



Prévisibilité des précipitations intra-saisonnières ouest-africaines par les modèles TIGGE.

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ANR PICREVAT (**P**révision de **I**nformation **C**limatique pour la **R**eduction et la Vulnérabilité de l'**A**griculture **T**ropicale)

PICREVAT propose un approfondissement de la question de la prévisibilité des caractéristiques intra-saisonnières de la saison des pluies (démarrage, fin, phase/durée/fréquence des séquences sèches etc.).

Plan de l'exposé :

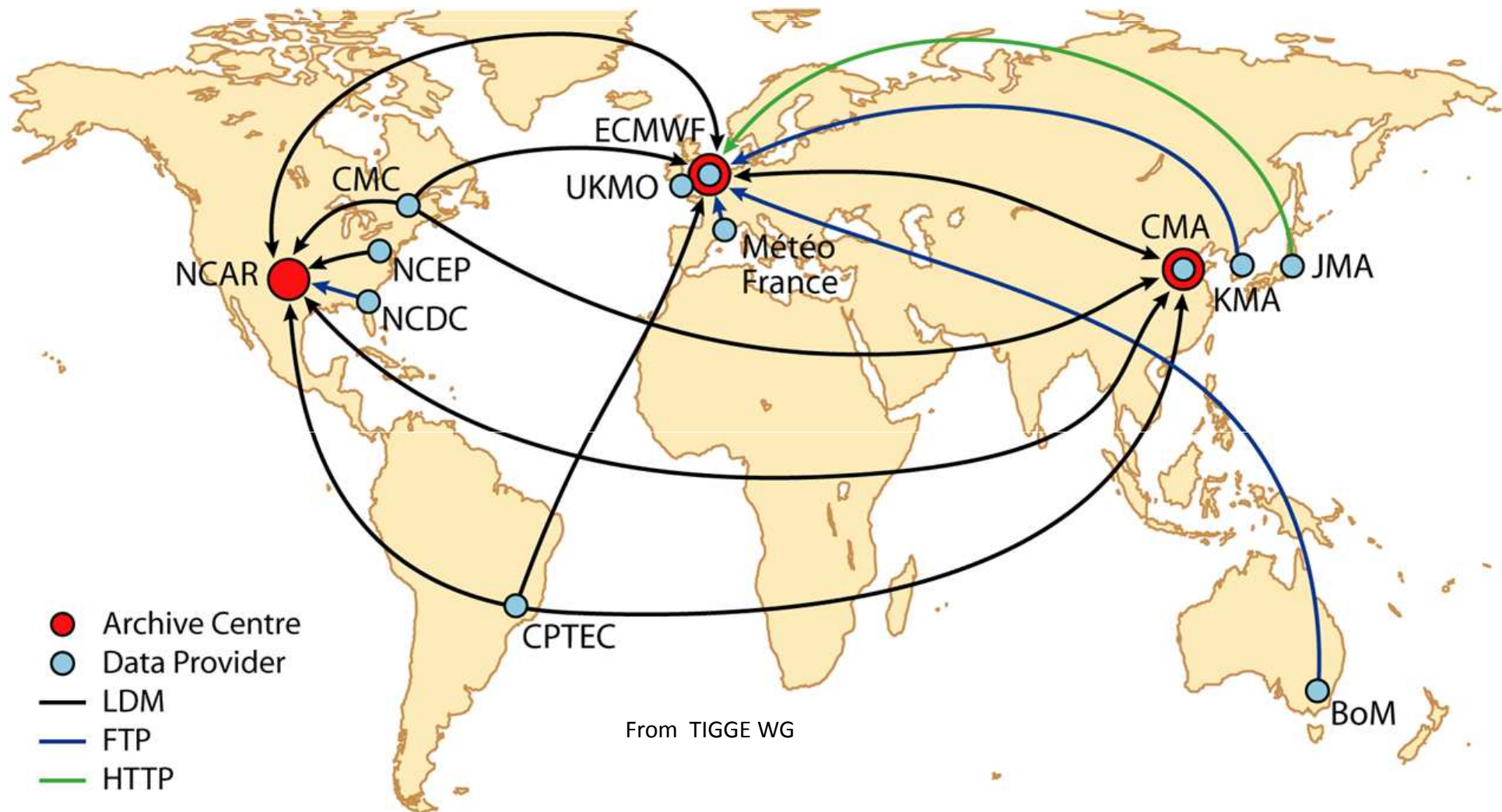
- La base de données utilisée
- La variabilité intra-saisonnière des précipitations:
 - Corrélations et Erreur relative standard.
 - Les démarrages (« locaux » et régionaux) de la saison des pluies.
 - L'Oscillation Madden-Julian.
 - Le cas de la pluie de Ouagadougou du 1^{er} septembre 2009.

Les Données utilisées:

- Les précipitations quotidiennes FEWS (RFE2) : $1^{\circ}\times 1^{\circ}$.
- Les précipitations quotidiennes TRMM (3B42) : $0.25^{\circ}\times 0.25^{\circ}$.
- Les réanalyses quotidiennes ERA-interim: $1.5^{\circ}\times 1.5^{\circ}$: vent (925hPa, 200hPa), humidité, température.
- Les données quotidiennes TIGGE: prévisions de 1 jours à 15 jours.

TIGGE, the THORPEX Interactive Grand Global Ensemble

10 Centres : UKMetOff, NCEP, ECMWF, JMA, CMC, CMA, CPTEC, Meteo-France, BOM, KMA



La base de données TIGGE

Models	Period	Number of run	Time Step (hour)
BOM	09/2007 : 07/2010	32	0:6:240
CMA	05/2007 : 12/2012	14	0:6:240
CMC	10/2007 : 12/2012	20	0:6:384
CPTEC	02/2008 : 12/2012	14	0:6:360
ECMWF	10/2006 : 12/2012	50	0:6:360
JMA	10/2006 : 12/2012	50	0:6:216
KMA	12/2007 : 12/2012	23	0:6:240
Meteo_France	10/2007 : 12/2012	34	0:6:60
NCEP	03/2007 : 12/2012	20	0:6:384
UKMO	10/2006 : 12/2012	23	0:6:360

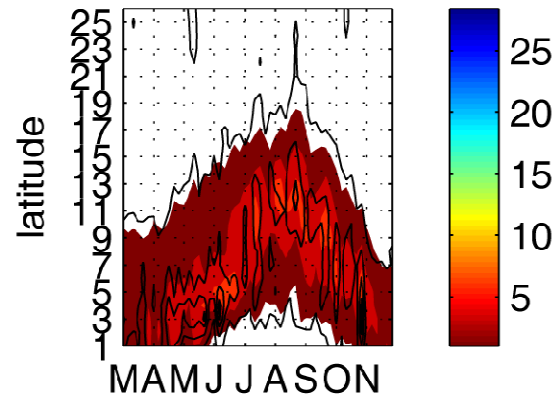
La base de données TIGGE

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NCEP	03/2007 : 12/2012	20	0:6:384
UKMO	10/2006 : 12/2012	23	0:6:360

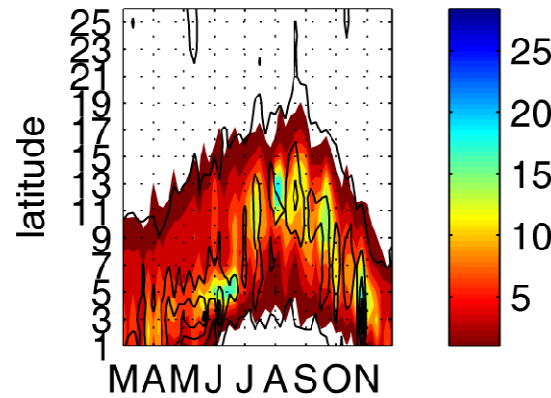
Travail sur les sorties de modèles (prévisions de 1 jour à 15 jours) sur la période 2008-2012

L'évolution intra-saisonnière des précipitations TIGGE : 2011

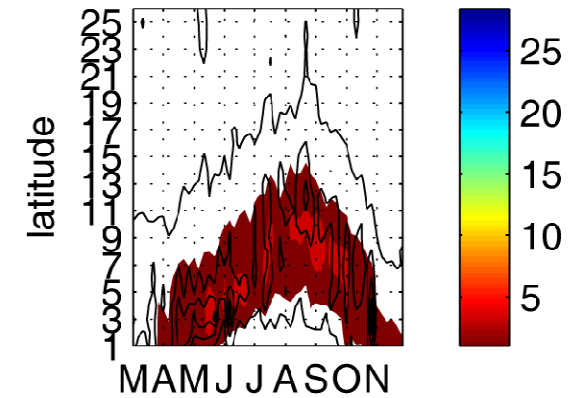
Ensemble; 10 days; 2011



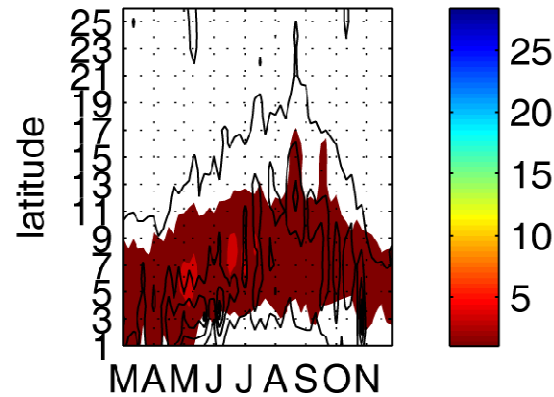
CMA; 10 days; 2011



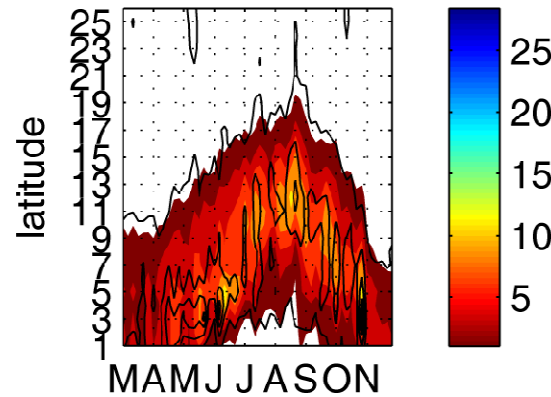
CMC; 10 days; 2011



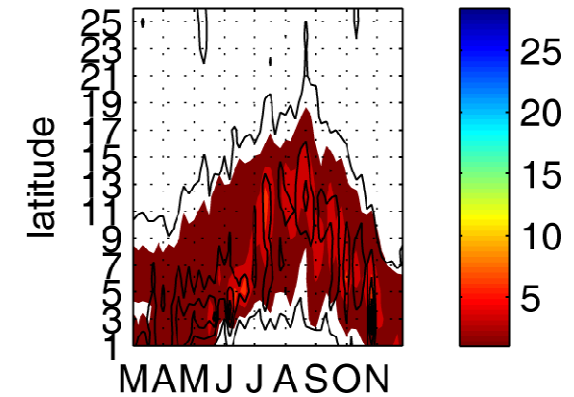
CPTEC; 10 days; 2011



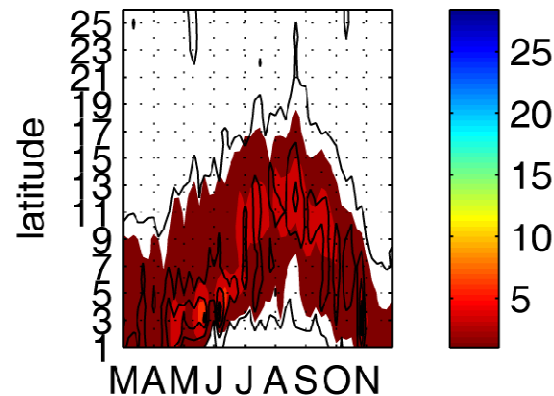
ECMWF; 10 days; 2011



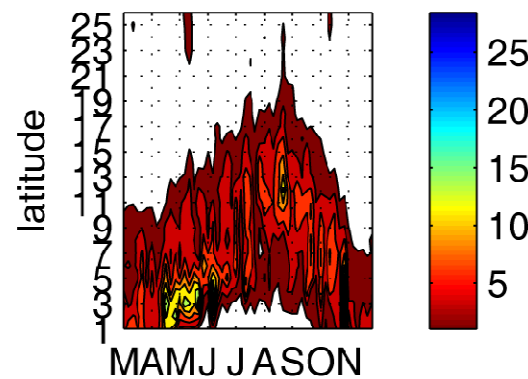
NCEP; 10 days; 2011



UKMO; 10 days; 2011

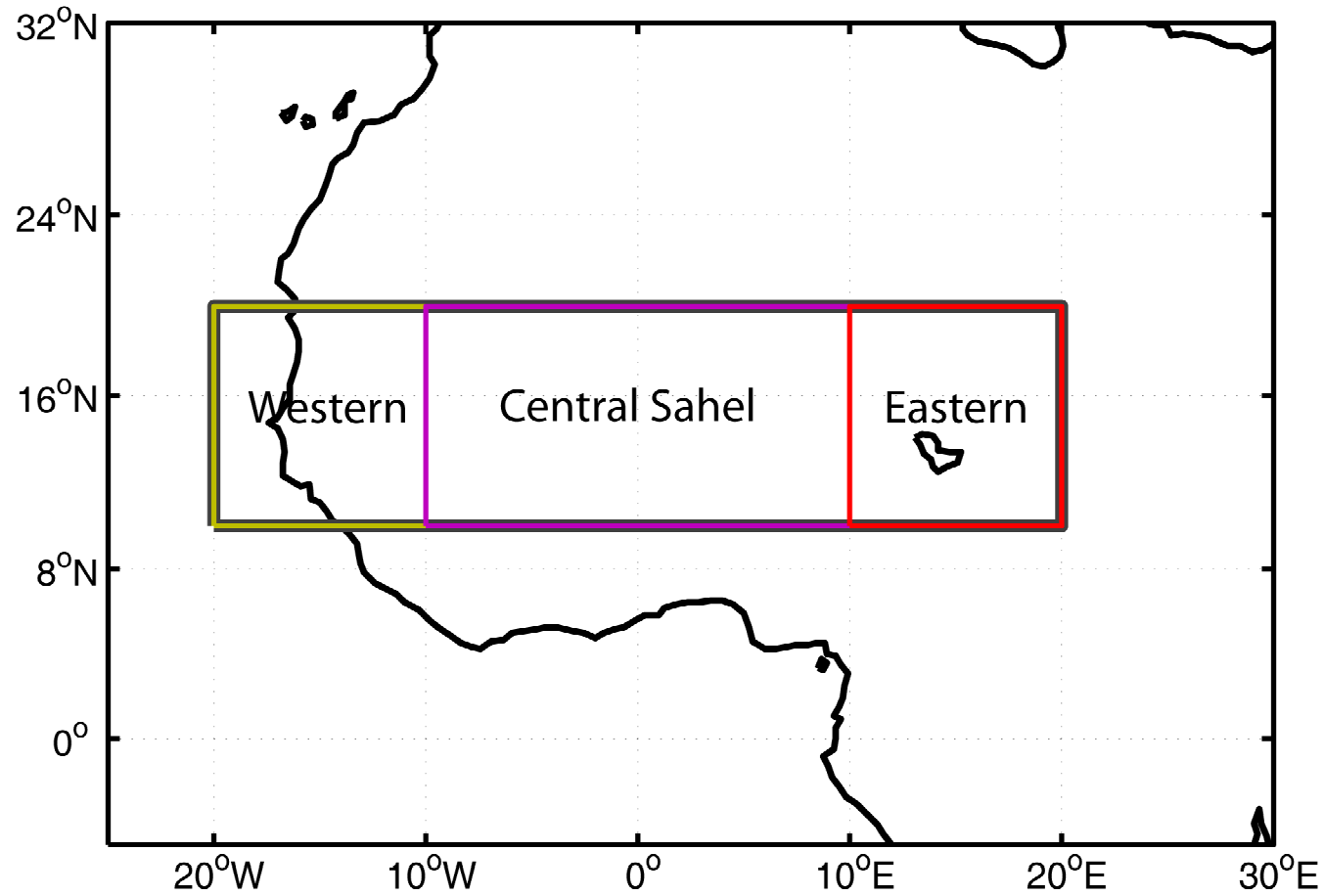


FEWS; 2011

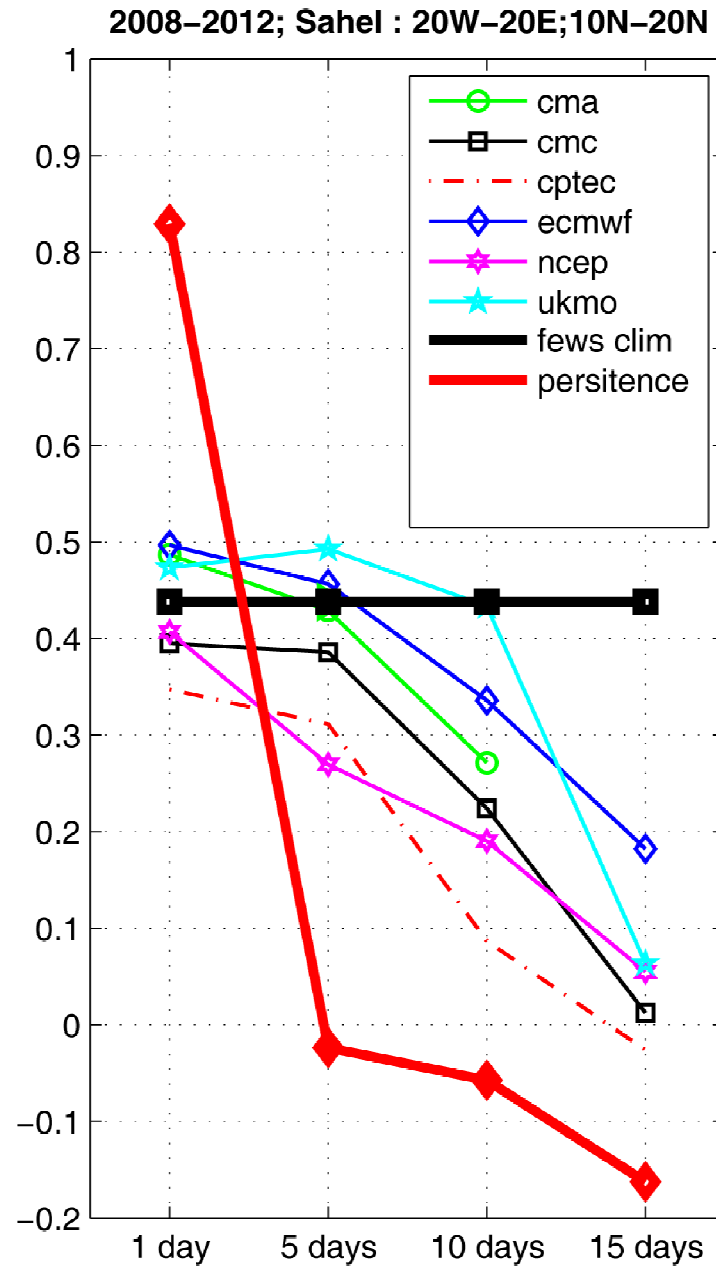


Moyenne:
[10°W:10°E]

