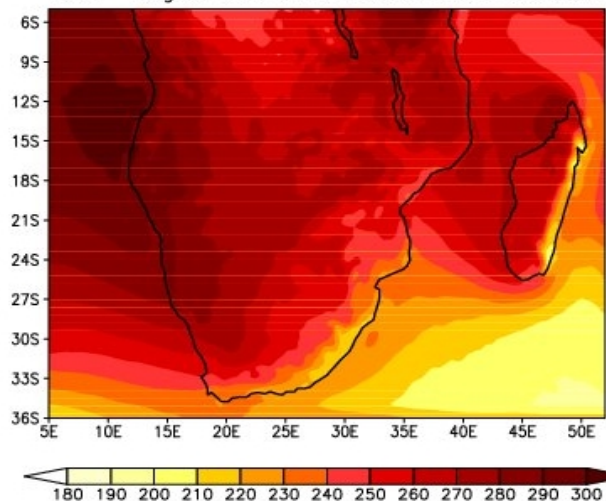
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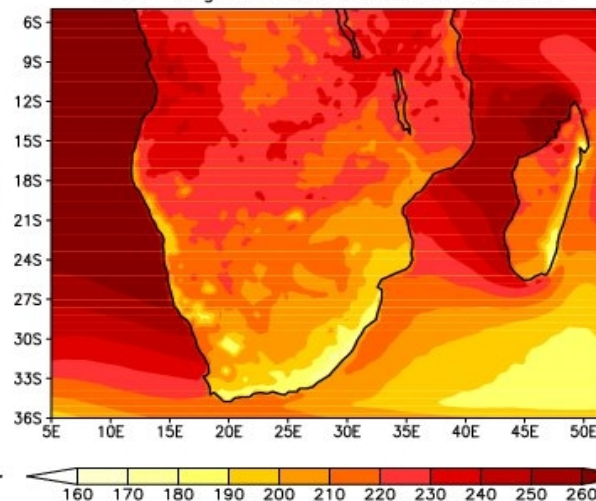


## ❖ Annual mean surface shortwave Radiation

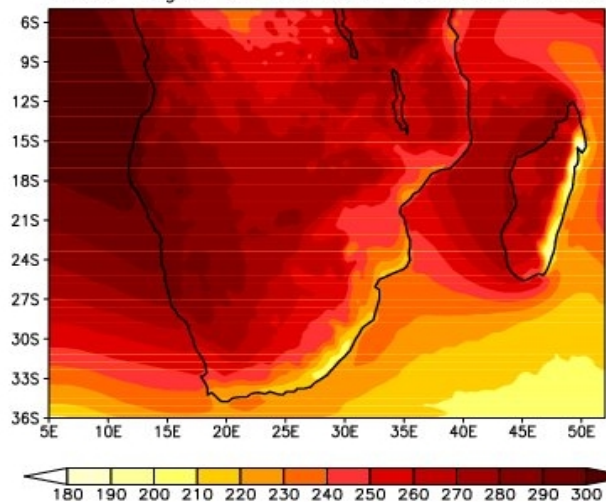
NCEP-RegCM Downward SW Surface Radiation



