Targeting climate research and services to development needs in Africa: The DFID-Met Office Hadley Centre Climate Science Research Partnership (CSRP)

Richard Graham (Met Office Hadley Centre), Yvan Biot (UK Department for International Development, DFID)

First Climate Change and Development in Africa (CCDA-I) Conference, Addis Ababa, 17-19 October 2011

CSRP: climate and modelling research, applications, capacity building – Africa
3-year programme, started January 2010

Initial consultation with African users of climate predictions

- To determine priority prediction and capacity building needs

Science component:

1. **Improved understanding and modelling of drivers of African climate – remote (e.g. ENSO), local (e.g. soil moisture);**

2. **Develop and trial new 'user-driven' climate services (monthly, seasonal, decadal) and 'attribution' analysis;**

3. **Regional Climate Model downscaling** – towards higher geographical detail (PRECIS);

Capacity building component:

4. **CSRP Fellowship scheme**: 11 fellows now appointed;

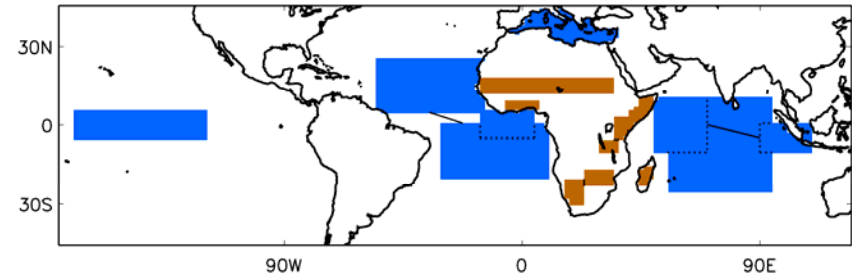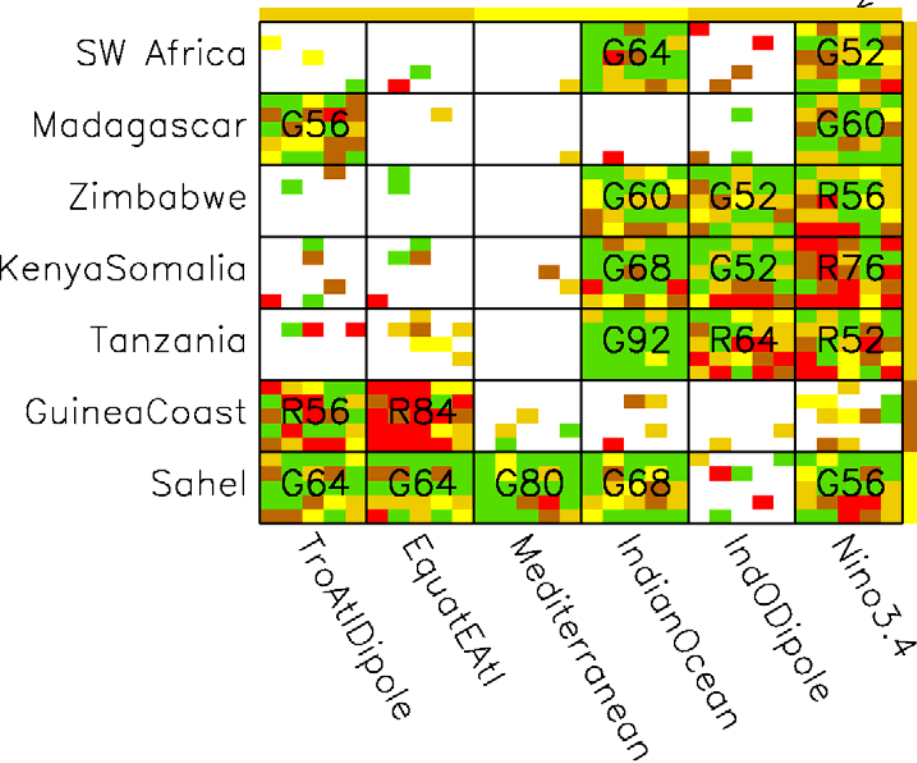5. **Workshops:** Capacity building workshops in climate science

Science component (1): Teleconnections
How well do models used in IPCC's AR4 represent observed SST/rainfall correlations?

