

AMMA-CATCH observatory: a portal for regionalizing eco-hydro-climatic observations in West Africa

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Observatoire **éco-hydro-météo**
en Afrique de l'Ouest



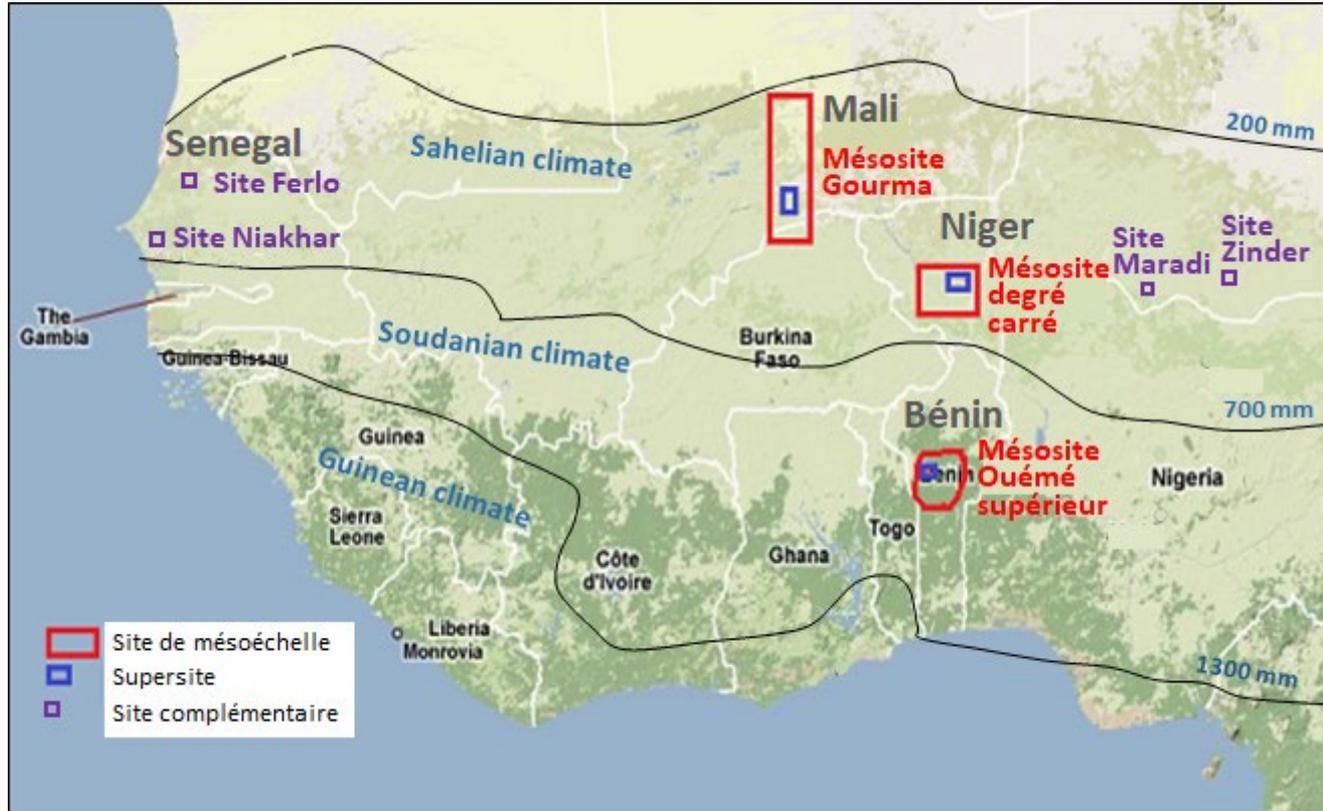
AMMA-CATCH: 30 years of hydro-Meteorological observations in West Africa

AMMA-CATCH



Survey of global changes impacts on the continental water cycle
and on the Critical zone processes in West Africa

Multi-scale sampling of spatial variability



OSUG



OREM3
OBSERVATOIRE DE RECHERCHE
MONTPELLERIEN DE CENVIRONNEMENT

Observatoire
Midi-Pyrénées
OMP

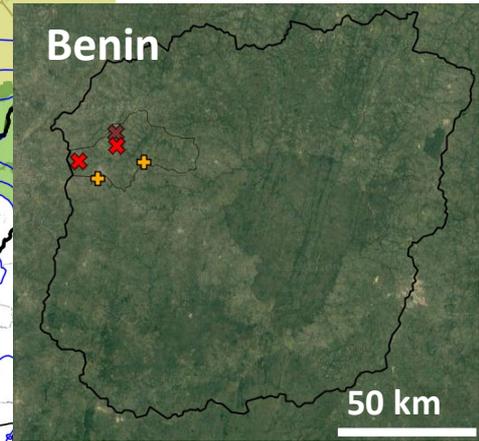
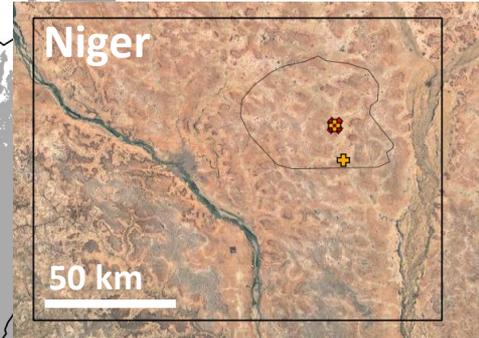
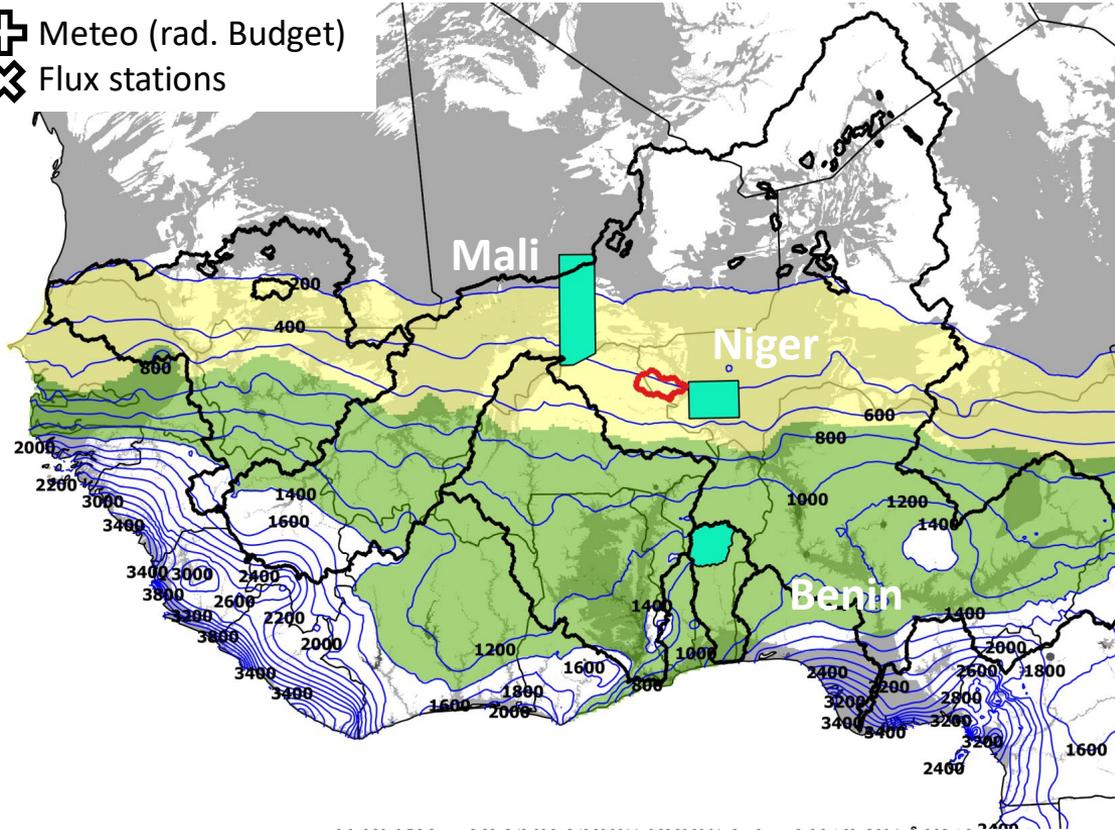
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I – THE AMMA-CATCH OBSERVATORY

