

Use and evaluation of ECMWF EPS at Météo-France (some examples)

✓ Confidence index

✓ use of 15-days EPS

✓ Use of EPS in tropical areas

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Since medium-range forecasts are produced, a confidence index is also provided.

- for ranges D+4-D+5 and D+6-D+7,
- Estimated by the forecaster,
- Based on the EPS spread, especially the number of tubes
- Ranked from 1 to 5, but in practice 1 and 5 are never used
→ 3 levels (low, normal, good).

Verification D+4/D+5 : june 2005 to may 2007

Conf. Index Forecast quality	low	normal	good
good	2 (5,4 %)	67 (20 %)	104 (30,6 %)
Rather good	23 (62,2 %)	199 (59,1 %)	192 (56,7%)
Rather bad	12 (32,4%)	67 (20 %)	42 (12,4 %)
bad	0	3 (0,9 %)	1 (0,3%)
total	37	336	339

Verification D+6/D+7 : june 2005 to may 2007

Conf.index	low	normal	good
Forecast quality			
good	4 (2,7 %)	39 (8,7 %)	9 (7,9 %)
Rather good	76 (50,7 %)	231 (51,6 %)	67 (58,8 %)
Rather bad	58 (38,6 %)	147 (32,8 %)	34 (29,8 %)
bad	12 (8 %)	31 (6,9 %)	4 (3,5 %)
total	150	448	114

In january 2006,

Request from commercial services :
confidence index for small areas, and ranges D to D+8



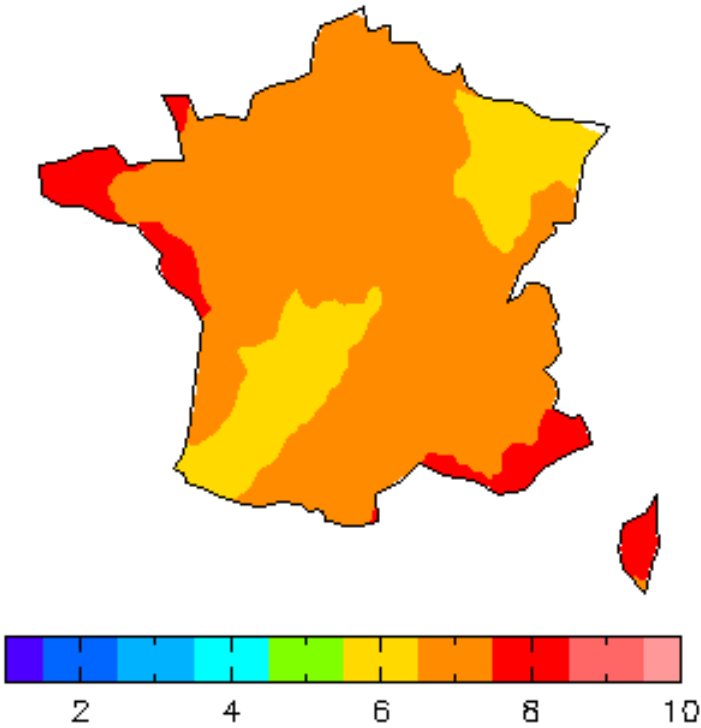
Use of automatic statistical methods

Principles of the method :

- index between 1 and 10,
- index * 10 = probability that the forecast error is small
- for parameters : 2m-temperature, 10m-windspeed, total cloud cover, 6h-precipitations
- the statistical model is based on a 4-years period, comparing ensemble-mean error and ensemble standard deviation
- discriminant analysis is used

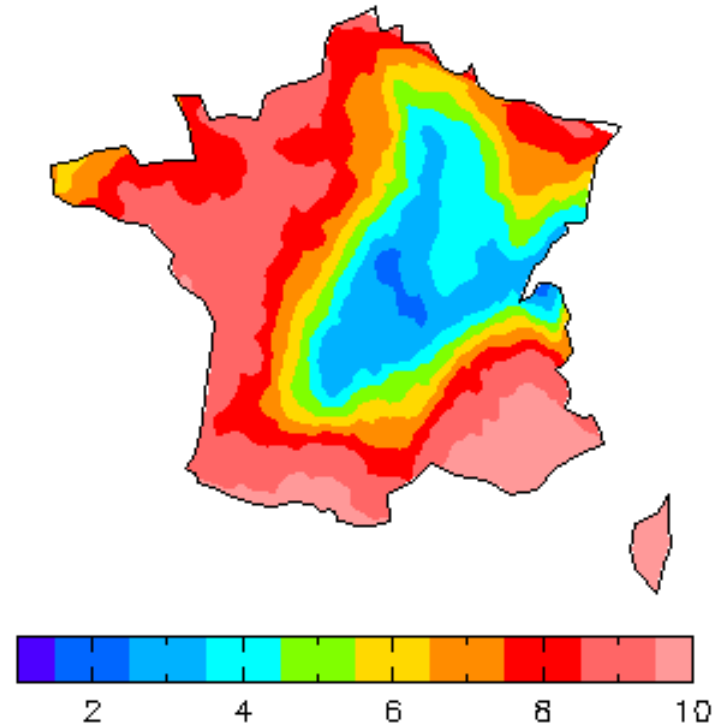
Examples of plot :

