Climatological and meteorological expertise to help decision making for beach management in the context of the new bathing water directive

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OCO 2008 : Decision making session

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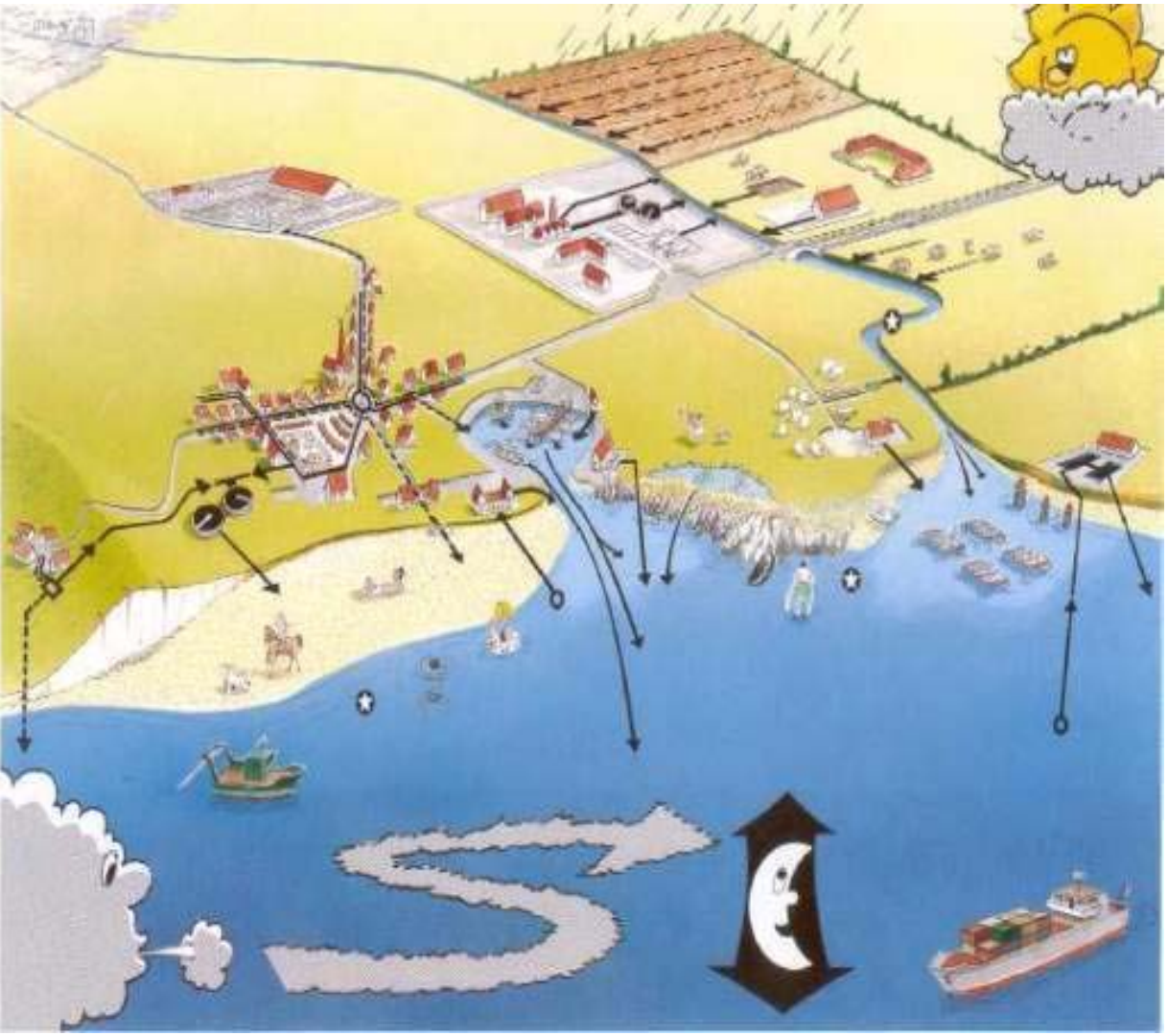
Outline

- Overall context
  - Which factors impact coastal water quality ?
  - New bathing water directive in few words
  - One consequence : increased value for weather forecast
- MareClean Project
  - Where, Who, and Why ?
  - Météo-France rôle and accomplishments
- Comparison with climate change case
- Perspectives

Which factors impact coastal water quality



Meteorogical factors

- Rainfall : Water run off
- Wind : sea state
- Insulation : Escherichia Coli (E. coli) life length
- Storm : Pump and/or sewerage systems power outage