the AMMA-CATCH observation network



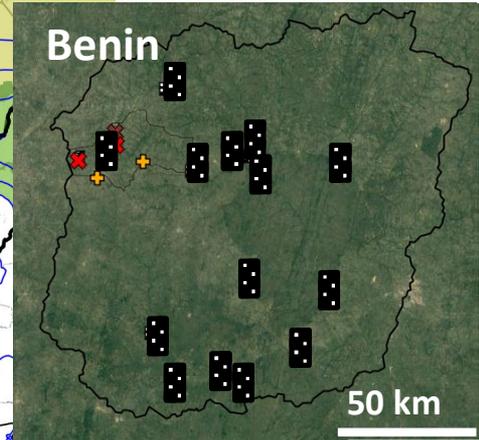
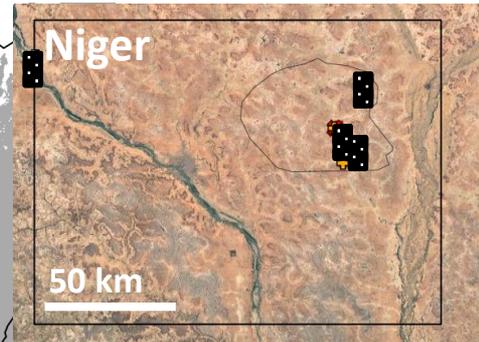
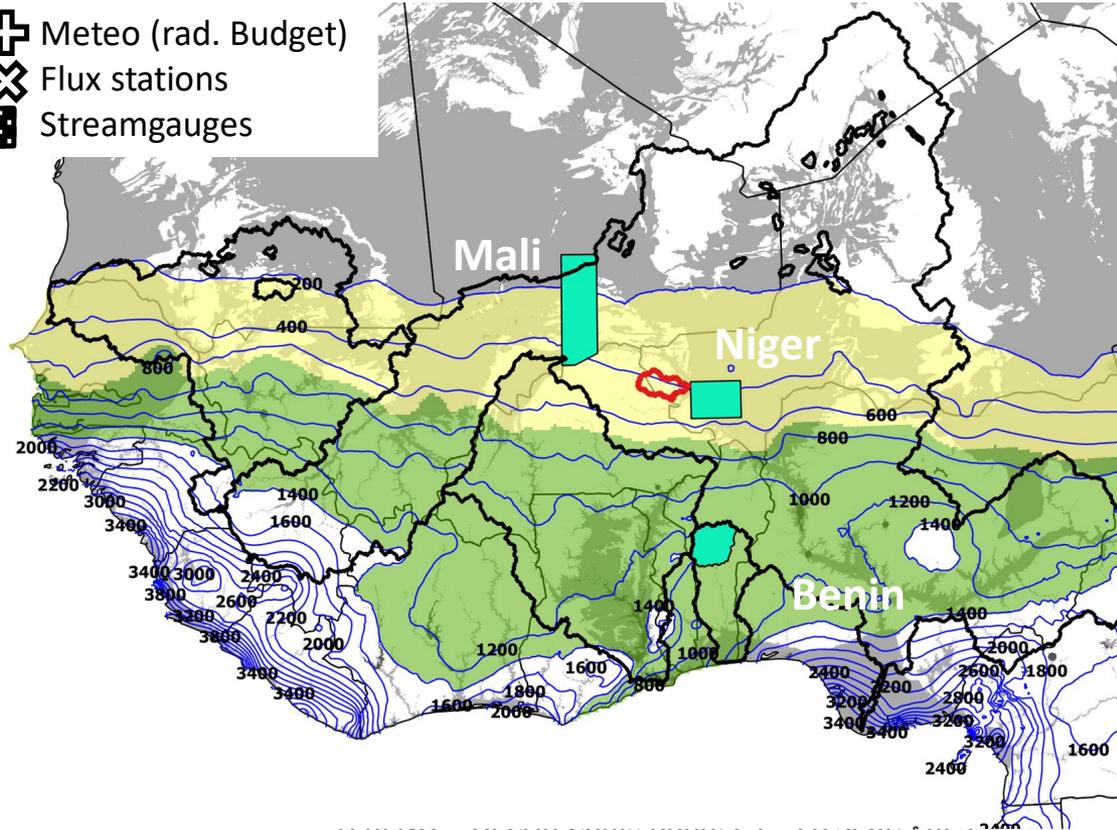
- ⊕ Meteo (rad. Budget)
- ⊗ Flux stations



