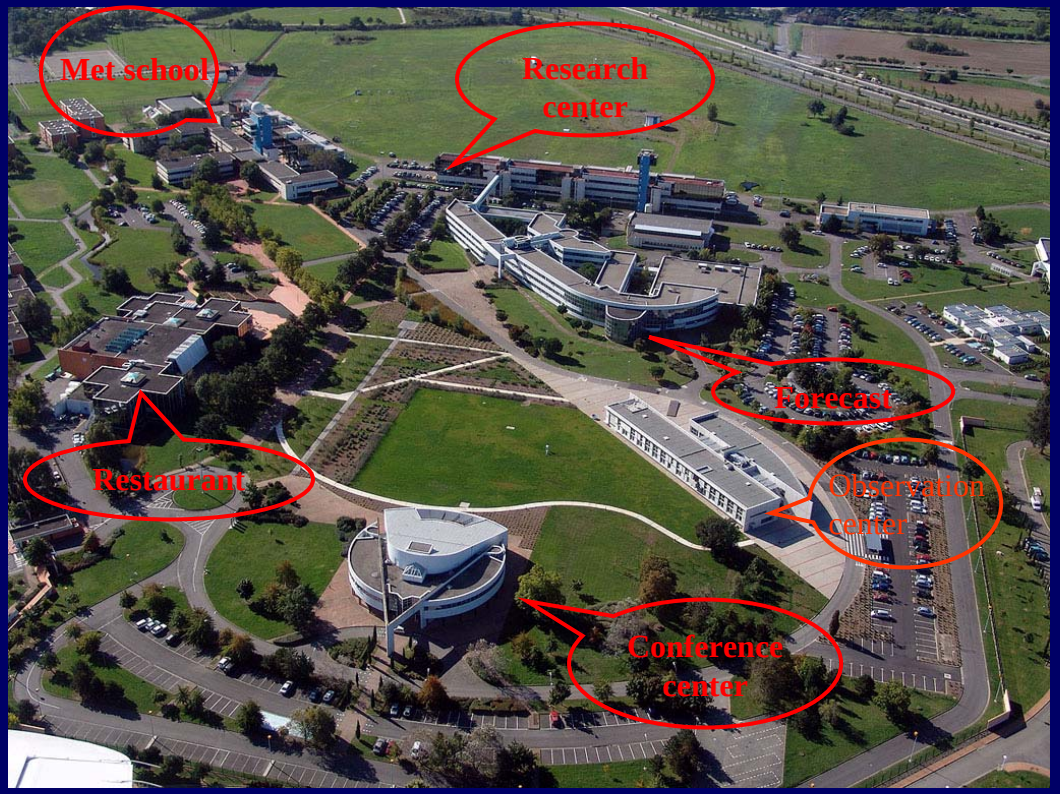
Use of the ECMWF ensemble products for operational forecasting at METEO-FRANCE

METEO FRANCE
Toujours un temps d'avance

Where ?

Météo-France in Toulouse



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Who ?

A team of meteorologists in the forecast room using Synergie workstations.

What ?

Medium range forecast guidance from D4 to D7 :

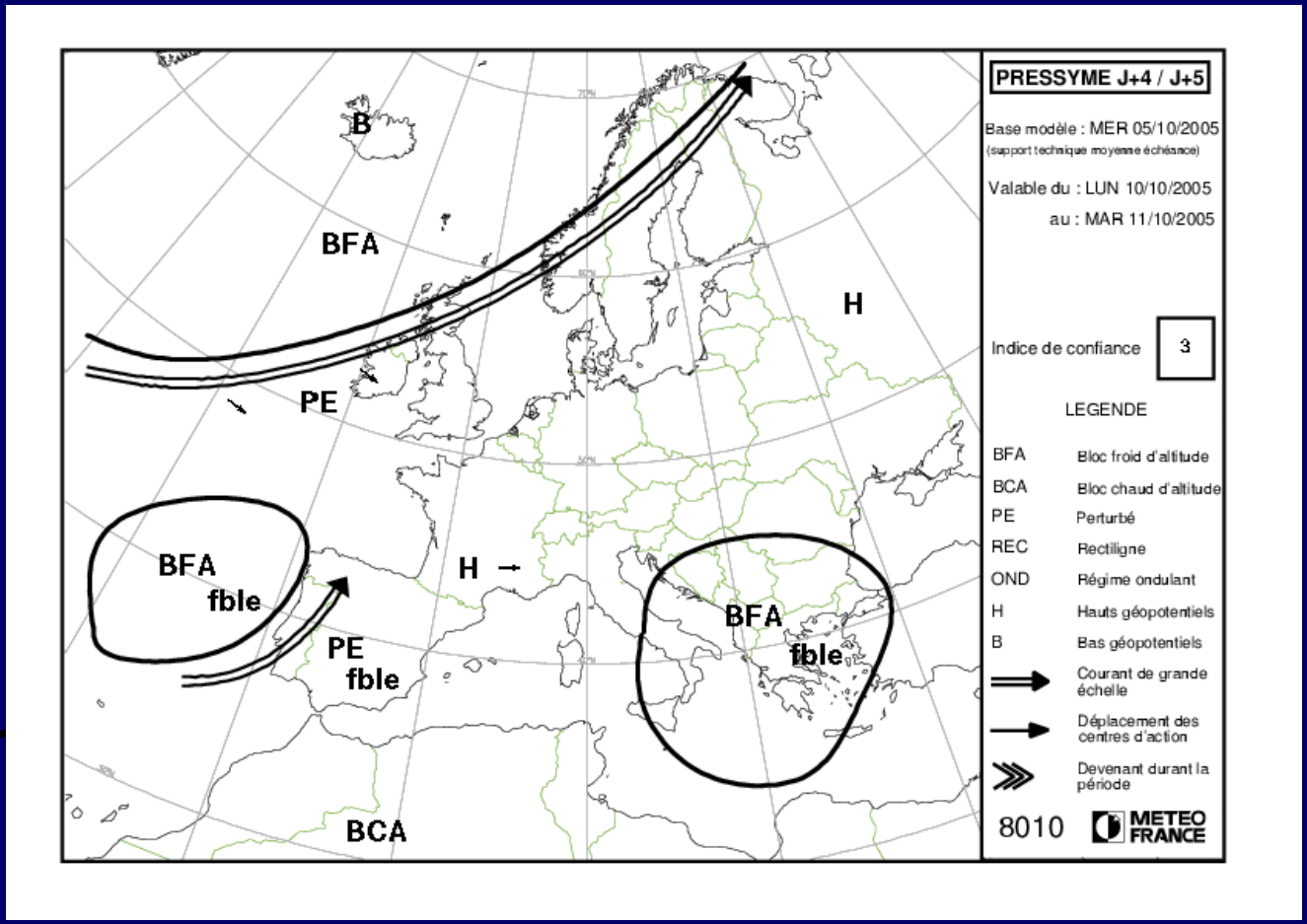
- Technical bulletin
  - Supra synoptic evolution
  - Most probable scenario
  - EPS stability
  - EPS spread
  - Confidence index
  - Significant weather (Cloudiness, precipitations, wind and temperatures)

For two groups of days : D4/D5 and D6/D7.

