

Scoping Meeting on Mediterranean COFs

Predictability of the Meteo France seasonal forecast model over the Mediterranean basin

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Madrid – 12 to 14 June 2013



Outline

■ GPC Toulouse

- Forecasting suite
- Products

■ Which Predictability for the Ocean/Atmosphere system?

- Seasonal scale – Global (SST)
- Seasonal scale – Regional (T2m and Rainfall)
- HPE predictability (at fall)

■ Which Predictability for the Hydrological system ?

- Spring (MAM)
- Summer (JJA)

The Meteo-France Operationnal Suite

■ Coupled Model version 5

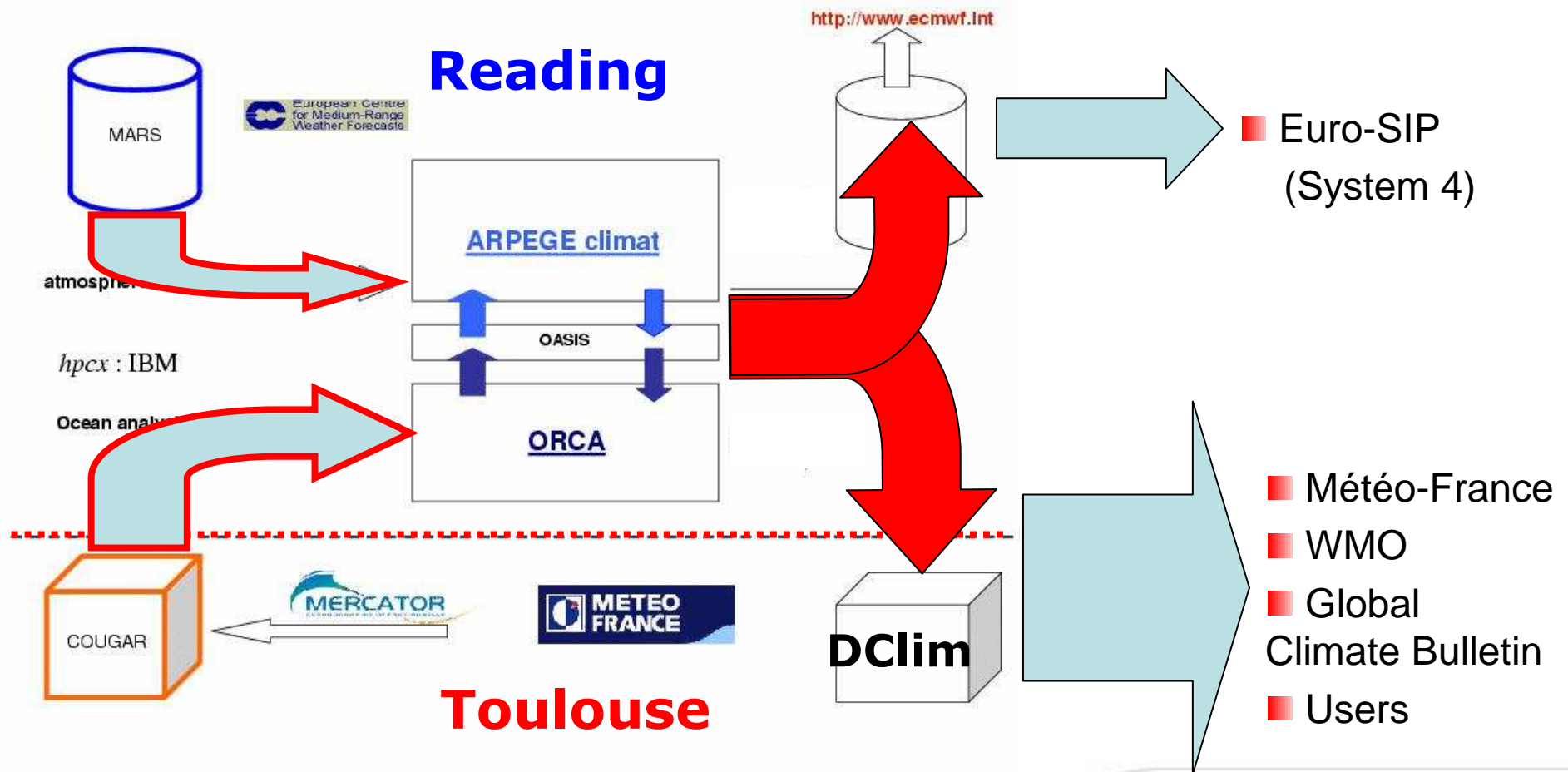
- Atmosphere : Arpege v5, t127 I31,
- Ocean : Nemo (31 vertical levels ~10m close to the surface and ~500 m below 3000 m, 1° resolution with 0.25° meridional resolution in the tropics),
- Coupling : Oasis,
- Mercator reanalysis : 1991 – 2010, new assimilation scheme using insitu data and altimetry,
- Hindcast : over the 1991-2010 period, 15 members, 7 month range run,
- Operationnal : 51 membres, 7 month range run,
- Availability : since the beginning of 2013

■ Products

- issuance at the beginning of the current month

Operationnal Forecasting Suite

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



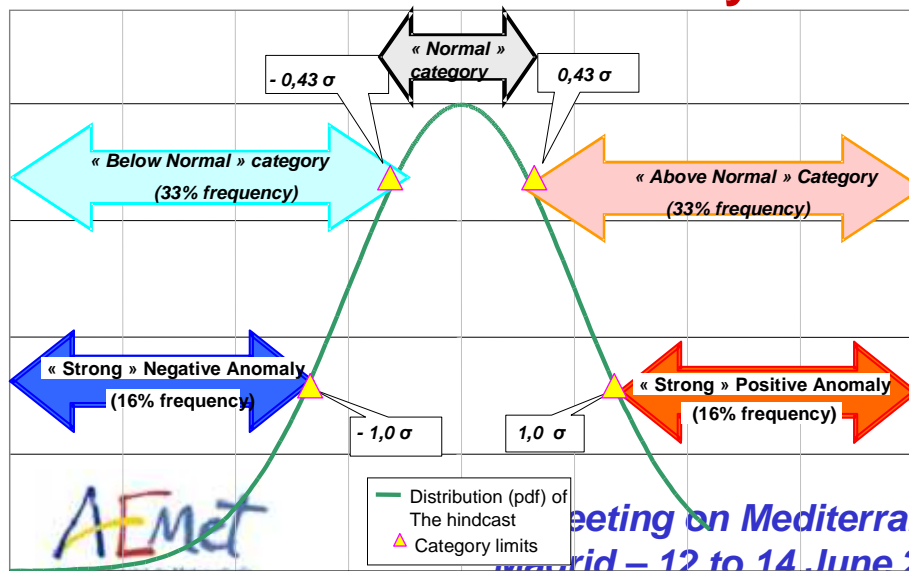
Products

■ 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)



Extranet dedicated to Seasonal Forecasts

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Extranet Prévisions saisonnières

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

Current bulletin | Saved bulletin | Useful Maps

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
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Documentation
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Working Space



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Extranet : Forecast access

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Home

Arpège Forecast

This part contains Météo-France Arpège forecasts. The forecasts are updated beginning of each month.

[See the documentation about products \(in French\)](#)

+ Forecast maps

forecast maps (deterministic and probabilistic) available for 4 lead-time and 10 parameters for surface an

+ "Plum diagrams" for the Ocean

Plums diagrams for the ocean for 4 boxes in the Equatorial Pacific, in the Tropical Atlantic and Indian ocea

[See Atlantic boxes](#)

[See Indian boxes](#)

[See Pacific boxes](#)

+ Circulation regimes

Diagrams of circulation regime occurrence over North Atlantic sector.

+ Climagrams

Temperature and precipitations Climagrams for 25 land boxes.

[See land boxes](#)

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Home

Arpège Scores

This page is dedicated to the verification of the seasonal forecasting Arpège model. The calculation is based on the hindcast period 1979-2008 and performed for 3 parameters: T 2m, SST and Rain. Deterministic scores (Msss and correlation) and Probabilistic scores (Roc and Brier) are displayed on maps (grid point scores) and diagrams (boxes for ocean and area for lands). They are available for individual month (7 lead-time) and the 12 overlapping seasons (4 lead-times). Plums diagrams for the ocean for 4 boxes in the Equatorial Pacific, in the Tropical Atlantic and Indian ocean: SST anomaly forecasts over 7 months range.