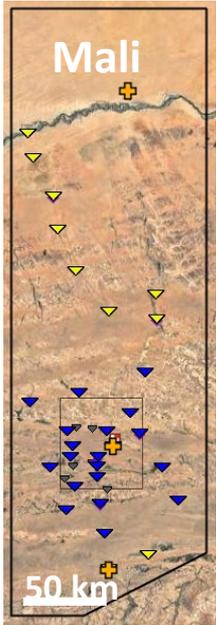
the AMMA-CATCH observation network



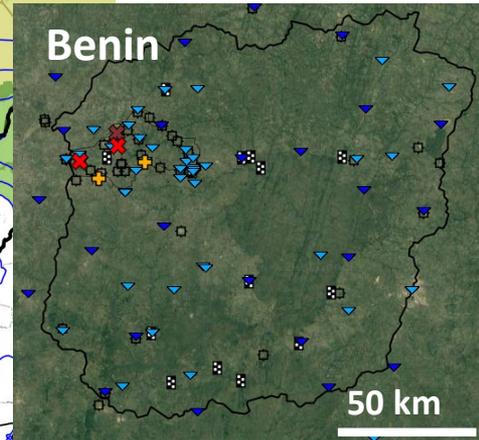
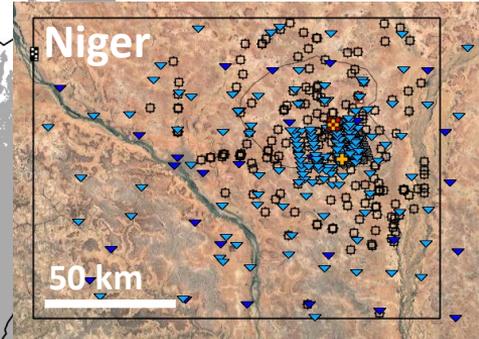
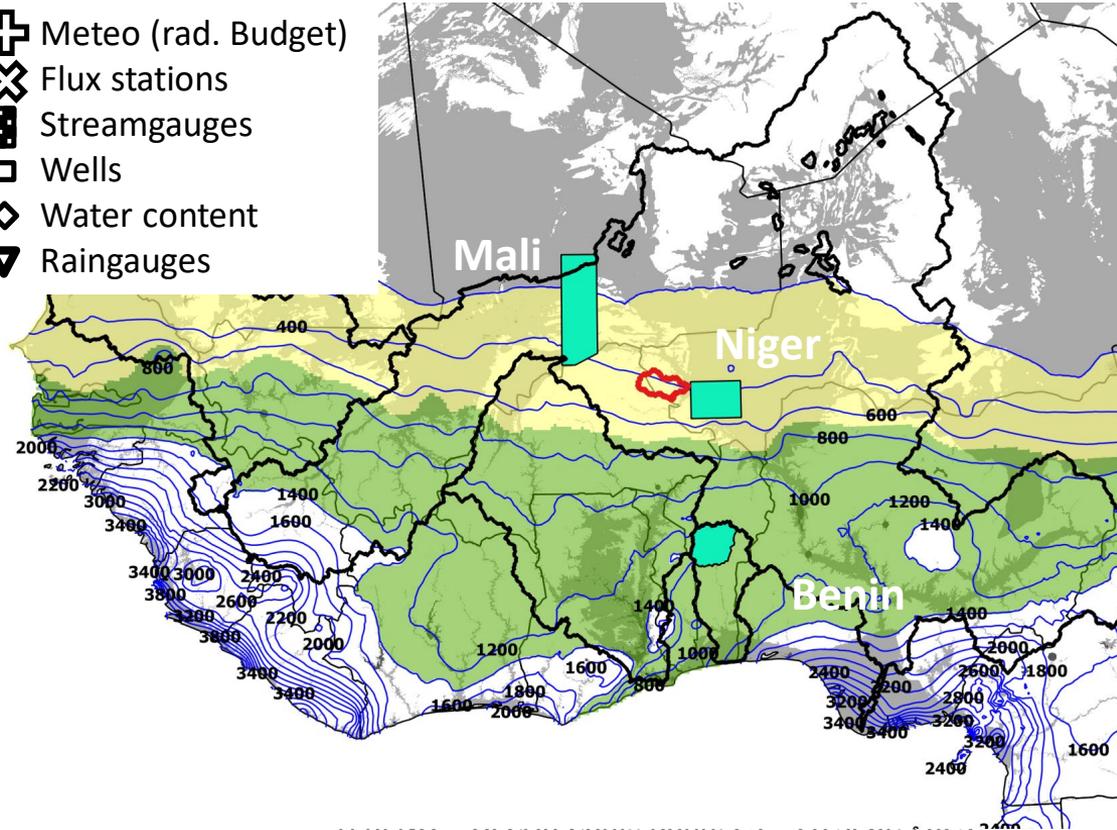
- ⊕ Meteo (rad. Budget)
- ⊗ Flux stations
- ▭ Streamgauges



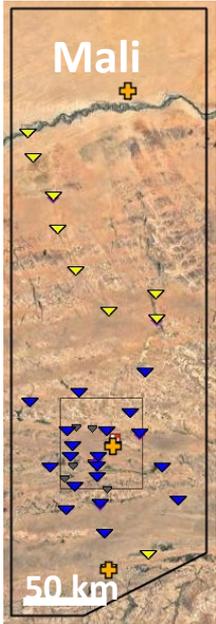
the AMMA-CATCH observation network



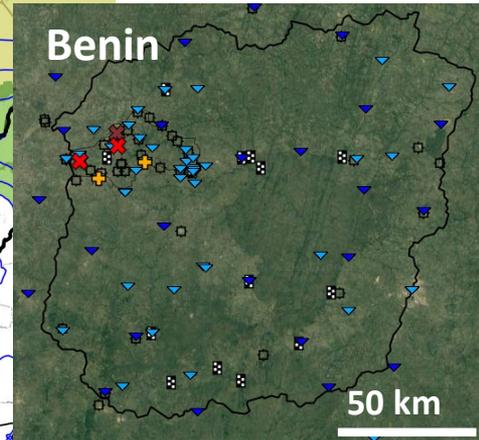
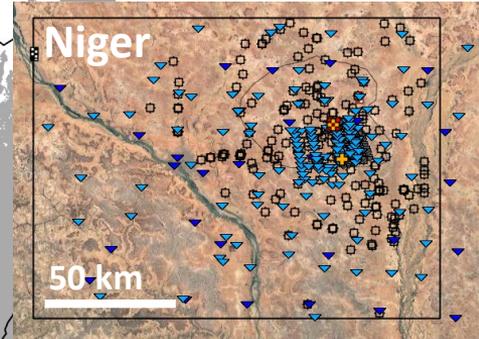
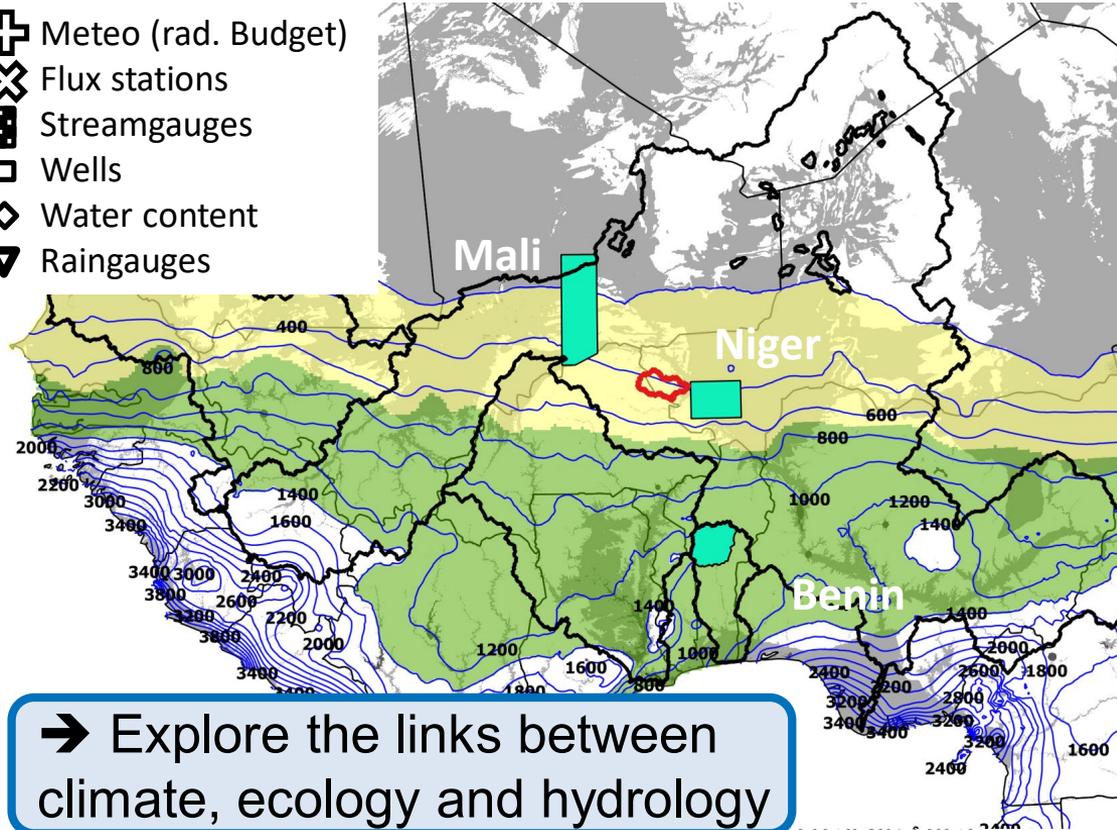
- ⊕ Meteo (rad. Budget)
- ⊗ Flux stations
- ▣ Streamgauges
- Wells
- ◇ Water content
- ▼ Raingauges



