

**WMO Workshop on Climate Monitoring including the
implementation of Climate Watch Systems in RA-I with
focus on Eastern and Southern Africa
Pretoria, South Africa
15 - 18 April 2013**

Available Climate Monitoring and Forecasting Products at the GPC- Pretoria

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Weather Service (SAWS)

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Introduction

- **2006, WMO started a process of designing centres making dynamical global long-range (seasonal) forecasts (LRF)**
- **WMO guided by Expert Team of the CBS on Extended and Long-range Forecasts (EC-ELRF) now ET-OPSLS (Operational Predictions from Sub-seasonal to Longer-time Scales)**
- **GPC Pretoria recognized in 2009**
- **12 WMO-designated GPCs adhering to agreed procedures/standards in LRF – integral part of the WMO GDPFS**

Introduction

- **User access to GPC products facilitated by 2 Lead Centres (LC-LRFMME and LC-SVSLRF)**
- **Objectives :**
 - **improved access and uptake of LRF products for use by RCCs, RCOFs and NMHSs to aid production of regional/national climate services**
 - **help to reduce the socio-economic losses associated with seasonal variability, and protect life and property.**
- **For more info explore:**
 - <https://www.wmolc.org/>
 - <http://www.bom.gov.au/wmo/lrfvs/>

Contributing GPCs

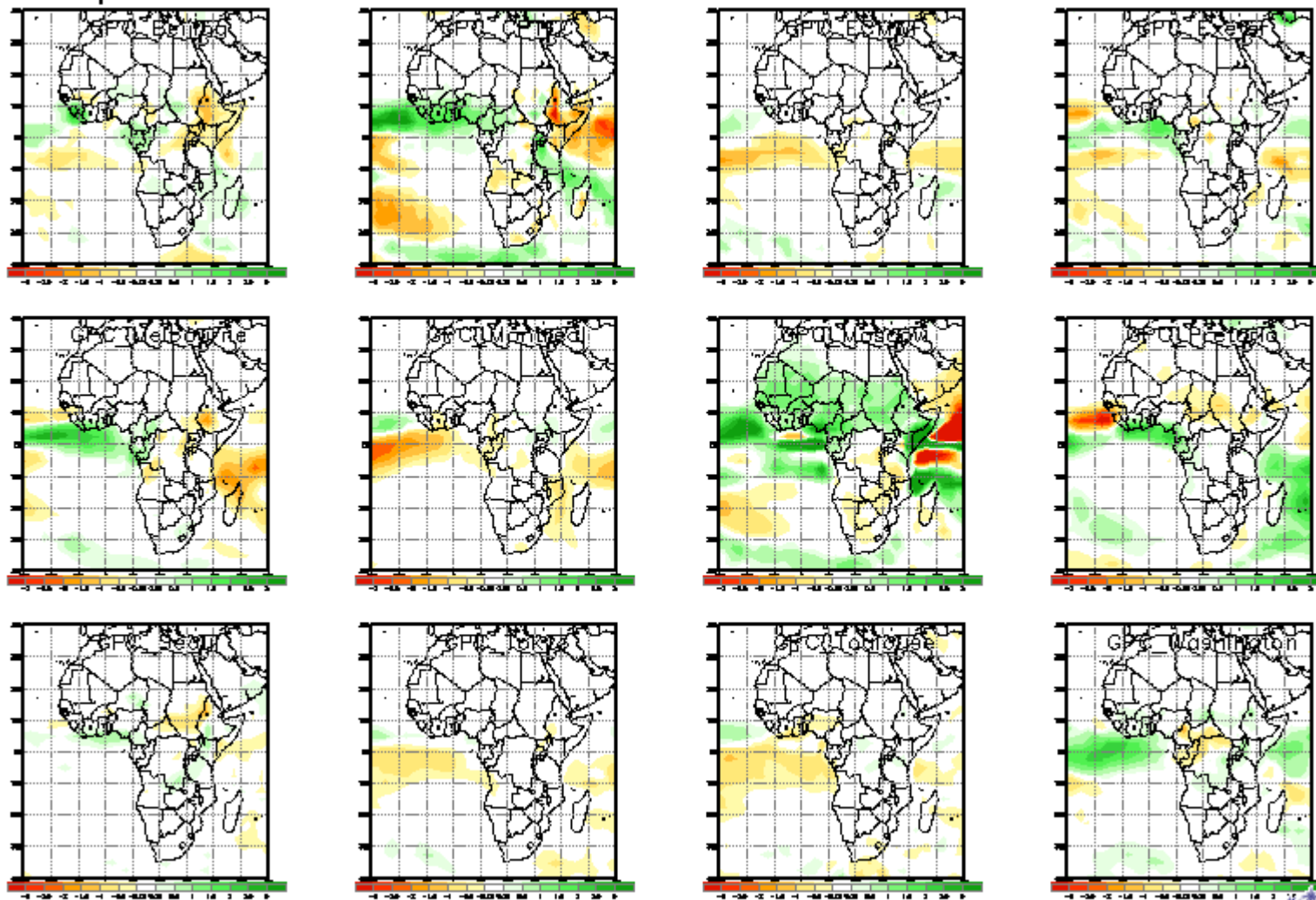
GPC	System Config. (ens)	Reso. (Atm.)	Hindcast Period
Beijing, BCC	Coupled (48)	T63/L16	1983-2004
ECMWF	Coupled (41)	T159/L62	1981-2005
Exeter, Met Office	Coupled (42)	1.25x1.85/L38	1989-2002
Melbourne, BoM	Coupled (30)	T47/L17	1980-2006
Montreal, CMC	2-tier (40)	T32/T63/T95	1969-2004
Seoul, KMA	2-tier (20)	T106/L21	1979-2007
Tokyo, JMA	2-tier (51)	T63/L40	1984-2005
Toulouse, Météo-Fr	Coupled (41)	T63/L31	1979-2007
Washington, NCEP	Coupled (40)	T62/L64	1981-2004
Moscow, HMC	2-tier (10)	1.1x1.4/L28	1979-2003
Pretoria, SAWS	2-tier (6)	T42/L19	1981-2001
CPTEC	2-tie(15)	T62/L28	1979-2001

