

AMMA PROJECT, WEST AFRICA: OVERVIEW AND BENEFITS



by

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**GHP Meeting, 17 – 19 November, 2015,
Entebbe, Uganda**

OUTLINE OF PRESENTATION

- Introduction: The AMMA Project in West Africa
 - ✓ *Aims and Objectives*
- Participation of West African Institutions
- Role of KNUST in the AMMA Project
- Benefits to the West African Community
 - ✓ *Other Projects resulting from AMMA*
- Some Results of Hydromet Studies
- Conclusion

Introduction: The AMMA Project in West Africa

- The AMMA project, a **French Government initiative**, was launched in Niamey, Niger in Feb 2002.
- The project completed its first phase in 2010 during which substantial progress was made in the research of the West Africa monsoon system including how the research relates to societal applications
- The AMMA project succeeded in building an international network (around 500 researchers including 250 Africans).

Introduction (contd)

The aims and objectives of AMMA 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 variability of the WAM to issues of health, water resources, food security and demography for West African nations and defining and implementing relevant monitoring and prediction strategies; and
- To ensure that the multidisciplinary research carried out in AMMA is effectively integrated with prediction and decision making activity.

Participation of West African Institutions

- From 2007 – 2009, the EU 7th Framework Programme (FP7) supported additional West African countries (AMMA-TTC) to carry out research on impact of climate variability and change on agriculture, water resources and health.
- This initiative supported an important part of the “Impact and Applications” studies and helped consolidate the AMMA-EU project.
- 20 African national research institutions and operational centres were funded by the EU for impact studies.

Role of KNUST in the AMMA Project

Climate Impacts on Health:

Investigation of the impacts of climate variability on malaria incidence and prevalence in the forest zone of Ghana

Climate drivers of vector-borne diseases:

- Impact of climate variables on malaria
- Identify malaria vectors and habitats in the study area
- Identify and map possible malaria risk areas
- Develop malaria early warning system

Benefits to the West African Community: Capacity Building and Training

Networking and Capacity Building

- The AMMA project has established a large and active West African community working on AMMA science, known as AMMANET.
- AMMA has been successful at motivating a very large international community to work on the West African climate and its interactions with the environment, the water cycle and the socio-economic factors controlling the life of the local population.
- AMMA thus encompasses both training and capacity building and application to bring research at the service of development. A number of African students completed their masters and PhD programmes within the framework of the AMMA project.

Benefits of AMMA Project (contd)

AMMA Workshops and Summer Schools

As part of capacity building and training, a number of training programmes and summer schools were successfully organized for scientists, researchers, and masters and PhD students.



Benefits of AMMA Project(contd)

- AMMA Summer School on African Monsoon, September 1-12, 2003, Lannemezan, France
- AMMA Professional training workshop for forecasters, June 2005, Niamey, Niger
- AMMA Training workshop for agricultural modelling, December 2005, Thies, Senegal
- AMMA Radio-sounding training in various places, 2006
- AMMA Summer School - International Summer School in Tropical Meteorology and Climate, co-funded by the British Council, July 21 – August 1, 2008, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana
- AMMA Summer School on Climate Change and Water Resources, November 9 – 20, 2009, Universite Cheikh Anta Diop, Dakar, Senegal
- AMMA Summer School on Weather and Climate Forecasting July 5 – August 6, 2010 at KNUST co-funded by ICTP

Benefits of AMMA Project (contd)

The AMMA database and the associated online tools have been fully developed and are managed by two teams in France (IPSL Database Centre, Paris and OMP, Toulouse). The complete system has been mirrored in Africa at AGHRYMET Regional Centre in Niamey, Niger and is operational there since January, 2009. Users can now access metadata and request data through one or the other of two equivalent gateways: <http://database.amma-international.org> or <http://amma.agrhymet.ne>

Introduction of Degree Programmes in Meteorology and Climate Science at KNUST, Kumasi, Ghana

For the first time in Ghana:

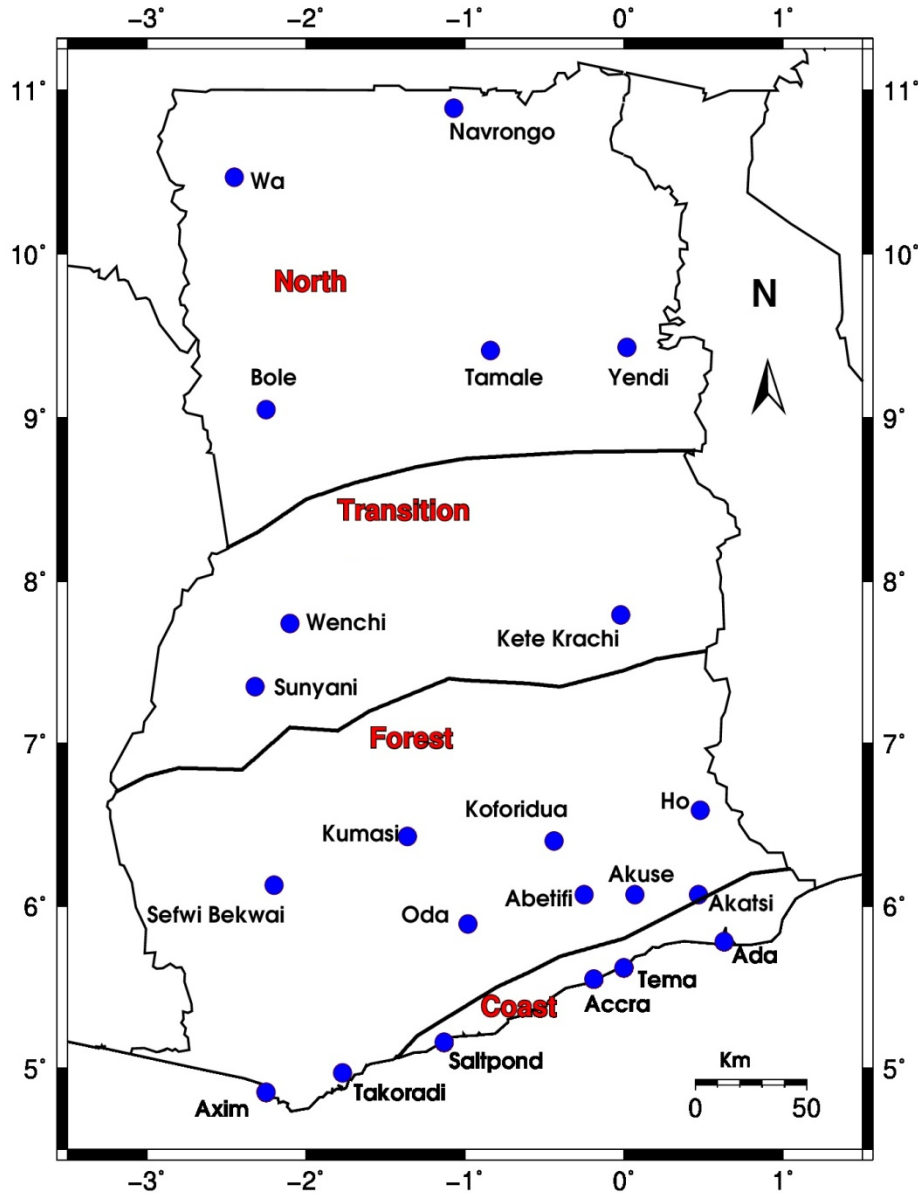
Establishment of Bachelors and Masters degree programmes in Meteorology and Climate Science at KNUST in 2008 to train meteorologists and climate scientists to enhance the capacity of the Ghana Meteorological Agency (GMet), the aviation industry, the public sector and also the University in teaching and research.

Other Projects resulting from AMMA

- **The QWeCI Project** – Quantifying Weather and Climate Impacts (QWeCI) on Health in Developing Countries; 2010 –2013; funded by the EU; 7 European Institutions, 7 African Institutions; coordinated by Univ. of Liverpool.
- **The DACCIWA project** – Dynamics-Aerosol-Chemistry-Cloud-Interactions in West Africa; 2014 – 2018; funded by the EU; 14 European Institutions, 6 African Institutions; coordinated by KIT, Germany.
- **The WASCAL Project** – West African Climate Service Centre for Adapted Land Use – German funded project