2m-temperature



TEMPERATURE A 2M
BASE : 07/06/2007 12H - VALID : VEN 15/06

6h-precipitations

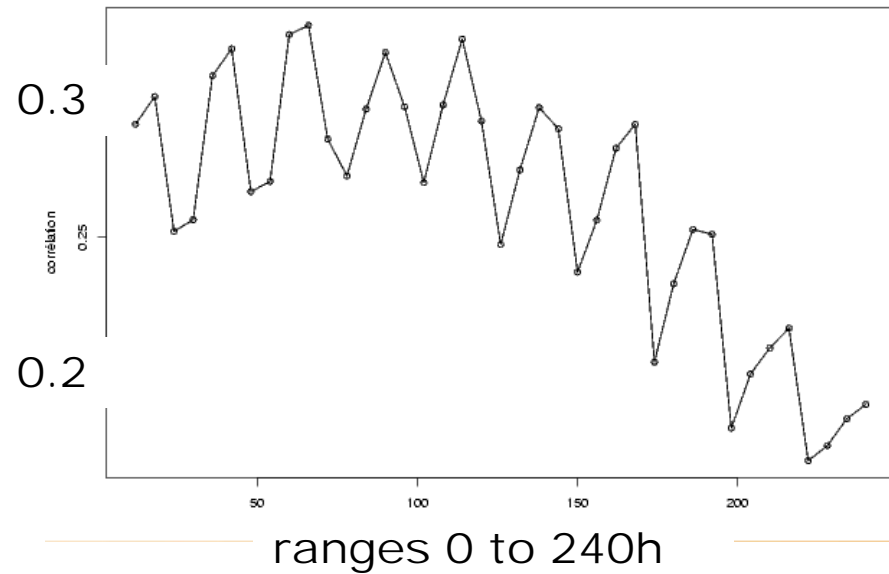


PRECIPITATIONS CUMULEES SUR 6 HEURES
BASE : 07/06/2007 12H - VALID : VEN 15/06

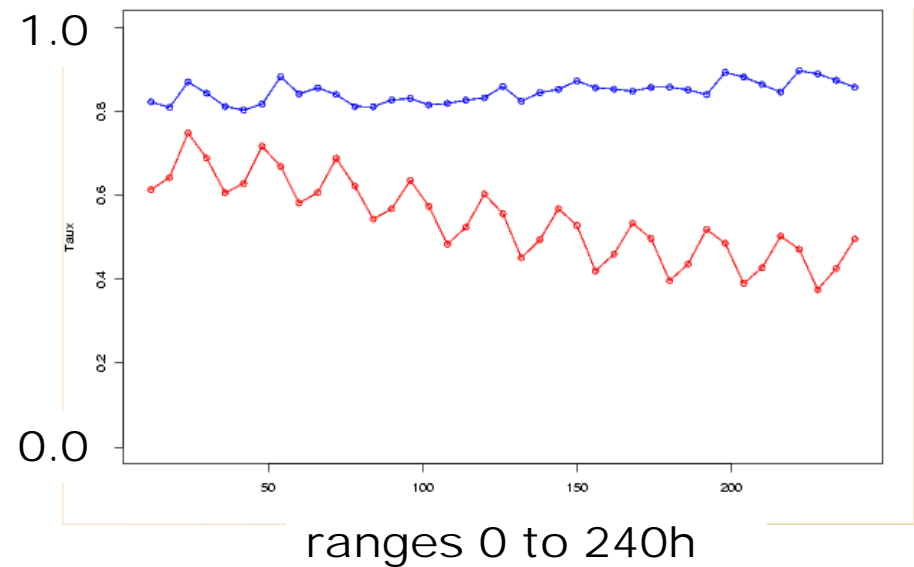
D+7

assessment of the « automatic » index : example of cloud cover

Correlation error/probability of large error

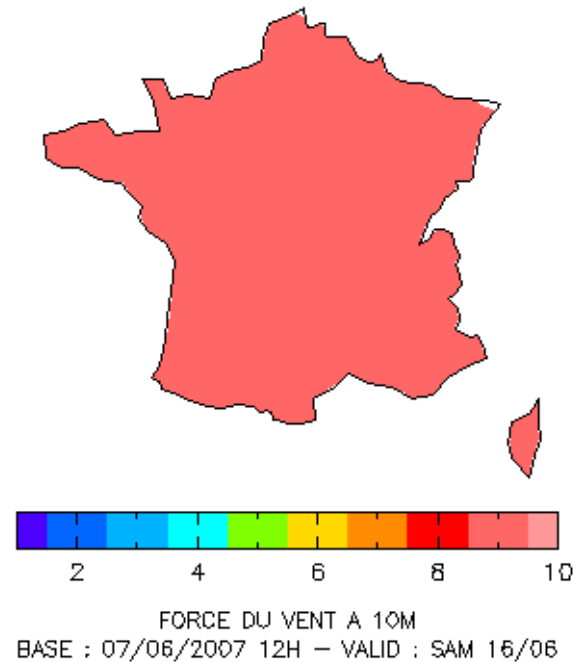


detection rate and false alarm rate for large errors



assessment of the « automatic » index : synthesis

- better than raw ensemble spread
- precipitations is the « best » parameter
- no signal with the 10m-windspeed



→ Possible improvement : re-tuning of the error thresholds

Is the automatic index linked with the forecaster index ?

- comparison from november 2006 to may 2007
- calculation of an average value over France and over D+4/D+5, D+6/D+7

→ Very low correlation between the two series

→ better correlation at D+4/D+5 than D+6/D+7

→ highest correlation with the temperature D+4/D+5 : 0,35

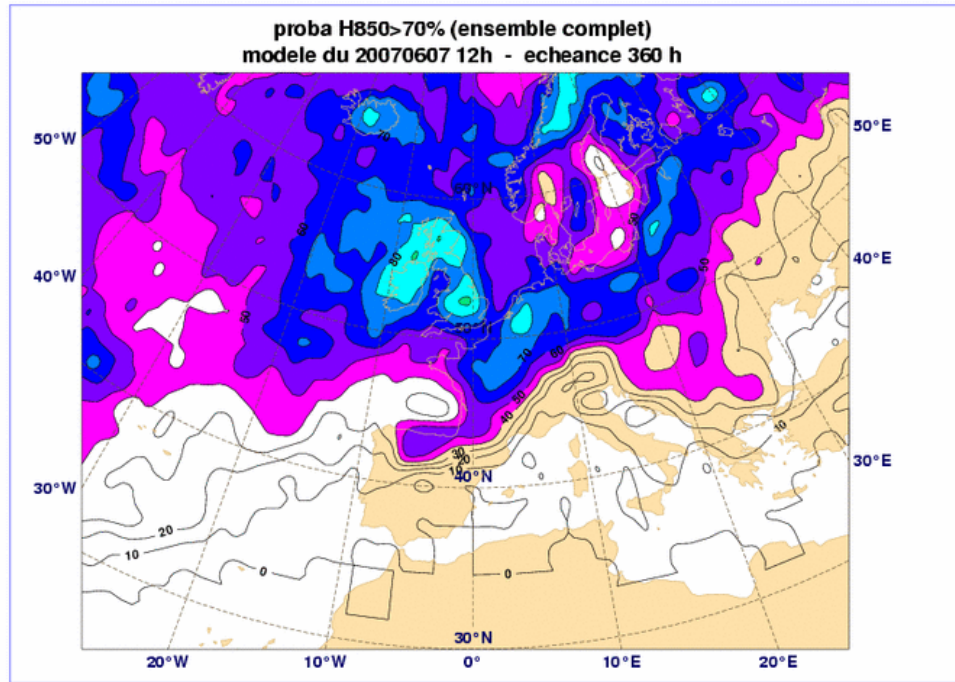
→ plan : assessment of the automatic index by the forecasters

