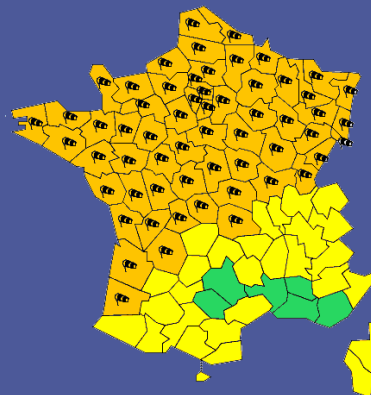
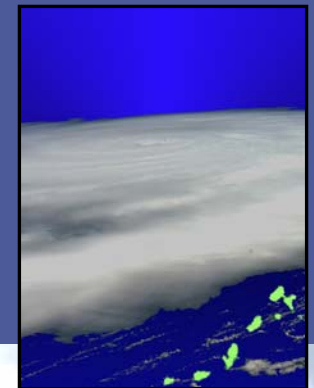


# The Vigilance system in France , (continental and overseas)

## An example of an Early Warning System with a Multi-Hazard Approach



Jean-Noel DEGRACE, MétéoFrance Director of the Met.Service of Martinique ,  
real-time coordinator for FWI & Guyana  
(with the help of C.Honoré, forecasting deputy director of MétéoFrance)

# Executive Summary

- ▶ **French legislation on risk prevention and crisis management**
  - a partnership to manage hazards and disasters
  - the key role of Météo-France in a global risk management system
- ▶ **The MHEWS « Vigilance » for the continental France**
  - Principles
  - Risk assesment
- ▶ **The MHEWS « vigilance » for overseas territories :**
  - example of French Antilles and Guyana
  - Principles and differences with the continental system
  - Risk assesment
  - Measures of behaviour
- ▶ **Dissemination and communication**
- ▶ **Requirements**
- ▶ **Assesment of the « vigilance » system**
- ▶ **Perspectives of improvement**

# French legislation on risk prevention and crisis management

## ▶ The law for natural and technological risks – 2003 July 30th

- ▶ imposes to assess and reduce the risk before a crisis,
- ▶ is administrated by the Ministry of Sustainable Development
- ▶ restricts urban planning to accomodate living conditions with nature-induced constraints
- ▶ encourages protection measures (water basin retention, territory management,...)
- ▶ promotes wide and detailed information of the citizens about risks

## French legislation on risk prevention and crisis management (ctnd)

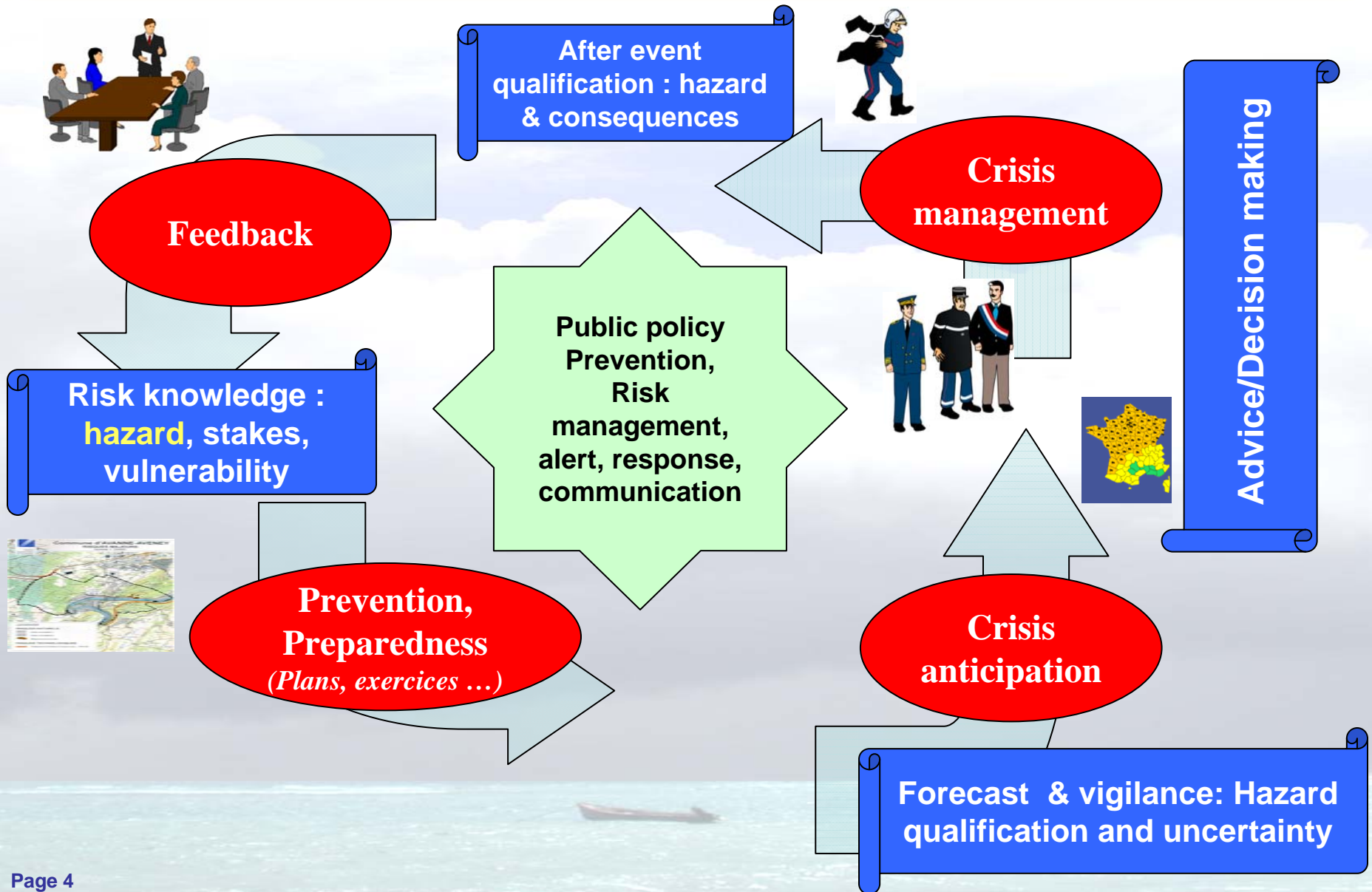
- ▶ **The law for civil protection crisis management – 2004 August 13th**
  - ▶ defines administrative and operational ruling on crisis management,
  - ▶ recalls that the citizen has a basic responsibility regarding his/her own security,
  - ▶ asserts that any operational response requires continuous watch on several risks.
  
- ▶ **The Orientation Council for Major Natural Hazard Management is now the national platform within ISDR scheme**