**SOME HYDROMET EXPERIMENTS PERFORMED
UNDER THE VARIOUS PROJECTS RESULTING
FROM AMMA**

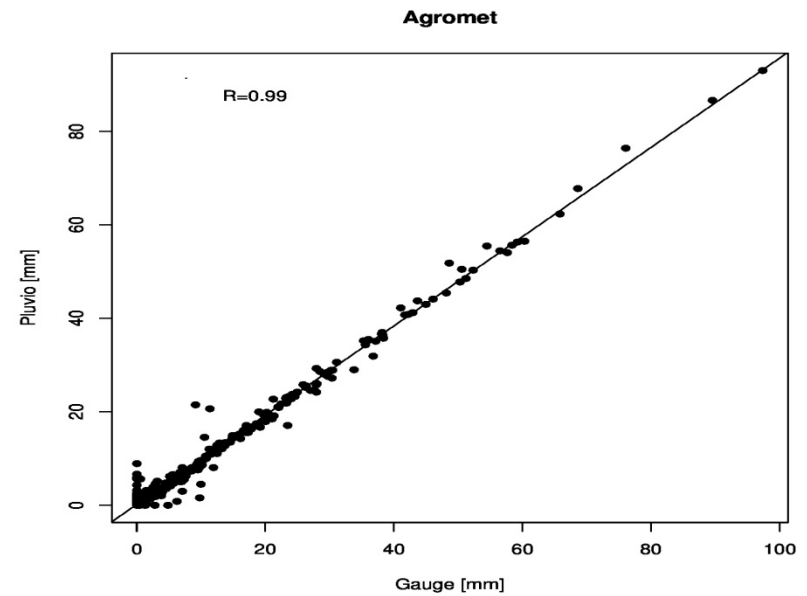
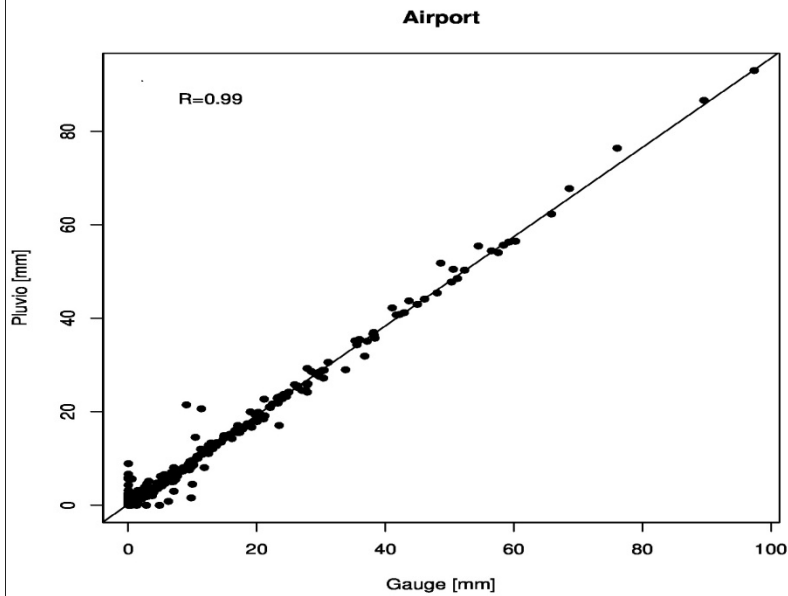
SYNOPTIC STATIONS IN GHANA