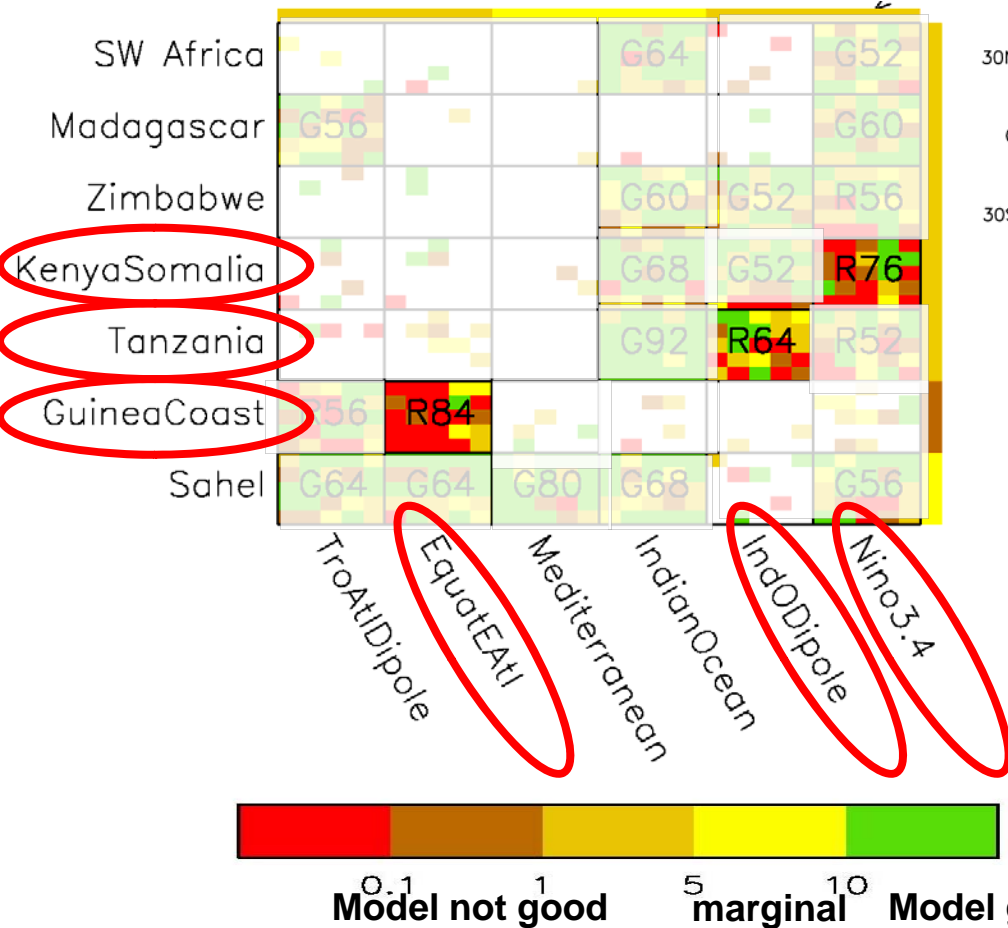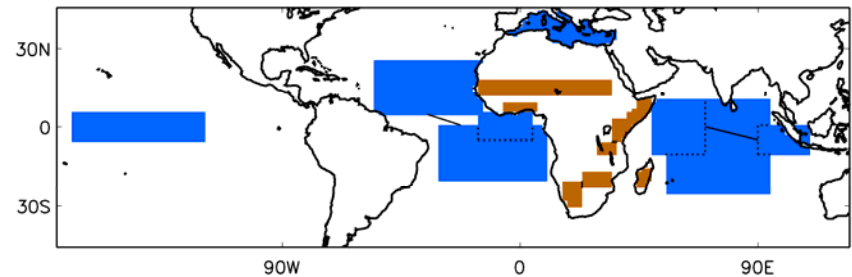**Assessment of model teleconnections**

Rainfall and SST areas

Dave Rowell

Science component (1): Teleconnections

How well do models used in IPCC's AR4 represent observed SST/rainfall correlations?