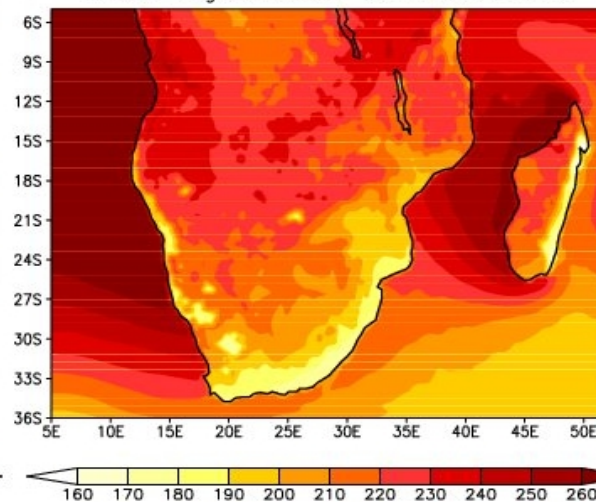
NCEP-RegCM Net SW Surface Radiation

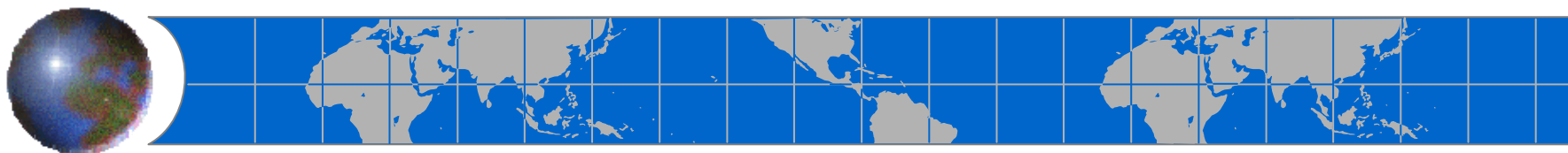


ERA-Interim-RegCM Downward SW Surface Radiation



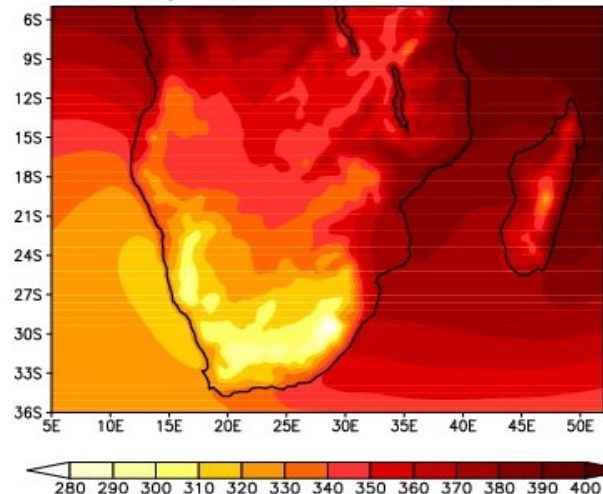
ERA-Interim-RegCM Net SW Surface Radiation



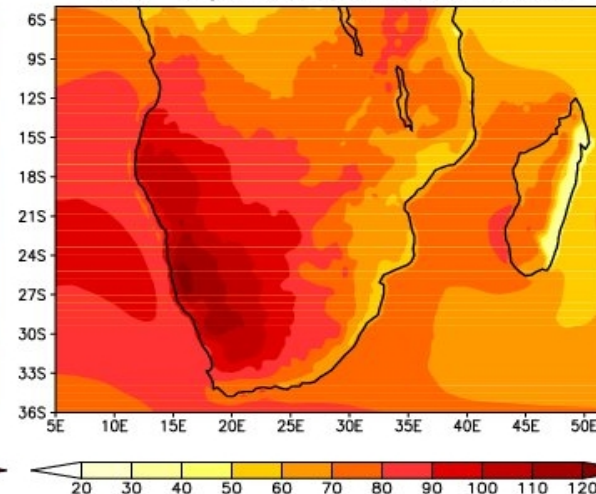


## ❖ Annual mean surface Longwave Radiation

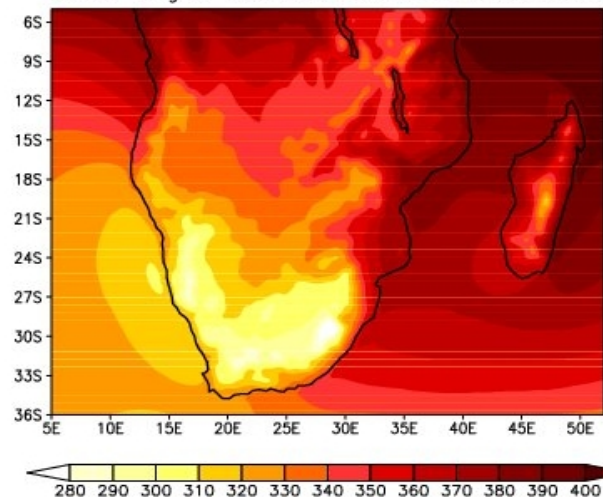
NCEP-RegCM Downward LW Surface Radiation



