

Predictability of 2011 rainfall intra-seasonal variability over Senegal from TIGGE data

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Testing the added value of climate with farmers in Kaffrine under CCAFS funded project



**team work : farmers, climatologist,
NGOs, Agriculture expert, sociologist,
journalist (rural radio)**

LA FIEVRE NAWU WALEE RIFT DE LA VALLÉE DU RIFT

NAWU KEENGU ADDIDE
WOPPERE NDER JISINGOL,
KAM E WADDE TAUDI

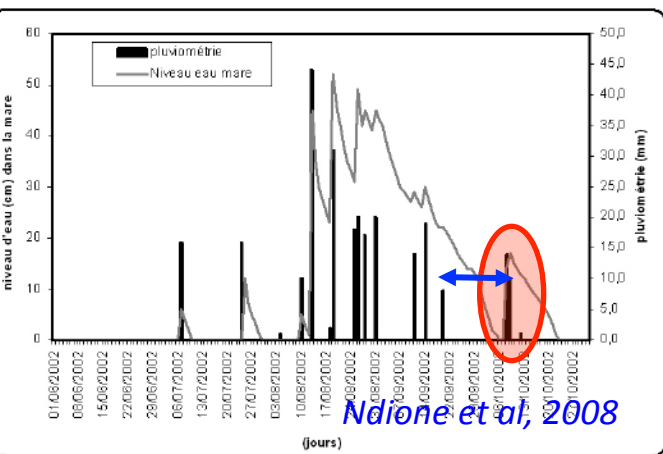
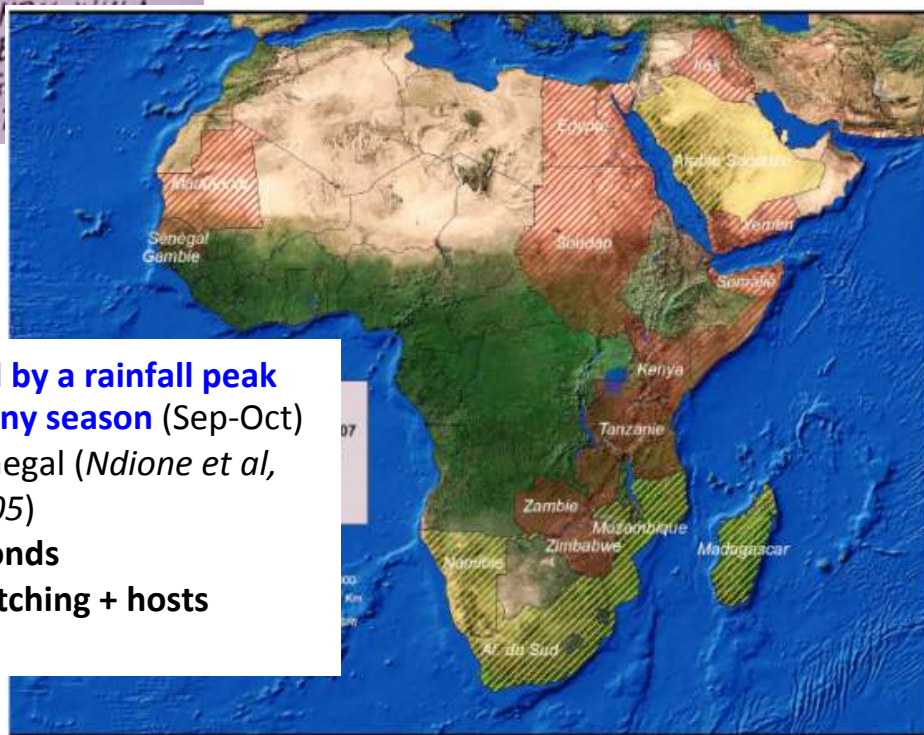
*** CHEZ LES ANIMAUX**
BEAUCOUP D'AVORTEMENTS
 - INA HEEWI ADDIDE WOPPERE (WERLERE)
 - FORTE MORTALITÉ DES AGNEAUX
 CHEVREAUX ET VEAUX.
 - INA HEEWI WARDE JAWDI WALLA
 NDAMMIRI TOKKOSIRI NDII



*** CHEZ L'HOMME**
TO NEDDO TOO
 - FORTE FIÈVRE RESSEMBLANT
 AU PALUDISME OU À LA FIÈVRE
 JAUNE.
 40°
 BAN
 YILL
 NO G
 JON




Avortons dus au virus de la FVR

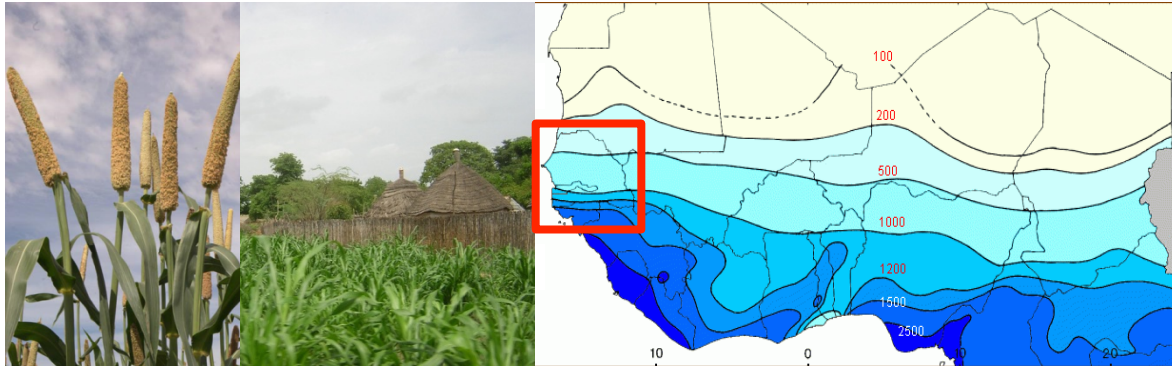


Dry spell followed by a rainfall peak during the late rainy season (Sep-Oct) over Northern Senegal (Ndione et al, 2008; Ba et al, 2005)
 → Rehydrating ponds
 → mosquitoes hatching + hosts
 → high RVF risk

