

NEACOF-5

Operational Seasonal Forecasts and Perspectives at Météo-France

J.P. Céron & Christian Viel

Météo-France – Climatology Department

Jean-Pierre.Ceron@meteo.fr

RosHydromet - Moscow

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Operational Seasonal Forecast at Météo-France

GPC Toulouse

■ Operationnal Forecasting Suite (System 4)

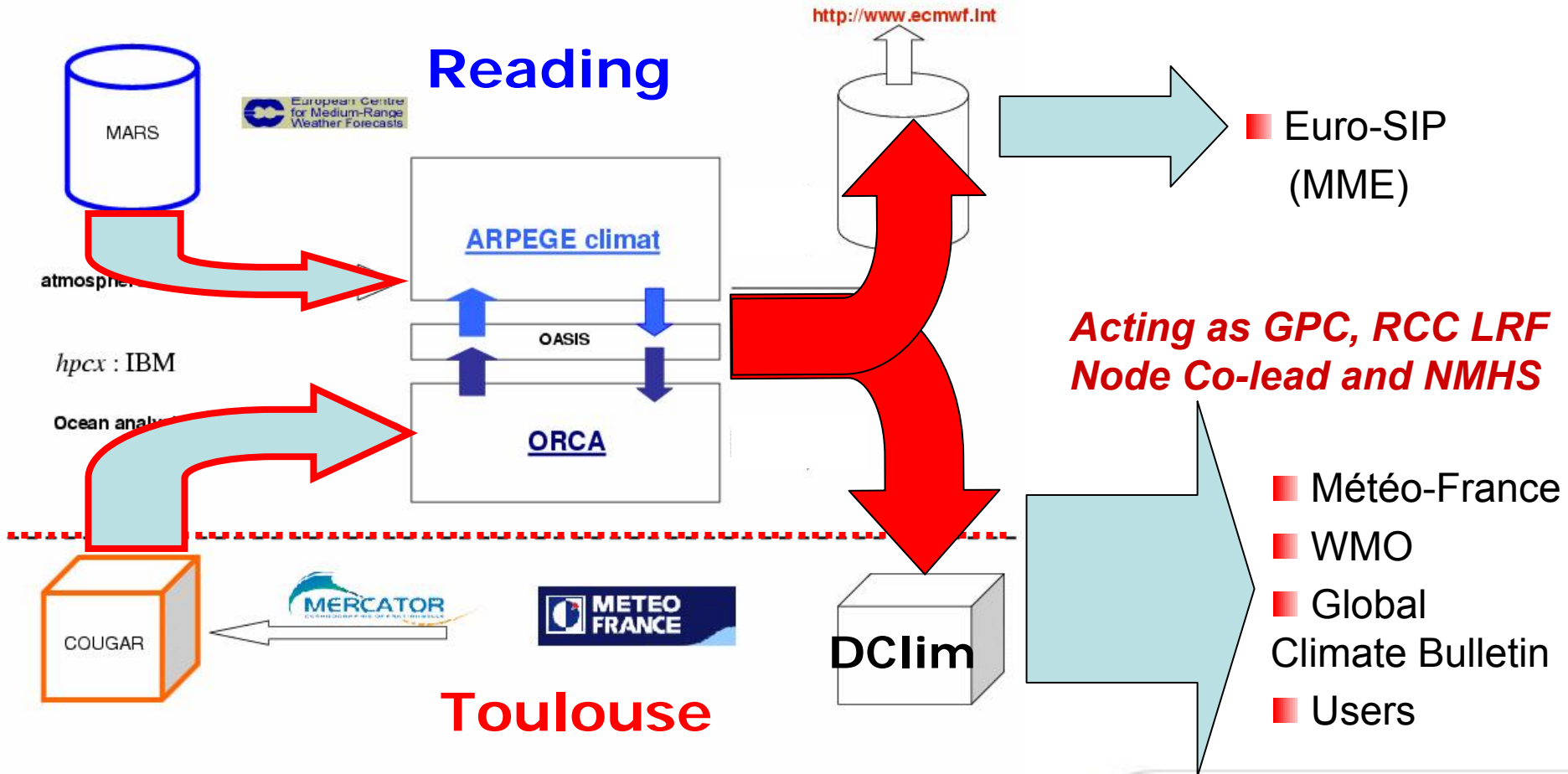
- Distributed Forecasting suite, coupled model (Arpège *T127L31*) for atmosphere and *NEMO 1°* grid for the ocean)
- ECMWF atmospheric (and surface) analysis – Mercator oceanic analysis
- Hindcast *1991-2010 – 15 members*
- Operations : 7 month range forecast - 51 members
10 atmospheric * 5 oceanic Initial Conditions (+ 1 member)

■ Products

- Issuance at the beginning of the current month (commitment for the 8th at the latest)
- Dedicated Web site (password protected – access granted on request under the WMO umbrella)

Operationnal Forecasting Suite

■ Arpège model (v 5) - Mercator initialisation (Ocean) :



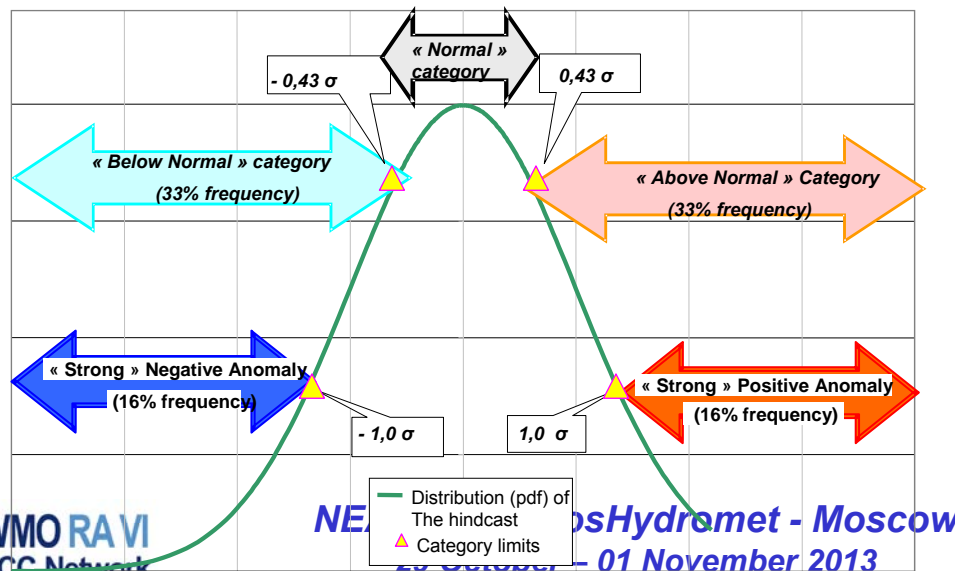
Products

■ Deterministic products :

- Ensemble mean : **Anomalies, Indices (Standardized anomalies)** and **recalibrated Anomalies**
- Significance Test (T test)

■ Probabilistic products :

- Ensemble Member frequency into the **tercile** categories,
- Ensemble Member frequency into « **extreme** » categories
- **Probabilistic forecast synthesis** (most likely category)



Category boundaries computed under gaussian assumption

Frequency computed using standardized anomalies

Products

■ Coupled model :

- Precipitation, Temperature at 2m and 850hPa, Geopotential Height at 500hPa, Mean Sea Level Pressure, **U and V at 850 hPa and 200hPa**
- SST
- Niño plumes for Niño 4, Niño 3.4, Niño 3 and Niño 1+2 boxes,
- **Oceanic plumes for TNA, TSA, TASI, WTIO, SETIO, DMI (OOPC boxes)**
- Global fields (2°5 by 2°5)
- Format by default gif files
 - On request postscript, Grib, ascii files,
- **Circulation regimes (North Atlantic sector)**
- **Velocity Potential and Stream Function at 200 hPa**

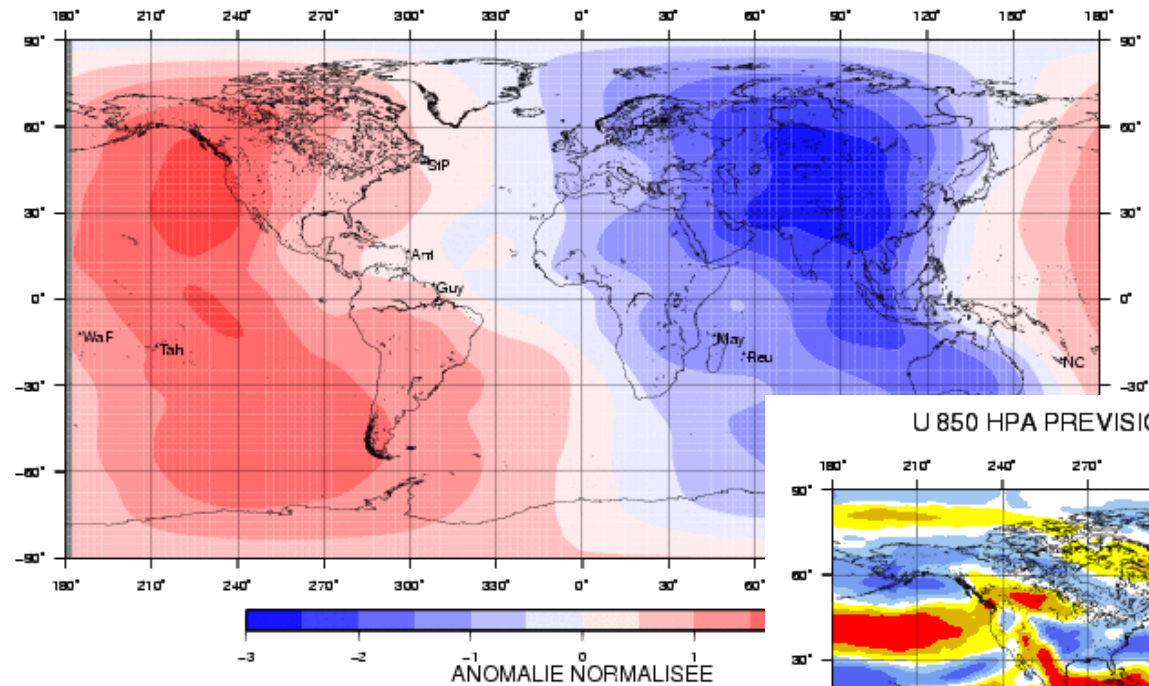
■ Expertised product :

- Global Climate Bulletin (GCB)
 - Monthly update,
 - Expected lead-time of 1 month for forecasts ,
 - Edited by the end of the current month (for next 3 month forecasts)