## Assessment of model teleconnections

Rainfall and SST areas

- Most climate models have inadequate representations of several important SST teleconnections to African rainfall

- Teleconnections errors due to:

  - Variability and/or climatology of SSTs in ocean-atmosphere models

  - Some errors are due to atmosphere-only processes

- Method can be used to rank models in terms of 'performance' for Africa – valuable information for users

Dave Rowell

Science component (2): Rainy season onset
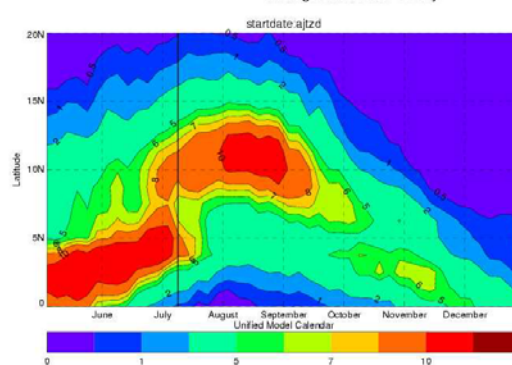## How well do models used in IPCC's AR4 represent season onset?

West African Monsoon (latitude Vs time)
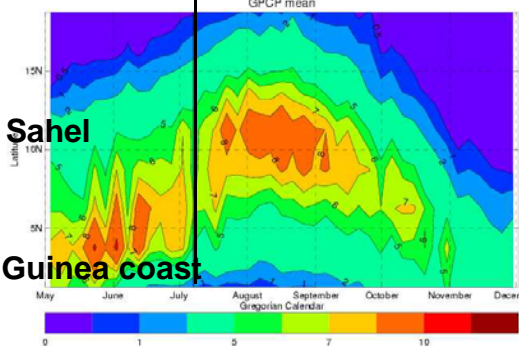
Average onset date

Sahel

Guinea coast

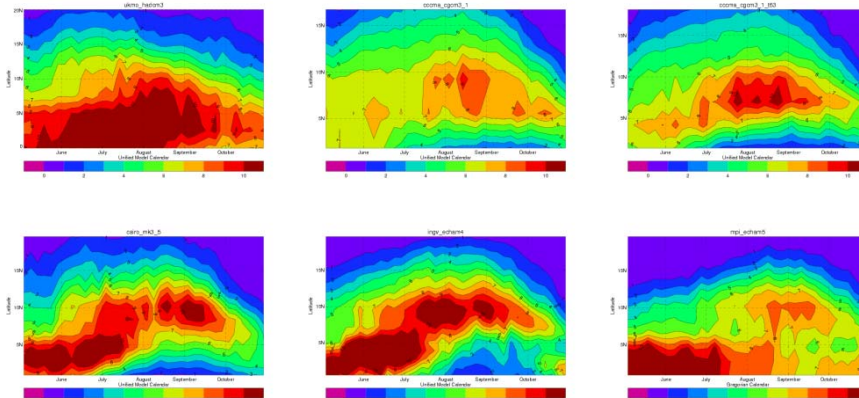**observed**   **HadGEM3(dev)**

Sample of CMIP3 models from AR4

- Most AR4 models do not have a good representation of the WAM onset

- Investigation of HadGEM3 suggests good representation is very sensitive to…

  - e.g. balance of latent and sensible heating over land

- Opportunity to improve understanding of mechanisms driving onset

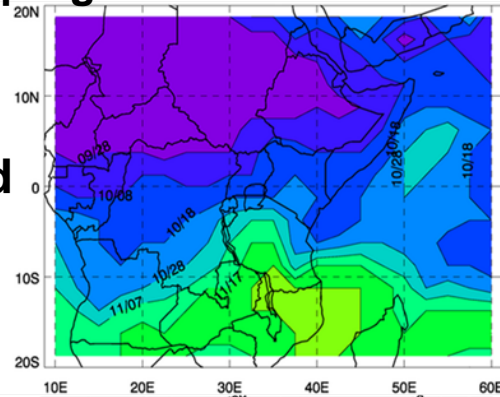*Michael Vellinga, Caroline Bain, Ruth Comer*

