



**African Monsoon Multidisciplinary Analyses**  
**Afrikanske Monsun: Multidisiplinære Analyser**  
**Afrikaanse Moesson Multidisciplinaire Analyse**  
**Analisi Multidisciplinare per il Monsone Africano**  
**Afrikanischer Monsun: Multidisziplinäre Analysen**  
**Analisis Multidisciplinar de los Monzones Africanos**  
**Analyses Multidisciplinaires de la Mousson Africaine**

# What is AMMA?

## 1. Aims

“AMMA is a coordinated international project to improve our knowledge and understanding of the **West African monsoon** (WAM) and its variability with an emphasis on **daily-to-interannual timescales** “

International aims are:

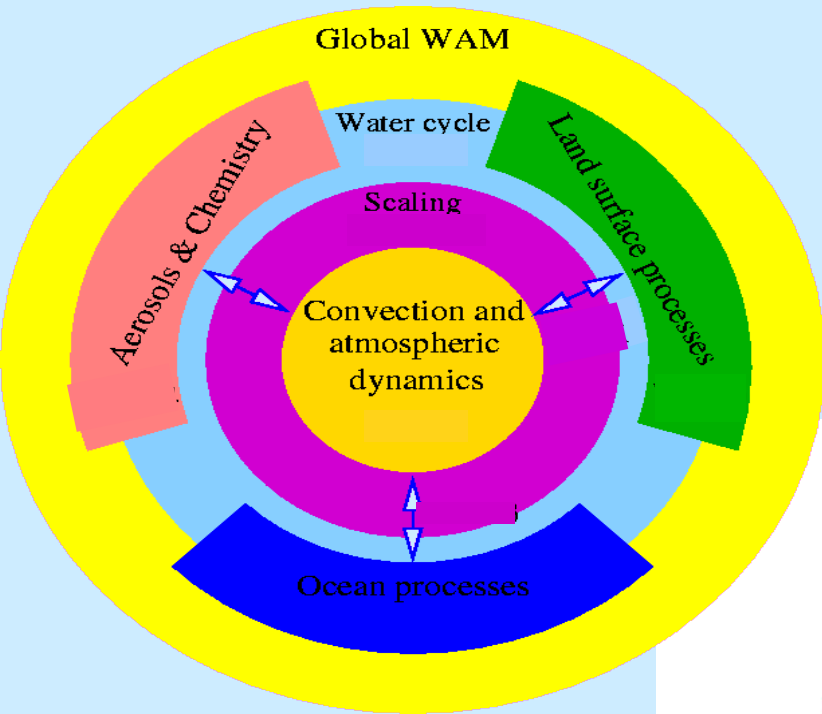
- To improve our understanding of the WAM and its influence on the physical, chemical and biological environment regionally and globally.
- To provide the underpinning science that relates climate variability to issues of health, water resources and food security and defining the relevant monitoring strategies.
- To ensure that the multidisciplinary research carried out in AMMA is effectively integrated with prediction and decision making activity.



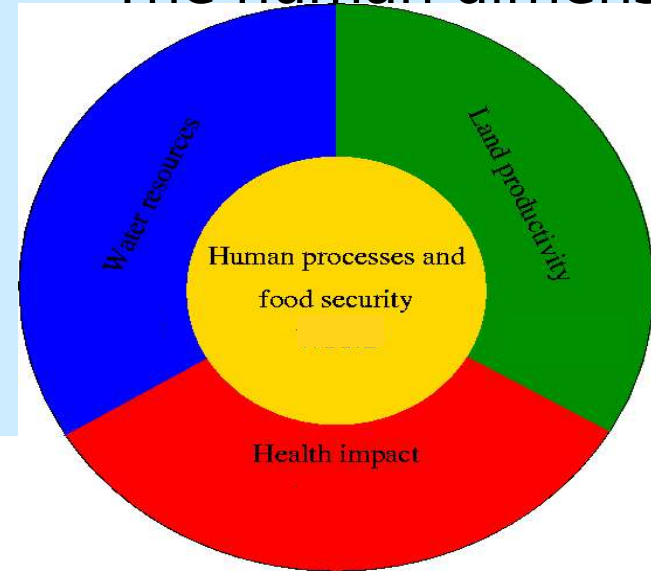
# What is AMMA?