Seasonal forecast products (LC-LRFMM)

lat=-40 40
lon=330 420

Precipitation : AMJ2013

(issued on Mar2013) [Unit: mm/day]



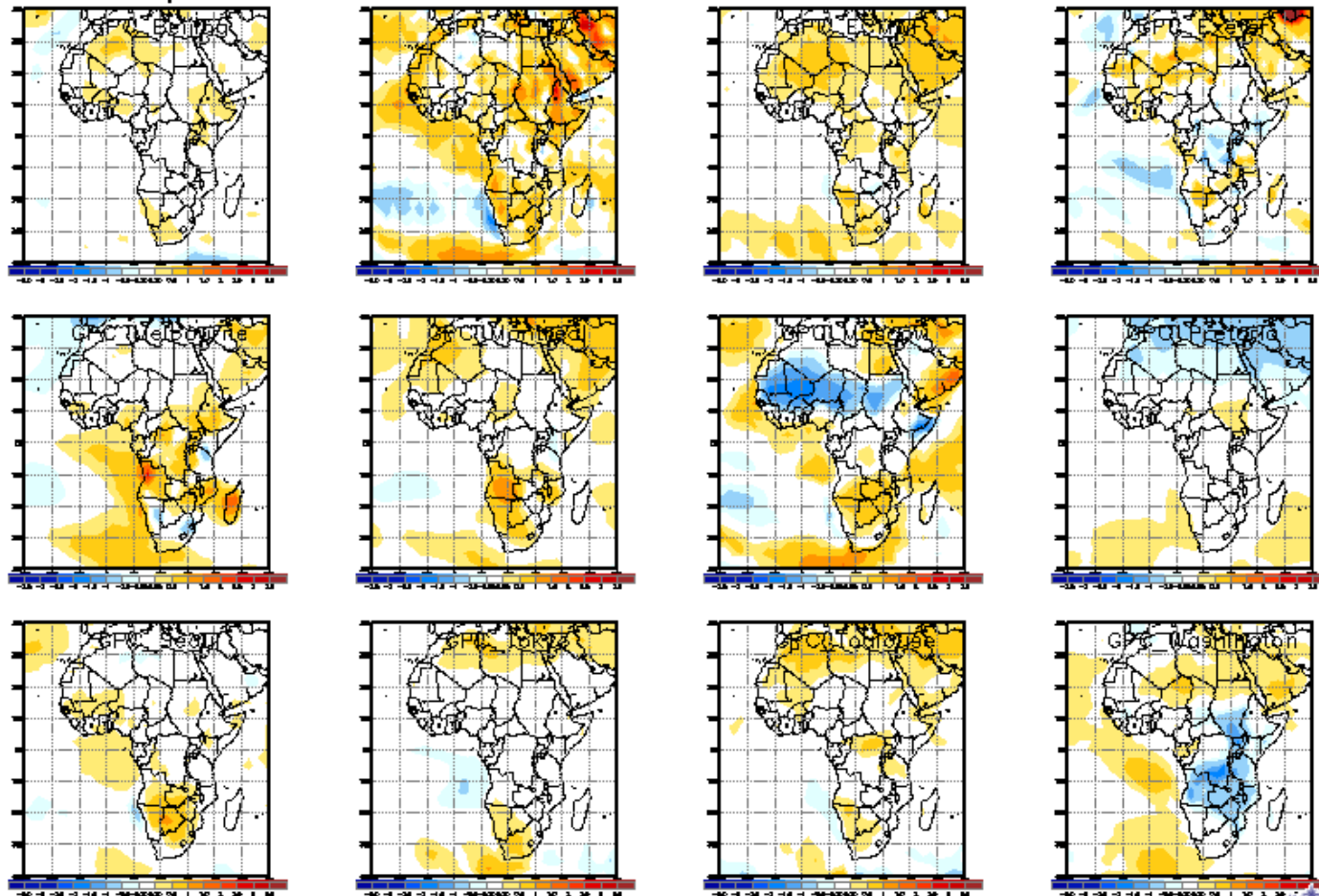
Seasonal forecast products (LC-LRFMM)

lat=-40 40
lon=330 420

2m Temperature : AMJ2013

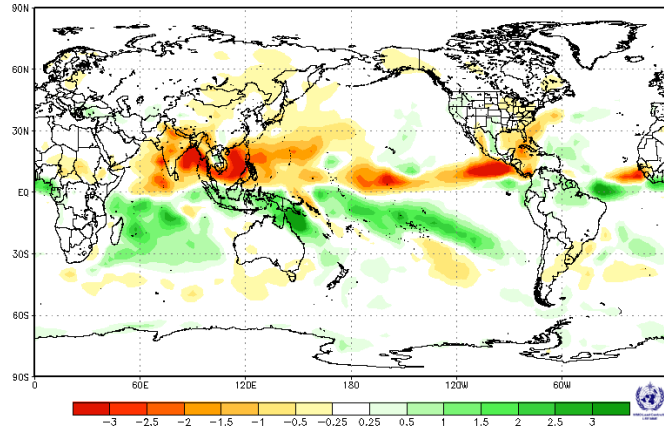
(issued on Mar2013)