# Legal framework

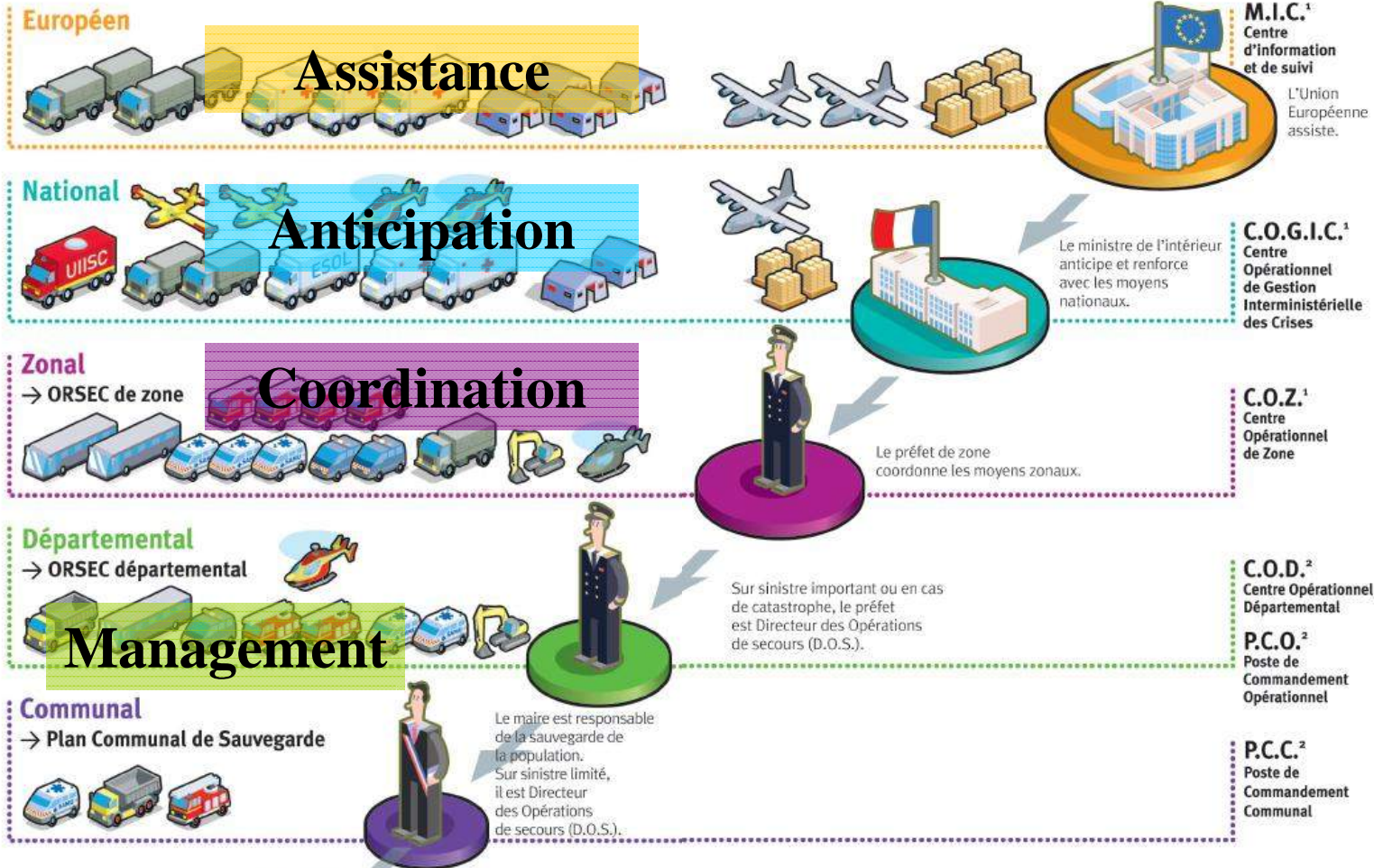
## ▲ ORSEC 04' : Organization of Civil Defence response

- 1 - Establishment of a Civil Defence network
- 2 - Identification and prior assessment of risks
- 3 - A general organizational structure for managing all types of events  
*(including specific arrangements for unusual events)*
- 4 - Preparedness, exercise and training phases
- 5 - Continuous improvement *(feedback and lessons learnt)*

# a key element for Risk Management



# Civil Defence organization



<sup>1</sup>opérationnel 24h/24h, <sup>2</sup>activé en cas de besoin

# Two levels of actual management

**Commune <=> Town**



Mayor

→ Safeguard plan

Preparedness

Public information

Reduction in population  
vulnerability

**Département <=> County**



Prefect

→ Disaster contingency plan  
→ Risk prevention plan

Preparedness

Disaster management

- *Alerts*
- *Response*
- *Mobilization of public or private means*



# French Vigilance System

## ▲ From an intra-administration warning procedure to a all-public watch and warning information

- Inter ministerial Circular defining the Vigilance system itself
- After the 1999 storms, need to change the meteorological warning system
- Design in 2000, implementation in 2001 for a first set of meteorological events
- Extension in 2004 to heat waves (2003), and cold spells
- Enlargement to a combined rainfall/flood vigilance in 2007

## ▲ Goals

- Anticipating crisis by delivering regular and descriptive informations about meteorological phenomena.
- Providing decision-making aids to adapt the Civil Defence response and the mobilization of means.
- Informing the population directly as a responsible actor of his own safety.

# Collecting users expectations

## ▲ The “Conseil Supérieur de la Météorologie”

(CSM - *High Council for Meteorology*)

**is a consultative body involving Météo-France and its partners together with public (21 ministries) and private users :**

- evaluates services provided by Météo-France to its users;
- formulates recommendations;
- proposes solutions to implement and fund the recommendations;
- monitors development of activities.

### Commissions of CSM:

- Agriculture
- Air transportation
- Civil Security**
- Education & training
- Environment and energy
- Health-biometeorology**
- Hydrology**
- Land transport and civil engineering
- Light aviation
- Marine
- Tourist-information

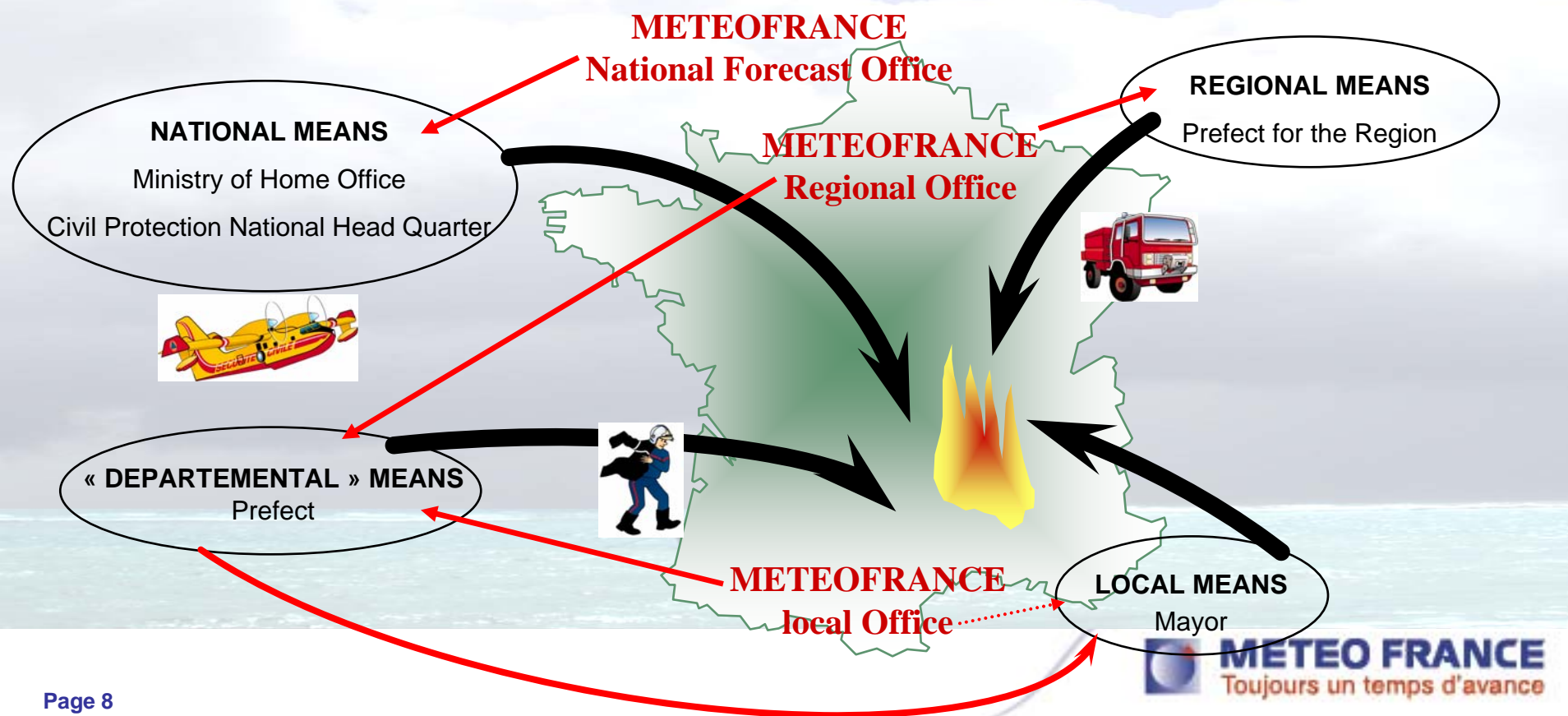
▲ **CSM IS A KIND OF NATIONAL PLATFORM DEDICATED TO METEOROLOGY**

# French Vigilance System

➤ The “vigilance” is a meteorological watch and warning procedure (MétéoFrance) that gives the best expertise

→to the “Prefects” and the Civil Defence Organization which take the decision concerning alarms and also to the general public  
 →To all the  
 →To the general public

➤ MétéoFrance is involved at all levels for actions and responses to naturel disasters.