✓ Confidence index

✓ **use of 15-days EPS**

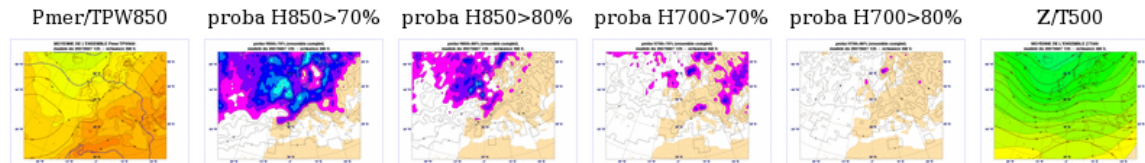
✓ Use of EPS in tropical areas

Products available for the forecasters have been extended



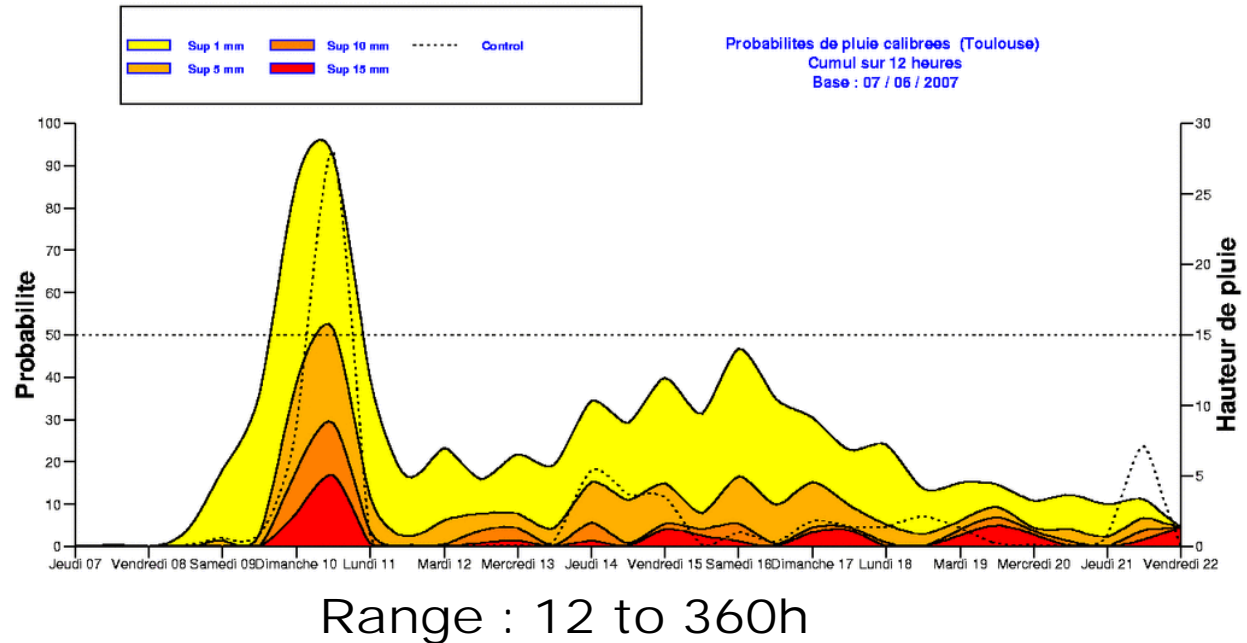
Probability
HU850>70%
Range : 360h

Echéance



Products available for the forecasters have been extended

Probability
12h-precip. →



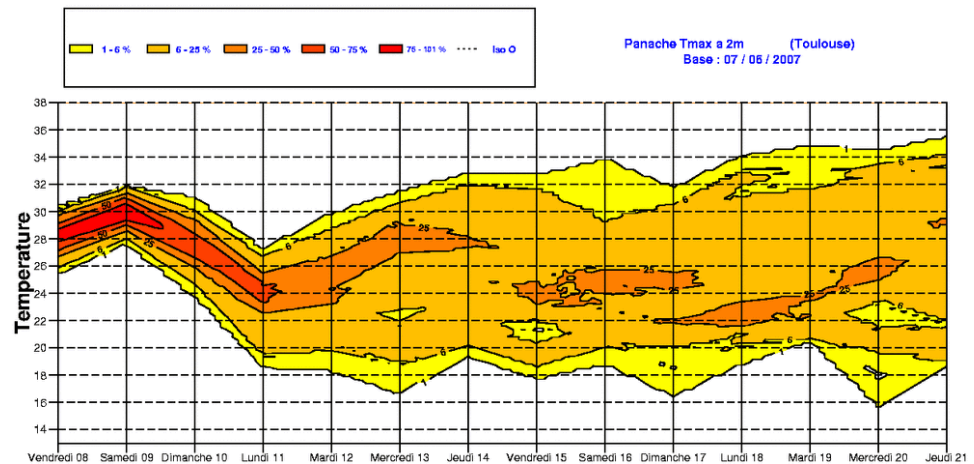
Plans :

- experience of a forecast message covering D+8/D+14
- Elaboration of plots corresponding to this period

Some products for professional users have been extended

Example : 2m-temperature with statistical adaptation, from range D to D+14, based on 0h and 12h EPS.

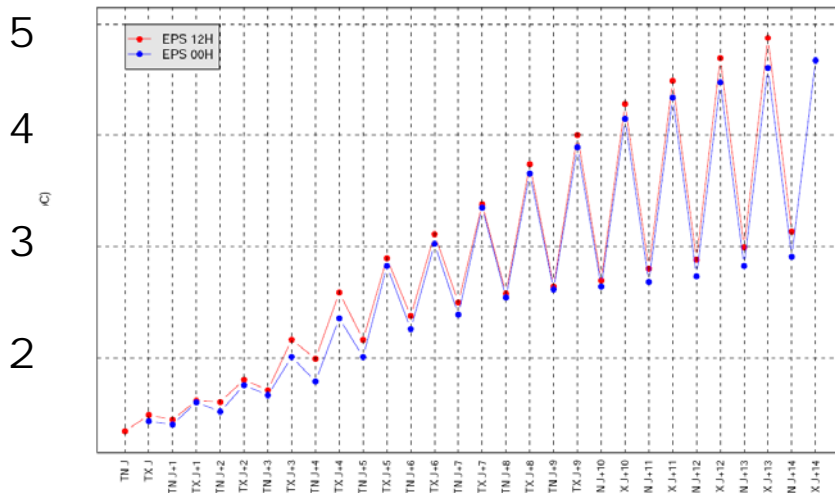
2m-max-temperature →
(evolution of PDF)