Products : General Circulation Velocity Potential 200 & U 850

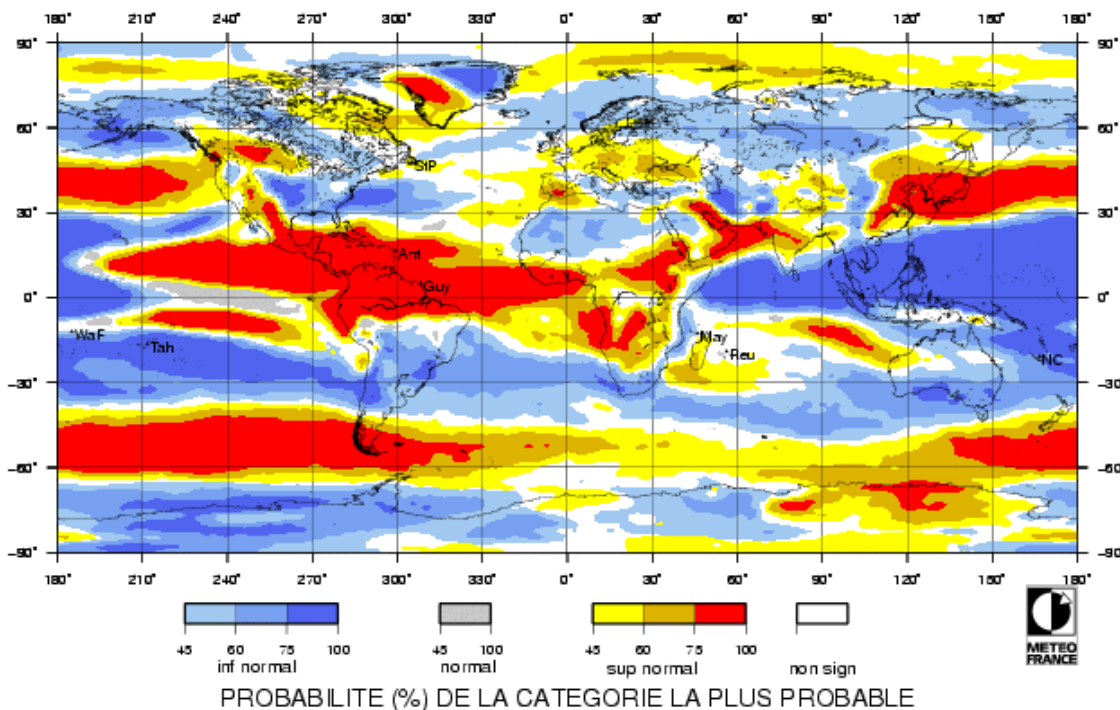
KHI 200 HPA PREVISION JUILLET-AOUT-SEPTEMBRE RUN DE JUIN 2010

Velocity Potential at 200 hPa
- Standardized Anomaly



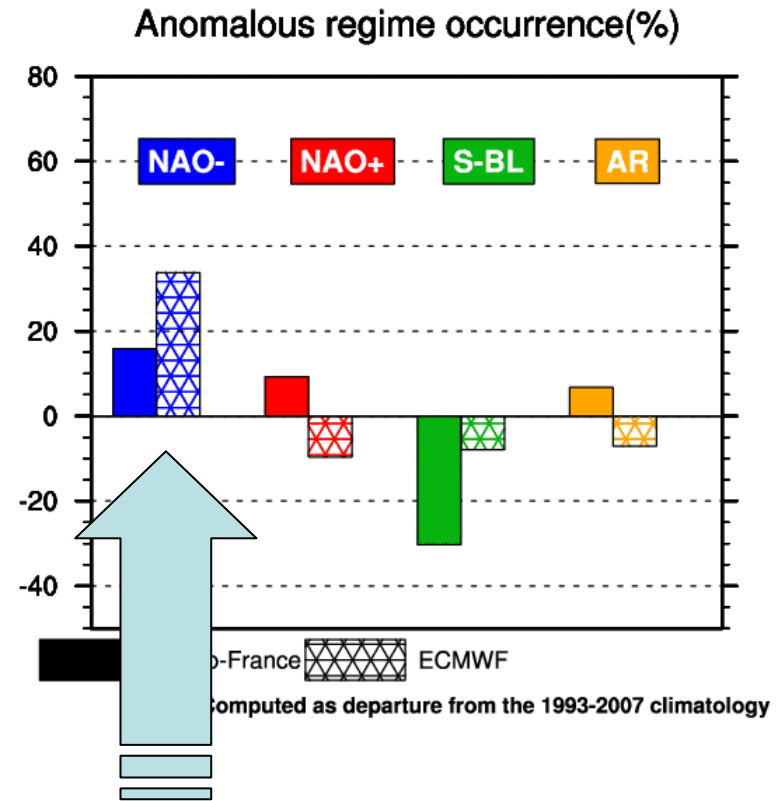
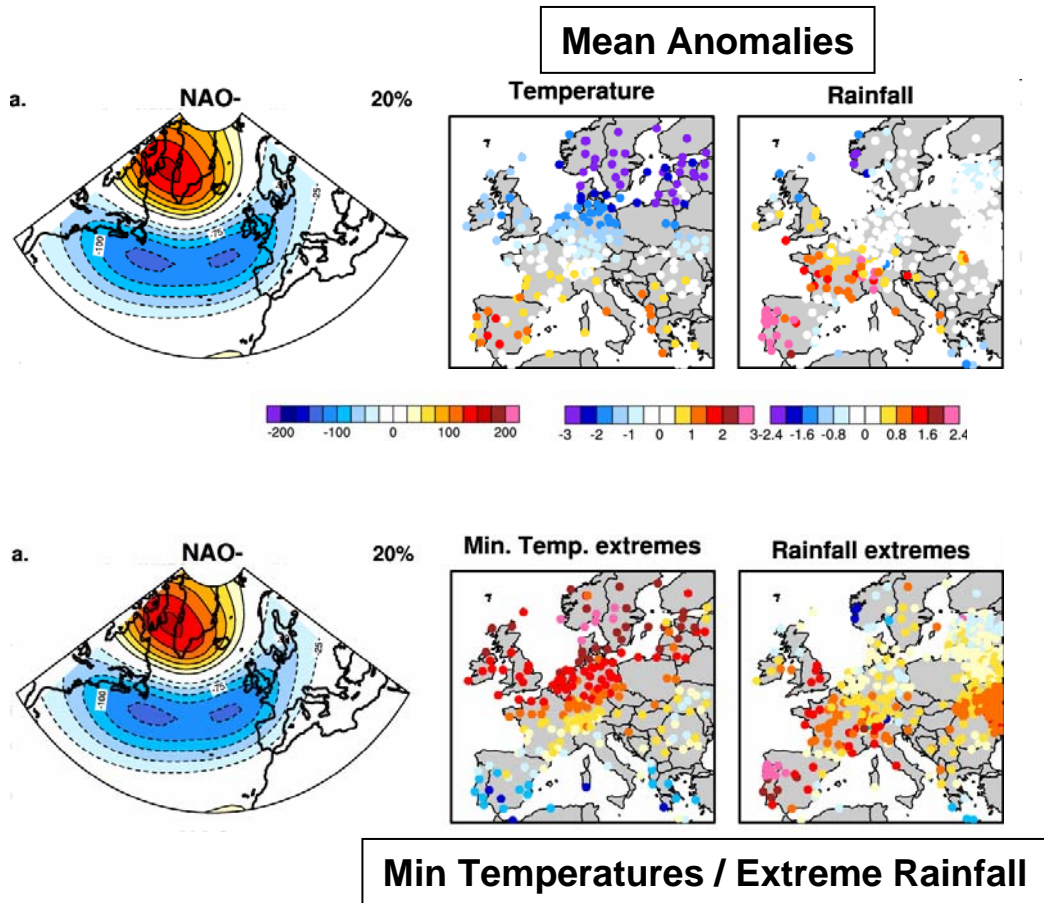
U 850 HPA PREVISION JUILLET-AOUT-SEPTEMBRE RUN DE JUIN 2010

U 850 hPa – Most
Likely Category



Products : Circulation Regimes

- Forecast Mode and use – Winter 2009 forecasts

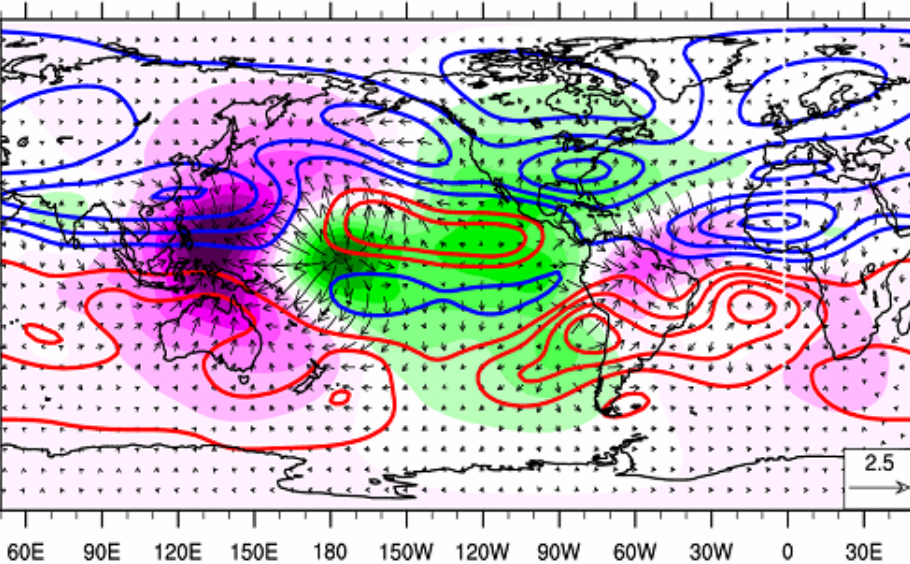


Increased Occurrence of NAO – regimes

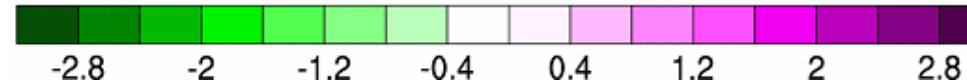
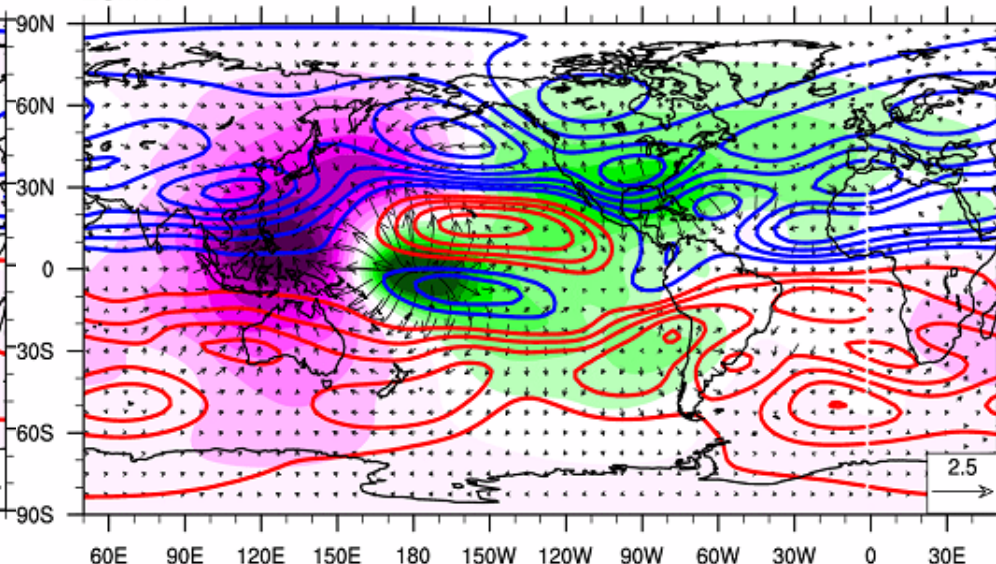
Products : Other Large Scale Parameters

New Model Diagnosis and associated evaluations (Stream function and Velocity Potential in the high troposphere)

Meteo-France



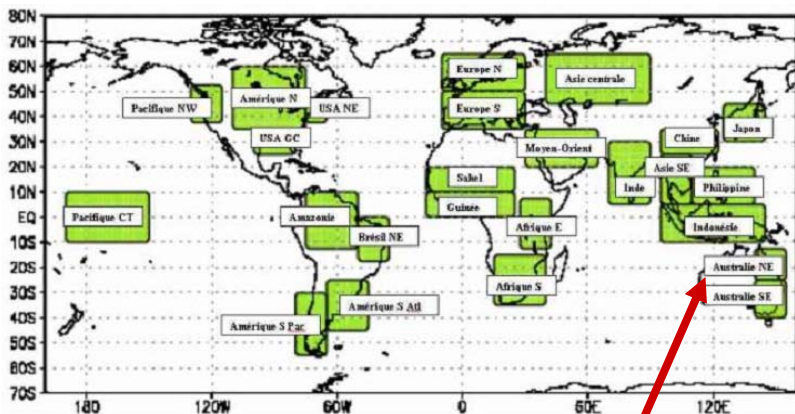
ECMWF **JFM 2010 forecasts**



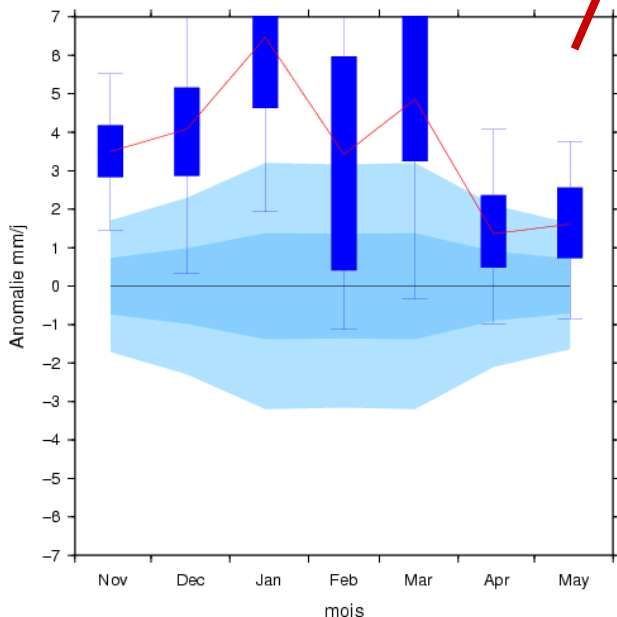
Velocity Potential gives insight into the atmospheric response in terms of Hadley-Walker circulation anomalies while the Stream Function gives complementary insight into the atmospheric response to tropical forcing (especially in terms of teleconnections with mid-latitudes)