the AMMA-CATCH observation network



- ⊕ Meteo (rad. Budget)
- ⊗ Flux stations
- ▣ Streamgauges
- Wells
- ◇ Water content
- ▼ Raingauges



➔ Explore the links between climate, ecology and hydrology

AMMA-CATCH



AMMA-CATCH
Analyse Multidisciplinaire de la Mousouon Africaine - Couplage de l'Atmosphère Tropicale et du Cycle Hydrologique

PRESENTATION SITES OBSERVATIONS PUBLICATIONS ANIMATION

DOI

Since 2016, the **observatory**, its **sites** and all AMMA-CATCH **datasets** have a DOI.

Object	Related DOI
AMMA-CATCH observatory	"AMMA-CATCH : a hydrological, meteorological and ecological observatory on West Africa" doi : 10.17178/AMMA-CATCH.all
Sites	
Mali Mesosite	"Gourma mesoscale site (30 000 km2) in the Sahelian pastoral zone, Mali" doi : 10.17178/AMMA-CATCH.mali
Niger Mesosite	"Niamey square degree mesoscale site (16 000 km2) in the cultivated Sahelian zone, Niger" doi : 10.17178/AMMA-CATCH.niger
Benin Mesosite	"Upper Oueme mesoscale site (14 000 km2) in the sudanian climate zone, Benin" doi : 10.17178/AMMA-CATCH.benin
Senegal complementary sites	"Ferlo and Niakhar complementary sites in the Sahelian pastoral zone, Senegal" doi : 10.17178/AMMA-CATCH.senegal
Data	
Dataset	sorted by country
Dataset	sorted by type of measurement

Legals | Consent | Contact | Site map | © OSUG - 2022

Service National d'Observations de long terme, part of OZCAR Network

Open data : Licence CC By 4.0 39 DOI + DOI for sites + DOI AMMA-CATCH

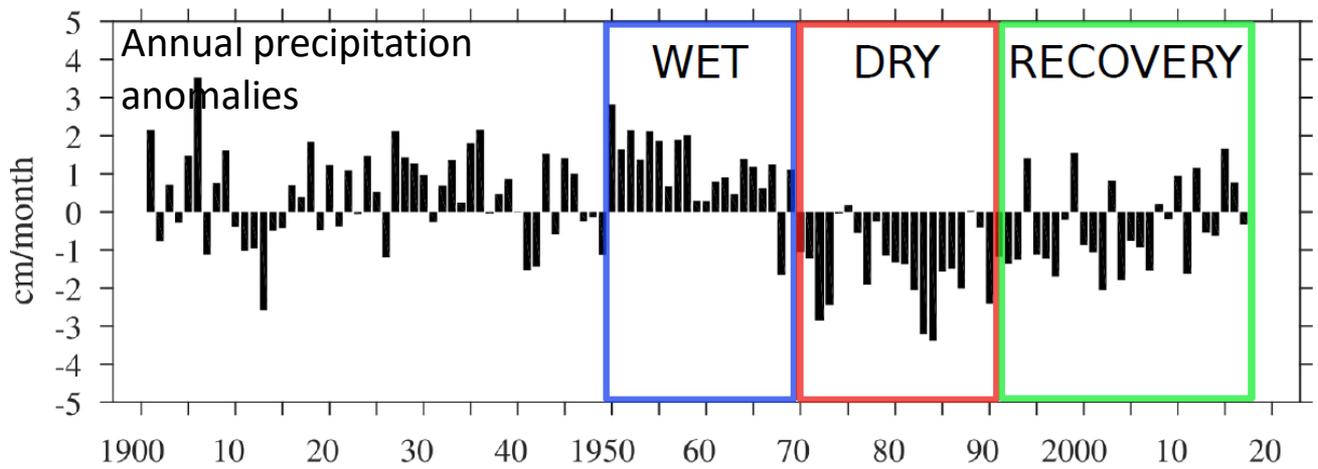
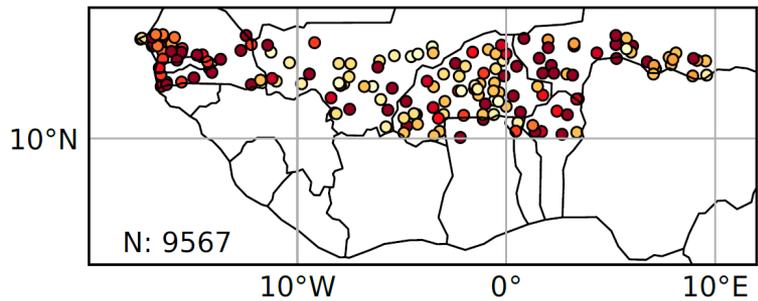
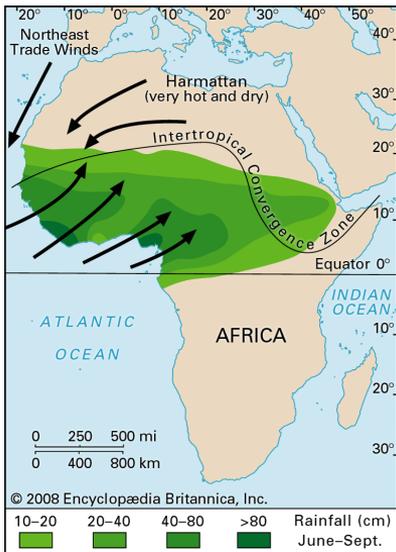
Open Science : No restriction for NC Research