QWeCI Equipment



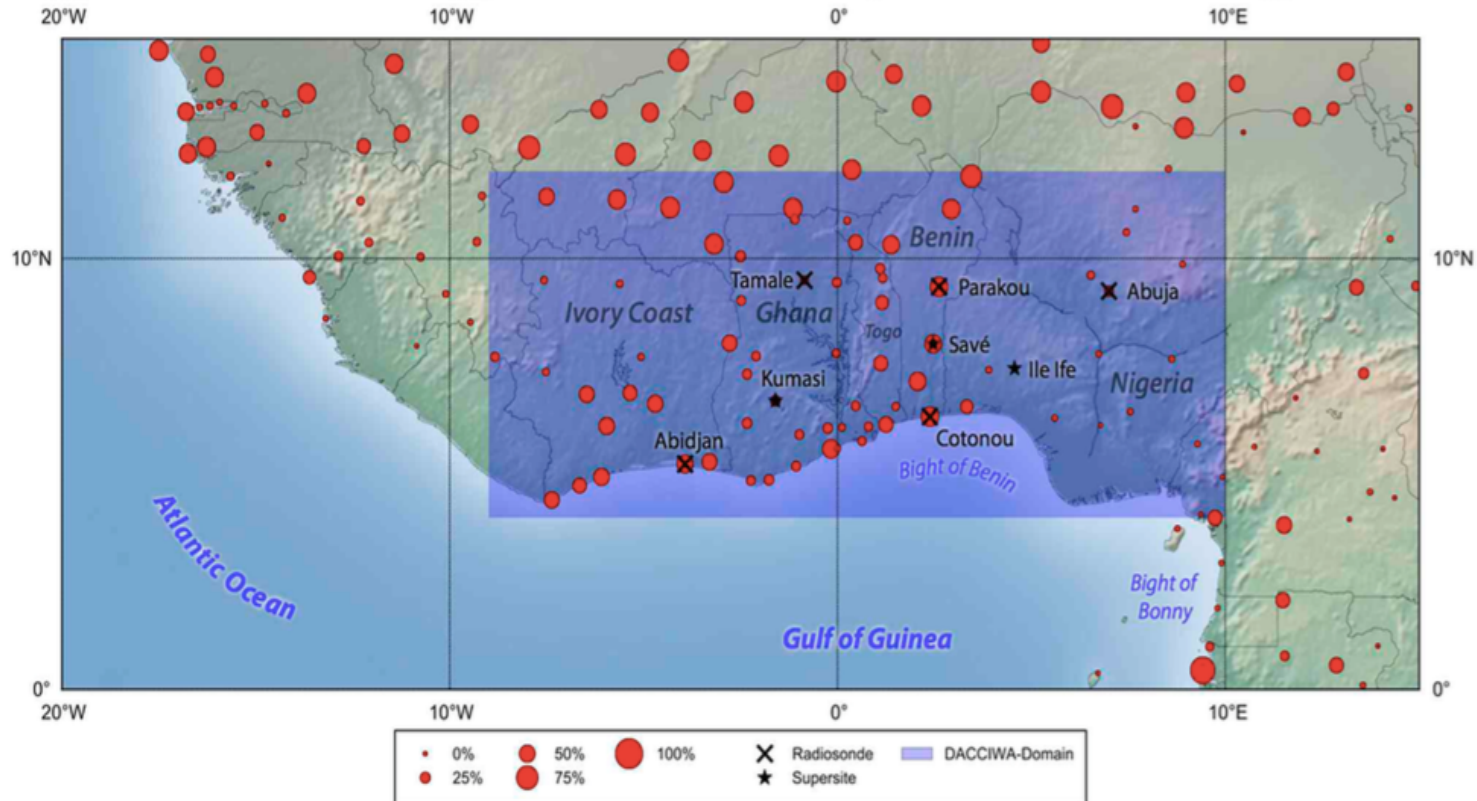
OTT pluviometer rain gauges obtained from the QWeCI project.