# Vigilance System for continental France



## Hazards



Strong wind



Thunderstorm



Strong rainfall



Heat waves



Cold spells



Avalanches



Snow/Ice



Rainfall/flood

## Next steps



High waves



Fog

## Levels of warning



Level 4



Level 3



Level 2



Level 1

## Alarms / Alerts

Warnings activate cascades of preparedness and response plans, and actions by various responsible bodies (Civil Security responsibility)

### Basic principles

- Lead time : 24 hours
- Deterministic hazard assesment
- May combine hazards with different time scales

## the four levels

### Green :

- No particular vigilance is required.

### Yellow :

- Be attentive if practising activities exposed to meteorological risk, for some phenomena have been forecast, that are occasionally dangerous, although usual in the region (e.g. mistral wind, summer thunderstorms); keep informed about weather developments.

### Orange :

- Be very vigilant; dangerous meteorological phenomena have been forecasted; keep informed about weather developments and directives broadcasted by the authorities;

### Red :


- Absolute vigilance is required; dangerous and exceptionally intense meteorological phenomena have been forecasted ; keep regularly informed about weather development and conform to directives or orders broadcasted by the authorities


# French Vigilance Map

## Vigilance météorologique

La carte est actualisée au moins 2 fois par jour, à 6h et 16h.

- Une vigilance absolue s'impose** des phénomènes météorologiques dangereux d'intensité exceptionnelle sont prévus ...
- Soyez très vigilant**, des phénomènes météorologiques dangereux sont prévus ...
- Soyez attentif** si vous pratiquez des activités sensibles au risque météorologique ...
- Pas de vigilance particulière.**

 Vent violent	 Neige-verglas
 Pluie-inondation	 Grand froid
 Orages	 Avalanches

 La vigilance pluie-inondation est élaborée avec le réseau de prévision des crues du Ministère du Développement durable



 **METEO FRANCE**  
Toujours un temps d'avance

**Diffusion** : le lundi 09 février 2009 à 19h08  
**Validité** : jusqu'au mardi 10 février 2009 à 16h00  
**Actualisation** : du lundi 09 février 2009 à 16h00

Consultez le [bulletin national](#)

Episode de vents tempêteux concernant une grande moitié nord du pays débutant en soirée. Niveau d'eau élevé dans l'estuaire de la Gironde.

Cliquez sur la carte pour lire les **bulletins régionaux**

### Conseils des pouvoirs publics :

Vent/Orange - Limitez vos déplacements et renseignez-vous avant de les entreprendre.- Prenez garde aux chutes d'arbres ou d'objets.- N'intervenez pas sur les toitures.- Rangez les objets exposés au vent. Crues/Orange - Renseignez-vous avant d'entreprendre un déplacement ou toute autre activité extérieure.- Evitez les abords des cours d'eau.- Soyez prudents face au risque d'inondations et prenez les précautions adaptées.- Renseignez-vous sur les conditions de circulation.- Ne vous engagez en aucun cas, à pied ou en voiture, sur une voie immergée ou à proximité d'un cours d'eau

- Coloured by « département »
- Updated twice a day at least ( around 6am and 4pm)

Copyright Météo-France

# « follow up » bulletins

## Bulletin de vigilance Régional pour : la région Ouest

Numéro : 0902004

Emis le : lundi 09 février 2009 à 20h01  
par : Météo-France Rennes

Date et heure du prochain message : au plus tard le lundi 09 février 2009 à 23h15



### Type de phénomène

Vent violent

Phénomène en cours .

Fin de phénomène prévu le : mardi 10 février 2009 à 12h00

Type of danger  
and schedule

### Localisation

Début de suivi pour :  
Aucun département

Maintien de suivi pour :

Côtes-d'Armor (22), Finistère (29), Ile-et-Vilaine (35), Morbihan (56), Calvados (14), Manche (50), Orne (61), Loire-Atlantique (44), Maine-et-Loire (49), Mayenne (53), Sarthe (72), Vendée (85)

Fin de suivi pour :

Aucun département

Areas  
(« département »)  
under warning

### Description

### Analysis and observations

#### Situation actuelle et données observées :

Le centre de la dépression (978Hpa) se situe à l'entrée de la Manche à 19h. Dans sa partie sud, le vent de Sud à Sud-Ouest continue de se renforcer dans le golfe de Gascogne et sur la pointe de Bretagne. A 19h, on a relevé des rafales de : 107km/h sur les îles de Groix et de Belle-île, 100km/h à Noirmoutier ainsi qu'à Lanvéoc (29) et déjà 98km/h dans la région de Guingamp.

#### Evolution prévue :

La dépression précitée va générer une tempête qui vient juste de débiter sur l'Ouest-Bretagne et la façade atlantique ; elle s'étendra en première partie de nuit au reste de la Bretagne, puis aux Pays de Loire et à la Basse-Normandie. Les rafales les plus fortes atteindront la nuit prochaine 130 à 140 km/h près des côtes et 100 à 120 km/h dans l'intérieur des terres. Attention, les départements de la Loire Atlantique et de la Vendée sont particulièrement exposés; les rafales de 150 km/h près des côtes, 120 voire très localement 130 km/h dans les terres sont possibles en milieu de nuit. Venant d'abord du sud-ouest, le vent tournera peu à peu à l'ouest puis au nord-ouest en deuxième partie de nuit, les départements côtiers de Manche seront alors les plus exposés. Une accalmie interviendra en début de journée de mardi près de l'Atlantique et gagnera toute la Bretagne et les Pays de Loire puis la Basse-Normandie pour le milieu de matinée. Phénomène aggravant : de très fortes vagues se développeront dans le Golfe de Gascogne. Compte tenu du fort coefficient de marée, le phénomène de surcotes pourrait provoquer des envahissements côtiers.

#### Faits nouveaux :

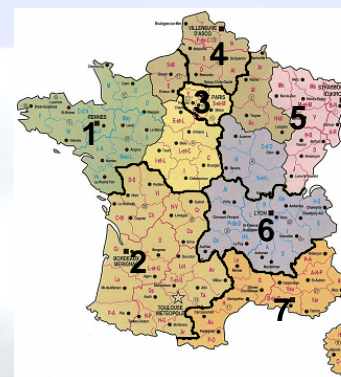
Confirmation des prévisions précédentes.

Qualification du phénomène : **Comments / comparisons/ frequency**

Fort tempête hivernale, moins intense que celle du 24 janvier, mais plus durable et plus étendue.

### Forecast

- National co-ordination with also a « follow up » national report
- Produced in case of orange or red warning by the « regional center » ( 7)
- Approximately every 3 hours



Potential consequences

Advice of behavior

### Conséquences possibles

#### Vent/Orange

\* Des coupures d'électricité et de téléphone peuvent affecter les réseaux de distribution pendant des durées relativement importantes.

\* Les toitures et les cheminées peuvent être endommagées.

\* Des branches d'arbre risquent de se rompre.

\* Les véhicules peuvent être déportés.

\* La circulation routière peut être perturbée, en particulier sur le réseau secondaire en zone forestière.

[\* Le fonctionnement des infrastructures des stations de ski est perturbé.]