<http://www.amma-catch.org>

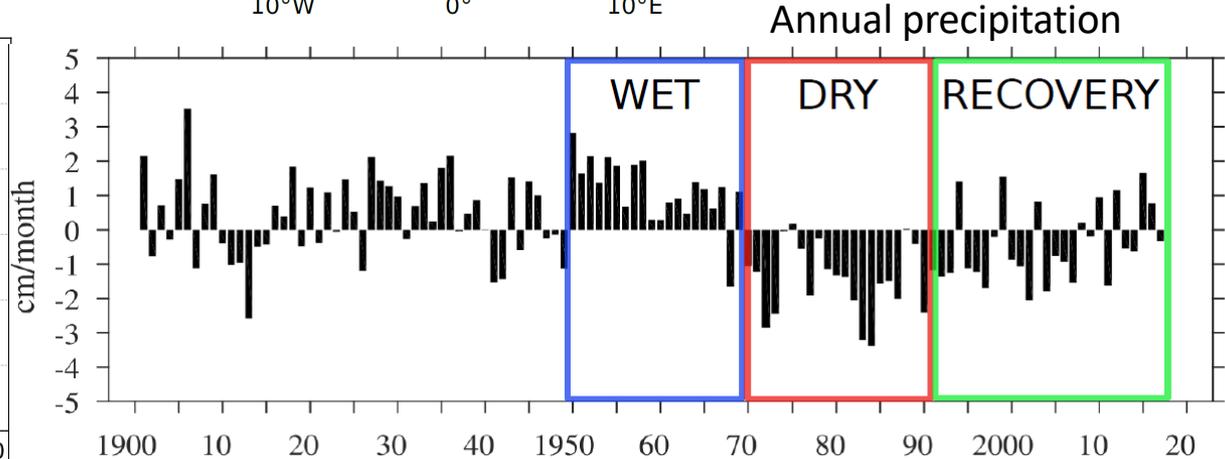
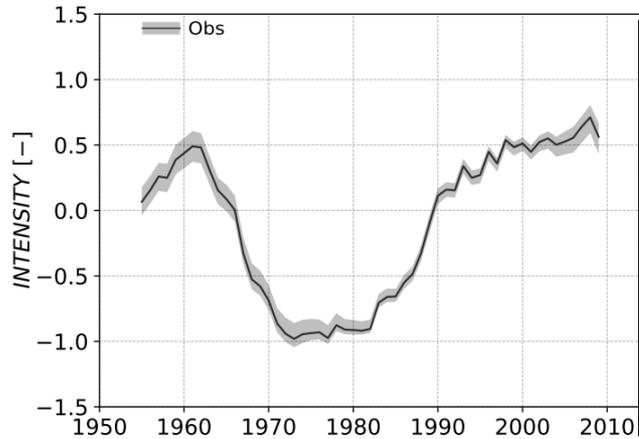
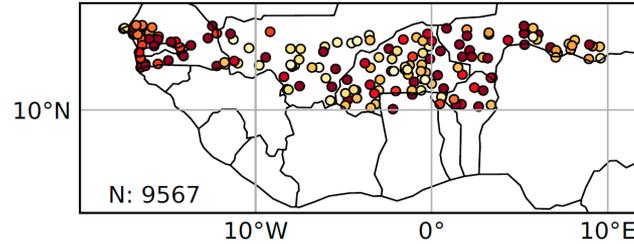


II – A STEPPING STONE FOR DATA AGREGATION AND REGIONAL STUDIES

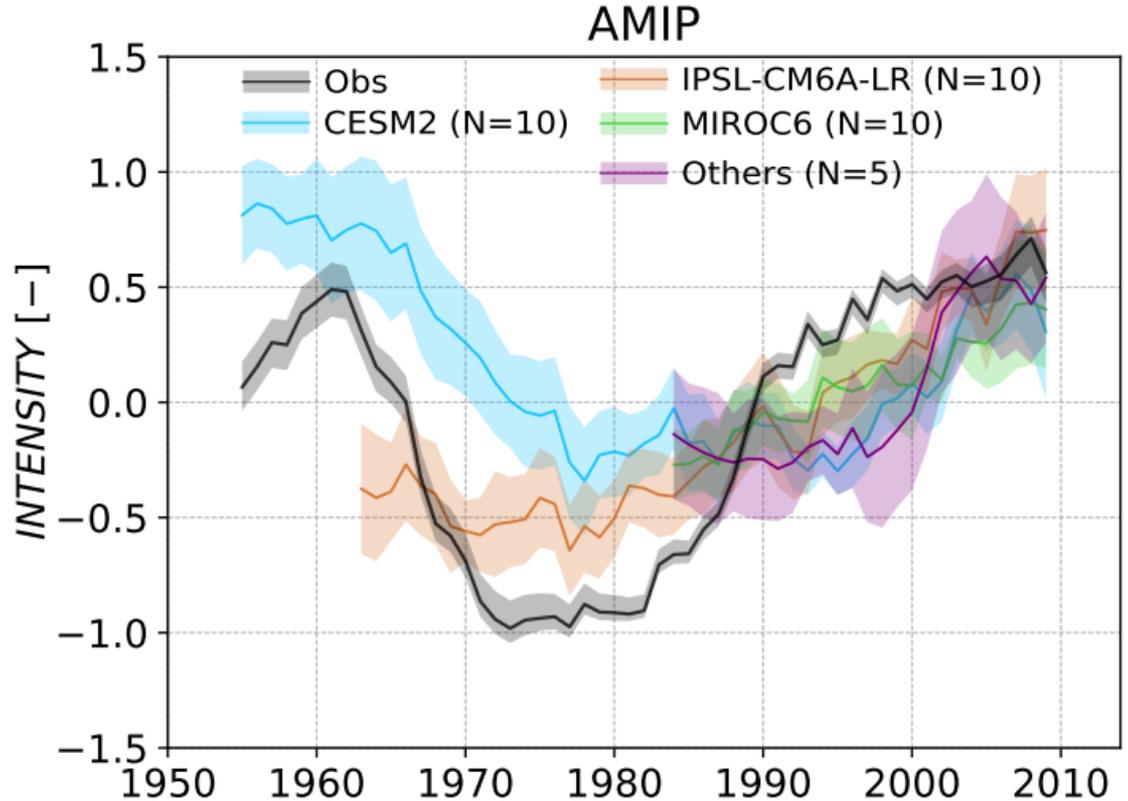
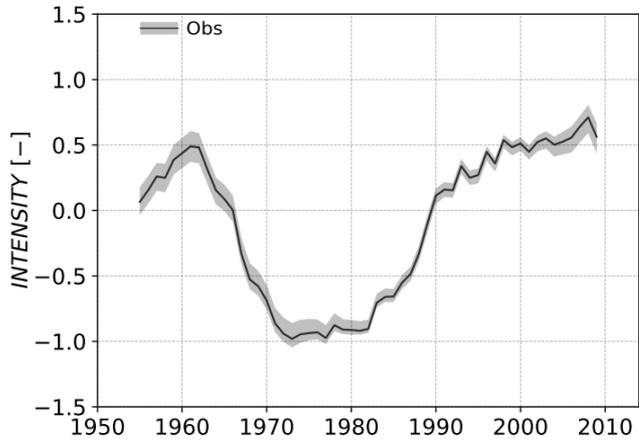
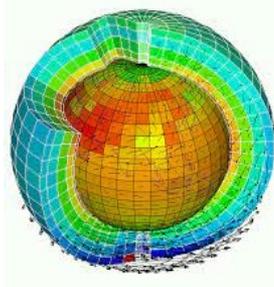
Hydro-climatic trends



