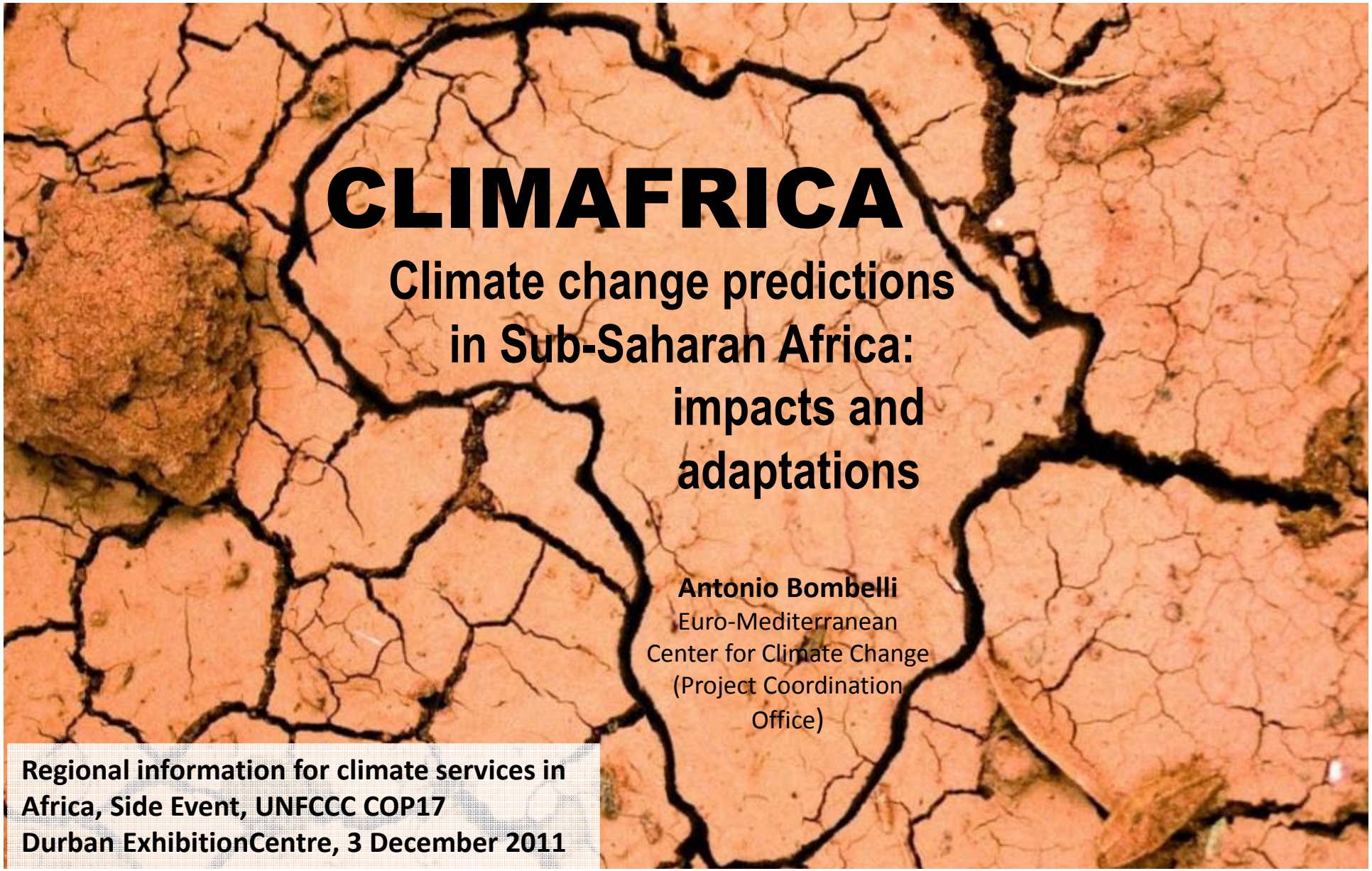
# ClimAfrica - Climate change predictions in Sub-Saharan Africa: impacts and adaptation




**Antonio Bombelli**
Euro-Mediterranean Center for Climate Change (Project Coordination Office)

**Regional information for climate services in Africa, Side Event, UNFCCC COP17**
**Durban ExhibitionCentre, 3 December 2011**