Introduction

A close link between crop and rainfall in Senegal

Rainfall and crop yield of millet in Senegal

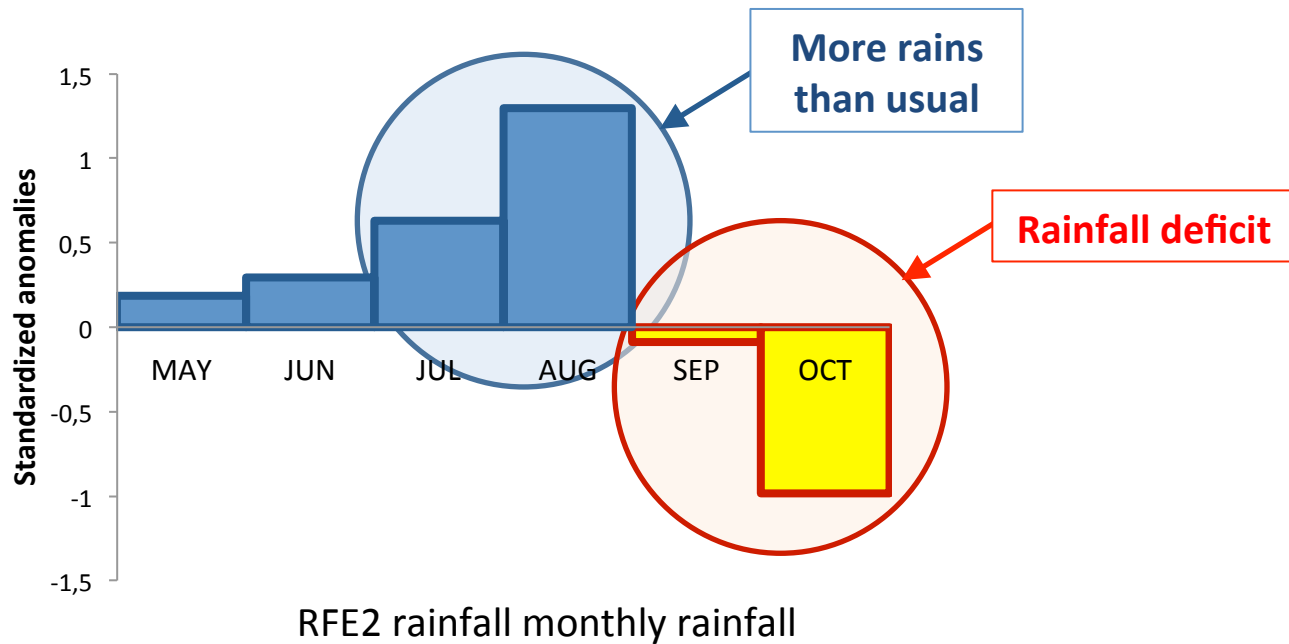


RFE2 rainfall and FAO data

Introduction

The monthly rainfall anomalies in 2011

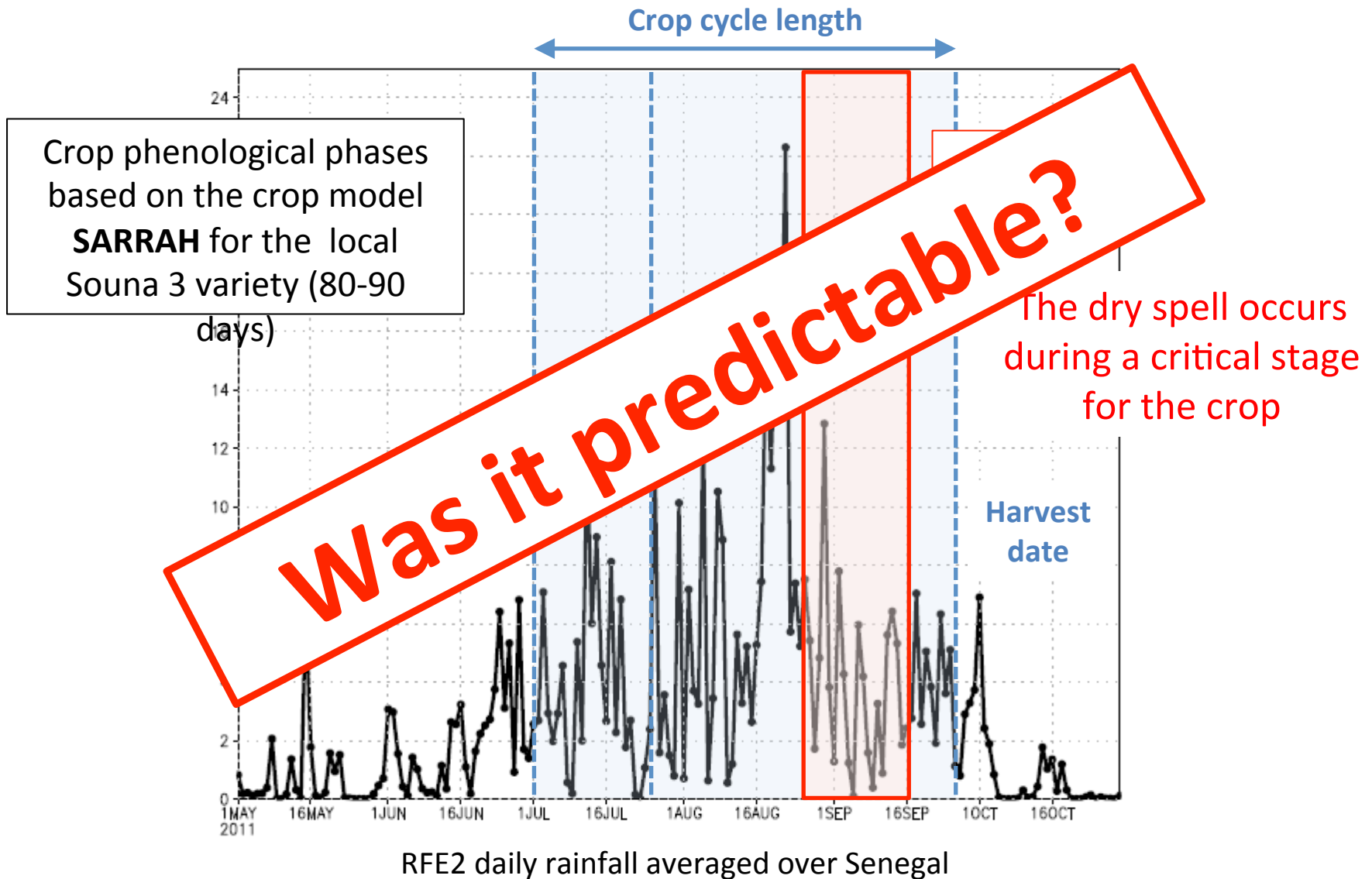
Monthly anomalies of 2011 (reference: 1983-2011)



Good rainy season versus good cropping season : deficit in 2011 was only experienced in late rainy season (September and October)

Introduction

The crop season in 2011



The TIGGE models

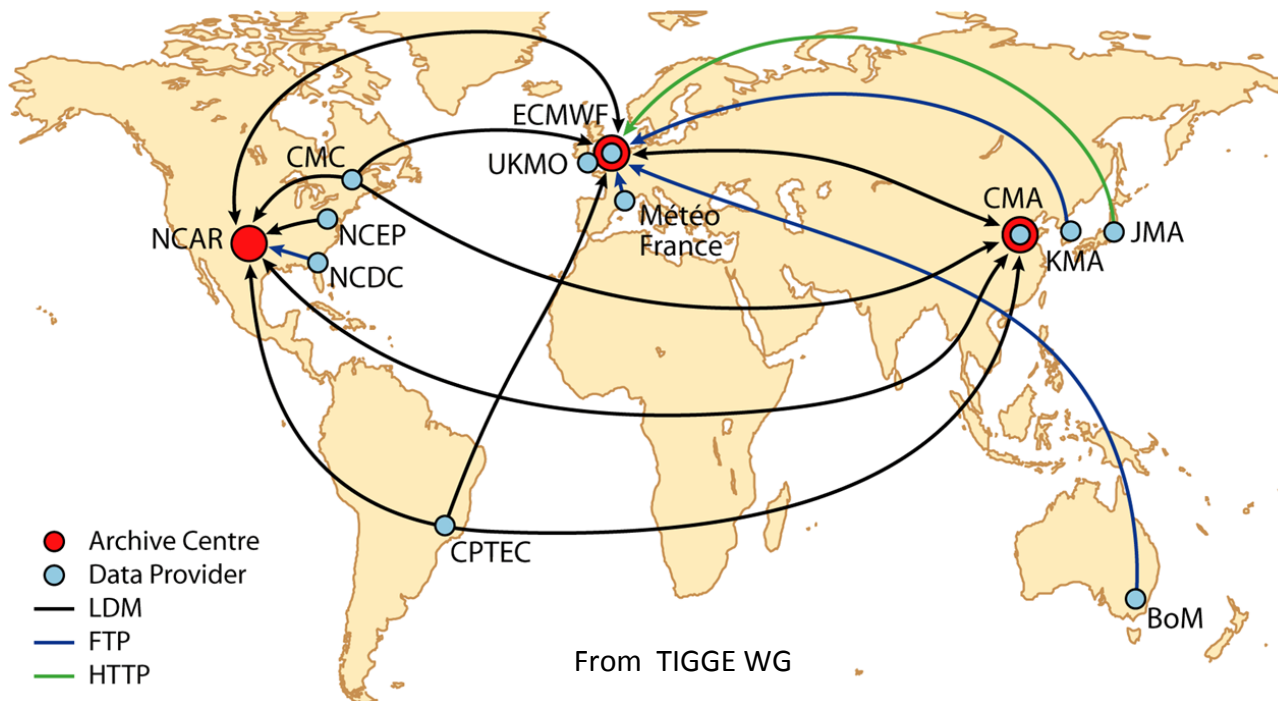
6 Centers : UKMetOff, NCEP, ECMWF, JMA, CMC, CMA, CPTEC (**10**)

Year 2011 : 1 May to 31 October (**2006->2012 -now-**)

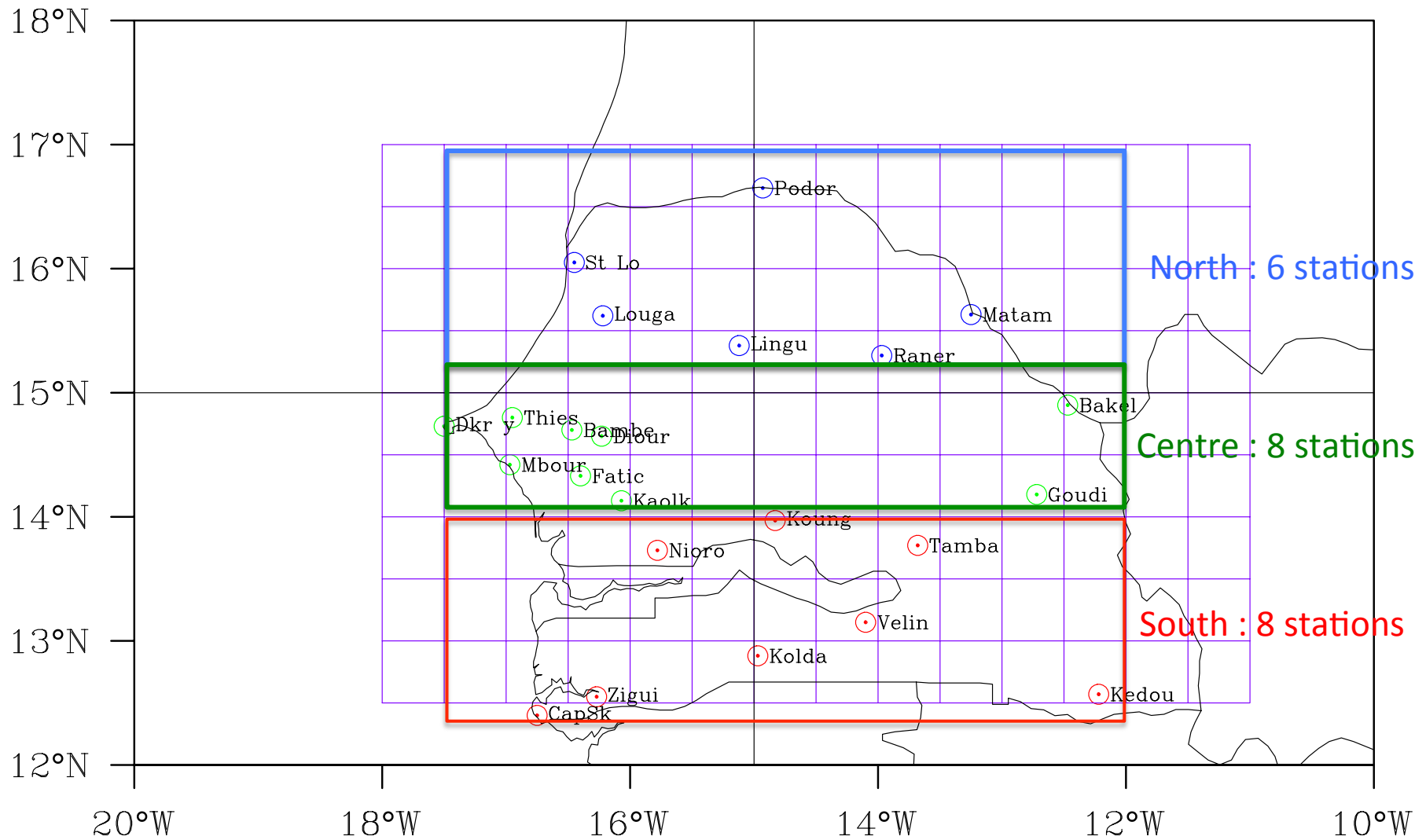
14 members for each Model (**14 to 50**)