[Unit: K]

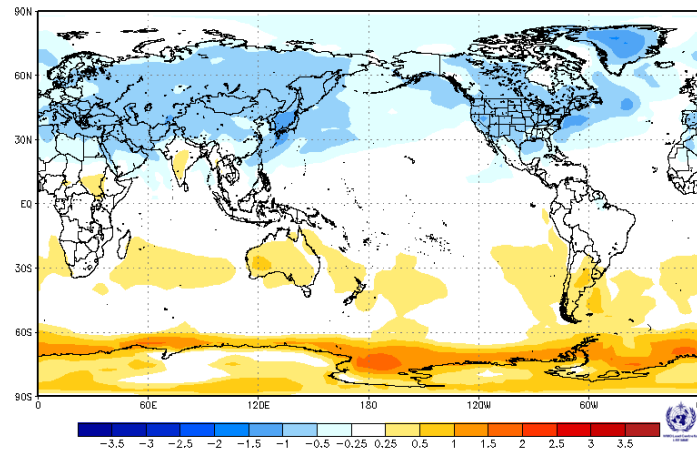


Seasonal forecast products (GPC Pretoria)

GPC_Pretoria
lat=-90 90
lon=0 360
lev=0
Precipitation : AMJ2013
[Unit: mm]
(issued on Mar2013)

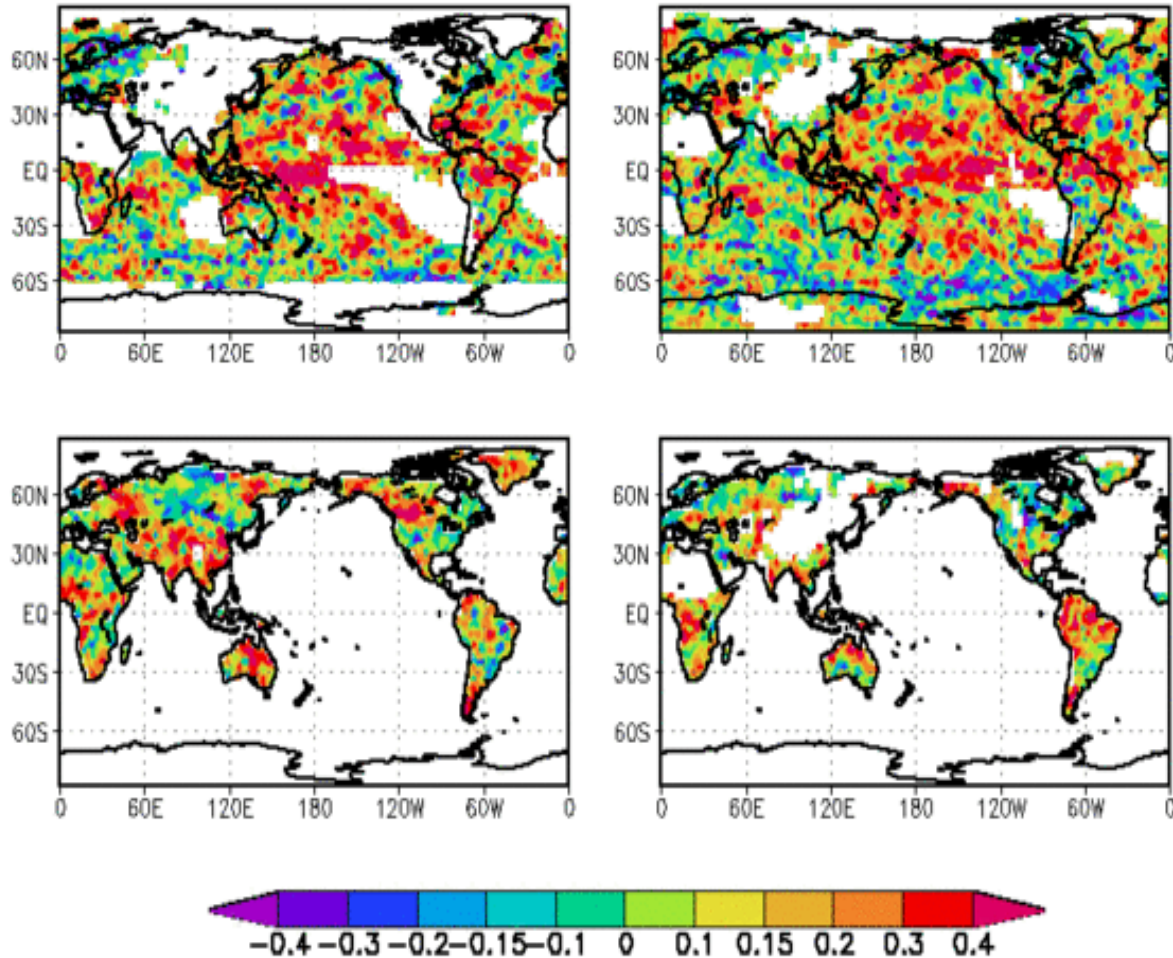


GPC_Pretoria
lat=-90 90
lon=0 360
lev=2
2m Temperature : AMJ2013
[Unit: K]
(issued on Mar2013)