➢PRESSYME

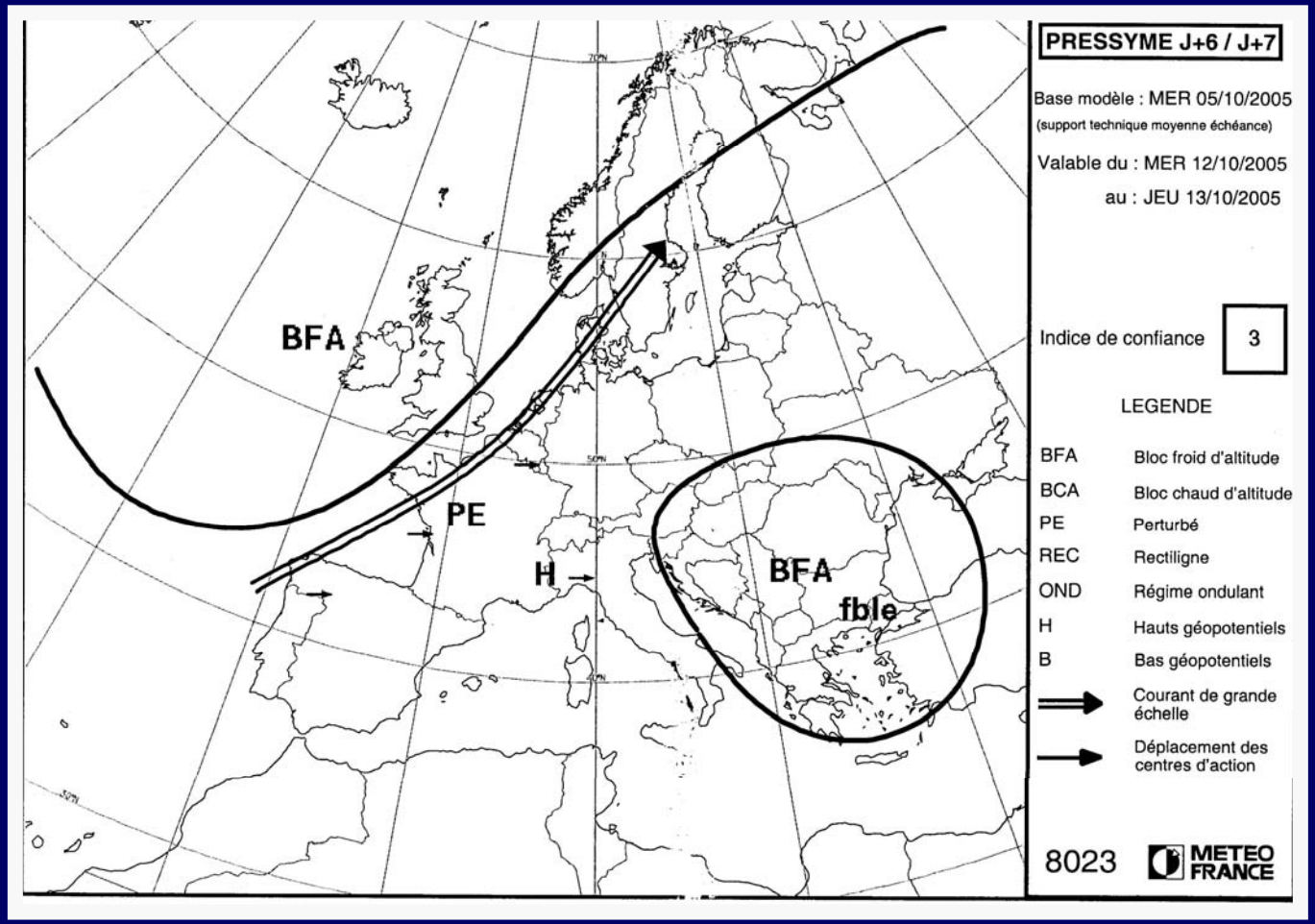
For two groups of days : D4/D5 et D6/D7

D4/D5

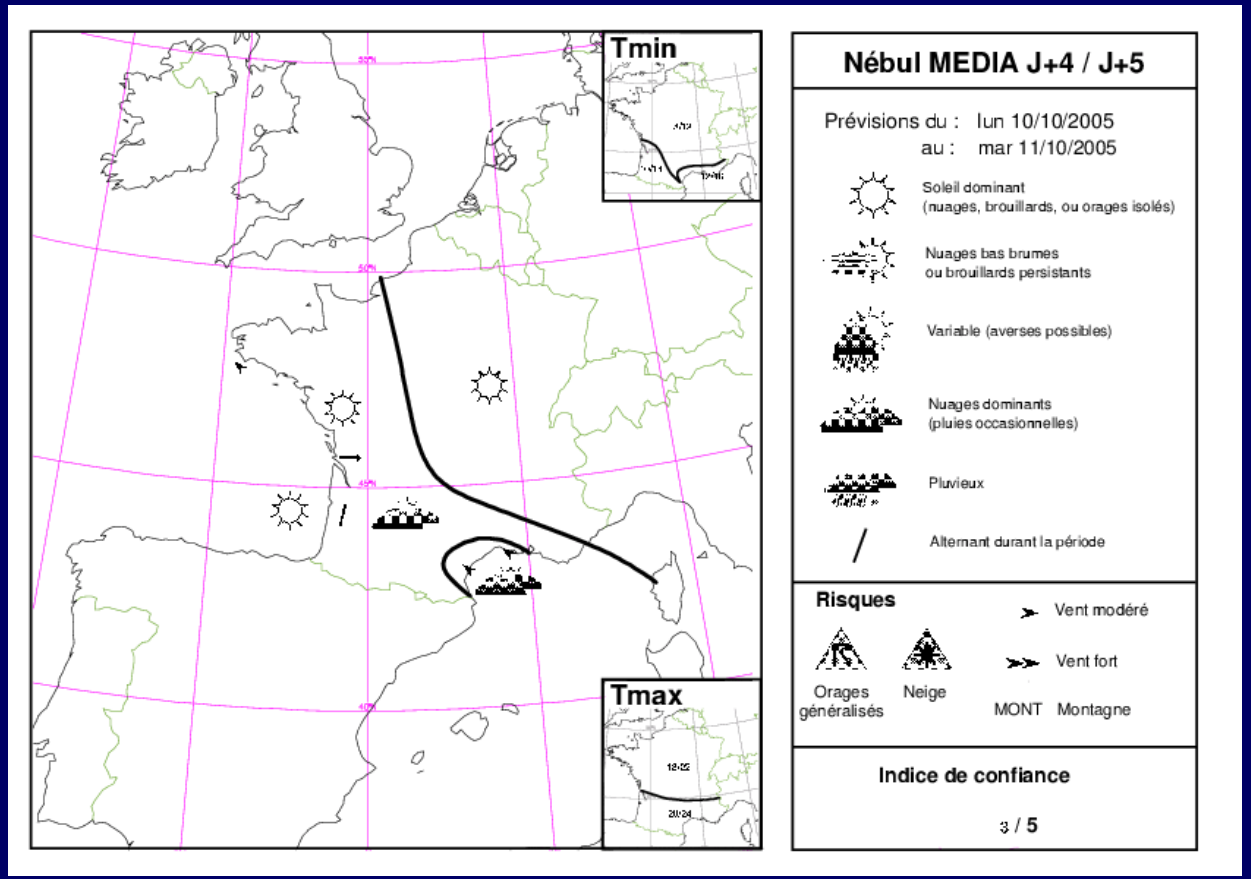


➢PRESSYME

D6/D7

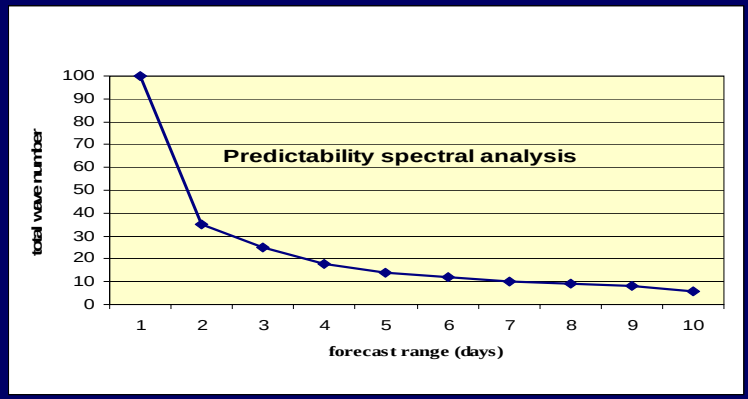


- Media bulletin
  - Significant weather
  - Winds
  - Temperatures for D4/D5 and bends for D6/D7
  - Confidence index
- Media map



Why ?

Predictability

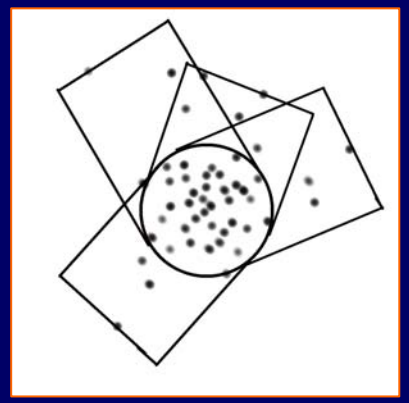


- depends on the range and the scale of the phenomenon.
- only long waves are still foreseeable in the medium range.
- a new scale : **supra synoptic scale**.

How ?

Tubing

- deterministic approach : using the central cluster mean
- probabilistic approach : alternatives, with the extreme runs of the tubes
- a measure of predictability : tubes - confidence index.



Centre of the central cluster: the ensemble mean of the 500 hpa geopotential height;

• **Radius of the central cluster** calculated at 500 hpa;depending on the **season** and the **spread of the day** ;

• Radius calculated to obtain from 0 to 9 tubes;

• tubes created by the extreme runs ;

• **three sets**: 48, 72 et 96 hours based on 96

96, 120 et 144 hours based on 144

144, 168 et 192 hours based on 192.

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Information tubing

Oct 5 2005 22:23 **Informations TUBING** Page 1

```
##########################################################################
#                                                                        #
#                  PREVISION MOYENNE-ECHEANCE                            #
#                                                                        #
#                           TUBING                                       #
#                                                                        #
##########################################################################

Tubing base sur le domaine Europe du Sud-Ouest, parametre Z500 a echeance 096h
--------------------------------------------------------------------------
Base modele : 05/10/2005 12hTU - reference : 96

ecart-type de l'ensemble : 34 m
ecart-type de l'amas central : 34 m (100% de la variance totale)
 nombre de tubes            : 0
 tube contenant le run oper   : 0
 tube contenant le controle   : 0

 TUBE 0  (amas central)
 ------
 51 membres          : 47 28 35  4 11  0 14 50 30 18 17 13 12 27 41
                       37 22 21  2 48 45 42  5 29 15 19 23 39 20 46
                        6  7 16 31 43 26 44  3 49 38  8  1 25 40 36
                       10 34 33 24 32  9
 rayon               : 67 m
 run le plus proche  : 47
 run le plus eloigne : 9


##########################################################################

Tubing base sur le domaine Europe du Sud-Ouest, parametre Z500 a echeance 144h
--------------------------------------------------------------------------
Base modele : 05/10/2005 12hTU - reference : 144

ecart-type de l'ensemble : 53 m
ecart-type de l'amas central : 44 m (69% de la variance totale)
 nombre de tubes            : 2
 tube contenant le run oper   : 0
 tube contenant le controle   : 0

 TUBE 0  (amas central)
 ------
 45 membres          : 13  0 19 26 21 40 30 45  6 44 46 35 47 18  1
                        2 42 14 34 29 20 23  8 41 36 28 38 11 22 15
                       50 32 48 33  7  3  4  5 31 49 43 10 27 37 24
 rayon               : 77 m
 run le plus proche  : 13
 run le plus eloigne : 24

 TUBE 1
 ------
 run extreme         : 17  a 126 m
  5 membres          : 12 25  9 39 17

 TUBE 2
 ------
 run extreme         : 16  a 92 m
  1 membres          : 16


##########################################################################

Tubing base sur le domaine Europe du Sud-Ouest, parametre Z500 a echeance 192h
--------------------------------------------------------------------------
Base modele : 05/10/2005 12hTU - reference : 192
```