Additional Products

climagrams

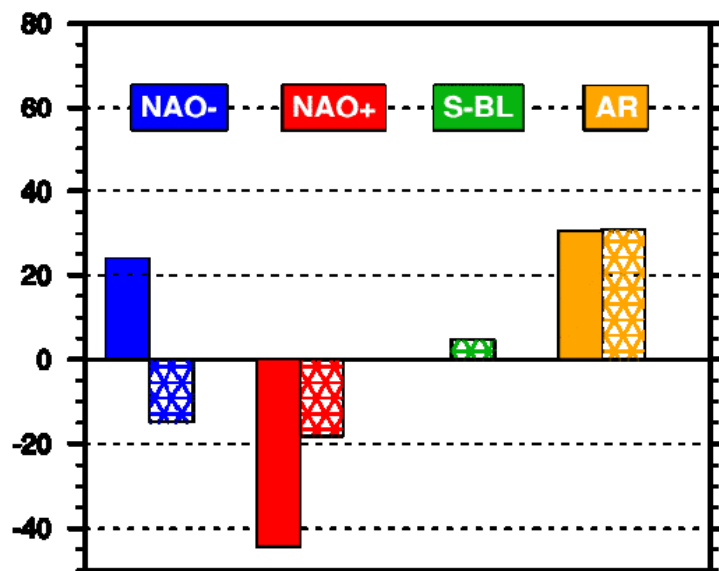


PRET Australie_NE 2010 11



Circulation Regimes over the North-Atlantic sector

Anomalous regime occurrence (%)



Computed as departure from the 1993-2007 climatology

DJF 2010-2011 – Very Strong Niña



GLOBAL CLIMATE BULLETIN
n°172 - OCTOBER 2013
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Products : Bulletins

Global Climate Bulletin n°172
(issued end of September)
August 2013 observations
and OND 2013 forecasts

MODELS	Northern Europe	Southern Europe	Central Europe	Eastern Europe	SEE Region
CEP					
MF					
Met Office					
CPC					
JMA					
synthesis					
LC-MME					
Eurosip					
privileged scenario by RCC-LRF node	<i>no privileged scenario</i>	<i>no privileged scenario</i>	<i>above normal</i>	<i>above normal</i>	<i>above normal</i>

Expertised scenarios – sub-regional

Dissemination

■ External :

- Password protected ftp site <http://elaboration.seasonal.meteo.fr> (on request under the WMO umbrella),
- ECMWF facilities (Euro-Sip MME, RCC Network for RA VI),

■ Availability dates :

- Beginning of the month in Toulouse,
- 15th of the month at ECMWF (Coupled model within the Euro-Sip MME),
- GCB provided at the end of the month at the latest,

Extranet dedicated to Seasonal Forecasts

Login and password on request

6 Menus

Bonjour meteo my account | logout

English Français

Arpège forecasts Arpège scores A posteriori checks Documentation Climate bulletin General public bulletin

Welcome
to the extranet collaborative space created by MétéoFrance and **dedicated to seasonal forecasts**.

Check out the last scientific bulletin

Arpège Forecast
This space contains MétéoFrance Arpège forecasts
+ Access ...

A posteriori checks
This space provides you with maps and diagrams from the observed data
+ Access ...

Contribution workspace
Global Climate Bulletin design reserved area
Enter

Arpège scores
This space contains the Arpège seasonal forecast scores
> Browse

Documentation
> Browse

Bulletin climatique global
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Bulletins

Working Space

Perspective in Seasonal Forecasting at Météo-France

Perspectives

■ Experimental Products at Météo-France

- Daily time series post-processing (preparation of products dedicated to Energy, Agriculture, ...),

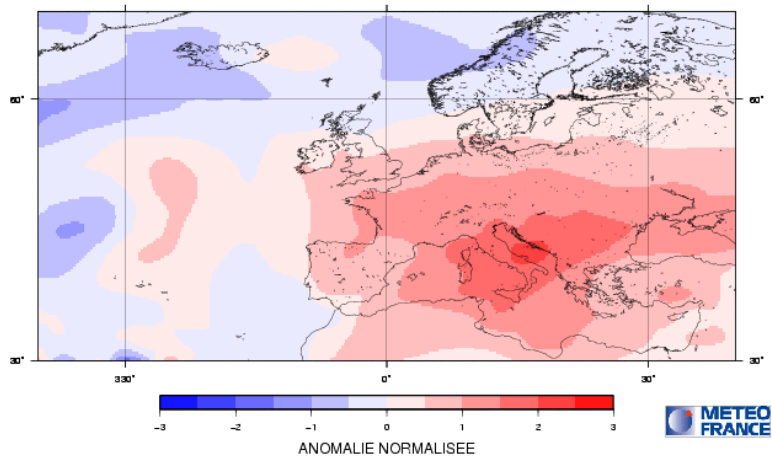
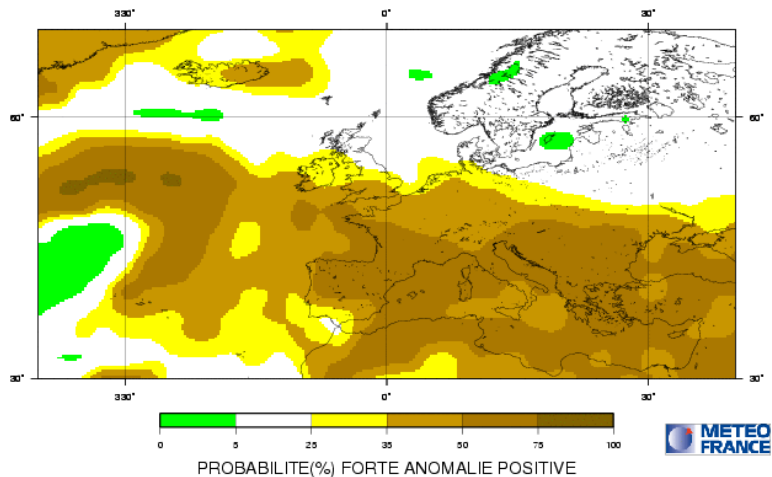
Perspectives

M-F Production

Atmosphere : DJF 2010-2011

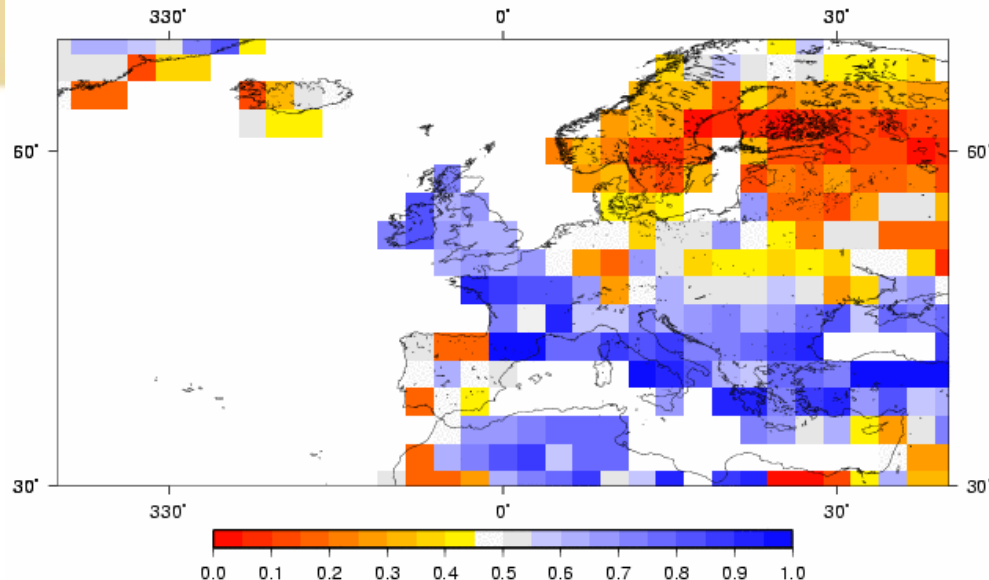
Heating Deares days (18°C)

DJU -18°C PREVISION FEVRIER-MARS-AVRIL RUN DE NOVEMBRE 2010

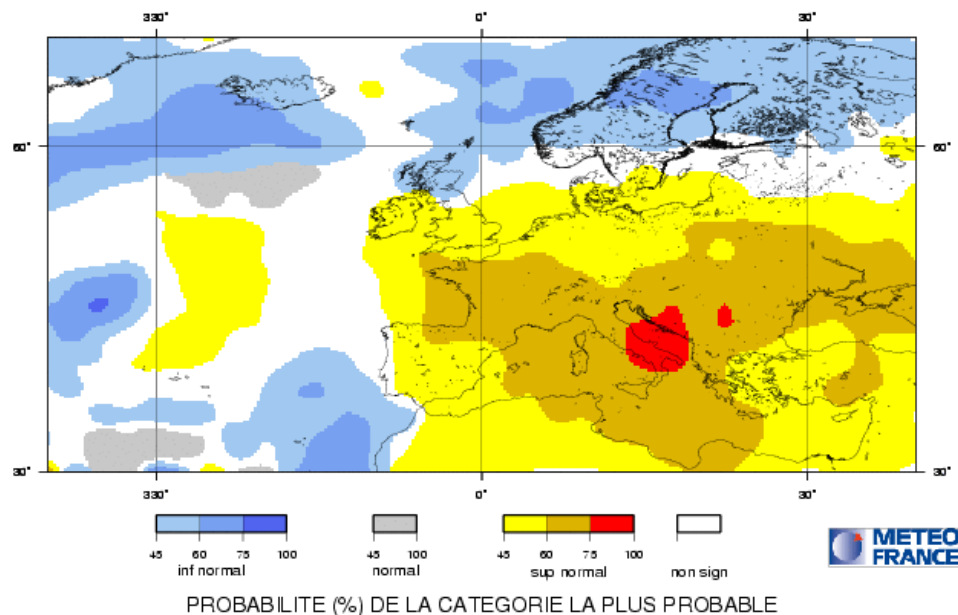


ROC Score for DJF

D-18 ARPEGE-COUPLE METEO-FRANCE ROCDJF LEAD=1 exts



DJU -18°C PREVISION DECEMBRE-JANVIER-FEVRIER RUN DE NOVEMBRE 2010



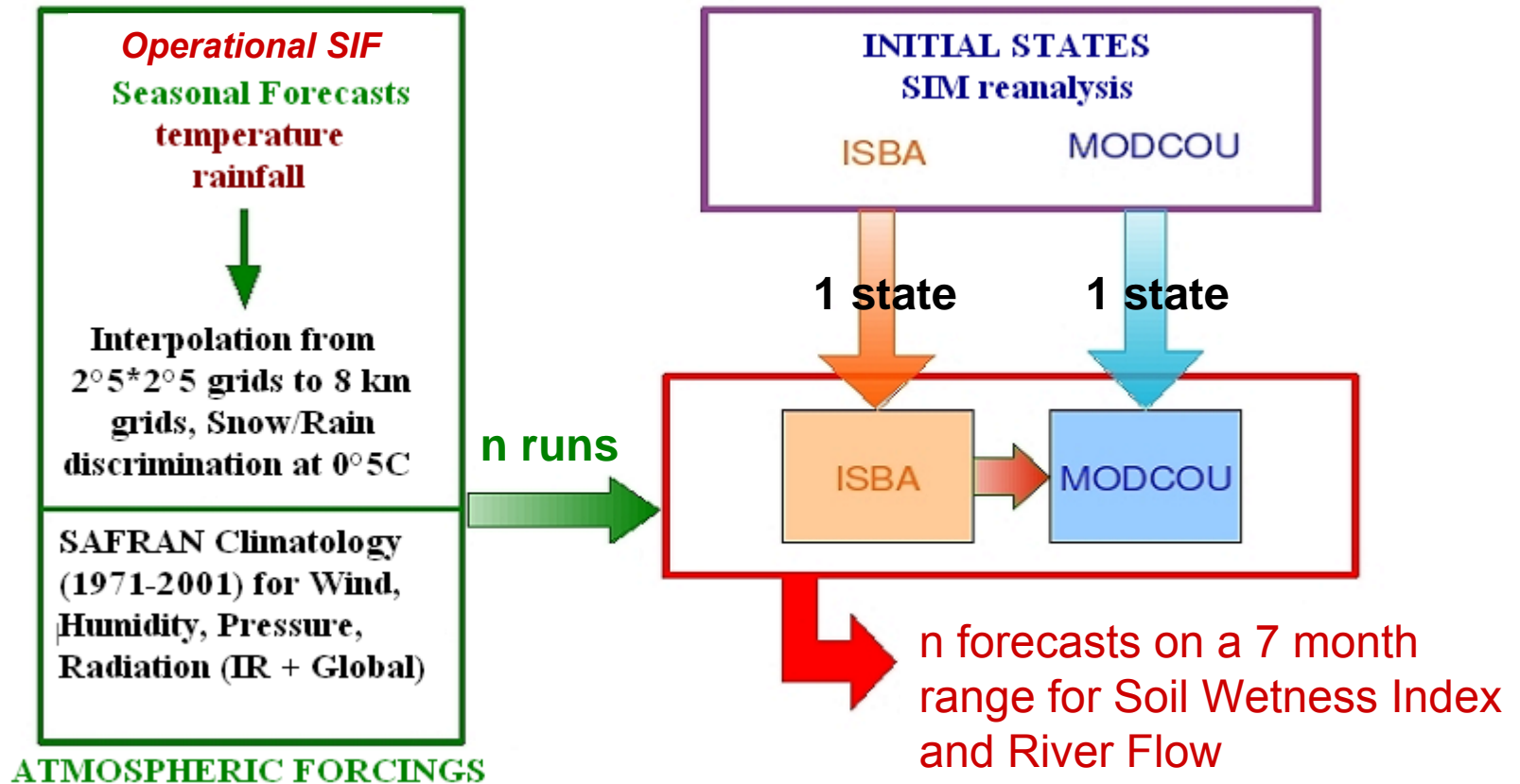
Perspectives

■ Experimental Products at Météo-France

- *Daily time series post-processing (preparation of products dedicated to Energy, Agriculture, ...),*
- Hydrological Seasonal Forecasts (Impact models, management models, ...),
 - Over France – Hydrological model (SIM),