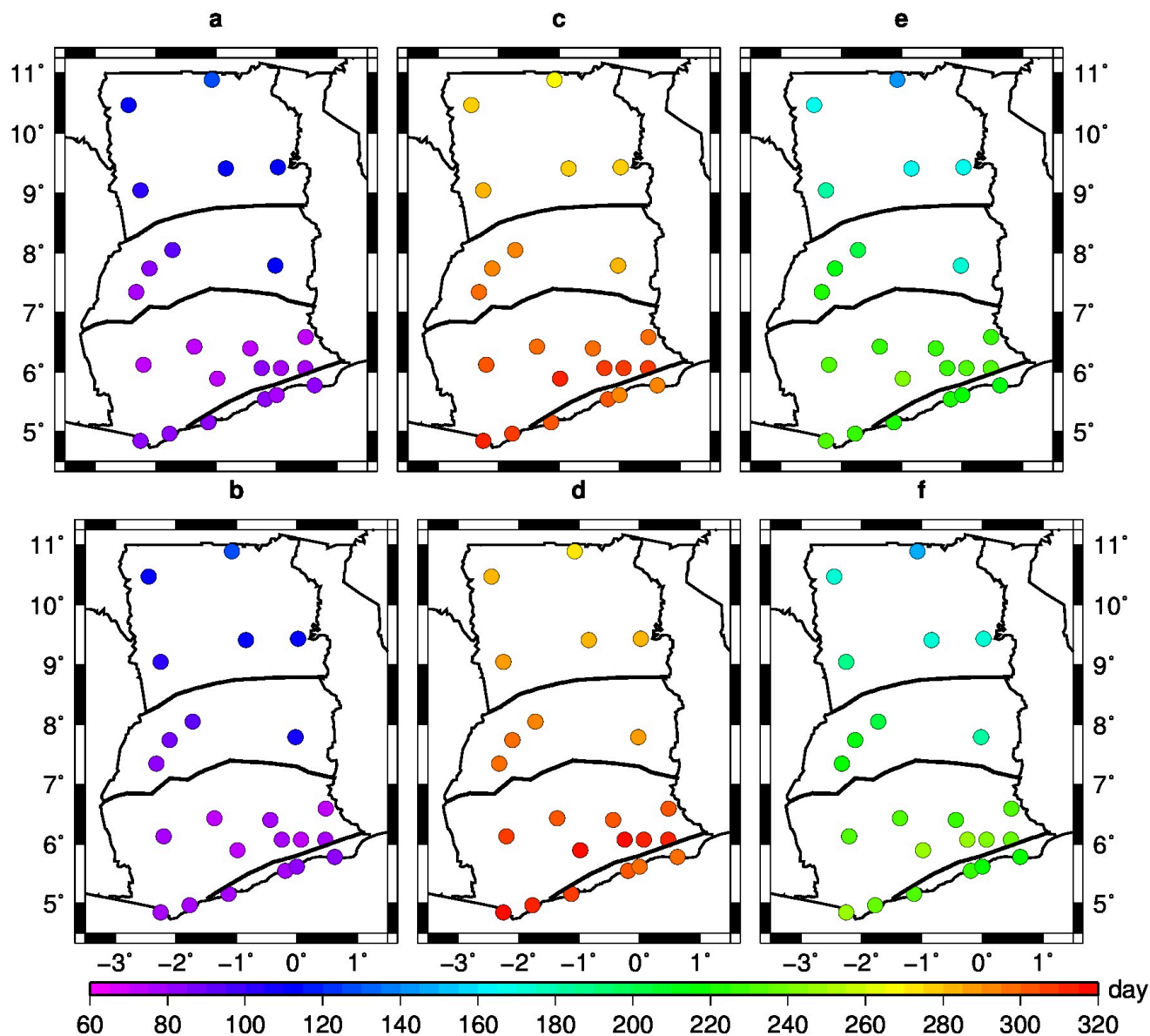
Validation of OTT rainfall with GMeT's rainfall data.

DACCIWA PROJECT

DACCIWA is a continuation of the AMMA project, but with a focus on Southern West Africa (SWA)



Overview of the DACCIWA study area. Indicated are supersites and planned radiosonde stations (black markers) and synoptic weather stations (red dots)



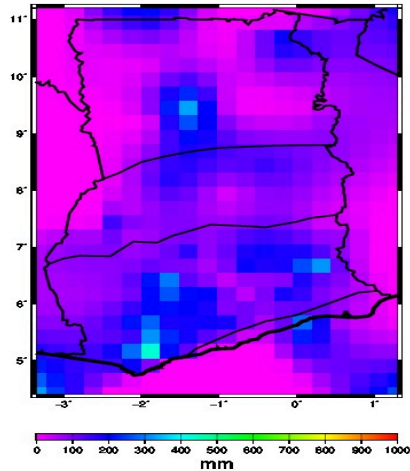
Rainfall Onset, Cessation and Length of the Rainy Season in the four (4) agro-ecological zones over Ghana (Amekudzi et al., 2015)

Rainfall Onset Determination by two methods (commulative rainy days and commulative rainfall amount)

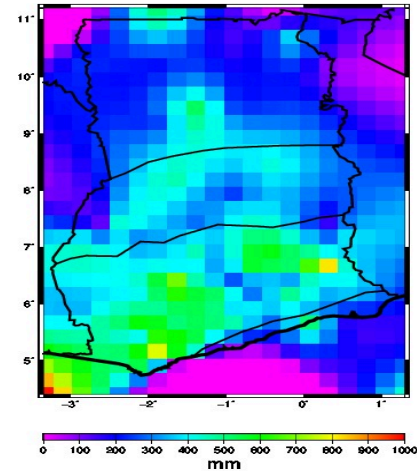
Table 1: Summary of rainfall onset days/dates for the GMet stations.