Oct 5 2005 22:23 **Informations TUBING** Page 2

```
ecart-type de l'ensemble : 70 m
ecart-type de l'amas central : 65 m (86% de la variance totale)
 nombre de tubes            : 1
 tube contenant le run oper   : 0
 tube contenant le controle   : 0

 TUBE 0  (amas central)
 ------
 48 membres          : 26 21 42 23  6 25  2  0  1 38 40 34 48 41  3
                       22 44 36 19 31 37 11 14 32 35 12 13 29 20 10
                       43  4 28 15 47 46  8 50 49  5 16 18  7 30 24
                       33  9 45
 rayon               : 101 m
 run le plus proche  : 26
 run le plus eloigne : 45

 TUBE 1
 ------
 run extreme         : 17  a 138 m
  3 membres          : 39 27 17


##########################################################################

Tubing base sur le domaine Europe du Sud-Ouest, parametre Z500 a echeance 240h
--------------------------------------------------------------------------
Base modele : 05/10/2005 12hTU - reference : 240

ecart-type de l'ensemble : 81 m
ecart-type de l'amas central : 79 m (96% de la variance totale)
 nombre de tubes            : 1
 tube contenant le run oper   : 0
 tube contenant le controle   : 0

 TUBE 0  (amas central)
 ------
 50 membres          : 40 16  6 46 21  4  0 37 35 34 31 42 10 45 43
                       29 48 33 22 25  8 44 12 13  2 32 15 14 38 36
                        9 47 23 49 20 39 26  5  1 27 28 30 18 24 50
                       41  7 11 17 19
 rayon               : 131 m
 run le plus proche  : 40
 run le plus eloigne : 19

 TUBE 1
 ------
 run extreme         : 3  a 136 m
  1 membres          : 3


##########################################################################
```

Spread

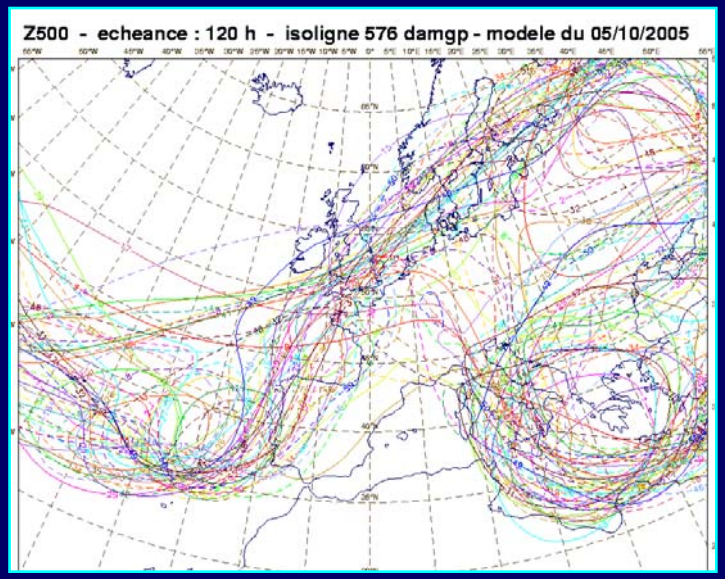
- It is an indication of uncertainty

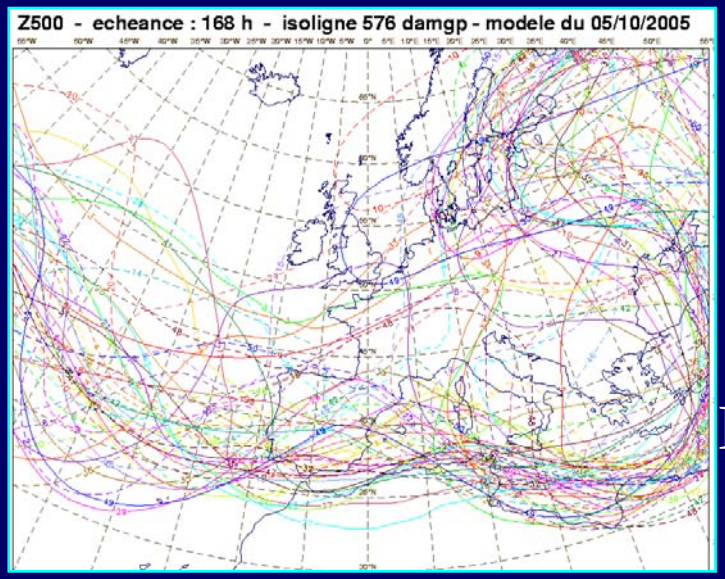
- Several products can inform about spread :