### Conseils de comportement

#### Vent/Orange

\* Limitez vos déplacements. Limitez votre vitesse sur route et autoroute, en particulier si vous conduisez un véhicule ou attelage sensible aux effets du vent.

\* Ne vous promenez pas en forêt [et sur le littoral].

\* En ville, soyez vigilants face aux chutes possibles d'objets divers.

\* N'intervenez pas sur les toitures et ne touchez en aucun cas à des fils électriques tombés au sol.

\* Rangez ou fixez les objets sensibles aux effets du vent ou susceptibles d'être endommagés.

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## Risk assesment

$$\begin{aligned} \blacktriangle \text{ RISK} &= \text{NATURAL HAZARD} \\ &+ \text{VULNERABILITY} \\ &+ \text{STAKES} \end{aligned}$$

### ▶ Pluridisciplinary approach

- Meteorologists alone do not know enough about vulnerability and stakes
- Meteorologists do not communicate with meteorologists only
- Statistics and guidelines may help to start with hazard assesment
- Knowledge and information have to be shared with other sciences in "historical" data base
- Lessons learned together are essential to improve the assesment



## Risk assesment

$$\begin{aligned} \blacktriangle \text{ RISK} &= \text{NATURAL HAZARD} \\ &+ \text{VULNERABILITY} \\ &+ \text{STAKES} \end{aligned}$$

### ⦿ Pluridisciplinary approach ...ctnd

#### ➤ Rain and flooding :

- combines assesment made by meteorologists and hydrologists

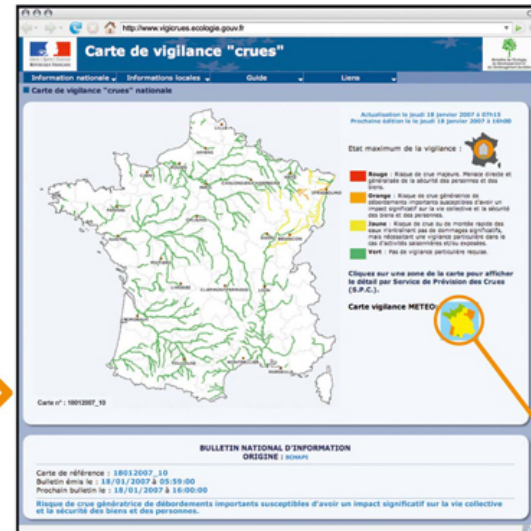
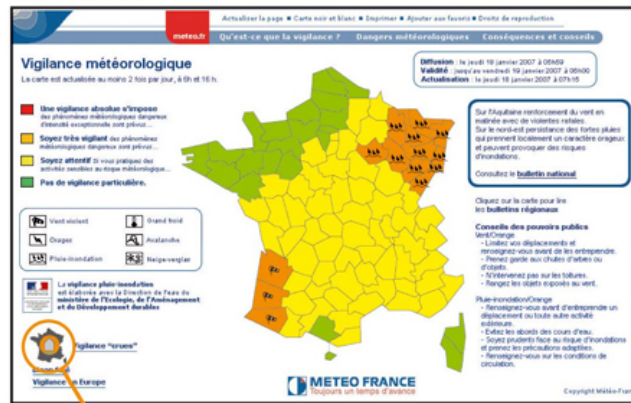
#### ➤ Heat waves :

- Responsibility is shared between INVS ( National Health Survey Intitute) and Météo-France

- Specific cooperation, exchange of data, indexes, worsering factors, ...

# Rainfall or flooding

[www.meteo.fr](http://www.meteo.fr)

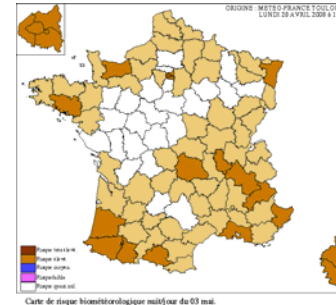
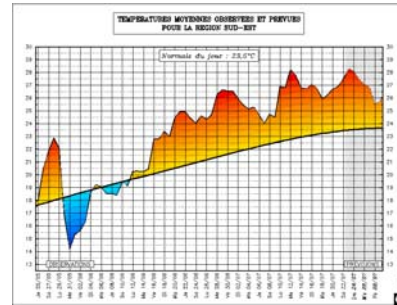
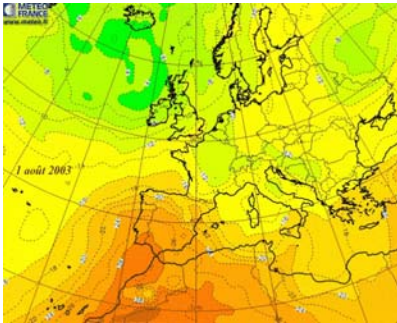


[www.vigicrues.ecologie.gouv.fr](http://www.vigicrues.ecologie.gouv.fr)

A pictogram  on the meteo chart : **rainfall or flood**, the "rain" part coming from Meteo-France, the "flood" part coming from national hydrological service

Coordination by national flood forecasting center in Toulouse near the National Forecast Center « (SHAPI) » with the input of 22 regional flood forecasting offices

# Heat wave specific cooperation



**Specific data, indexes and expertise**

Conference calls if needed

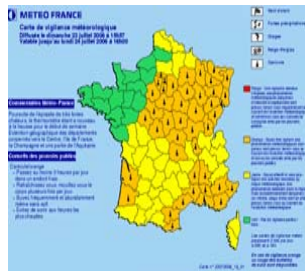
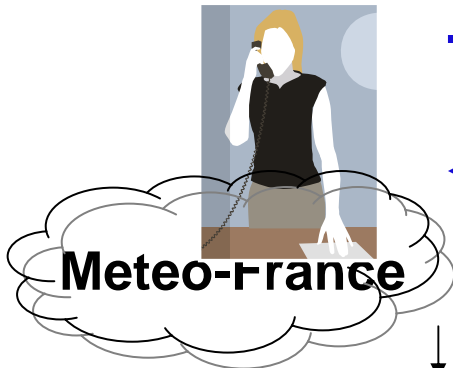
**Health reports, worsening factors**

**INVS**

Warning status and proposals for action

**Local authorities (Préfets)**

**ACTION**



## Criteria for color decision making as a guidance












Weather phenomenon	Criteria for yellow	Criteria for orange	Criteria for red
Strong winds (gusts, storms)	Widespread gusts in plain > 60 to 80 or 80 to 100 km/h depending on regions	Widespread gusts > 100 to 130 km/h inland,	Widespread gusts > 130 km/h inland
Heavy rainfalls	Depends on the regional climatology (30 à 60 m/24h)	Depends on the regional climatology (60 à 100mm/24h, South East : >80mm in less 6 hours or [120,300 mm] in 24h	Depends on the regional climatology
Thunderstorms	Whatever Thunderstorm	Widespread organized thunderstorms	No standard criteria
Avalanche	15/12 – 30/04 risk 3 or 4 on the European scale	15/12 – 30/04 risk 5 on the European scale	15/12 – 30/04 risk 5 (+) on the European scale

**Some criteria are thresholds, but it is not a automated process, human expertise is mandatory !**

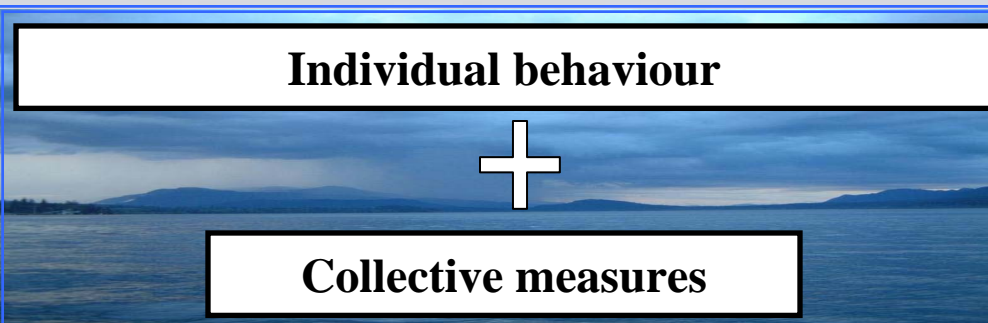
# Vigilance system in the french west indies and guyana

## ASSESS THE RISK

A type of hazard , A colour for the level of the danger , A watchword

	 Strong winds	+	 No danger
	 Dangerous sea		 <b>Be attentive !</b> ( Imprecise danger or limited effects )
	 Heavy rain, Thunderstorm		 <b>Be prepared !</b> ( probable danger or moderate effects)
	 Cyclone		 <b>Protect yourself.</b> (Very probable danger and heavy consequences)
			 <b>Stay safely enclosed.</b> Imminent danger
			 <b>Keep being careful.</b> (reduced or moved away danger but ...)