Range : D to D+13

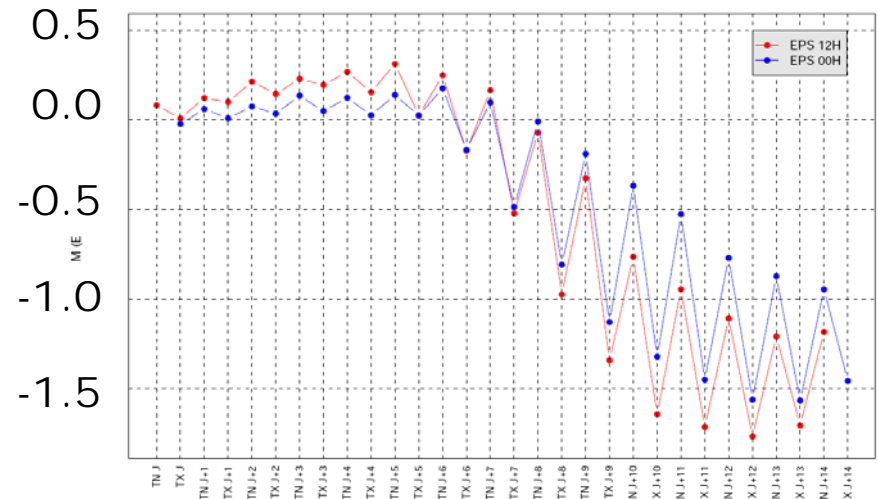
Assessment of 2m-min/max-temperature : mars and april 2007
(with statistical adaptation)

Root Mean Square Error



Range : D to D+14

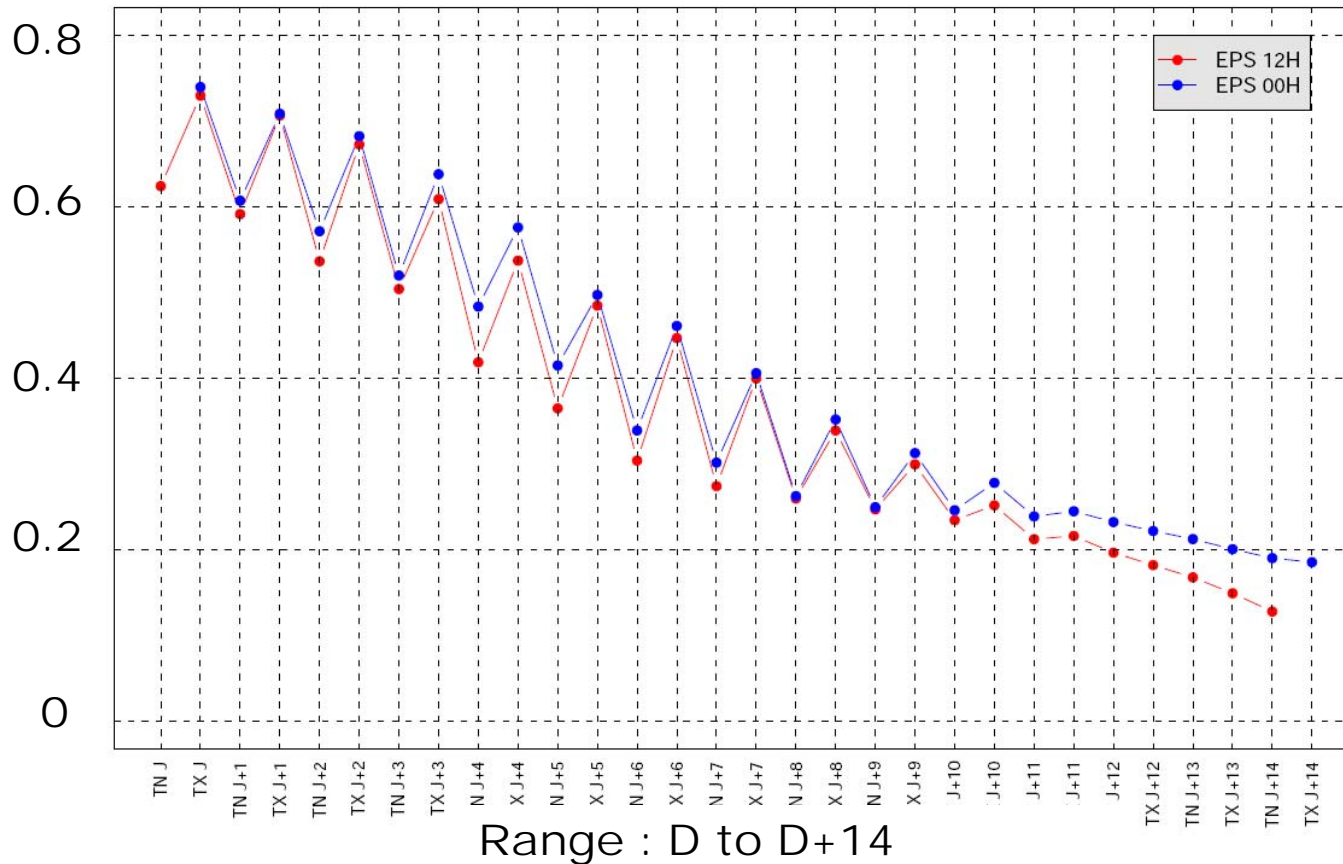
Bias



Range : D to D+14

Assessment of 2m-min/max-temperature : mars and april 2007
(with statistical adaptation)

RMSE skill score against climatology



✓ Confidence index

✓ use of 15-days EPS

✓ **Use of EPS in tropical areas**

Use of EPS in tropical areas (1/9)

high swell over La Réunion (indian ocean)

(video on

<http://tibal2riie.canalblog.com/archives/2007/05/13/4938856.html>)