  - Spaghetti maps
  - Plumes…

500 hPa

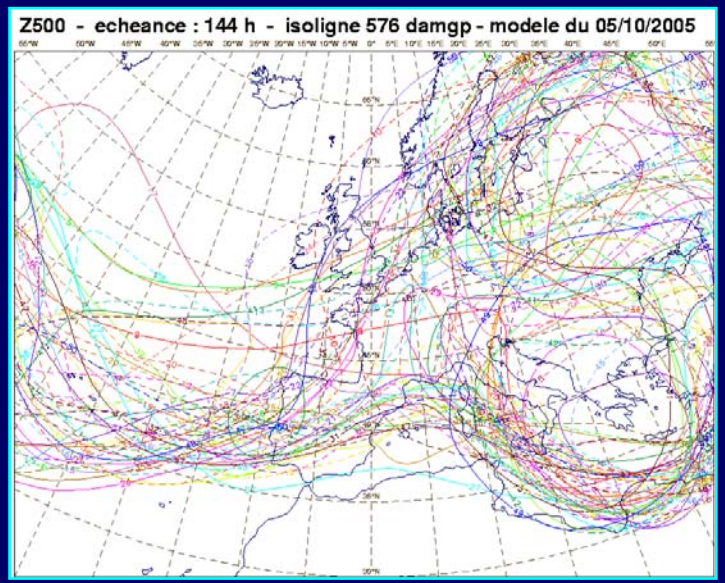
D4

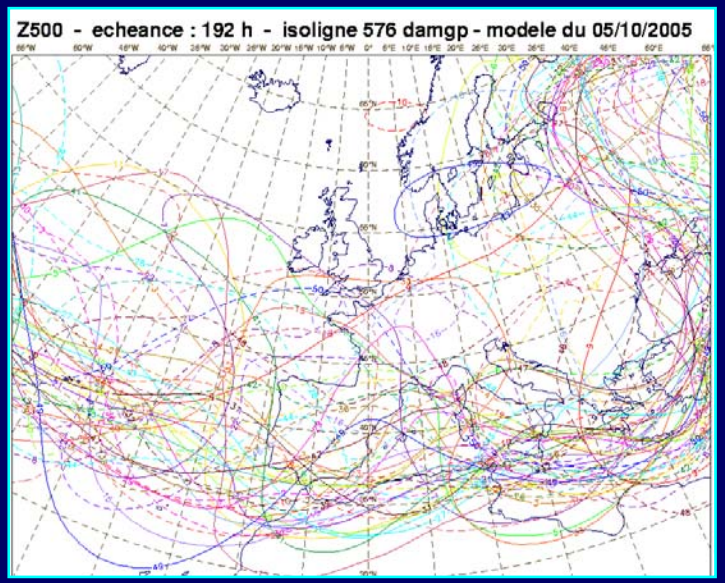




D6

D5





D7

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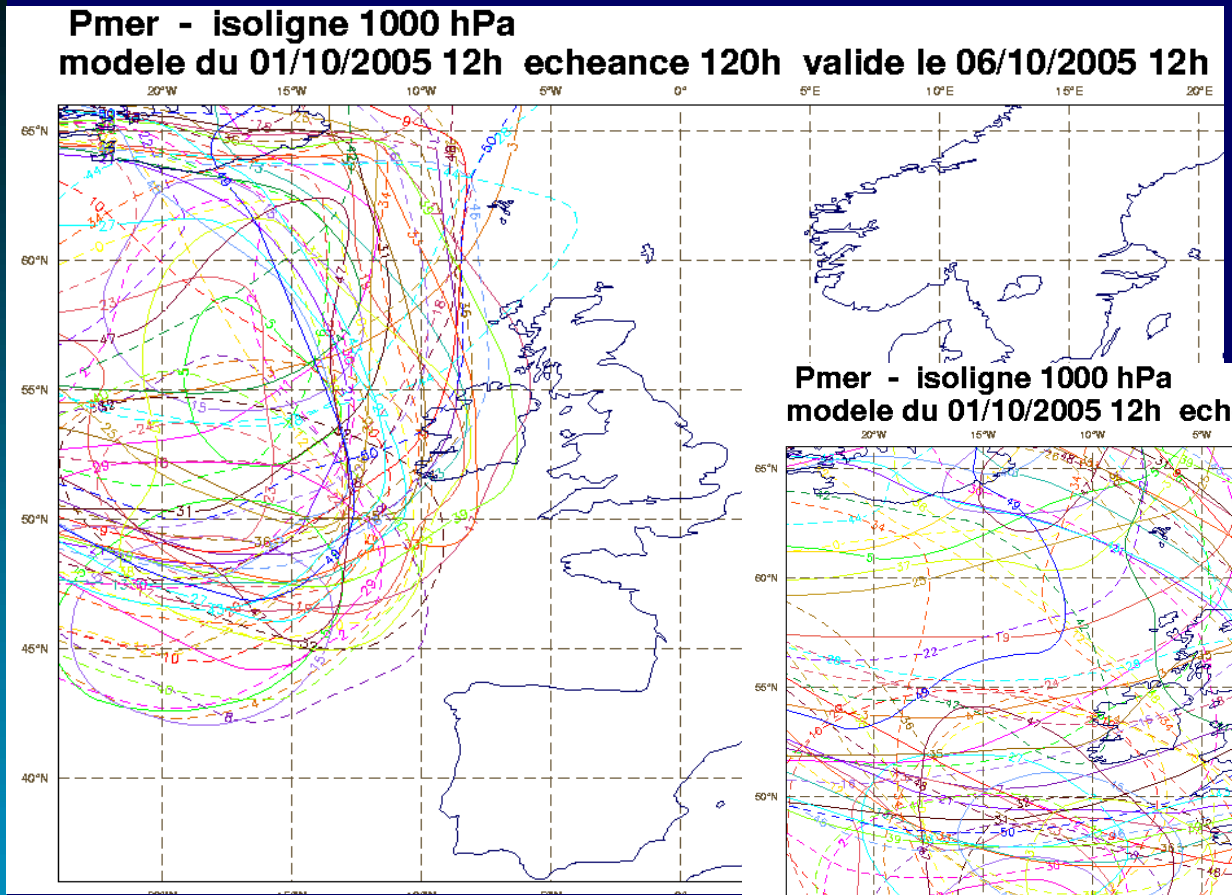
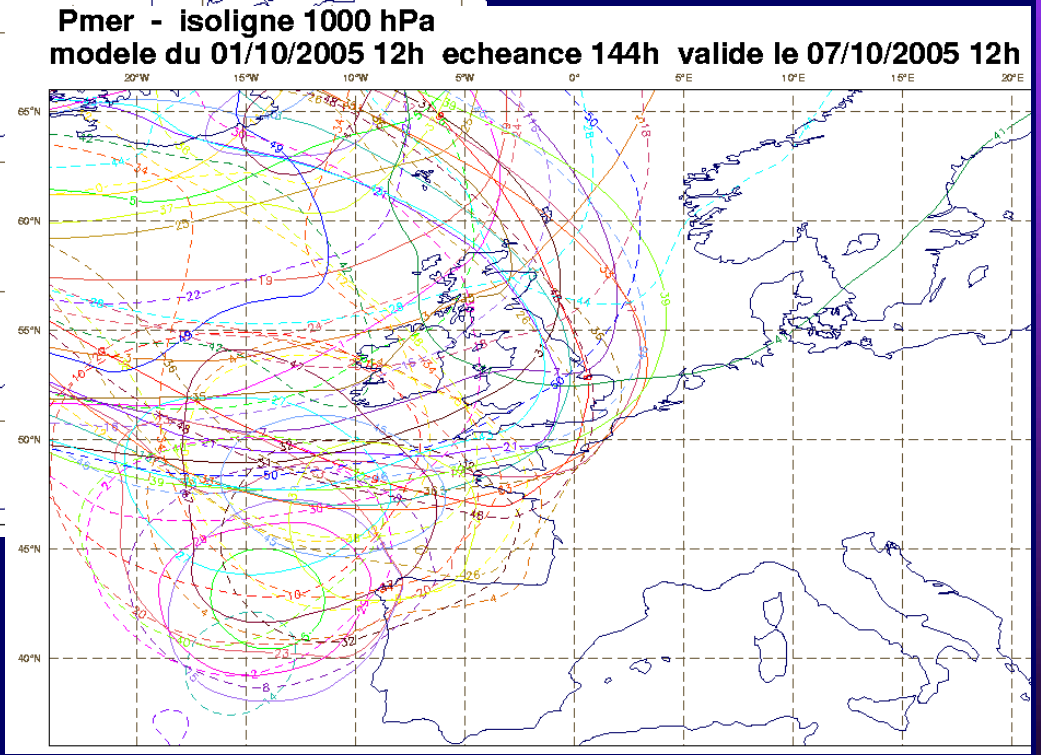
Spaghetti
Sea level



D4



D5

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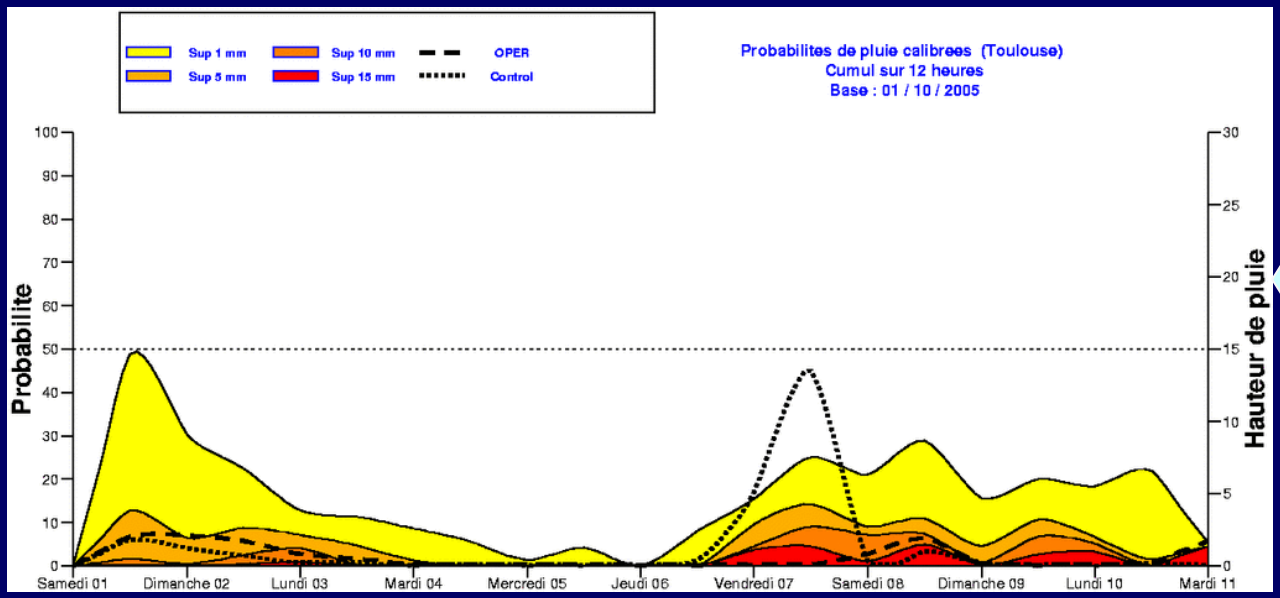
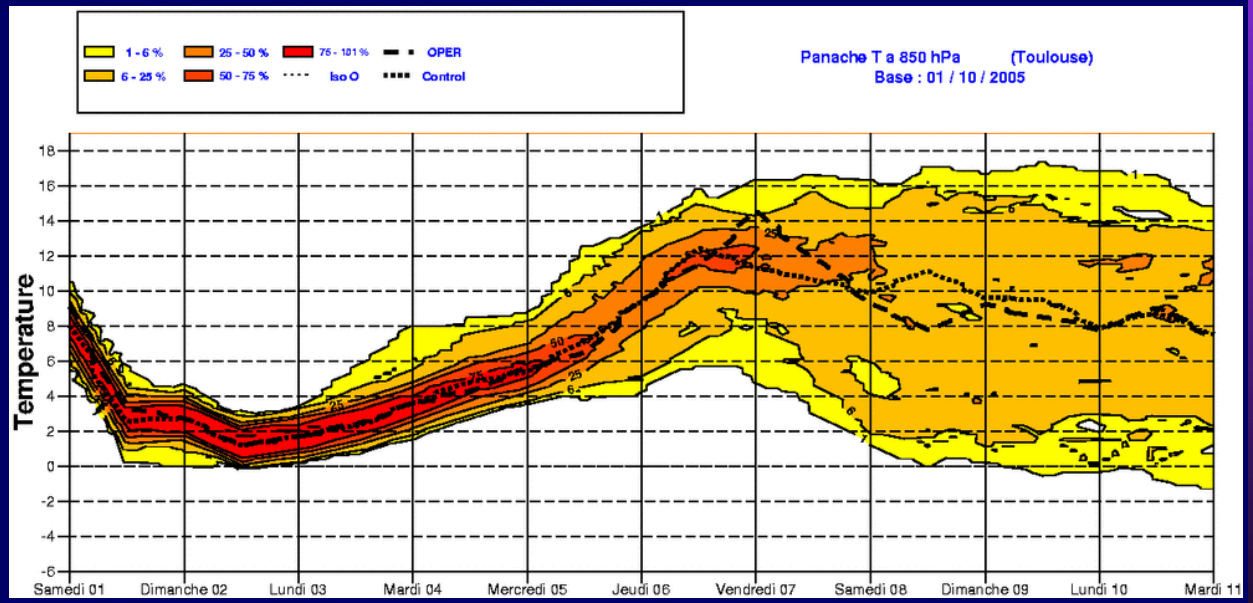
Toujours un temps d'avance



Temporal rain 12 h probabilities

T 850 hPa Plumes



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Toujours un temps d'avance

Supra-Synoptic types of flows or blocks

- **Perturbed flow** (cloudy, rainy, windy…)

  alternative : straight disturbed flow (// strength of gradients)

- **Undulating flow** (changing weather, alternating rain and sun)

  real undulating (large scale troughs/ridges alternating)

  pseudo-undulating (like Mediterranean flows)

- **Warm block** (Anticyclonic conditions, dry, sunny in summer,

  foggy or dull in winter)

- **Cold block** (cool or cold weather, unsettled, often rainy/showers..)