## 2. A multidisciplinary approach

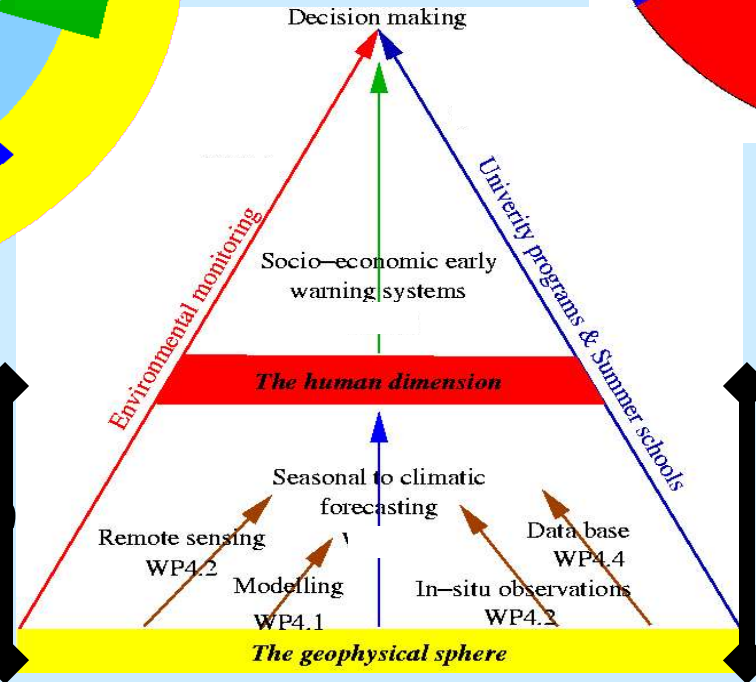
The geophysical sphere



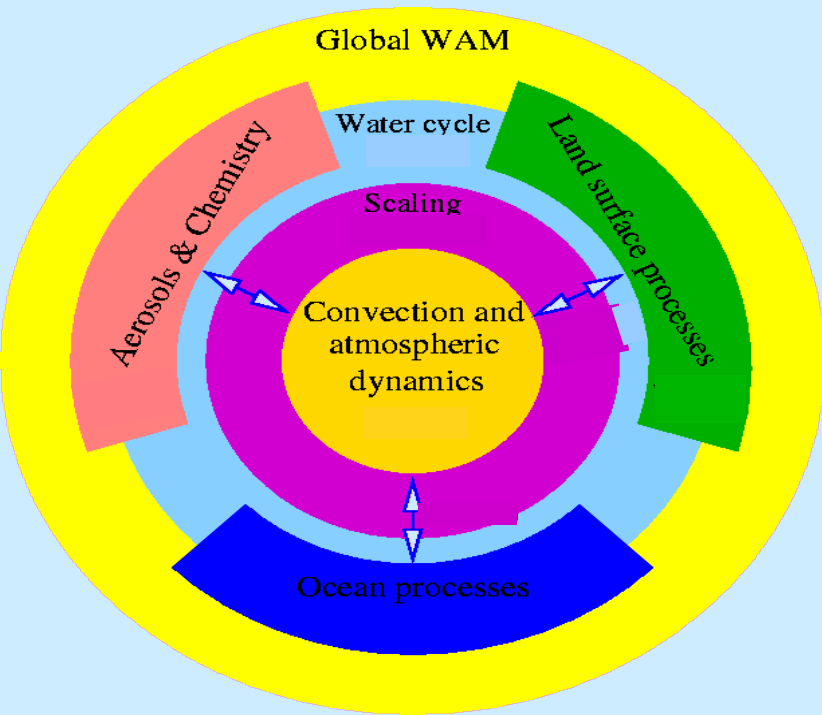
The human dimension



**Tools & Method**



# The geophysical sphere



## **Integrative science:**

- West African Monsoon and the global climate
- The water cycle
- Surface atmosphere feedbacks
- Scaling issues in the West African Monsoon

