



# The DFID-Met Office Hadley Centre Climate Science Research Partnership: improved climate understanding; prediction; collaboration – for Africa

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# DFID-Hadley Climate Science Research Partnership (CSRP): programme for Africa

3-year programme, 8.5 Hadley staff

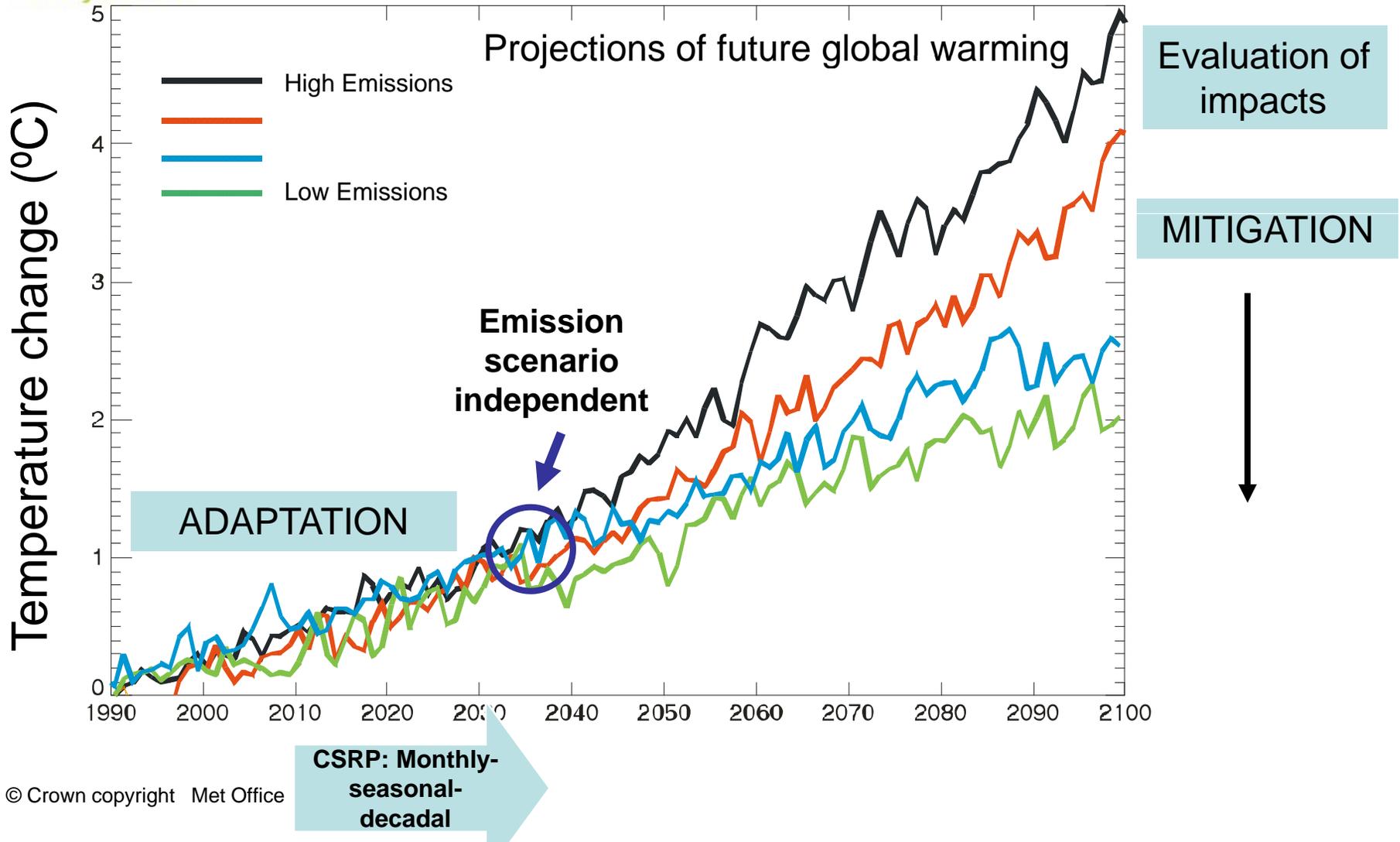
Programme of research and user-guided application: for monthly, seasonal and decadal (10-year) timescales