Lead-time : from 1 (Z24) to 9 Days (Z216) (**1 to 17 days**)

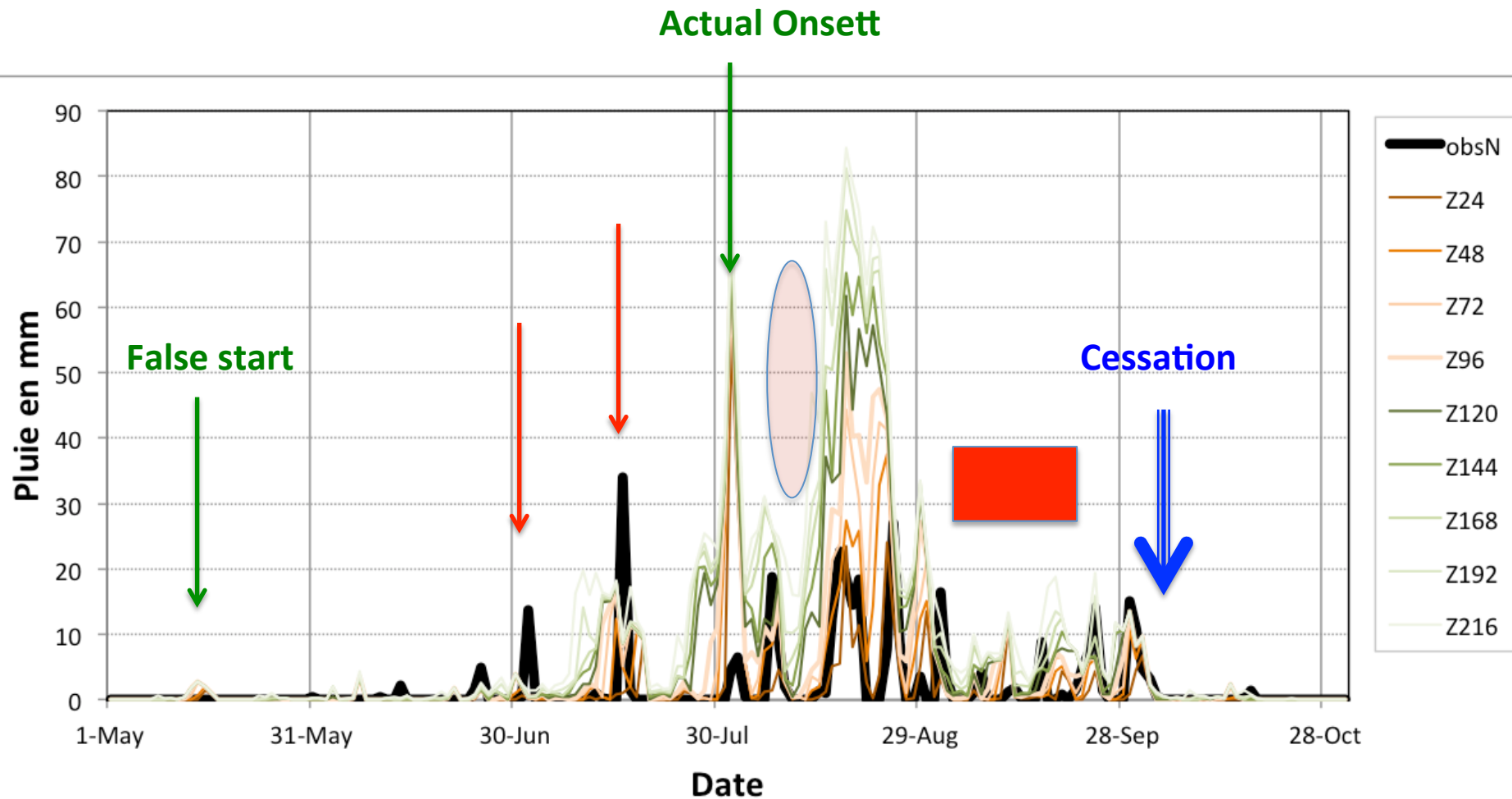
Resolution : $0.5^{\circ} \times 0.5^{\circ}$ (**0.287^{\circ}**)



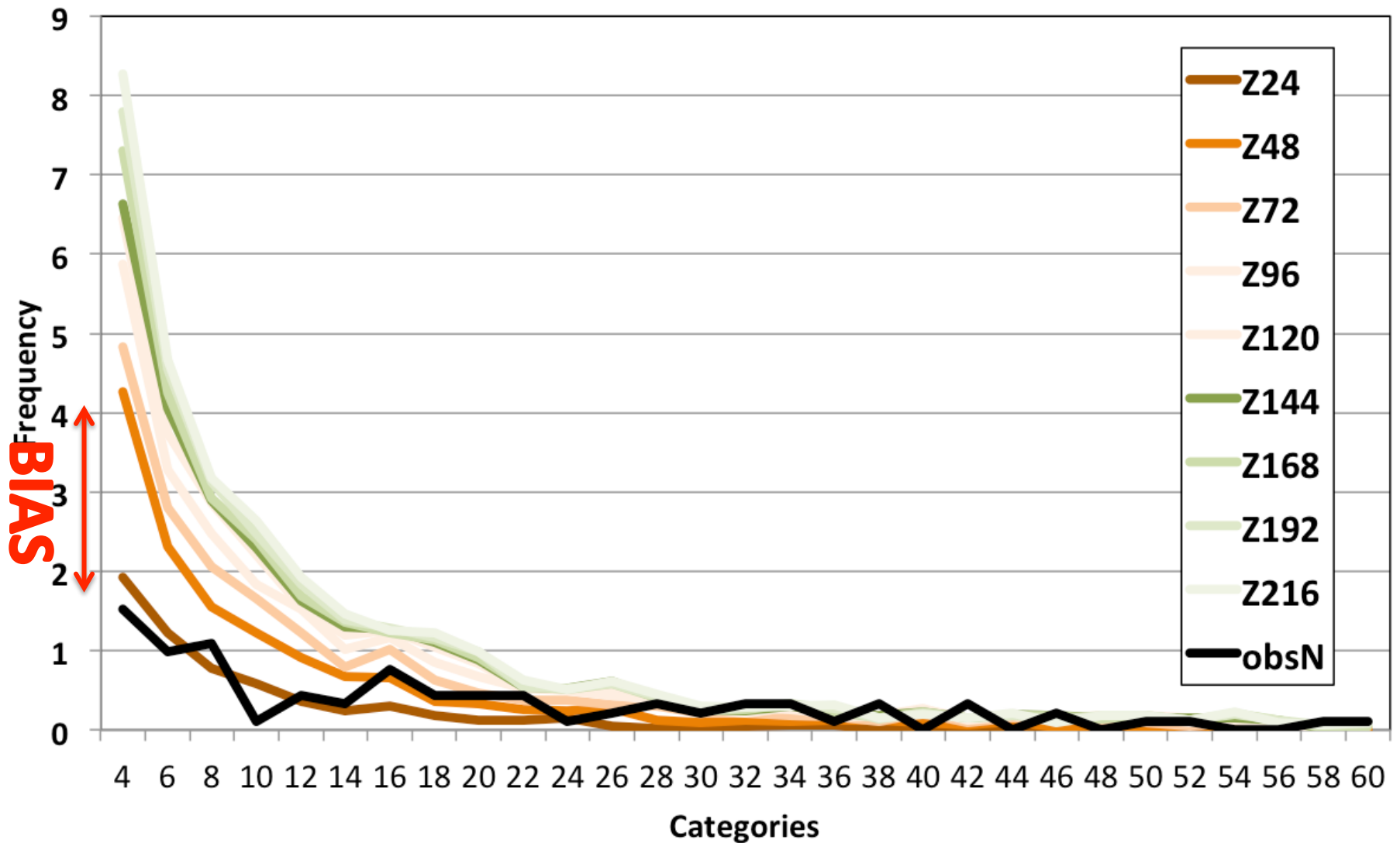
Daily rainfall forecasted by TIGGE models during 2011 : over North, Center and South of Senegal