Perspectives

- Hydrological model use downstream of atmospheric seasonal forecasts

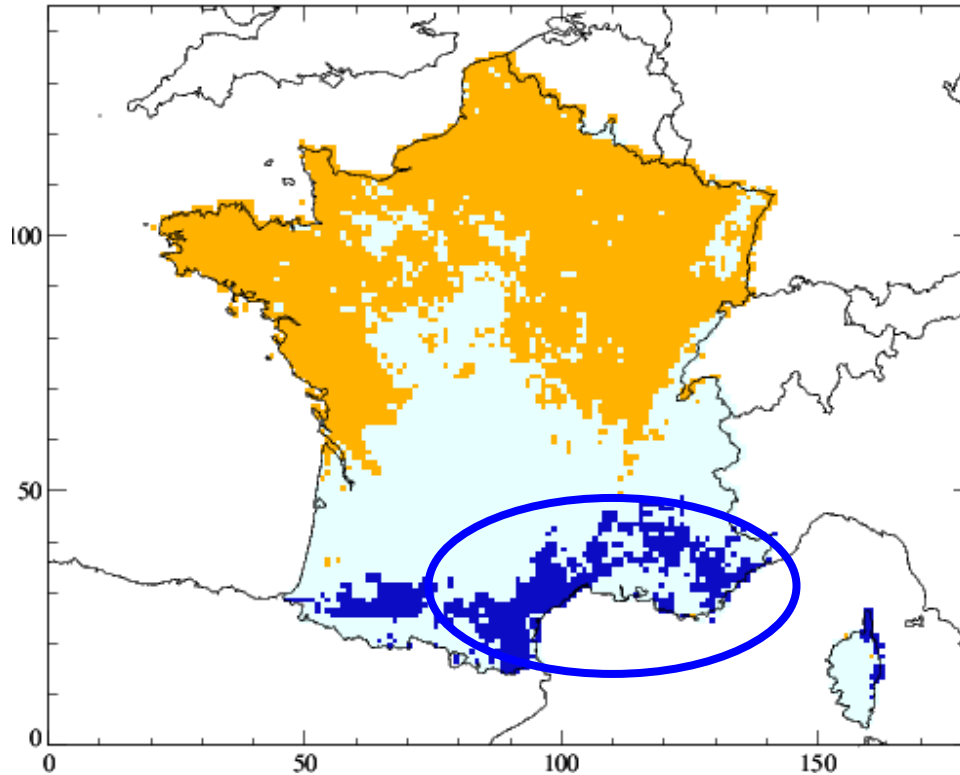


Singla, S., Céron, J.-P., Martin, E., Regimbeau, F., Déqué, M., Habets, F., and Vidal, J.-P.: Predictability of soil moisture and river flows over France for the spring season, *Hydrol. Earth Syst. Sci.*, 16, 201-216, doi:10.5194/hess-16-201-2012 <http://www.hydrol-earth-syst-sci.net/16/201/2012/hess-16-201-2012.html>

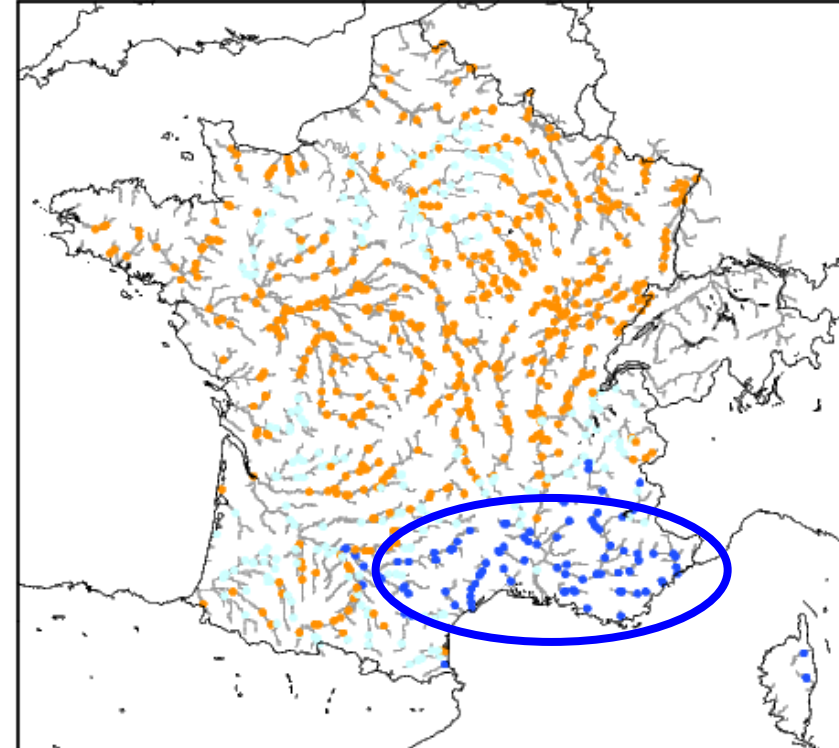
Results for Spring (MAM)




Comparison of correlations between Hydro-SF and RAF – IC 1st of February
(Singla *et al.*, 2012)

SWI



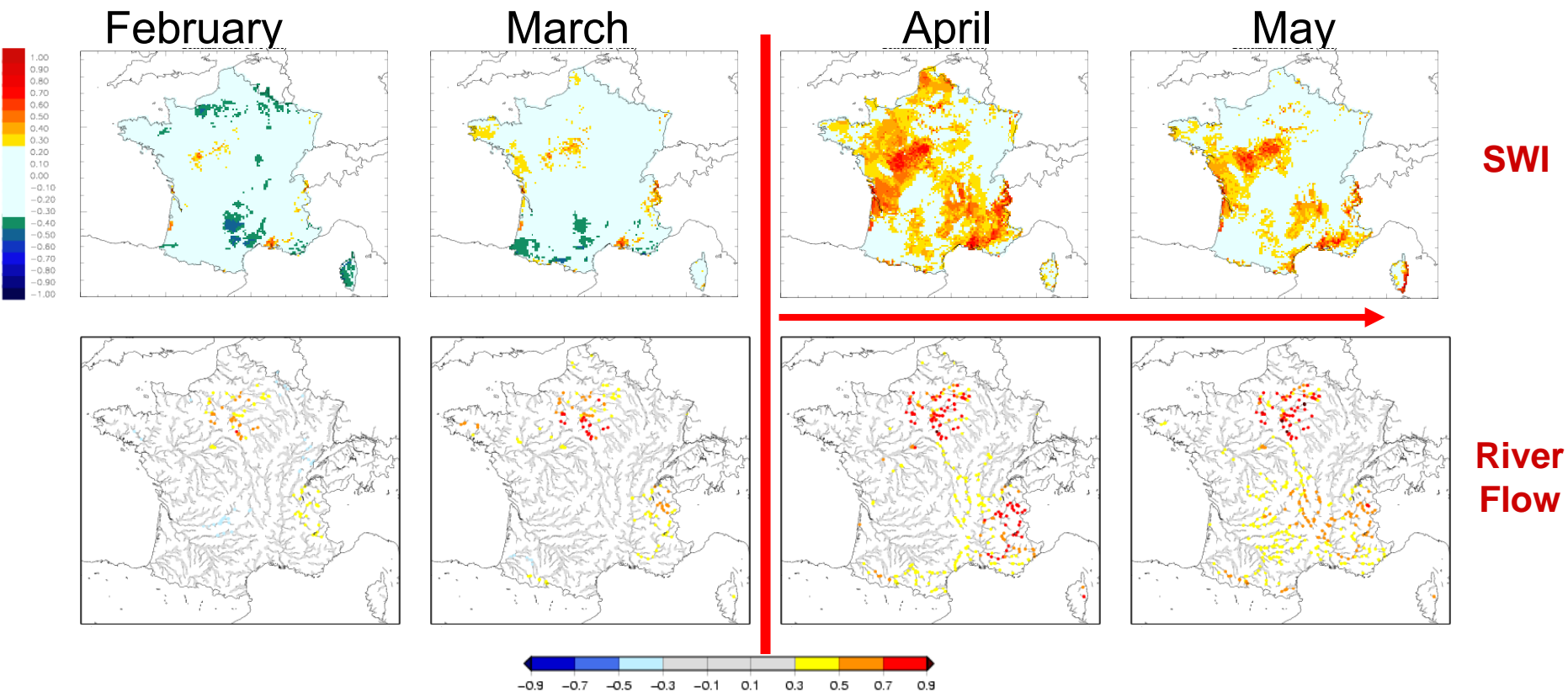
River Flow



-  Regions where Hydro-SF is significantly better than RAF
-  Regions where Hydro-SF is equivalent to RAF
-  Regions where RAF is significantly better than Hydro-SF

Results for Summer (JJA)

- Correlation for SWI and River Flows over the 1979-2007 period (HYDRO-SF / ARPEGE-S3) for different IC for the summer forecast (JJA)

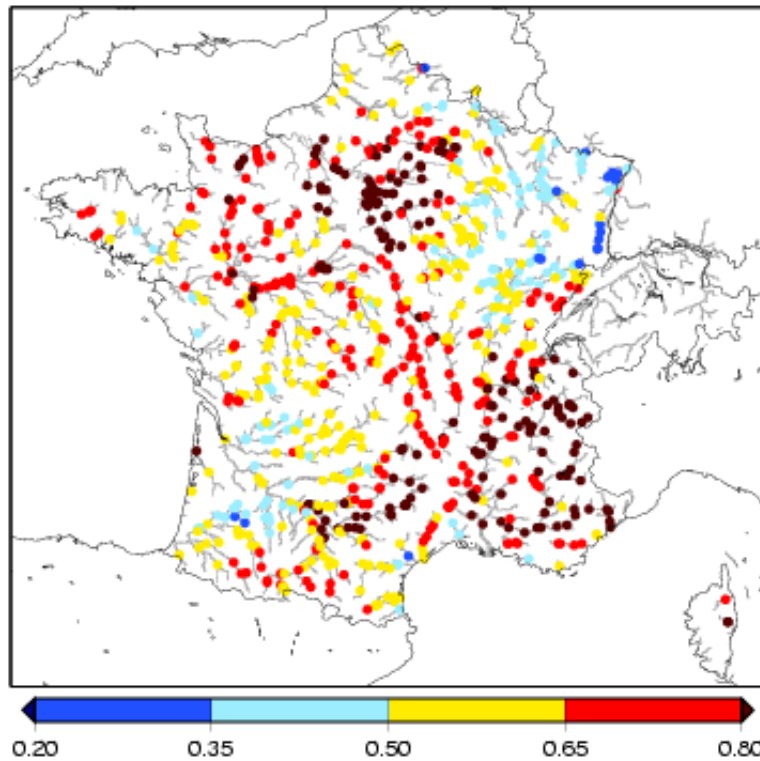


Correlations > 0.3 significant.
Clear improvement between March
and April

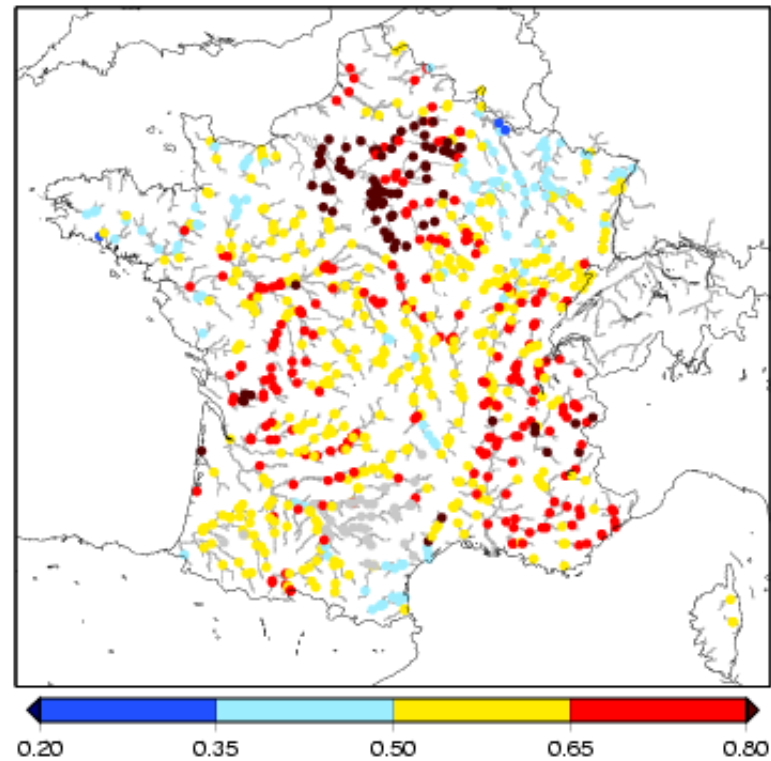
*No useable information before the
beginning of April*