A medium range weather type always depends on **season** and **geographical localisation.**

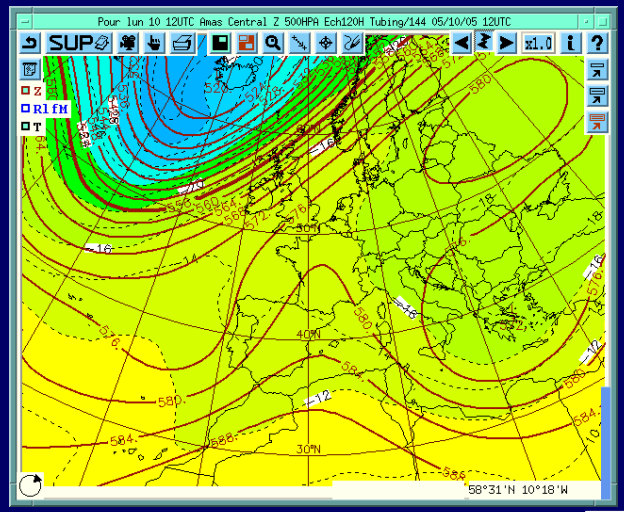
What about

Confidence index

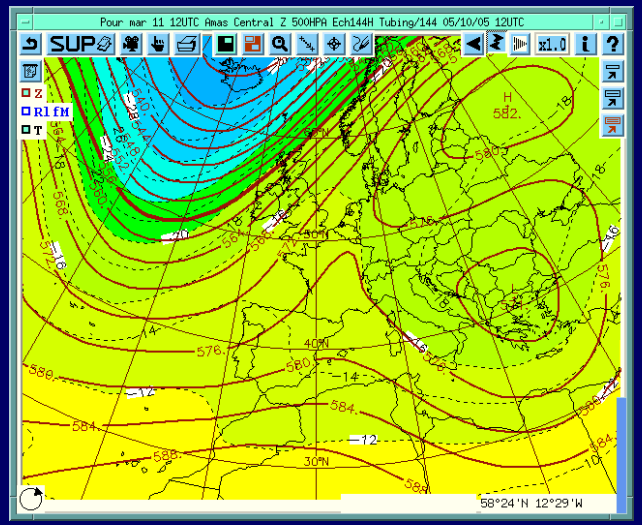
- Aimed at the public
- Global (one for D4/D5 and another for D6/D7)
- Depends on the number of tubes.
- Subjective : according to weather type and season.
- 5 levels
  - 1 : very low confidence
  - 2 : low confidence
  - 3 : normal confidence
  - 4 : high confidence
  - 5 : very high confidence

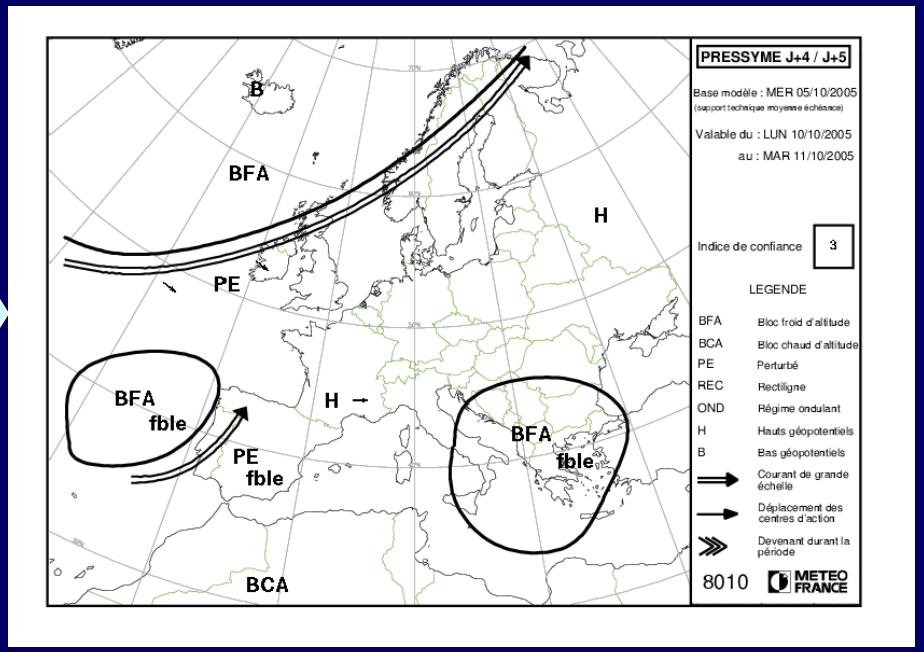
PRESSYME D4/D5

D4



D5





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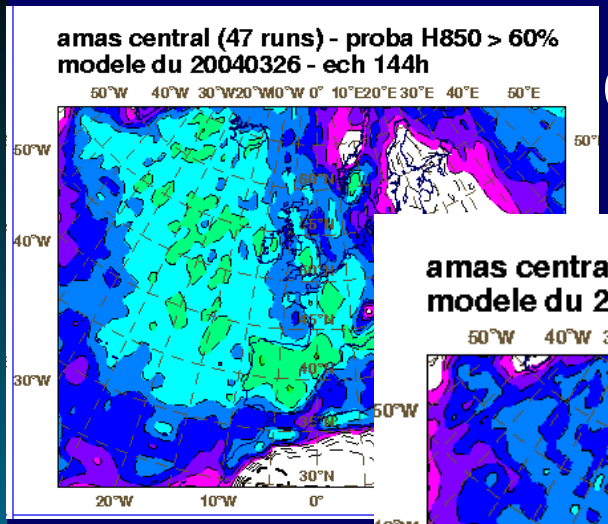
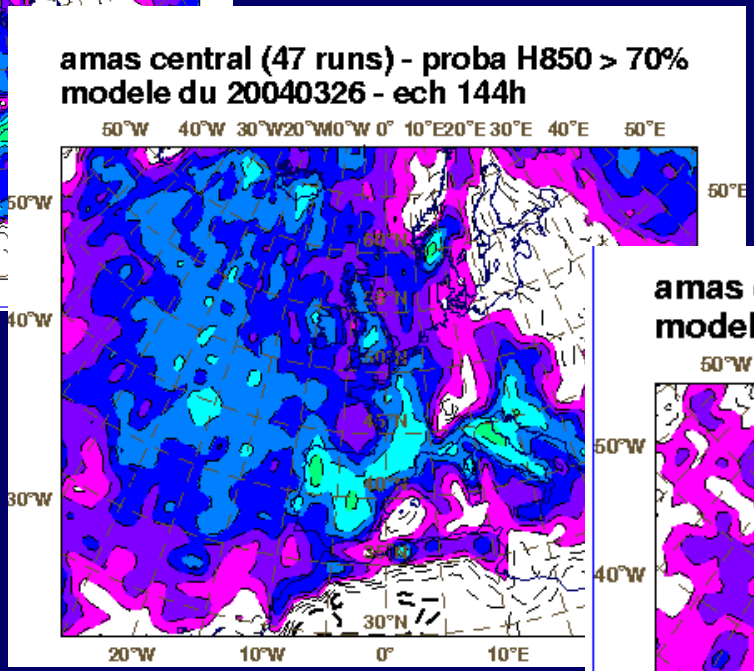
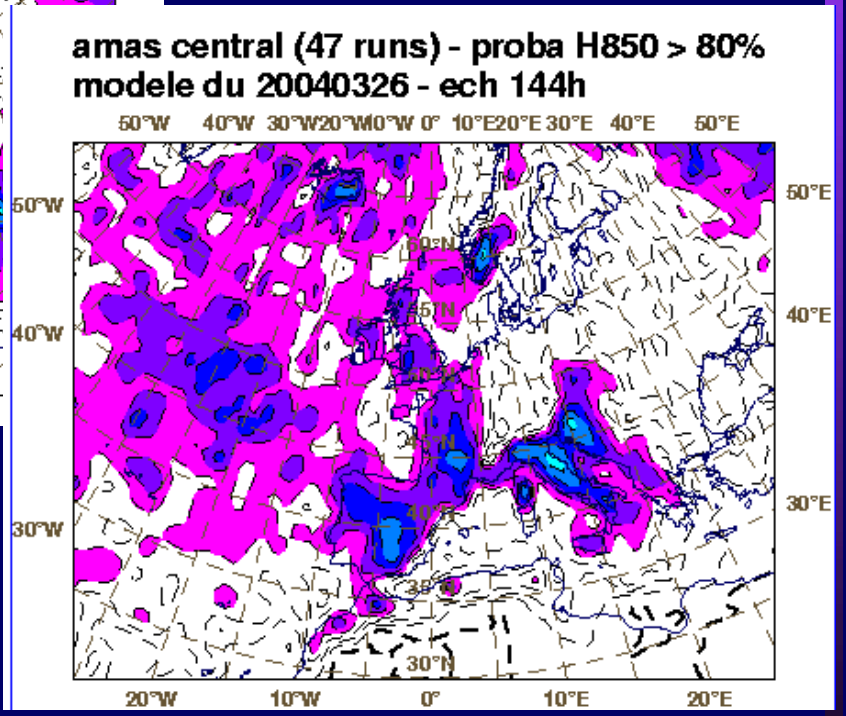
Central cluster-Probability of HU 850 hPa







At different levels (850 and 700 hPa)

and different percentages (60,70, 80%).