## **Process studies:**

- Convection and atmospheric processes
- Oceanic Processes
- Physical and biological processes over land-surfaces
- Aerosol and chemical processes in the atmosphere

Process studies are only the first step towards a better understanding and prediction of the African monsoon



# The largest regional precip deficit on last century

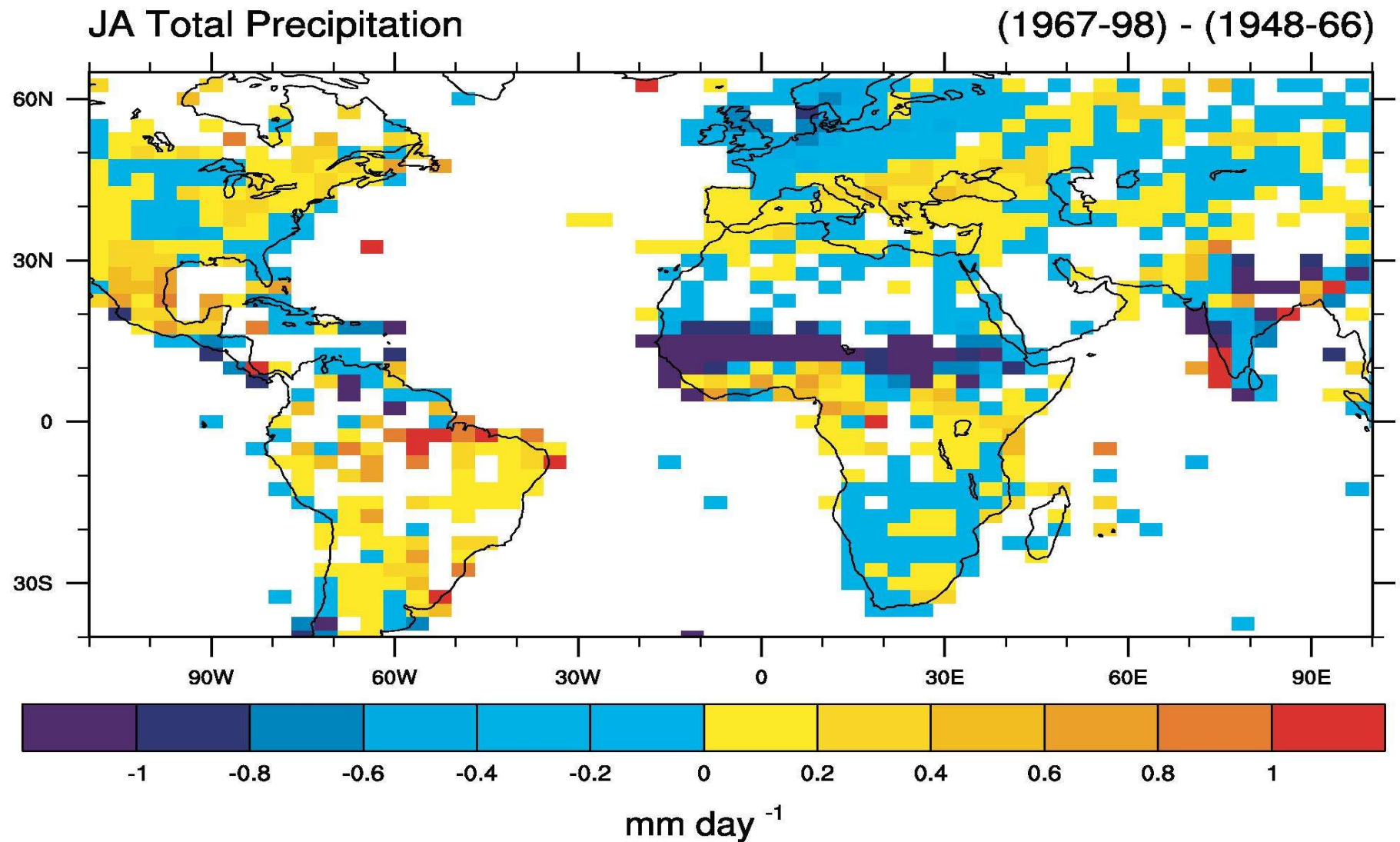


Fig. 3: The change in high summer (July-August) total precipitation (mm day<sup>-1</sup>), 1967-1998 minus 1948-1966, estimated from land surface records ('g55wld0098.dat' constructed and supplied by Dr. Mike Hulme at the Climatic Research Unit, Univ. of East Anglia, Norwich, UK).