Results for Summer (JJA)

ROC scores for Hydro-SF (1979-2007 – IC from 1st of April)



Upper Tercile



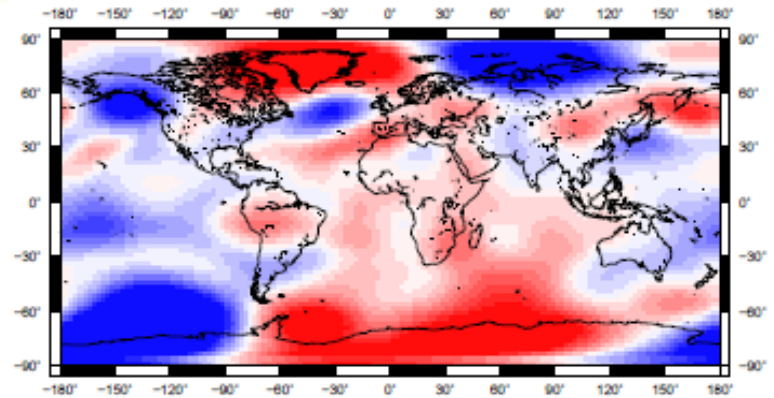
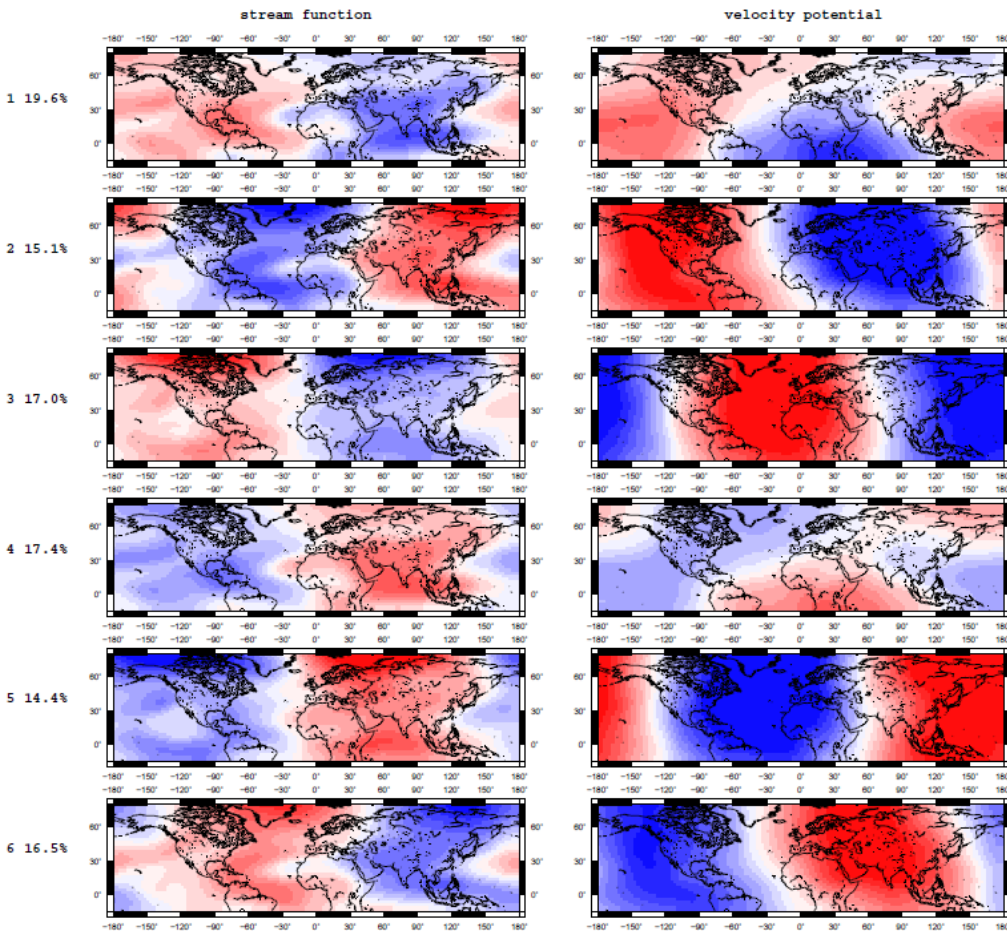
Lower Tercile

Perspectives

■ Experimental Products at Météo-France

- *Daily time series post-processing (preparation of products dedicated to Energy, Agriculture, ...),*
- *Hydrological Seasonal Forecasts (Impact models, management models, ...),*
 - *Over France – Hydrological model (SIM),*
- Extreme events
 - Over the French Mediterranean area – High Precipitation Events (Cevenoles Events) at Fall (SON).

HPE predictability (SON)



Psi 200 Composite for years with a high number of HPE

	MF	EC	MED	NPiR
ROC (area)	0.62	0.71	0.68	0.77
95% Bootstrap	(0.37, 0.83)	(0.48, 0.90)	(0.41, 0.92)	(0.56, 0.94)

ROC area for years with a high number of HPE

Guérémy, J.-F., Laanai, N., and Céron, J.-P.: Seasonal forecast of French Mediterranean heavy precipitating events linked to weather regimes, Nat. Hazards Earth Syst. Sci., 12, 2389-2398, doi:10.5194/nhess-12-2389-2012, 2012

Psi and Khi 200 Circulation Regimes in SON

Perspectives

■ Experimental Products at Météo-France

- *Daily time series post-processing (preparation of products dedicated to Energy, Agriculture, ...),*
- *Hydrological Seasonal Forecasts (Impact models, management models, ...),*
 - *Over France – Hydrological model (SIM),*
- *Extreme events*
 - *Over the French Mediterranean area – High Precipitation Events (Cevenoles Events) at Fall (SON).*

■ Modeling Improvement

- GPC Evolution
 - Toward System 5,

GPC evolutions

■ Coupled Model version 6 (System 5)

- Version close to the IPCC-AR5 version (consistency with Decadal Forecasts)
- Atmosphere : Arpege version 6.i,
- Ocean : NEMO (free elevation at the surface),
- Mercator Ocean analysis and Reanalysis: 1979 – 2010,
- Availability for operations : targetted for 2015 (possibly end of 2014 - developements in progress)

Scores System 5 (development in progress)

- Hindcast over 1979 - 2011 (DJF and JJA), 15 and 30 members
- Different options tested (DSM, Ajc, Ecume, Resolution, Time Step)
- Anomaly correlations for Z500.

mACC DJF Z500 1979-2011 (15 et 30 membres)

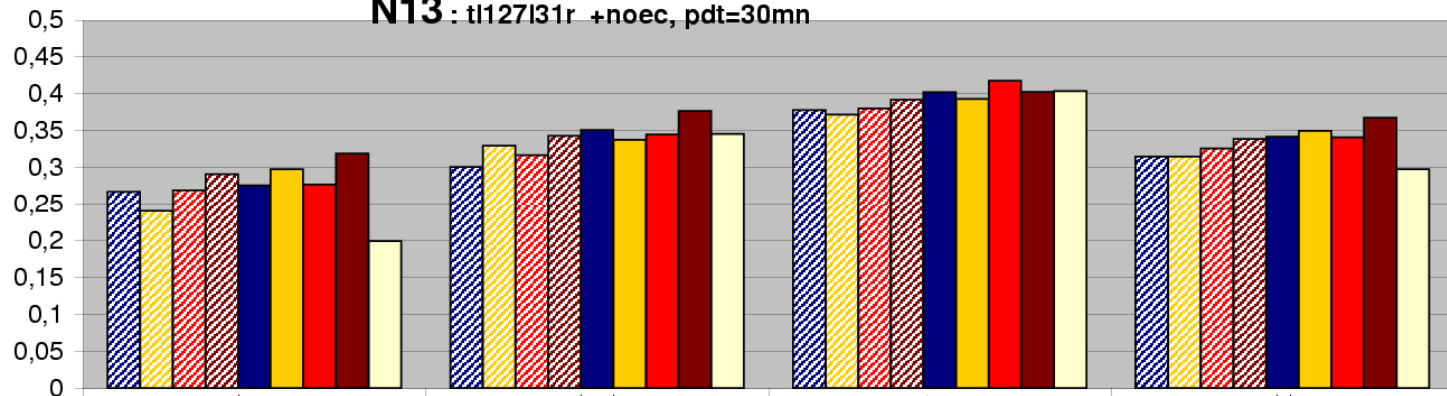
N8 : t1127191r DSM+ajc+noec, pdt=20mn

N10 : t159171r DSM+noec, pdt=30mn

N11 : t1159191r DSM+ajc+noec, pdt=30mn

N12 : t1127191r DSM +noec, pdt=10mn

N13 : t1127131r +noec, pdt=30mn



	hnor	hsud	trop	glob
■SYS5_N8(15)	0,267	0,301	0,378	0,315
■SYS5_N10(15)	0,24	0,33	0,372	0,315
■SYS5_N11(15)	0,269	0,317	0,38	0,326
■SYS5_N12(15)	0,291	0,343	0,392	0,339
■SYS5_N8(30)	0,276	0,351	0,402	0,342
■SYS5_N10(30)	0,298	0,338	0,393	0,35
■SYS5_N11(30)	0,277	0,345	0,418	0,341
■SYS5_N12(30)	0,319	0,377	0,403	0,368
■SYS5_N13(30)	0,199	0,346	0,404	0,298

Scores System 5 (development in progress)

- Hindcast over 1979 - 2011 (DJF and JJA), 15 and 30 members
- Different options tested
- Anomaly correlations for T2m

mACC DJF TSUR 1979-2011 (15 et 30 membres)