[See Atlantic boxes](#)

[See Indian boxes](#)

[See Pacific boxes](#)

[See land boxes](#)

+ 3-months score maps

3-month Brier, Roc, msss, correlation and ratio scores for upper and lower terciles and 2 extreme categories.

+ 3-months score diagrams

3-month Roc and reliability diagrams for upper and lower terciles and 2 extreme categories over different oceanic and land zones.

+ monthly score maps

monthly Brier, Roc, msss, correlation and ratio scores for upper and lower terciles and 2 extreme categories.

+ monthly score diagrams

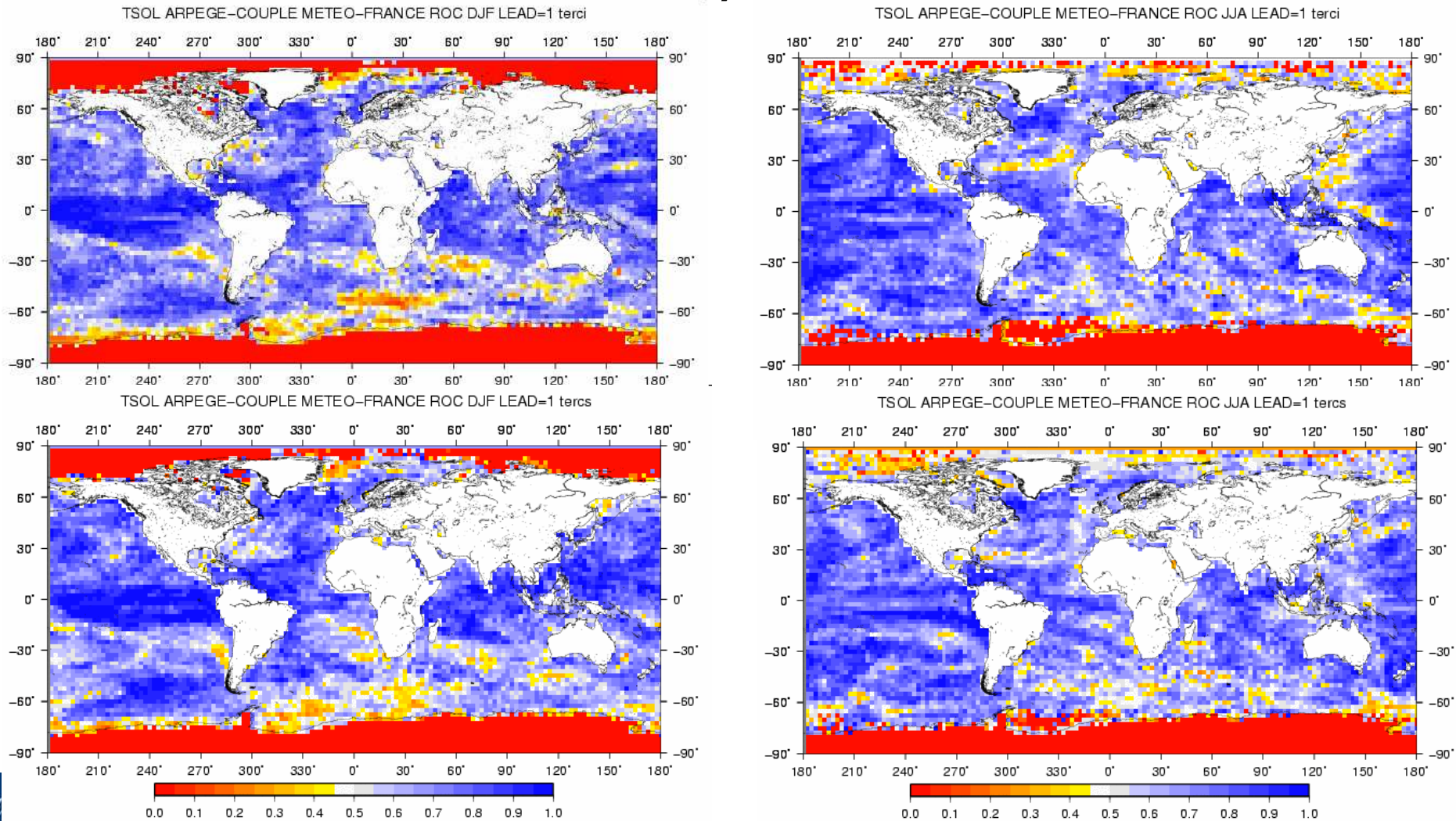
monthly Roc and reliability diagrams for upper and lower terciles and 2 extreme categories over different oceanic and land zones.



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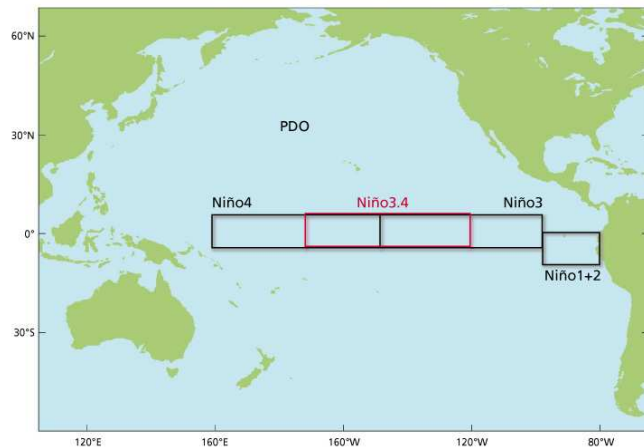
Predictability of the Ocean/Atmosphere system

Global - Seasonal (Ocean) :

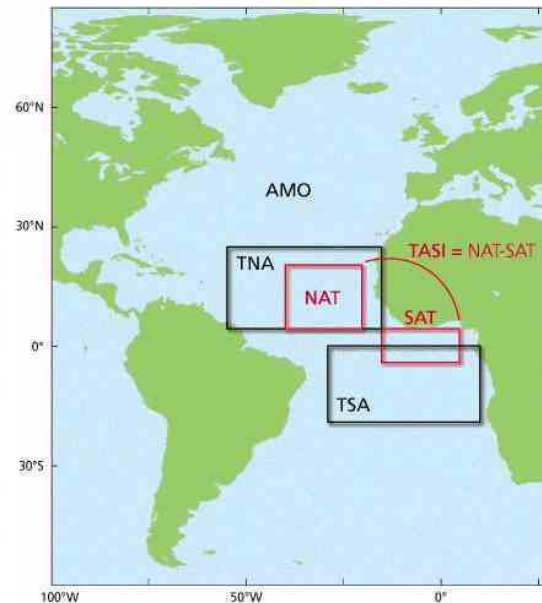


Predictability of the Ocean/Atmosphere system

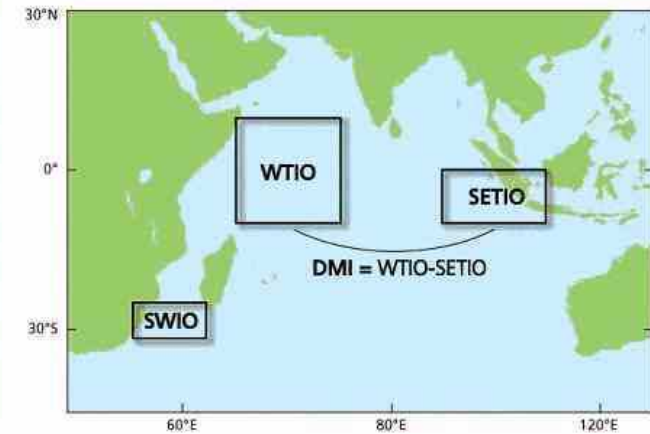
■ Global - Seasonal (Ocean) :