# What is AMMA?

## 2.b A multiscale approach

**Global:** 2-way interactions between the WAM & the rest of the globe

(e.g. role of SST patterns on WAM variability; impact of WAM on tropical Atlantic, export of aerosols/chemical species).

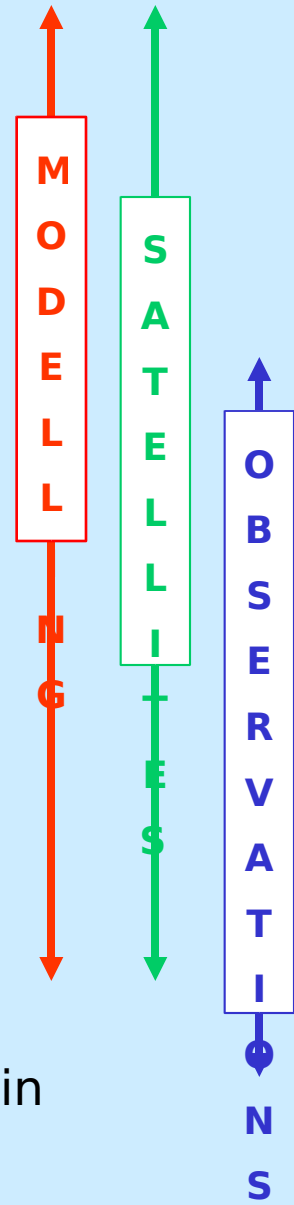
Variability from seasonal to decadal scales

**Regional:** Monsoon Dynamics and Scale Interactions, Continental Water Cycle, Land and Ocean Processes, Aerosols and Chemistry  
Variability from intraseasonal to interannual scales