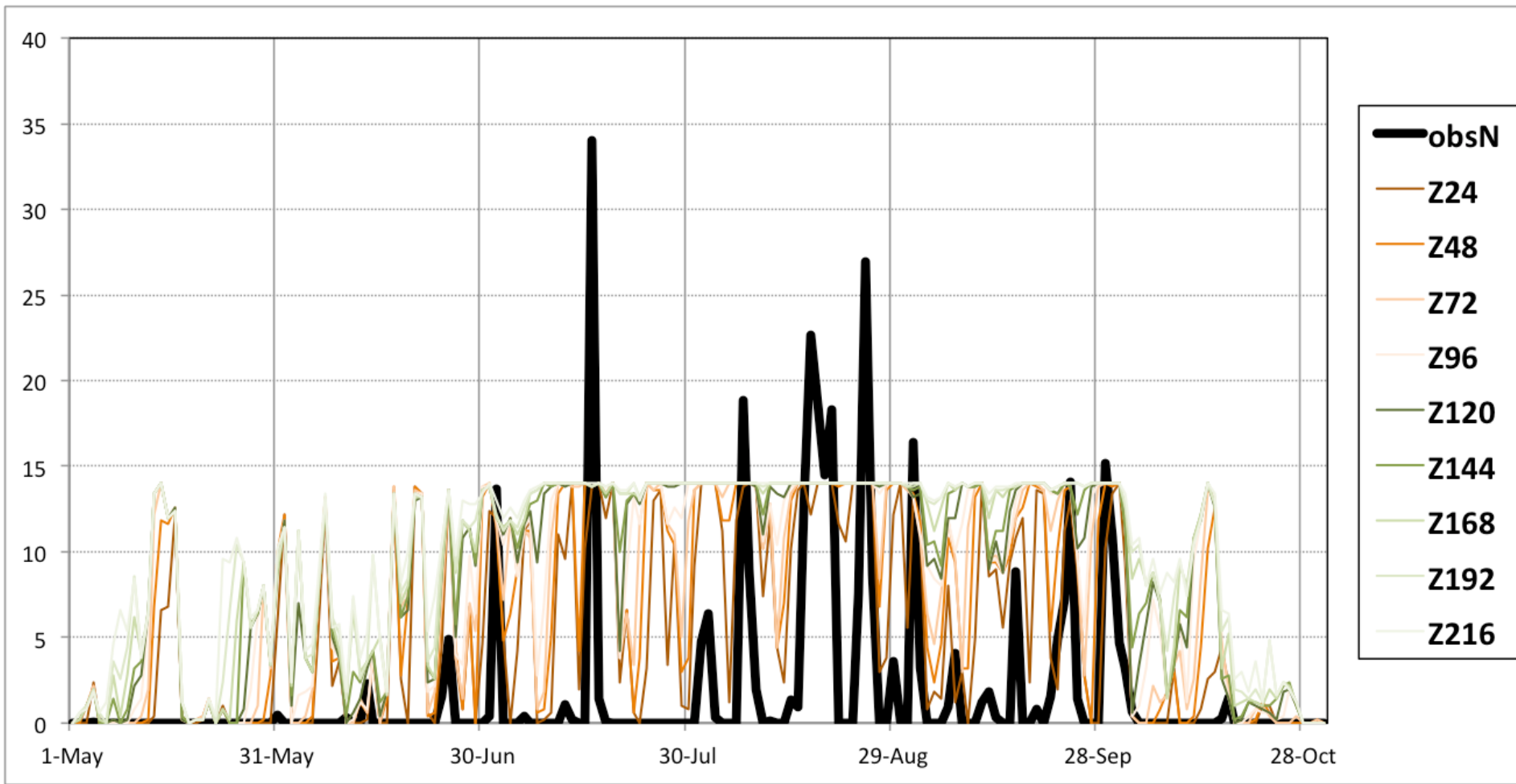
NCEP : daily prediction during 2011 season



Rainfall frequency : bias

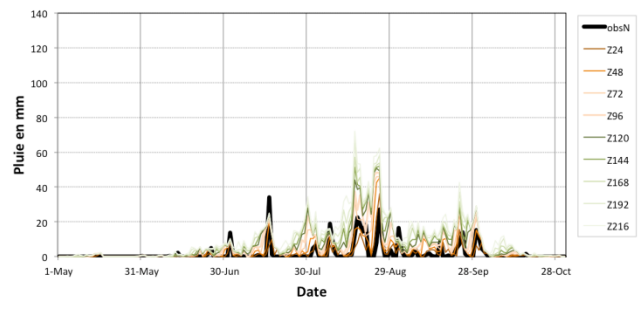


The 14 members coherency : how many members predicted the rainy event ?

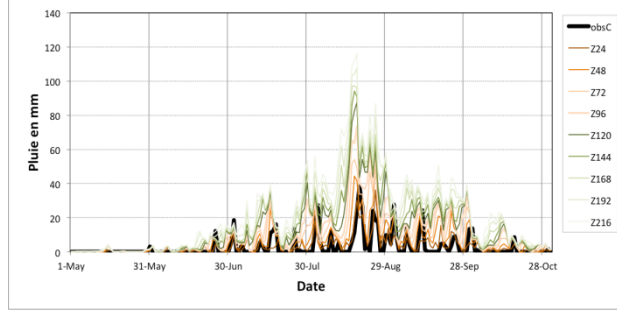


Example of ECMWF performance

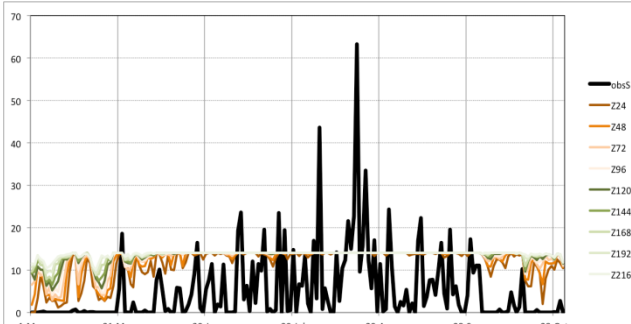
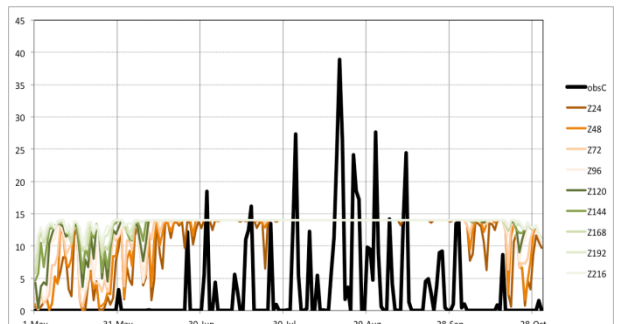
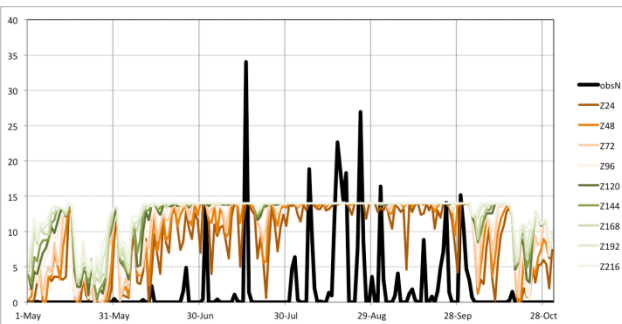
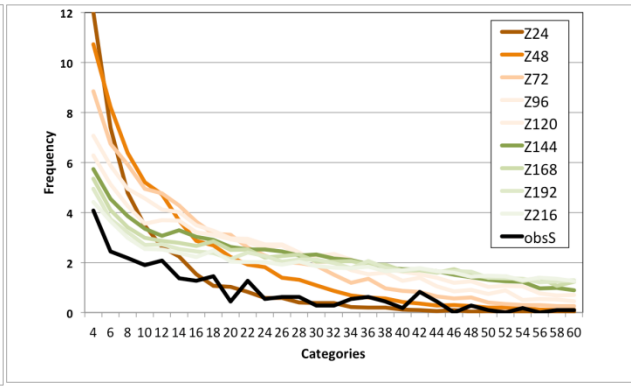
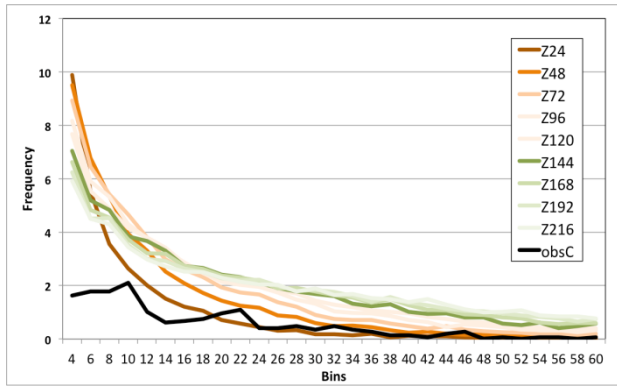
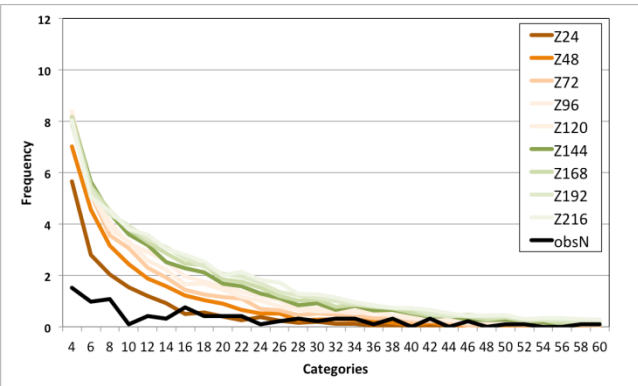
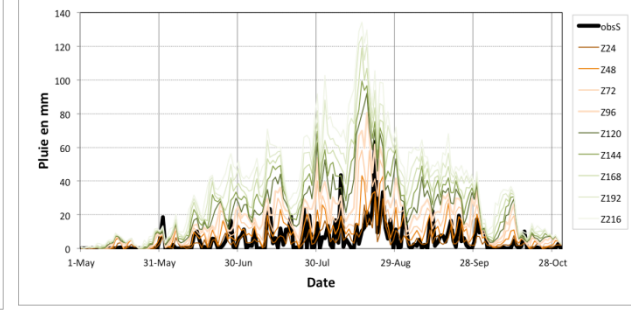
North