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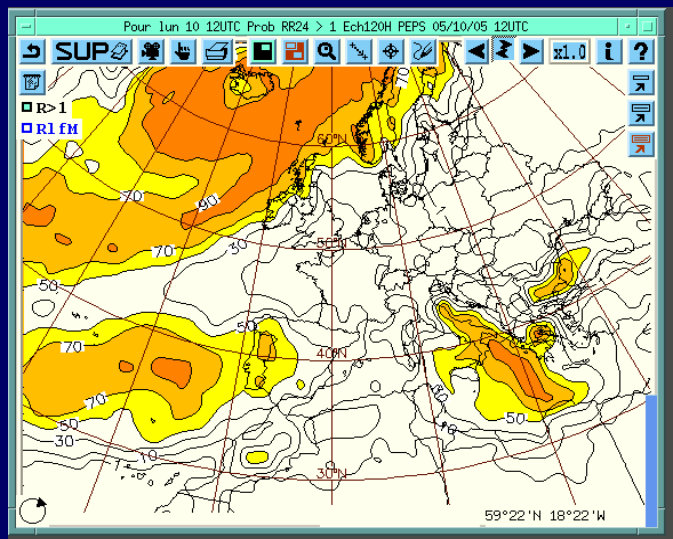
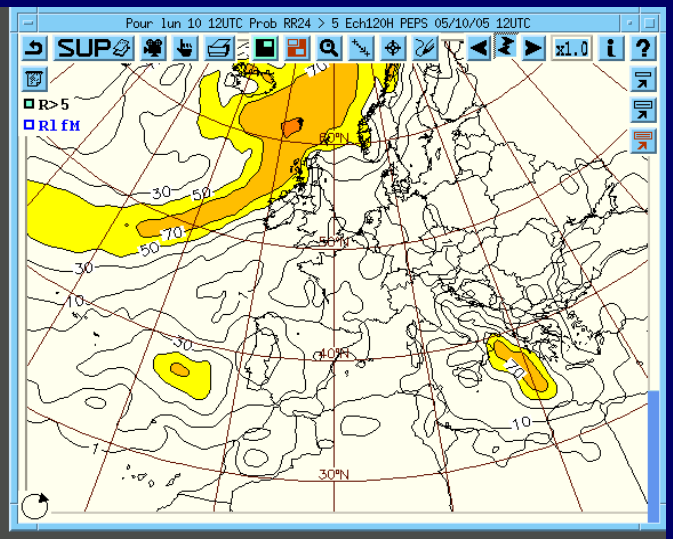
Rain probability

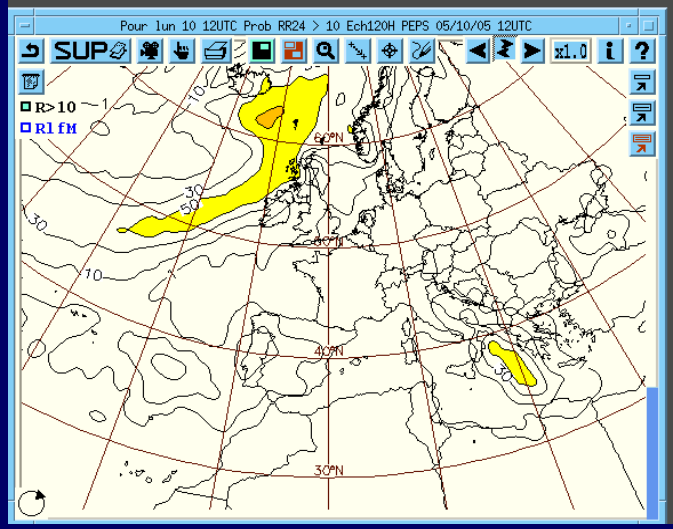
RR24
>1 mm

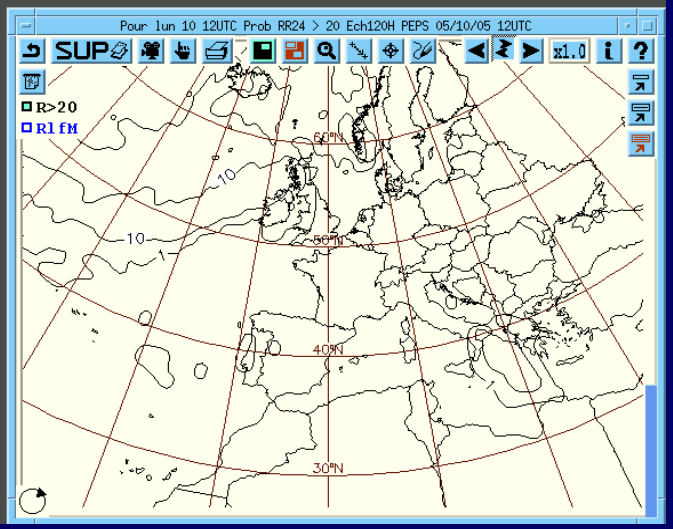




RR24
>5 mm

RR24
>10 mm





RR24
>20 mm

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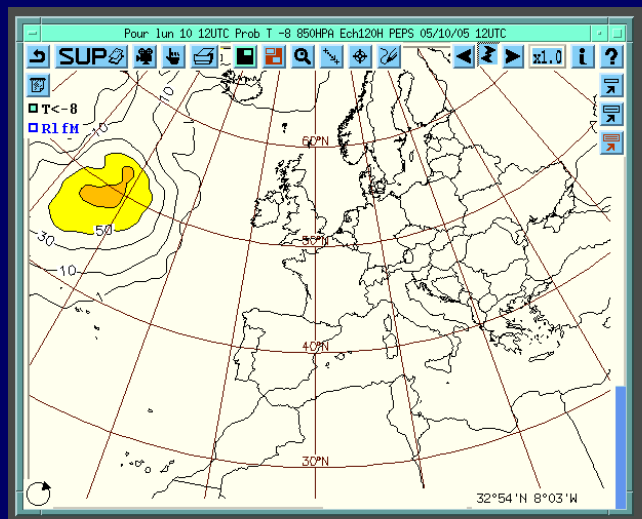
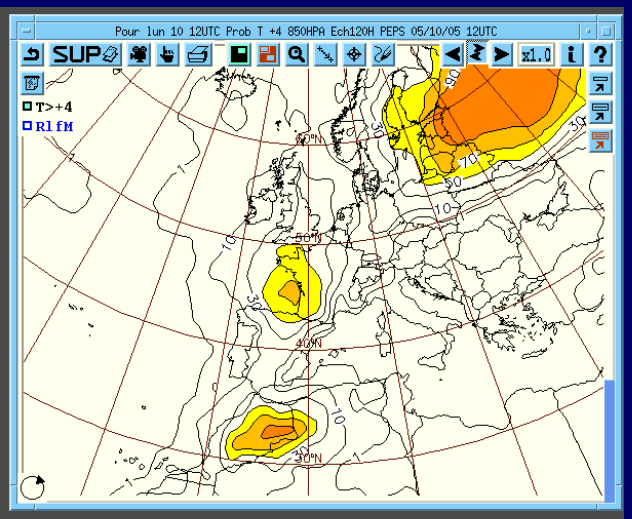
Temperature probability