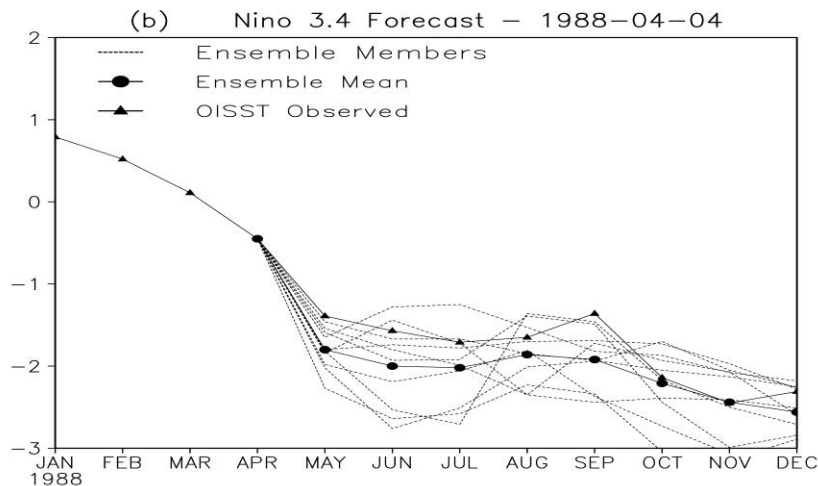
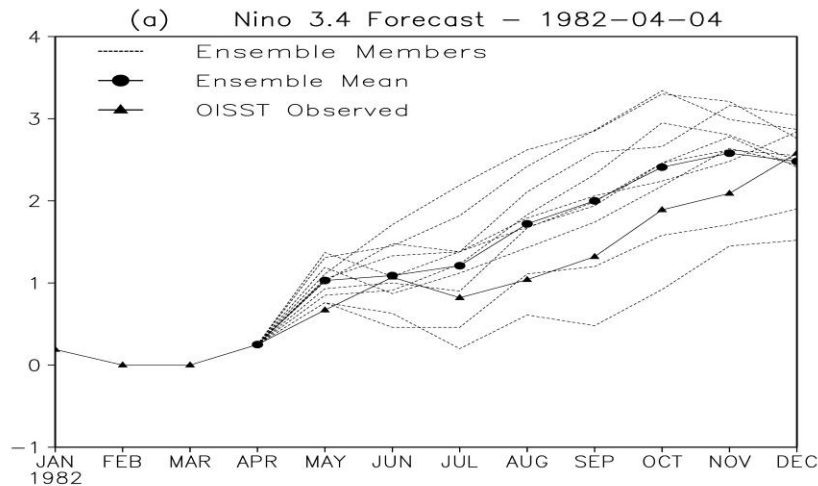
- Global Precip. and Temp. Forecasts for 3 seasons (up to 5 months ahead)
- Uninitialized System
- Forced with persisted and forecast SST scenarios
- Provides operational probabilistic forecast for different timescales
- Feeds information to the Multi-Model System (SAWS)

Emerging Products (2-tiered)



- enhancements relative to the existing operational forecasting system:
 1. Better uncertainty representation of initial atmospheric state
 2. Better description of uncertainties in the boundary conditions
 3. Better soil moisture representation
- Hindcast period 1982-2009
- 30 Ensembles
- Joins the SAWS Multi-Model System (SAWS)

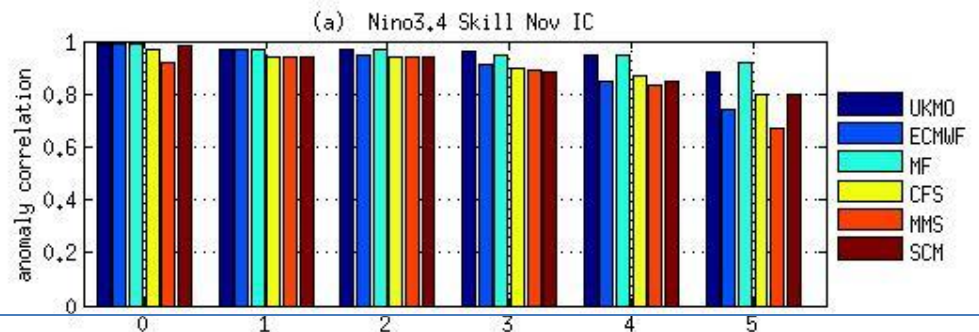
Emerging Products (1-tiered)



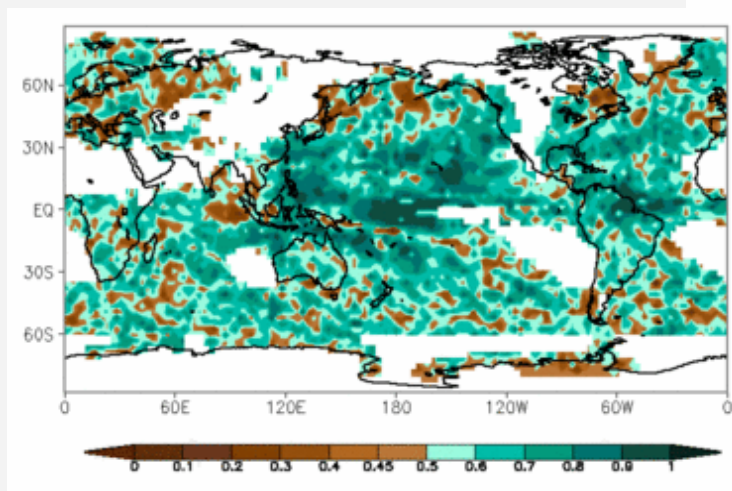
(Beraki, et al. 2013)