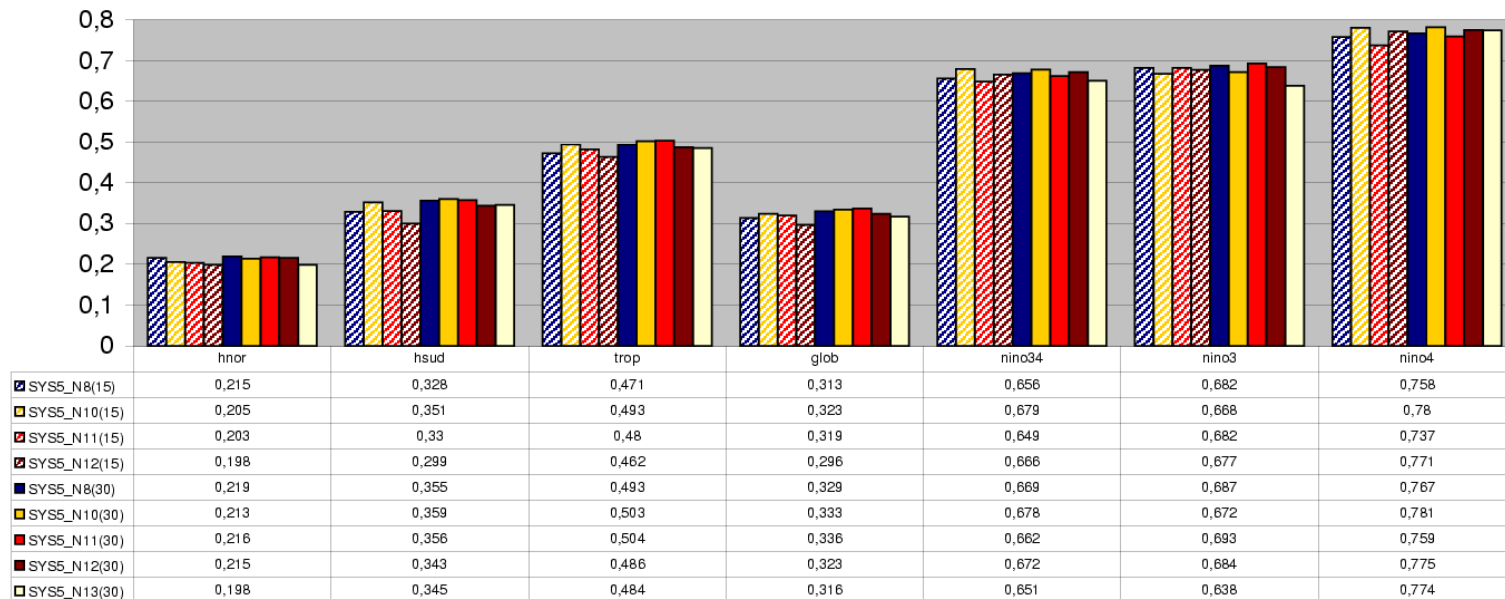
N8 : t1127191r DSM+ajc+noec, pdt=20mn

N10 : t159171r DSM+noec, pdt=30mn

N11 : t1159191r DSM+ajc+noec, pdt=30mn

N12 : t1127191r DSM +noec, pdt=10mn

N13 : t1127131r +noec, pdt=30mn



Scores System 5 (development in progress)

- Hindcast over 1979 - 2011 (DJF and JJA), 15 and 30 members
- Different options tested
- Anomaly correlation for Rainfall

mACC DJF PREC 1979-2011 (15 et 30 membres)

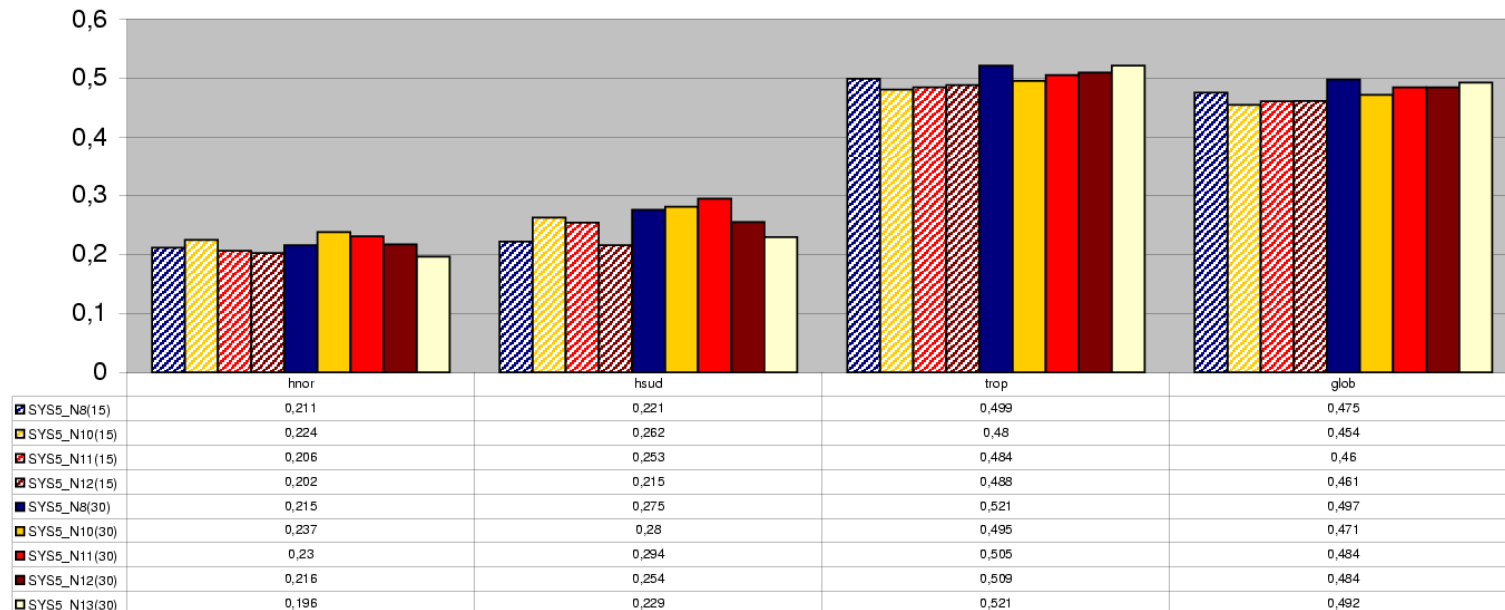
N8 : t1127191r DSM+ajc+noec, pdt=20mn

N10 : t159171r DSM+noec, pdt=30mn

N11 : t1159191r DSM+ajc+noec, pdt=30mn

N12 : t1127191r DSM +noec, pdt=10mn

N13 : t1127131r +noec, pdt=30mn



GPC evolutions

■ Coupled Model version 6 (System 5)

- Atmosphere : Arpege 6.i,
 - T127 L91 (configuration close to N12),
- Ocean : NEMO (1° resolution, free elevation at the surface),
- Still to be added (already tested)
 - Stochastic Dynamic,
 - Sea-Ice : Gelato model,
 - Surface : Surfex model,
- Some options remain open,
 - Hindcast using both NemoVar and Mercator
 - ...

NEACOF - 5

Thank you for attention



Elaboration of products

- **Direct Methods (deterministic and probabilistic products)**
formulation as **Indices or Recalibrated Anomalies**

Indices (Standardized Forecasts) :

Model forecast compared to its own
climatology

$$A = \underbrace{\frac{F - \bar{F}}{\sigma_F}}_{\%} \circ \sigma_o$$

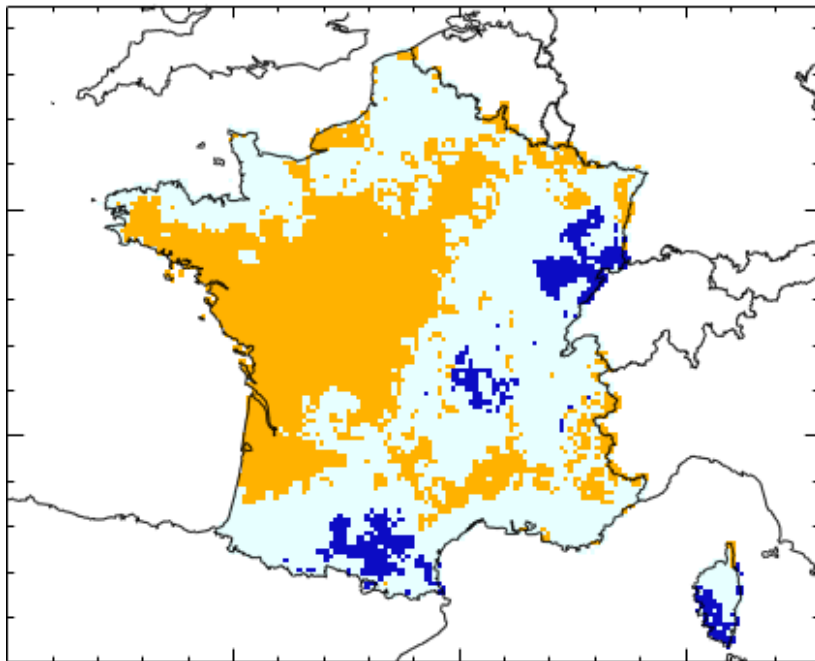
°C, mm/D, m/s, ...

Recalibrated Anomalies :

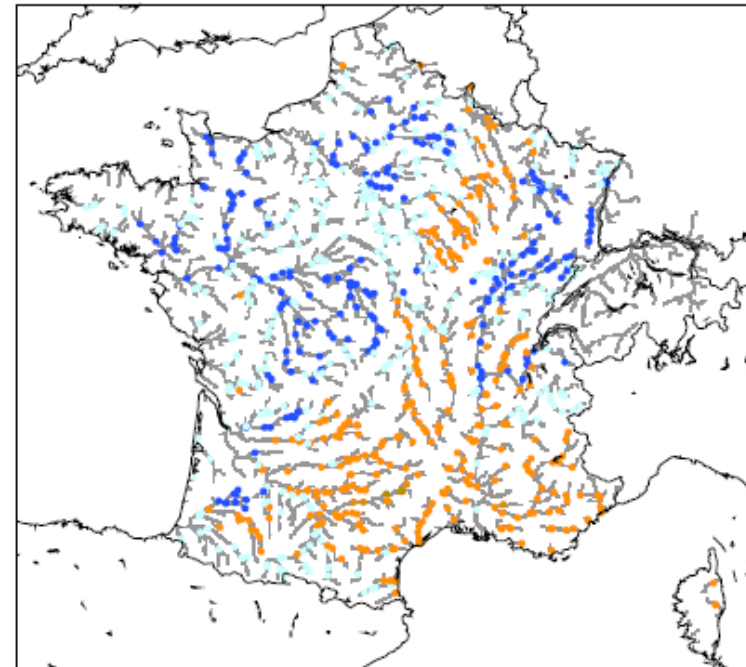
Adaptation to « local »
observation properties

Results for Summer (JJA)




Comparison of correlations between Hydro-SF (April IC) and RAF



SWI



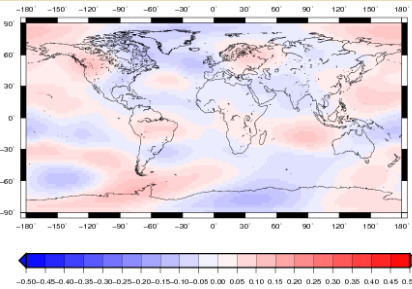
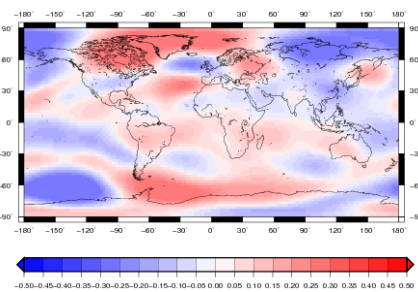
River Flow

-  Regions where Hydro-SF is significantly better than RAF
-  Regions where Hydro-SF is equivalent to RAF
-  Regions where RAF is significantly better than Hydro-SF

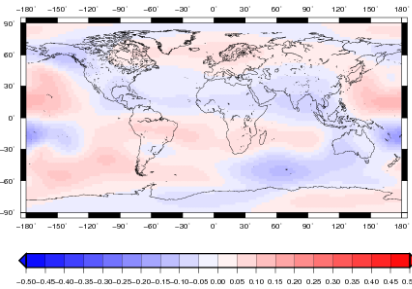
HPE predictability (SON)

Composite Analysis (DCLIM) Teleconnections (MedUp project - SON season)

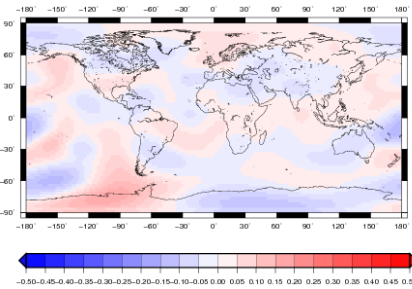
ψ_{200} ERA40



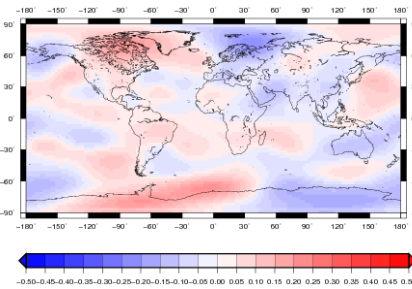
ψ_{200} ENS



ψ_{200} MED

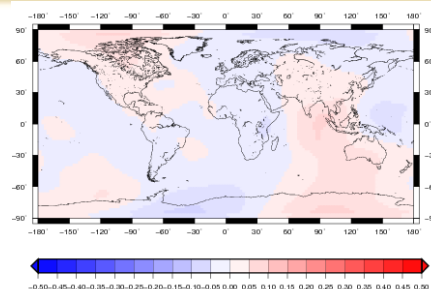
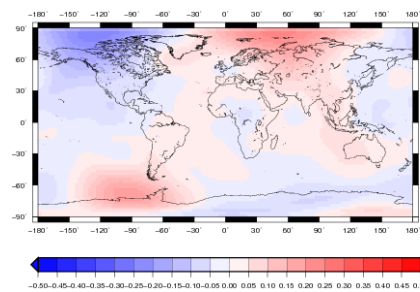