Niño 3.4



TNA



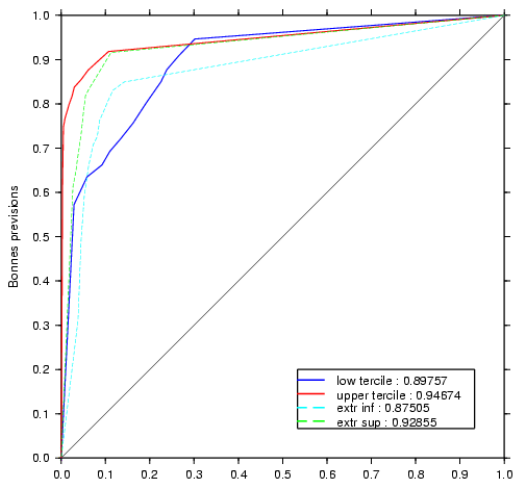
WTIO

Predictability of the Ocean/Atmosphere system

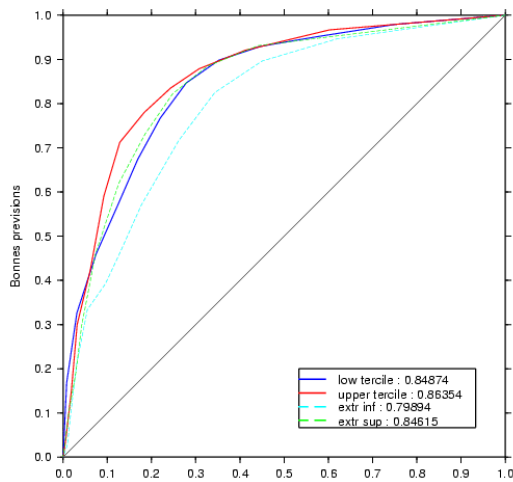
Global - Seasonal (Ocean) :

Best

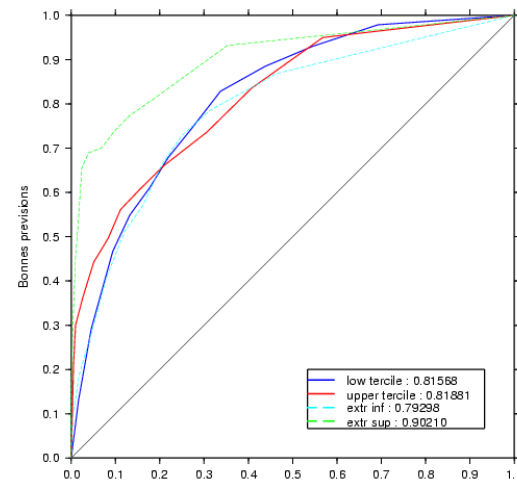
TSOL METEO-FRANCE ROC CURVES NDJ LEAD=1 NINO3.4



TSOL METEO-FRANCE ROC CURVES NDJ LEAD=1 TNA

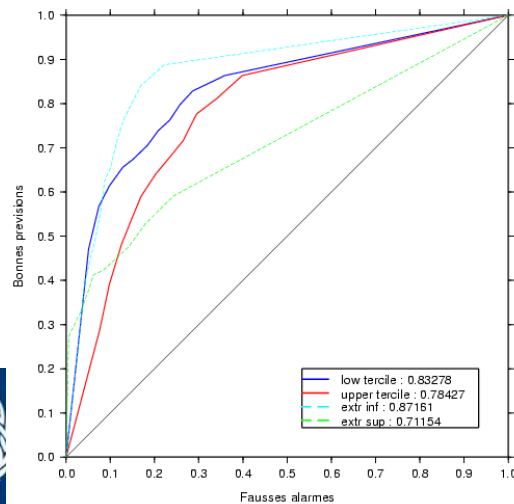


TSOL METEO-FRANCE ROC CURVES DJF LEAD=1 WTIO



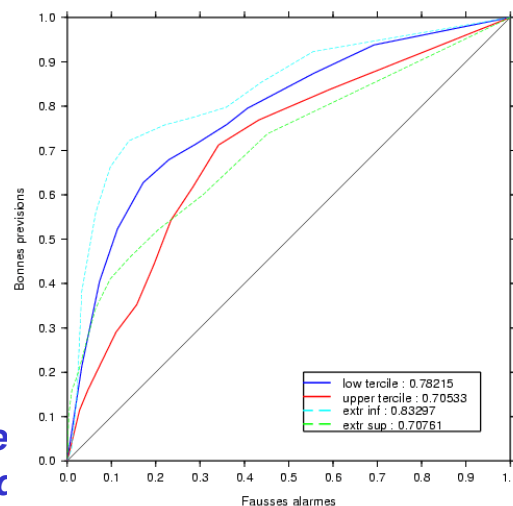
Nino 3.4

TSOL METEO-FRANCE ROC CURVES JJA LEAD=1 NINO3.4



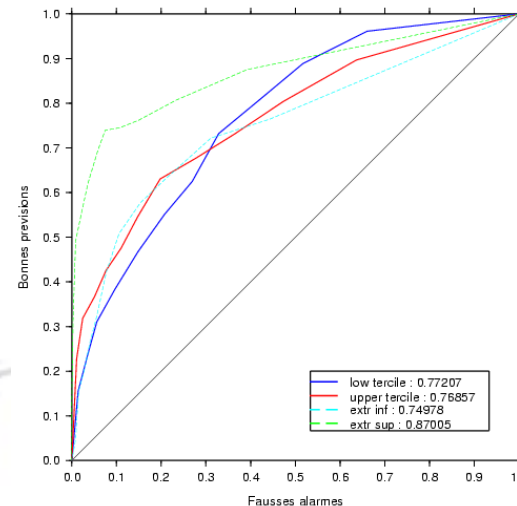
TNA

TSOL METEO-FRANCE ROC CURVES AMJ LEAD=1 TNA



WTIO

TSOL METEO-FRANCE ROC CURVES NDJ LEAD=1 WTIO



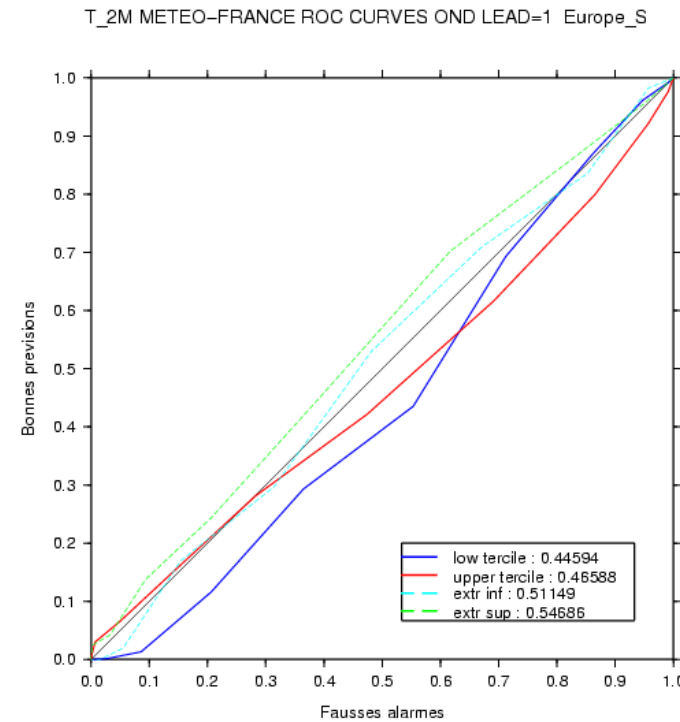
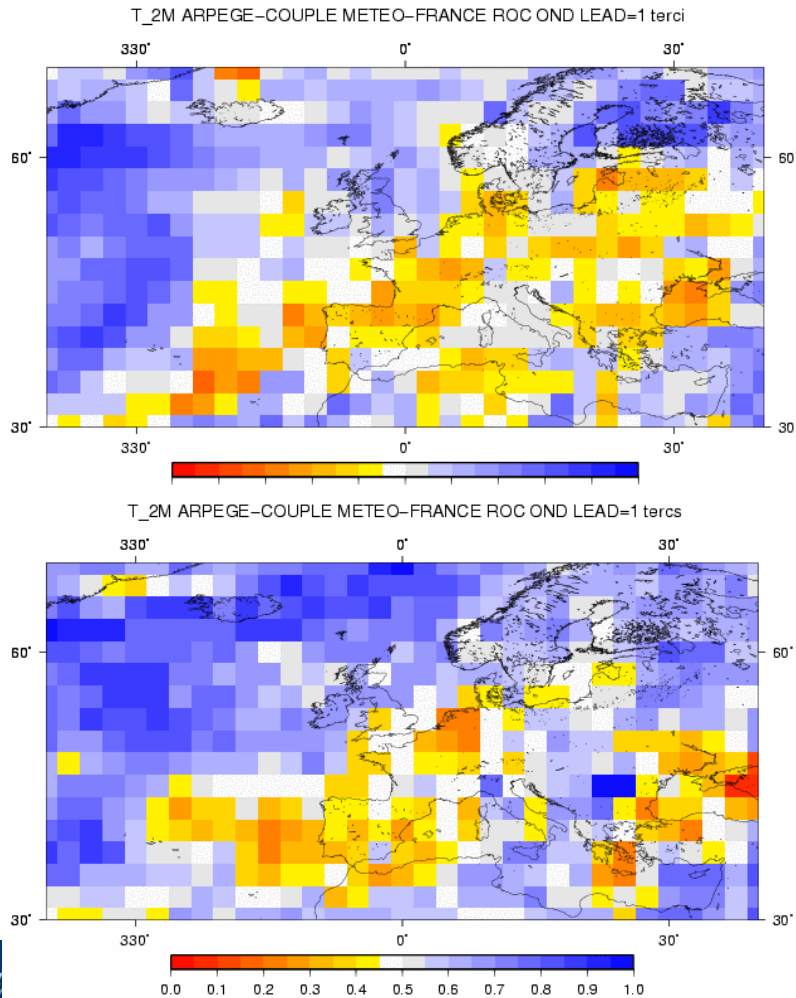
Worst