## GIVE ADAPTED MEASURES



# Vigilance system in the french west indies and guyana

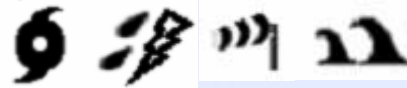
## Differences with the « continental » system :

- ▶ **MétéoFrance vigilance plan included in the Disaster contingency plan of the Prefect**
  - MétéoFrance gives the color, the Defense Civil gives the individual and collective measures ( predefined)
  - Individual measures of behaviour are included in all « follow up » bulletins : importance of the « watchword » for the communication
  - Collective measures are decided in real time by the Prefect
  
- ▶ **Probabilistic and « impact oriented » hazard assesment with progressive upgrade or downgrade**
  
- ▶ **Lead time up to 72 hours, depending on the type of hazard and the predictability**

# Vigilance system in the french west indies and guyana

## Differences with the « continental » system ... ctnd:

### ▲ 4 types of danger only



→ tropical cyclone (implicit possible combination of the 3 others hazards)

→ heavy rainfall and thunderstorms combined

→ « dangerous sea » (coastal impact) and strong wind

### ▲ 2 additionnal colours for tropical cyclones



### ▲ Yellow level managed in the same way than the other colors (follow up bulletins, pictogram of hazard, ...)

# RISK ASSESSMENT

- ▲ Each regional forecast office (Martinique, Guadeloupe and French Guyana) assess the dangers for its own area in coordination with an « interregional » level
  - ▲ Assesment based on a combination of probabilistic forecasts and possible impact
    - 4 levels of impacts combined with 4 levels of probabilities
    - Forecast impact : low (imprecise), moderate, important and major.
    - Probability : low, moderate/high, very high and certain ( or imminent )
- the probability is strongly correlated with the forecast range and the predictability, specially for tropical cyclone

	Impact	Light or imprecise	Moderate	Deep	Very deep (major)
Probability					
low		1	1	1	2
Moderate to high		1	1	2	3
Very high		1	2	3	3
Certain ... (imminent)		1	2	3	4

Timing \ Impact	+ 48h	42h 48h	36h 42h	30h 36h	24h 30h	18h 24h	12h 18h	06h 12h	00h 06h
Light or Imprecise	Light	Light	Light	Light	Light	Light	Light	Light	Light
Moderate	Light	Light	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Deep	Light	Light	Moderate	Moderate	Moderate	Deep	Deep	Deep	Deep
Very deep Major	Light	Moderate	Moderate	Moderate	Moderate	Deep	Deep	Deep	Very deep Major



# RISK ASSESSMENT

## ▲ Accordance with RSMC Miami watch and warning system for tropical cyclone (only)

( Official alerts of each country indicated on the « vigilance » map )

PT = Préalerte Tempête = Storm Watch

AT = Alerte Tempête = Storm Warning

PO = Préalerte Ouragan = Hurricane Watch

AO = Alerte Ouragan = Hurricane Warning

### FWI Vigilance / RSMC

Anticipation / Type	Trop. Dep	Week T.Storm	Strong T.Storm	Hurricane
48 hours or more	NIL	PT Storm Watch	PT Storm Watch	PO Hurricane Watch
24 - 48 hours	NIL	PT Storm Watch	PT Storm Watch	PO Hurricane Watch
18 - 24 hours	NIL	AT Storm Warning	AT Storm Warning	AO Hurricane Warning
6 - 18 hours	NIL	AT Storm Warning	AT Storm Warning	AO Hurricane Warning
3 - 6 hours	NIL	AT Storm Warning	AT Storm Warning	AO Hurricane Warning

## MEASURES and BEHAVIOR



**Specific measures of prevention, protection and behaviour have to be applied to social and economical sectors and also by every citizen, depending on the hazard and the level ( color) of risk .**

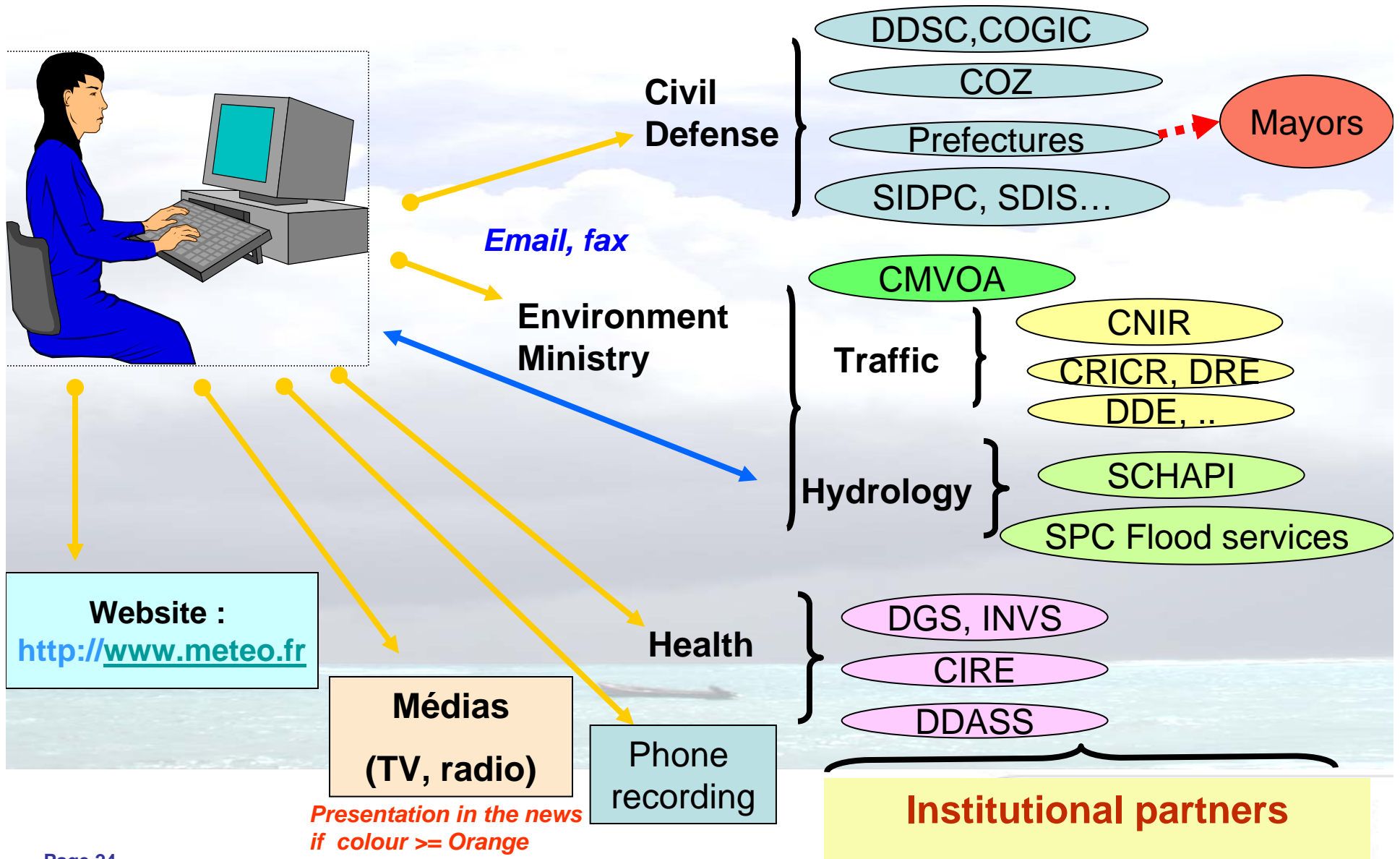
### ▲ Individual behaviour measures

- Give advice to be prepared or protected and to behave before, during and after the event
- Included in « Follow-up » bulletins of each region and also available from the web site by a single click on the colour key
- Pre-defined in collaboration with the emergency managers; they →