**CLIMAFRICA**
**Climate change predictions in Sub-Saharan Africa: impacts and adaptations**

**European Commission – FP7**
**3.5 M€**

**48 months: 1 Oct 2010 – 30 Sep 2014**

***Key Words***
**Climate Predictions; Climate Impacts; Vulnerabilities; Adaptation; Case Studies; Agriculture and Water Resources; Socio-economic analysis**

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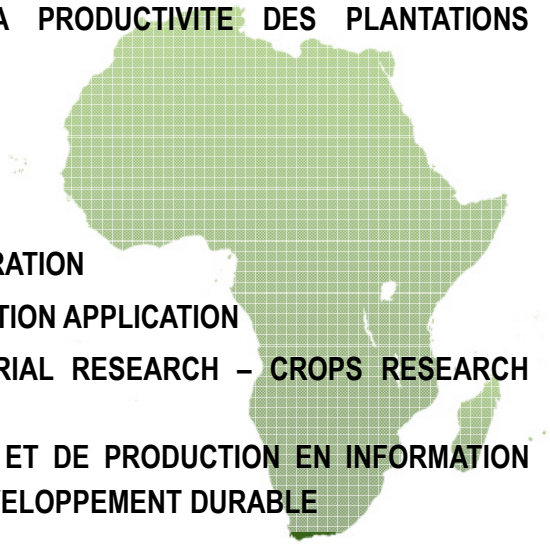
| | Acronym | Participant organisation name | Country |
|---|---|---|---|
| 1 | CMCC | CENTRO EURO-MEDITERRANEO per i CAMBIAMENTI CLIMATICI | Italy |
| 2 | ULUND | LUNDS UNIVERSITET | Sweden |
| 3 | CEA | COMMISSARIAT A L'ENERGIE ATOMIQUE | France |
| 4 | MPG | MAX PLANCK GESELLSCHAFT ZUR FOERDERUNG DER WISSENSCHAFTEN | Germany |
| 5 | VUA | VERENIGING VOOR CHRISTELIJK HOGER ONDERWIJS WETENSCHAPPELIJK ONDERZOEK EN PATIENTEZORG | Netherlands |
| 6 | CTFC | CENTRE TECNOLOGIC FORESTAL DE CATALUNYA | Spain |
| 7 | PIC | POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH | Germany |
| 8 | CIRAD | CENTRE DE COOPERATION INTERNATIONAL EN RECHERCHE AGRONOMIQUE POUR LE DEVELOPPEMENT | France |
| 9 | FAO – GTOS | FOOD and AGRICULTURE ORGANISATION of the UNITED NATIONS | |
| 10 | SOW – VU | STICHTING ONDERZOEK WERELDVOEDSELVOORZIENING VAN DE VRIJE UNIVERSITEIT | Netherlands |
| 11 | UR2PI | UNITE DE RECHERCHE SUR LA PRODUCTIVITE DES PLANTATIONS INDUSTRIELLES | Congo |
| 12 | UCT | UNIVERSITY OF CAPE TOWN | South Africa |
| 13 | BCA | UNIVERSITY OF MALAWI | Malawi |
| 14 | LBEV | UNIVERSITY OF LOMÉ | Togo |
| 15 | ARC | AGRICULTURAL RESEARCH CORPORATION | Sudan |
| 16 | ICPAC | IGAD CENTRE FOR CLIMATE PREDICTION APPLICATION | Kenya |
| 17 | CSIR-CRI | COUNCIL FOR SCIENTIFIC INDUSTRIAL RESEARCH – CROPS RESEARCH INSTITUTE | Ghana |
| 18 | CERPINEDD | CENTRE D'ETUDE DE RECHERCHE ET DE PRODUCTION EN INFORMATION POUR L'ENVIRONNEMENT ET LE DEVELOPPEMENT DURABLE | Burkina Faso |



## Partnership

**18 institutions:**

**9 Europe**

**8 Africa**

**+ FAO**

**Project coordinator: CMCC – Italy**

**www.cmcc-org**

**Local case studies:**

1)Burkina Faso
2)Congo
3)Ghana
4)Malawi
5)Sudan
6)Togo
7)Kenya
8)Ethiopia
9)Tanzania

# CMCC: Euro-Mediterranean Center for Climate Change

**CMCC is the Italian Research Centre on Climate Science and Policy**. Partnership of 10+ Italian research institutes. Supported by the Italian Ministry for the Environment Land and Sea, the Ministry for Education, University and Research and the Ministry for Economy


- 68 total staff members
- Innovative Supercomputing Infrastructure
- CMCC hosts the IPCC Italian Focal Point
- 61 (national and international) projects for a total amount of 23M€ c.a.