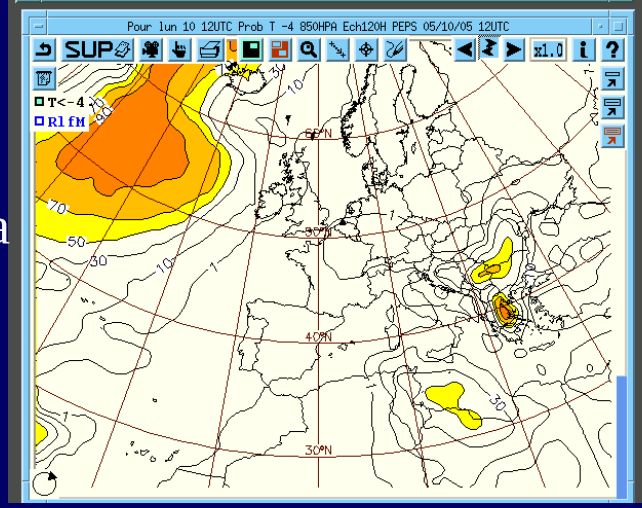
T850 hPa
–8°C

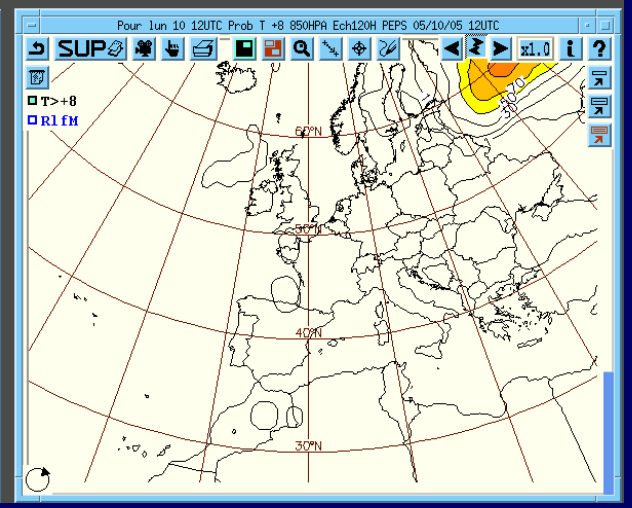




T850 hPa
+4°C

T850 hPa
–4°C





T850 hPa
+8°C

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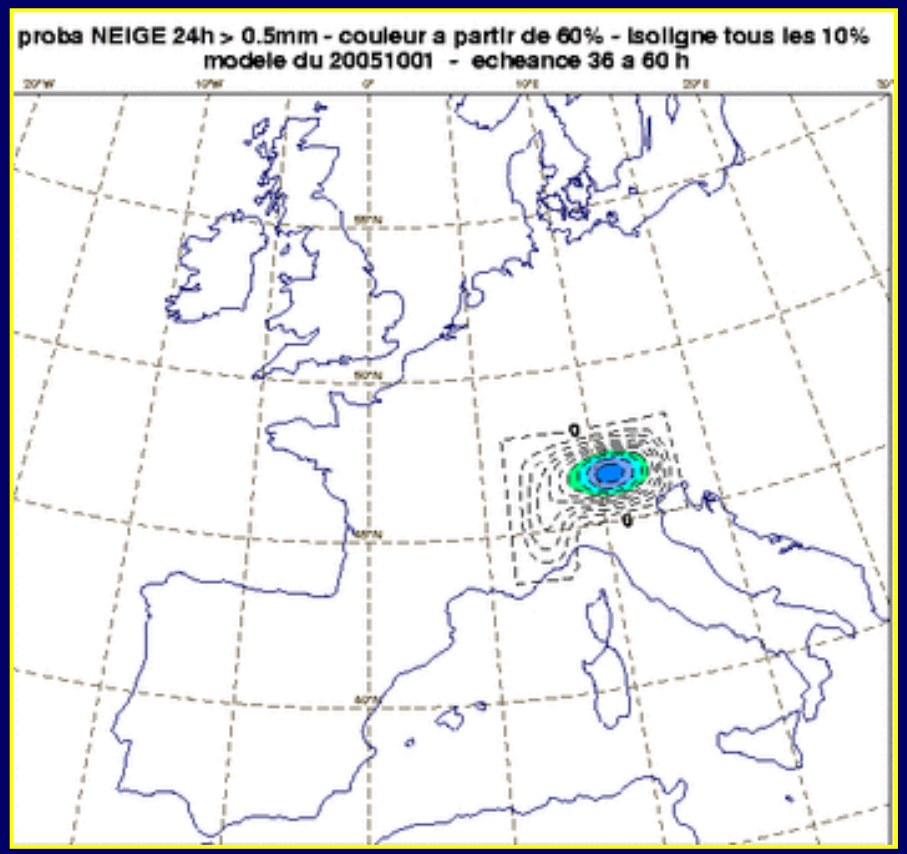
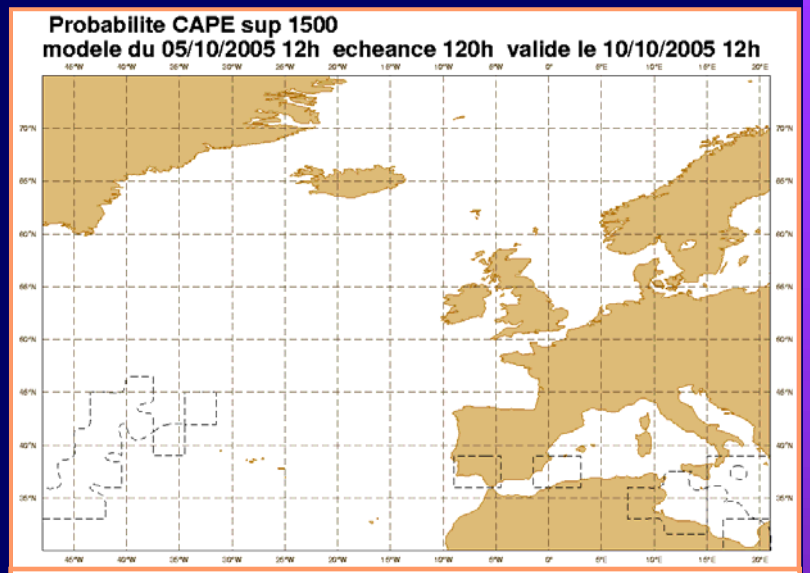
Toujours un temps d'avance

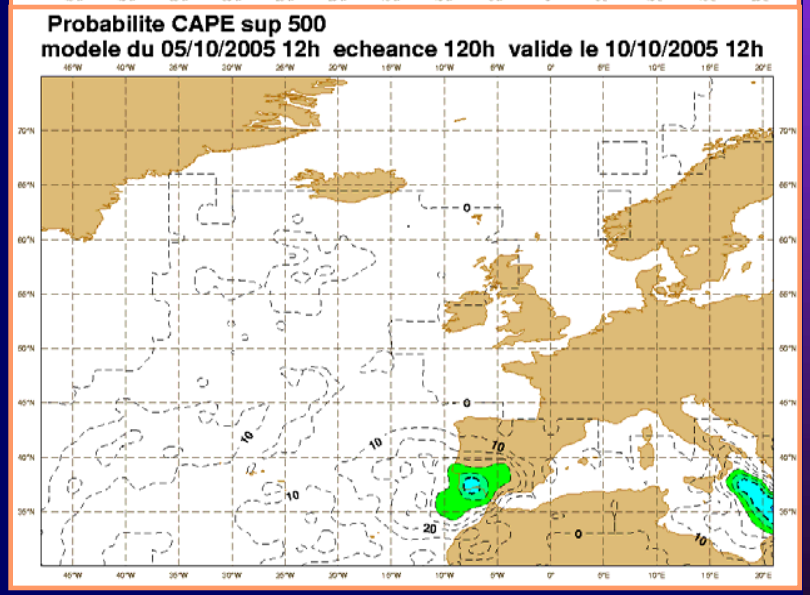
Risks

Of thunderstorms

Of snowfall







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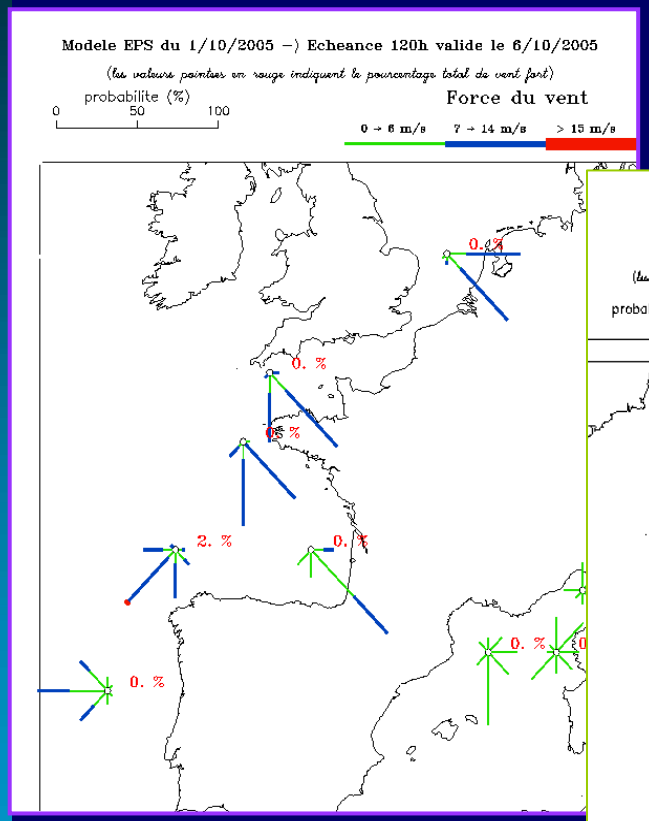
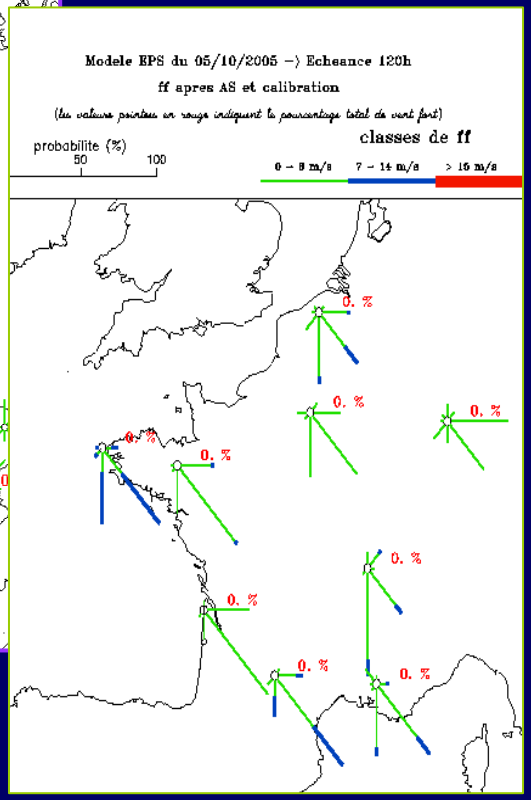
Risks of wind

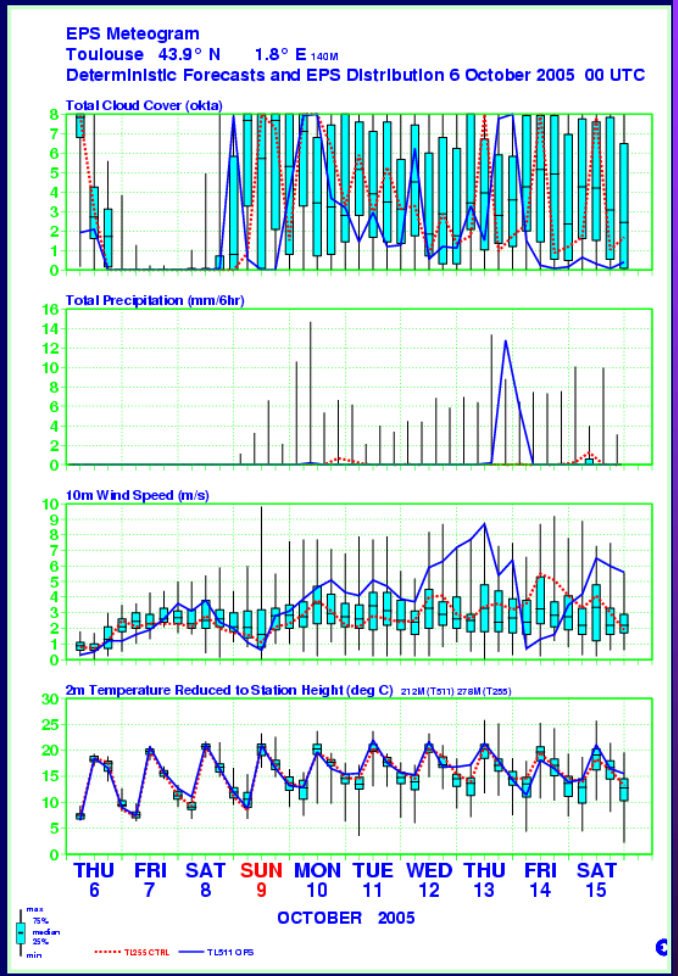
Off-shore



Inland



EPS Meteogram



Daily assessment

- Evaluation of EPS output

Prévision du 2005-10-05		
	J4/J5	J6/J7
Position modèle déterministe : Type de temps prévu : Type de flux prévu : Commentaires :	amas_central PE BCA SO	amas_central PE SO
Contrôle supra-synoptique		
	J4 / J5	J6 / J7
Position Analyse	◉ amas_central ○ tube ○ exterieur	○ amas_central ○ tube ◉ exterieur
Notation CEP opérationnel	○ Très bon ◉ Bon ○ Mauvais ○ Très mauvais	
Type de temps	☑ PE ☐ OND ☑ BCA ☐ BFA	☑ PE ☐ OND ☑ BCA ☐ BFA
Type de flux	☐ N ☐ NE ☐ E ☐ SE ☐ S ☑ SO ☐ O ☐ NO [☐ VAR]	☐ N ☐ NE ☐ E ☐ SE ☑ S ☐ SO ☐ O ☐ NO [☐ VAR]
Notation cadre supra-synoptique	○ Très bon ◉ Bon ○ Mauvais ○ Très mauvais	○ Très bon ○ Bon ◉ Mauvais ○ Très mauvais
Commentaires		