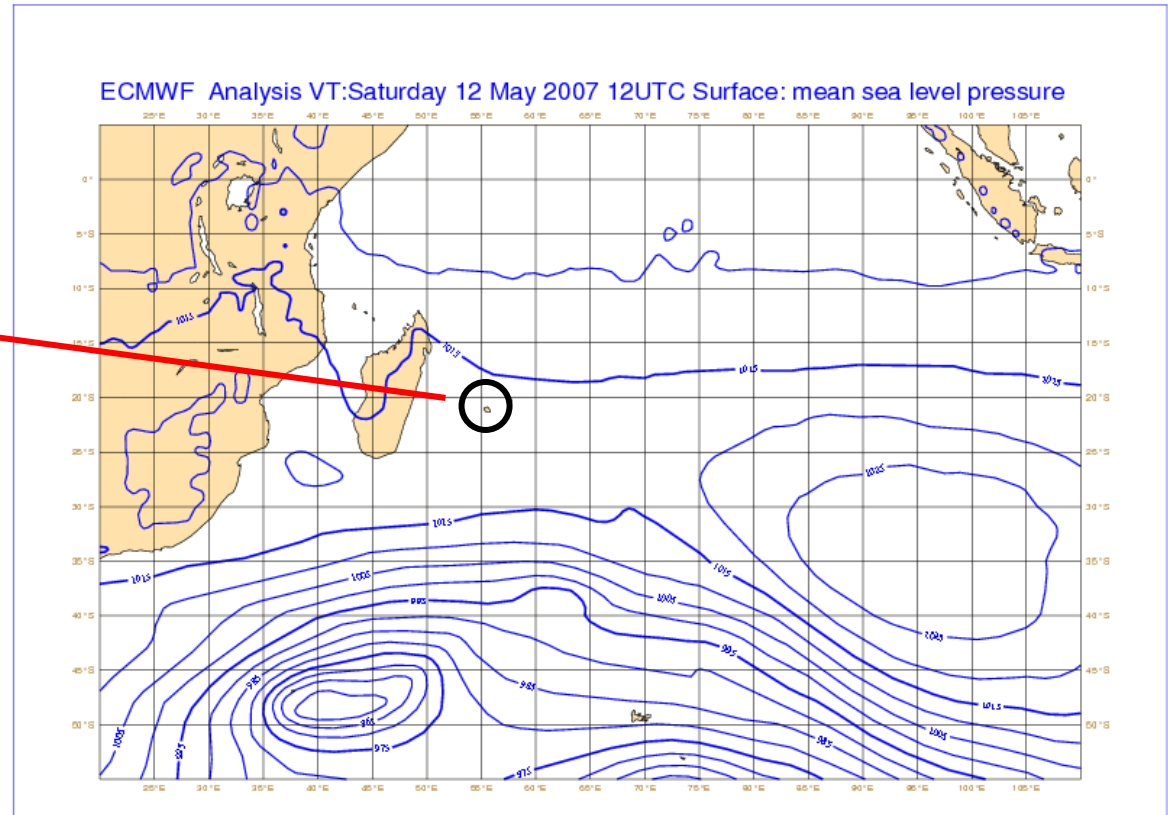
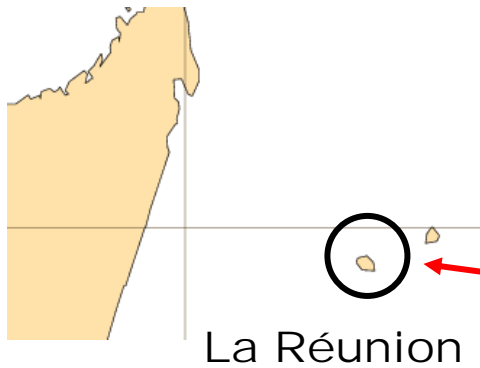
13 may

- 11m height observed
- two fishermen disappeared
- height > 3m is dangerous



Use of EPS in tropical areas (2/9)

Difficulty with the swell → caused by depressures located far away + propagation time delay

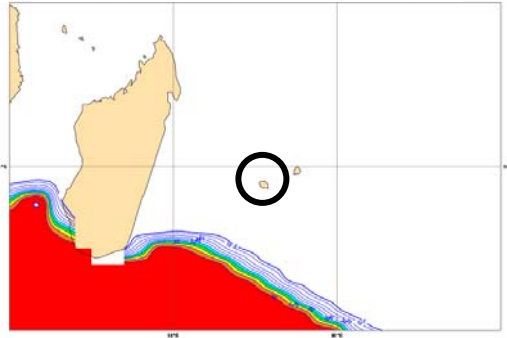


Use of EPS in tropical areas (3/9)

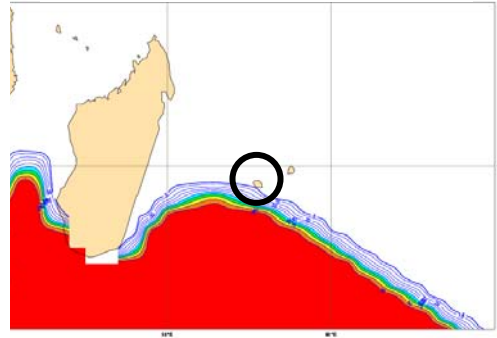
high swell over indian ocean : short-range forecast

Probability swell Height > 4m – EPS from 10/05/2007 12h

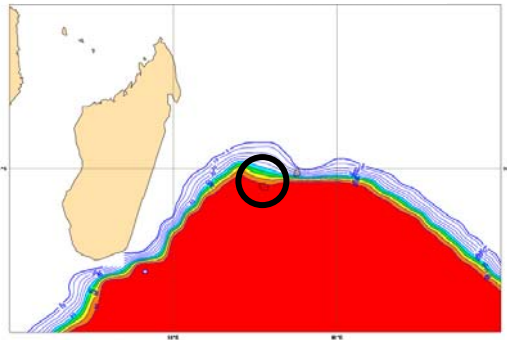
range 36h



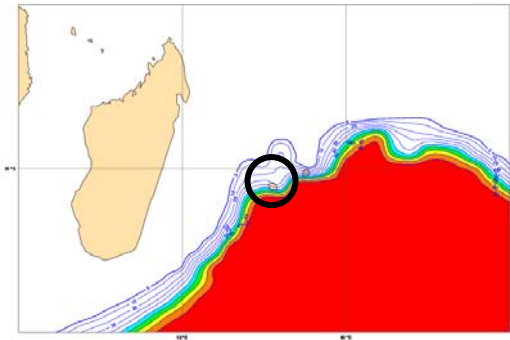
range 48h



range 60h



range 72h



Good signal and good timing,

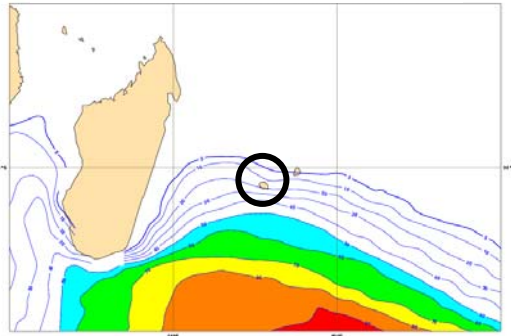
Note : no signal with threshold 6m

Use of EPS in tropical areas (4/9)