**Science basis**

- Variability of the climate (and changes)
- Development of Numerical Models

**Physical Impacts**

- Impacts and risks of climatic changes on Agriculture, Forests (and others ecosystems) + hydrological cycle

**Economics**

- Energy and Emission Long Term Scenarios and Mitigation Policies
- Economic Assessment of Climate Impacts and Adaptation Policies

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## Why ClimAfrica?

### Africa and Climate Change

- key role in the global C-cycle and climate system
- ≅ 50% of interannual variability of the global C-balance
- > 50% of global fire emissions
- ≅ 1/5 of the global C-emissions from land use change

### Weakness

- most vulnerable continent to climate change/variability
- population mostly depend on the rain fed rural sector
- economy relies mainly on natural resources

} direct linkage between climate, food production, economy and livelihood

- less covered region by climate change studies
- climate models developed outside the African context
- current climate scenarios consider long term trends, with less focus to the shorter time frame

} not enough or not adequate climate related info and products for Africa

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**Urgent need for the most up-to date and appropriate information and products, developed specifically for Africa, to better understand and predict climate change and its impacts in Sub-Saharan Africa for the next 10-20 years**

**Weakness**

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# ClimAfrica - Climate change predictions in Sub-Saharan Africa: impacts and adaptation

## ClimAfrica Objectives

1. Develop improved climate predictions on seasonal to decadal time scale
2. Assess climate impacts in water resources and agriculture sectors
3. Evaluate the vulnerability of ecosystems and population to inter-annual variations and decadal trends in climate
4. Suggest and analyse new adaptation strategies suited to SSA
5. Develop a new concept of medium term warning system for food and water security
6. Analyse the economic impact of climate change on agriculture and water resources and the cost-effectiveness of potential adaptation measures

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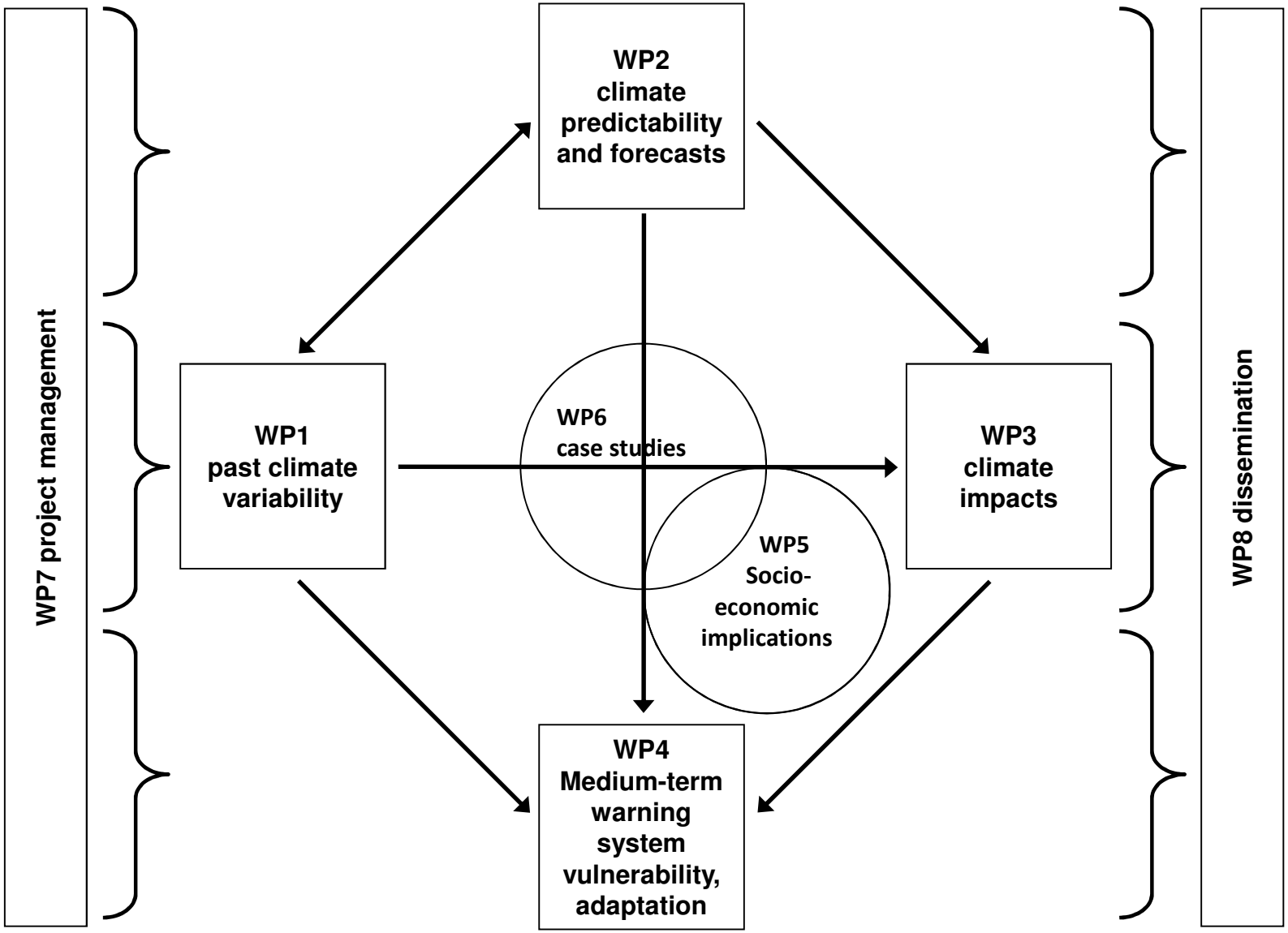