Center



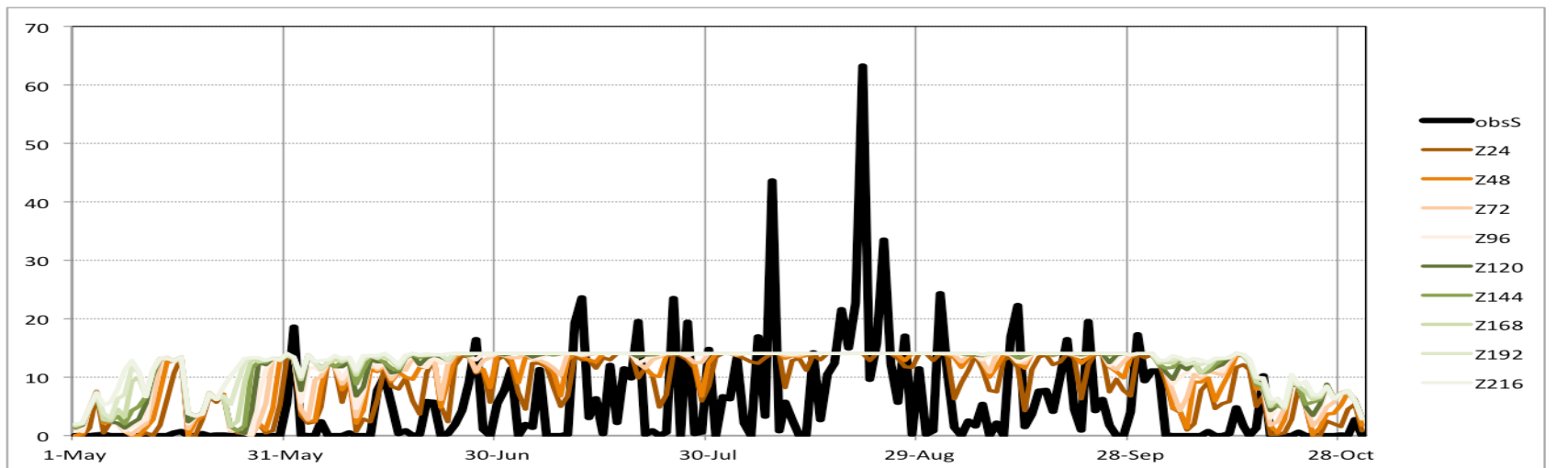
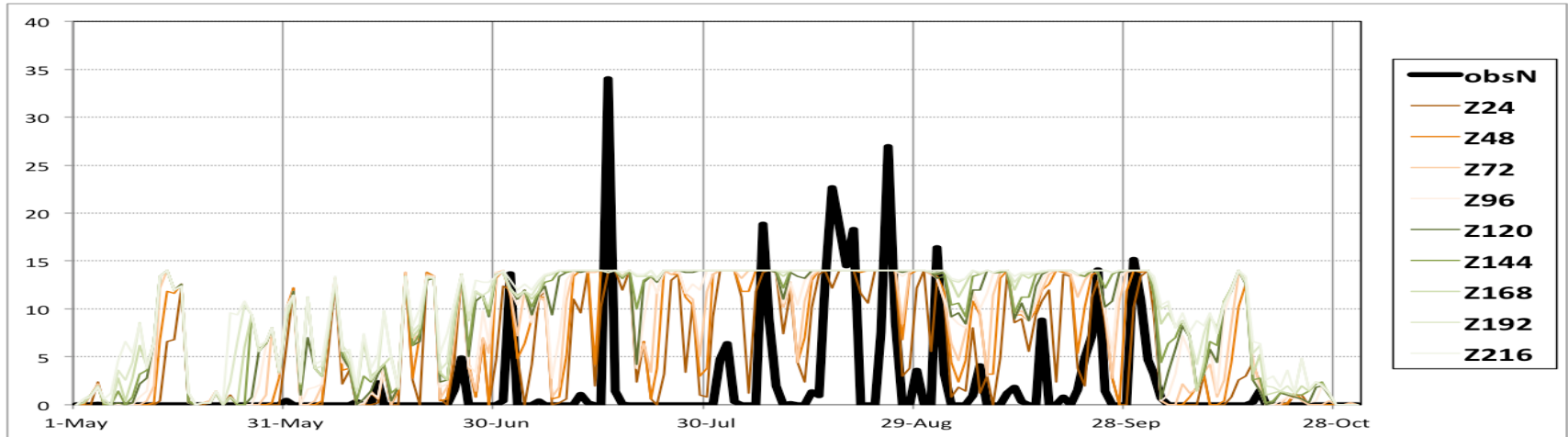
South



Example of NCEP performance

North

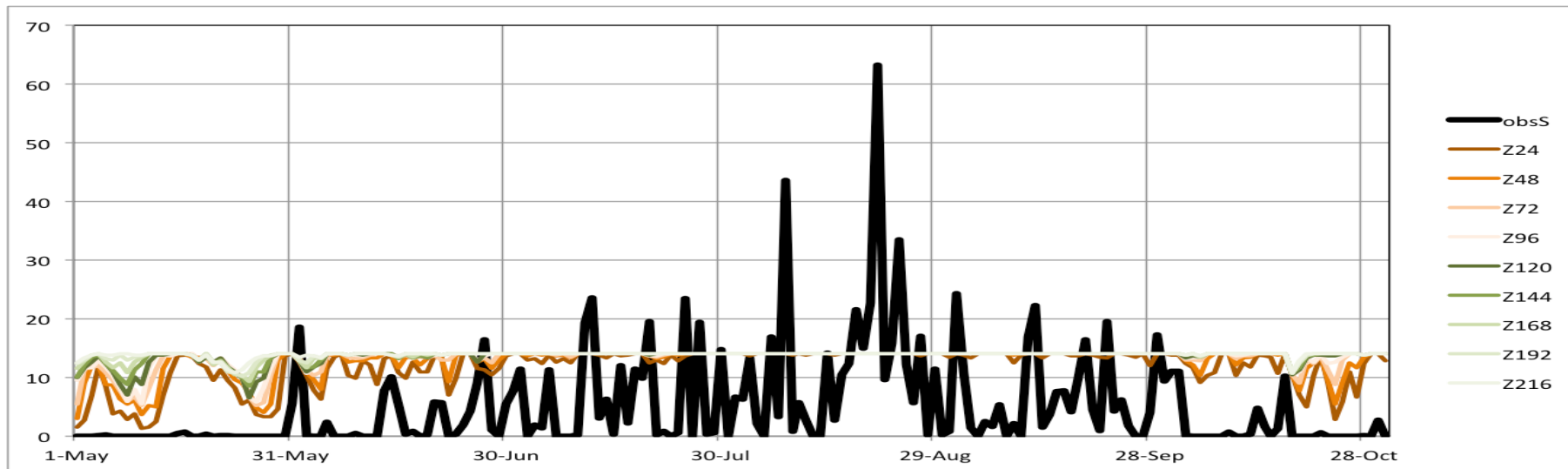
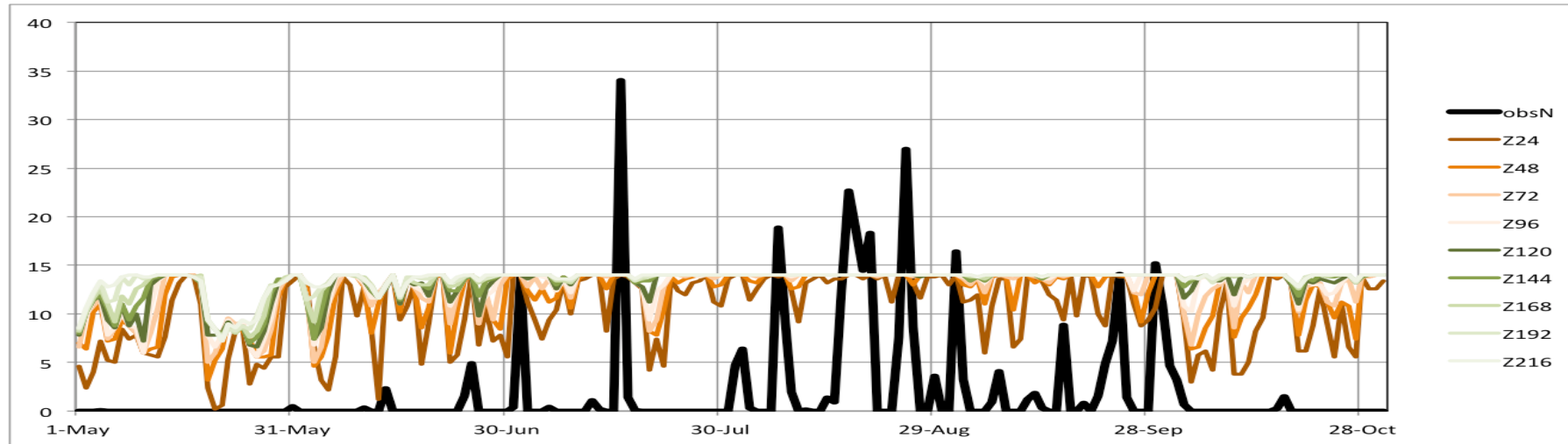
South