Travail sur les indices sahéliens



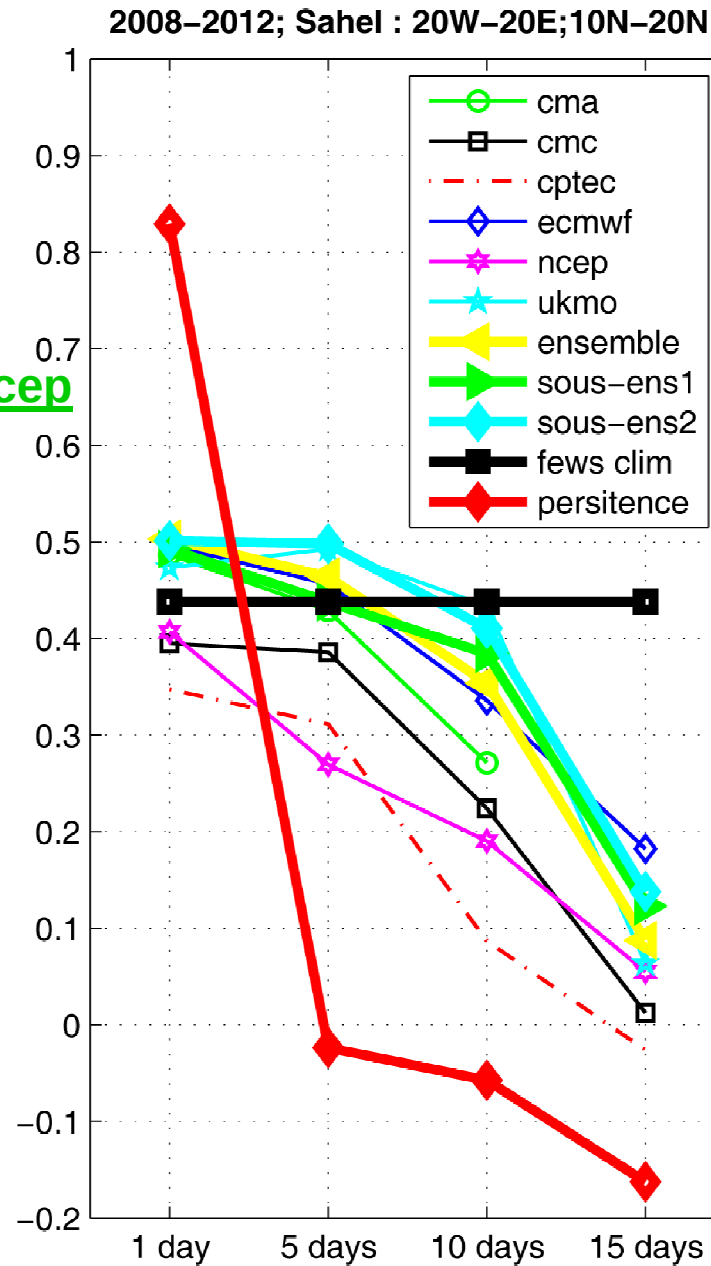
Les Corrélations sur les données filtrées entre 5 et 90 jours; période Juillet-Août (2008-2012)



Les Corrélations sur les données filtrées entre 5 et 90 jours; période Juillet-Août (2008-2012)

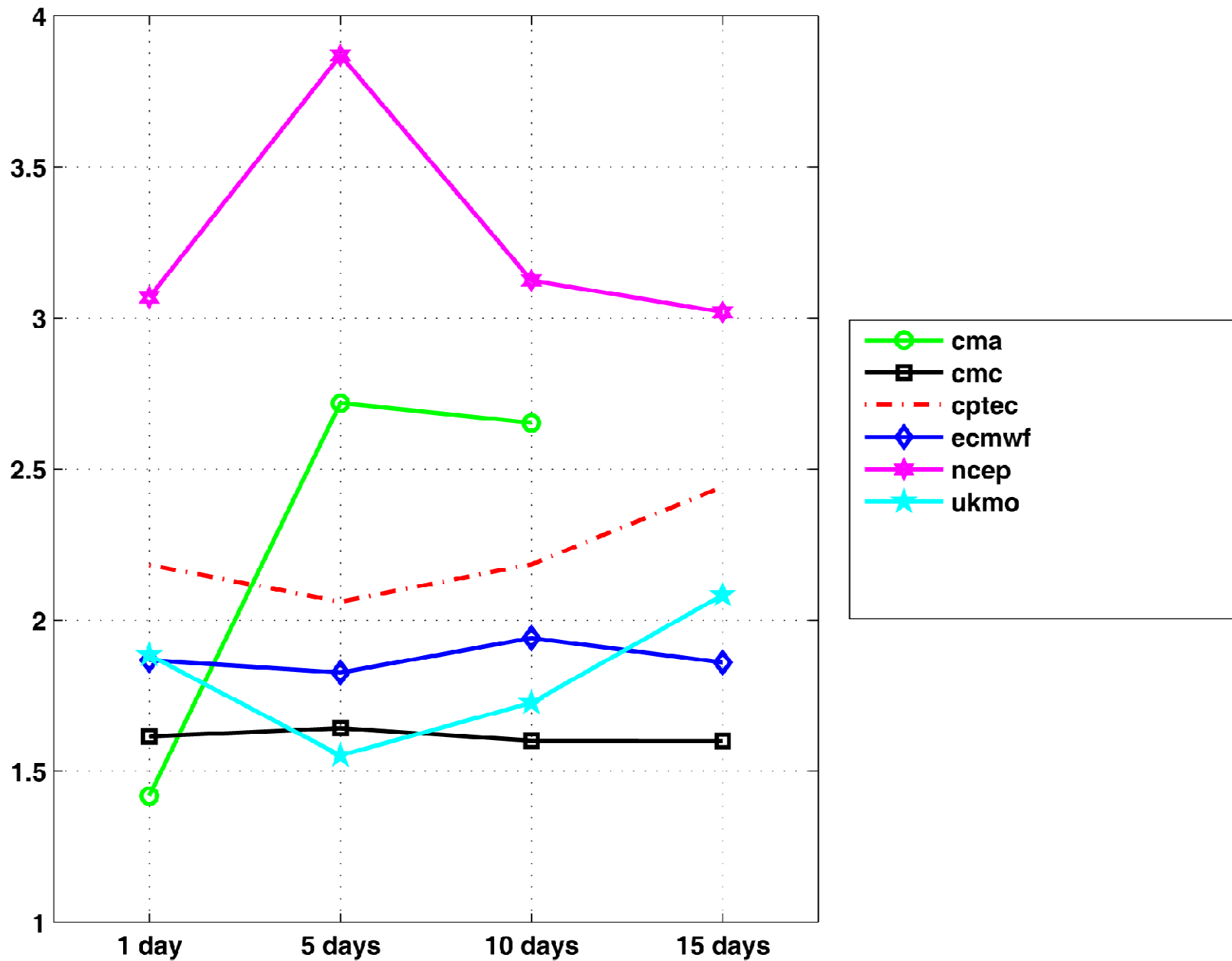
sous-ens1 :
ecmwf+ukmo+ncep

sous-ens1 :
ecmwf+ukmo

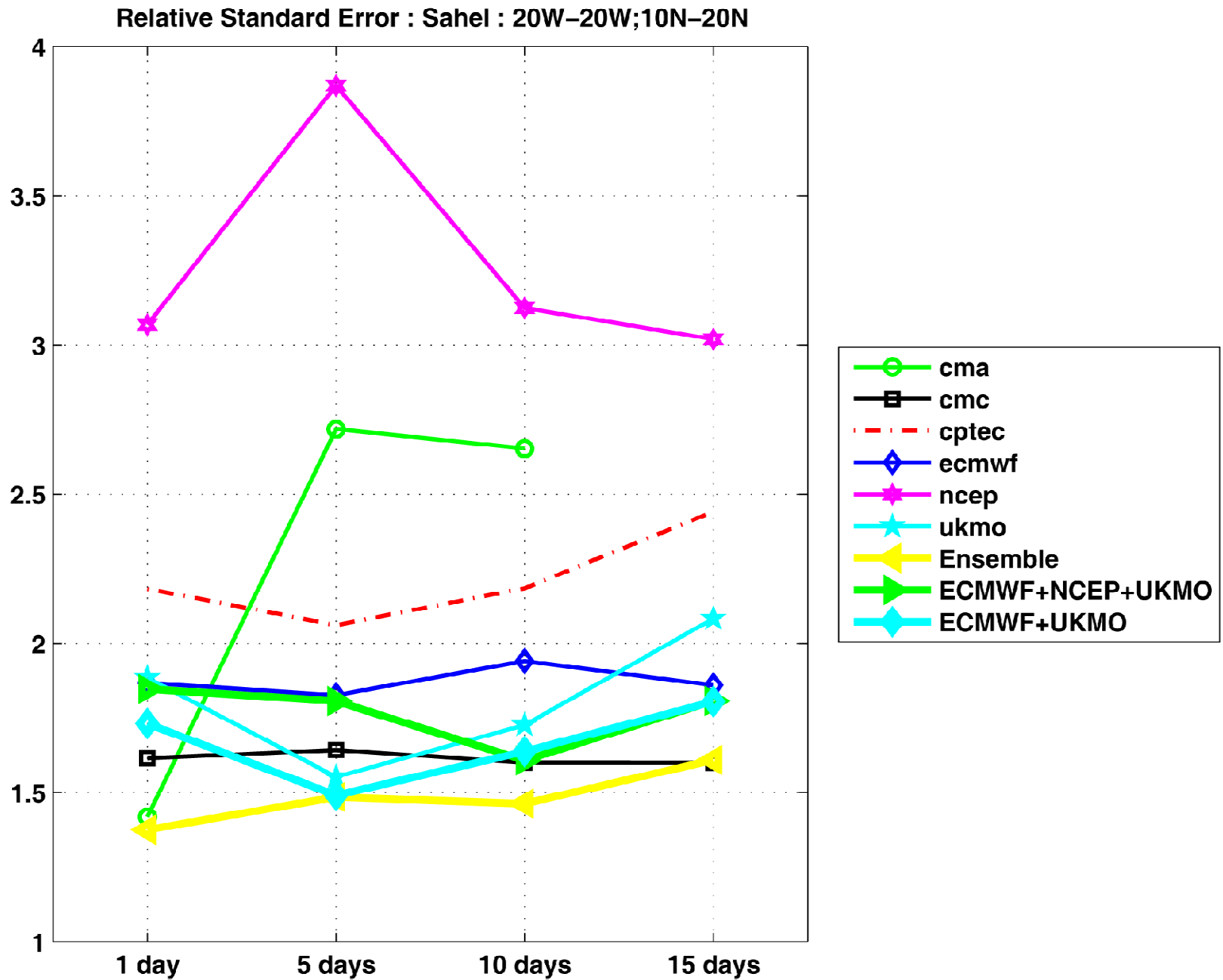


L'Erreur Relative Standard

Relative Standard Error : Sahel : 20W-20W;10N-20N

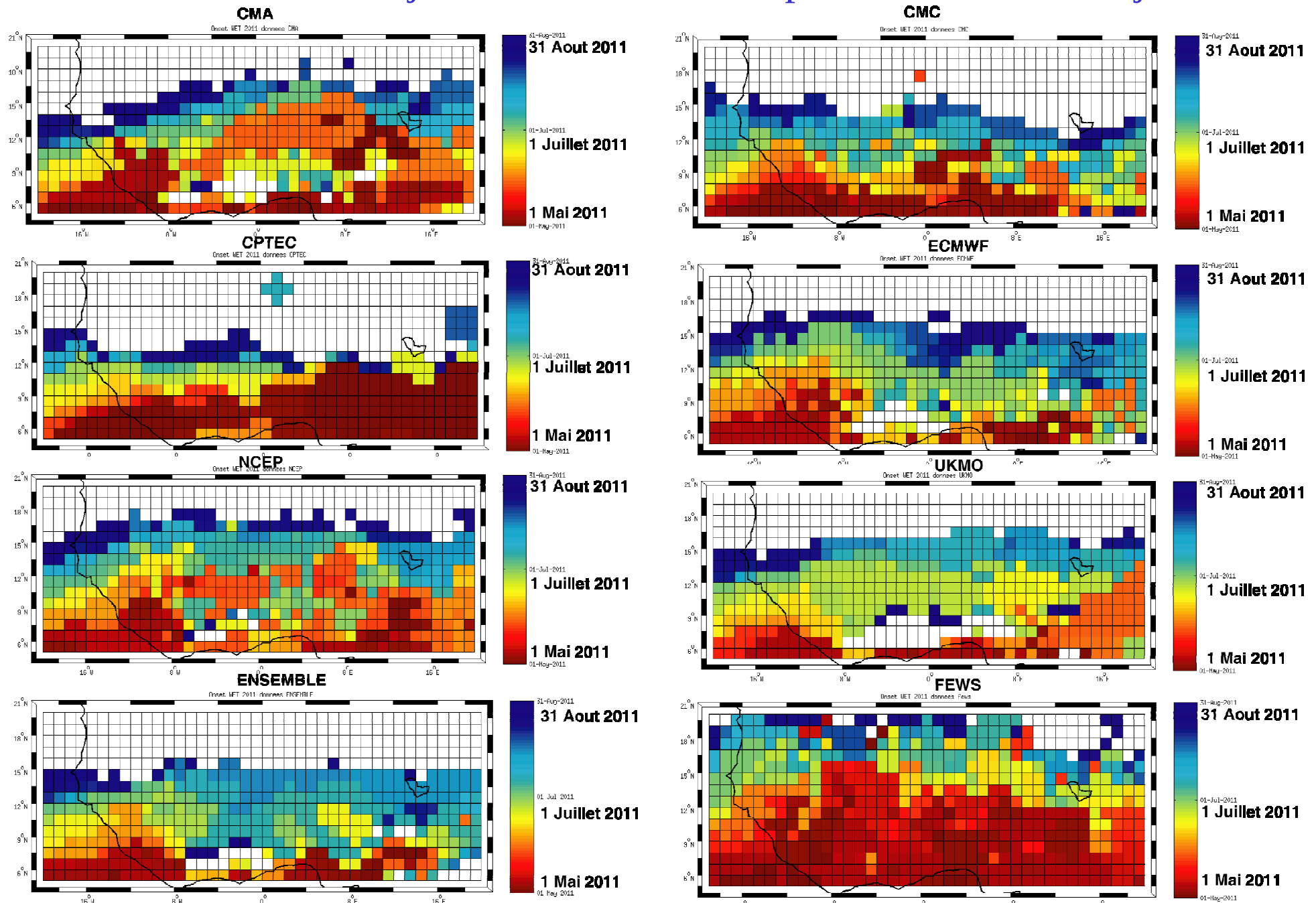


L'Erreur Relative Standard

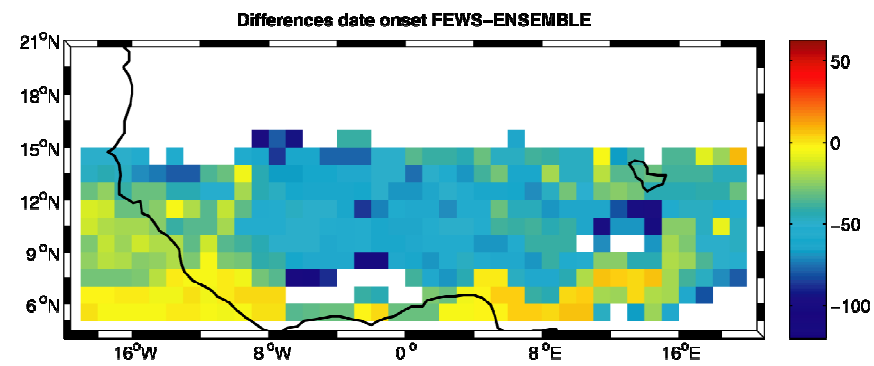
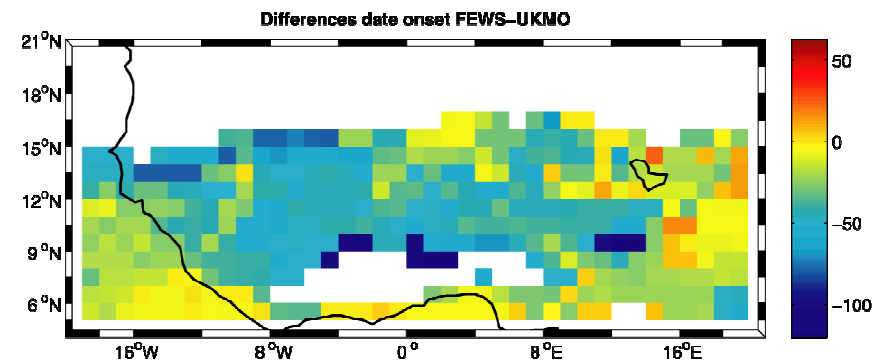
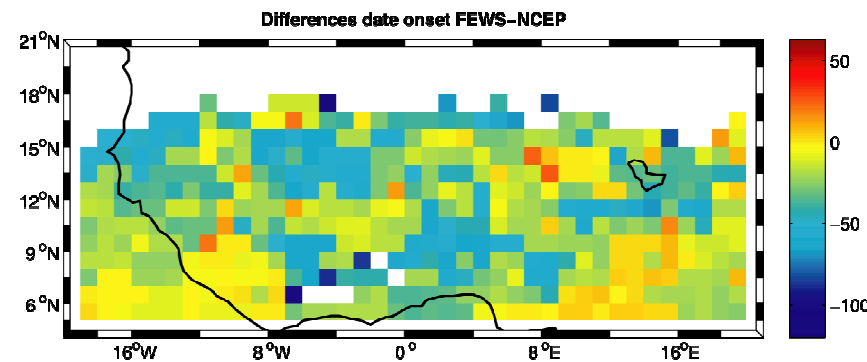
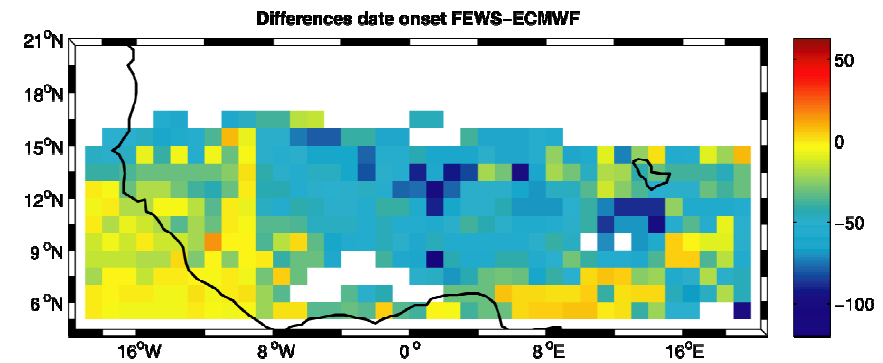
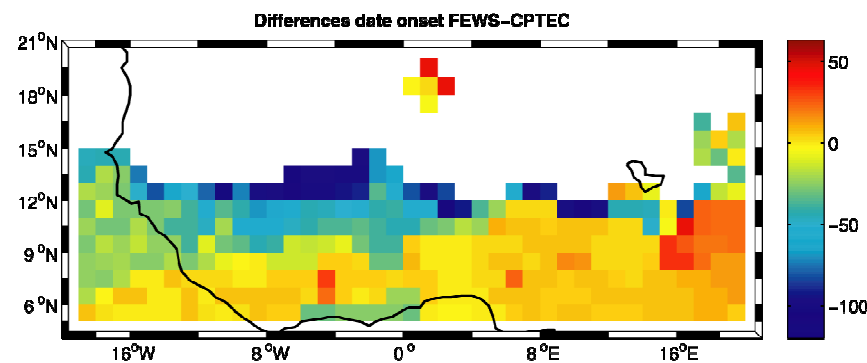
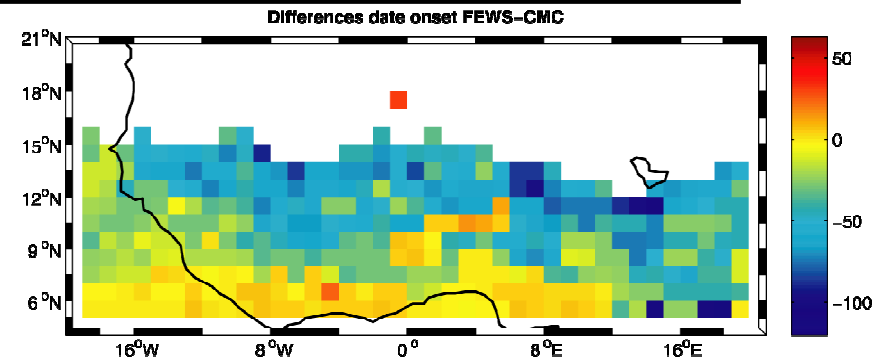
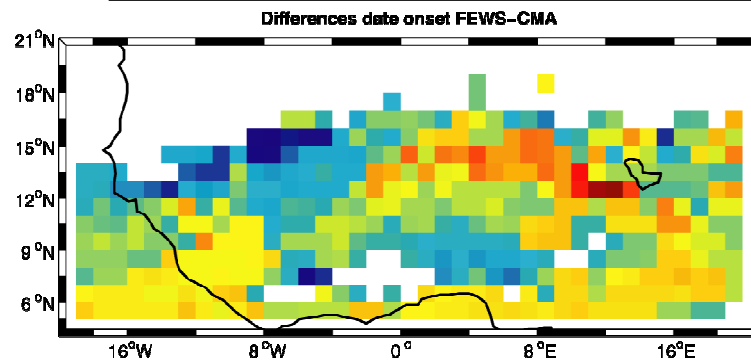


Le démarrage « local » de la saison des pluies

Critère : $PP > 10\text{mm/jour}$ non suivie d'une période sèche de 10 jours



Le démarrage « local » de la saison des pluies



Les différents démarrages régionaux de la saison des pluies sahélienne

Critères de détermination basés :

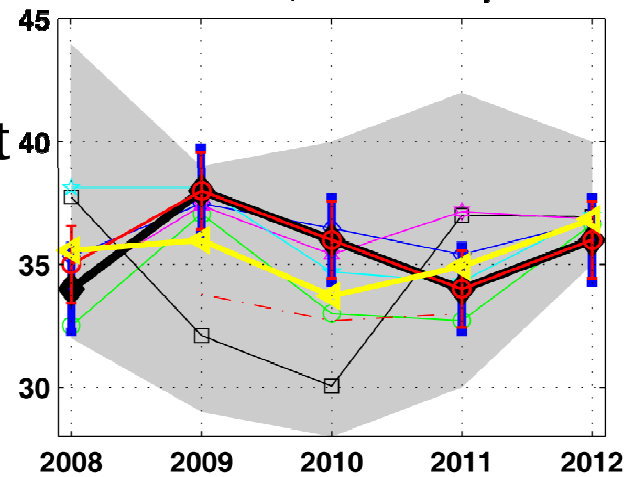
- (1) sur les précipitations uniquement (saut de la ZCIT); Fontaine, & Louvet, (2006).
- (2) sur l'OLR; Fontaine et *al* (2008)
- (3) sur l'ESH et le WAMI; Vellinga et *al* (2012).