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Madric

Predictability of the Ocean/Atmosphere system

Regional - Seasonal : T2m



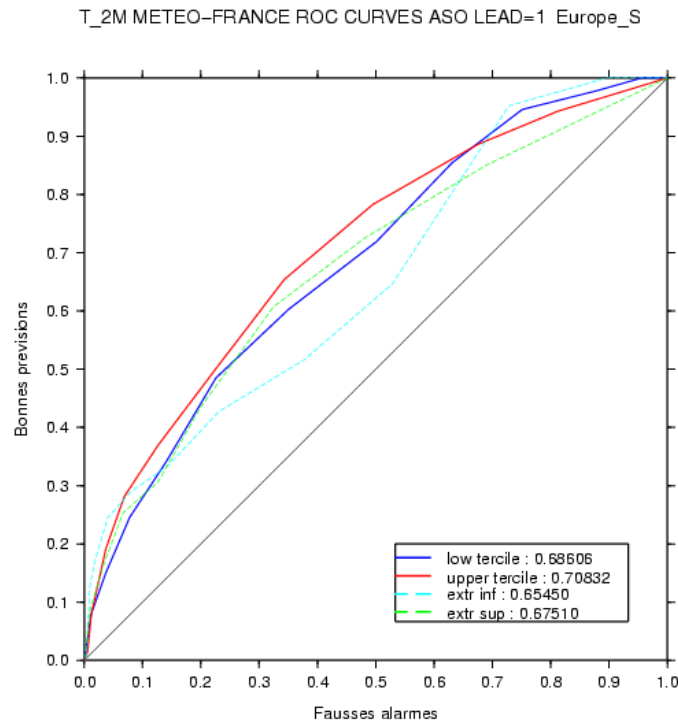
Worst

October-November-December

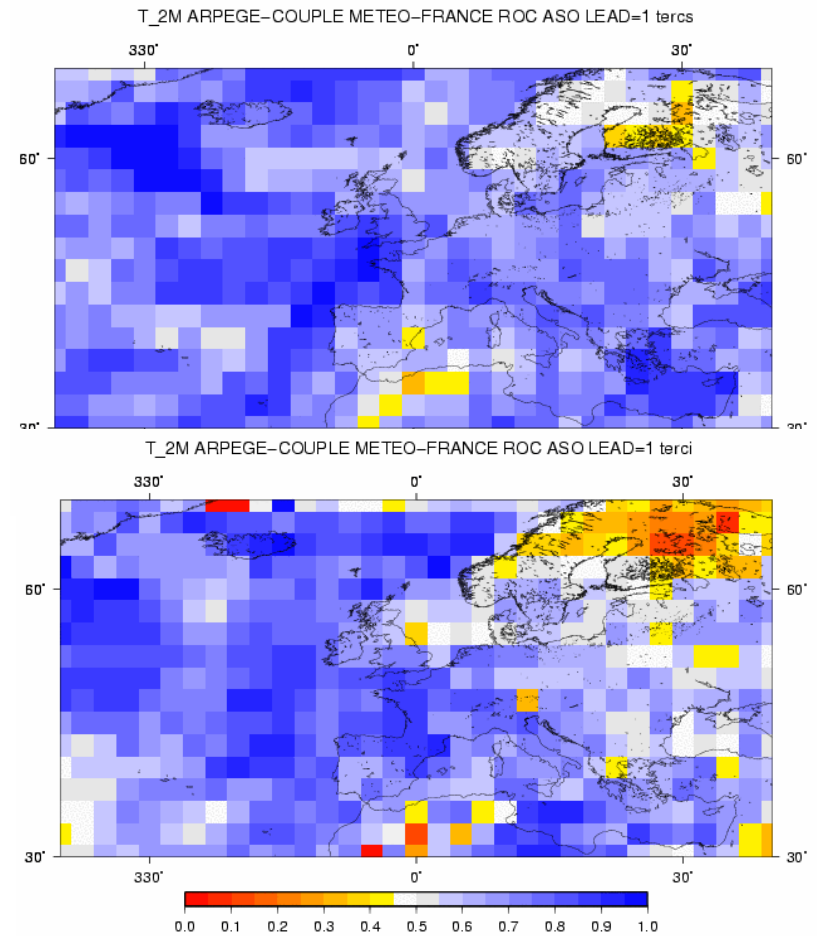
Predictability of the Ocean/Atmosphere system