SAWS coupled model: ECHAM4.5 and MOM3 using MPMD coupler software:

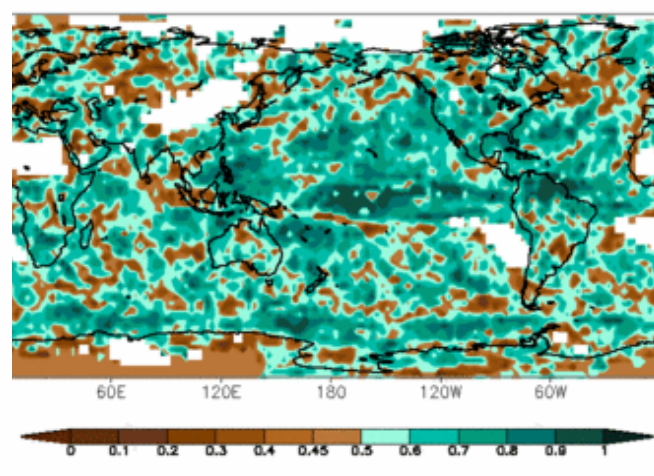
- Hindcast period 1982-2009
- T42/L19 AGCM and variable horizontal resolution/ L25 OGCM
- 10 Ensembles
- Joins the SAWS Multi-Model System (SAWS)
- In the process of upgrading GPC Pretoria (forecast and verification) and contribution to GFCS with this system.



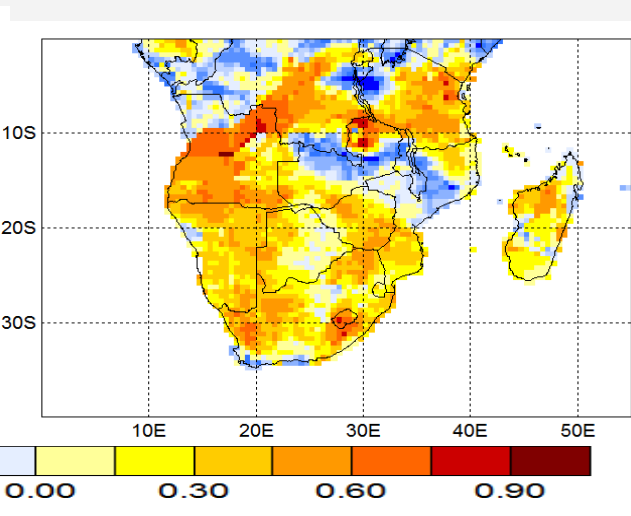
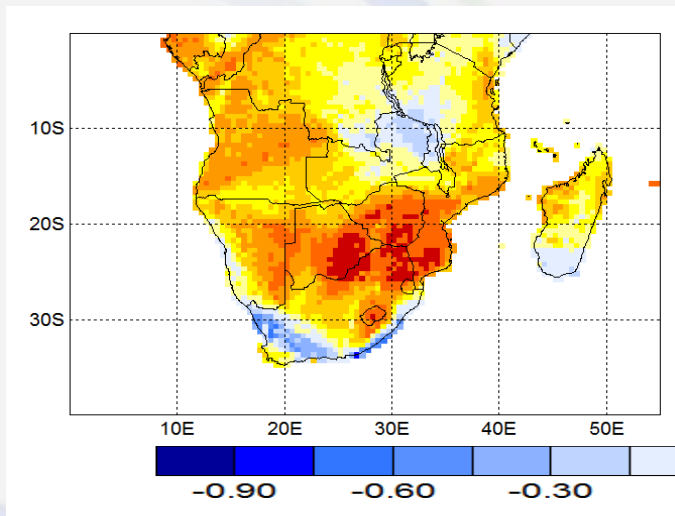
Emerging Products (1-tiered)