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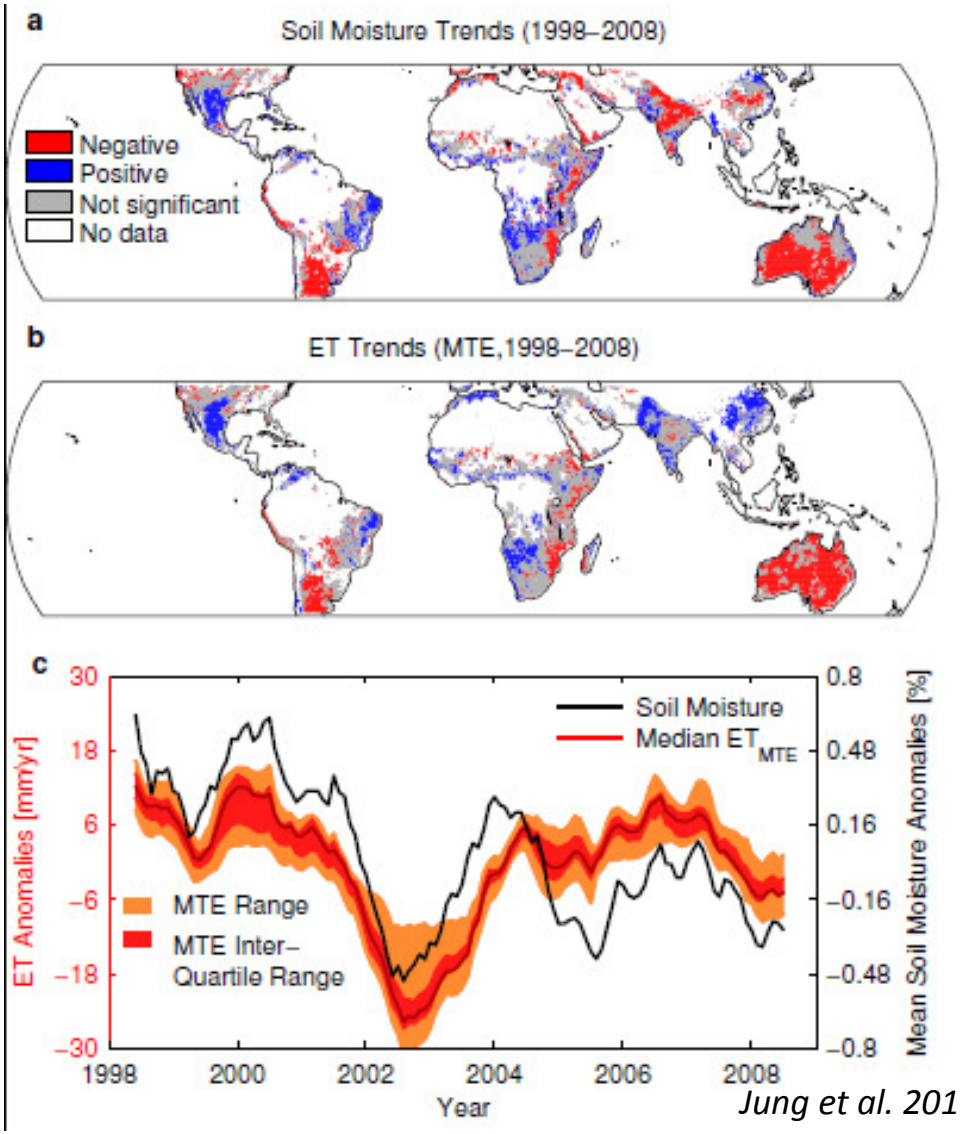
**WP1 – Effects of past climate variability on ecosystem productivity and water cycle**