## Aims:

- improve understanding of African climate processes, and their representation in climate models
- jointly develop new forecast products to inform early warning systems and adaptation planning
- study programmes and knowledge sharing, to strengthen climate science centres in Africa
- **consultation with African stakeholders to determine specific prediction requirements.**



# CSRP: timescale focus - adaptation

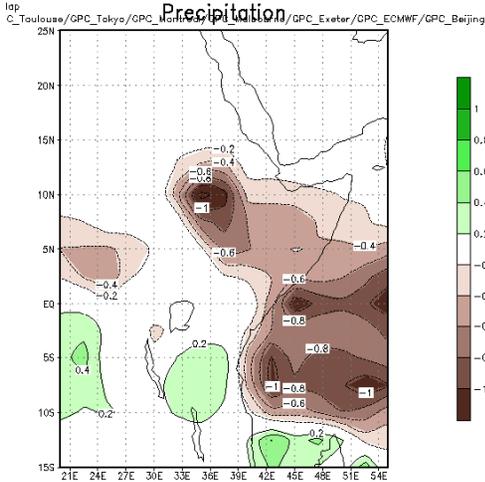




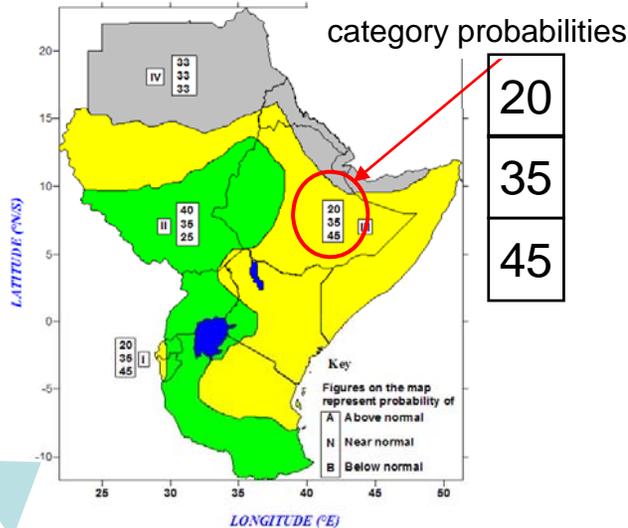
# Output 1: improved understanding and modelling of African climate

## seasonal prediction example

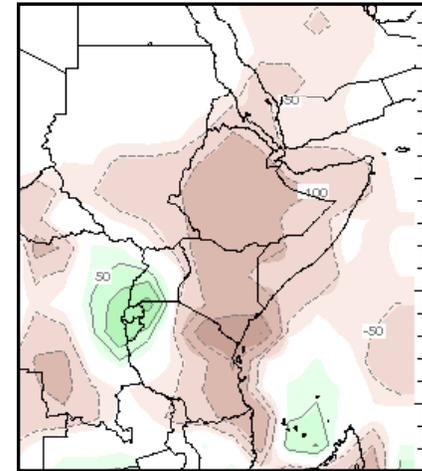
multi-model prediction from 10 seasonal models



Regional Climate Outlook Forum consensus



Observed precipitation anomalies



ICPAC and GHA country climatologists

**March-April-May 2009: GHACOF 23**

**Models are crucial tools for prediction – we need to better understand and improve their representation of climate processes**



# Output 1: main aims

- Evaluation of new Hadley climate model (HadGEM3) over Africa for variables of interest (e.g. rains onset)
- Improved understanding of remote influences (e.g. ENSO, Indian Ocean Dipole)
- Role of land-atmosphere coupling – e.g. soil moisture
- Other influences: e.g. higher model resolution