Travail à l'échelle pentadaire

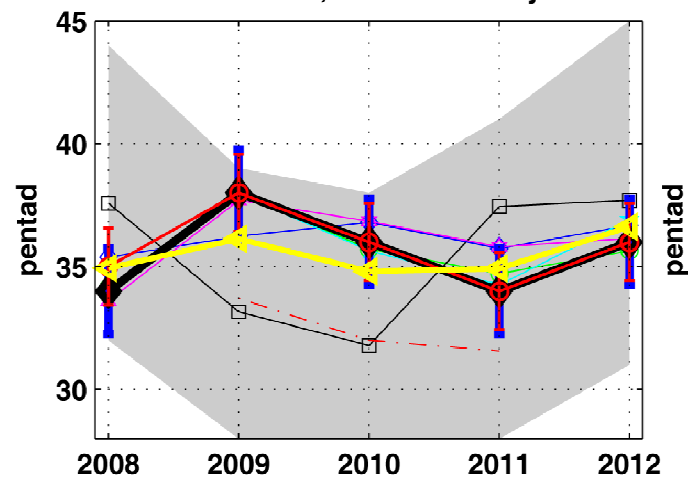
17 juillet
22 juin

Onset (1) basé sur les précipitations uniquement (saut de la ZCIT)

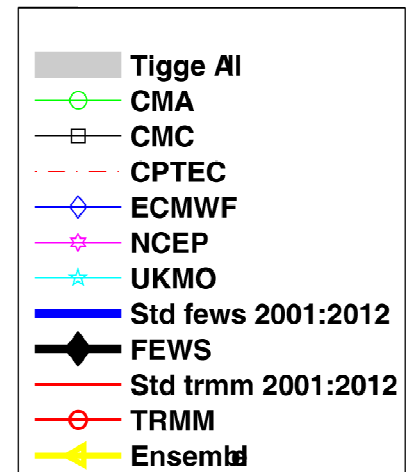
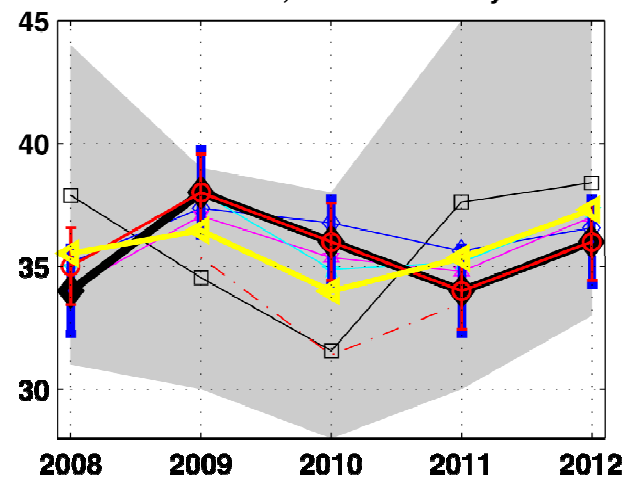
Onset IDD, forecast 5 days



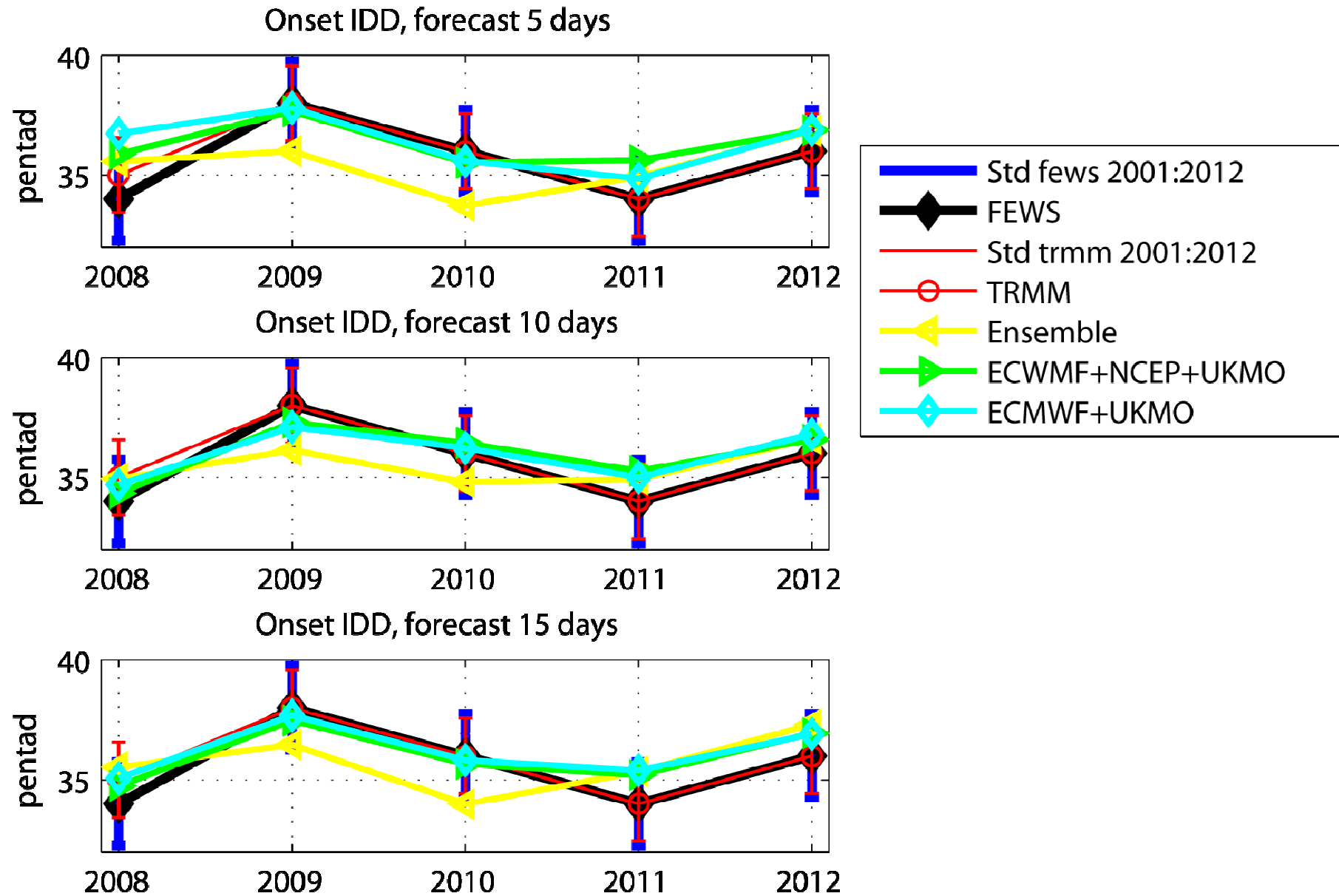
Onset IDD, forecast 10 days



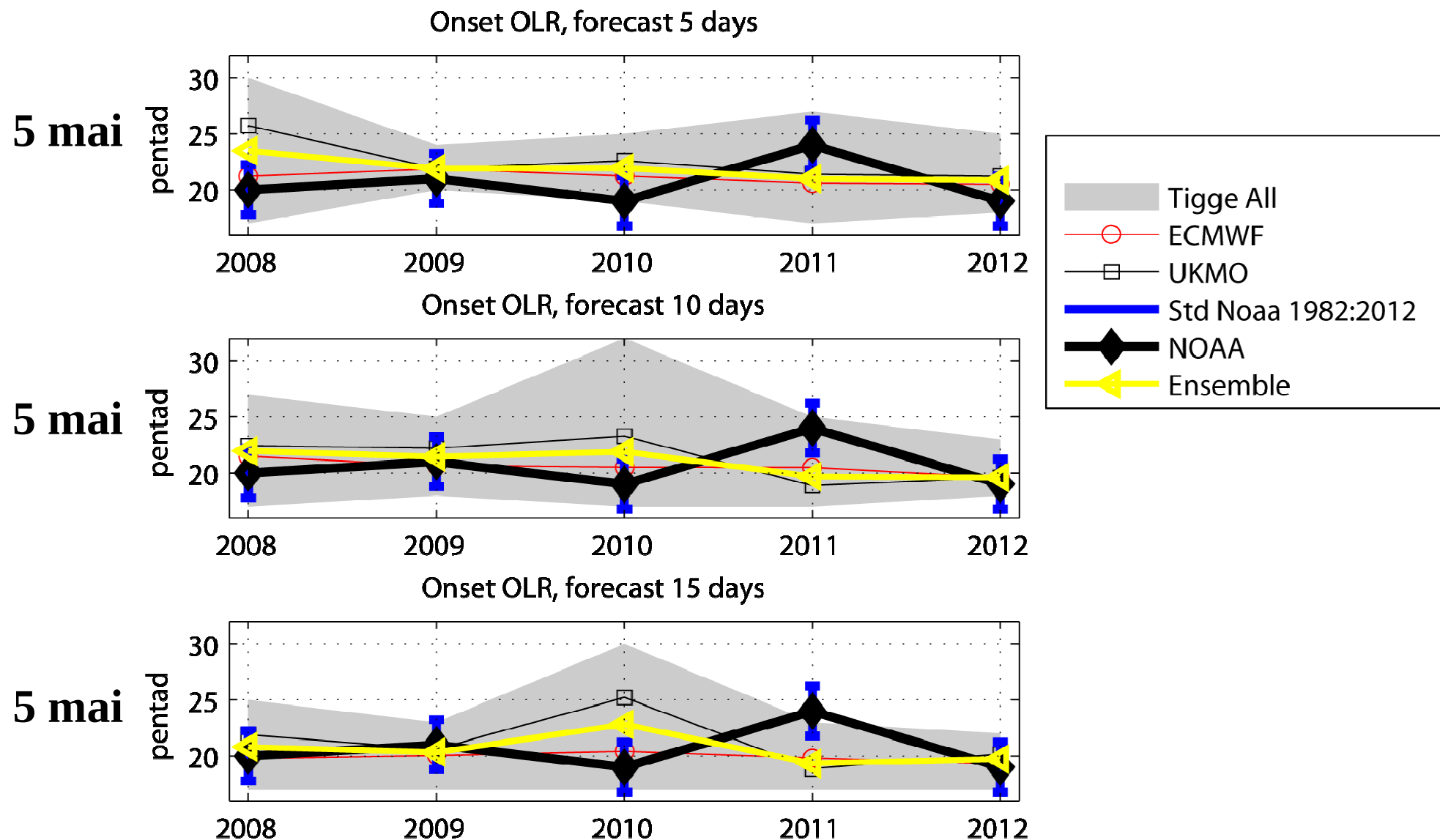
Onset IDD, forecast 15 days



Onset (1) basé sur les précipitations uniquement (saut de la ZCIT)



Onset: (2) basé sur l'OLR.

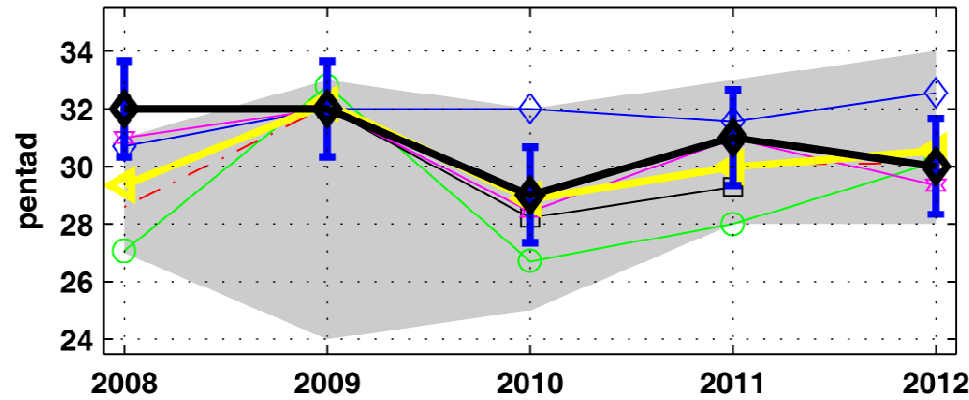


Onset: (3) basé sur l'ESH et le WAMI

28 mai

8 mai

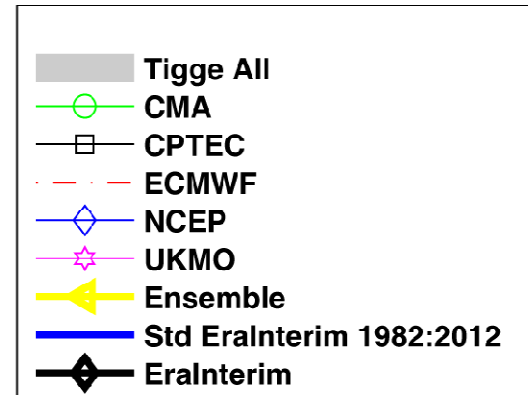
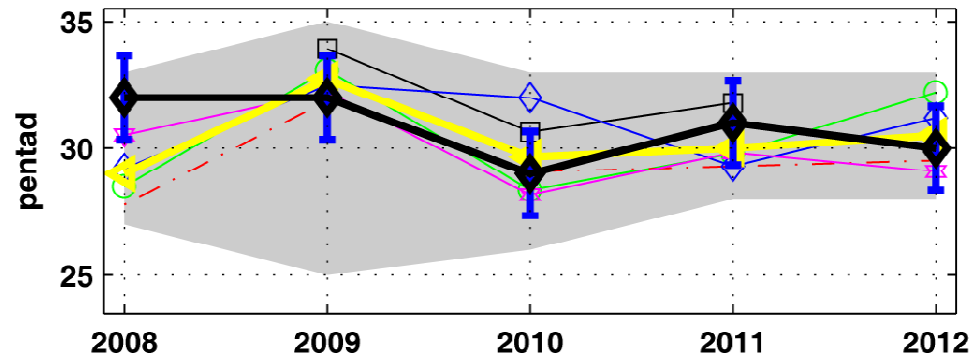
Onset ESH WAMI, forecast 5 days



28 mai

8 mai

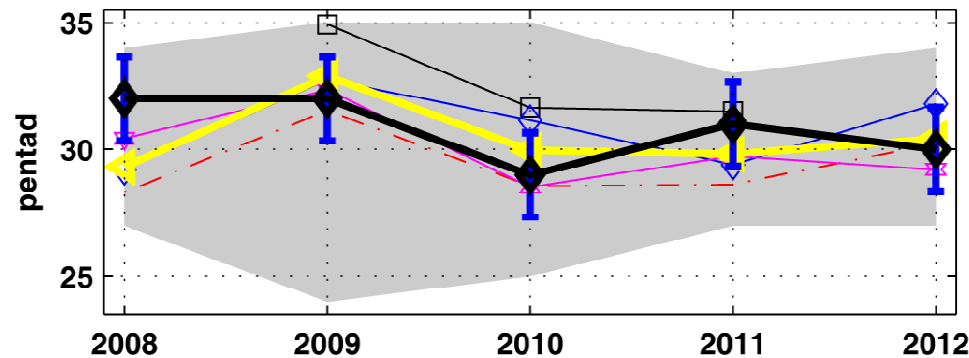
Onset ESH WAMI, forecast 10 days



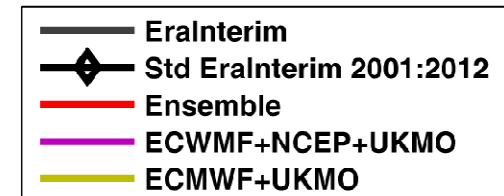
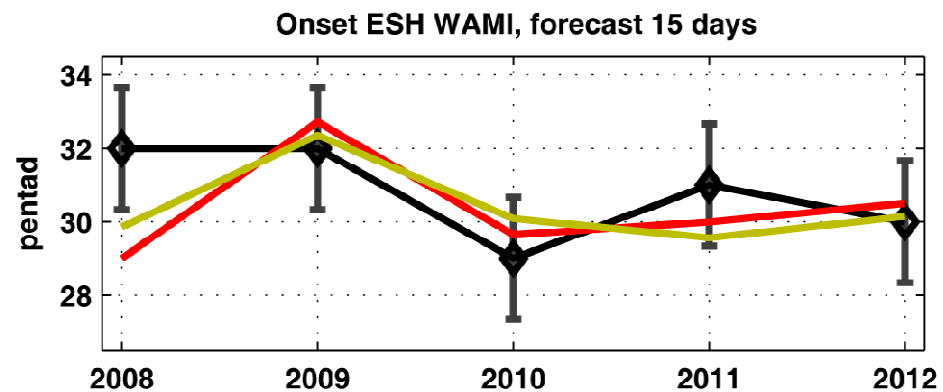
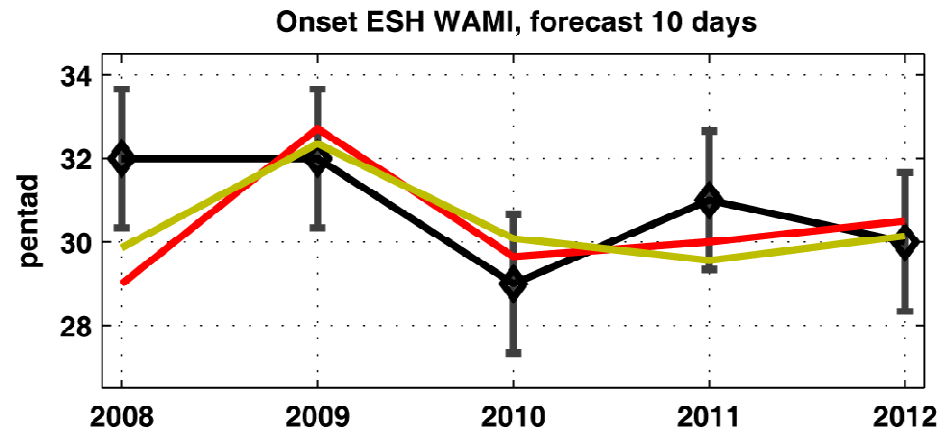
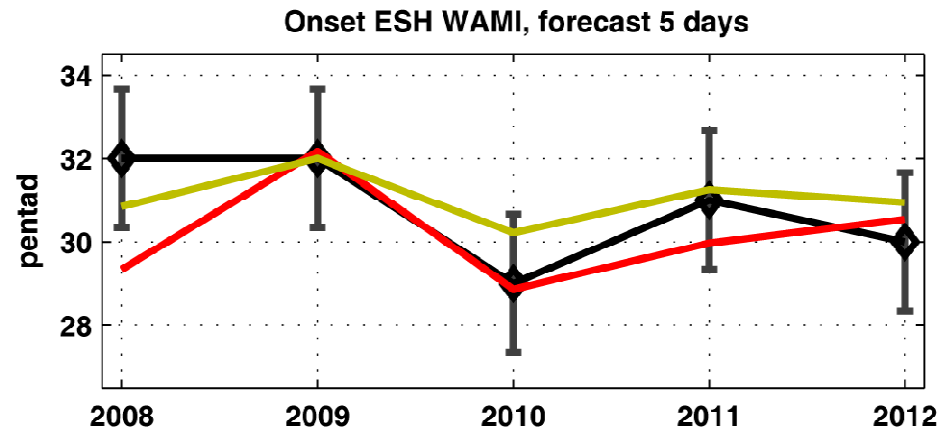
28 mai