Daily assessment

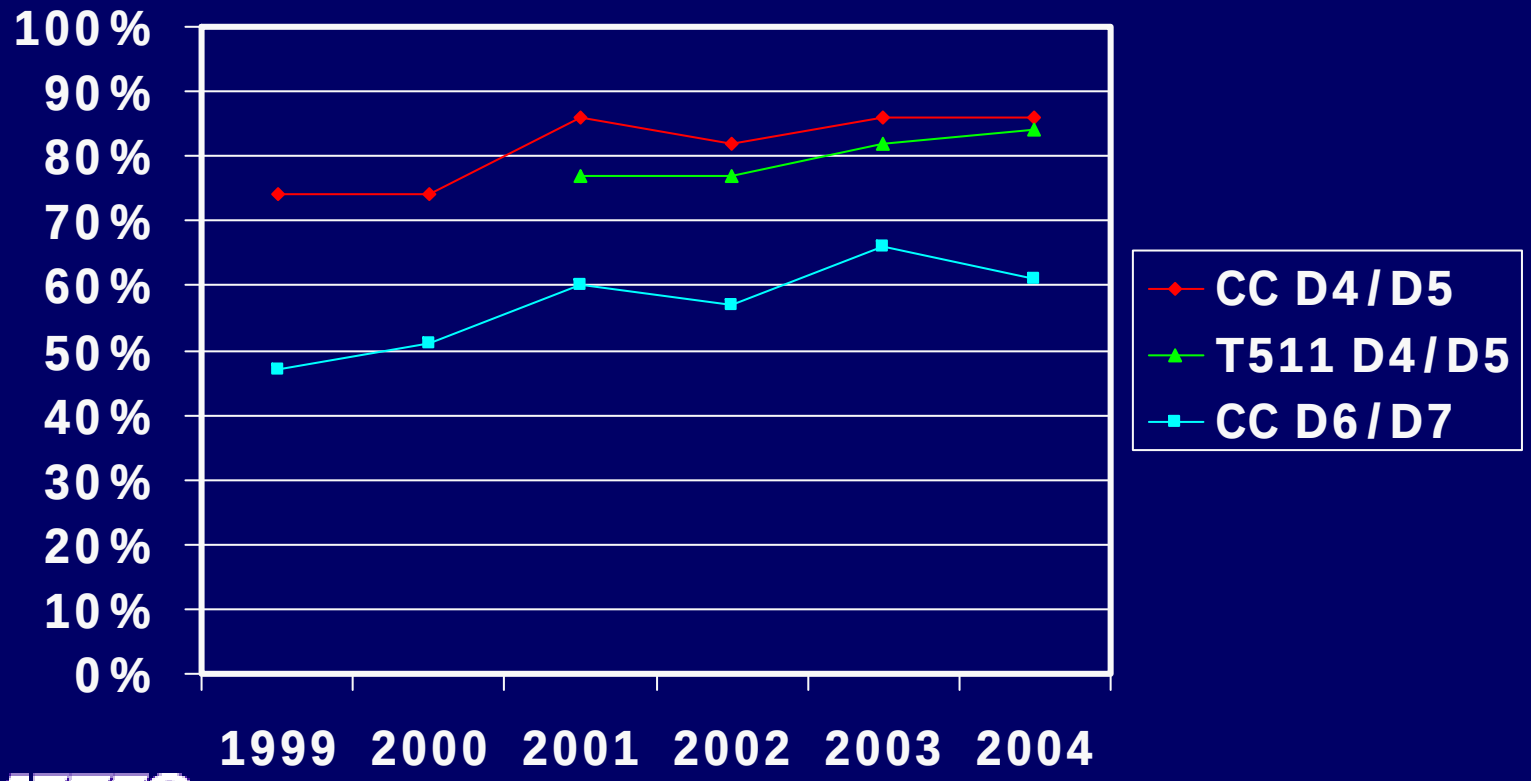
- Evaluation of predicted weather

Contrôle temps sensible		
	J4/J5	J6/J7
Notation globale	○ Très bon ◉ Bon ○ Mauvais ○ Très Mauvais	○ Très bon ○ Bon ◉ Mauvais ○ Très mauvais
Découpage J4/J5 pertinent	☐ OUI ☐ NON	

Notation par paramètre à J4/J5							
Nébulosité	Précipitations	Orages	Neige en plaine	Neige en montagne	Températures minimales	Températures maximales	Vent
◉ Bon ○ Mauvais	◉ Bon ○ Mauvais	☐ Bon ☐ Mauvais	☐ Bon ☐ Mauvais	☐ Bon ☐ Mauvais	◉ Bon ○ Mauvais	◉ Bon ○ Mauvais	◉ Bon ○ Mauvais
Enregistrer contrôle				Revenir menu principal			

Scores

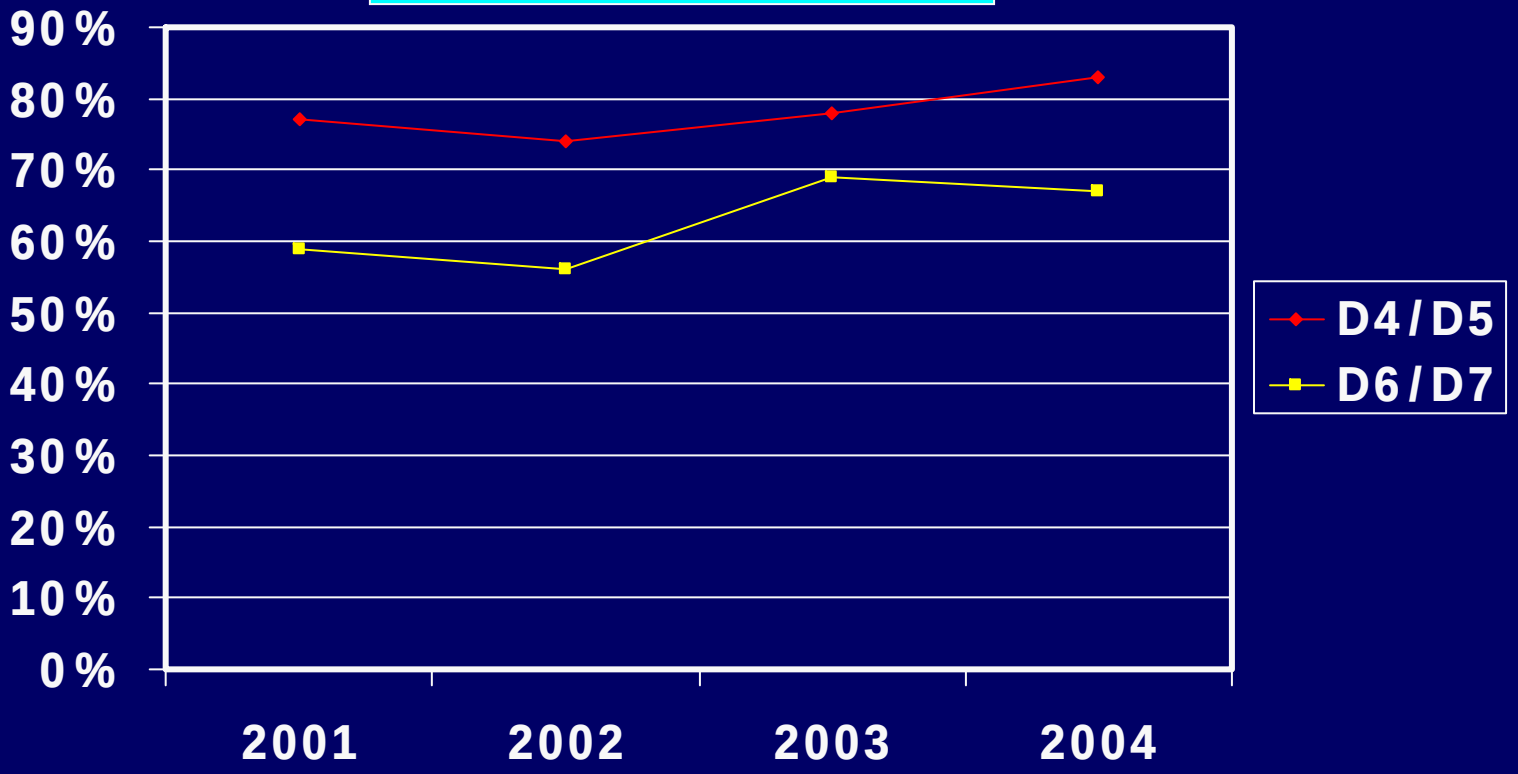
« Good » marks of EPS central cluster and T511



METEO FRANCE
Toujours un temps d'avance

Scores

« Good » marks of predicted weather



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Evolution ...

- Deterministic forecast for D4 ?
- Extend the medium range forecast until D9 ?

Many thanks to you and . . .

to GTME (middle range working group)

- Mail : patricia.salerno@meteo.fr

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Toujours un temps d'avance