Regional - Seasonal : T2m

Best

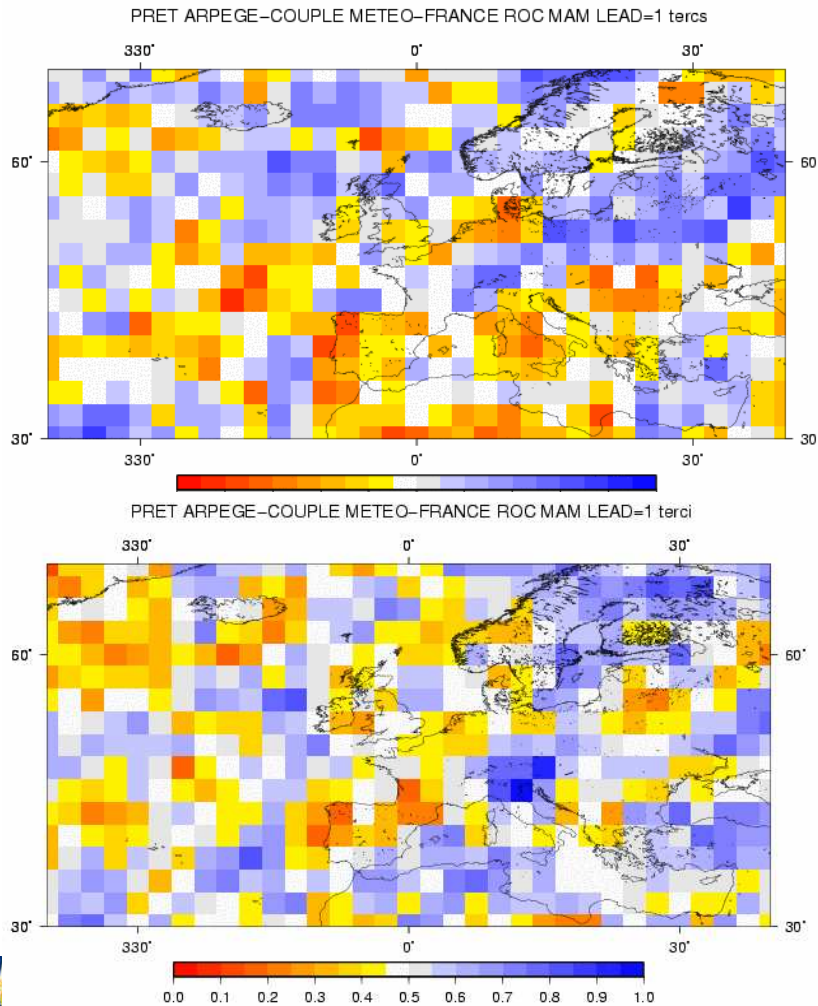


August-September-October

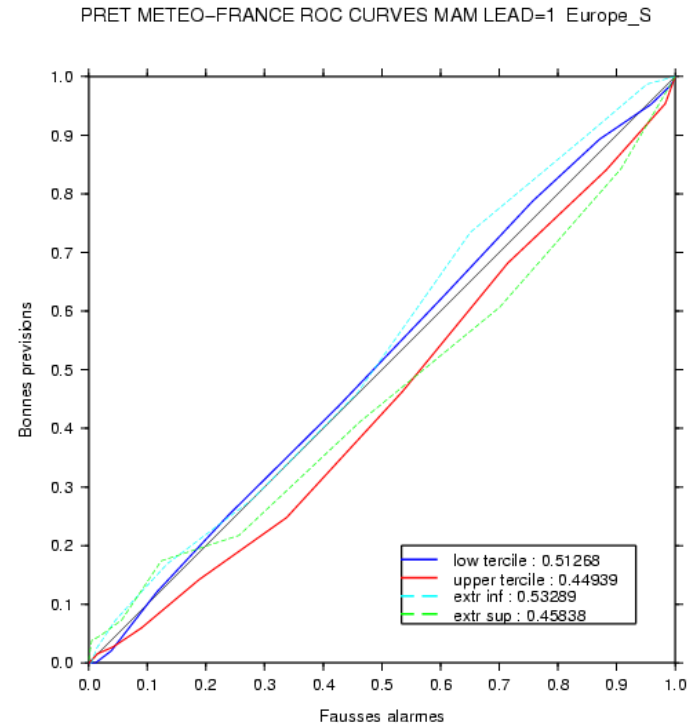


Predictability of the Ocean/Atmosphere system

Global - Seasonal (Regional) : Rainfall



Worst

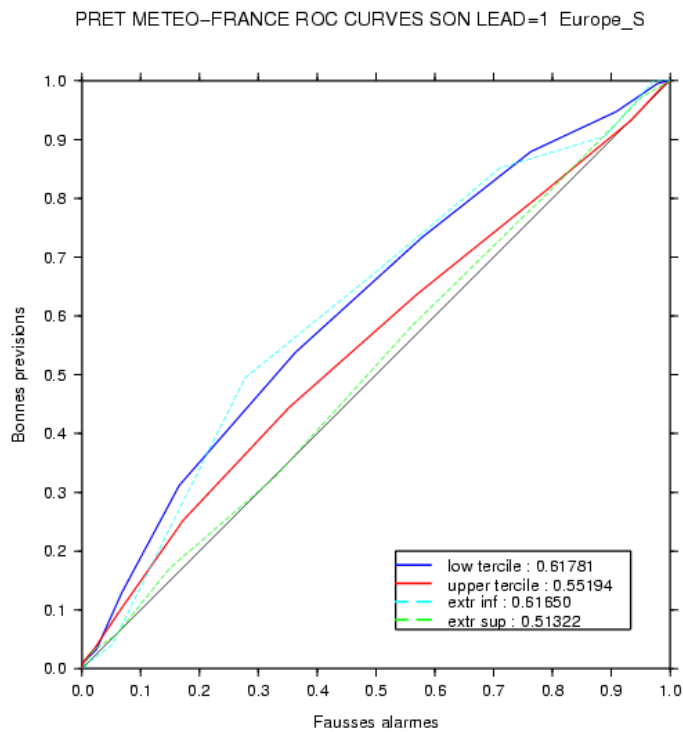


March-April-May

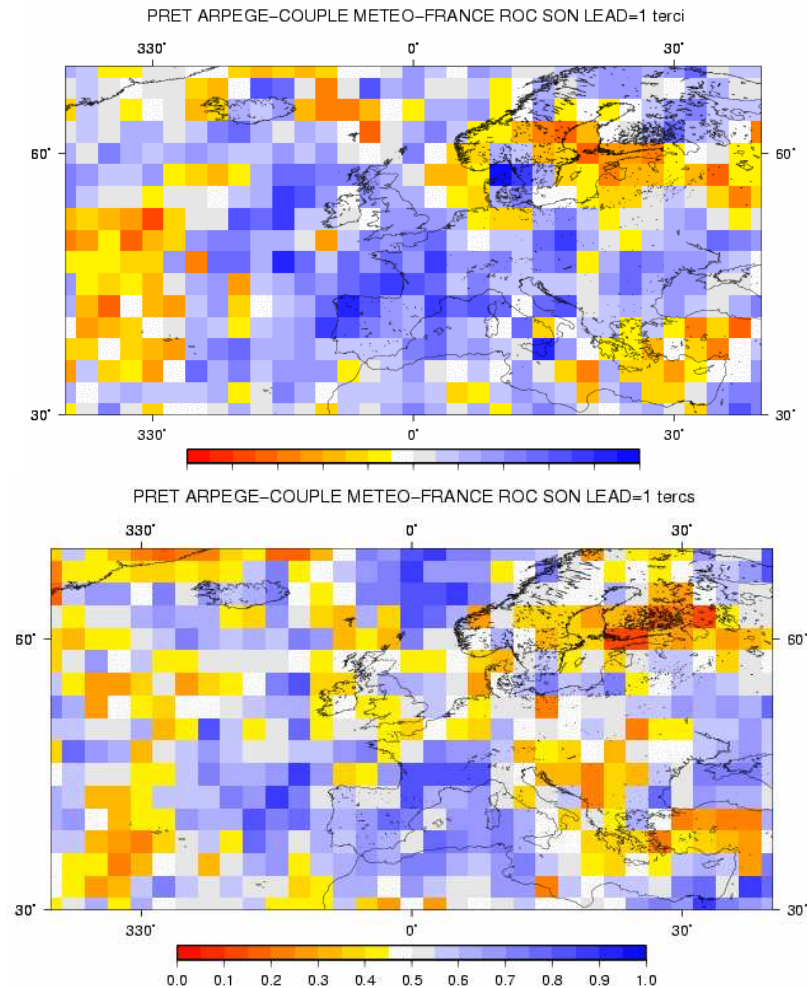
Predictability of the Ocean/Atmosphere system

Global - Seasonal (Regional) : Rainfall

Best



September-October-November



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HPE predictability

Predicted event: HPE occurrence $> m + 1*\sigma$

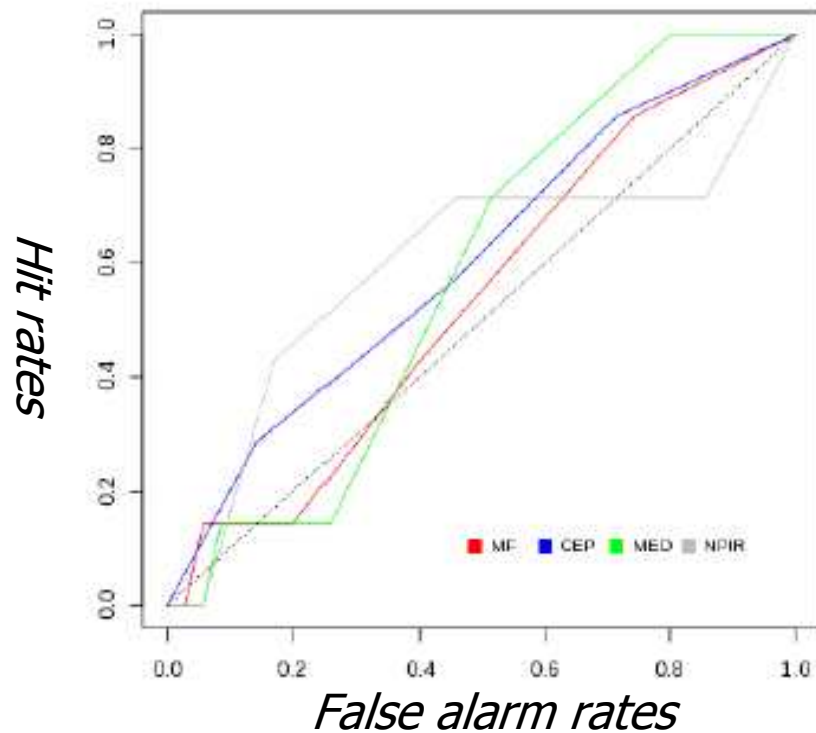
1. Direct method: Definition of HPE from daily simulated precipitations taken at one of the two grid points in southern France (distribution quantile providing a similar amount of HPE than the observed)
2. Linear indirect Method: Definition of HPE from a Linear Discriminant Analysis model from the simulated cluster (MOS technique) occurrence (Z500 firstly and $\chi\psi$ 200 secondly)

The predictability will be assessed using ROC curves and areas (confidence interval from a bootstrap) and economical value (cost/loss ratio framework) skill scores