Active management of sewerage system

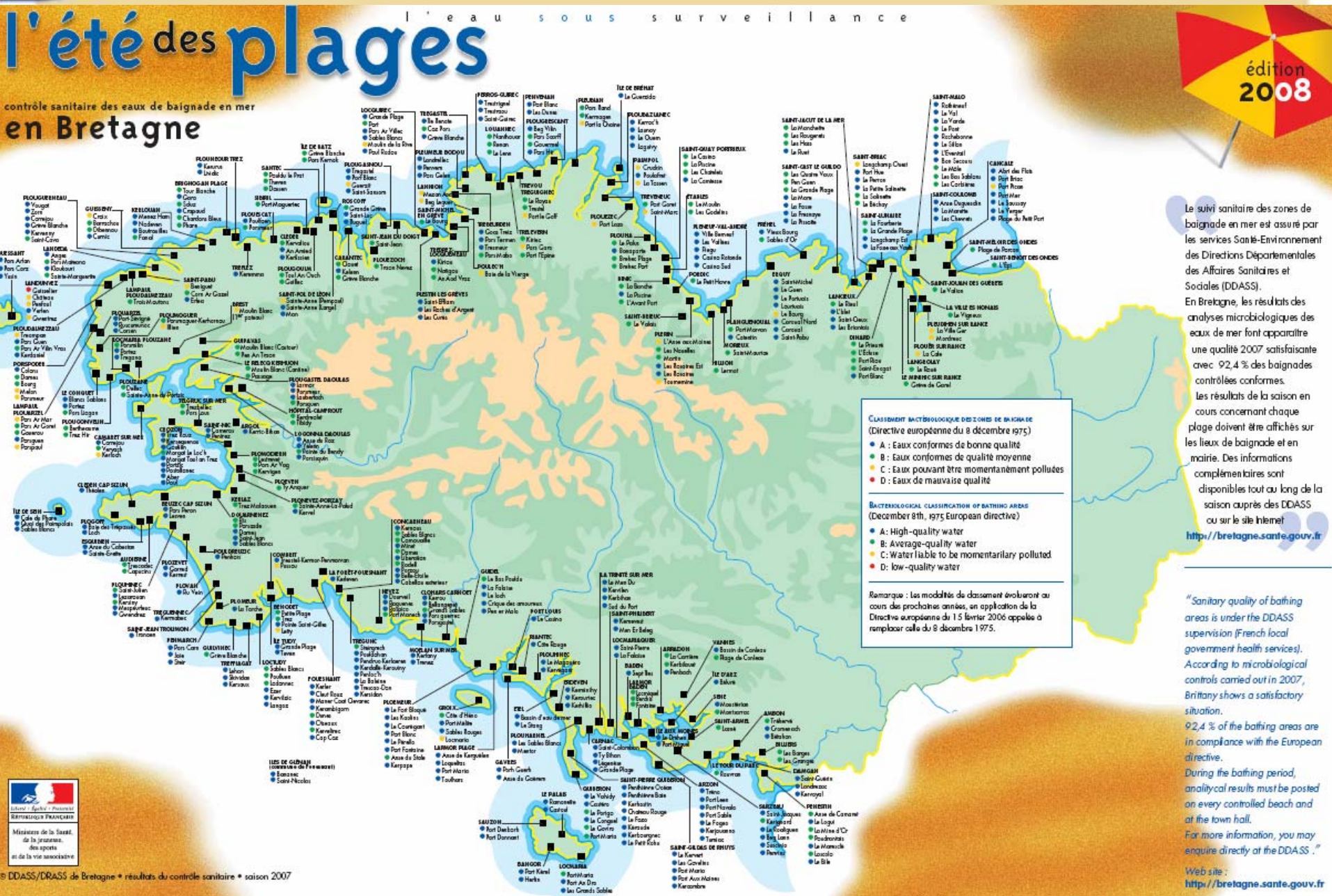
- Urban areas
  - Urban waste water
  - Heavy infrastructures
  - Very short reaction time for hydrological basins
  - Direct use of radar images (example: Paris, Nancy and Nimes)
- Coastal areas
  - Bathing water directive
  - Lighter infrastructures
  - Very short reaction time for hydrological basins
  - Tide effects
  - Scrubbing effects strengthened after long periods of drought

New European bathing water directive :

- is based on scientific knowledge on protecting health and the environment, as well as environmental management experience,
- provides better and earlier information of citizens about quality of their bathing waters,
- moves from simple sampling and monitoring of bathing waters to bathing quality management, and
- is integrated into all other EU measures protecting the quality of all our waters (rivers, lakes, groundwaters and coastal waters) through the Water Framework Directive.

According to European Commission website !

Bacteriological classification of bathing areas (1/2)



Bacteriological classification of bathing areas (2/2)

Classement bactériologique des zones de baignade
(Directive européenne du 8 décembre 1975)

- A : Eaux conformes de bonne qualité
- B : Eaux conformes de qualité moyenne
- C : Eaux pouvant être momentanément polluées
- D : Eaux de mauvaise qualité

Bacteriological classification of bathing areas
(December 8th, 1975 European directive)