Collection and synthesis of various past data streams (in situ + remote sensing + model simulations) to analyze the interactions between climate variability, and water availability and ecosystem productivity of Sub-Saharan Africa.

<u>Example output:</u>
30+ soil moisture harmonized database




*Jung et al. 2010*

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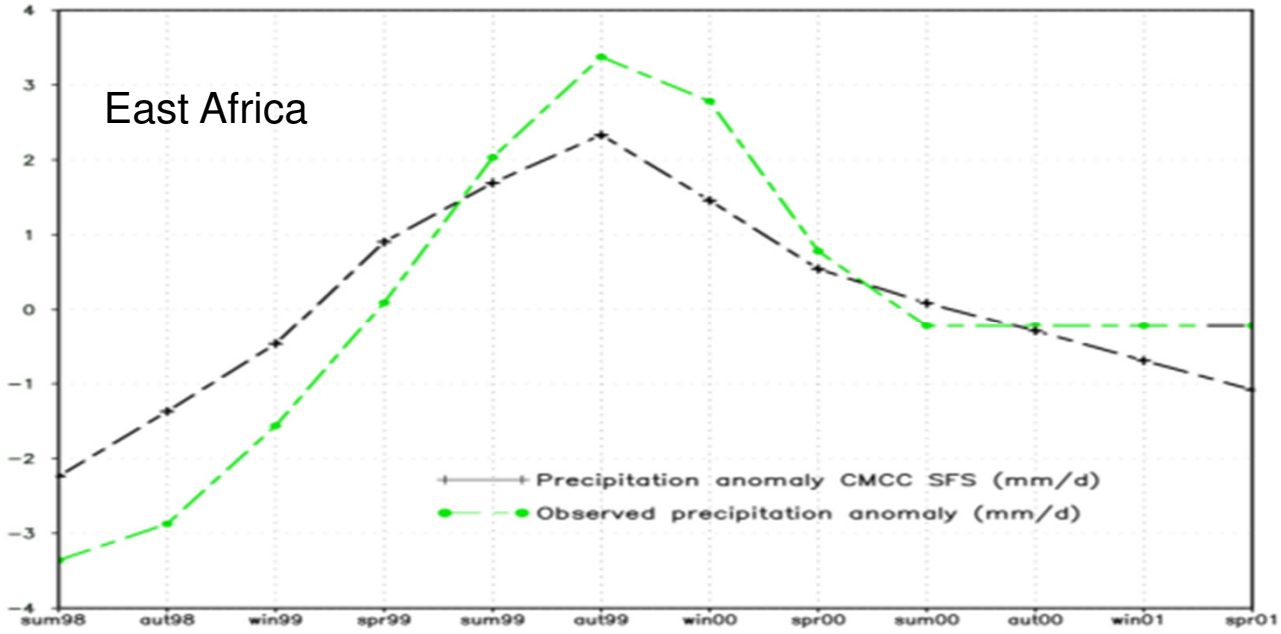
## WP2 – Improving modelling seasonal to decadal climate predictions