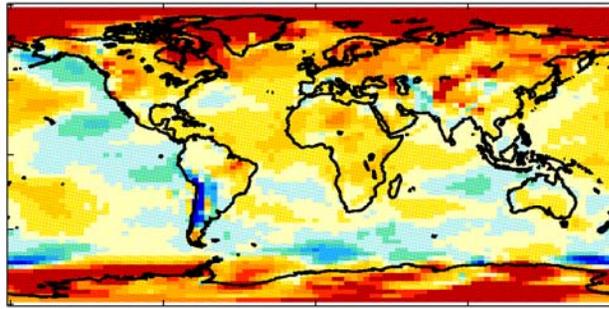
**Result: improved HadGEM3 for ‘seamless’ monthly-seasonal-decadal forecasting for Africa**



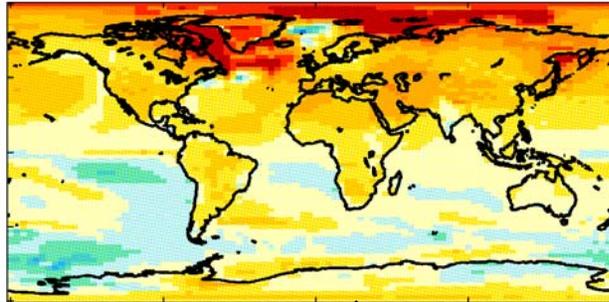
# Output 2a: monthly-seasonal-decadal prediction

## multi-annual prediction example

observed



Predicted: with initialisation



Temp. anomalies for the (~3.5yr) period June 2005 to Nov 2008, predicted from Nov 2005

Initialised predictions needed to inform warnings on multi-annual to decadal range

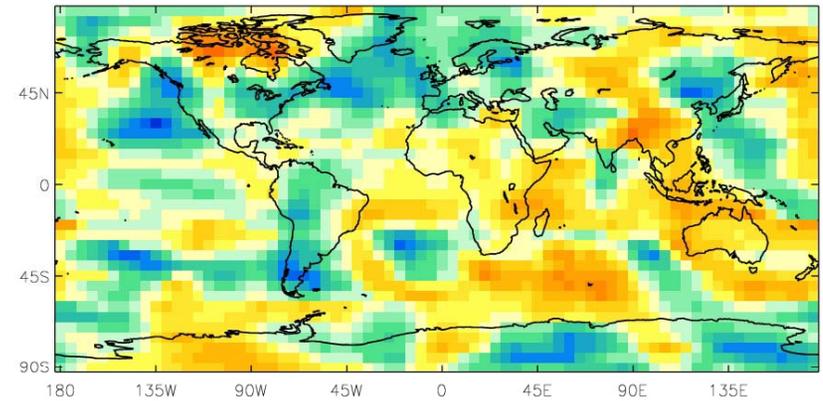
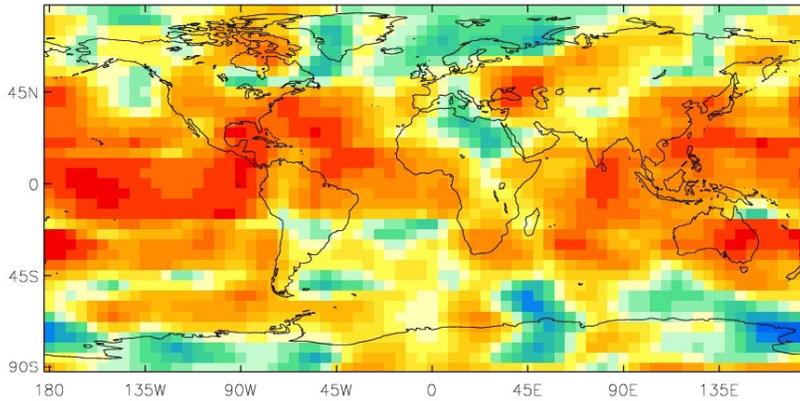


# Potential for multi-annual rainfall prediction: Anomaly correlation, November hindcasts 1979-2001, 35°x35° averaging (verification = GPCP)