SPC 500hPaGH SH – T2m

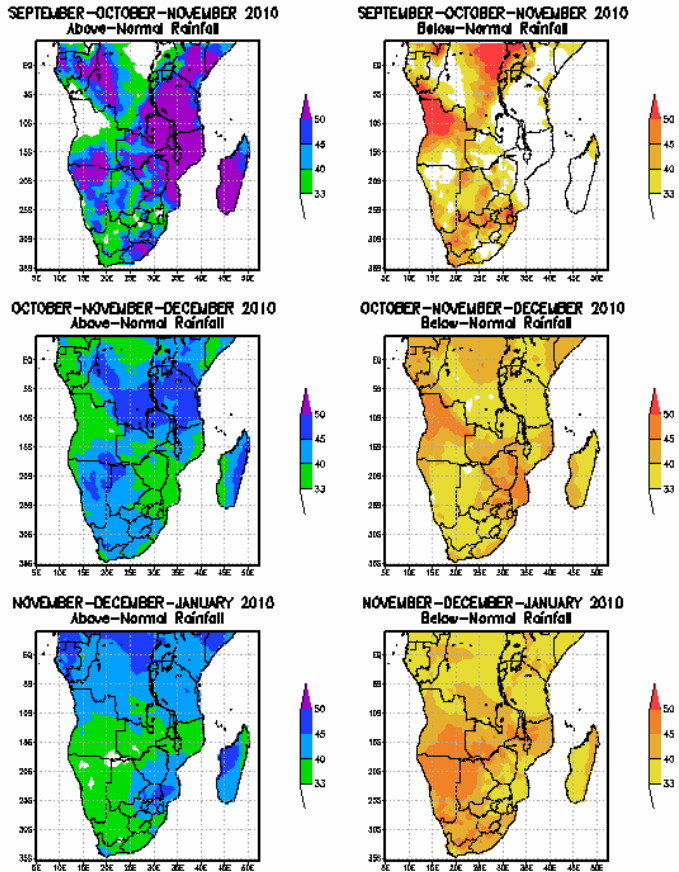


SPC 500hPaGH SH – Tpre

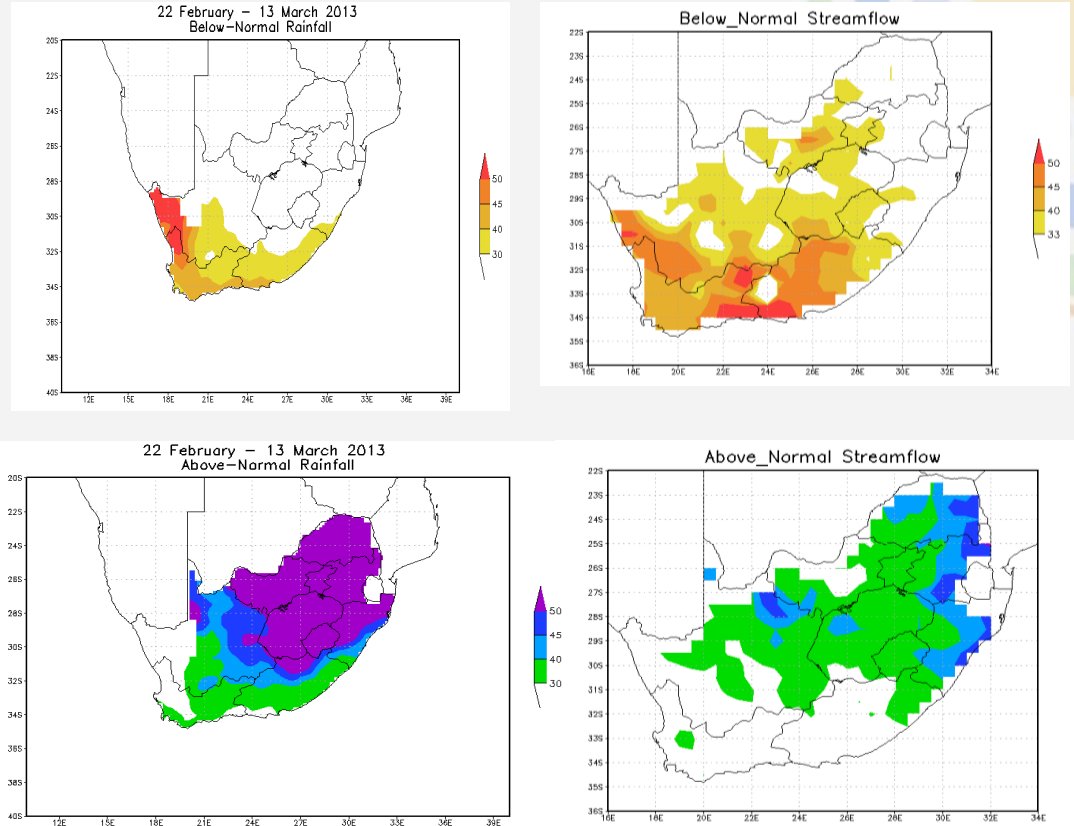


SAWS Multi-Model System

(rainfall) Seasonal



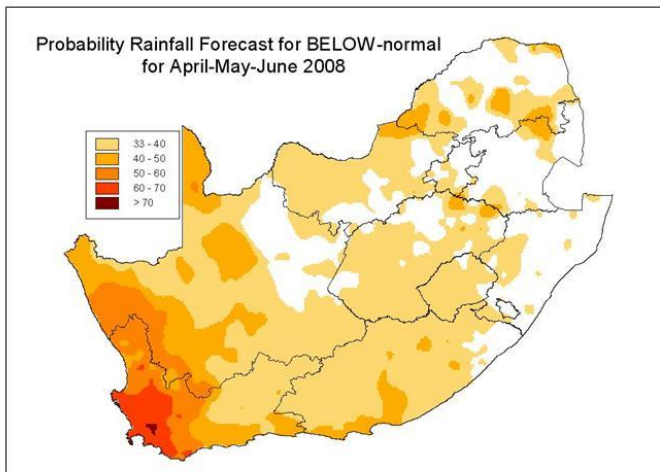
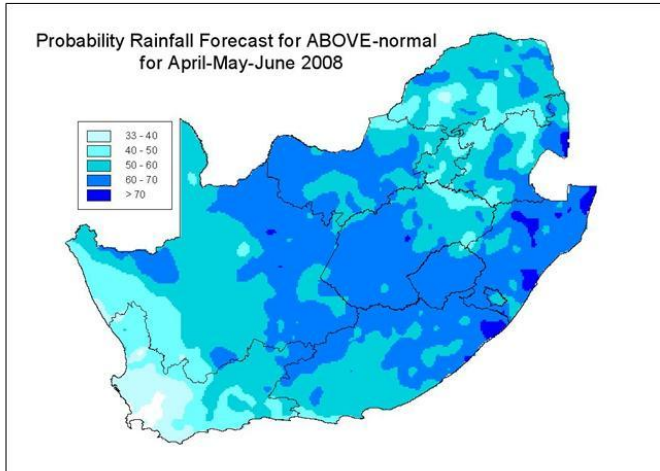
Rainfall (Extended-range) Streamflow (seasonal)



