

# SYNERGIE\* updates and plan

A. Lasserre-Bigorry & M-F Voidrot  
Météo-France

\*Météo-France Operational forecasting tool

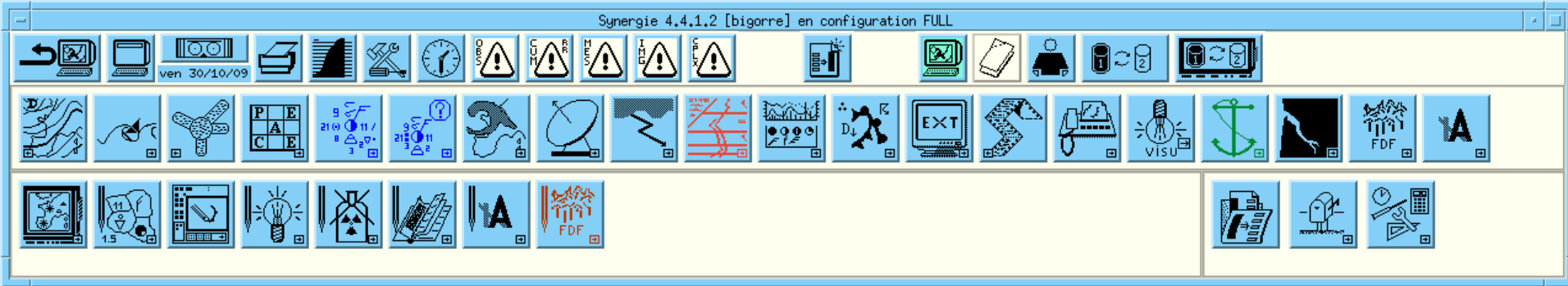


**METEO FRANCE**  
Toujours un temps d'avance

# Overview

- Background
- Revue of 2 years of development (from 11<sup>th</sup> workshop)
- And after ...