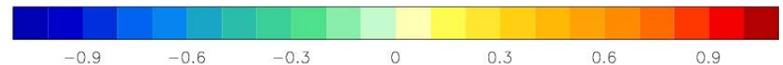
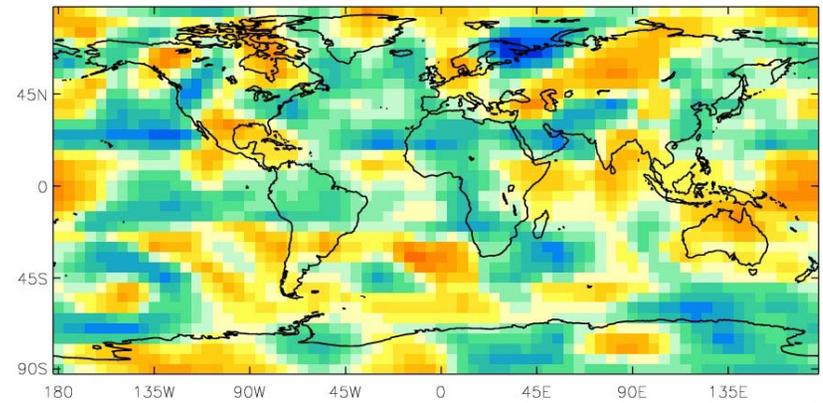
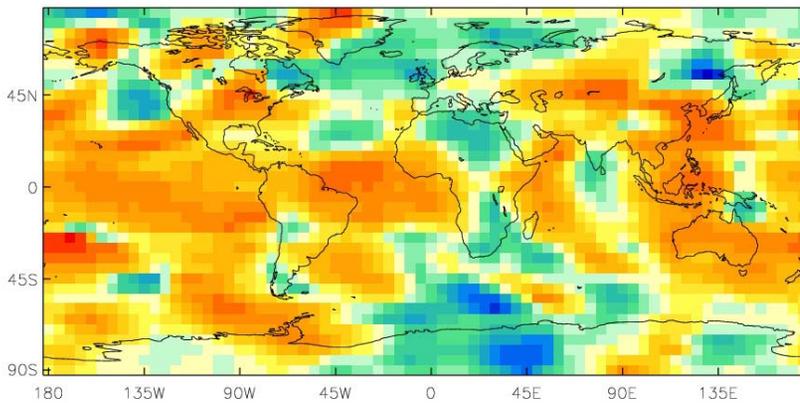
DePreSys