8 mai

Onset ESH WAMI, forecast 15 days



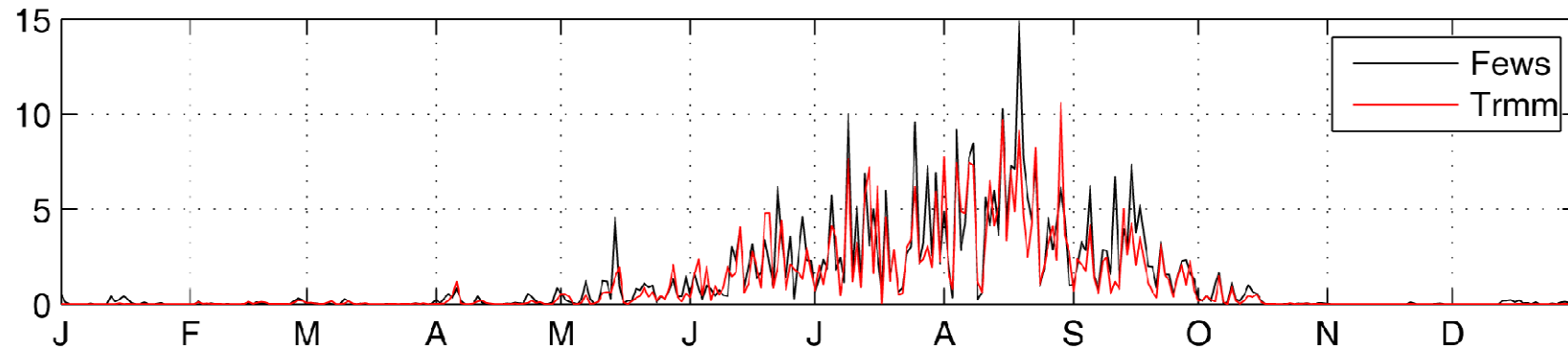
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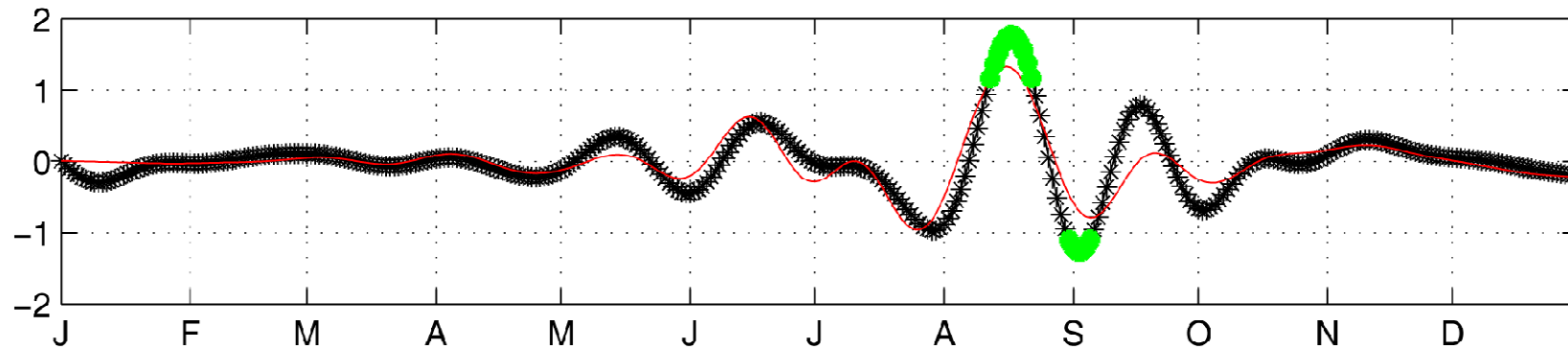
L' Oscillation Madden-Julian