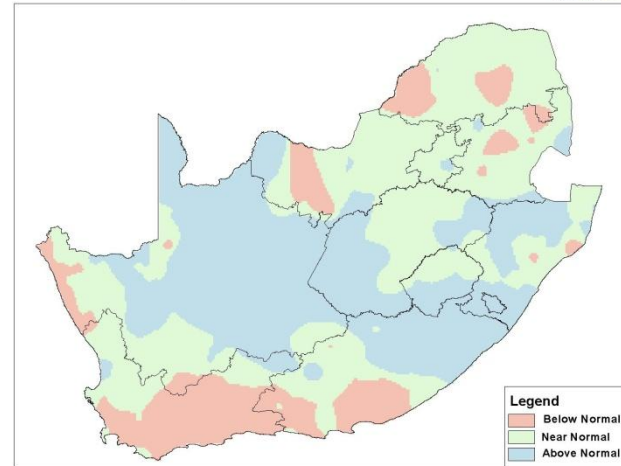
(Landman and Beraki, 2012)

SAWS Multi-Model System (examples)

New objective multi-model forecast

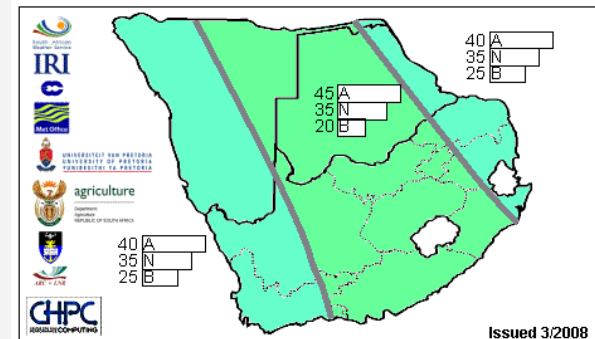


Assessment of Rainfall for April to June 2008



Old subjective consensus forecast

Expected Total Rainfall for the period April-May-June 2008



Probability (%)

60	55	50	45	40	40	45	50	55	60
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Please send comments to longrange@weathersa.co.za

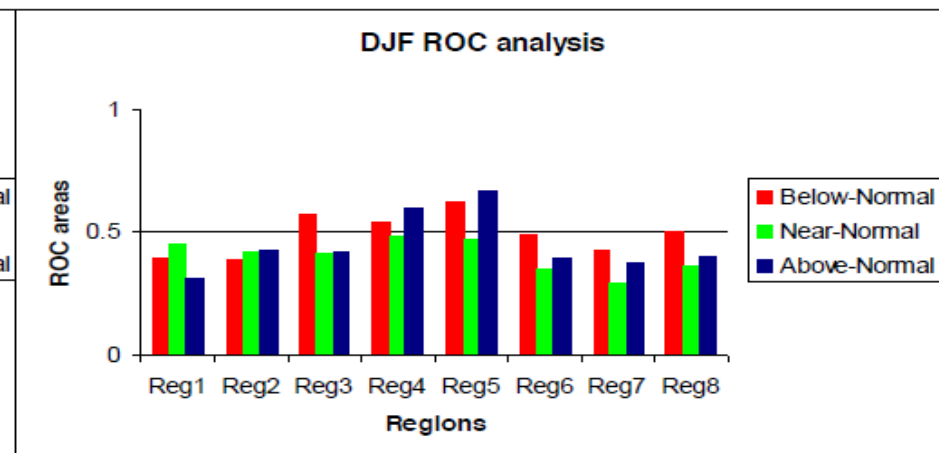
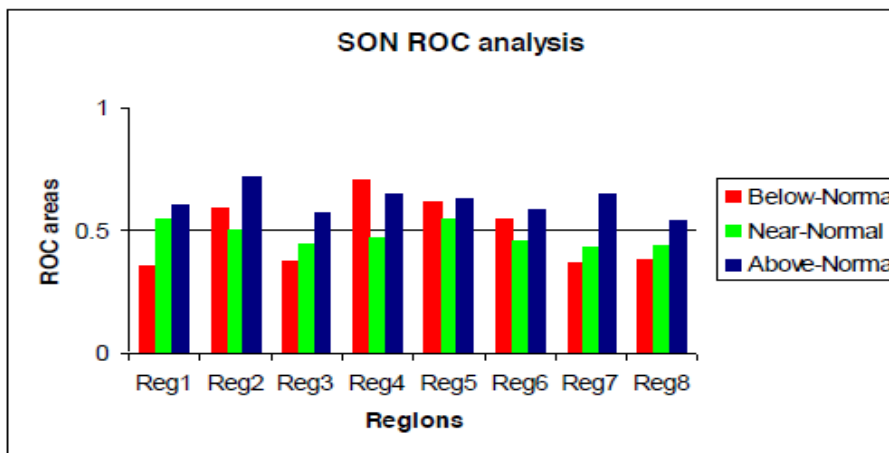
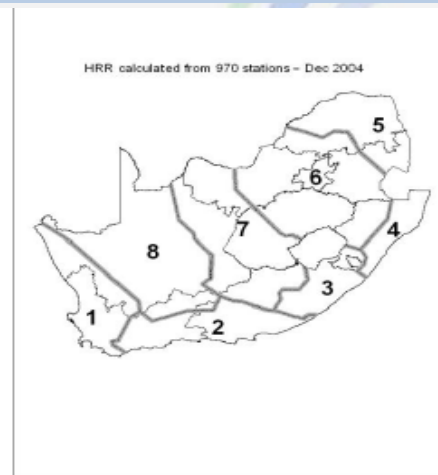
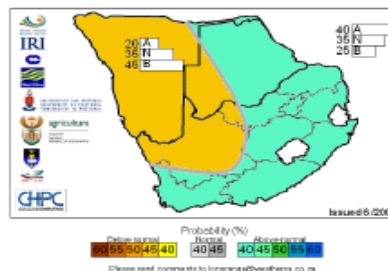
SAWS Subjective Consensus forecast --Lessons