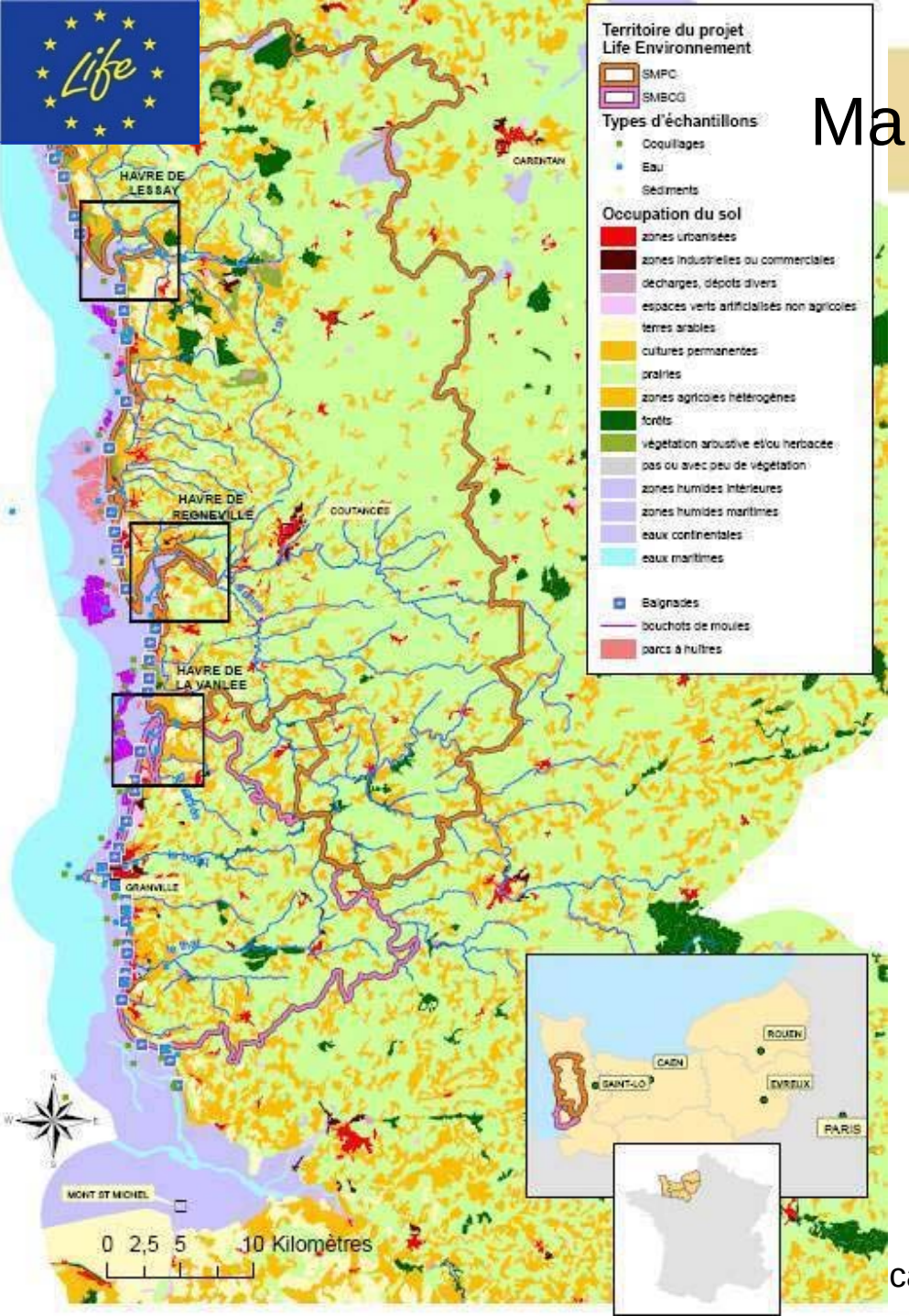
- A: High-quality water
- B: Average-quality water
- C: Water liable to be momentarily polluted
- D: low-quality water

Remarque : Les modalités de classement évolueront au cours des prochaines années, en application de la Directive européenne du 15 février 2006 appelée à remplacer celle du 8 décembre 1975.

Monitoring to managing = value for weather forecast

- 1976 bathing water directive : beach quality classified according to regular monitoring even if measurement are made the day after a big rainfall
- 2006 bathing water directive :
  - Lower limit for Escherichia Coli (from 2000 to 500 per 100 ml)
  - Possibility to close beaches for few events in the year
- Measurement made during the time beaches are closed won't be used to classify beach quality
- Idea behind this : avoid to invest in big sewerage system which will be useful only twice a year

MareClean: where and who ?



- Financed by European Commission (LIFE Environment) and Agence de l'Eau Seine Normandie (River basin authority)
- Beneficary : Syndicat Mixte des Bassins Côtiers Granvillais (SMBCG, group of 30 local autorities)
- Technical partners : IRH environnement, Météo-France, IFREMER
- Water operators : Veolia, SAUR

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MareClean : why ?

- ranking of coastal pollution sources according to impacts caused, based on spatially resolved transfer models,
- economic evaluation of damage,
- Avoiding Combined Sewage Overflows (CSO) in urban areas by
  - active management of urban wastewater transport infrastructures for minimal discharge, based on integrated flow+impact modelling,
  - improvement of urban wastewater transport infrastructures for taking full advantage of active management.
- targeted improvement of infrastructures and of their management in rural areas (wastewater lift stations, fencing pastures along rivers, containment of barn drainage, nutrient removal or improved treatment of collected waste water),
- coordinated management of pastures on the shore and of shellfish harvesting and/or purification,
- exchange of information between water managers and shellfish breeders / bathing policy for reducing the economic loss associated with a forecasted pollution.