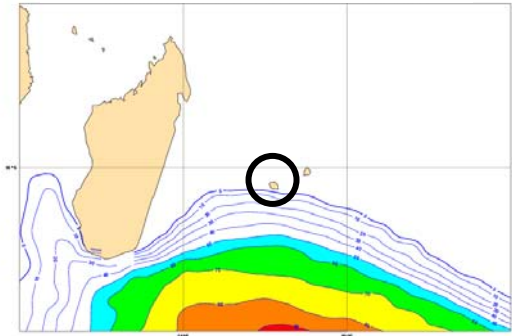
high swell over indian ocean : medium-range forecast

Different forecasts for the same time : 13/05/2007 0h

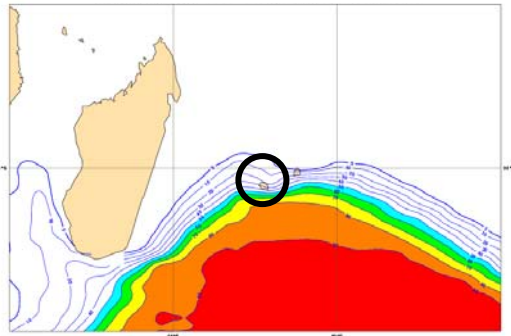
range 156h



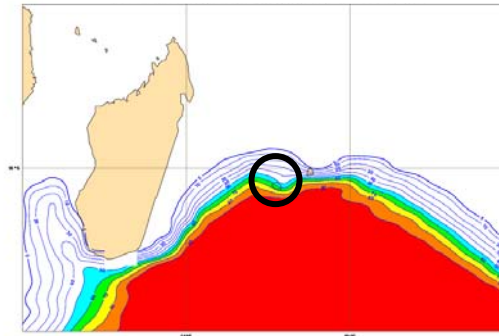
range 132h



range 108h



range 84h



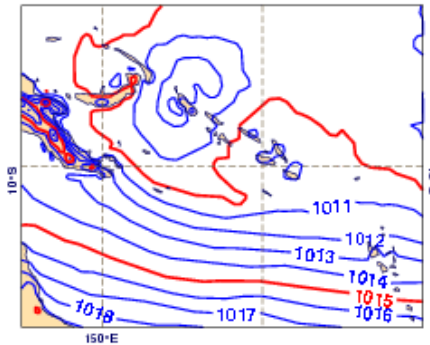
→ Increasing signal

Detection of cyclogenesis

T799 can detect cyclones, but it can be surprising
Example of cyclone Xavier :

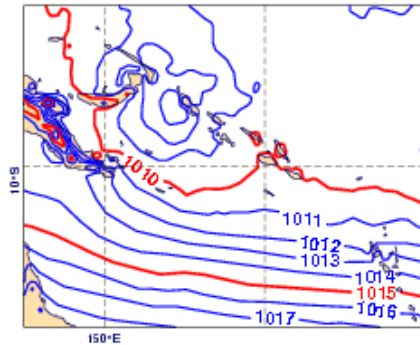
T799 from
20061016 12h

T799 from 20061016 12h +192h valid on 20061024 12h



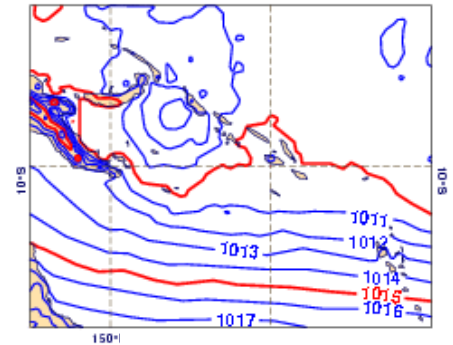
192h

T799 from 20061016 12h +204h valid on 20061025 00h



204h

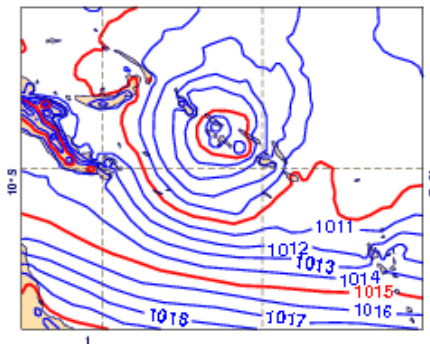
T799 from 20061016 12h +216h valid on 20061025 12h