Science component (3): Predicting onset timing

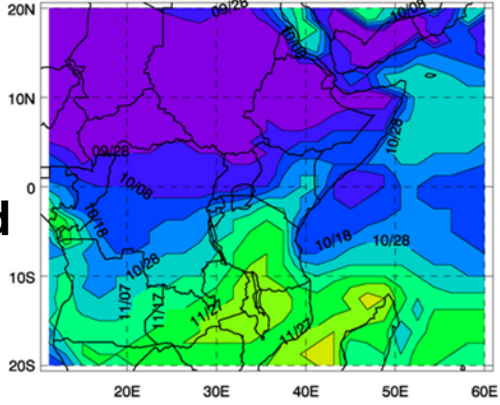based on local time of arrival of 20% of long-term seasonal average

Average southward progression of rains with ITZC

Skill of Met Office seasonal forecasts of onset timing
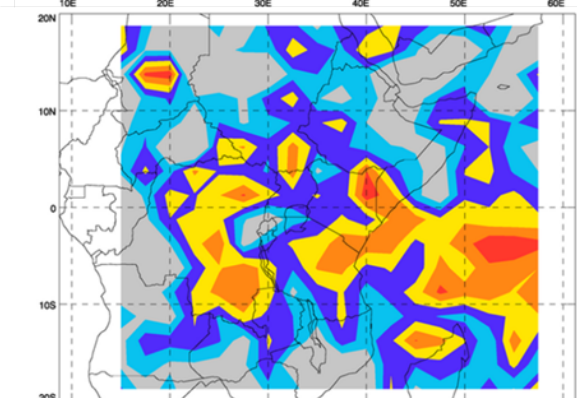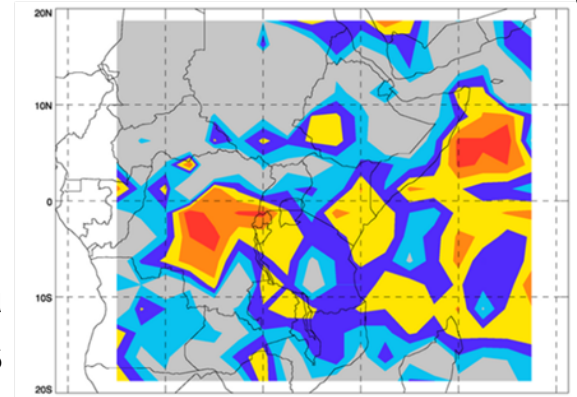

observed

modelled

Example: East Africa short-rains (OND)

early onset

orange/red = 'good' skill

late onset

Encouraging first results: trial onset forecasts have been provided to Regional Climate Outlook Forums ICPAC, ACMAD and SADC-DMC
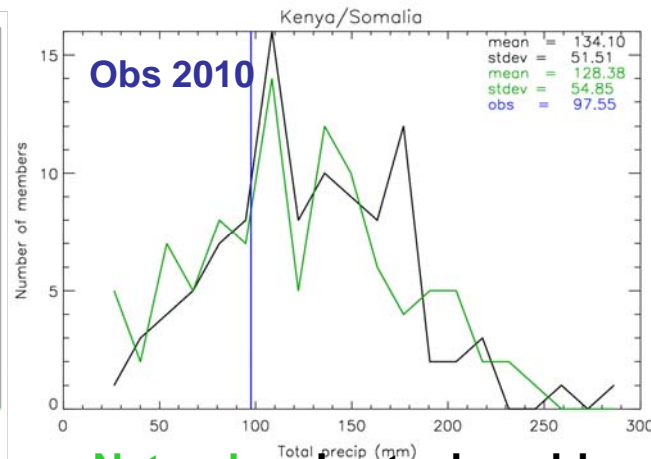
Science component (4): Attribution of extreme events

there is a growing tendency to attribute all observed extremes to man-made climate change – bringing potential for mal-adaptation

schematic
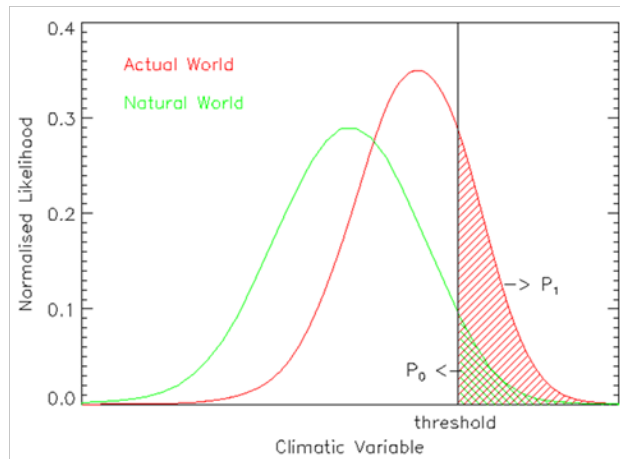
Greater Horn of Africa short-rains OND 2010