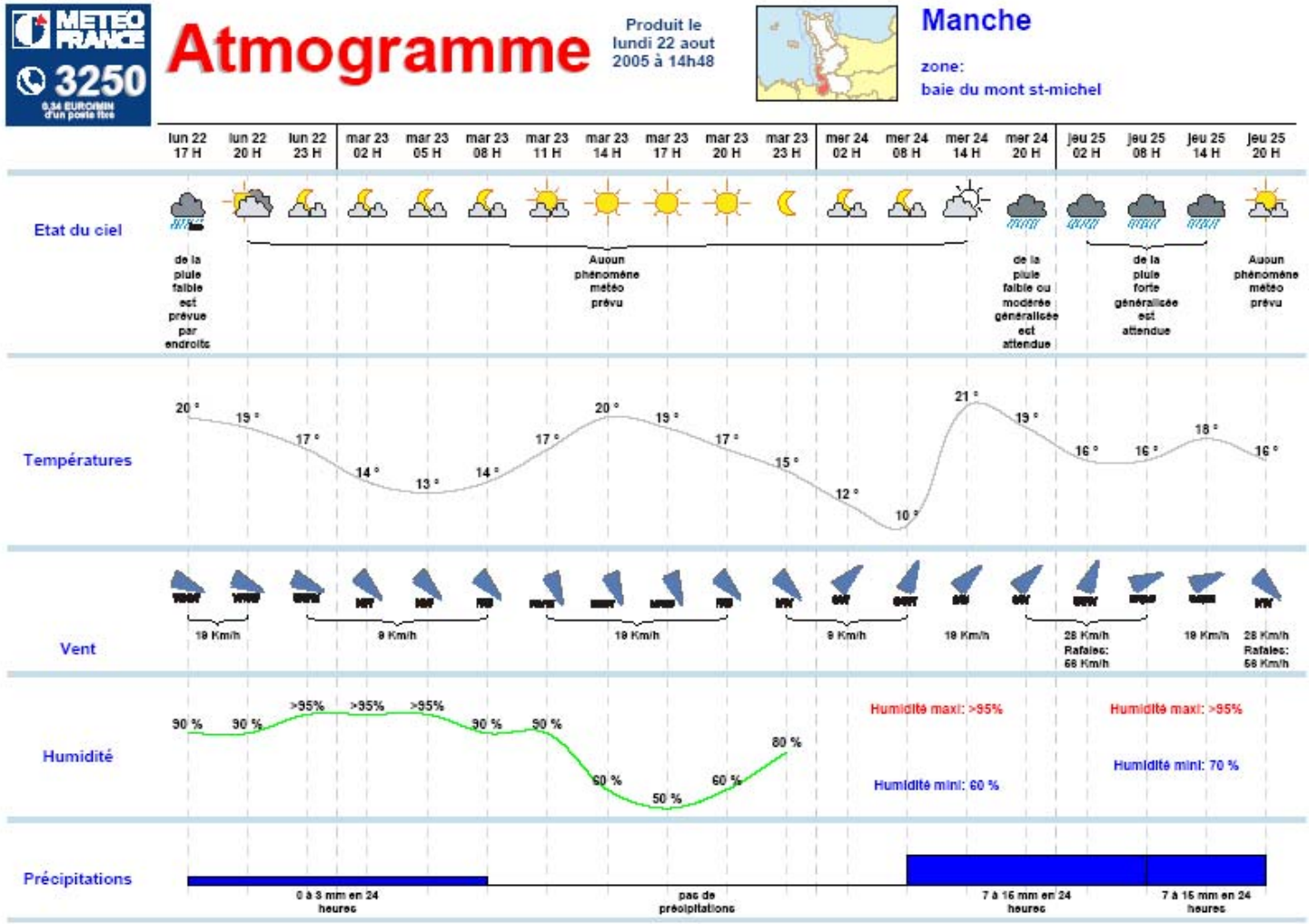
MareClean : Météo-France role

- Correlation study between pollution measurements made by health authorities and meteorological parameters (rainfall quantity but also intensity, wind, soil wetness index, ...)
- Assessment of the existing observing network around the site to specify possible improvements in the context of active management sewerage system
- Specification and implementation of meteorological system to help decision making in this context