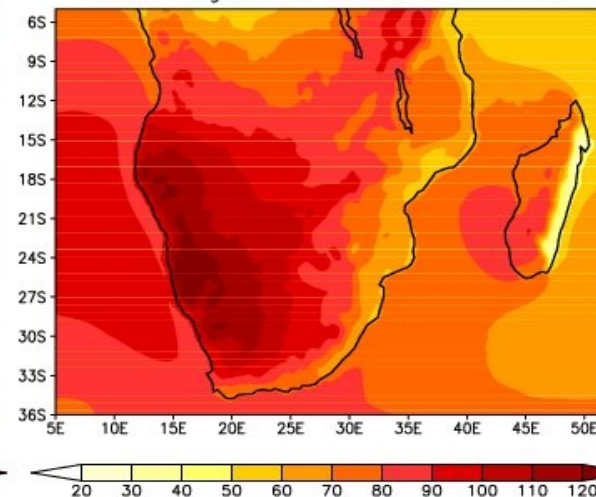
NCEP-RegCM Net LW Surface Radiation



ERA-Interim-RegCM Downward LW Surface Radiation



ERA-Interim-RegCM Net LW Surface Radiation

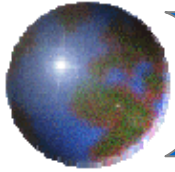




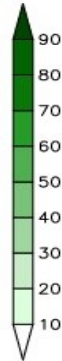
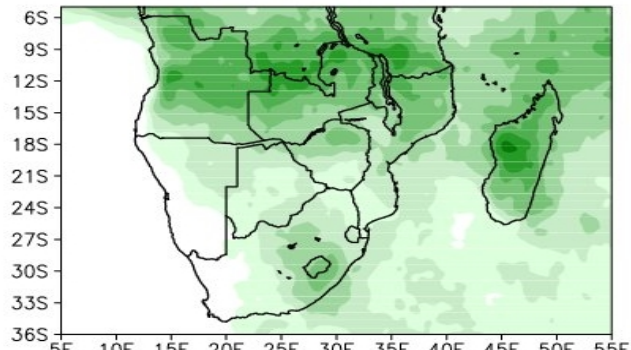
## III/ Results

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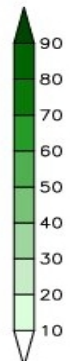
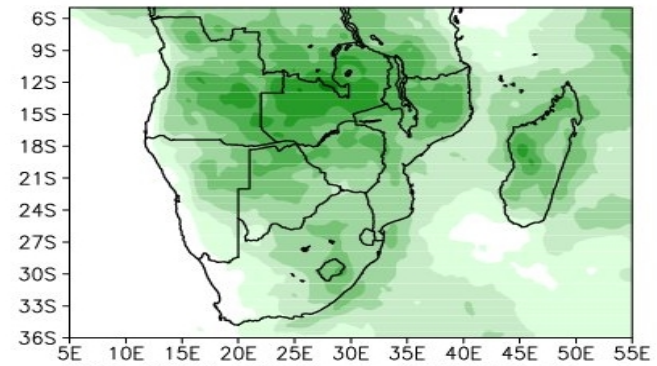




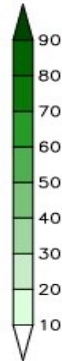
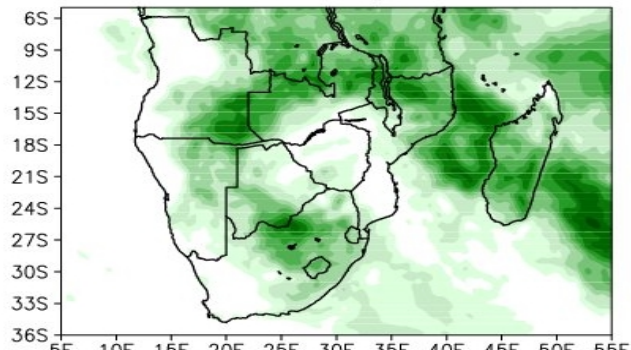
DJF 1998 TRMM WD Num