216h

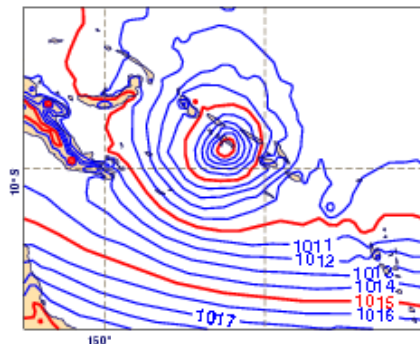
T799 from
20061017 0h

T799 from 20061017 00h +180h valid on 20061024 12h



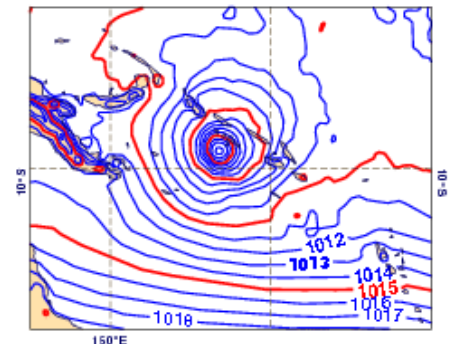
180h

T799 from 20061017 00h +192h valid on 20061025 00h



192h

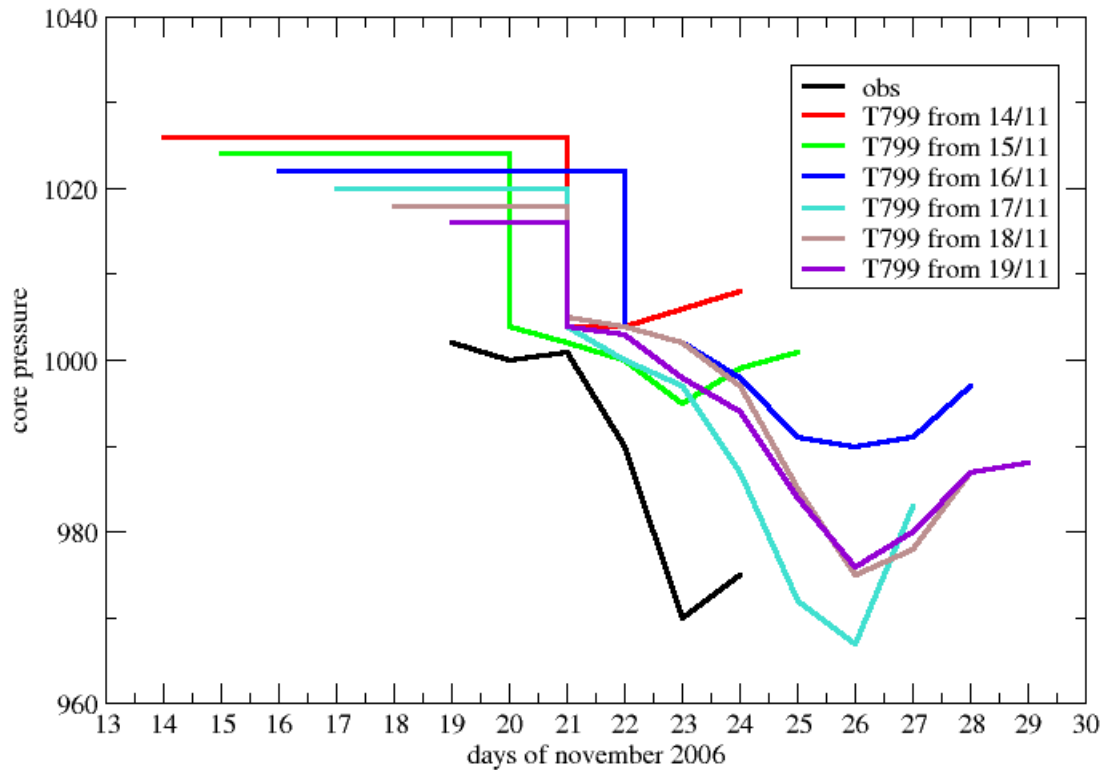
T799 from 20061017 00h +204h valid on 20061025 12h



204h

Example of cyclone Yani (22-24/11/2006)