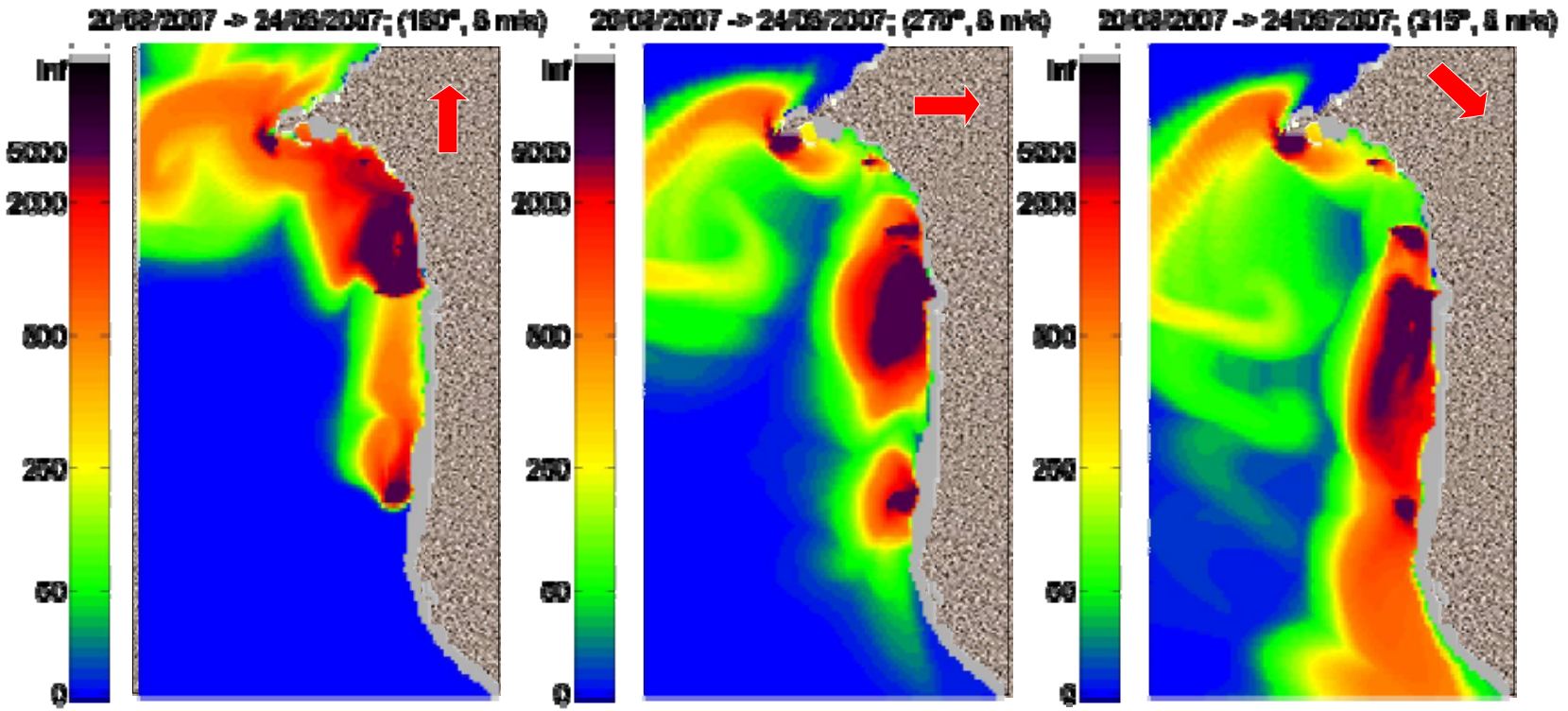
MareClean : pollution event analysis

- At least 50 % pollution events correspond to stratiform rainfall higher than 10 mm/d
- Return period of these rains is of 4 days on July/August
- 20% of pollution independent of rain (tide, sewage treatment plant problem?…)
- 30% of intermediate case (rainfall before pollution but too small to be considered alone as responsible for pollution)

MareClean : twinkle of destiny

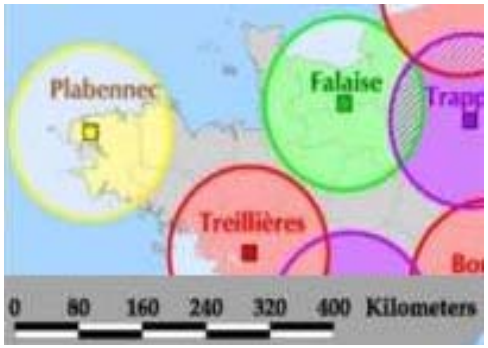


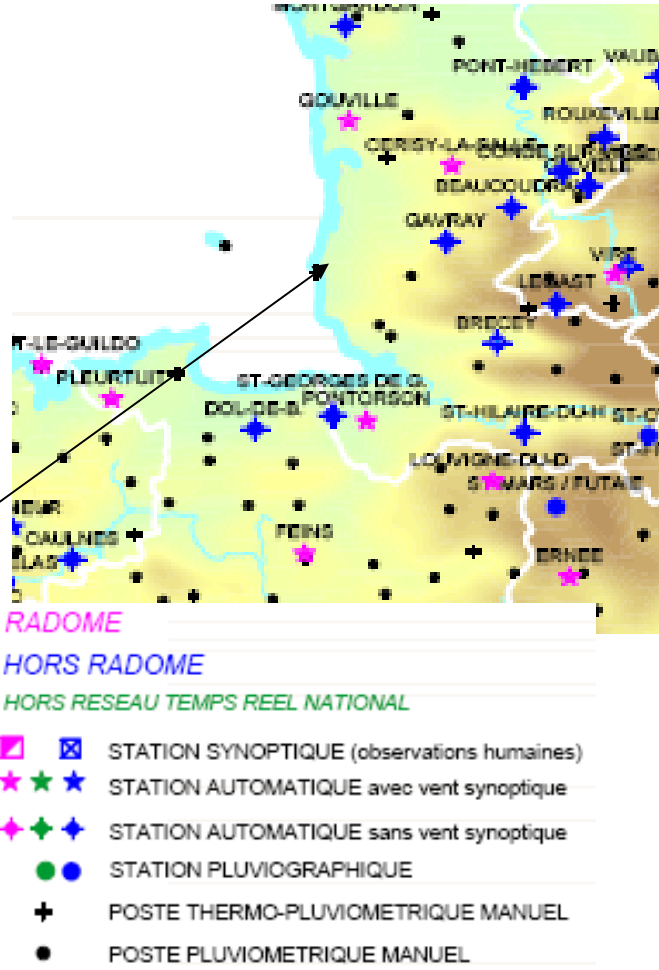
MareClean : Wind sensibility



MareClean : Meteorological observing network around the zone (1/2)

- Too few weather automatic station**s**
- Too far away from French hydrometeorological radars