Travail sur un indice sahélien

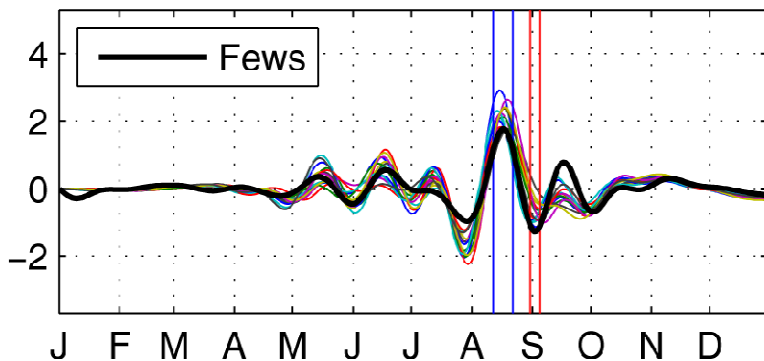
Raw data; 2011



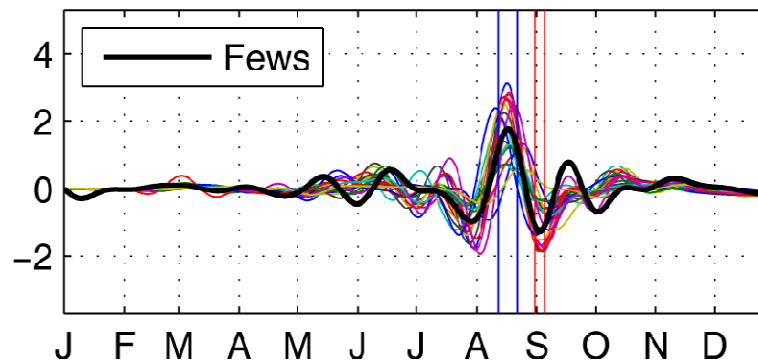
Filtered between 25 and 90 days; 2011



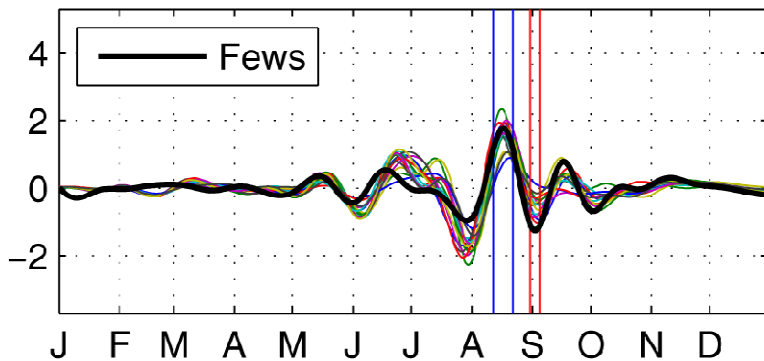
CMA 2011, 5 days ; 14 runs



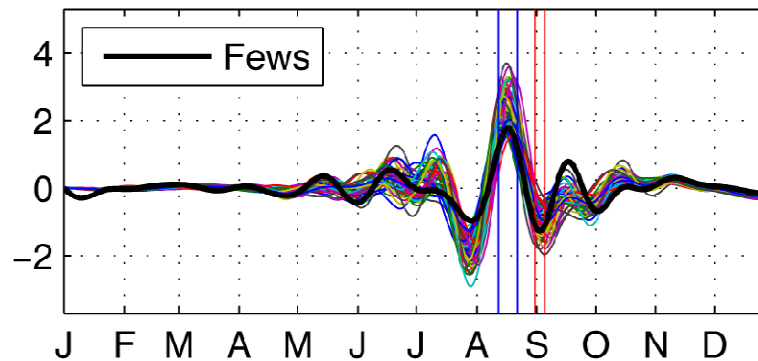
CMC 2011, 5 days ; 20 runs



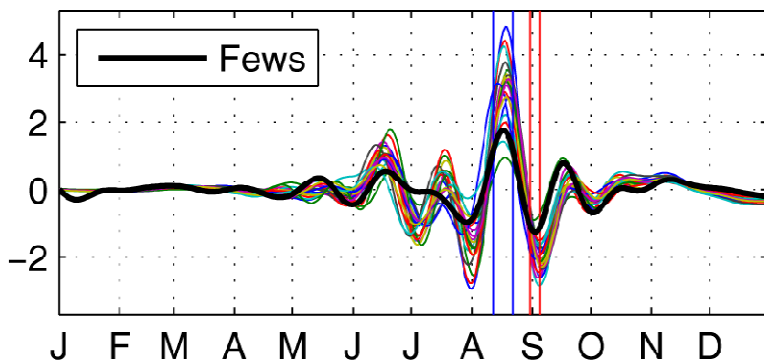
CPTEC 2011, 5 days ; 14 runs



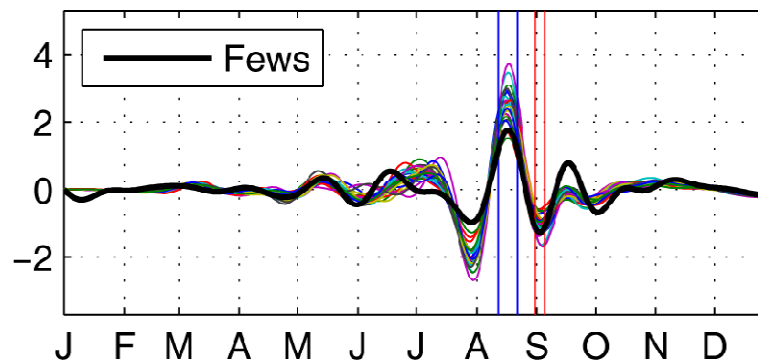
ECMWF 2011, 5 days ; 50 runs



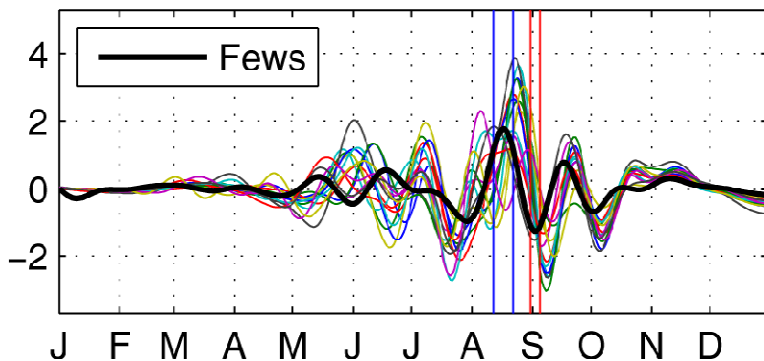
NCEP 2011, 5 days ; 20 runs



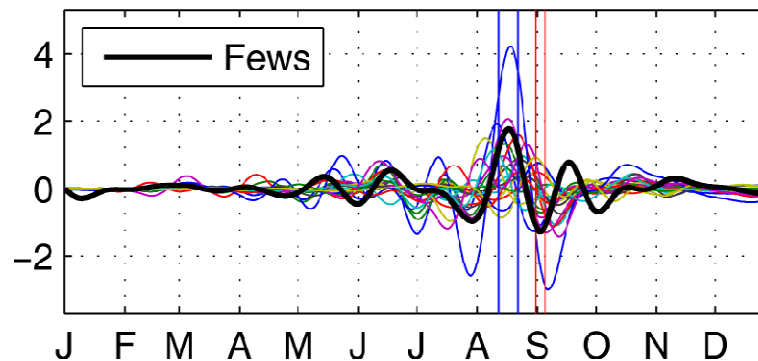
UKMO 2011, 5 days ; 23 runs



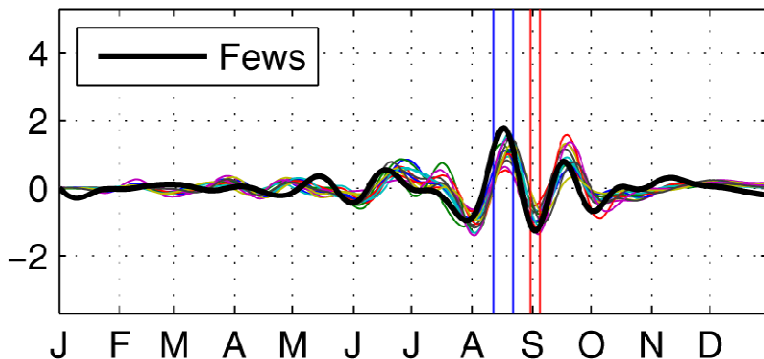
CMA 2011, 10 days ; 14 runs



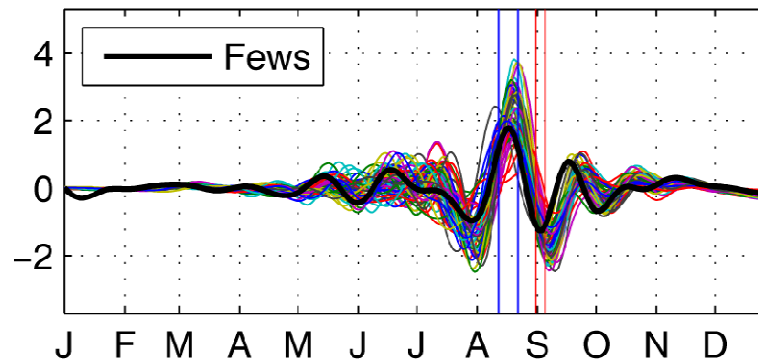
CMC 2011, 10 days ; 20 runs



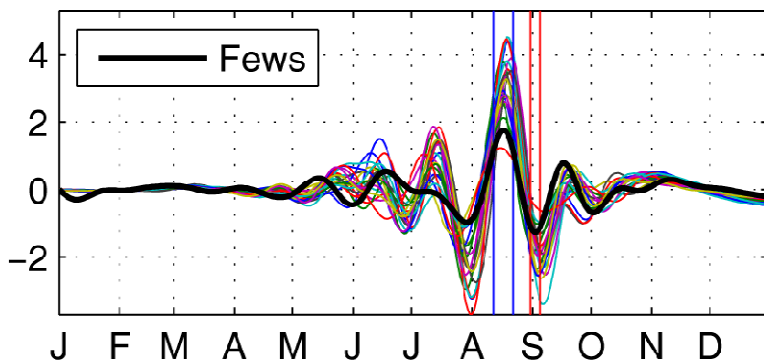
CPTC 2011, 10 days ; 14 runs



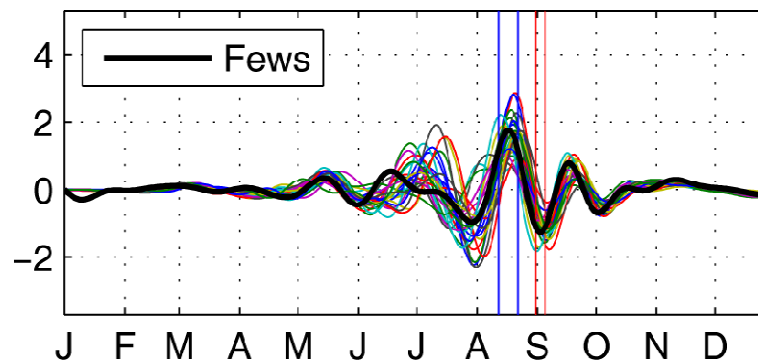
ECMWF 2011, 10 days ; 50 runs



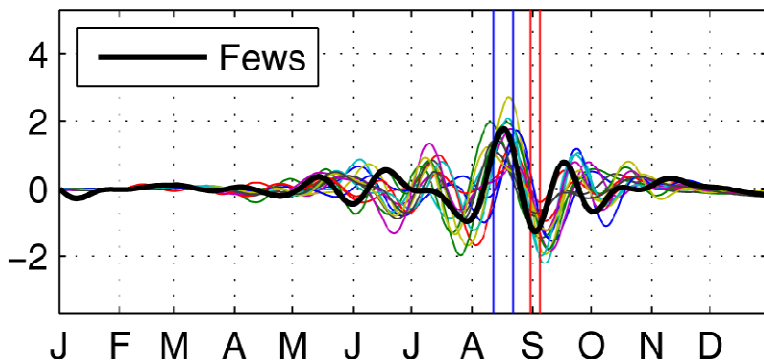
NCEP 2011, 10 days ; 20 runs



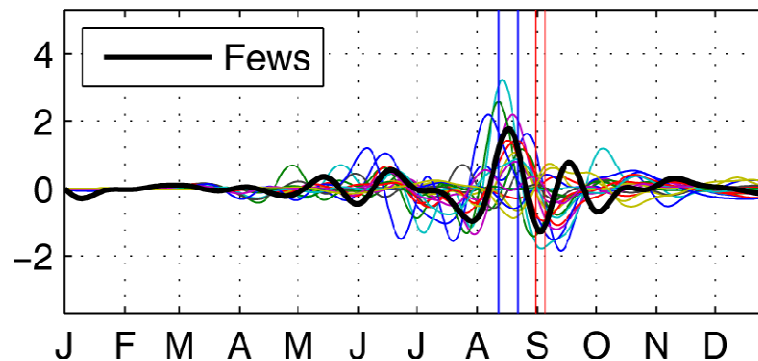
UKMO 2011, 10 days ; 23 runs



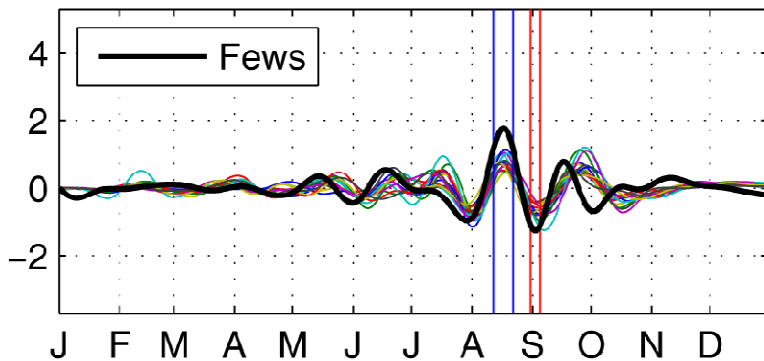
CMA 2011, 15 days ; 14 runs



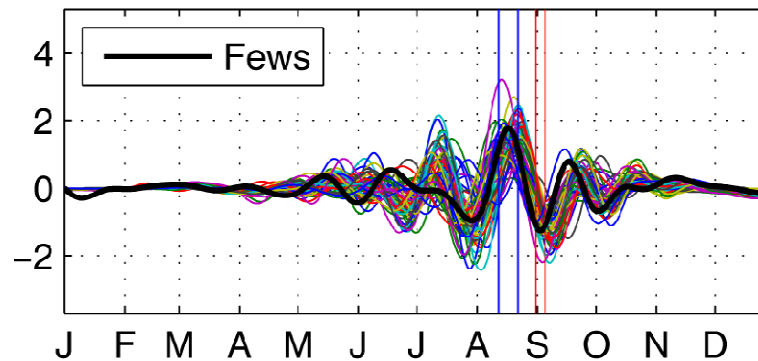
CMC 2011, 15 days ; 20 runs



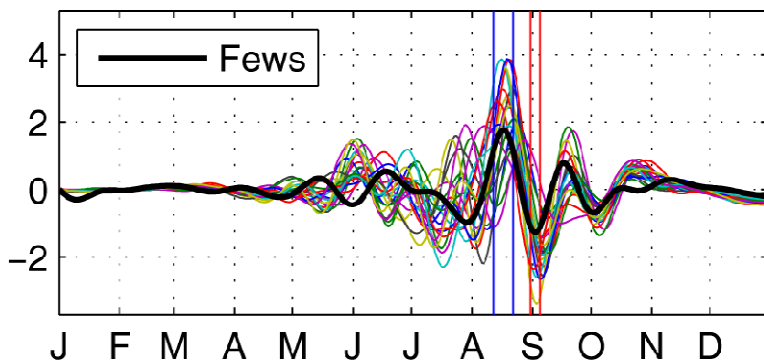
CPTEC 2011, 15 days ; 14 runs



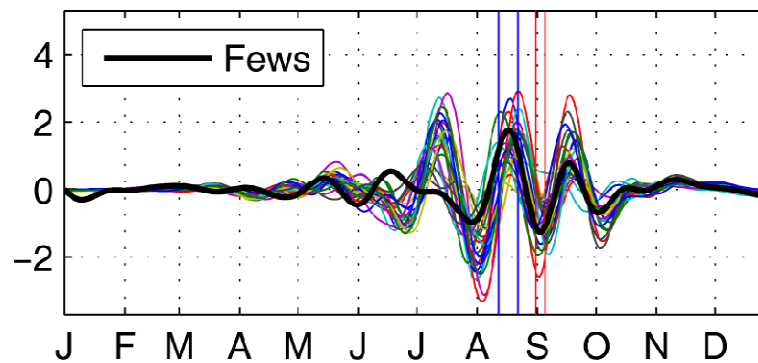
ECMWF 2011, 15 days ; 50 runs

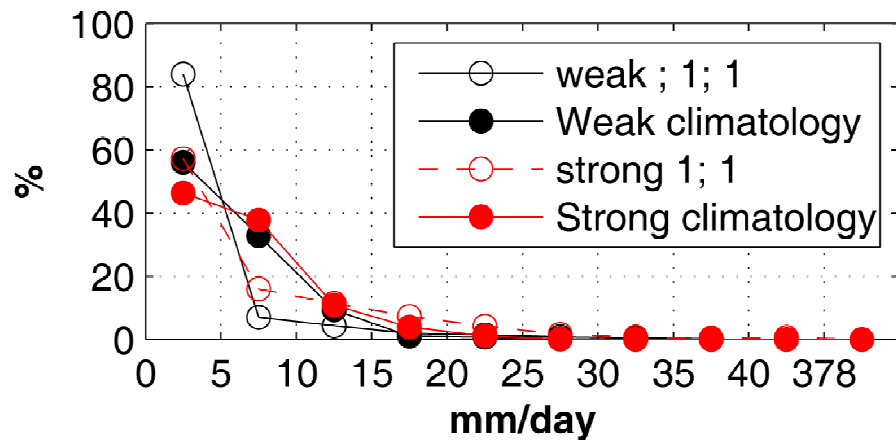
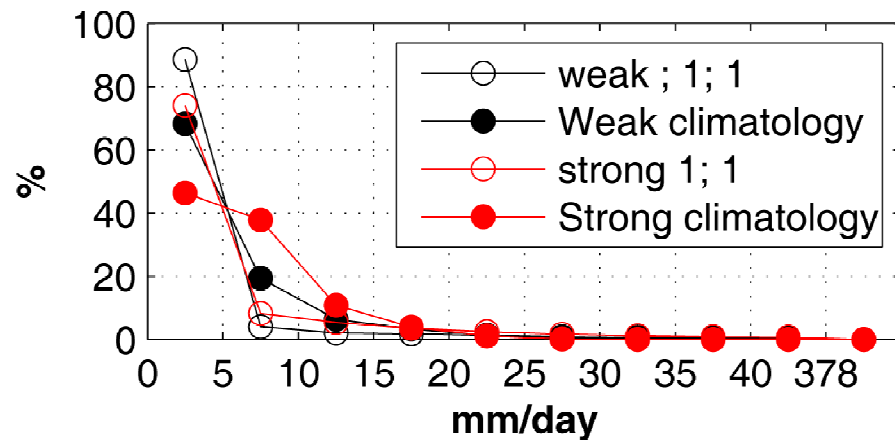
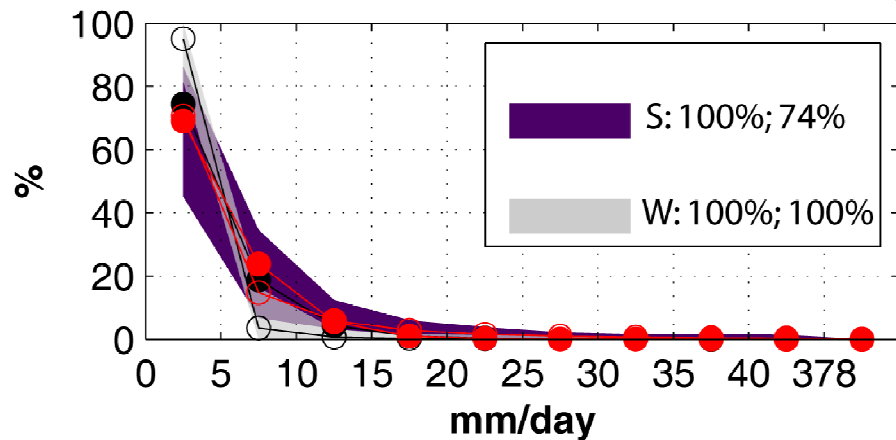
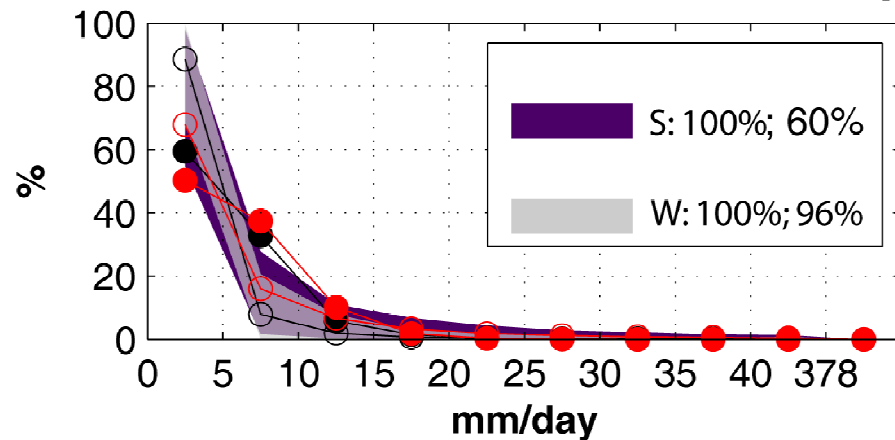
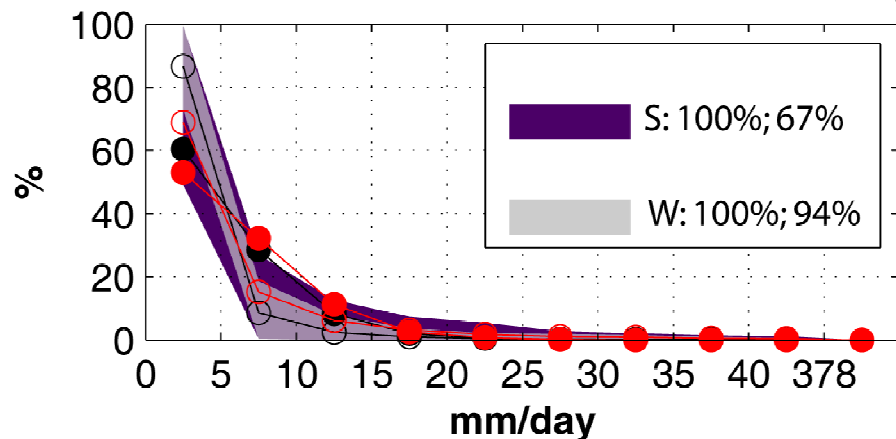
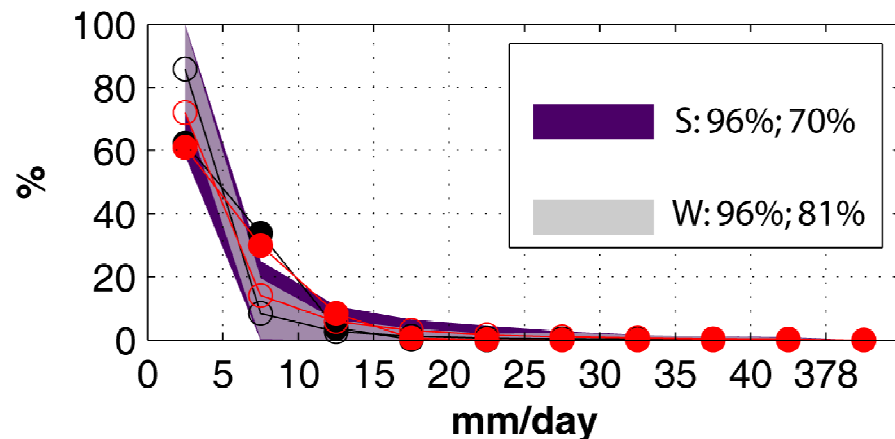


NCEP 2011, 15 days ; 20 runs

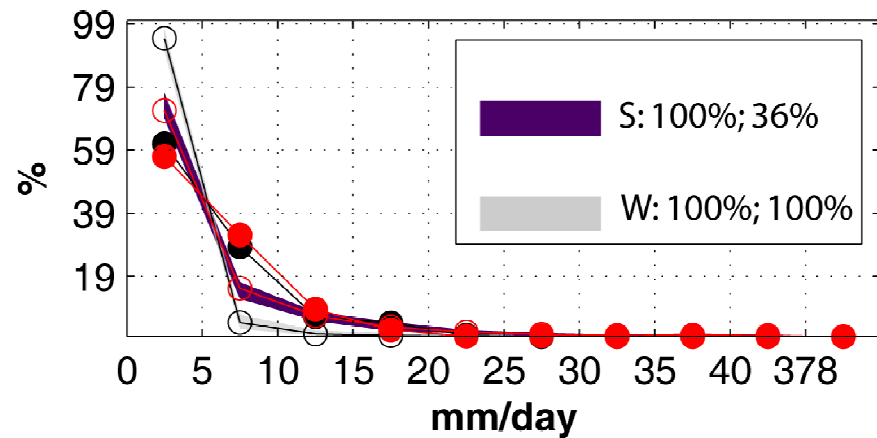


UKMO 2011, 15 days ; 23 runs

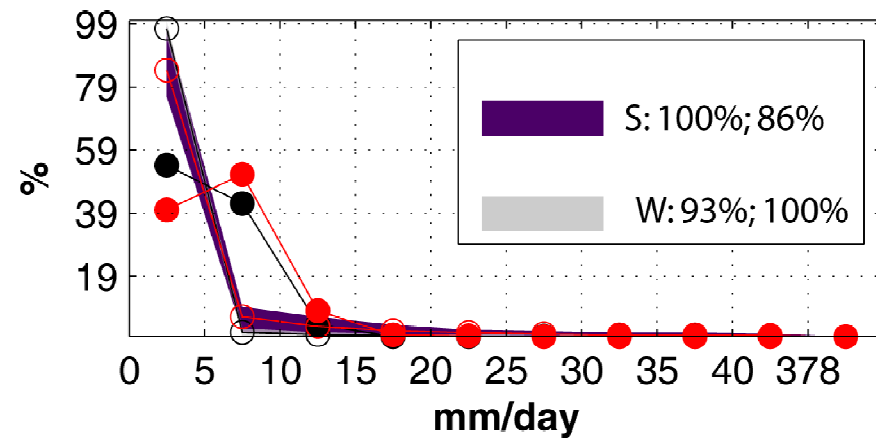


Fews 2011**Trmm 2011****Ensemble 2011, forecast 1 day****Ensemble 2011, forecast 5 days****Ensemble 2011, forecast 10 days****Ensemble 2011, forecast 15 days**