NoAssim

Year 1



Year 2





## Output 2a: Main aims

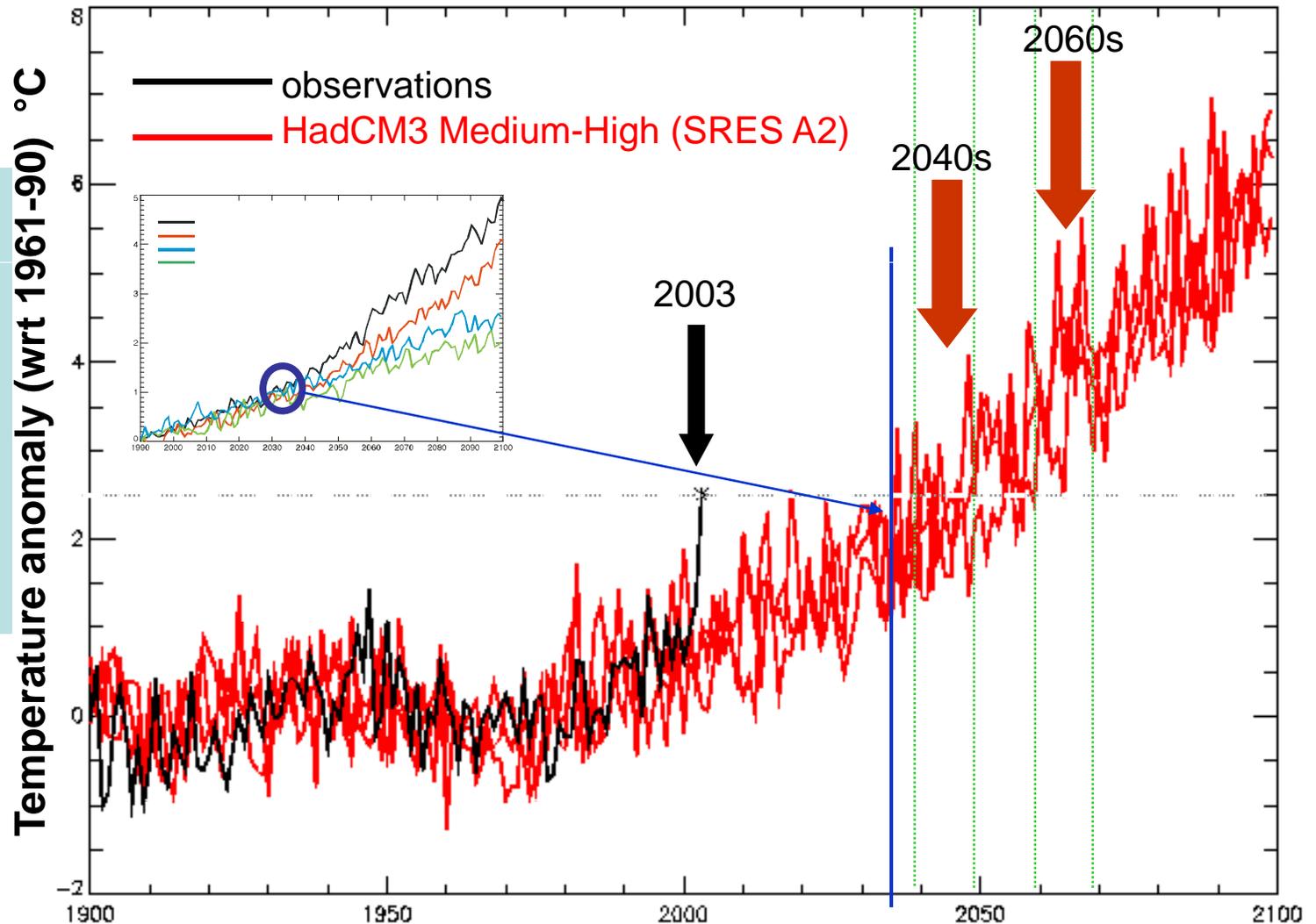
- Assess monthly-seasonal prediction skill for ‘high impact’ events: e.g. onset/cessation timing, extremes
  - i.e. move beyond prediction of seasonal rainfall totals
- With African centres, develop early warning products
- Develop and assess inter-annual/decadal predictions

**Result: experimental ‘seamless’ (all HadGEM3) system for monthly-seasonal-decadal forecasts, assessed for performance on ‘useful’ prediction products**

# Output 2b: real-time monitoring and attribution e.g. of extreme events

Attribution example: European summer 2003

More than 90% likely that human influence has doubled the risk of European heatwaves of intensity observed in summer 2003 (Stott et al, Nature 2004)





## Output 2b: Main aims

- Develop continuous observational monitoring capability for Africa (review and consolidate existing datasets)
- Develop a near-real time attribution capability for Africa (important to avoid expensive mal-adaptation)