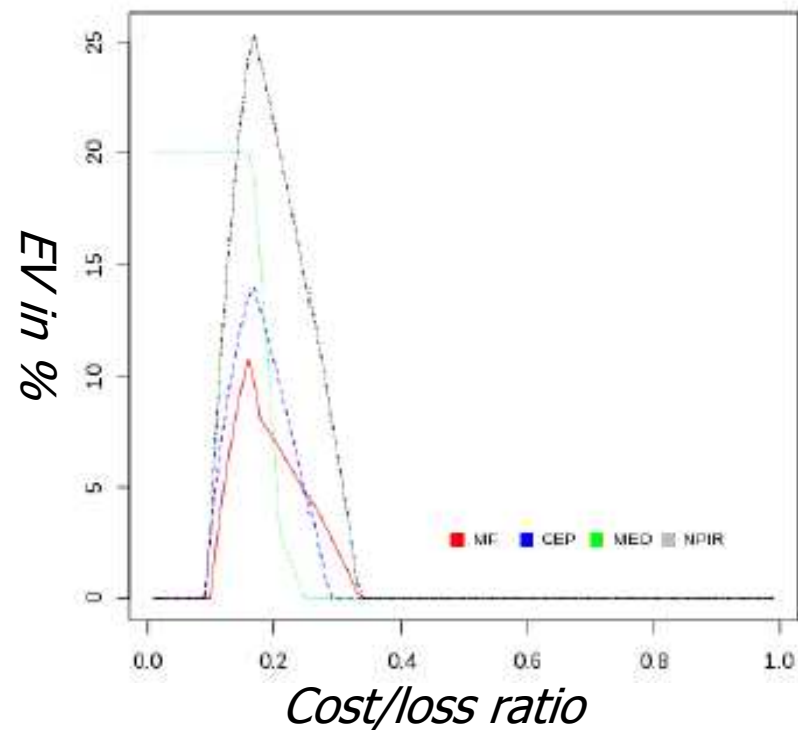
HPE predictability

1. Direct Method

ROC curves



Economical value

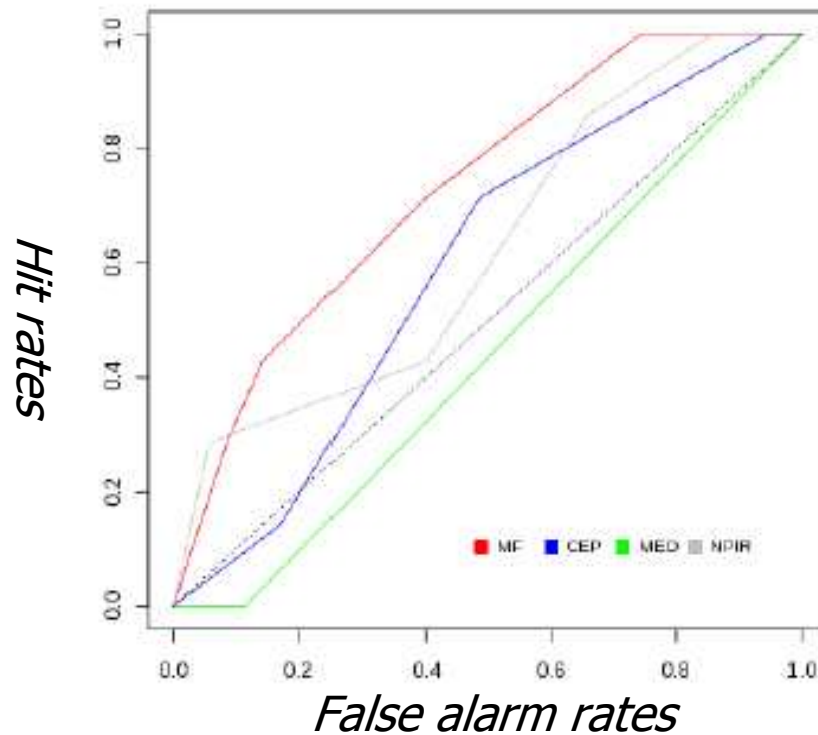


	MF	EC	MED	NPIR
ROC (area)	<i>0.54</i>	<i>0.60</i>	<i>0.58</i>	<i>0.60</i>

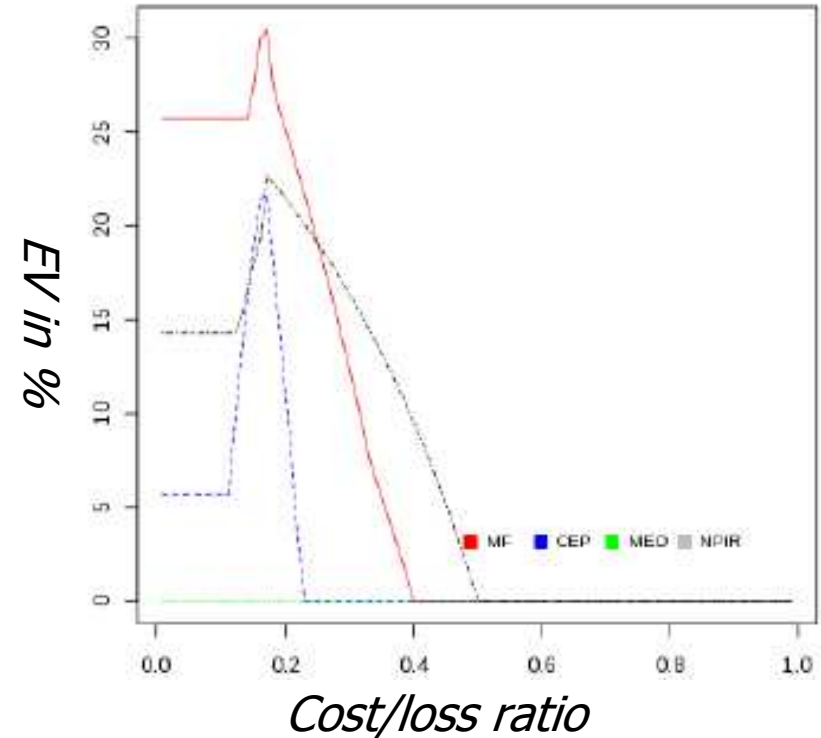
HPE predictability

2. Indirect Method Z500

ROC curves



Economical value

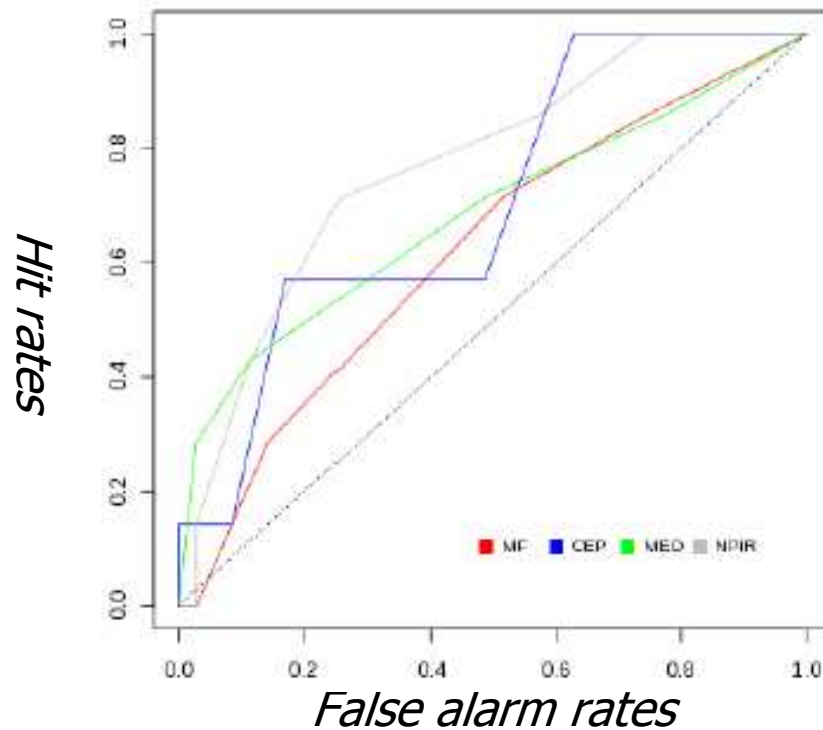


	MF	EC	MED	NPIR
ROC (area)	<i>0.73</i>	<i>0.60</i>	<i>0.44</i>	<i>0.62</i>

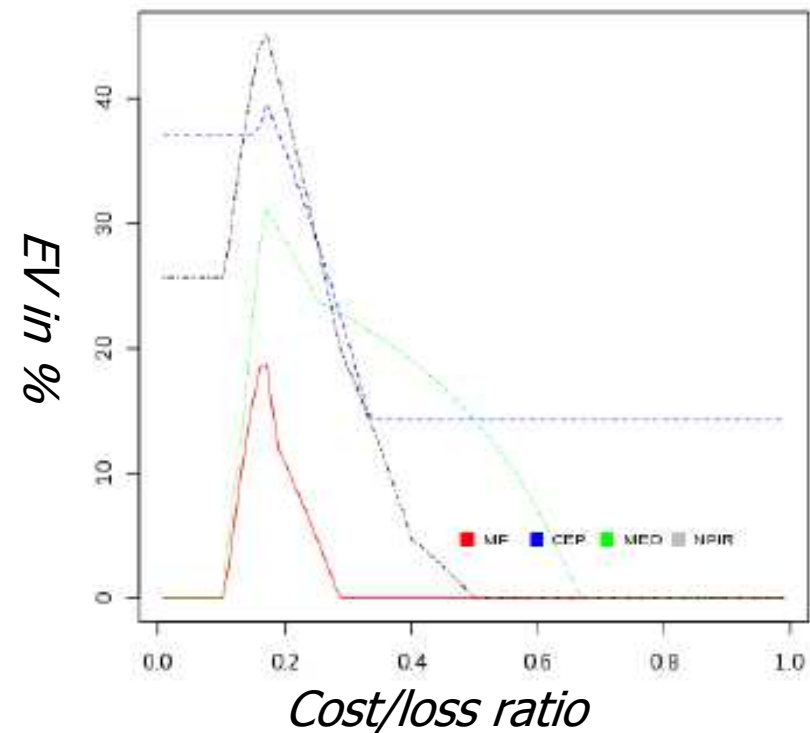