Operational Forecast Skill From CONSENSUS discussions

Verification work by Peggy Moatshe

Verification over 7 years of
consensus forecast production

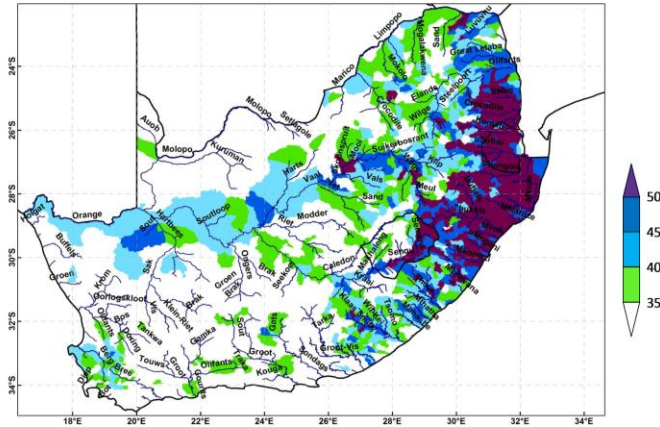
Expected Total Rainfall for the period
August-September-October 2008



Challenges and Limitations

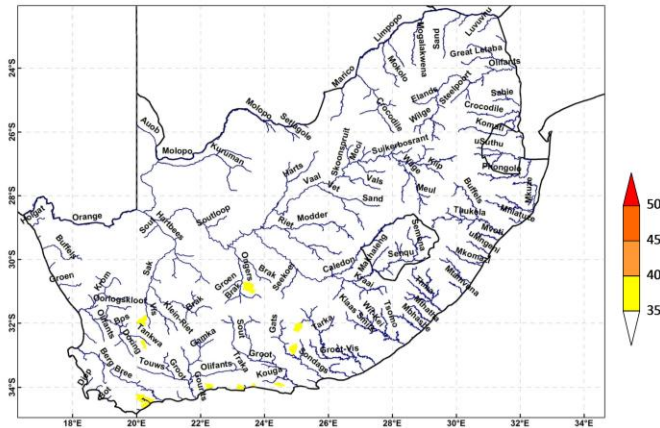
FEBRUARY – MARCH - APRIL 2011

EXTREMELY Above – Normal Accumulated Streamflow



FEBRUARY – MARCH - APRIL 2011

EXTREMELY Below – Normal Accumulated Streamflow

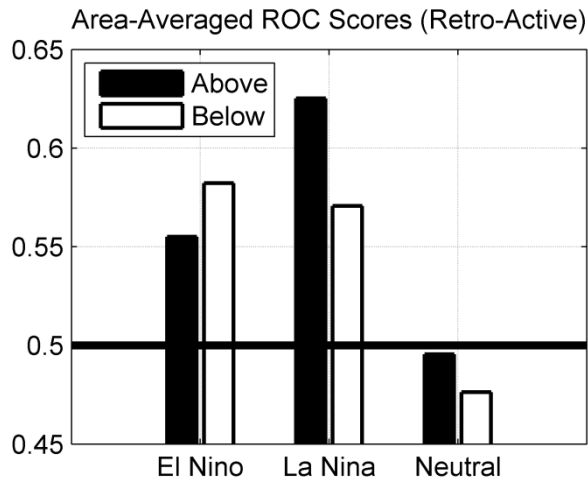


Contributing Agencies:
CSIR, IRI, University of KwaZulu-Natal

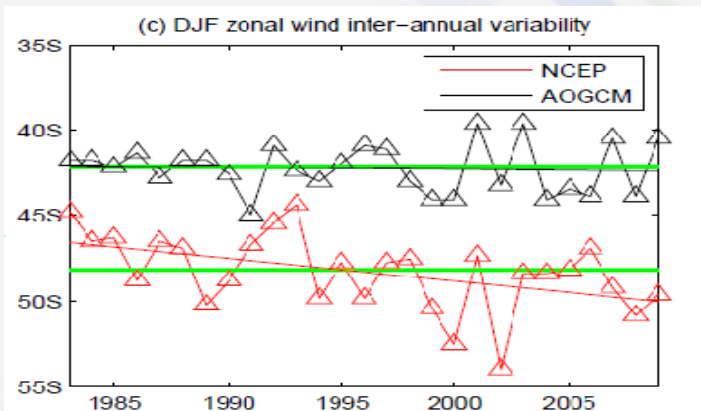
- Product uptake is poor
- A tendency among users to highlight more forecast failure than success



Challenges and Limitations



Landman and Beraki (2012)



Mathole et al. (2013)

- **No ENSO no Skill (Southern Africa Region)**
- **Mid-latitude Jet stream southward migration is not detected in the model ;**
- **lack of lower stratospheric temperature cooling**
- **IOD predictability is still limited to the austral spring period (October) to the start of Summer (December)**

Concluding remarks and next plan

- **Pretoria GPC would contribute to the Operational Predictions from Sub-seasonal to Longer-time Scales to GFCS programme through the LCs.**
- **More focus on applications, product utilization and stakeholders/users engagement: through application interface development and awareness campaign**
- **Anthropogenic forcing perhaps needed to be represented in state-of-the-art models used for seasonal prediction (usually neglected)**