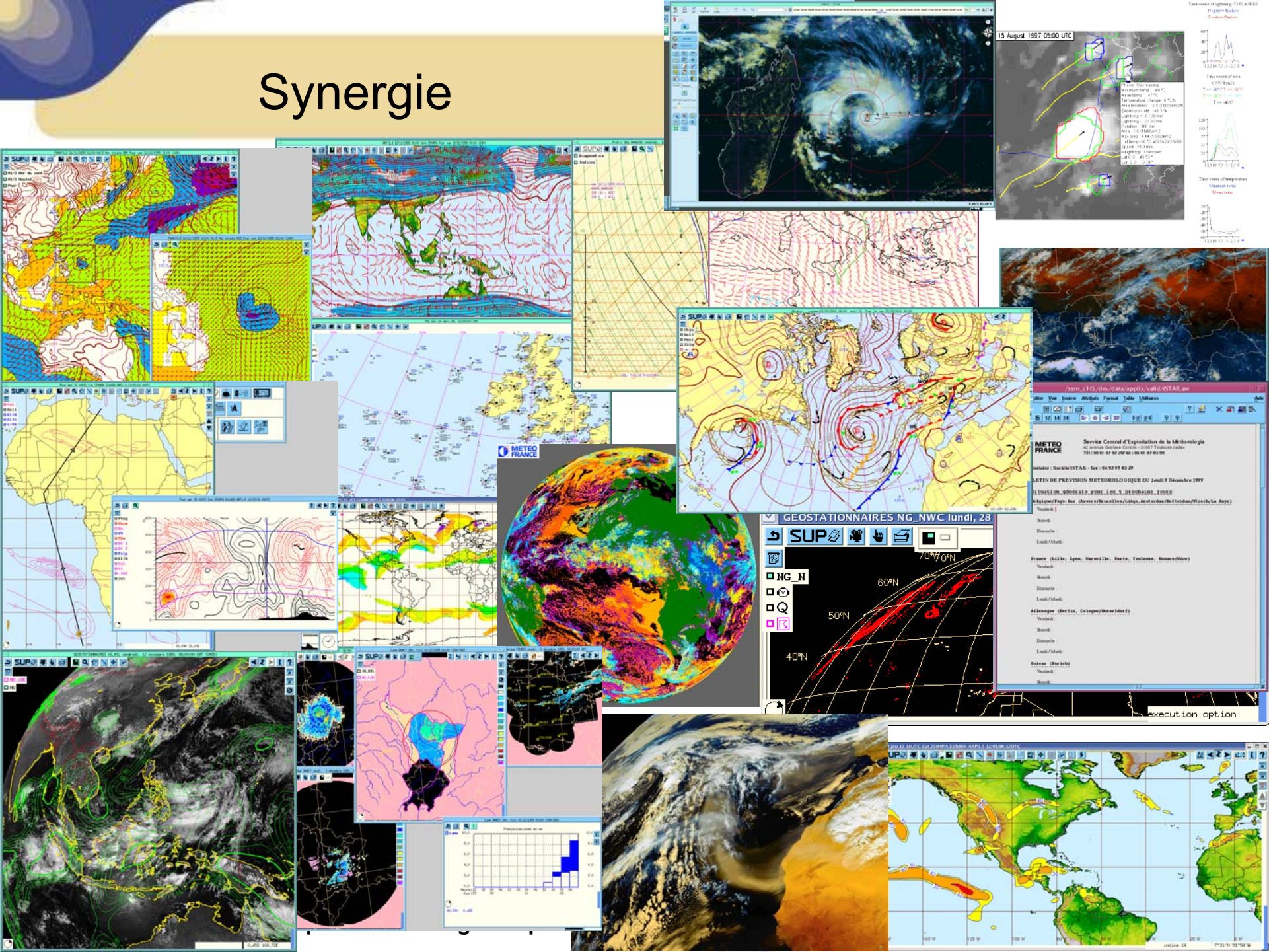




- Synergie has been the operational forecaster tool since 1993.
- The present operational version for French forecasters is Synergie 4.4 :
  - Visualisation of all available data (model, observation, radar, lightning, satellite, objects – from WAFS, fronts, RDT, ...)
  - Overlays and animation
  - Cross sections on 3D data
  - Production of objects (fronts, ANASYG, SIGWX, tropical cyclone track)
  - Production of maps and charts, and local forecast (Symposium).
  - Macros or short cuts.
  - Batch production
- Synergie 4.5 version is under development.



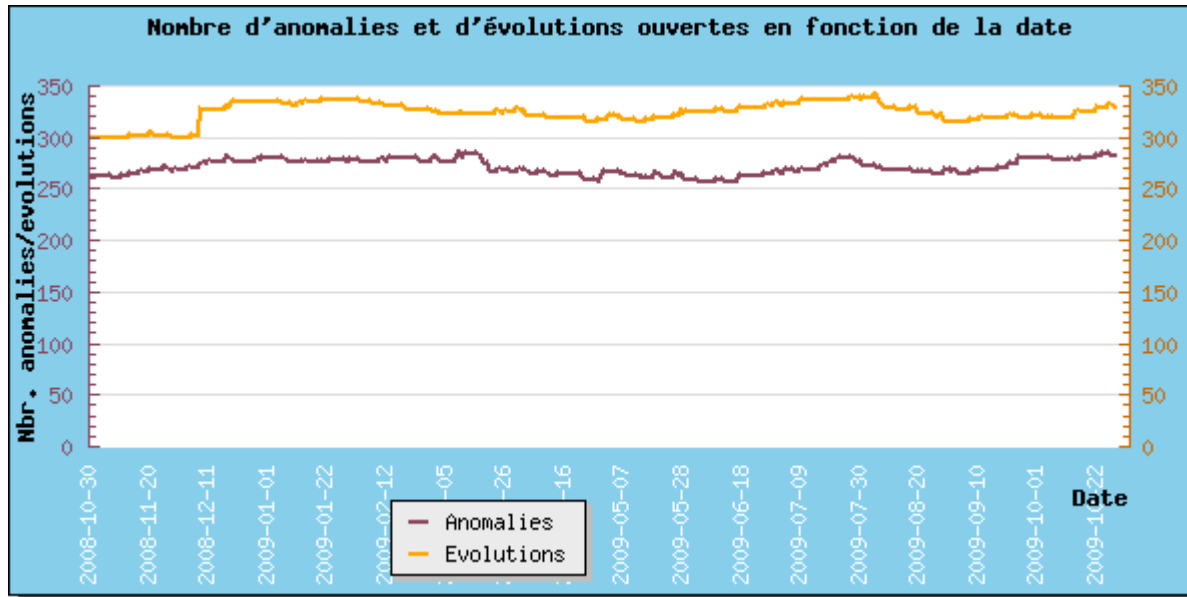
# Synergie





# Synergie development today

- A mean of 8 Synergie developers
- A calendar driven release policy
  - A new version by year (June)
  - Three patches by year (or lighter releases)
- More than 100 new features and bug fixes for each version
- Many remaining needs !