### ▲ Collective measures

- Also pre-defined by emergency managers and the authorities
- Concerning instructions for all the society : schools, industries, airports, shops, ...
- The collective measures are decided by the « crisis management team » in real time

# Dissemination : for who ?



# Dissemination : how ?

## On « push » mode (email + fax + sms)

- All authorities responsible for safety
- French media agency AFP
- **In case of red, radio and TV channels**

## On « pull » mode

Internet : [www.meteo.fr](http://www.meteo.fr)

(+ security back-up for authorities in case of problems)

## Health and flood information

is additionally disseminated to authorities by INVS and SCHAPI

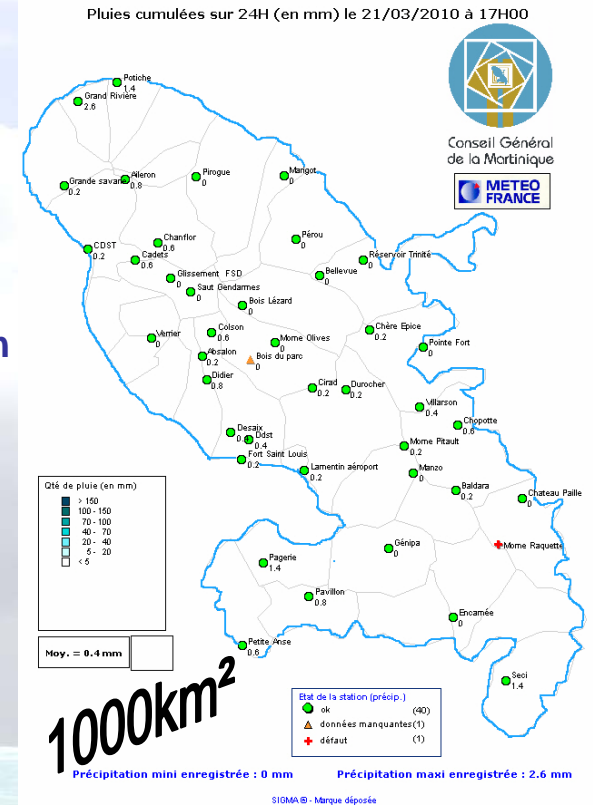
# Requirements

The good monitoring of the vigilance is not possible without a wide range of observations and forecast means

It requires

→ Regional and local observations  
(monitored with specific « watch » workstation )

- Synoptical and automated weather stations network  
550 AWS in France, 40 in Martinique thanks to local cooperation
- Autowatch AWS collected every 30' if needed,
- Rivergauge (limnimeters) network
- Waveriders
- Upper air soundings
- Radar imagery (network)
  - Rain accumulation, nowcast tools
- High resolution satellite imagery



# Requirements ... ctnd

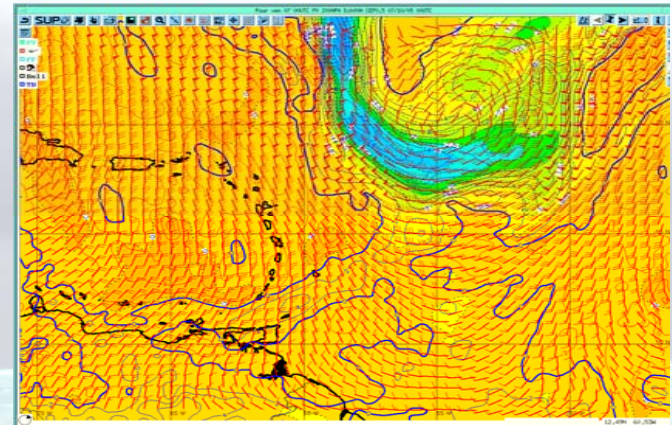
The good monitoring of the vigilance is not possible without a wide range of observations and forecast means

It requires

→ Forecast and nowcast (NWP outputs)

- Atmospheric models
  - Global model (ARPEGE – ECMWF/IFS – 30km ): medium/short range
  - Limited area model (ALADIN – 10 km): short range
  - Fine mesh models (AROME – 2.5 km): very short range
- Waves and storm surge models
- Specific rainfall / river flow models

→ and human expertise ... of course !!!



# Assessment of the “vigilance” system

▶ A partnership framework and review process for a continuous assessment and a continuous improvement trend

→ Quarterly meetings with the main partners of the Ministries of Interior, Ecology, Transportation and Health

→ Assess operational capability at local / regional / institutional level

→ Assess effectiveness of coordination and management of warnings from end to end

→ Annual meeting of the interministerial steering committee to decide on procedural developments

→ annual assessment document : Feedback about procedure and presentation of statistical data about quality of warnings and related damages

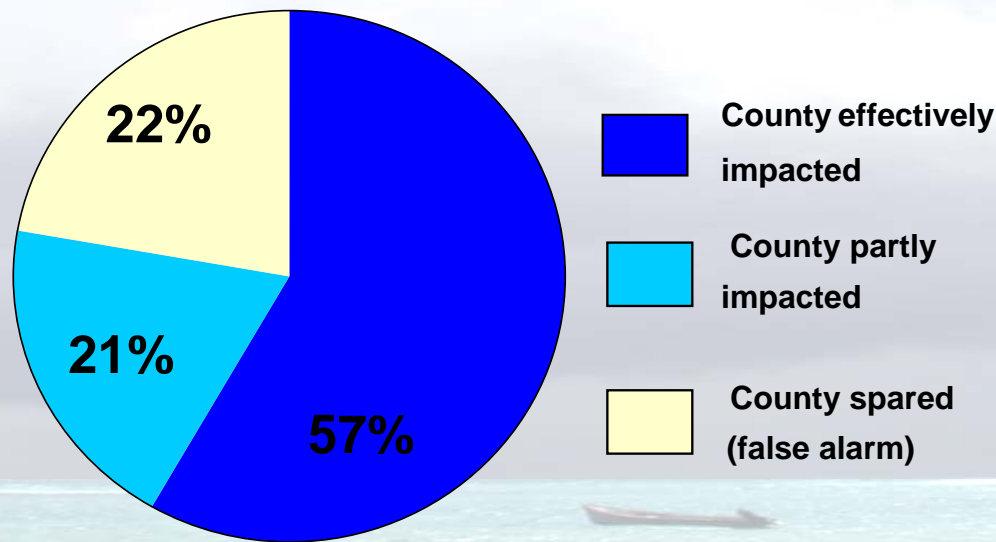
→ Exercices led by the civil defense



# Orange or Red vigilance cases

Nearly 300 cases assessed since 2002 :