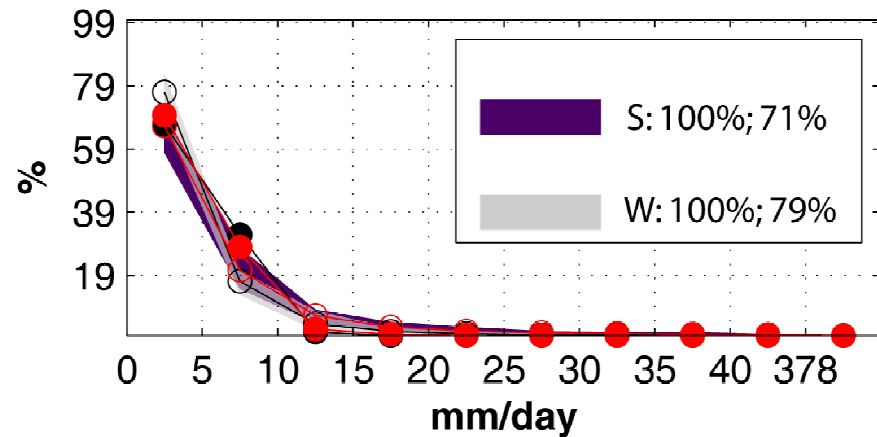
CMA 2011, 5 days



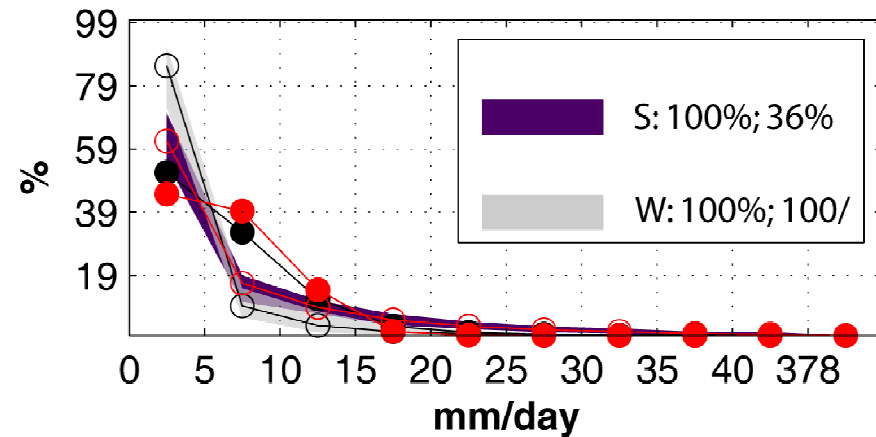
CMC 2011, 5 days



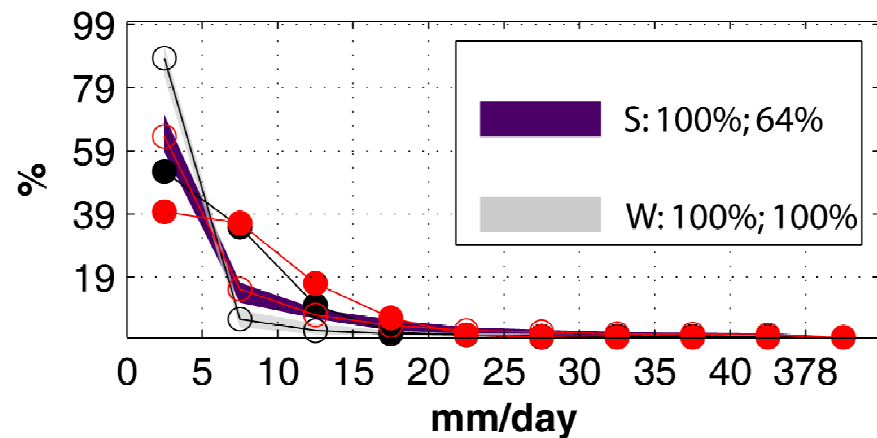
CPTEC 2011, 5 days



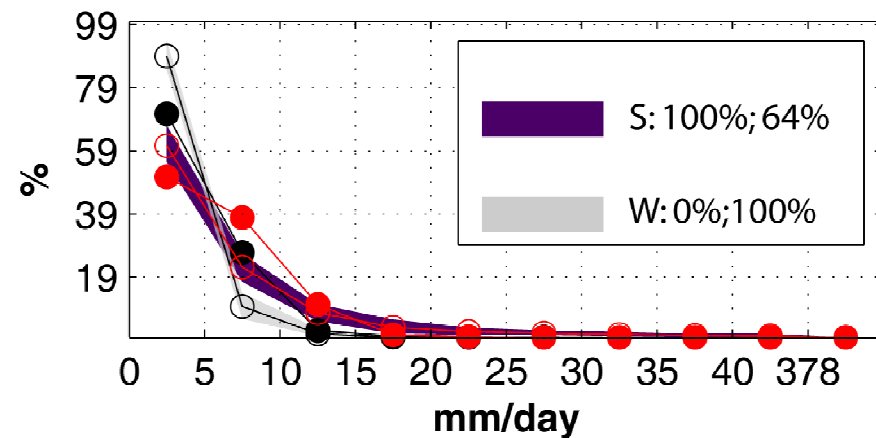
ECMWF 2011, 5 days



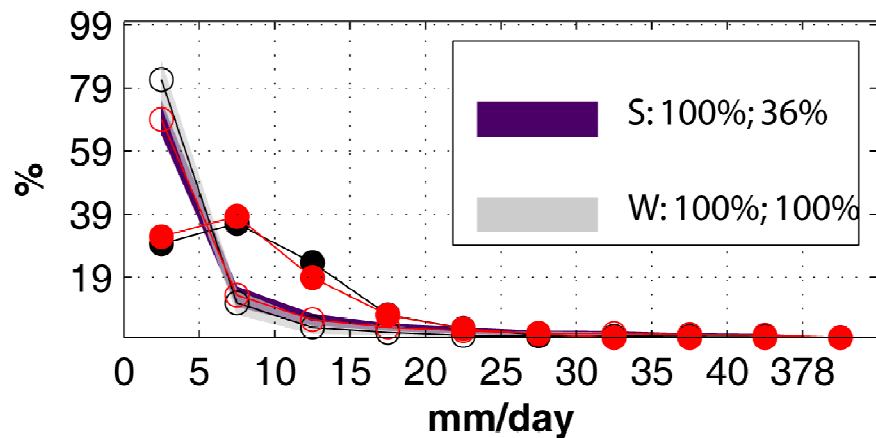
NCEP 2011, 5 days



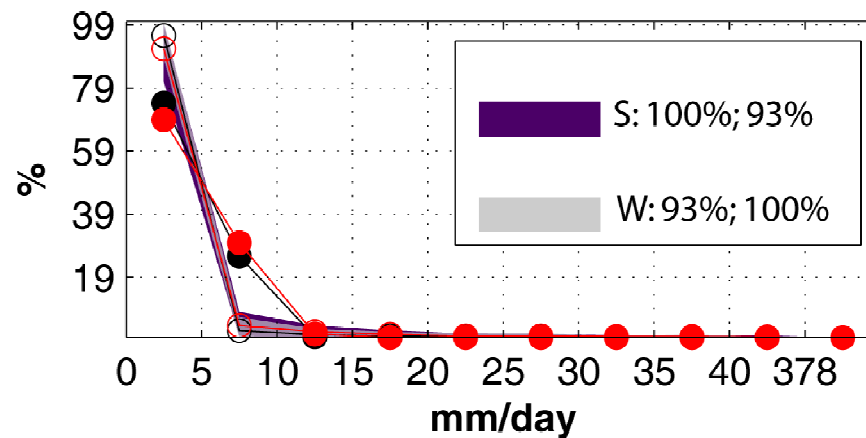
UKMO 2011, 5 days



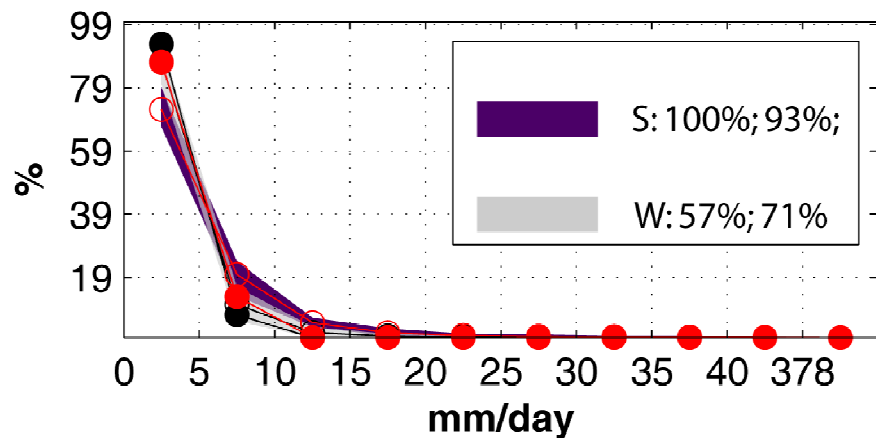
CMA 2011, 10 days



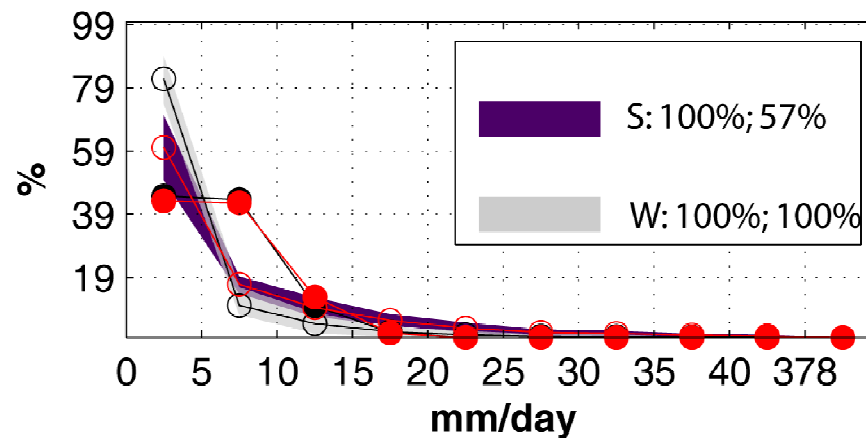
CMC 2011, 10 days



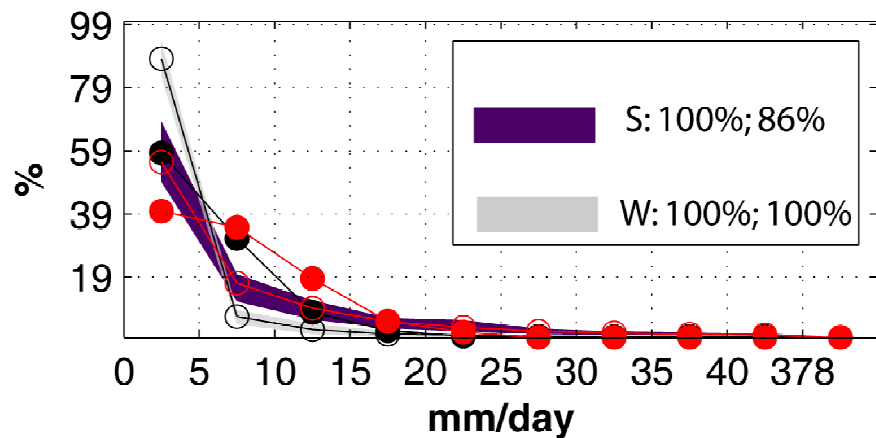
CPTEC 2011, 10 days



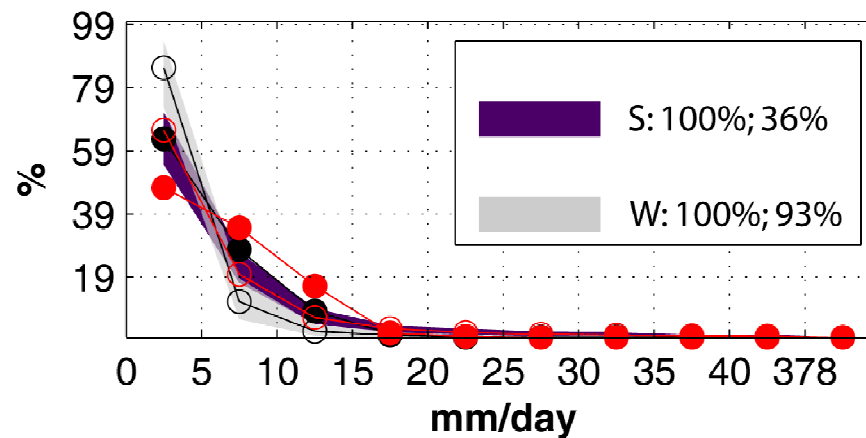
ECMWF 2011, 10 days



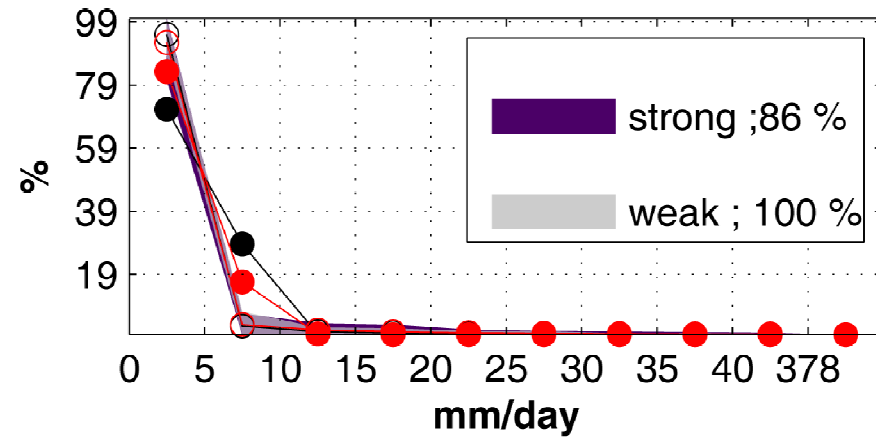
NCEP 2011, 10 days



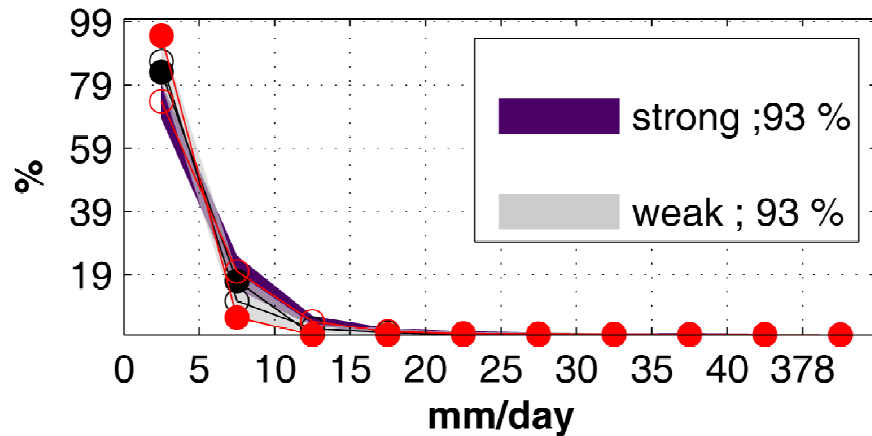
UKMO 2011, 10 days



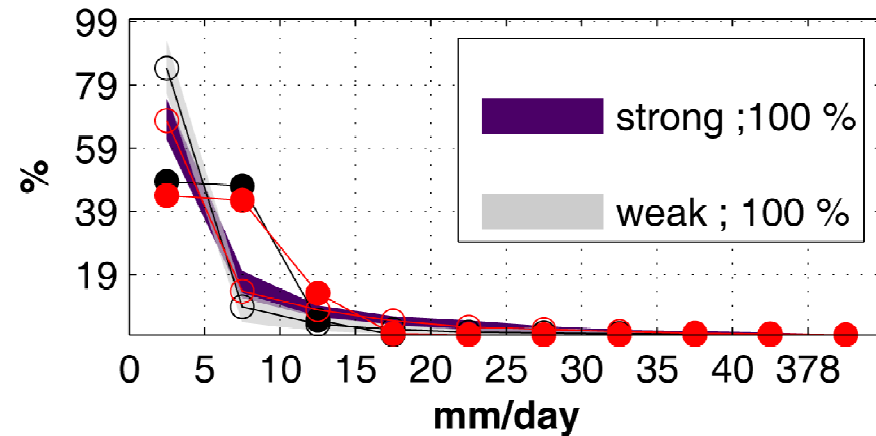
CMC 2011, 15 days



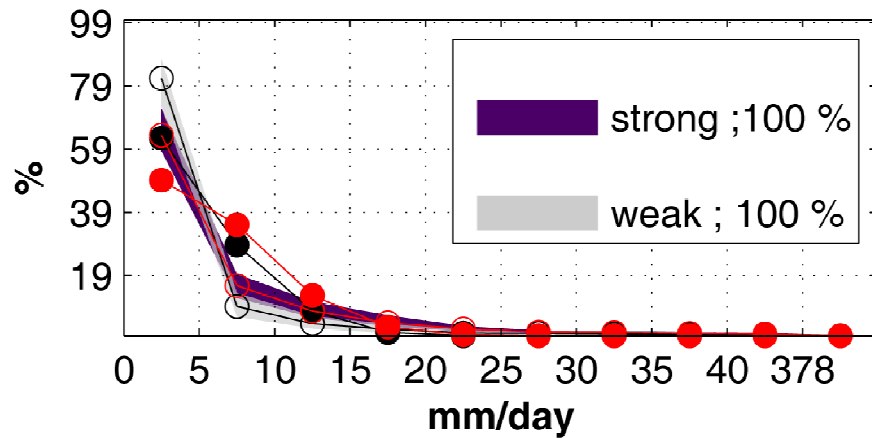
CPTEC 2011, 15 days



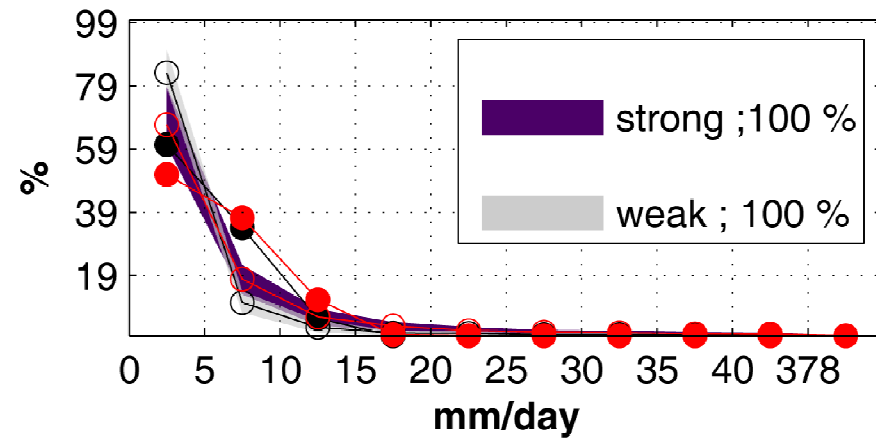
ECMWF 2011, 15 days



NCEP 2011, 15 days



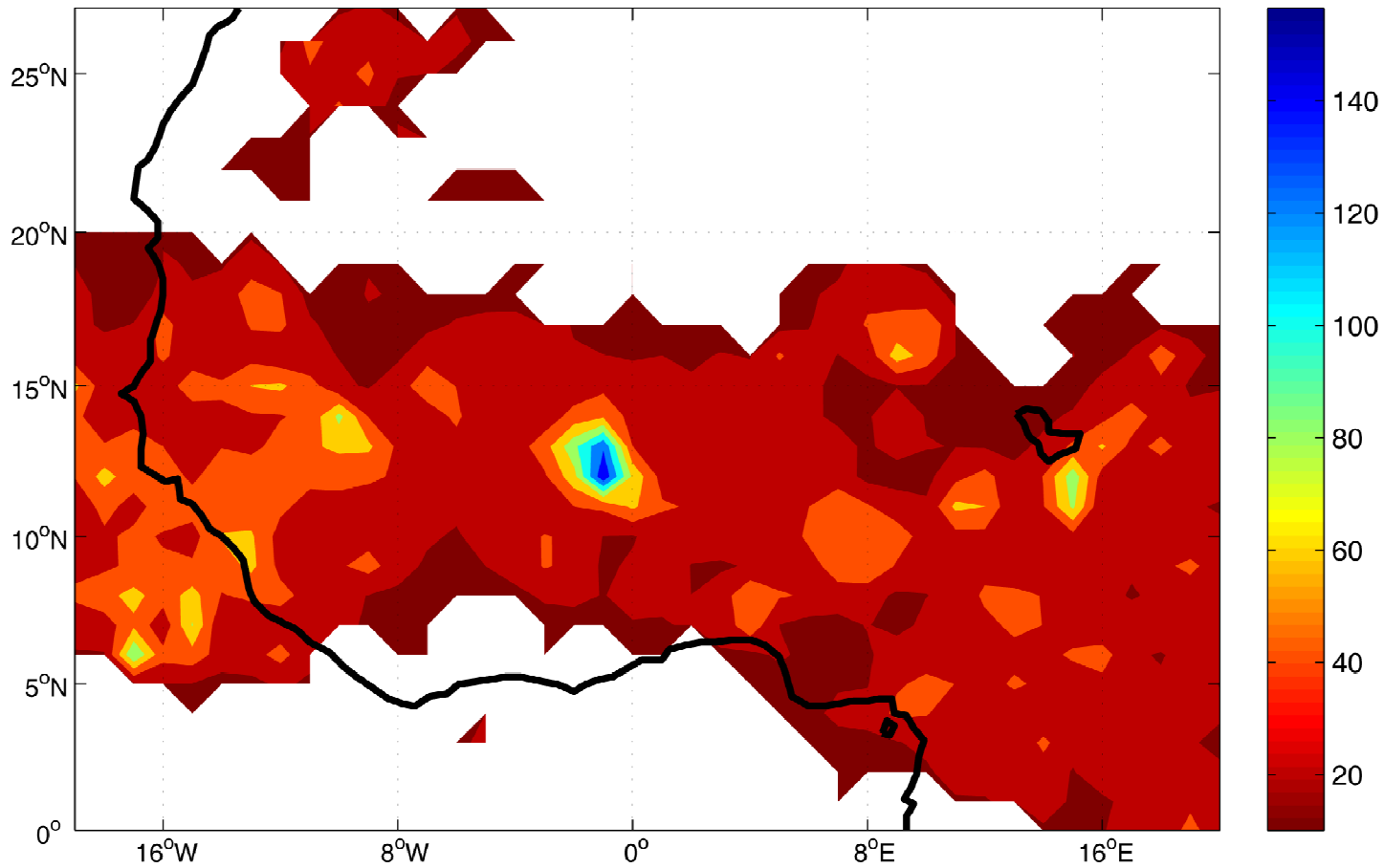
UKMO 2011, 15 days



L'événement pluvieux de Ouagadougou :

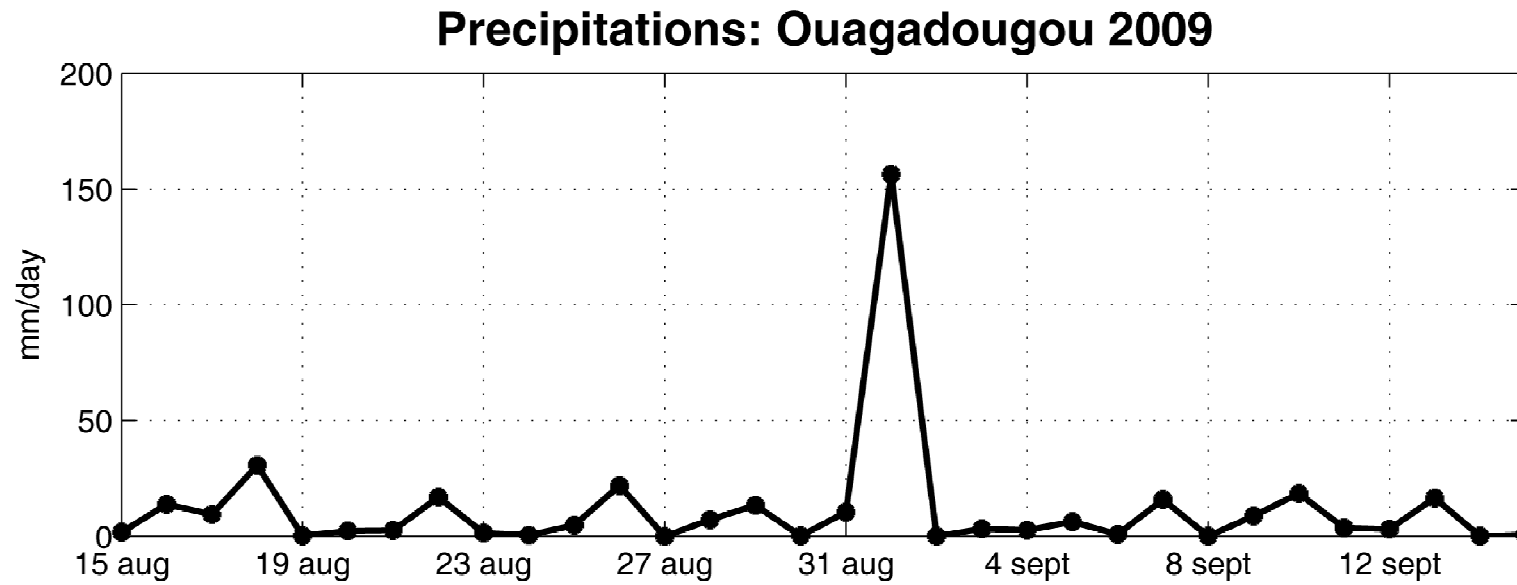
1^{er} septembre 2009

Maximum quotidien de précipitations entre
le 15 août 2009 et le 15 septembre 2009



L'événement pluvieux de Ouagadougou :