Natural and actual world simulations for OND 2010 (100 realisations each)
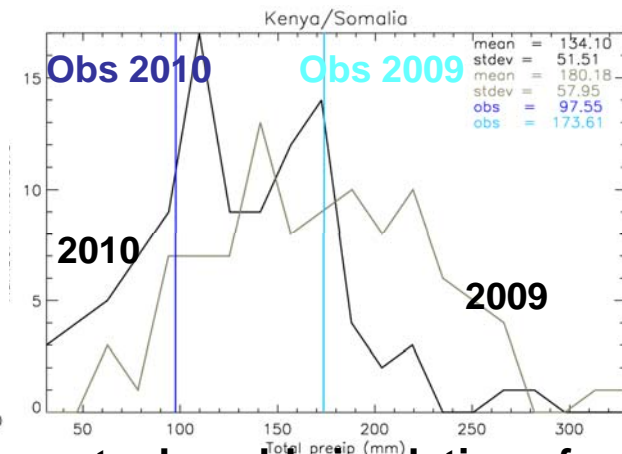
actual world simulations for OND 2009 and 2010

- Severe drought characterised by poor rains OND 2010 and MAM 2011

Preliminary results:

- Little 'man-made' influence detected on OND season – natural forcing (La Niña) likely increased risk of dry (consistent with known teleconnections)
- For MAM season: some evidence that man-made influence increased risk of dry (consistent with Funk et al 2008) – but more research needed

Fraser Lott, Nikos Christidis

Capacity building component:

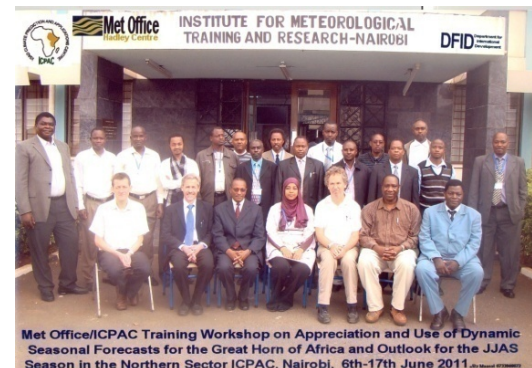## CSRP Fellowship scheme

- 11 African climate scientists appointed as CSRP fellows;

- 4 West; 4 East Africa; 1 Central and 2 southern Africa;

- Fellows will work on CSRP research themes;

- Each fellow has been assigned a (Met Office) expert as mentor;

- Fellows are based at African Institutes, with 4-week visit to the Met Office

Workshops in climate science and applications

- 'Use of dynamical seasonal forecasts for the Greater Horn of Africa' – hosted by ICPAC Nairobi (June 2011);

- 15 participants from countries of the GHA;

- Tools and methods developed helping to enhance regional seasonal forecasting;

- Opportunities for longer-range (ENSO-based) predictions explored – potential for longer-lead drought/flood warnings.

Met Office/ICPAC Training Workshop on Appreciation and Use of Dynamic Seasonal Forecasts for the Great Horn of Africa and Outlook for the JJAS Season in the Northern Sector ICPAC, Nairobi, 6th-17th June 2011.

Recommendations

- Increased Africa-focussed climate research is urgently needed to improve models and reduce prediction uncertainties in user-relevant climate variables;

- Performance tests (diagnostics) for user-relevant variables should be agreed for climate models and monthly-seasonal-interannual prediction systems. Results of testing should be published;

- The above must be guided by increased liaison between model developers and the African climate prediction and user communities (Regional Centres, NMSs and Regional Climate Outlook Forums);

- Application of longer-range (~6 months – 2 years) dynamical model ENSO predictions is a particular opportunity for Africa.

(*Recommendations are consistent with priorities of the Global Framework for Climate Services, GFCS*)

Thank you.
Questions?