ψ_{200} NPBR

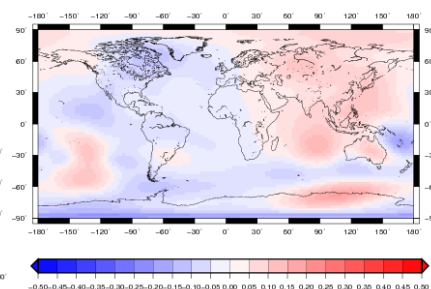


ψ_{200} NPFR

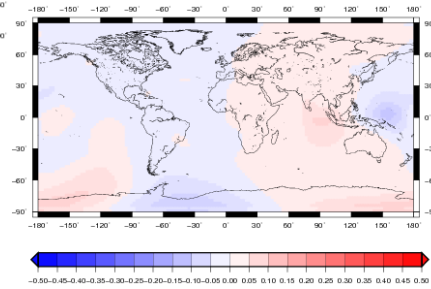
χ_{200} ERA40



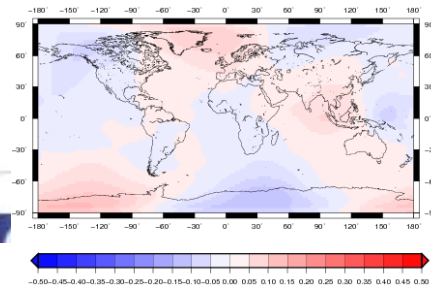
χ_{200} ENS



χ_{200} MED



χ_{200} NPBR

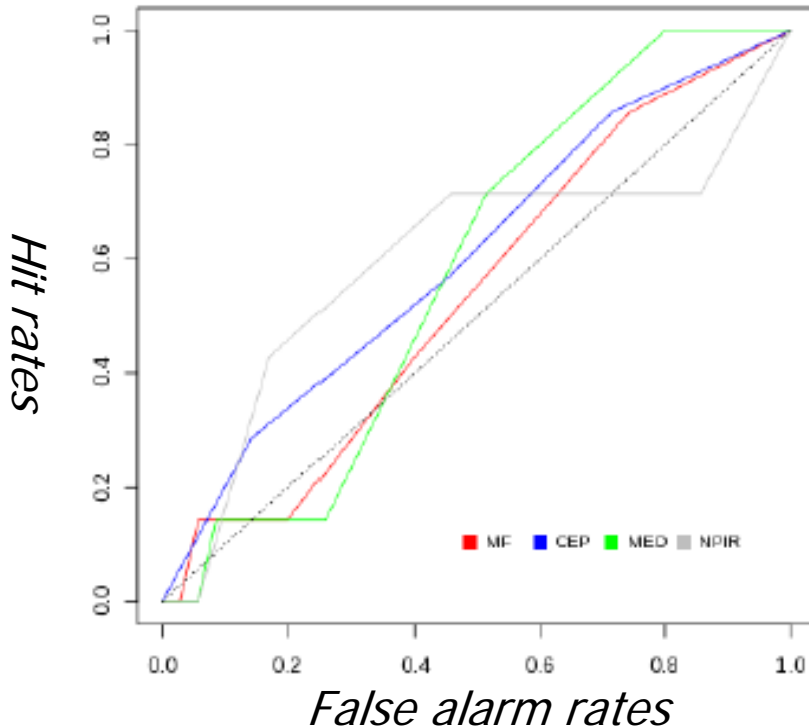


χ_{200} NPFR

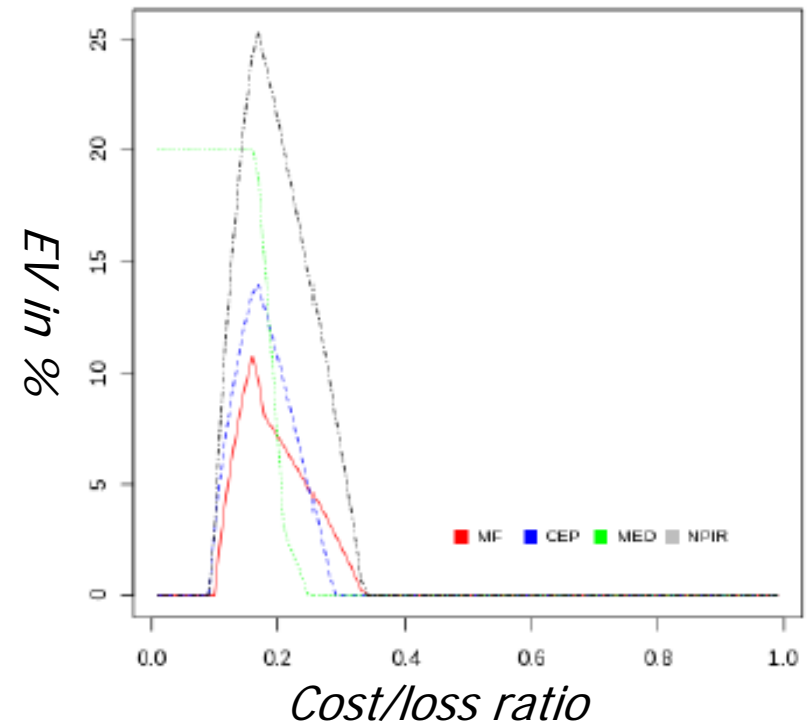
HPE predictability

1. Direct Method (Rainfall)

ROC curves



Economical value

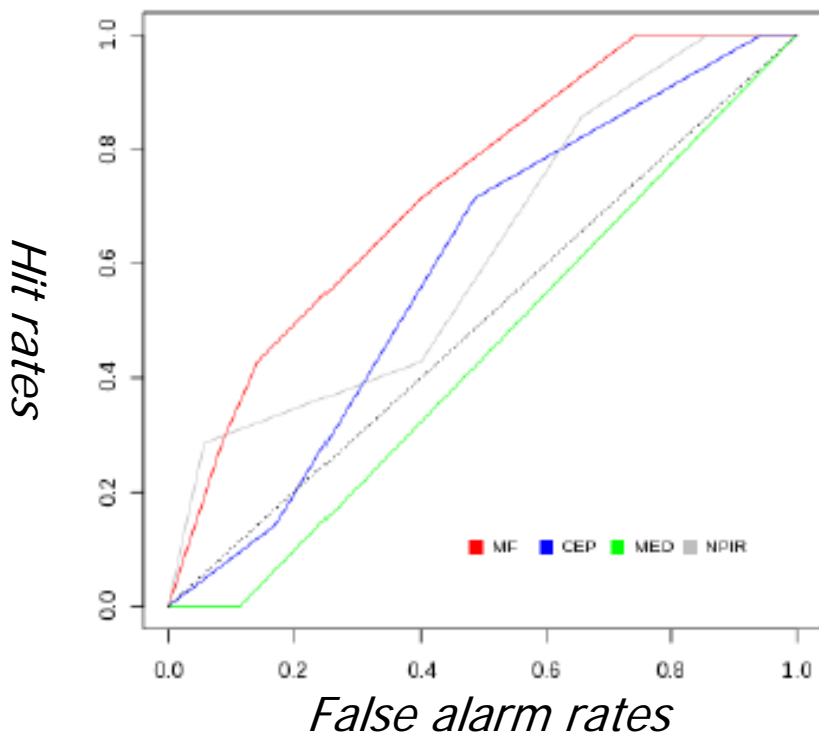


	MF	EC	MED	NPIR
ROC (area)	<i>0.54</i>	<i>0.60</i>	<i>0.58</i>	<i>0.60</i>

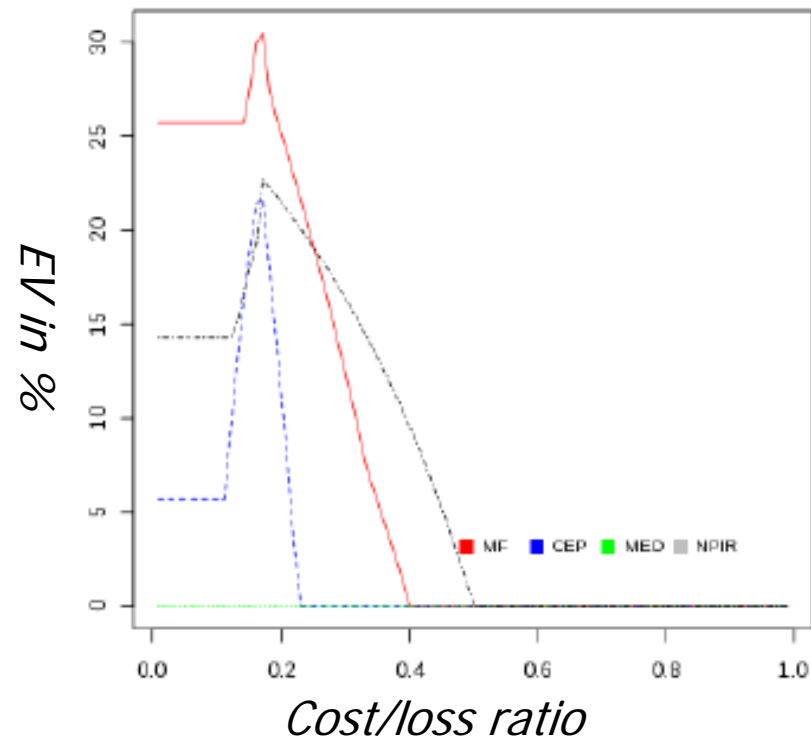
HPE predictability

2. Indirect Method Z500

ROC curves



Economical value

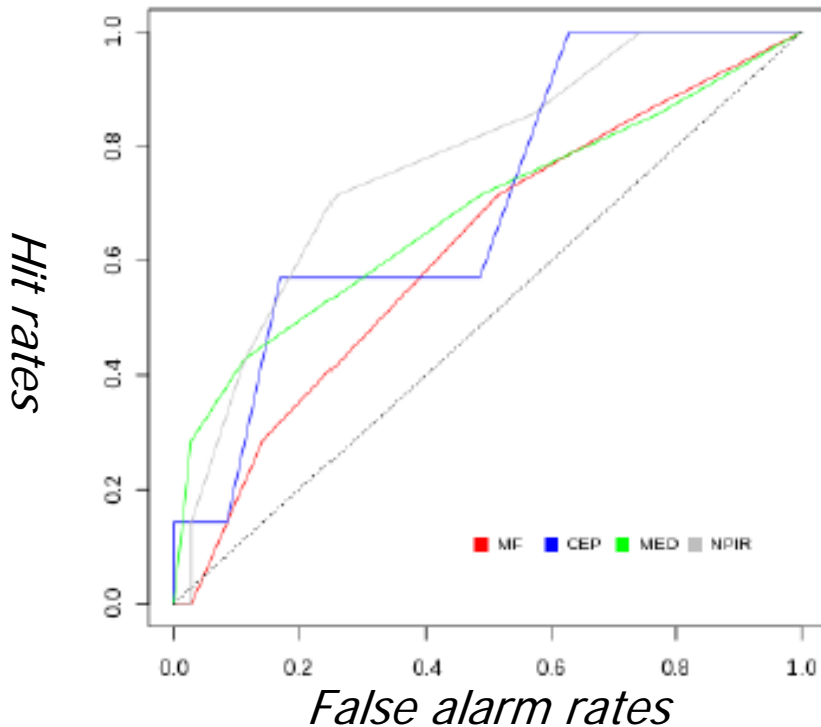


	MF	EC	MED	NPIR
ROC (area)	0.73	0.60	0.44	0.62

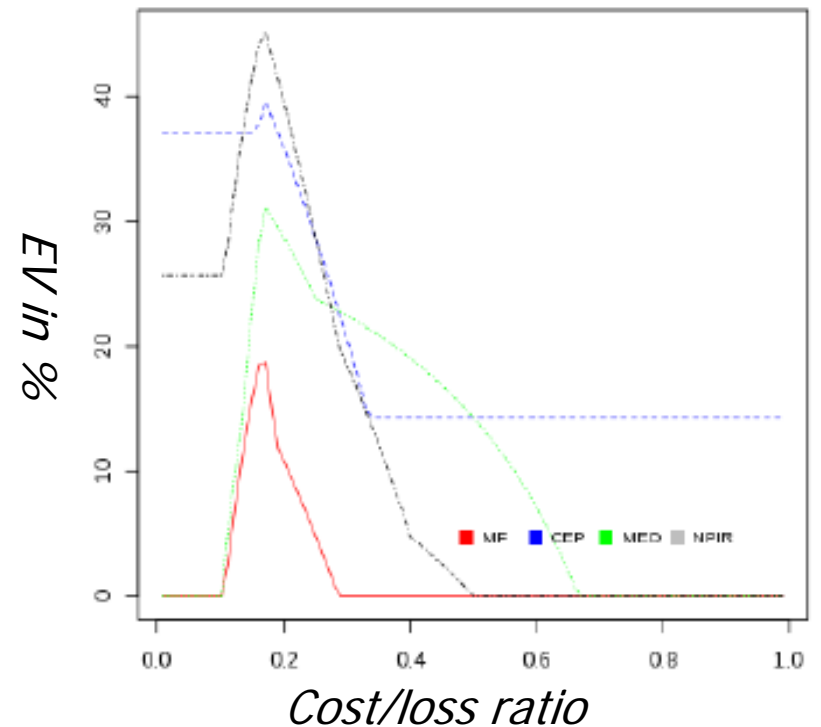
HPE predictability

2. Indirect Method $\chi\psi 200$

ROC curves



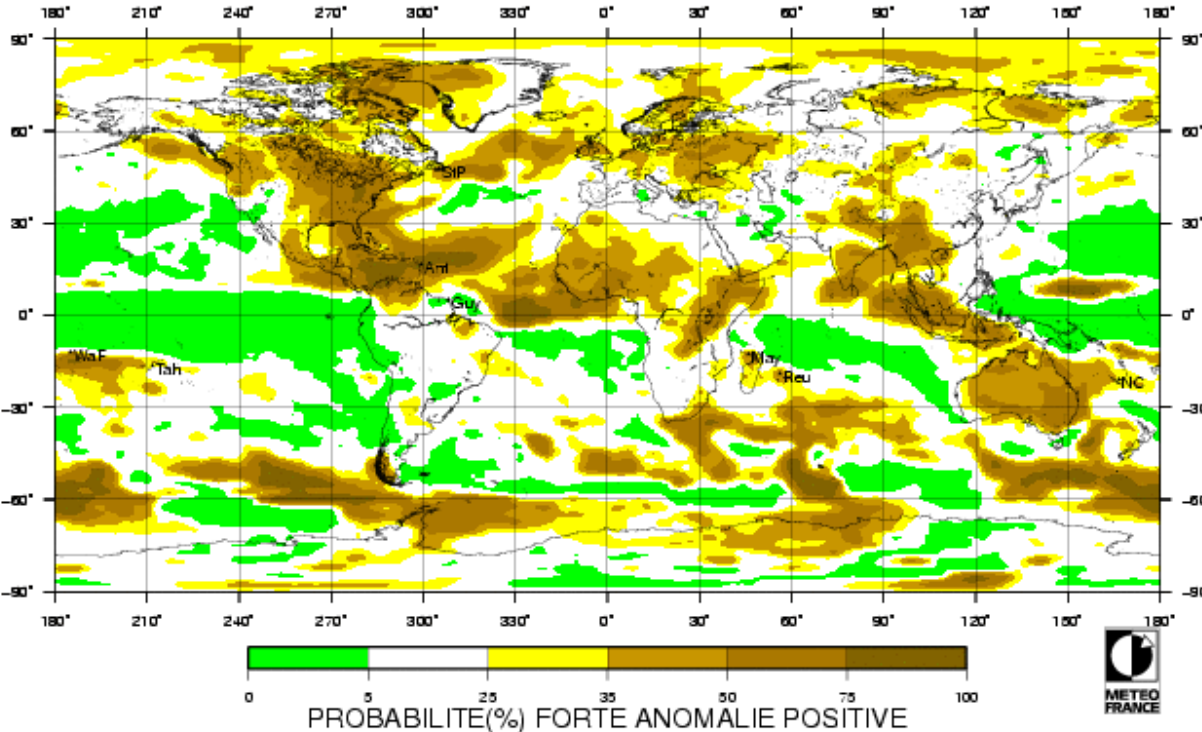
Economical value



	MF	EC	MED	NPIR
ROC (area)	0.62	0.71	0.68	0.77
95% Bootstrap	(0.37, 0.83)	(0.48, 0.90)	(0.41, 0.92)	(0.56, 0.94)

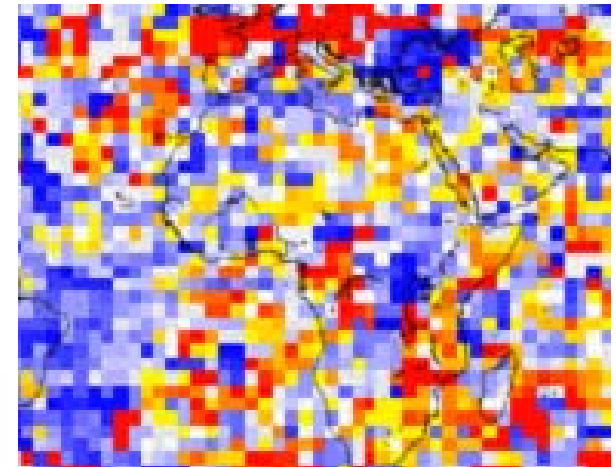
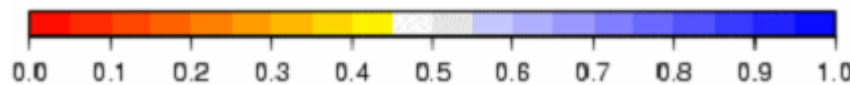
Precipitation probability and ROC skill: JAS

PRECIPITATIONS PREVISION JUILLET-AOUT-SEPTEMBRE RUN DE JUIN 2010



Extreme category :
above +1 StD

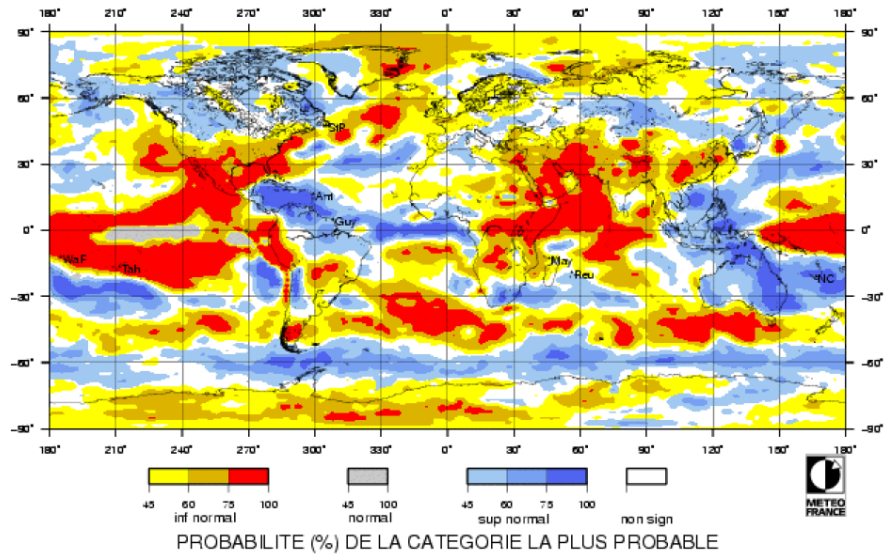
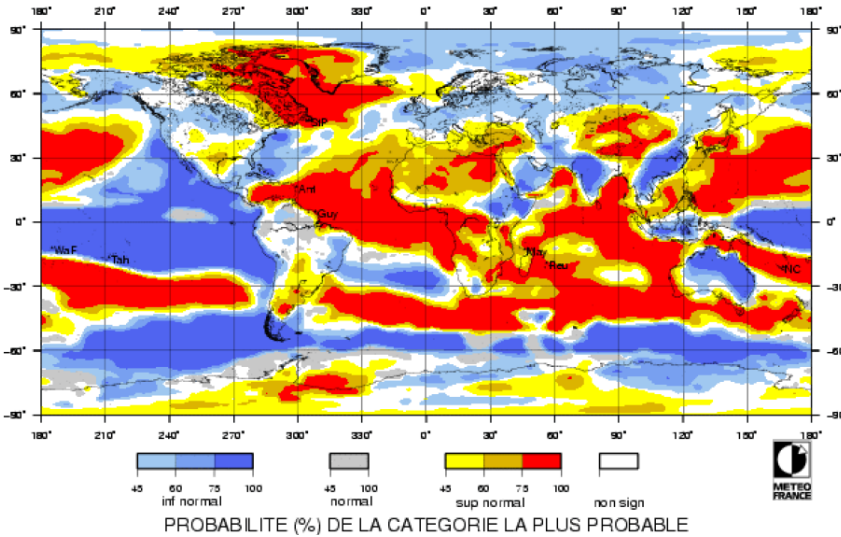
Roc for JAS – LT 1 month



Available Products

Forecasts Maps

DJF 2010-2011 – Very Strong Niña



MODELES	France Métropole	Antilles	Guyane
CEP	Grey	Yellow	Yellow
IRI	Cyan	Yellow	Green
MF	Cyan	Yellow	Yellow
Met Office	Yellow	Yellow	Yellow
JMA	Cyan	Yellow	Yellow
Synthèse	(3/5)	(5/5)	(4/5)
Scénario privilégié par Météo-France	Froid	Chaud	Chaud

MODELES	France Métropole	Antilles	Guyane
CEP	Grey	Cyan	Grey
IRI	Grey	Grey	Cyan
MF	Yellow	Cyan	Cyan
Met Office	Yellow	Cyan	Cyan
JMA	Yellow	Cyan	Cyan
Synthèse	(3/5)	(4/5)	(4/5)
Scénario privilégié par Météo-France	Sec	Humide	Humide

Expertized Scenarios

MAM 2013