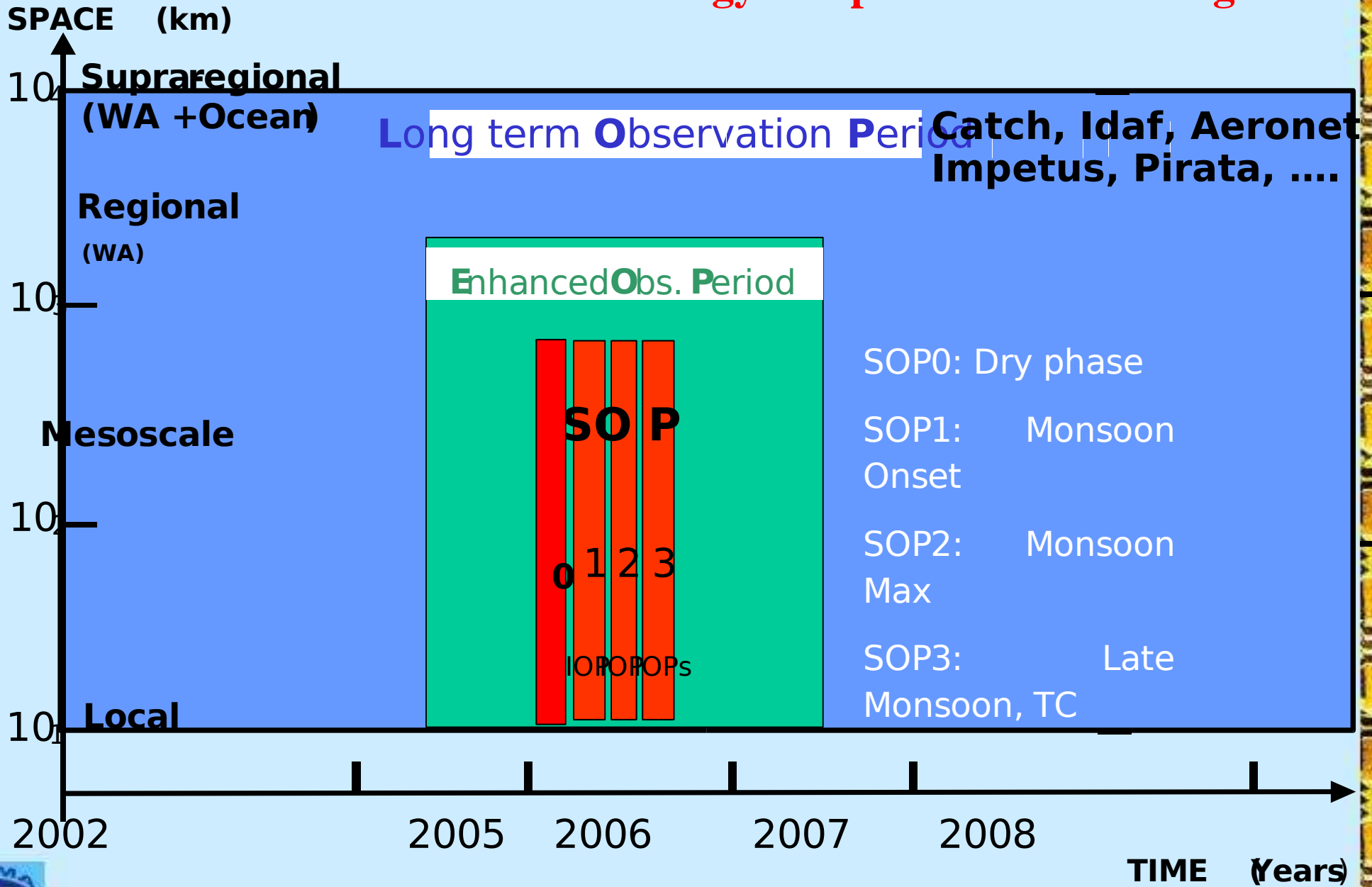
**Mesoscale:** Mesoscale Convective Systems, Vertical transports (Aerosols, Water, chemical species), Tropical Cyclones, Catchments and Vegetation  
Intraseasonal variability

**Sub-meso (<10km):** Hydrological Cycle, Vegetation

Convective rain scale => Coupling scale with hydrology (Sahel) => Main scale of interest for agriculture, ...