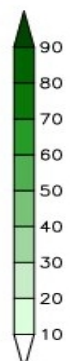
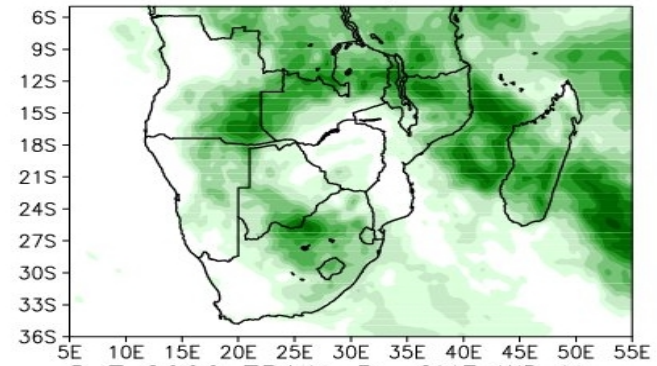
DJF 2000 TRMM WD Num



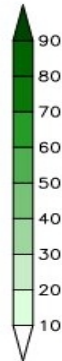
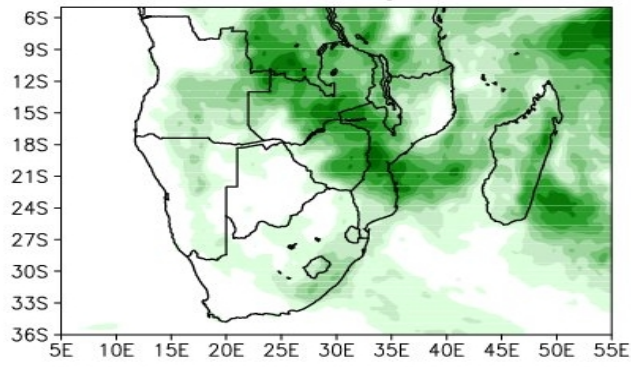
DJF 1998 NCEP-RegCM3 WD Numb



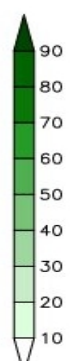
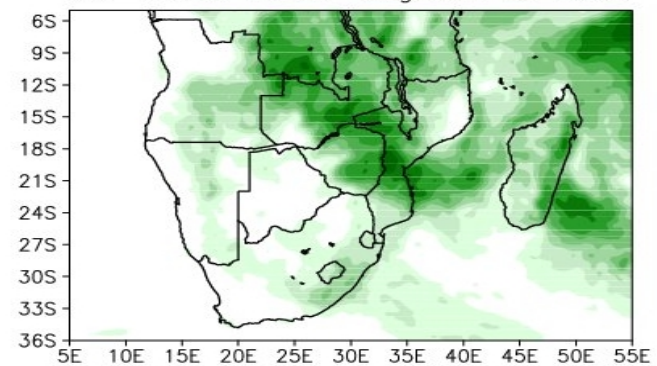
DJF 2000 NCEP-RegCM3 WD Numb



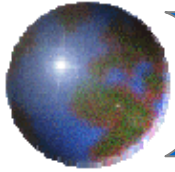
DJF 1998 ERAIN-RegCM3 WD Num



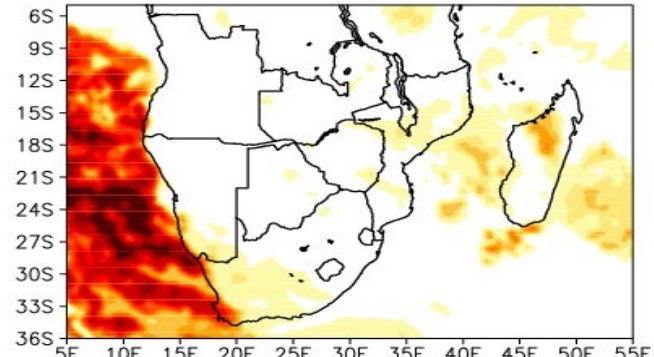
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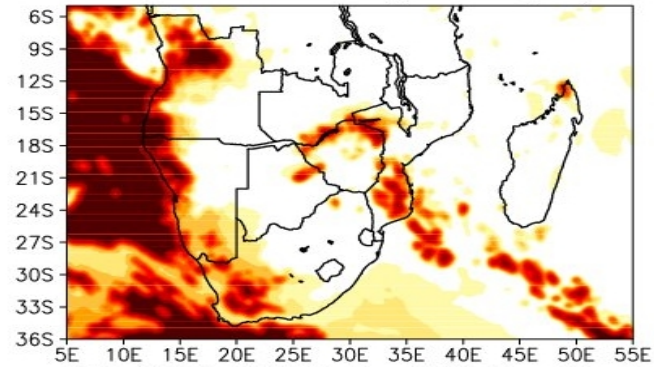