- 0% to 2% annual non detection
- 22% of false alarm at county scale,

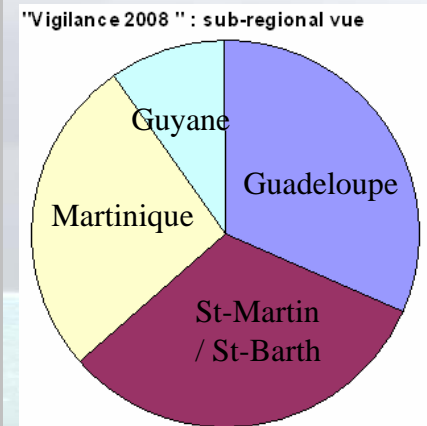
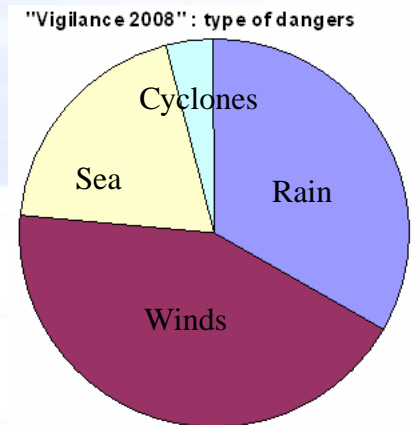




## Example : French Antilles and Guyana 2008

Operational since 1st of january 2006 for the French West Indies and since 15th of december 2007 for French Guyana

<b>YEAR : 2008</b>	<b>St-Martin</b>				
	<b>St-Barth</b>	<b>Guadeloupe</b>	<b>Martinique</b>	<b>Guyane</b>	<b>TOTAL</b>
<b>TOTAL</b>	<b>13</b>	<b>13</b>	<b>11</b>	<b>4</b>	<b>41</b>
<b>Type of danger</b>					
Heavy rain/thunderstorm	5	7	5	0	17
Strong winds	7	6	5	4	22
Dangerous sea	3	4	3	0	10
Cyclones	1	1	0	0	2
<b>Evaluation of the forecasts</b>		<b>in percentage</b>			
Good to very good		63	55	50	
Sufficiently good		16	46	50	
False alarm		21	9	0	
Non detection		0	0	0	
<b>Anticipation</b>		<b>in percentage</b>			
Good to very good		74	82	25	
Sufficiently good		11	9	75	
Too late		15	9	0	
<b>Global evaluation</b>		<b>in percentage</b>			
Good to very good		42	55	0	
Sufficiently good		26	27	100	
Not sufficiently good		16	18	0	
Bad		16	0	0	



# Assessment of the "vigilance" system

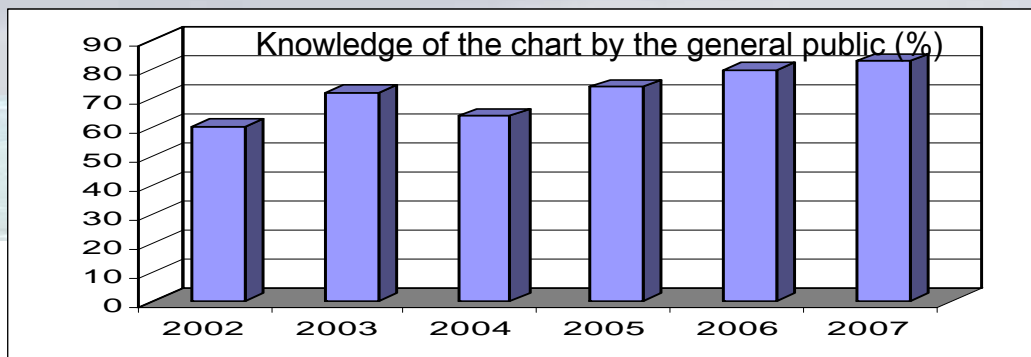
## ▲ Usefulness and common knowledge

### → The general public: a wide common knowledge

- The map is very well known (86%)
- one feels sufficiently informed (70%)
- main access to information (96%)

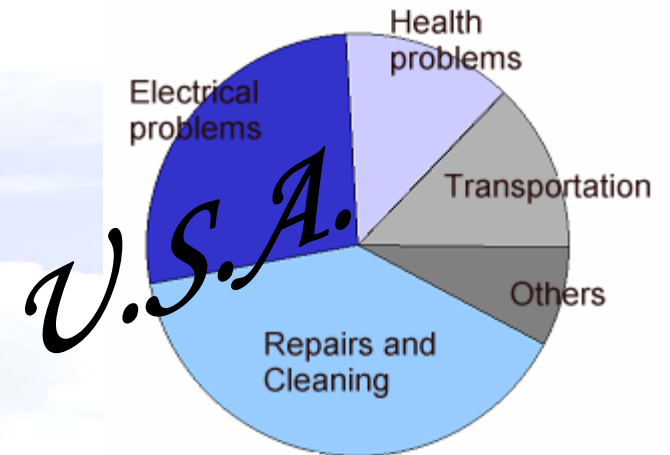
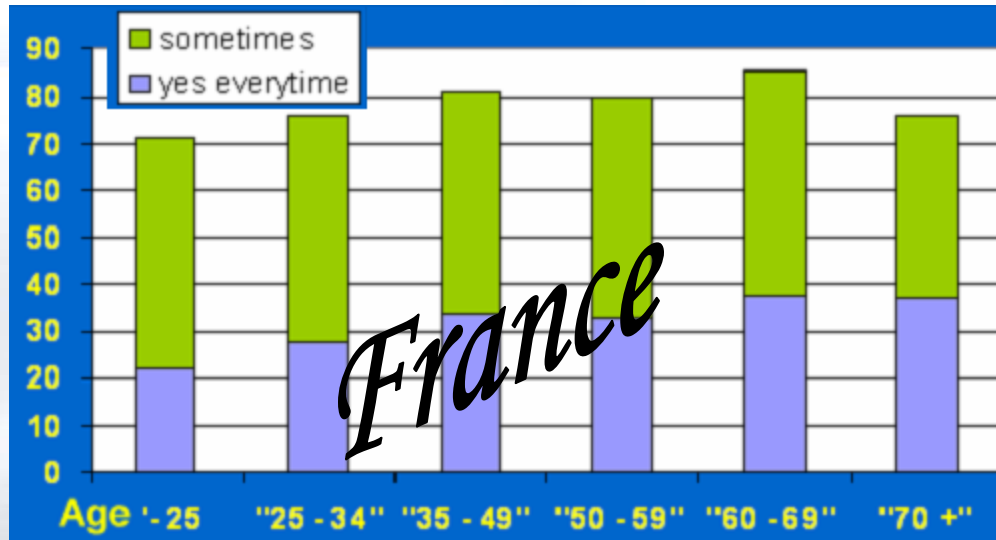
### → "Prefectures" (emergency managers) : a noticeable improvement

- + early warning;
- + a decreasing number of weather watches;
- + local expertise;
- - reports must be improved;
- - improved communication to be performed towards mayors and the general public



# Influence on self behaviour ?

Do you follow the recommendation on behaviour (%) ?



Florida hit by 4 hurricanes in 2004

→ very few direct deaths

→ 92 undirect deaths

Source : Florida Medical Examiners Commission



## Perspectives for other improvements for continental France

### ▶ Better adjust thresholds between risk level colours

- Take benefit from past events (avoid non-detections with lesser false alarms)
- Discuss with all stakeholders (influence of local or regional context changes)

### ▶ Increase anticipation

- Improve hydro/met observation, modelling and forecast (potential for increased lead time in danger awareness)
- Promote pro-active behaviour (earlier contacts in case of high local impact)

### ▶ Other challenges

- Extension to phenomena at the coastline and at sea (implication of more key players) and for fog
- Better management of very local but intense phenomena (more interactive services)
- Cross-border events (use of international or European disaster scales)



# Perspectives for other improvements in French Antilles and Guyana

## Thinking of including other hazards : → Floodings

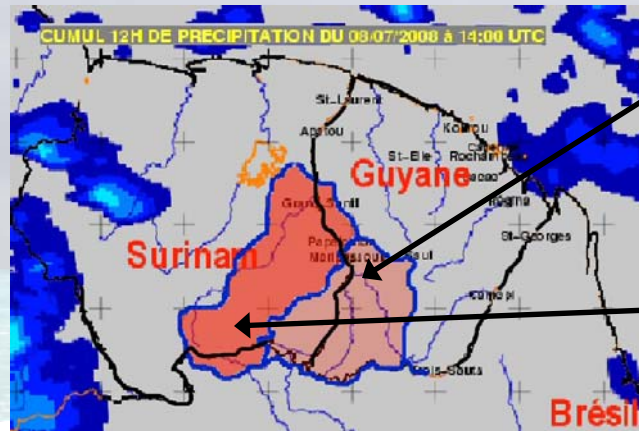
- Other than « flash flooding » concerning torrents in the Antilles ( delay between heavy rain and flooding often less than 1 hour )
- Real need for long and big rivers in French Guiana and border regions

⌘ Request :

- local partnership in French Guyana with hydrologists and river managers ( like in « continental » France )
- co-operation and exchange with border countries :
  - exchange of datas, forecasts co-ordination, communication
  - homogeneous watch and warning system ?