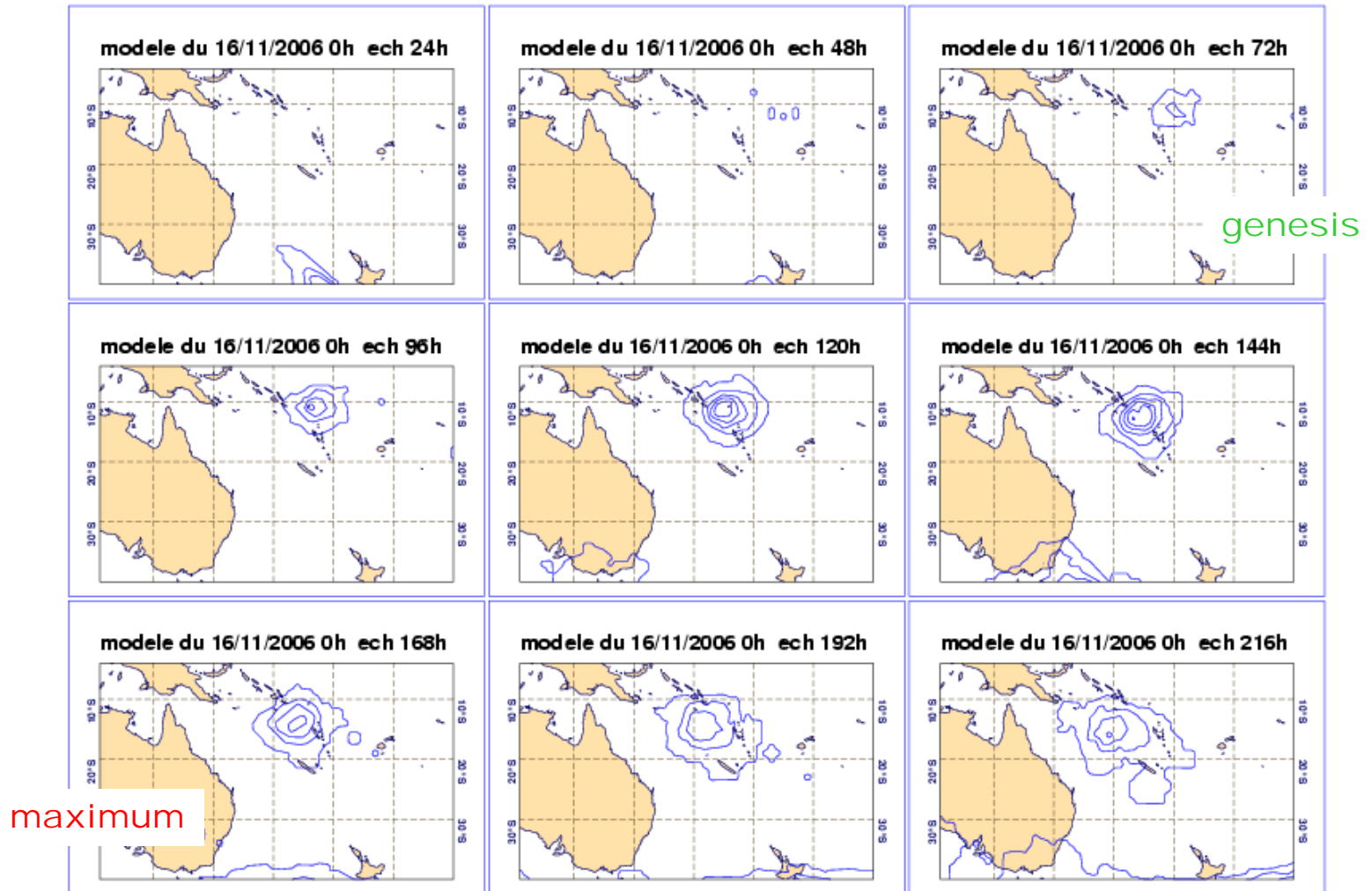
tropical cyclone YANI - core pressure



→ the timing seems better at medium-range

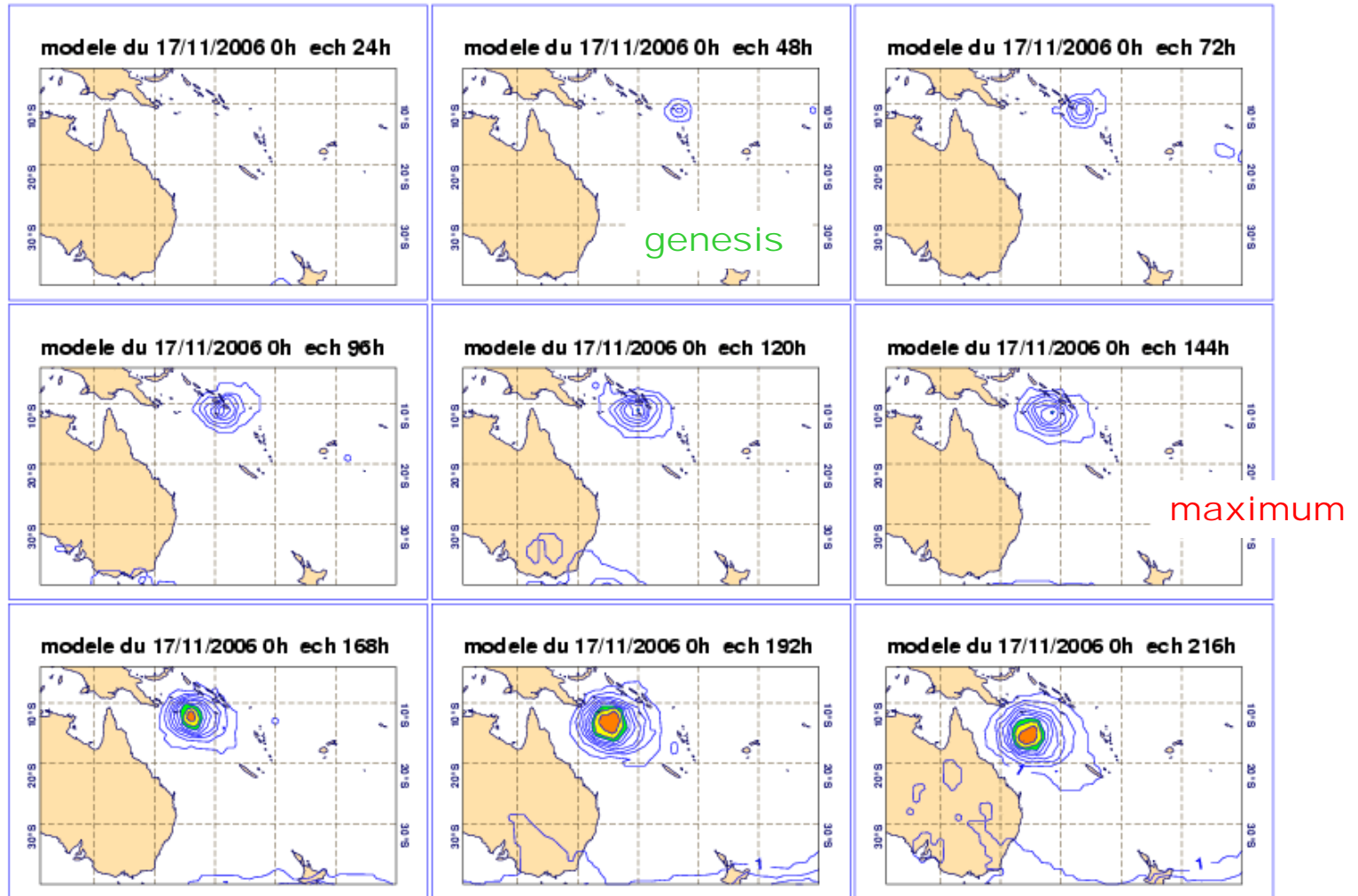
Use of EPS in tropical areas (7/9)

Probability MSLP < 1005 hPa – EPS from 16/11/2006 0h

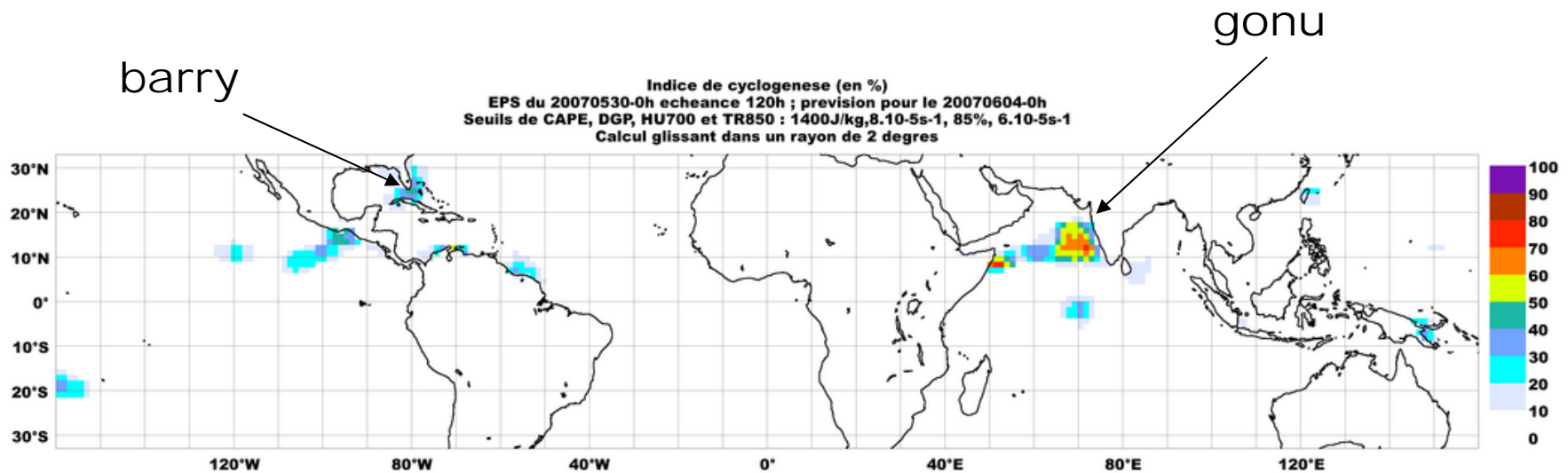


Use of EPS in tropical areas (8/9)

Probability MSLP < 1005 hPa – EPS from 17/11/2006 0h



Experimental product for cyclogenesis



- CAPE > 1400 J/kg
- HU700 > 85 %
- Vo850 > 6.10-5 s-1
- DGP > 8.10-5 s-1

Index based on simple probabilities :

Acknowledgments

Metéo-France : **Serge Farges, Thierry Lefort,
Alain Muzellec, Olivier Cabanes
many forecasters**

P1 : new pressure levels 600, 800, 900, 950 hPa (for geopotential height, temperature, relative humidity, specific humidity, U, V, vertical velocity, potential vorticity, vorticity, divergence)

P2 : if filtering available for grid point fields, new iso-PV levels 1500 and 700 mPVU (for U, V and potential temperature)

P3 : new height levels 20, 50, 100, 250, 500, 750, 1000, 1250, 1500, 2000, 2500, 3000 m (for temperature, relative humidity, U and V)