Example of UKMetOff performance

North

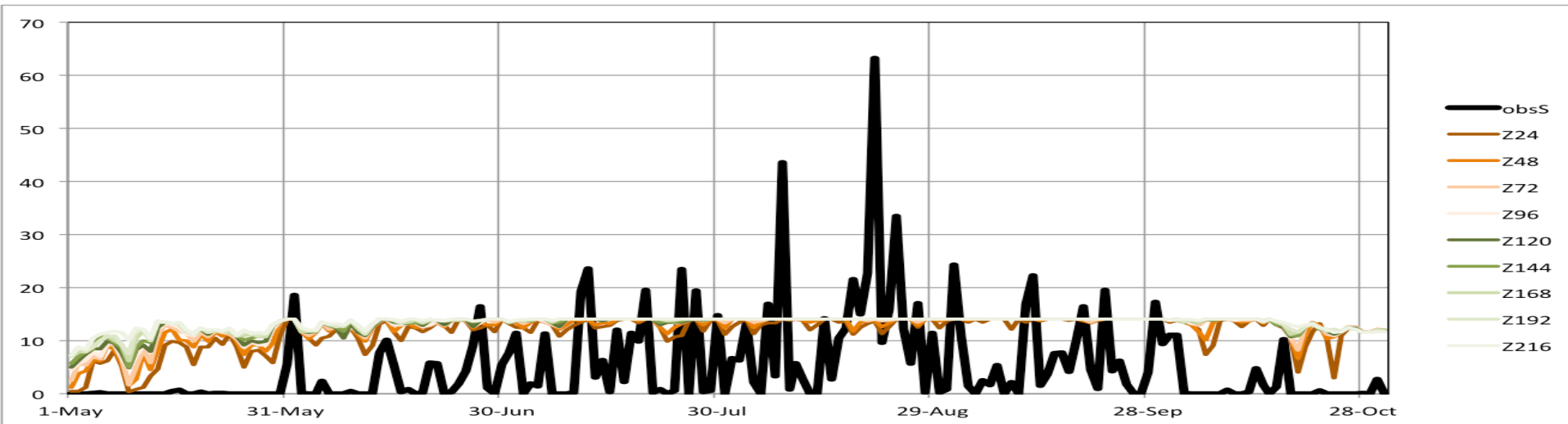
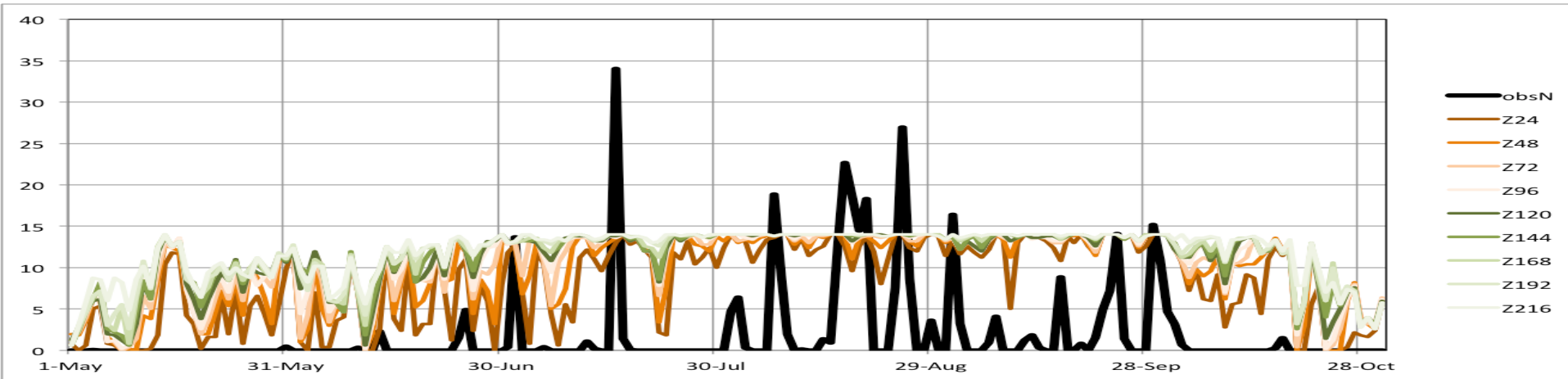
South



Example of JMA performance

North

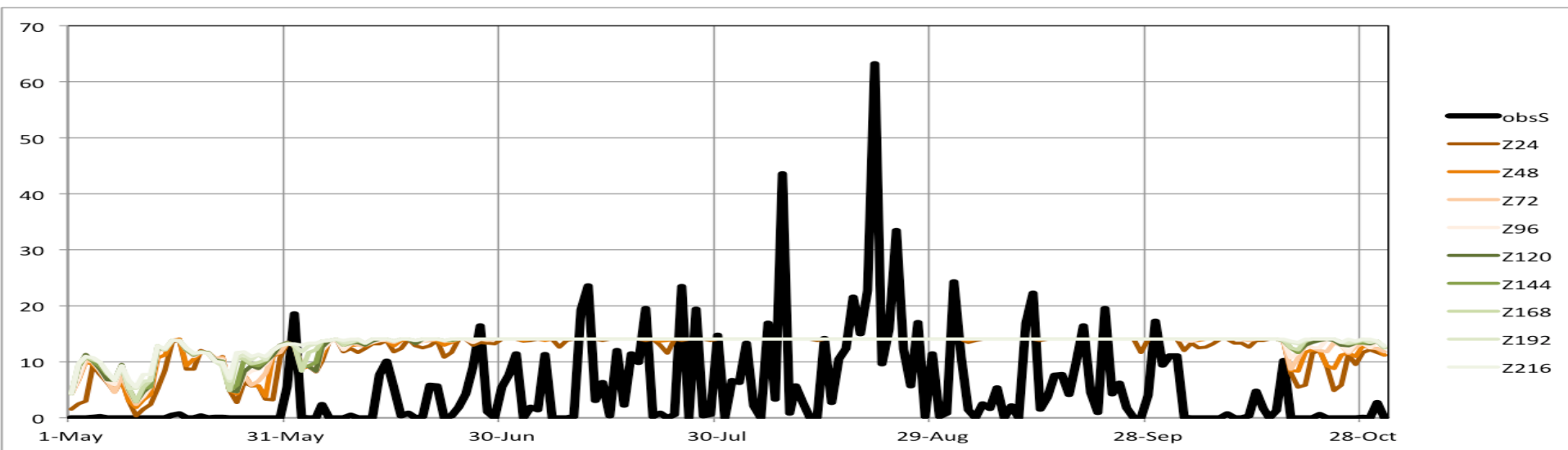
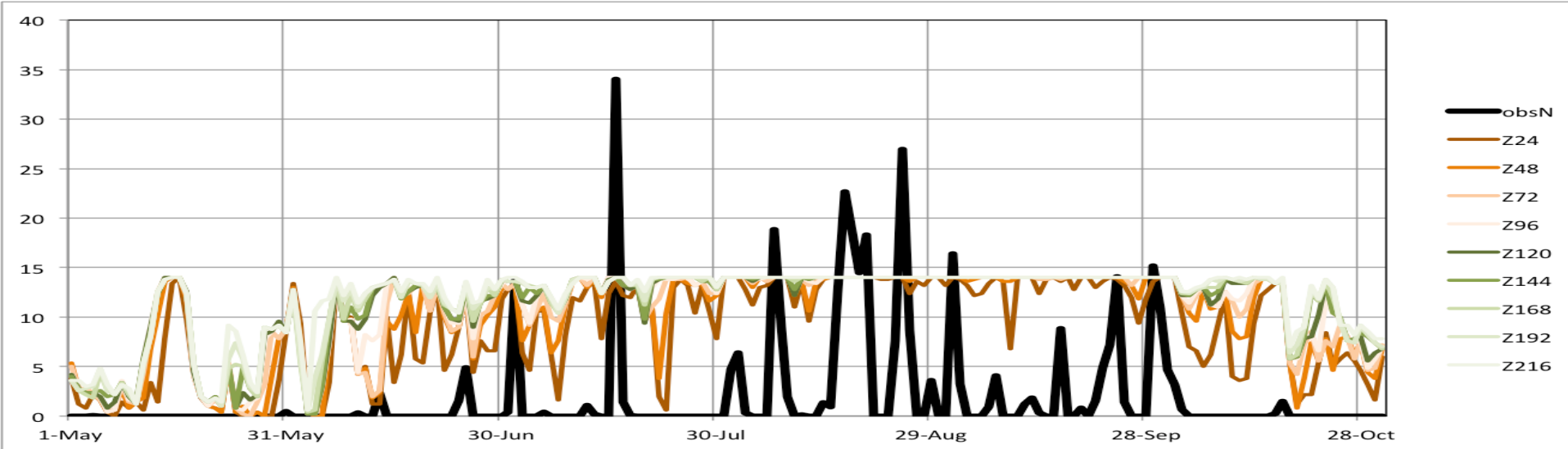
South



Example of CPTeC performance

North

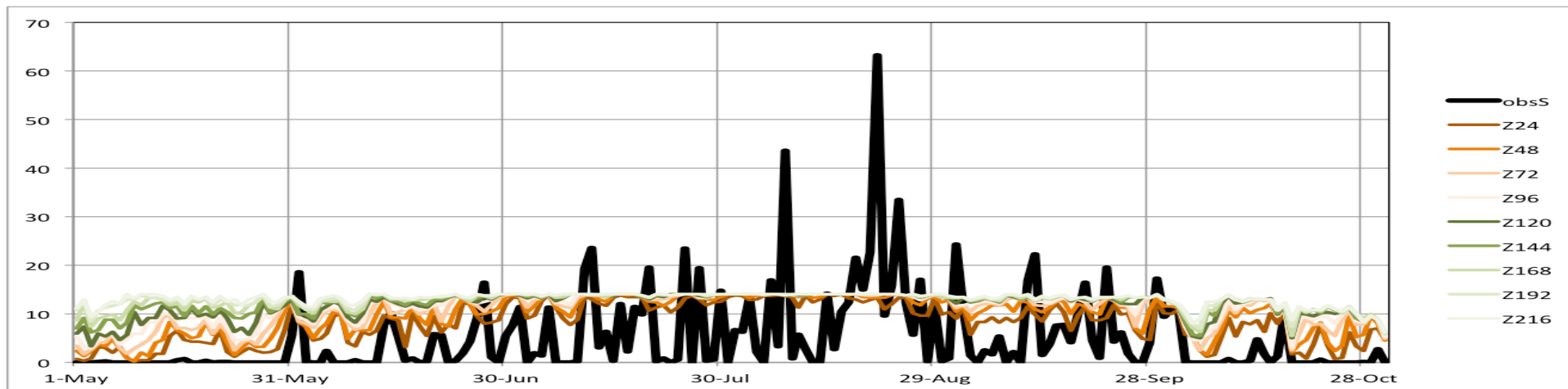
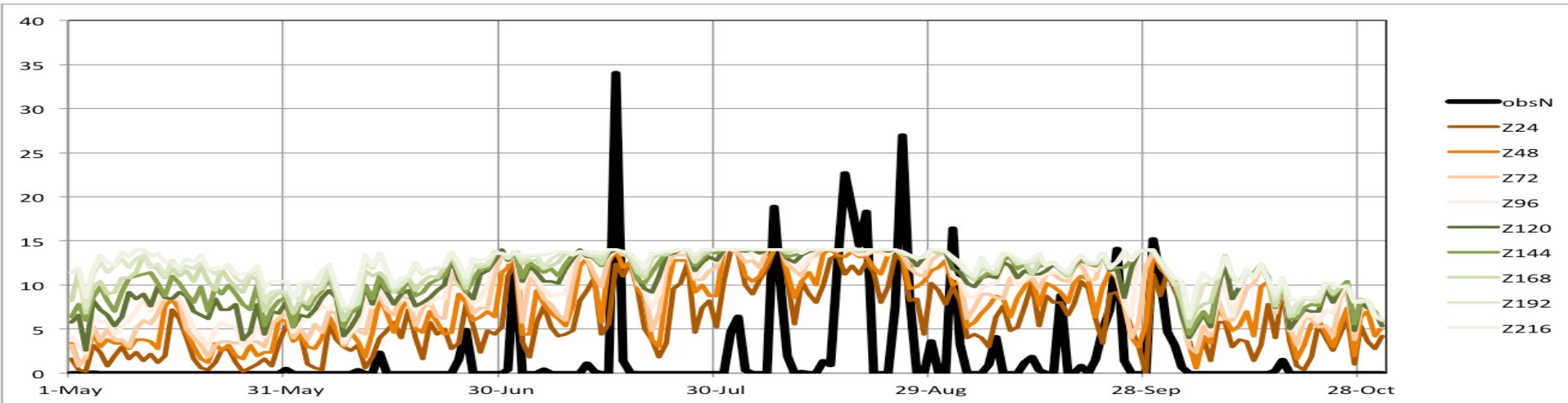
South