MODELES	France Métropole	Antilles	Guyane	Réunion	Mayotte	Nouvelle Calédonie	Wallis et Futuna	Polynésie	St Pierre et Miquelon
CEP	Yellow	Grey	Grey	Yellow	Yellow	Yellow	Grey	Grey	Yellow
MF	Yellow	Yellow	Yellow	Cyan	Grey	Grey	Green	Green	Yellow
Met Office	Grey	Grey	Yellow	Grey	Grey	Grey	Grey	Grey	Yellow
NCEP	Grey	Grey	Grey	Grey	Grey	Yellow	Yellow	Yellow	Grey
JMA	Grey	Yellow	Green	Green	Green	Grey	Green	Green	Yellow
Synthèse	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Yellow
LC-MME	Grey	Green	Yellow	Green	Grey	Green	Yellow	Green	Yellow
EuroSIP	Yellow	Grey	Yellow	Grey	Grey	Yellow	Grey	Grey	Yellow
Scénario privilégié par Météo-France	<i>pas de scénario privilégié</i>	<i>pas de scénario privilégié</i>	<i>chaud</i>	<i>pas de scénario privilégié</i>	<i>pas de scénario privilégié</i>	<i>chaud</i>	<i>pas de scénario privilégié</i>	<i>normal</i>	<i>chaud</i>

MODELES	France Métropole	Antilles	Guyane	Réunion	Mayotte	Nouvelle Calédonie	Wallis et Futuna	Polynésie	St Pierre et Miquelon
CEP	Yellow	Grey	Grey	Grey	Yellow	Cyan	Cyan	Grey	Grey
MF	Cyan	Cyan	Grey	Yellow	Yellow	Cyan	Yellow	Yellow	Cyan
Met Office	Grey	Yellow	Yellow	Grey	Yellow	Cyan	Yellow	Grey	Grey
NCEP	Grey	Grey	Cyan	Yellow	Grey	Cyan	Yellow	Yellow	Grey
JMA	Cyan	Grey	Yellow	Grey	Yellow	Yellow	Grey	Green	Grey
Synthèse	Grey	Grey	Grey	Grey	Yellow	Cyan	Yellow	Grey	Grey
LC-MME	Grey	Yellow	Yellow	Grey	Yellow	Grey	Yellow	Yellow	Grey
EuroSIP	Grey	Grey	Grey	Grey	Yellow	Cyan	Grey	Grey	Grey
Scénario privilégié par Météo-France	<i>pas de scénario privilégié</i>	<i>pas de scénario privilégié</i>	<i>pas de scénario privilégié</i>	<i>pas de scénario privilégié</i>	<i>sec</i>	<i>humide</i>	<i>sec</i>	<i>pas de scénario privilégié</i>	<i>pas de scénario privilégié</i>

Yellow: T supérieure à la normale (chaud) Grey: Pas de scénario privilégié



Dengue Alert

Yellow: P inférieures à la normale (sec) Green: P proches de la normale Cyan: P supérieure à la normale (pluvieux) Grey: Pas de scénario privilégié