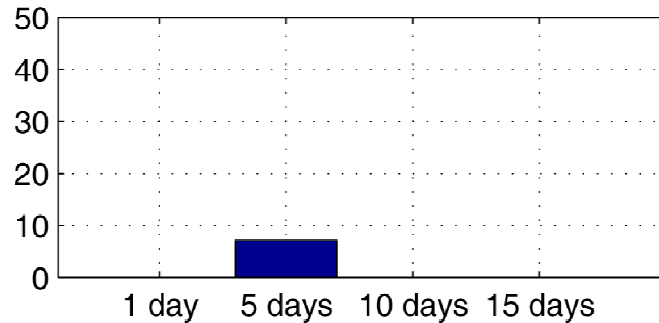
1^{er} septembre 2009



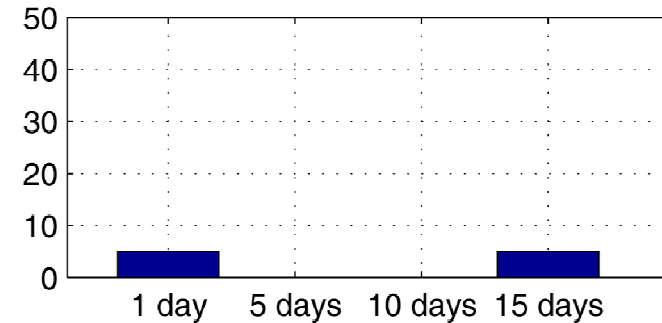
Pourcentage de run donnant la pluie du 1^{er} septembre > 40%

du total 15 août : 14 septembre

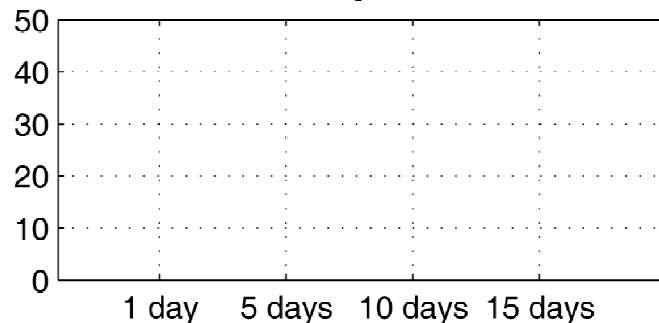
CMA : 1st sept 2009; 14 runs



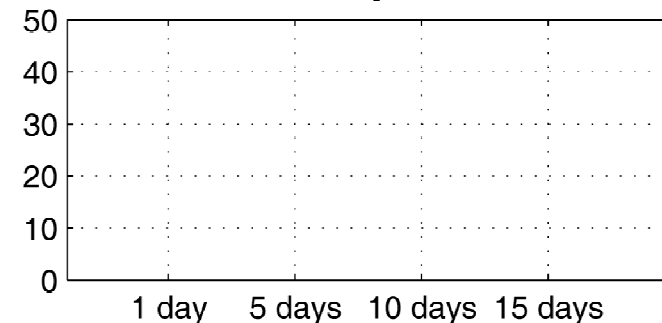
CMC : 1st sept 2009; 20 runs



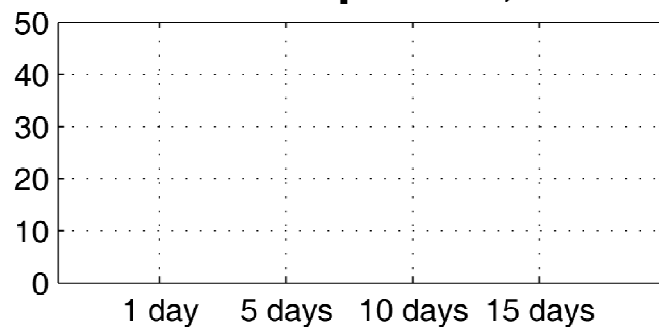
CPTEC : 1st sept 2009; 14 runs



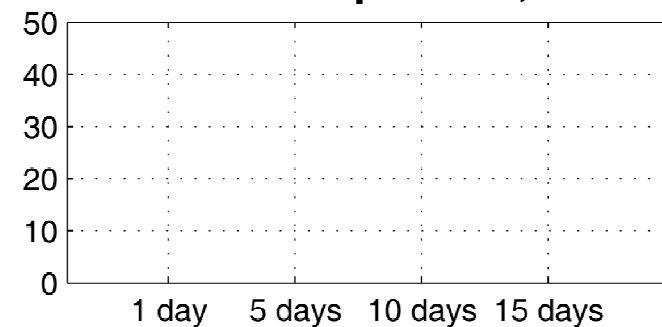
ECMWF : 1st sept 2009; 50 runs



NCEP : 1st sept 2009; 20 runs



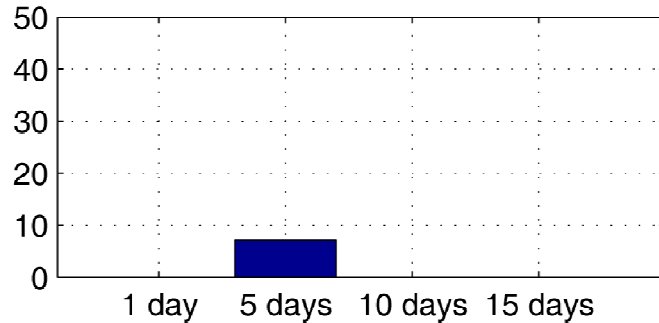
UKMO : 1st sept 2009; 23 runs



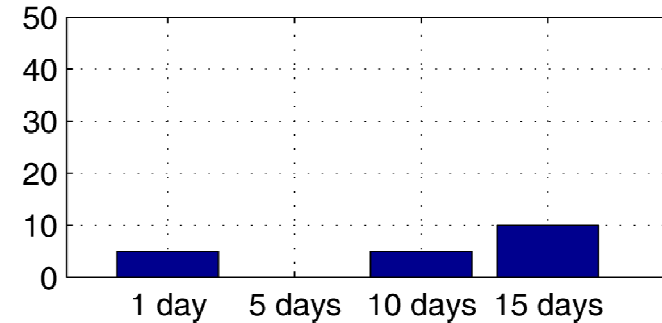
Pourcentage de run donnant la pluie du 1^{er} septembre > 30%

du total 15 août : 14 septembre

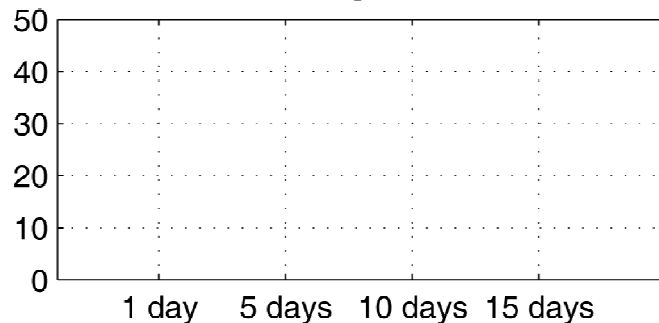
CMA : 1st sept 2009; 14 runs



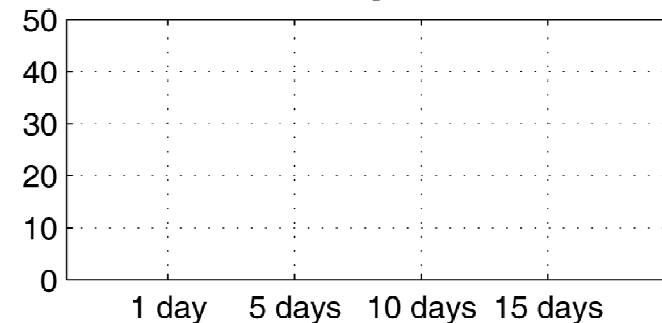
CMC : 1st sept 2009; 20 runs



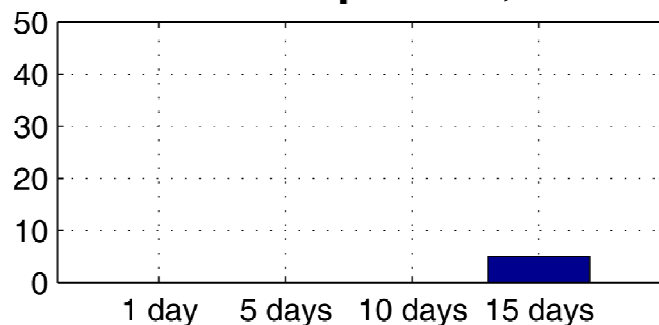
CPTEC : 1st sept 2009; 14 runs



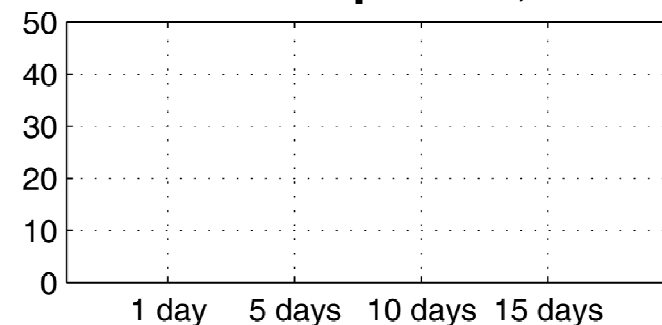
ECMWF : 1st sept 2009; 50 runs



NCEP : 1st sept 2009; 20 runs



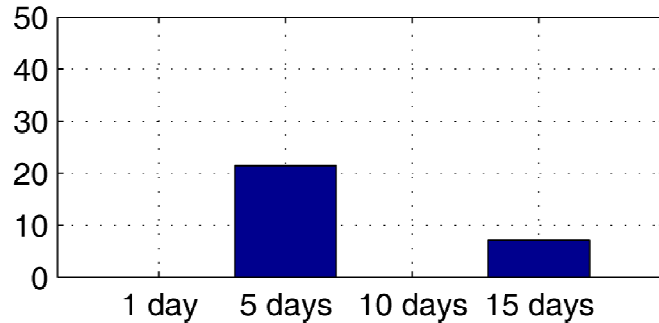
UKMO : 1st sept 2009; 23 runs



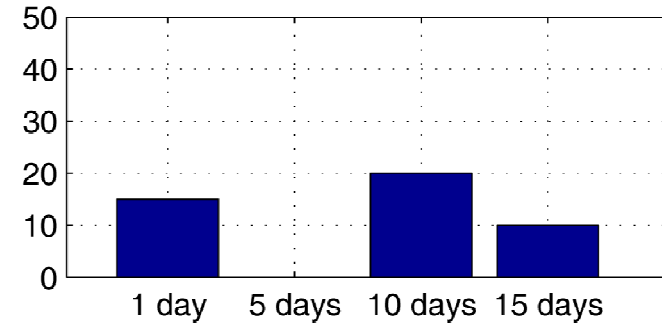
Pourcentage de run donnant la pluie du 1^{er} septembre > 20%

du total 15 août : 14 septembre

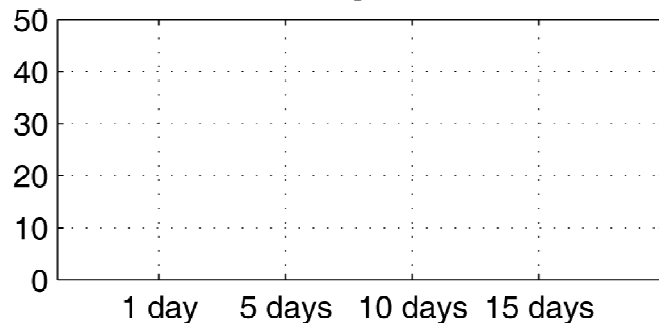
CMA : 1st sept 2009; 14 runs



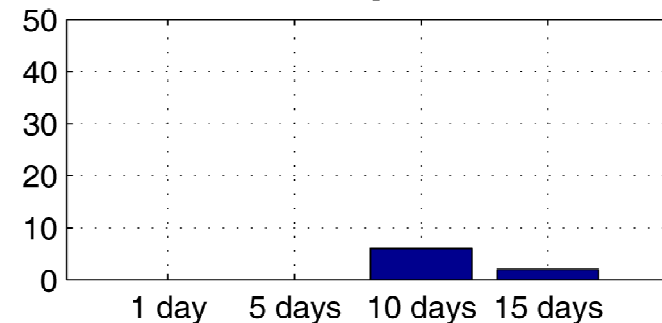
CMC : 1st sept 2009; 20 runs



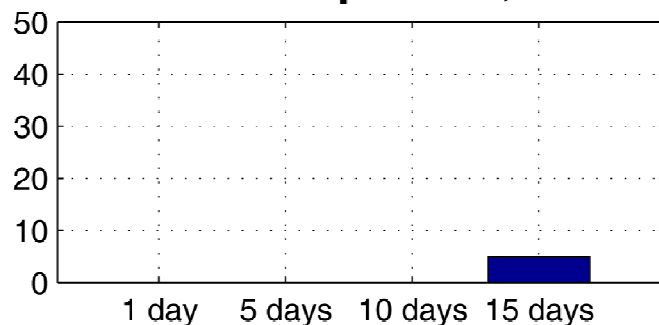
CPTEC : 1st sept 2009; 14 runs



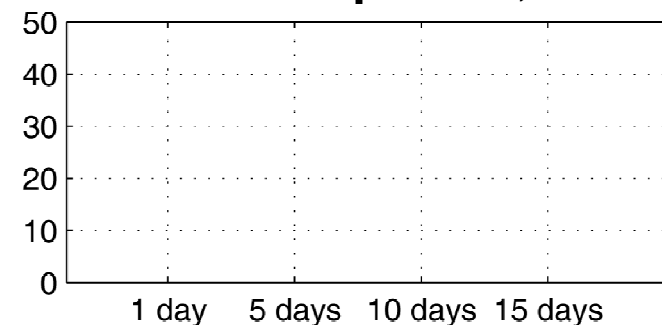
ECMWF : 1st sept 2009; 50 runs



NCEP : 1st sept 2009; 20 runs

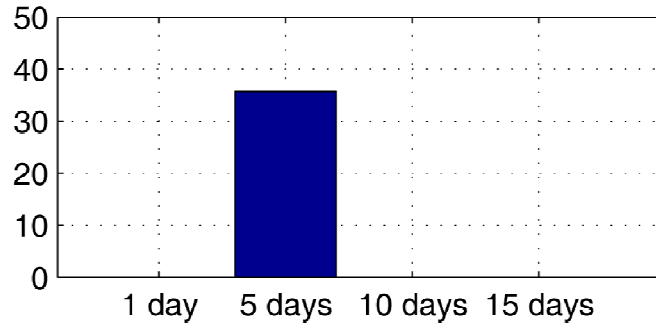


UKMO : 1st sept 2009; 23 runs

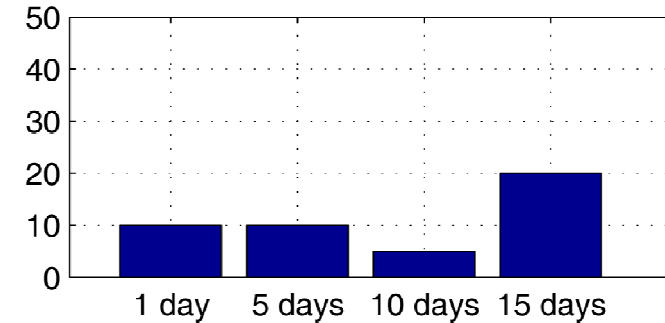


% de run donnant la pluie du 31 août au 2 septembre > 40%
du total 15 août : 14 septembre

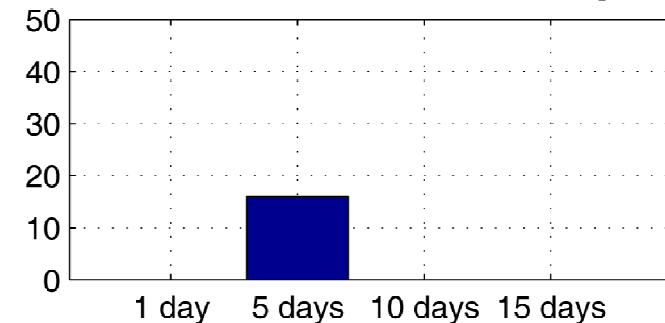
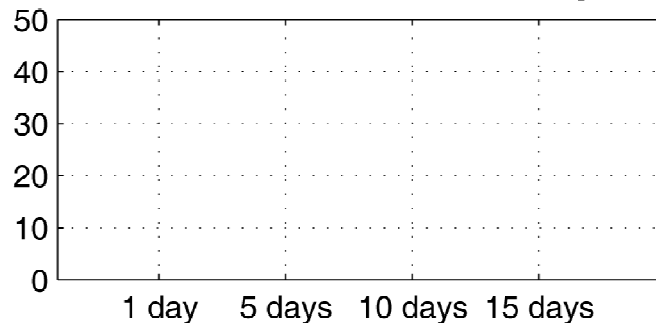
CMA : 31st aou to 2nd sept 2009;



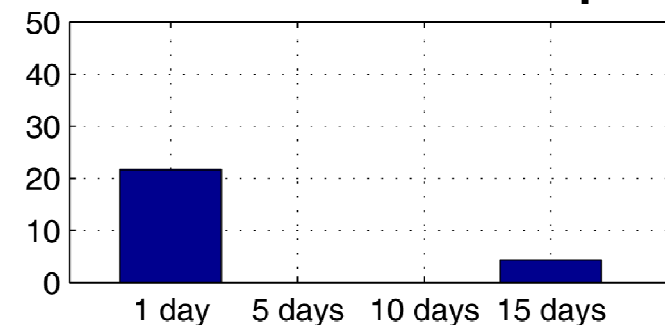
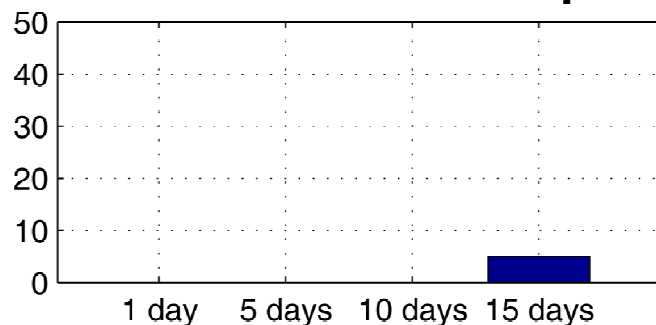
CMC : 31st aou to 2nd sept 2009;



CPTEC : 31st aou to 2nd sept 2009; ECMWF : 31st aou to 2nd sept 2009;

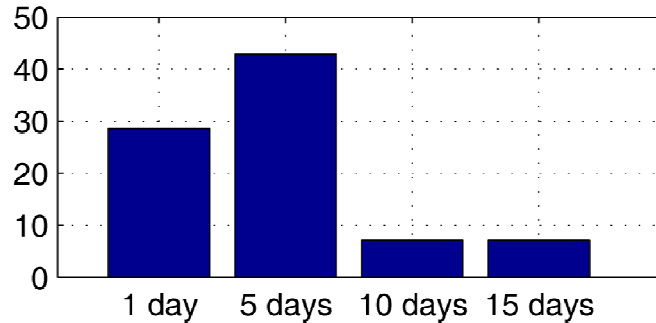


NCEP : 31st aou to 2nd sept 2009; UKMO : 31st aou to 2nd sept 2009;

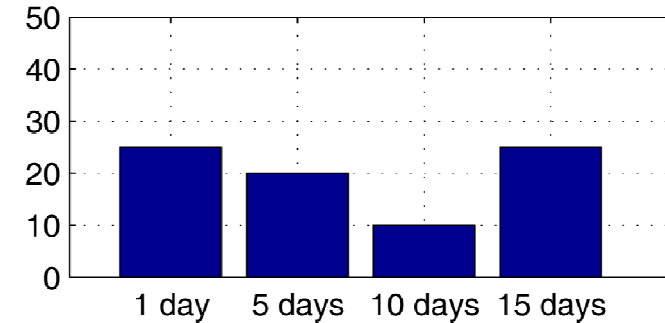


% de run donnant la pluie du 31 août au 2 septembre > 30%
du total 15 août : 14 septembre