Station	Onset Days (Rainy Days)	Date	Onset Days (Rainfall Amount)	Date
Sunyani	80 ± 5	21 March	75 ± 5	16 March
Abetifi	75 ± 5	16 March	70 ± 5	11 March
Akuse	70 ± 5	11 March	75 ± 5	21 March
Axim	75 ± 7	16 March	80 ± 7	21 March
Ho	70 ± 5	11 March	70 ± 5	11 March
Koforidua	75 ± 5	16 March	80 ± 5	21 March
Kumasi	70 ± 5	11 March	70 ± 5	11 March
Akim-Oda	70 ± 5	11 March	70 ± 5	11 March
Sefwi Bekwai	75 ± 5	16 March	70 ± 5	11 March
Takoradi	75 ± 7	16 March	80 ± 7	21 March
Accra	75 ± 7	16 March	80 ± 7	21 March
Ada	80 ± 7	21 March	80 ± 7	21 March
Salt pond	75 ± 7	16 March	80 ± 7	21 March
Akatsi	75 ± 5	16 March	75 ± 5	16 March
Bole	100 ± 5	10 April	100 ± 5	10 April
Kete-Krachi	105 ± 5	15 April	110 ± 5	20 April
Navrongo	125 ± 5	5 May	125 ± 5	5 May
Wa	110 ± 5	20 April	110 ± 5	20 April
Wenchi	85 ± 5	26 March	80 ± 5	21 March
Yendi	110 ± 5	20 April	110 ± 5	20 April
Kintampo	90 ± 5	31 March	90 ± 5	31 March
Tema	80 ± 7	21 March	75 ± 7	16 March
Tamale	110 ± 5	20 April	110 ± 5	20 April

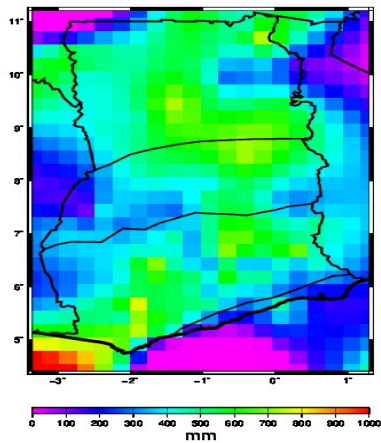
Development of High Spatial Resolution Rainfall Climatology for Ghana (1980 -2010) using 113 stations



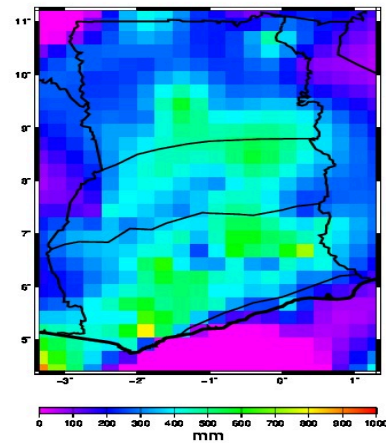
(a) DJF



(b) MAM



(c) JJA



(d) SON

Rainfall Seasonal Mean and Annual Total in the Four Agro-Ecological Zones

Table 1: Mean seasonal and annual total rainfall in the four agro-ecological zones.

Period	Rainfall (mm)			
	North	Transition	Forest	Coast
December-January-February (DJF)	76.8	138.5	190.1	100.9
March-April-May (MAM)	322.7	432.9	544.4	398.1
June-July-August (JJA)	529.0	376.4	380.4	175.1
September-October-November (SON)	135.2	213.5	289.9	183.5
Annual	1063.7	1161.3	1404.8	857.6

Lessons Learnt from Hydromet Experiments

- ❖ Climatic variables play a key role in malaria transmission
- ❖ The need to establish a dense rain gauge network in the forest zone of Ghana to serve as a useful database for climate-impact studies; this already ongoing.
- ❖ Highly variable onsets have been detected across the four agro-ecological zones of Ghana
- ❖ A countrywide rainfall climatology has been developed at a high spatial resolution 0.25×0.25 degrees



Optically-sensed
Rain gauge

20 rain gauges mounted
within an area of
approximately 150 km²

DACCIWA Project: creation of
dense rain gauge network
over the Forest Zone of
Ghana.



Power source and data logger

Conclusion

- AMMA is one of the atmospheric and climate research activities that has helped develop capacity for African institutions.
- Some of its achievements are:
 - ❑ AMMA has brought together a critical mass of scientists and meteorologists to improve our ability to forecast weather and climate in the region
 - ❑ It has involved local scientists and students in its successful field campaigns
 - ❑ AMMA has demonstrated that the radio-sounding network in the region can work as efficiently as elsewhere
 - ❑ Considerable understanding of the meteorological processes over the region has been achieved by AMMA
 - ❑ Network and collaboration between Anglophone and Francophone African countries has been enhanced by AMMA

THANK YOU