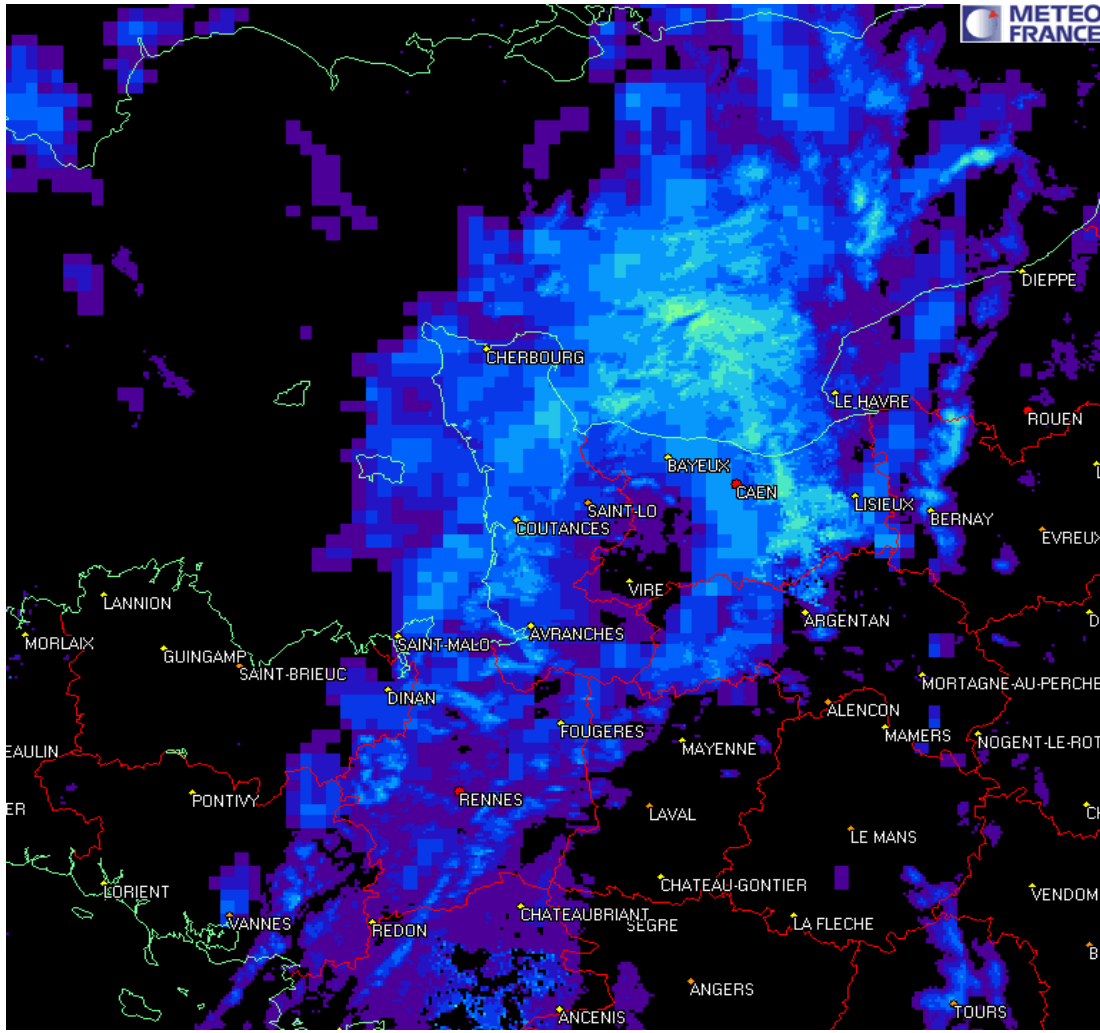


=> New automatic station installed in the center of zone

- Real time data for all stakeholder**s**
- Use in an integrated analysis model (named ANTILOPE) whic**h** merge data from ground stations and radar to provide hourly rain maps

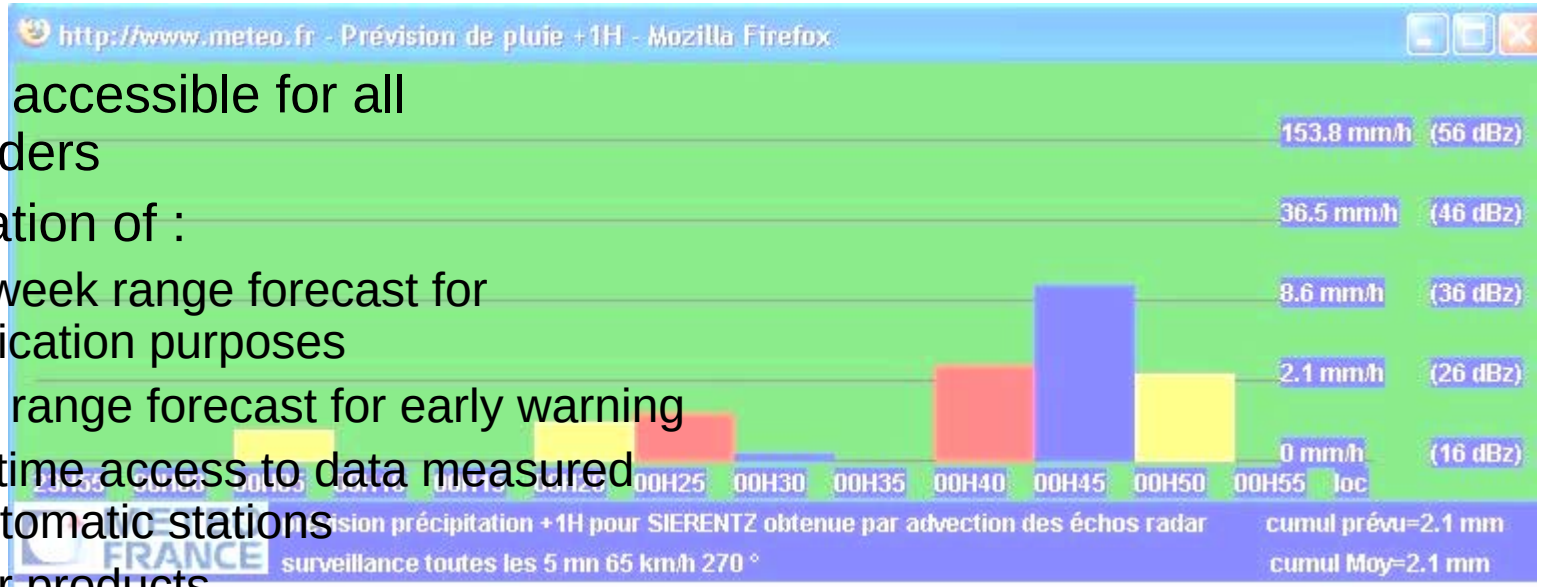
MareClean : Meteorological observing network around the zone (2/2)