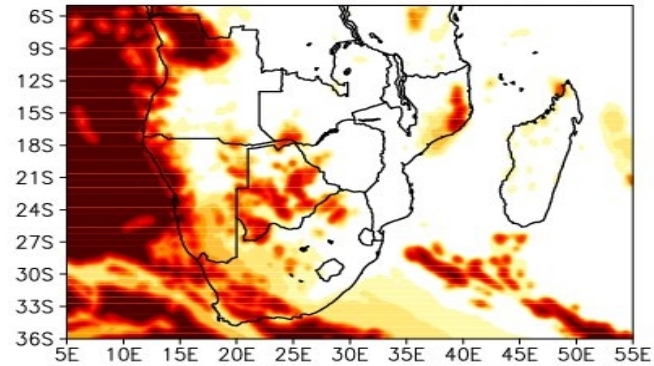
DJF 2000 TRMM Dry Spell



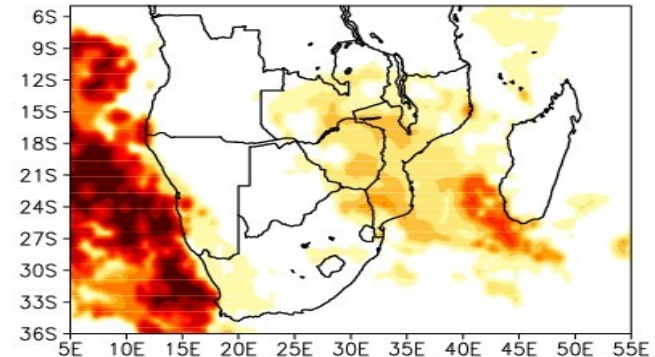
DJF 2000 NCEP-RegCM3 Dry Spell



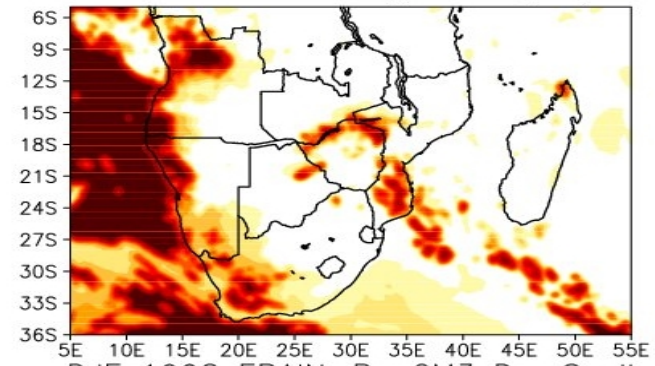
DJF 2000 ERAIN-RegCM3 Dry Spell



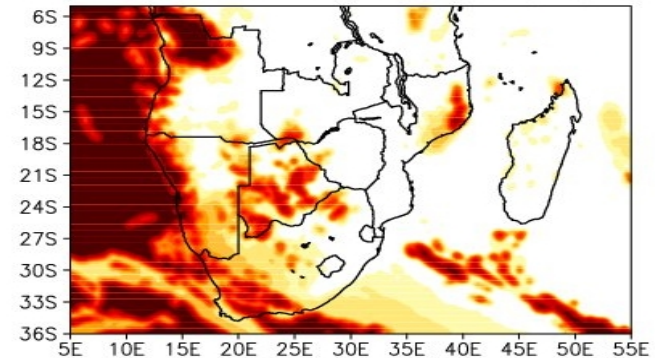
DJF 1998 TRMM Dry Spell



DJF 1998 NCEP-RegCM3 Dry Spell



DJF 1998 ERAIN-RegCM3 Dry Spell





## **Conclusion : to be completed**

- ❖ **Mean intraseasonal and interannual variability**
- ❖ **More analysis in synoptic features**
- ❖ **.....**

**Thanks for your Attention**