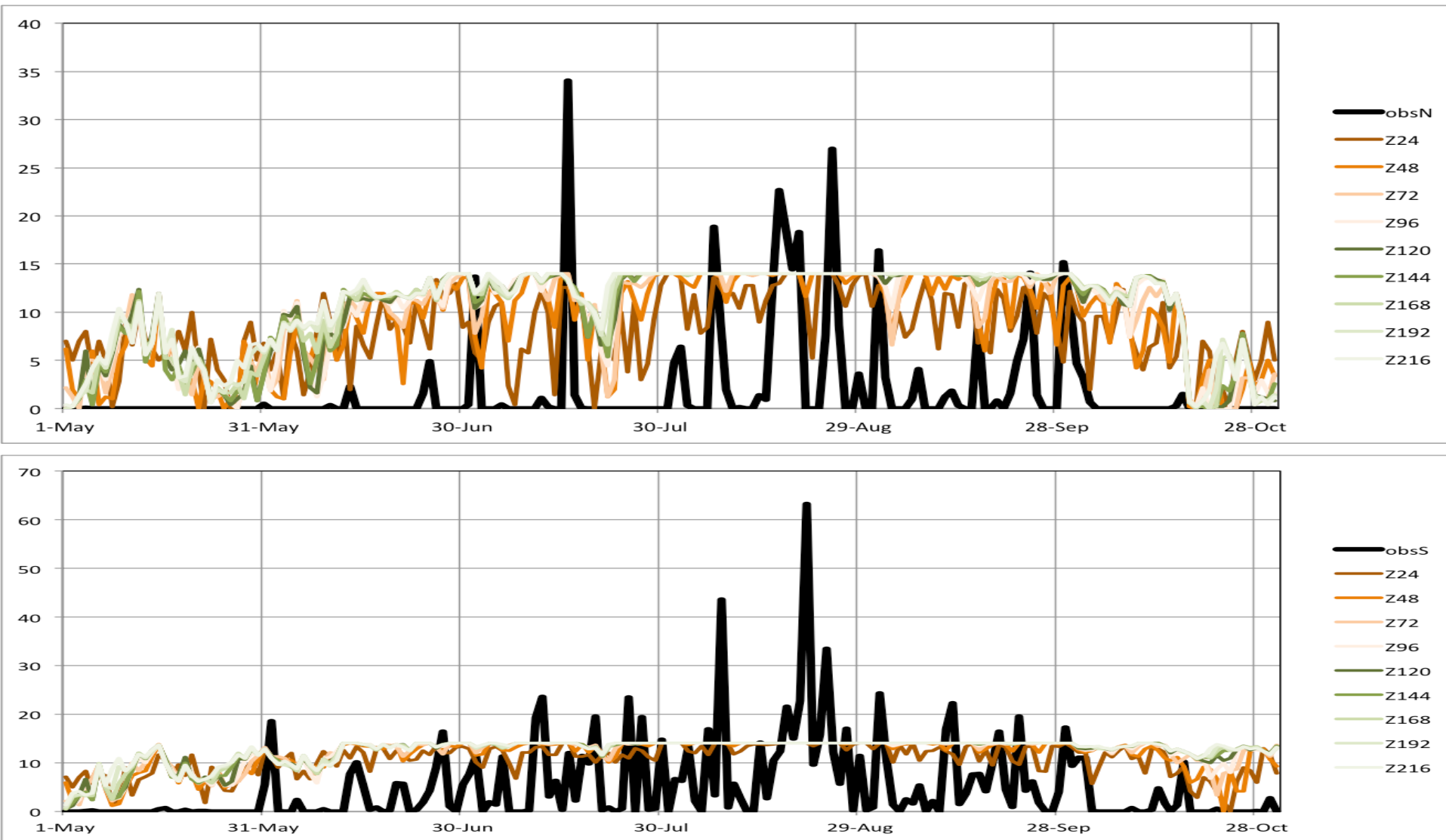
Example of CMC performance

North

South



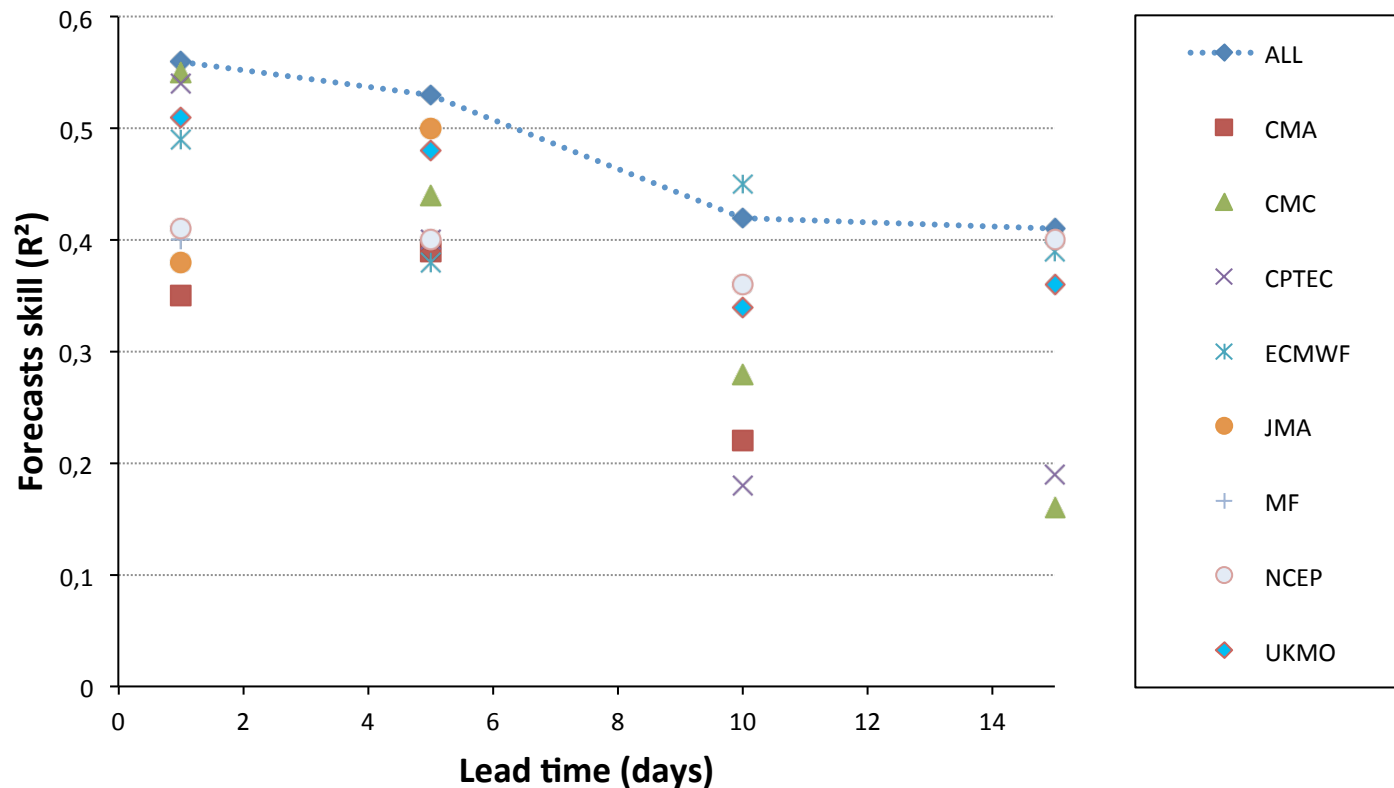
CMA



Results

The TIGGE ensemble forecasts in Senegal

Forecast skill for rainfall in 2011



- The skill is decreasing with the lag
- The ensemble forecast performs better than any single model forecast