- Jersey radar data available on European radar mosaic but not of any help for hydrological purposes
  - **one** image every 15 minutes
  - Pixel = 5 km

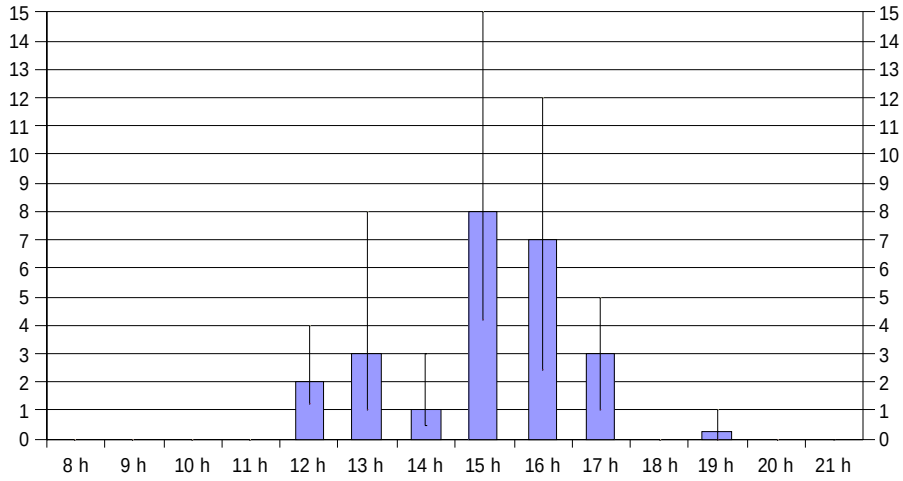


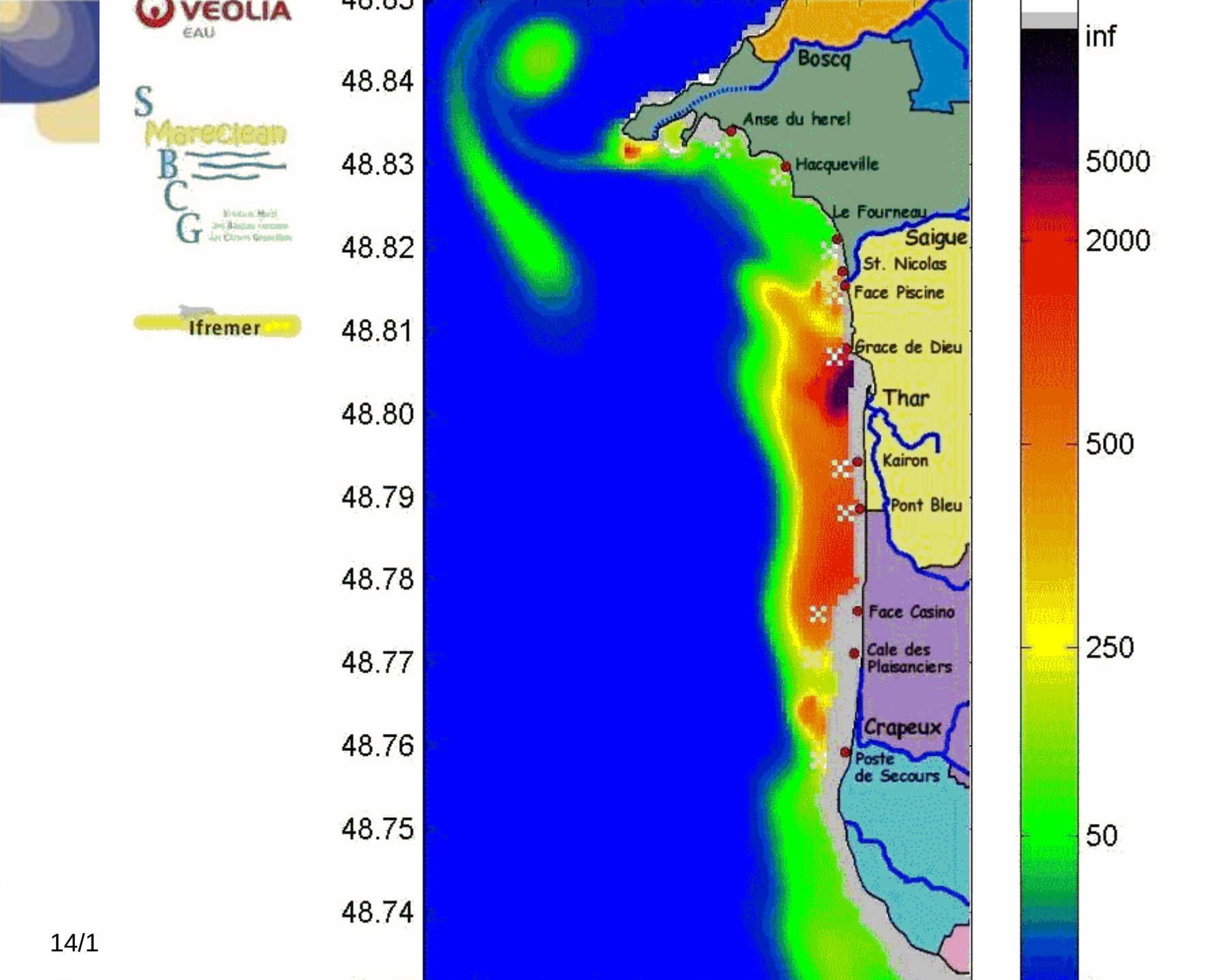
MareClean : Draft meteorogical decision support system