Following the flood event of 2008 of the Maroni river, a collaboration in French Guiana between DIREN (Direction of Environment) and Météo-France has been initiated for the watch of the amount of rain over the two river sub-basins.

A collaboration with the meteorological and hydrological services in Surinam is expected.



Maroni river sub-basin  
(French Guiana)

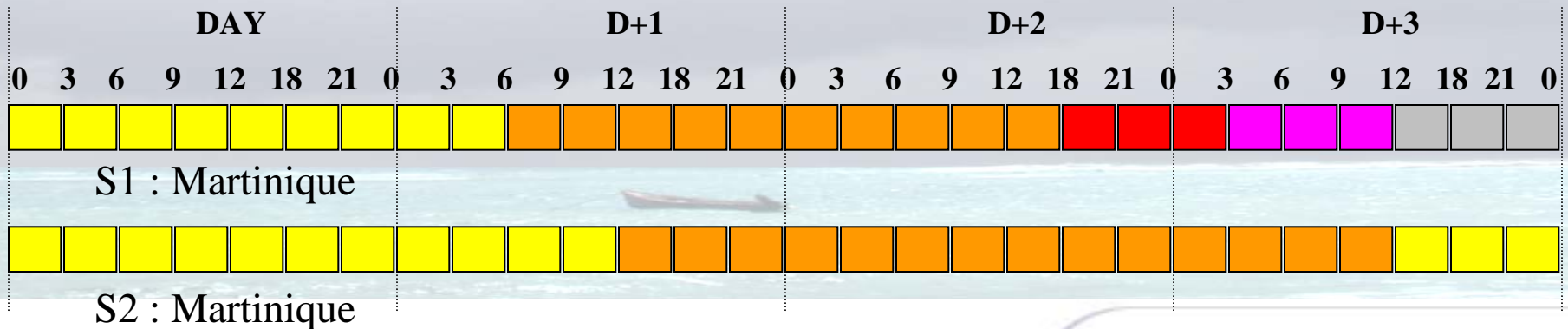
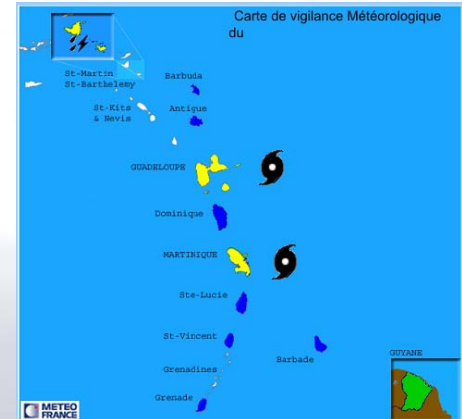
Maroni river sub-basin  
(Surinam)

# Perspectives for other improvements in French Antilles and Guyana

## Scenario of « vigilance » to better inform decision makers

- Goal : Anticipate changes of vigilance level and optimize decisions concerning collectives measures ( the good « mean » between realistic and probabilistic way )
- Giving the « worse » realistic scenario (S1, « precaution principle ») or/and the scenario with the highest probability (S2) ( restricted communication )

Example for a tropical cyclone approaching the Lesser Antilles

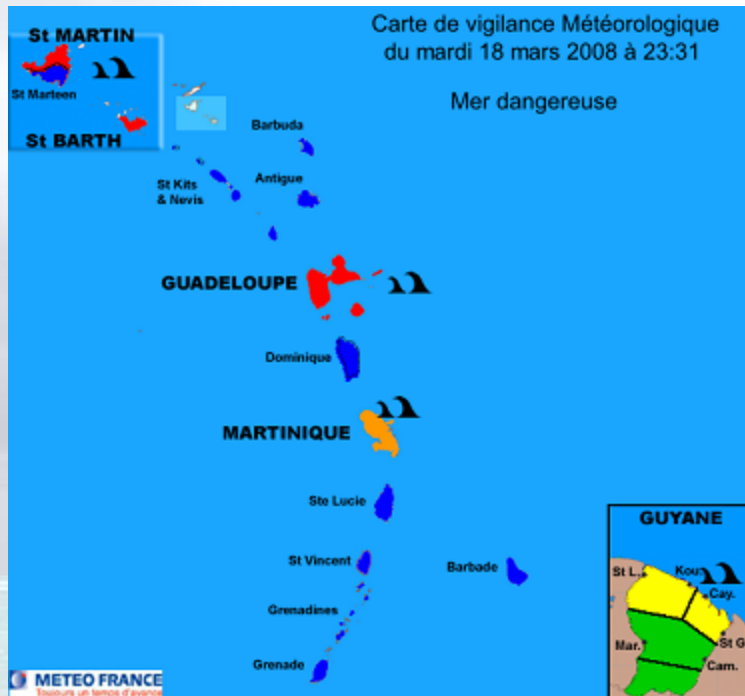


# Perspectives for other improvements in French Antilles and Guyana

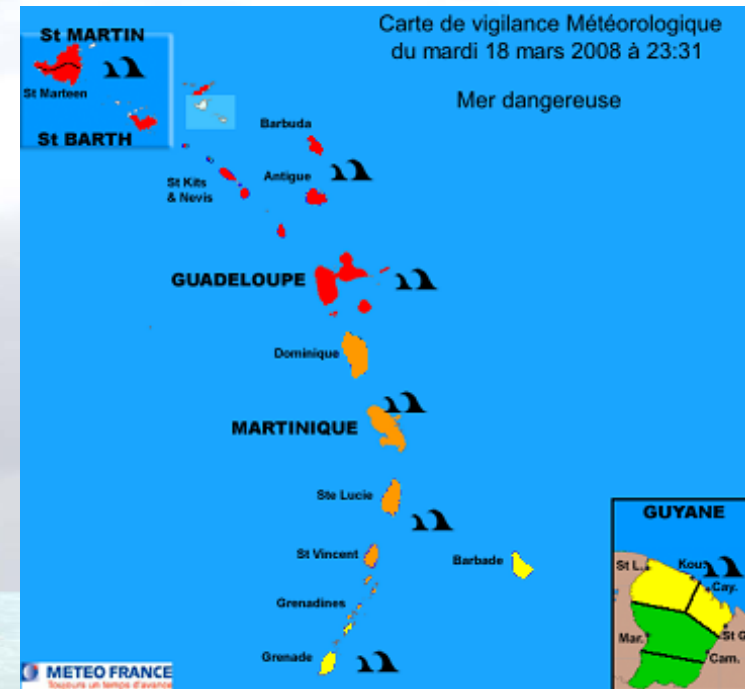
## Thinking « International » for all the hazards (not only for tropical cyclone)

→ exchange and coordination with all the other countries for the guidance (that does not require the same watch and warning system at a national level), the same way it works between Martinique, Guadeloupe and French Guyana.

### Actual procedure



### « Antilles wide » procedure



Example : Strong Northerly Swell – March 2008

# Perspectives for other improvements

▲ Thinking « International » for all the hazards ???







The MHEWS « Vigilance » is a living procedure  
to protect living things and their environment  
thanks to the good cooperation of all partner institutions

**but**

It could be unefficient if general public is not enough involved  
at all level...

Before the event – education, knowledge, preparedness...

During the event – behaviour, communication

After the event – lessons to be learnt