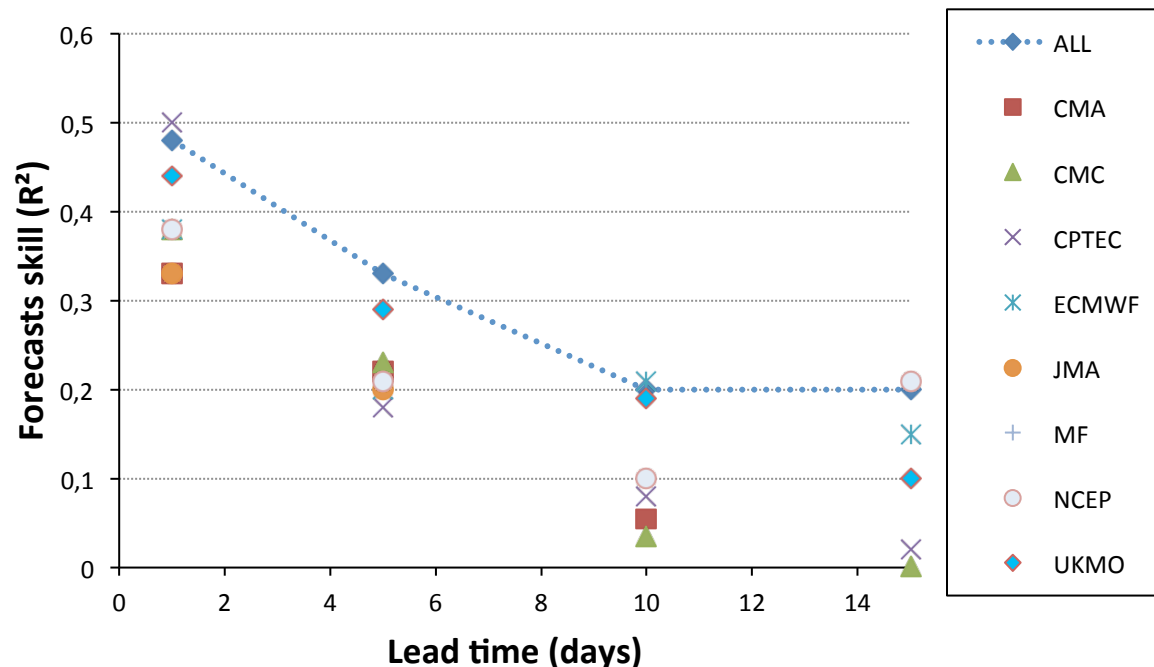
Results

The TIGGE ensemble forecasts in Senegal

Forecast skill for rainfall in 2011

Intra-seasonal timescale

Data and forecasts are filtered between 5 and 90 days

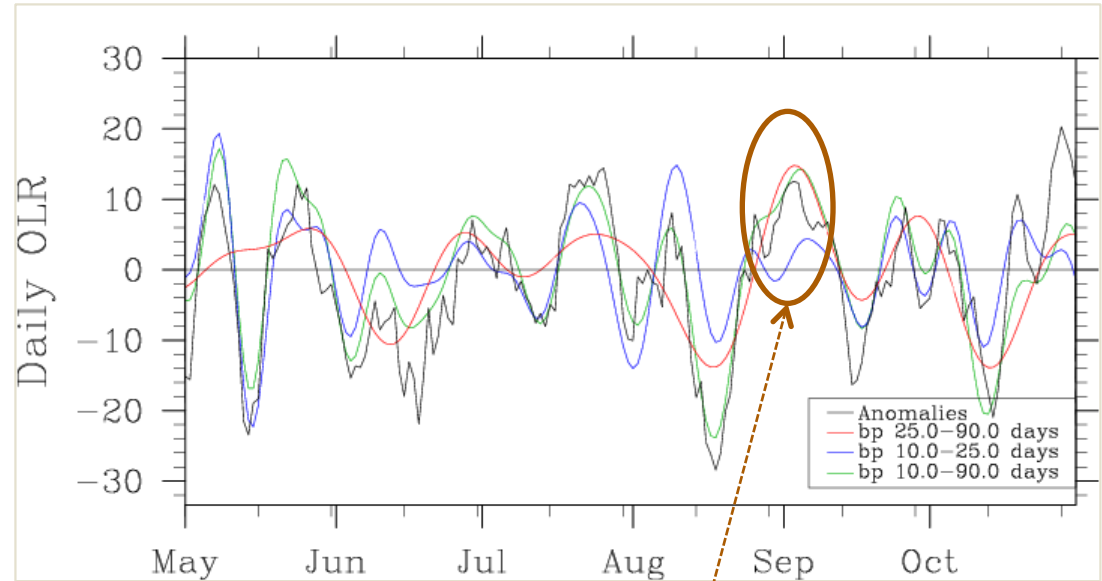


- There is still some skill when removing the seasonal cycle
- The ensemble forecast performs better than any single model forecast

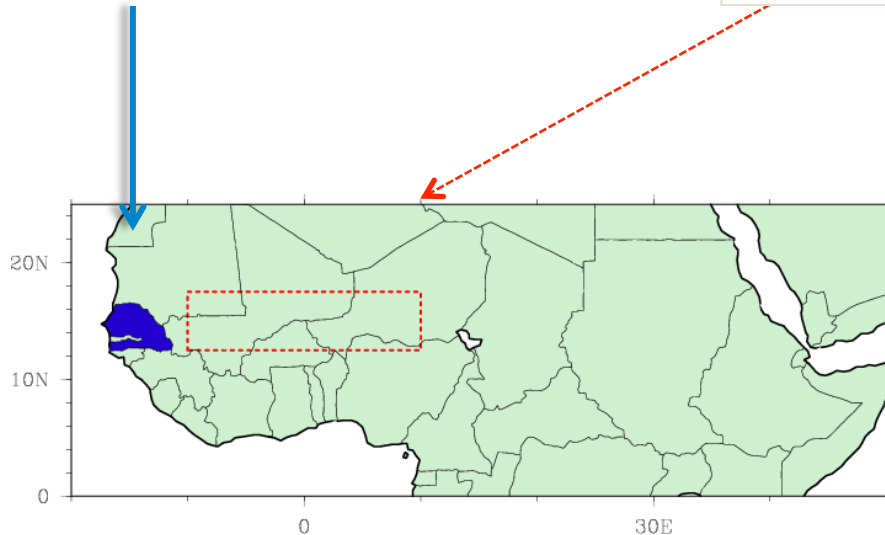
Results

A large scale intraseasonal event

March to October 2011 times series of unfiltered (black line) and bandpass filtered (colored lines) OLR.



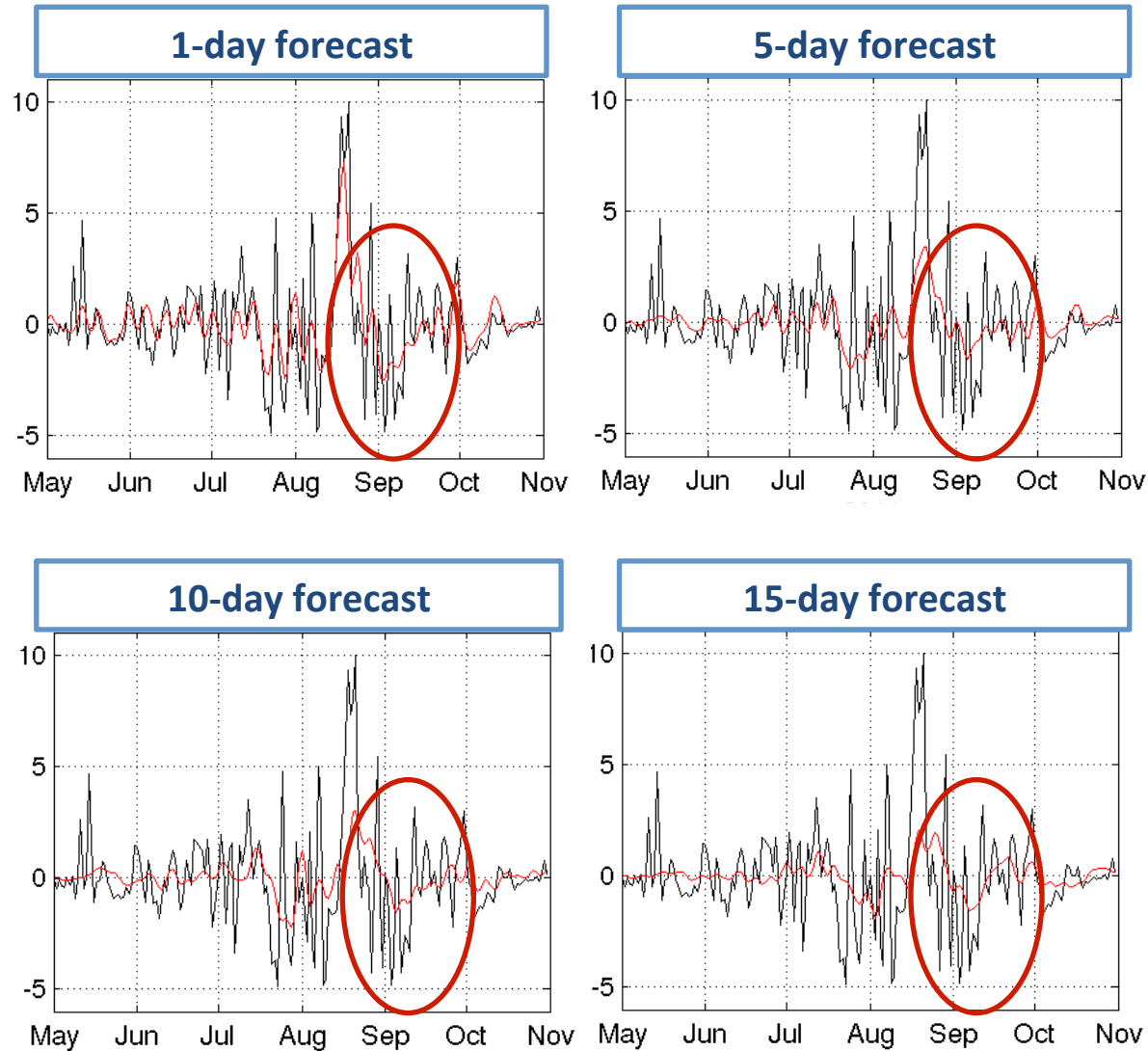
Sénégal



25-90 days (red line) break phase leads and correspond to the MJO first mode (40 days).

Results

The TIGGE ensemble forecasts in Senegal



— RFE2 rainfall in average over Senegal

— Ensemble forecast (6 to 7 models with 14 members per model)

Intra-seasonal timescale:

Data and forecasts are filtered between 5 and 90 days

Conclusions and outlooks

- A large-scale intraseasonal signal in 2011 with adverse impacts for agriculture in Senegal (Sahel)
- The TIGGE dynamical forecasts capture this feature with an interesting skill even when removing the seasonal cycle
- The ensemble multi-model and multi-member shows the highest skill
- **TIGGE way of sampling uncertainties (Multi-Model-Ensemble) => communication of confidence to climate users (Agriculture, Health)**
- **Model consistency on simulating rain (to be defined) or not across members is good indicator of forecast reliability**

Thank you for your attention!