- improve seasonal forecasts and decadal climate change predictions over SSA.
- regional (dynamic and statistical) downscaling over east, west and south Africa
- seasonal hind casts

<u>Example outputs:</u>

- surface temperature
- precipitation
- heat fluxes
- wind
- soil moisture
- others




CMCC Seasonal Prediction System

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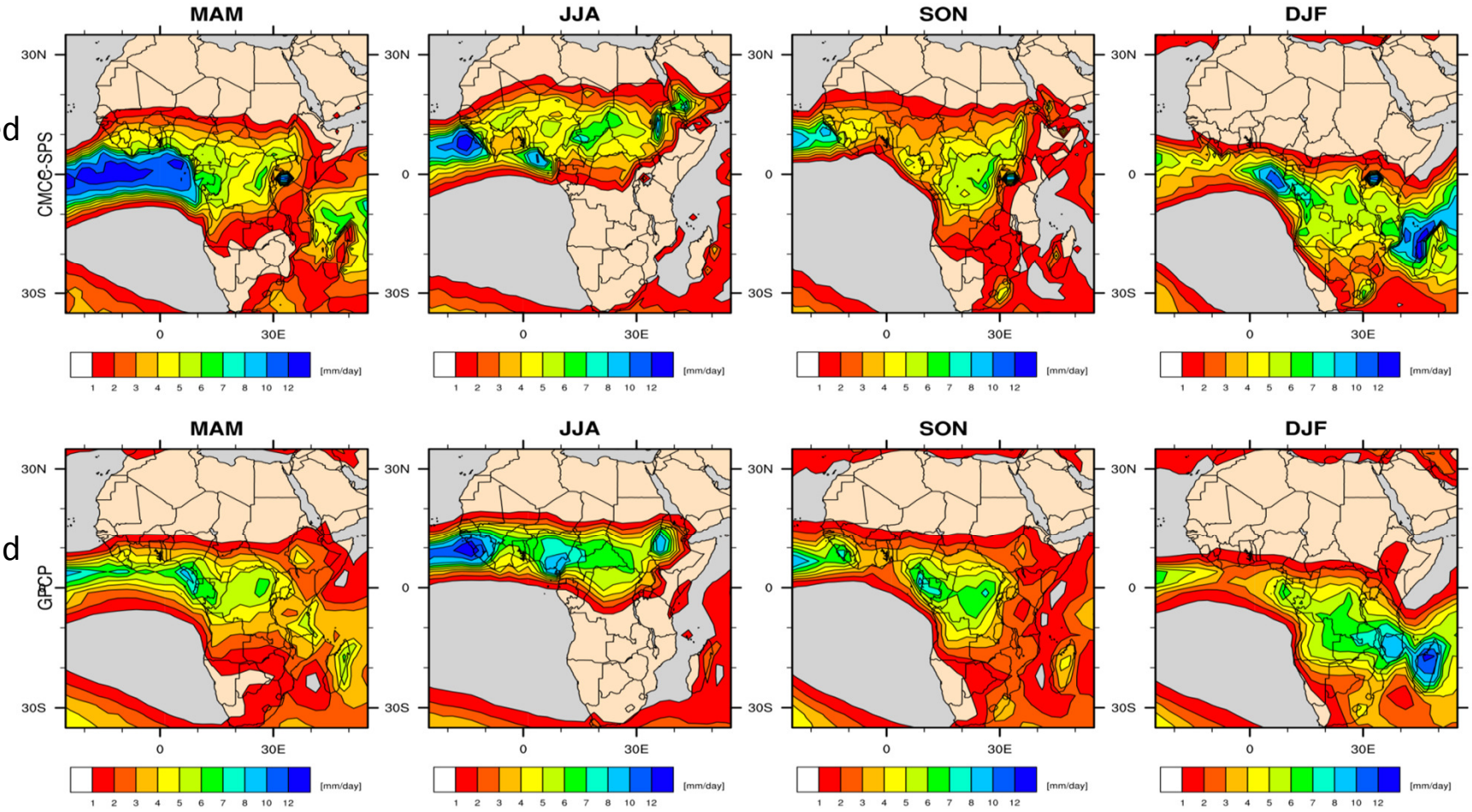
Example output: CMCC-Seasonal Prediction Model for Sub-Sahara Africa rainfall.
The basic annual cycle with good spatial distribution is captured by the model.