HPE predictability

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)

Predictability of the Hydrological system

■ National - Seasonal : SWI and River Flow



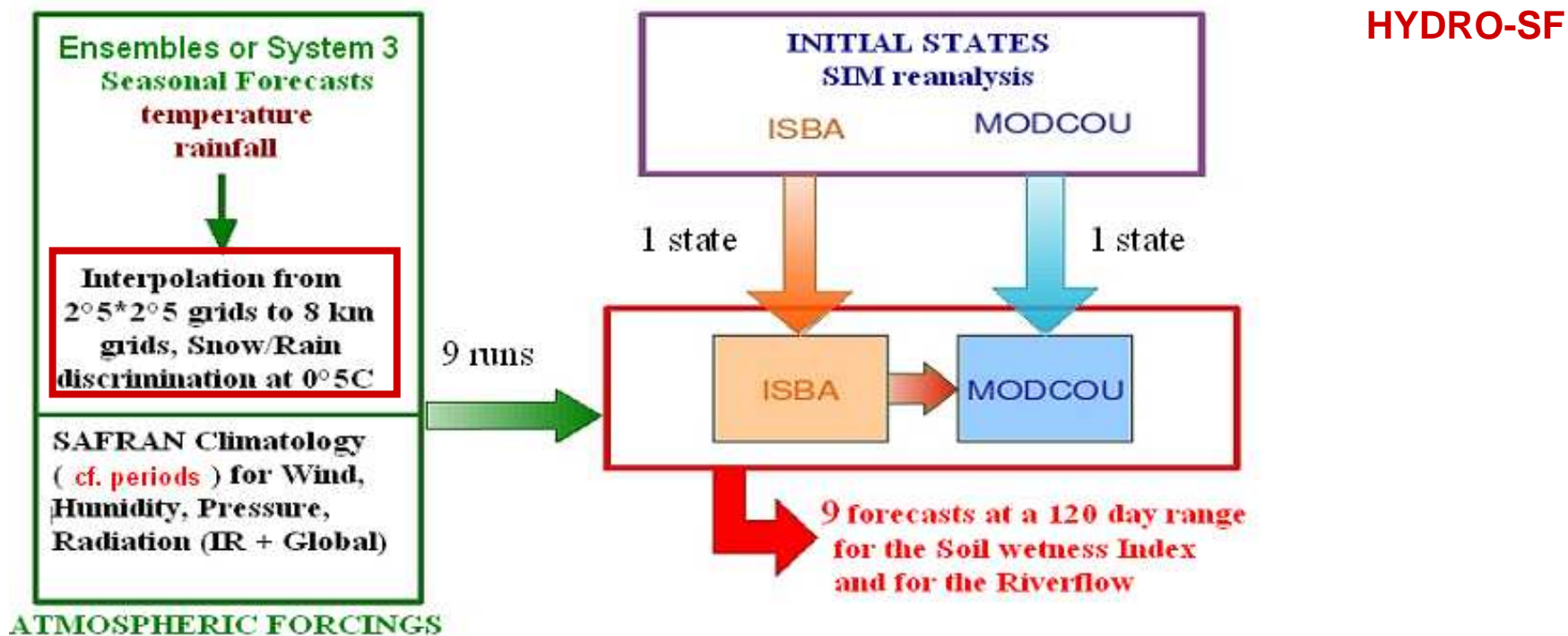
September-October-November

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The hydrometeorological suite

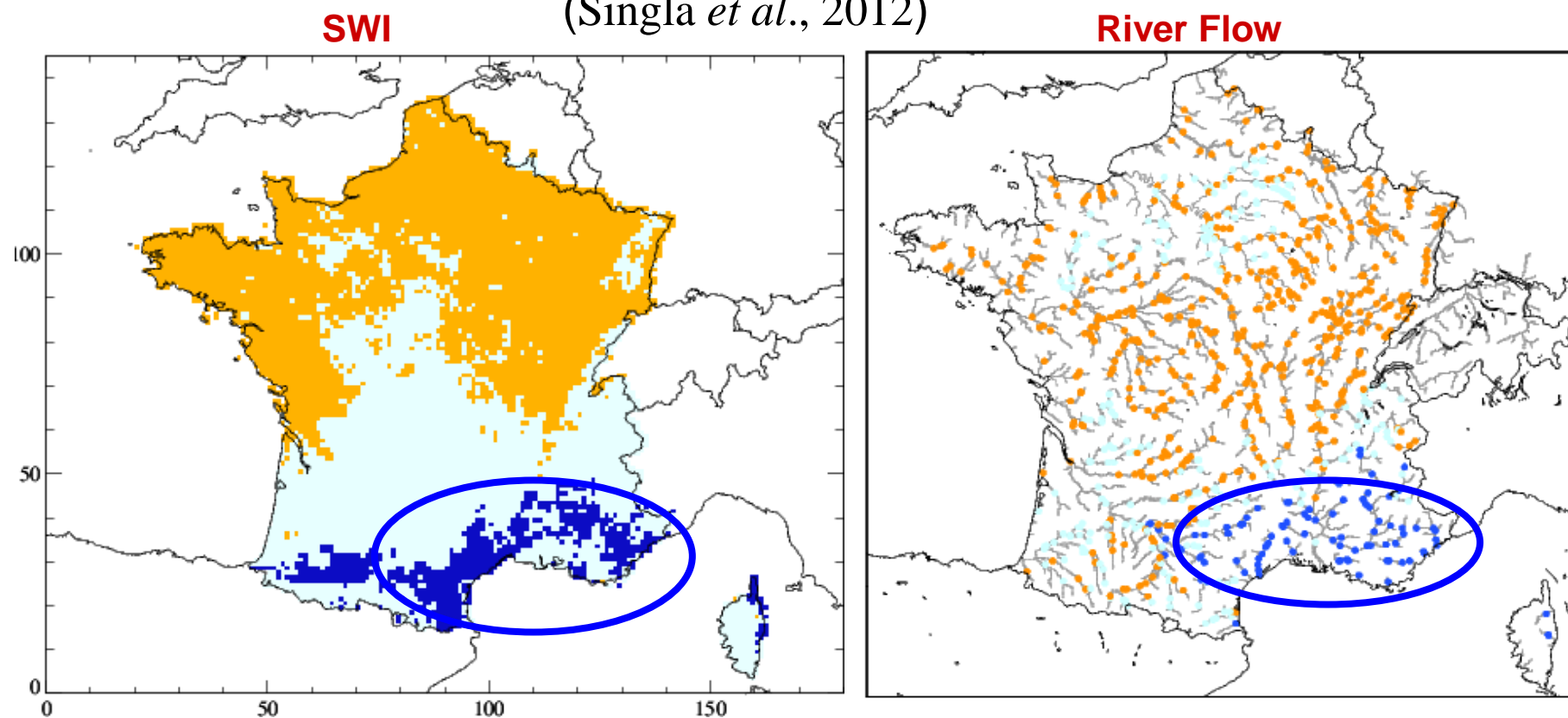
- Method adapted from the medium range ensemble riverflow forecast (Tanguy - 2009, Céron *et al.* - 2010)