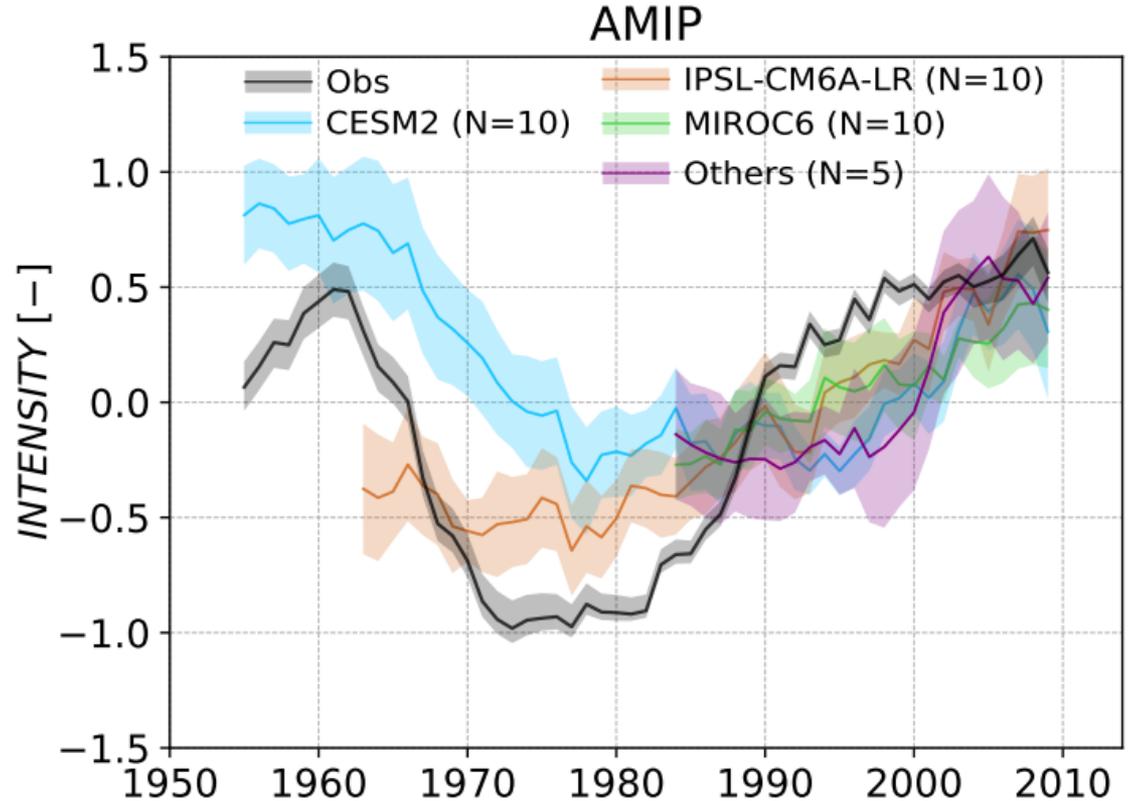
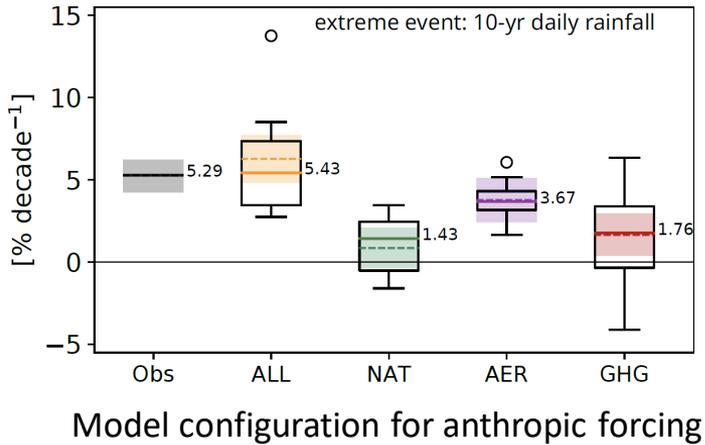
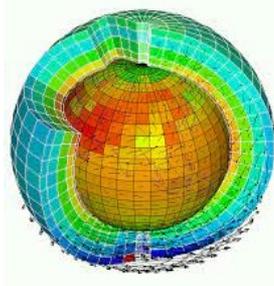
Observed intensity trends



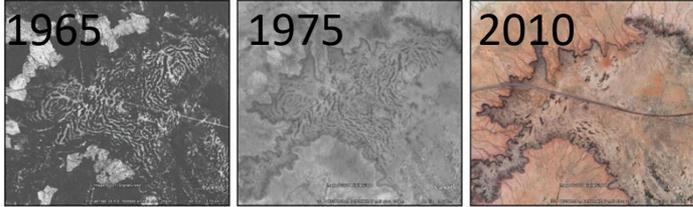
Observed and simulated intensity trends



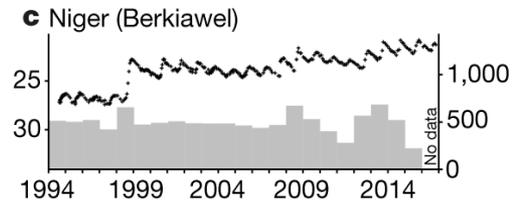
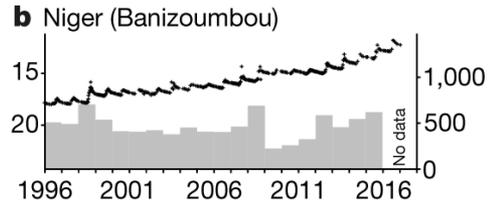
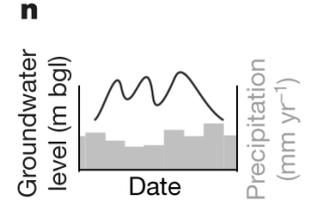
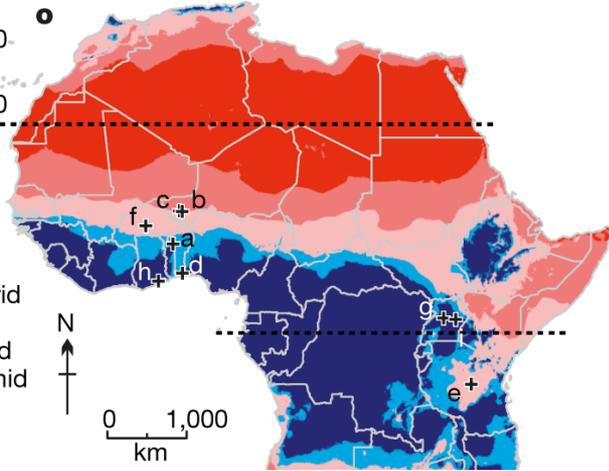
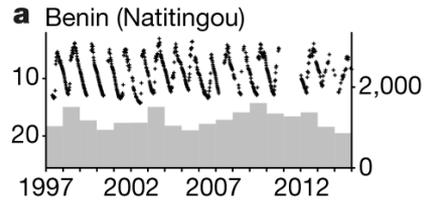
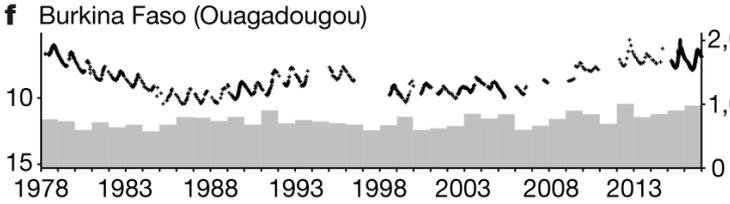
Climatic extreme trend attribution