- Extranet accessible for all stakeholders
- Combination of :
  - One week range forecast for planification purposes
  - Short range forecast for early warning
  - Real time access to data measured by automatic stations
  - Radar products
  - Hourly hyetograph based upon Antilope and showing the mean an extreme value of precipitation over river basin
- Hindcast of hydrodynamic models based on a variety of scenarii (rainfall, wind, tide, sea state...)



Exemple hyétogramme pour bassin versant

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48.74
Boscq
Anse du herel
Hacqueville
Le Fourneau
Saigue
St. Nicolas
Face Piscine
Grace de Dieu
Thar
Kairon
Pont Bleu
Face Casino
Cale des Plaisanciers
Crapeux
Poste de Secours
inf
5000
2000
500
250
50

Decision support system comparison

Bathing water quality

- Climatologists, meteorologists, hydrologists, modelers, microbiologists, ...
- Weather forecasters,
- something like : « Forecast weather is similar to that past situation who created major pollution » not « You must close the beaches » OR « helpful pieces of advice »

Upstream Expertise

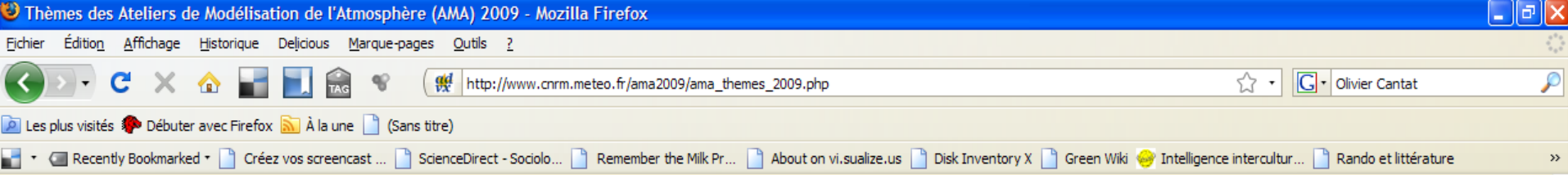
Expertise linked to decision making

Climate change

- Climatologists, economists, biologists...
- Scientists directly involved in IPCC work
- « Policy relevant » not « Policy prescriptive »

Perspectives : interdisciplinary real time decision support system

- Rainfall forecast integrated in real time rainfall runoff model
- River flow forecast integrated in real hydrodynamic models
- Steps already passed
  - PREVIMER : http://previmer.org/ real time hydrodynamic models run on a day to day basis forced by atmospheric models
  - Progress made by Météo-France in terms of river flow forecast
- GIRAC (Gestion intégrée des rejets d'assainissement côtier, Integrated management of sewerage systems coastal discharges, Leader : Veolia, labelled by French sea cluster)
  - Four (4) sites in Bretagne and Provence
  - Real time nested hydrodynamic models in PREVIMER modems



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A.M.A. 2009
Ateliers de Modélisation de l'Atmosphère 2009
Toulouse, du 27 au 29 janvier 2009

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Résumés longs

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Les AMA 2009 portent sur les modélisations de l'interface océan-atmosphère.

Ce thème regroupe à la fois les recherches sur la problématique de la couche limite océanique, de la paramétrisation des flux, des méthodes de couplage océan-atmosphère, de la modélisation des vagues, des dérives d'objets ou de polluants en surface et des niveaux d'eau.

Ce thème regroupe l'étude et la modélisation des processus à l'interface air-mer et au sein des couches limites océaniques et atmosphériques. Sont particulièrement encouragés tous les travaux sur l'estimation, l'assimilation et la paramétrisation des flux océan-atmosphère, et leurs impacts sur la modélisation atmosphérique ou océanique, en particulier en conditions d'évènements intenses. Les travaux sur les méthodes de couplage océan-atmosphère, la modélisation des vagues, les dérives d'objets ou de polluants en surface et les niveaux d'eau trouvent aussi leur place dans cet atelier.

Les présentations concernant les développements instrumentaux et les campagnes de mesures, et leur impact sur l'amélioration des connaissances et de la modélisation des processus à l'interface océan-atmosphère sont fortement encouragées. Le spectre des ateliers ira jusqu'à couvrir les aspects " biogéochimie marine ", " glace de mer " et " lac ".

Thank you for your attention

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And do not forget
http://www.cnrm.meteo.fr/ama2009/