Modelled rainfall pattern

Observed rainfall pattern



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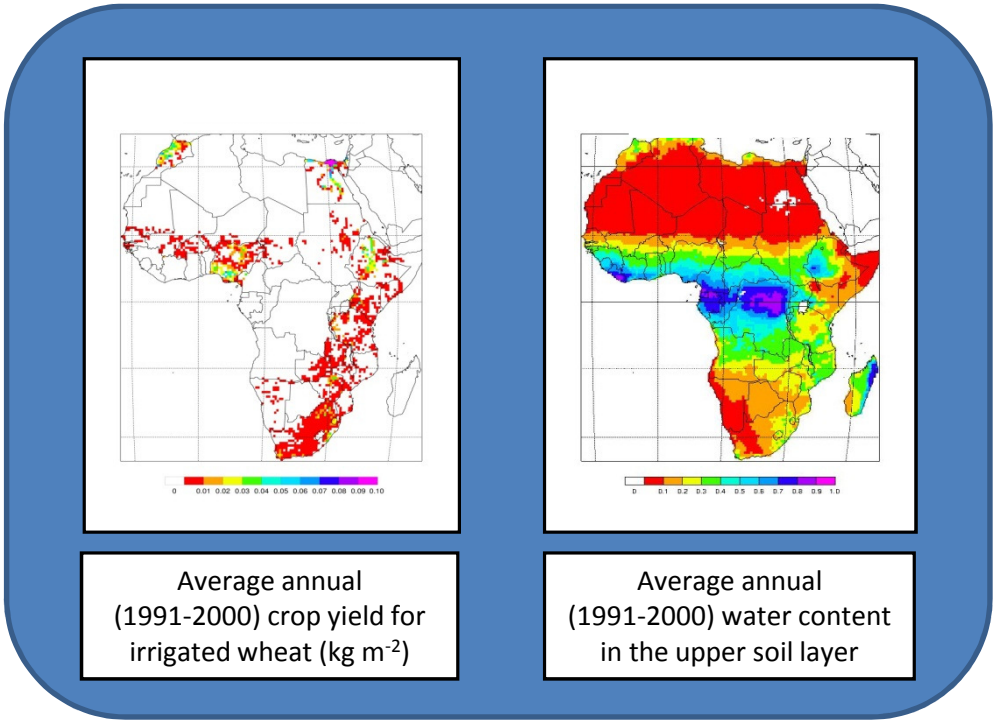
## WP3 - Analysis of climate impacts on water and agriculture

*Quantifying sensitivity of water resources and vegetation productivity to seasonal, interannual and decadal variability in climate*

Example Output:

*Crop models* to simulate crop yields and water availability under short-term scenarios of future climate change (5-10 years), to identify regional differences in the climate sensitivity of crop production.



Average annual (1991-2000) crop yield for irrigated wheat (kg $m^{-2}$)