The Sahelian Paradox

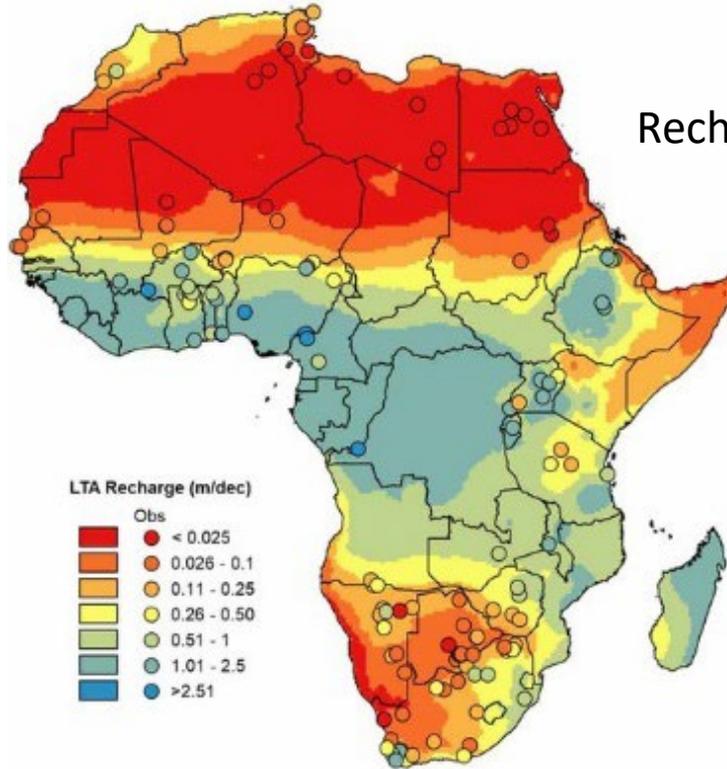


Woody vegetation clearance
 → more runoff → more focused recharge
 → Water table rise

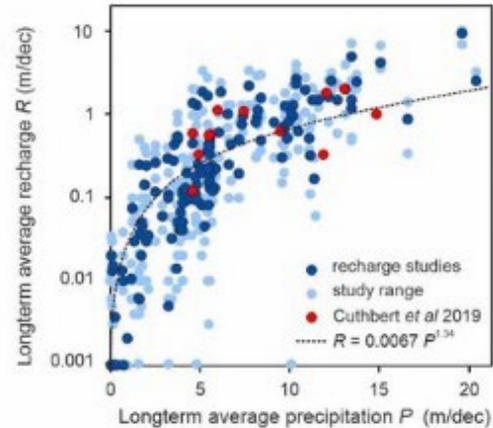


Favreau et al. 2012
 Cuthbert et al. 2018

Part of larger networks



Recharge map for Africa



Woody vegetation in the Sahel

Tucker et al. 2023

Brandt et al. 2016a,b

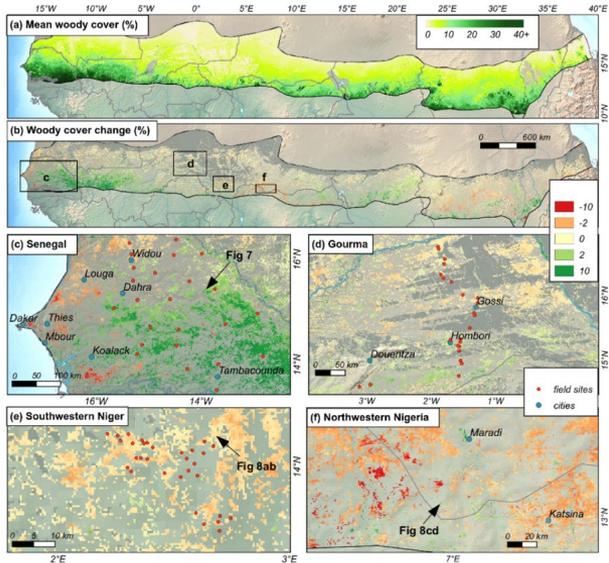
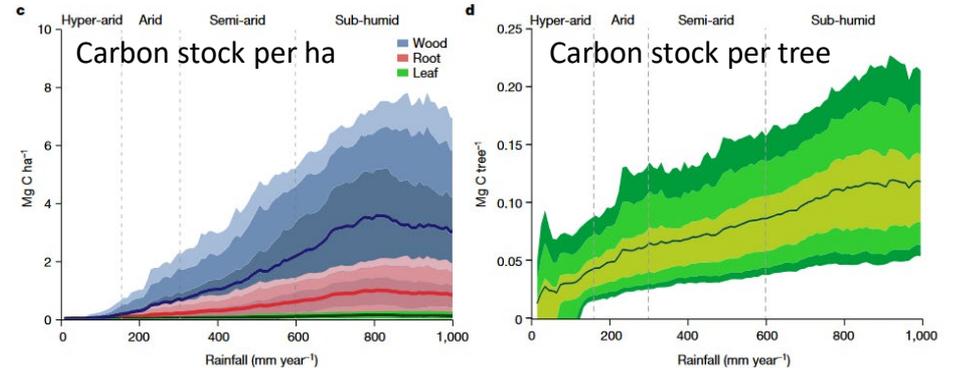
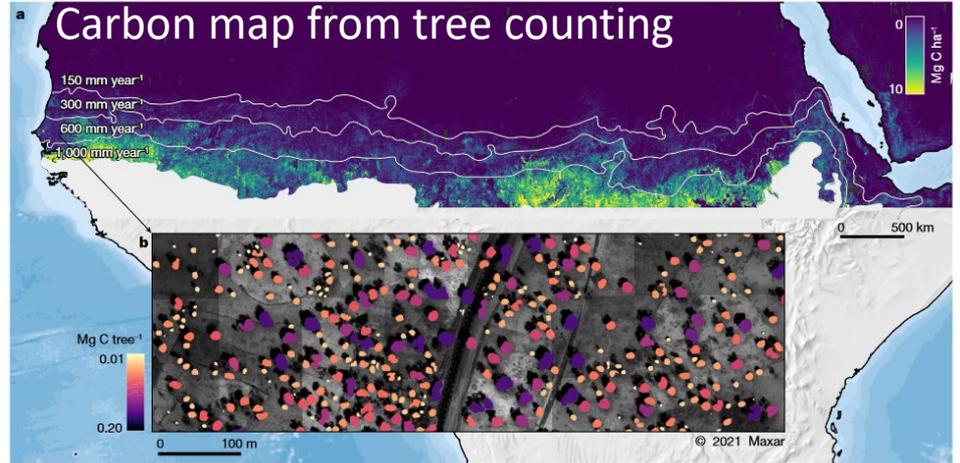