# Observation strategy ↙ Space & time nesting



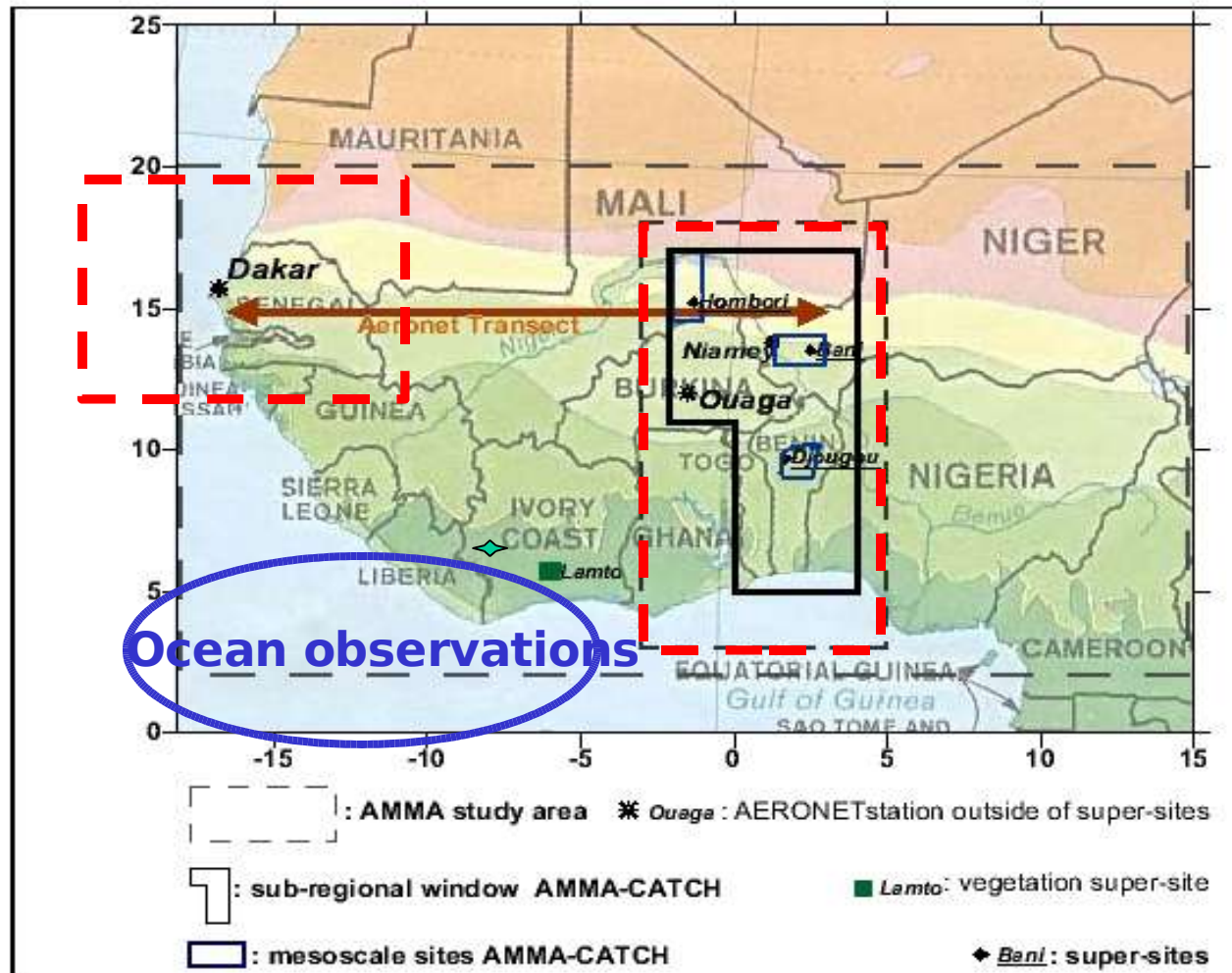
# International Field Program: a strong component of AMMA

- ***The Long Term Observing Period (LOP)*** is concerned with multi-year observations of the coupled atmosphere-ocean-land system to support analysis of interannual variability of the WAM.
- ***The Enhanced Observing Period (EOP, 2005-2007)*** To document over a climatic transect the annual cycle of the surface conditions & atmosphere and to study the surface memory effects at the seasonal scale. A major focus will be on improving radiosounding coverage & establishing surface flux stations (aerosols, chemical species, water, energy) over the continent.
- ***The Special Observing Period (SOP, 2006)*** will provide a multi-scale & multi-process detailed analysis of one monsoon season.

<u>SOP 0</u> Dry phase	(Jan-Feb)
<u>SOP 1</u> Monsoon Onset	(~ 1-30 June)
<u>SOP 2</u> Monsoon Maximum	(~ 1 July - 15 August)
<u>SOP 3</u> Late Monsoon	(~ 15 August - 15 September)



# The Core AMMA Region



# What is AMMA?

## 3) A coordinated international effort

📍 Scientists from more than 25 agencies/institutions in more than 20 countries in Africa, Europe and the US are now involved: Algeria, Belgium, Benin, Burkina Faso, Cameroon, Chad, Congo, Denmark, France, Germany, Ghana, Italy, Ivory Coast, Mali, Morocco, Niger, Nigeria, Senegal, Spain, Togo, UK, US

📍 Endorsement received from WCRP (CLIVAR & GEWEX), GCOS, ...

📍 Links are developing with THORPEX, IGBP, ...

📍 Funding supports

❖ Commitments of French & UK agencies to fund

★ France: Soundings, aircrafts, ground stations (aerosols, chemical species, water, ...), lidar, Doppler radar, ship, ..


★ UK: Soundings, aircraft, surface stations, ...

❖ US (DoE, NOAA, NSF, NASA) & German current requests for additional support

❖ EU AMMA-IP consortium (Funded project running on 2005-2010)



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