Average annual (1991-2000) water content in the upper soil layer

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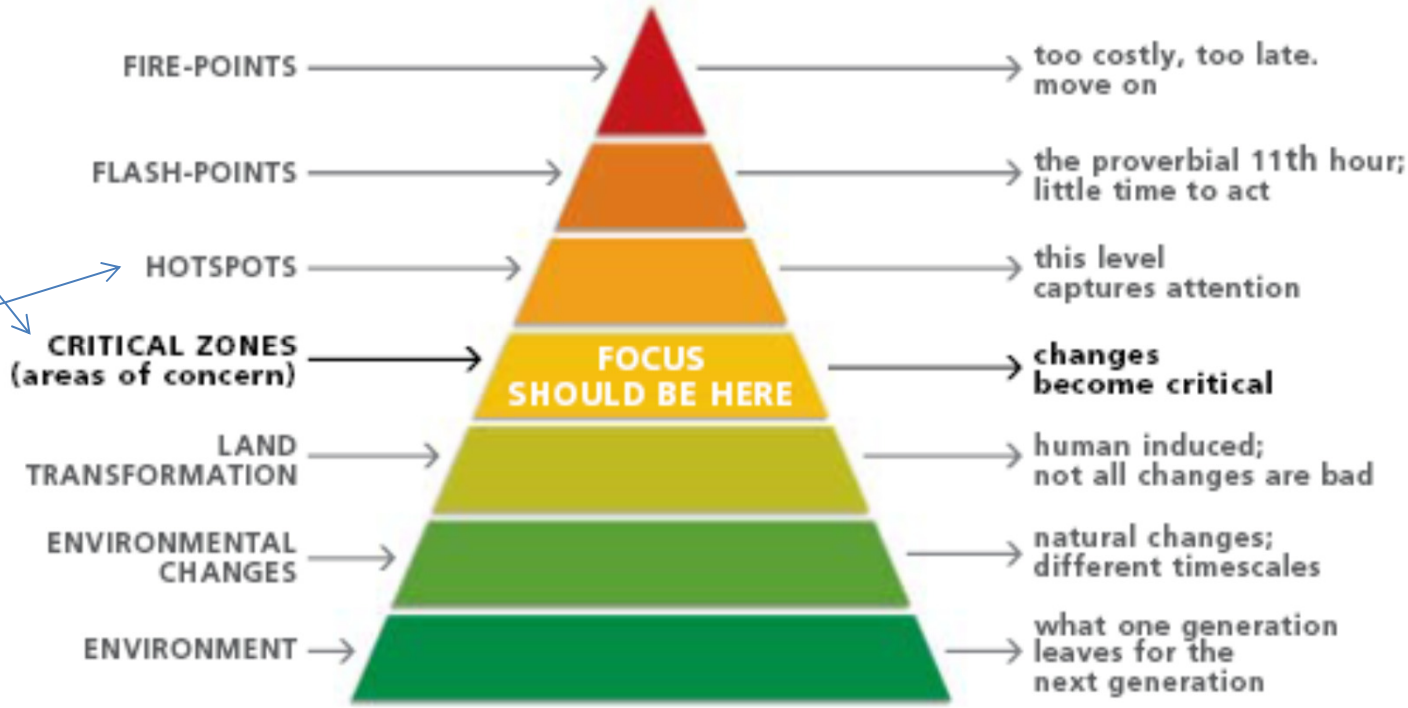
## WP4 - Medium-term forecasting of food and water vulnerabilities, and adaptation measures

Example output: medium term monitoring and forecasting warning system for a prospective analyses of food insecurity and water crisis for the next 10 years.
*(fill the gap between seasonal scale predictions and long-term impact scenarios)*

*Identify the future Areas of Concerns and likely Hotspots of food and water vulnerabilities*



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## WP5
## Socio-economic implications of climate change impacts and adaptation measures in Sub-Saharan Africa

*Evaluation of the economic effects of climate change impacts on water resource and agriculture including the cost of adaptation measures proposed by the project*

Example output: a set of climate information and policy indications, at regional and local level, to prevent and cope with climate induced crises, and build cost effective agricultural systems, taking vulnerabilities into account.

Comprehensive analysis of economic implications:
not only direct costs
+ other relevant economic indicators (e.g. GDP changes)

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## WP6 – Case Studies

Characterize the environmental and socio-economic conditions of 9 different Sub-Saharan African countries distributed along a wide climate gradient (Burkina Faso, Congo, Ethiopia, Ghana, Kenya, Malawi, Sudan, Tanzania, and Togo).

Example output: field data for developing and validating models and the warning system.

*Tchizalamou site, Congo*

# ClimAfrica - Climate change predictions in Sub-Saharan Africa: impacts and adaptation

## Expected advancements

**Improved climate-related information and products for Africa delivered on a time scale effective for timely adaptation:**

1. Improved climate predictions (seasonal/decadal)
2. Assessment of climate impacts on water resources and agriculture in the next 10-20 years
3. New adaptation strategies suited to Africa's needs
4. Assessment of economic implications of climate change impacts and adaptation
5. An operational medium term warning system

**The improved predictions of climate change and impacts are fundamental climate information needed by African communities for climate risk analysis related to agriculture and water resources, and including the socio-economic welfare.**

# THANKS!

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