**Result: near-real-time monitoring and attribution system**



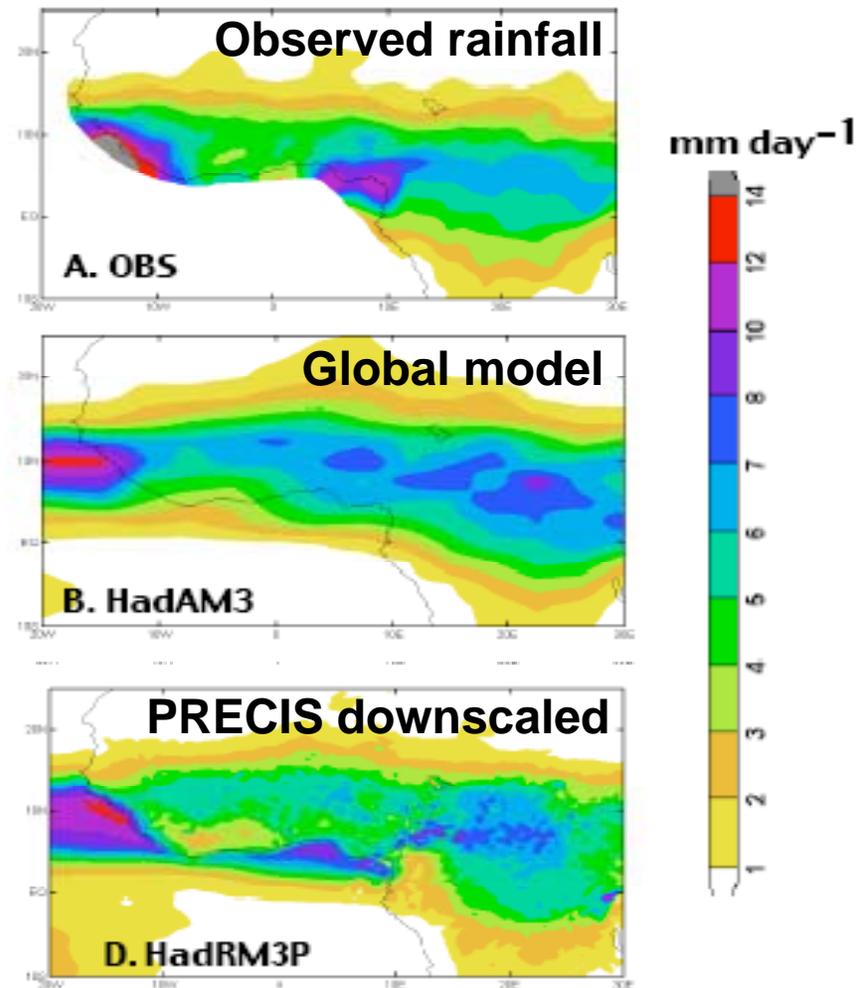
# Output 3: Downscaling of monthly-decadal forecasts with the PRECIS system

Information is needed on spatial scales that are appropriate for decision making

PRECIS - dynamical downscaling

Right:  
Results from WAMME project on W African monsoon from US/UK/W.African researchers:

Example: 2000-2005





## Output 3: Main aims

- Evaluate PRECIS (new HadGEM3 version) over Africa, compare with other RCMs
- Enable PRECIS to be driven by monthly-decadal GCM predictions
- Enable PRECIS to model regional forcing scenarios (dust, deforestation and other land use changes)
- Build ‘in country’ capacity to run PRECIS downscaling

**Result: experimental monthly-decadal downscaling capability (PRECIS V3) to run ‘in country’ for monthly-decadal predictions**



# Outputs 4&5: Knowledge management

- Consultation with Africa stakeholders: to ensure research is directed to practical needs
  - Regional Centres and all African NMHSs have been contacted; questionnaires are being prepared
- Strengthen the 'research into use' process – link with 'boundary agencies' and application 'champions'
- Establish study fellowships at African institutes to further research on outputs 1,2 and 3, and build professional development
- Training workshops: training in use of new information coming from the CSRP and PRECIS.
- Joint publications: e.g. peer review journals, policy forums (Nairobi Work Programme)



# DFID-Hadley Centre CSRP: Summary

Climate forecasts for the next 0-20 years are required for near-term adaptation planning

The CSRP will:

- Work with African stakeholders to understand detailed requirements for Africa and to make best use of information
- Focus effort to understand climate processes over Africa, improve robustness and usefulness of model predictions
- Enable clear casual attribution of observed changes - important to avoid mal-attribution
- Strengthen the climate science base in Africa



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Thank you! Any questions?