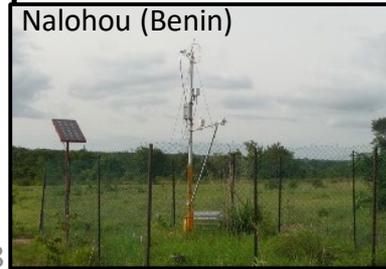
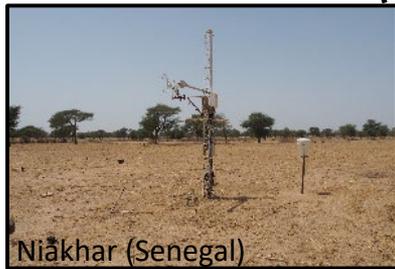
Fig. 5. Predicted woody cover changes (2000–2014) in the Sahel: (a) Mean woody cover, (b) changes of woody cover in the Sahel belt show a heterogeneous patterns, (c) in Senegal the has positive trends and the west negative trends, (d) in the Gourma (Mali) trends are very subtle, (e) in southwestern Niger negative trends are limited to tiger bush areas, northwestern Nigeria strongly negative trends are observed. Non-significant trends (95% level) and masked wetlands are transparent, masked areas with a mean woody cover ≥ 25 displayed dark gray.



From Long term AMMA-CATHC Woody vegetation survey (P. Hiernaux)

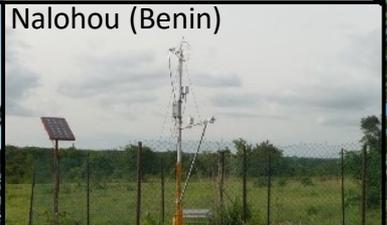
III – REGIONAL SCALE OBSERVATION NETWORK

the AMMA-CATCH observation network



III – REGIONAL SCALE OBSERVATION NETWORK

the AMMA-CATCH observation network



Operated by CIRAD

Niakhar (Senegal)

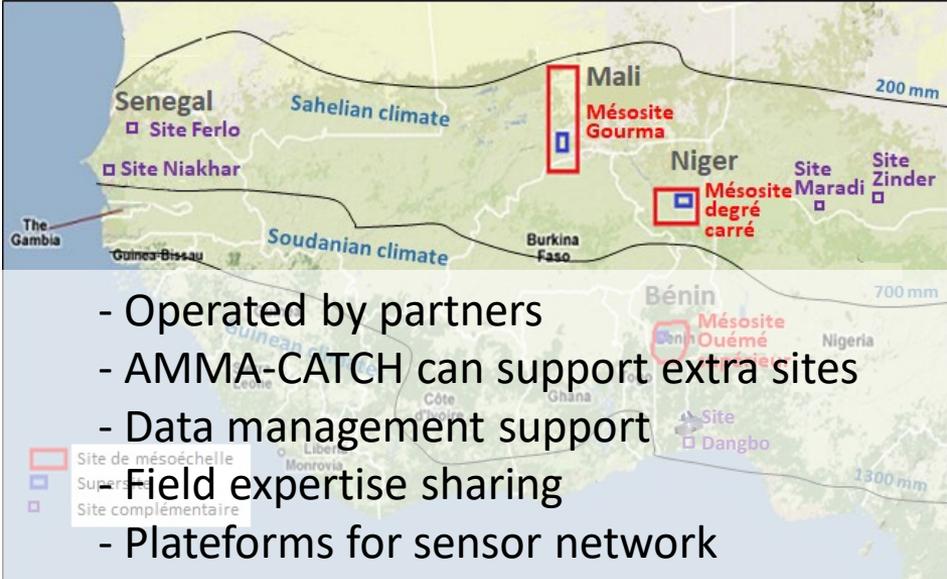
Operated by INE

Nalohou (Benin)

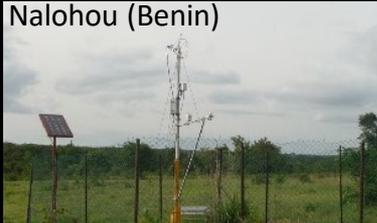
Bellefougou (Benin)

III – REGIONAL SCALE OBSERVATION NETWORK

the AMMA-CATCH observation network



- Operated by partners
- AMMA-CATCH can support extra sites
- Data management support
- Field expertise sharing
- Platforms for sensor network



Operated by CIRAD

Niakhar (Senegal)

Operated by INE

Nalohou (Benin)

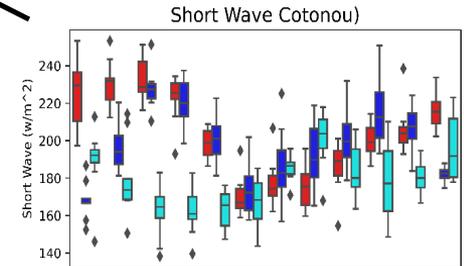
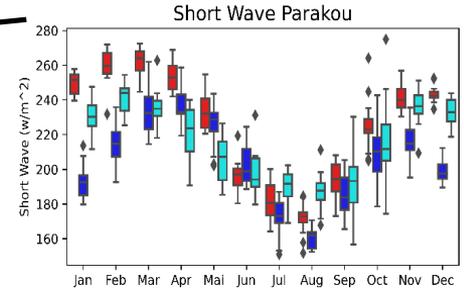
III – REGIONAL SCALE OBSERVATION NETWORK

Diffuse/direct Radiation network

SPN1 sensor

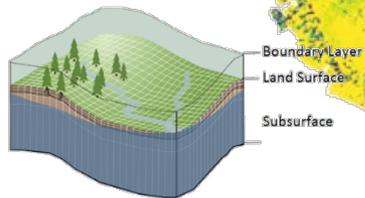


Seasonal cycle of short wave radiations observed (blue) from ERA5 (Red) and MERRA2 (light blue) in Cotonou and Parakou (Bénin)



- Evaluation of remote sensing products and re-analysis
- Necessary measurement for eco-hydrological models
- Solar farm production Forecasts

Continental hydrological modeling as hydrological re-analysis

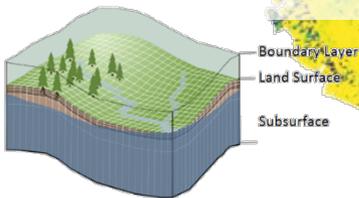


Simulated groundwater storage over West-Africa
Cohard et al. 2023

Take home messages

- **AMMA-CATCH** : an Eco-Hydroclimatic observatory enabling regional studies (<http://www.amma-catch.org>)
- A platform to **enhance partnerships and share field expertises**, data management services, ...
- A platform to **build and host sensor network**
- A platform to evaluate **hydrological re-analysis**

Thank you for Attention



Simulated groundwater storage over West-Africa
Cohard et al. 2023