- Period from 1958 to 2005 (ENSEMBLES) – 9 members
- Period from 1979 to 2007 (System3) – 9 or 11 members

Results for Spring (MAM)

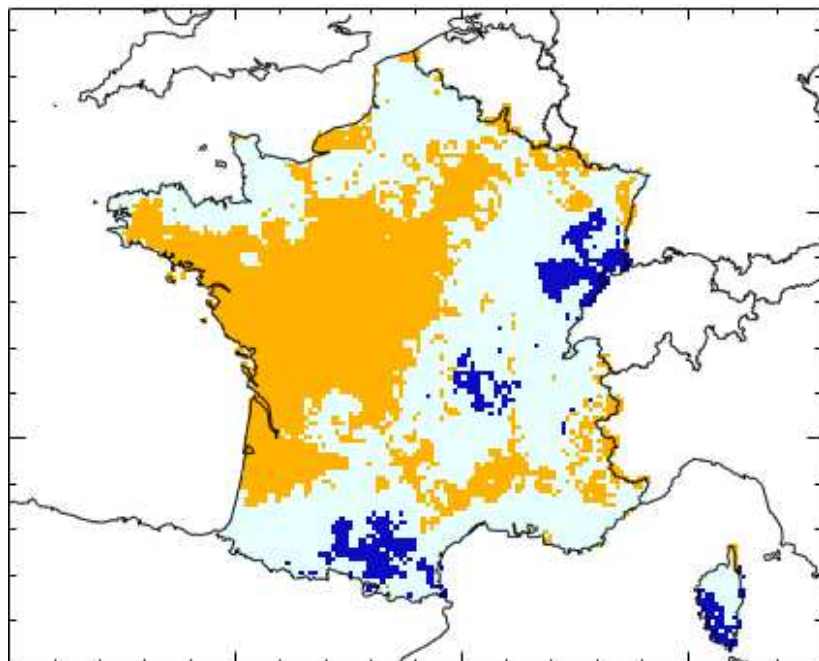
Comparison of correlations between Hydro-SF and RAF – IC 1st of February
(Singla *et al.*, 2012)



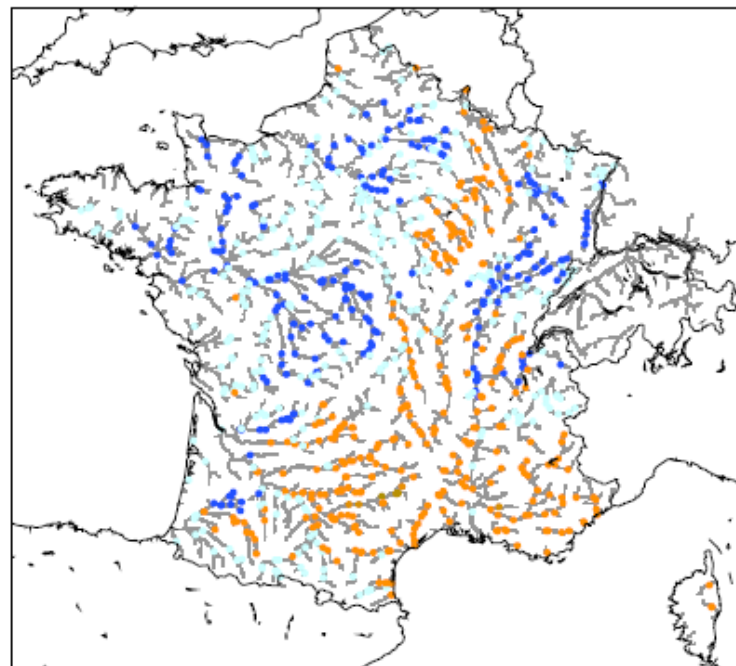
-  Regions where Hydro-SF is significantly better than RAF
-  Regions where Hydro-SF is equivalent to RAF
-  Regions where RAF is significantly better than Hydro-SF

Results for Summer (JJA)




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



SWI

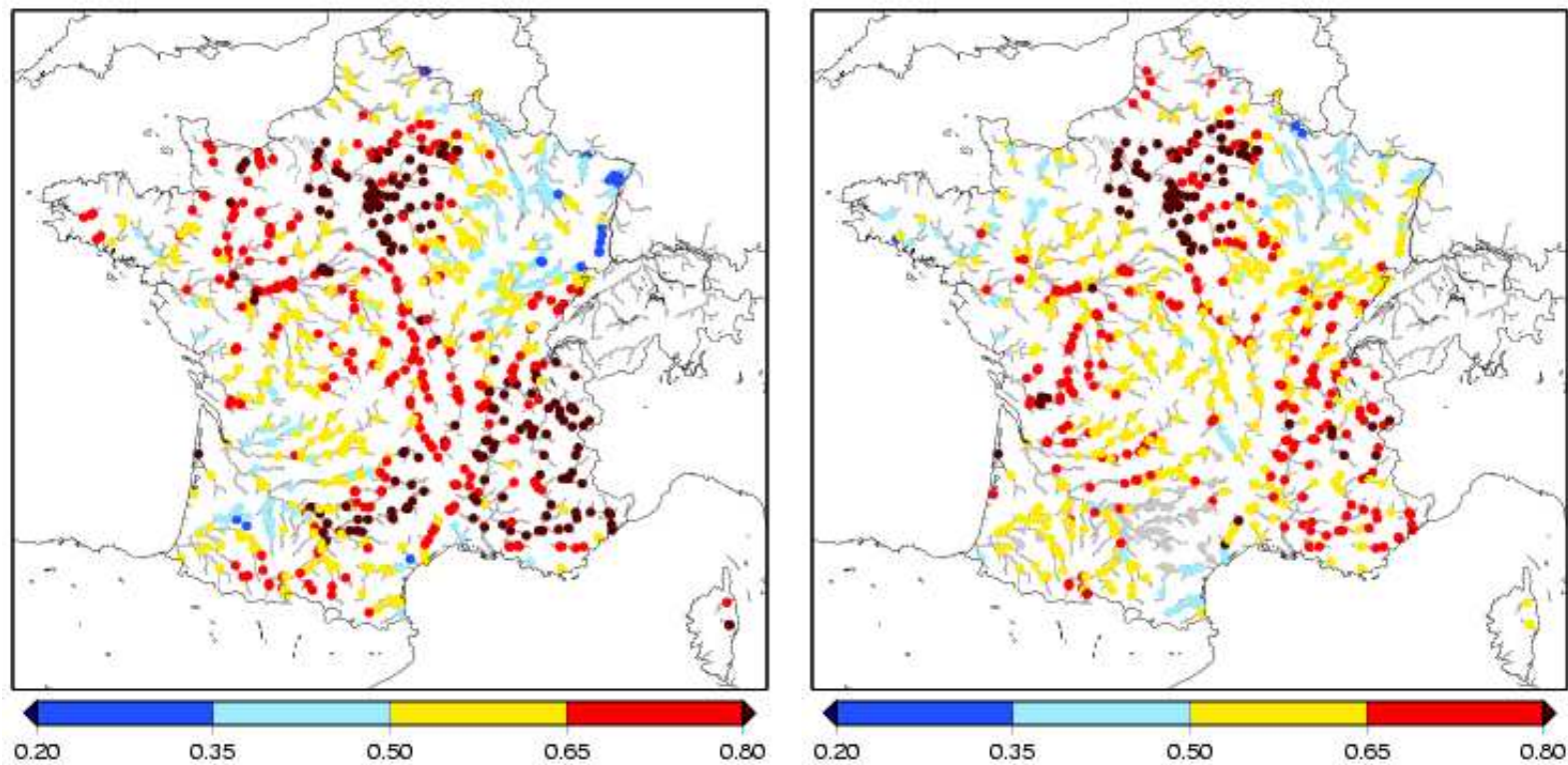


River Flow

-  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

Results for Summer (JJA)

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



Upper Tercile

Lower Tercile

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Thank you for attention