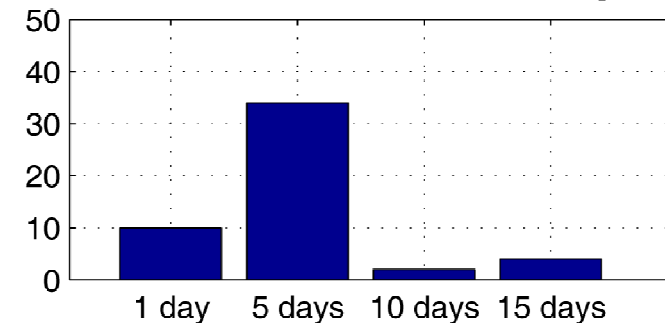
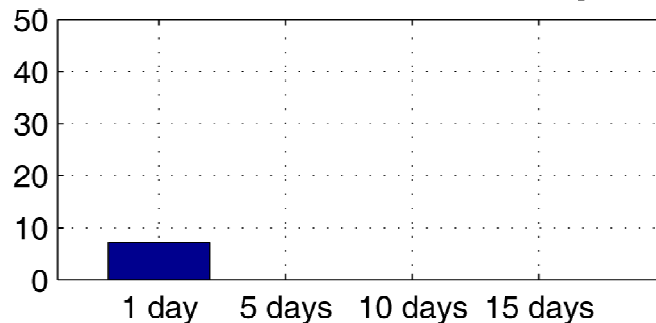
CMA : 31st aou to 2nd sept 2009;



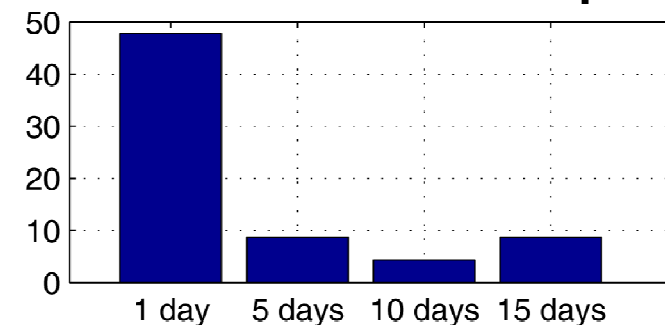
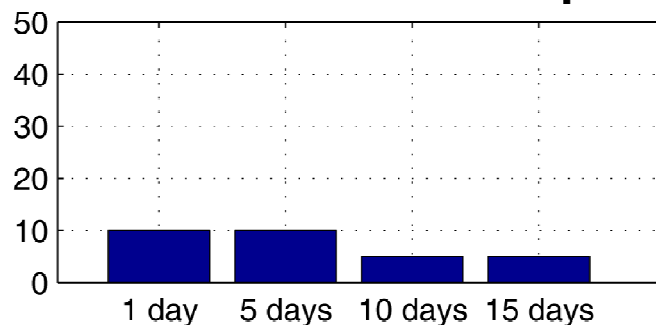
CMC : 31st aou to 2nd sept 2009;



CPTEC : 31st aou to 2nd sept 2009; ECMWF : 31st aou to 2nd sept 2009;



NCEP : 31st aou to 2nd sept 2009; UKMO : 31st aou to 2nd sept 2009;



Conclusions:

- Les résultats sont mitigés, bien souvent l'ensemble fournit de meilleurs résultats.
- Localement les onsets sont mal prévus, régionalement les résultats sont meilleurs.
- Evénement MJO 2011, bien prévu par les modèles.

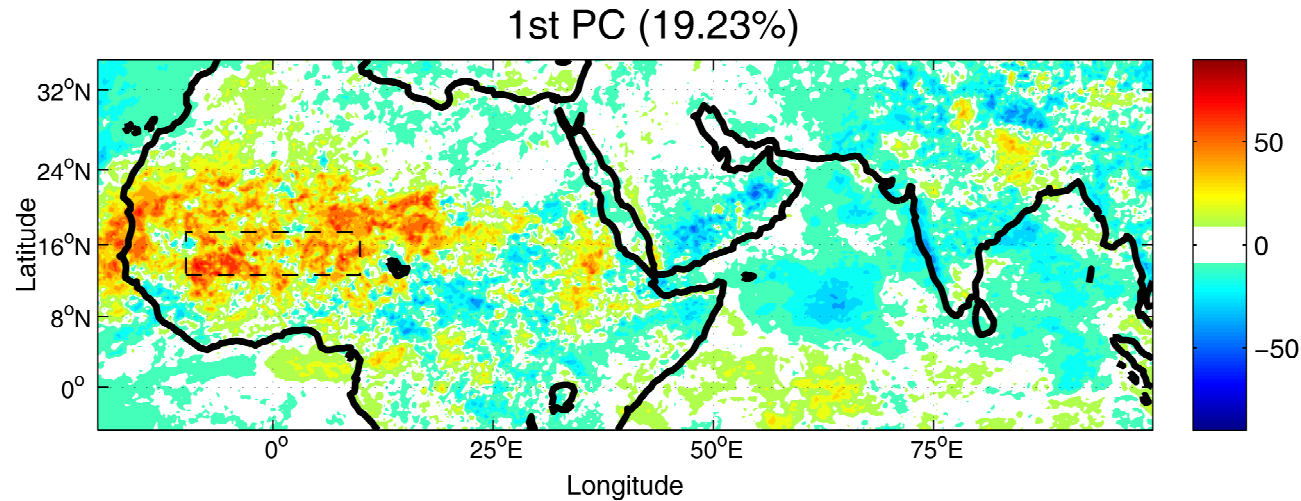
Perspectives :

- Comparaison plus locale avec les données de la DNM du Sénégal
- Travail sur les fausses alertes MJO
- Elaboration de scores d'ensemble (type ROC)
- Cas d'études d'événements pluviométriques exceptionnels

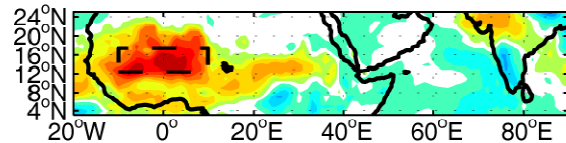
Merci de votre attention



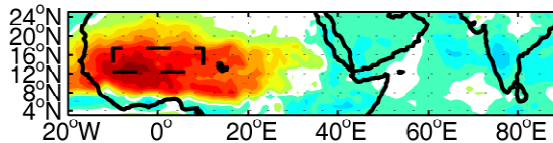
Modes de variabilité détectés dans les précipitations (TRMM 3B42) filtrées entre 25 et 90 jours



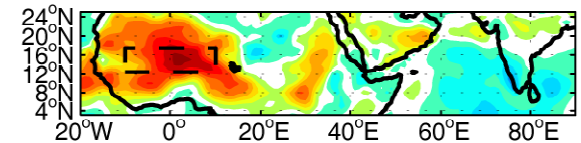
CMA (5 Days) $r=0.51$ [0.27;0.56]



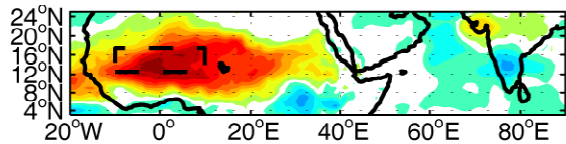
CMC (5 Days) $r=0.66$ [-0.05;0.59]



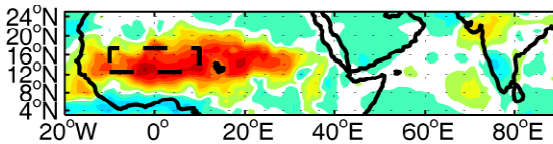
CPTEC (5 Days) $r=0.65$ [0.02;0.43]



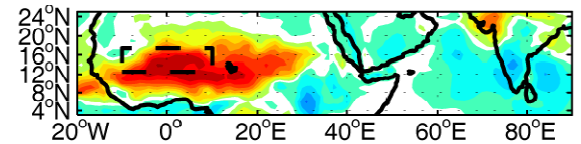
ECMWF (5 Days) $r=0.77$ [-0.36;0.55]



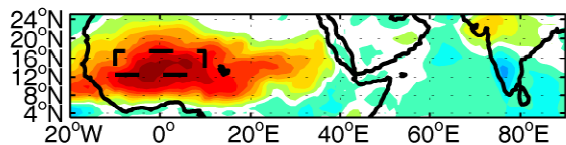
NCEP (5 Days) $r=0.61$ [0.19;0.53]



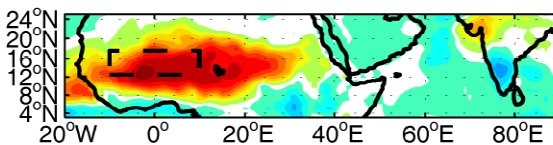
UKMO (5 Days) $r=0.48$ [0.35;0.61]



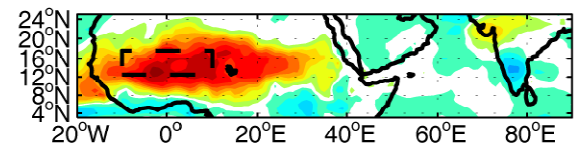
Ensemble (5 Days) $r=0.75$



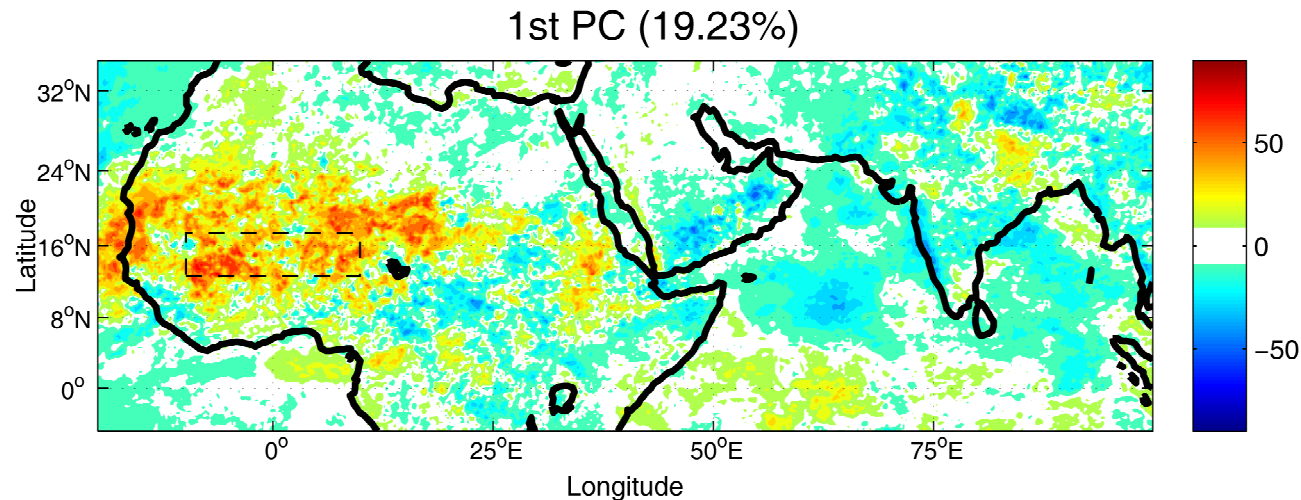
ec+nc+uk (5 Days) $r=0.70$



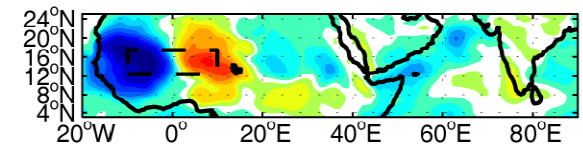
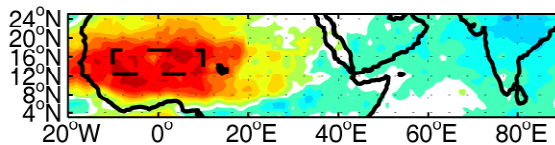
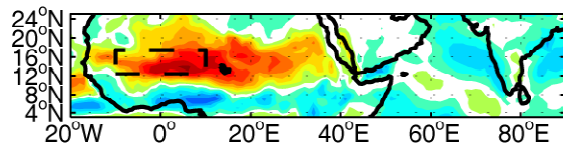
ecmwf+ukmo (5 Days) $r=0.75$



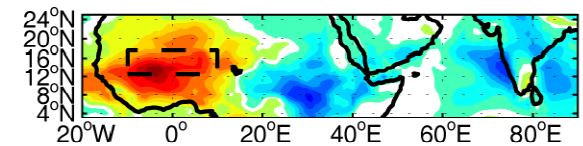
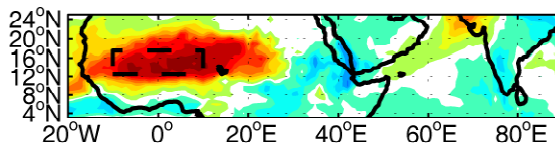
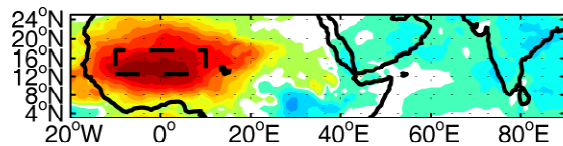
Modes de variabilité détectés dans les précipitations (TRMM 3B42) filtrées entre 25 et 90 jours



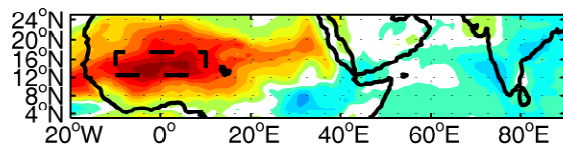
CMA (10 Days) $r=0.43$ [-0.18;0.10] CMC (10 Days) $r=0.76$ [-0.20;0.57] CPTEC (10 Days) $r=0$ [-0.33;0.31]



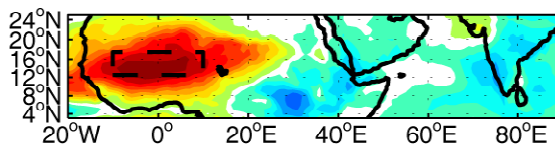
ECMWF (10 Days) $r=0.80$ [0.13;0.44] NCEP (10 Days) $r=0.47$ [0.15;0.43] UKMO (10 Days) $r=0.70$ [-0.45;0.68]



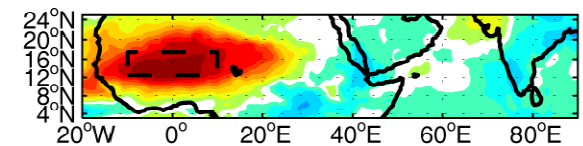
Ensemble (10 Days) $r=0.74$



ec+nc+uk (10 Days) $r=0.74$

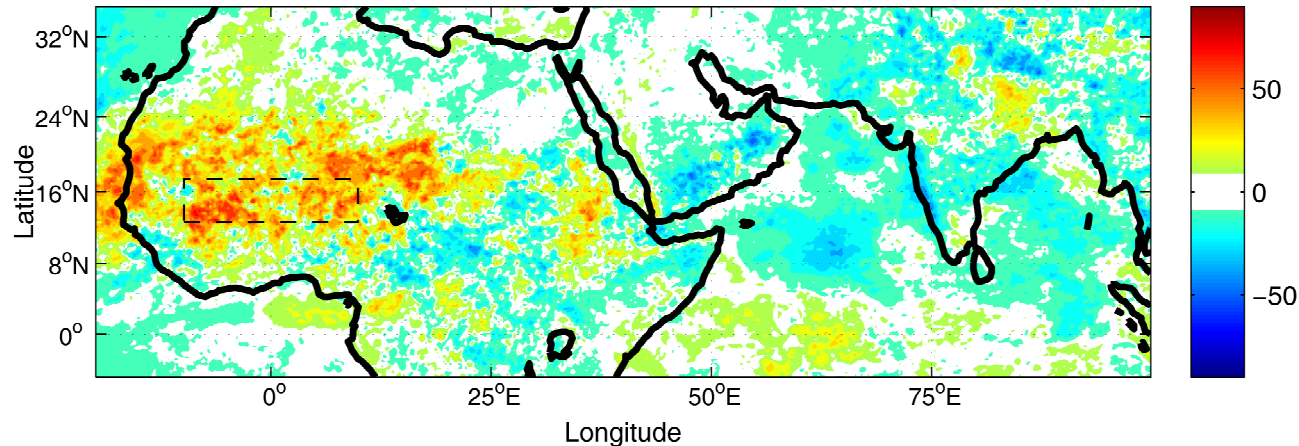


ecmwf+ukmo (10 Days) $r=0.71$

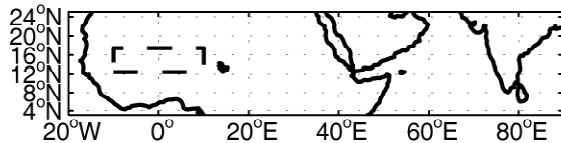


Modes de variabilité détectés dans les précipitations (TRMM 3B42) filtrées entre 25 et 90 jours

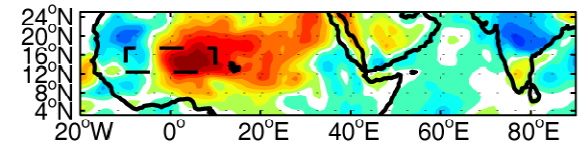
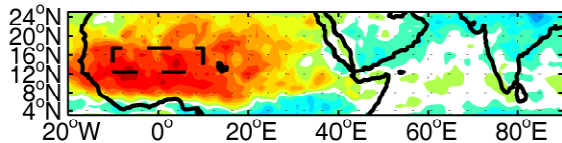
1st PC (19.23%)



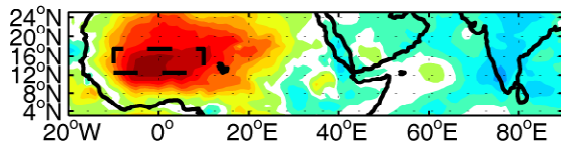
CMA (15 Days)



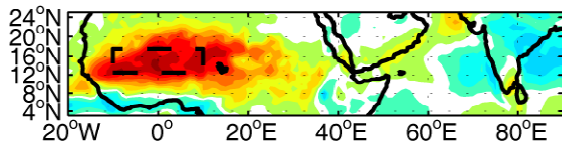
CMC (15 Days) $r=0.59$ [-0.33;0.47] CPTEC (15 Days) $r=0.44$ [-0.35;0.44]



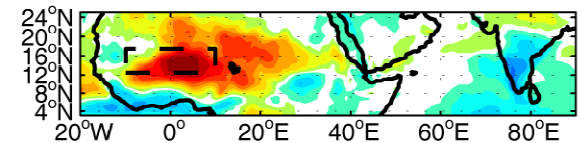
ECMWF (15 Days) $r=0.68$ [-0.27; 0.32]



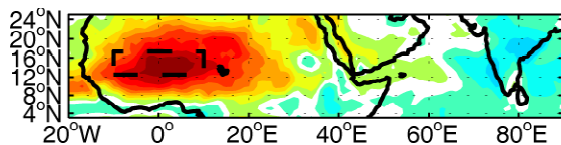
NCEP (15 Days) $r=0.38$ [-0.13;0.29]



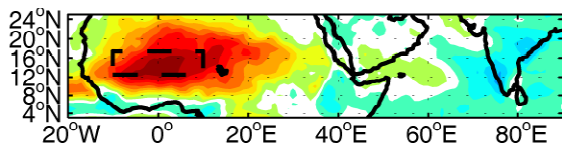
UKMO (15 Days) $r=0.31$ [-0.37;0.28]



Ensemble (15 Days) $r=0.64$



ec+nc+uk (15 Days) $r=0.58$



ecmwf+ukmo (15 Days) $r=0.62$