# Synergie development today

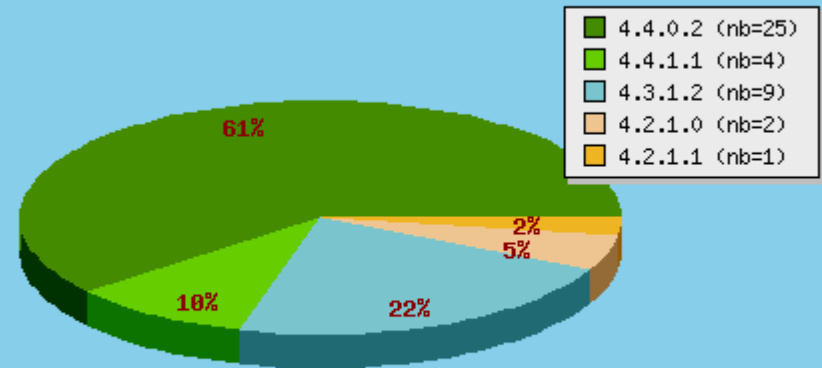
- Modern methods and tools

- Change and configuration management based on CVS
- Automatic packaging (RPM)
- Bug Tracking System (Flyspray)
- Wiki (dokuwiki)
- Automatic balanced scorecard

Avancement du développement de la version 4.4.8



Suivi des versions pour les serveurs opérationnels (hors clients externes)



Version applicable : 4.4.1.1

# Developments planned for 4.3 and after

- ***Announced since the last workshop (Nov 2007)***

- Functionalities and Data aspects:

- Oceanographic data : Calypso project with French Navy
- Surge check along an estuary
- Nowcasting Objects and other data animation
- New Visualisation for 3D radar observations
- Symposium 2

Done

Done

Done

Done

In progress

- Technical aspects:

- Move Data Base from Oracle to PostgreSQL
- Migration of Synergie on SOA (**Service Oriented Architecture**) step by step, by developing Web Services (WMS).
- Test feasibility of integration Magics++

Done

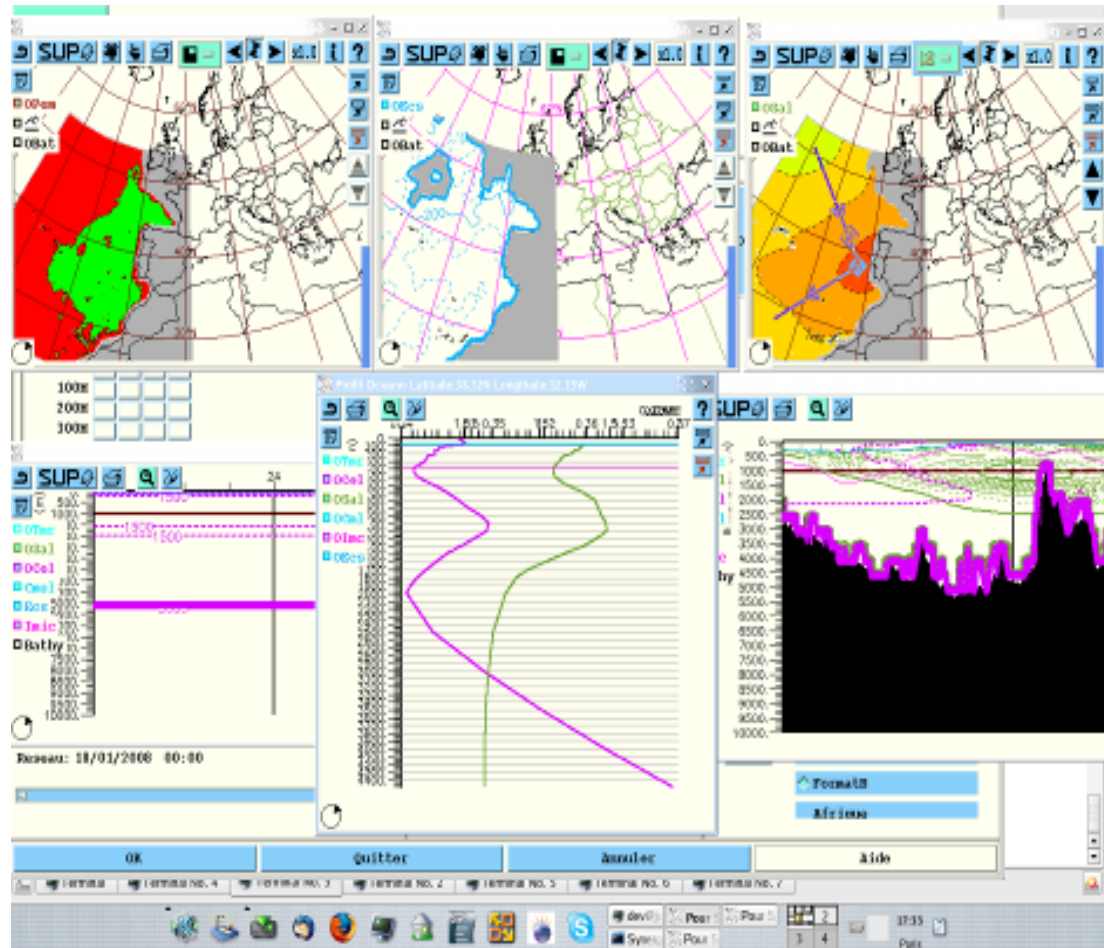
In progress :  
(WMS done)

In progress



# Synergie Metoc (Calypso)

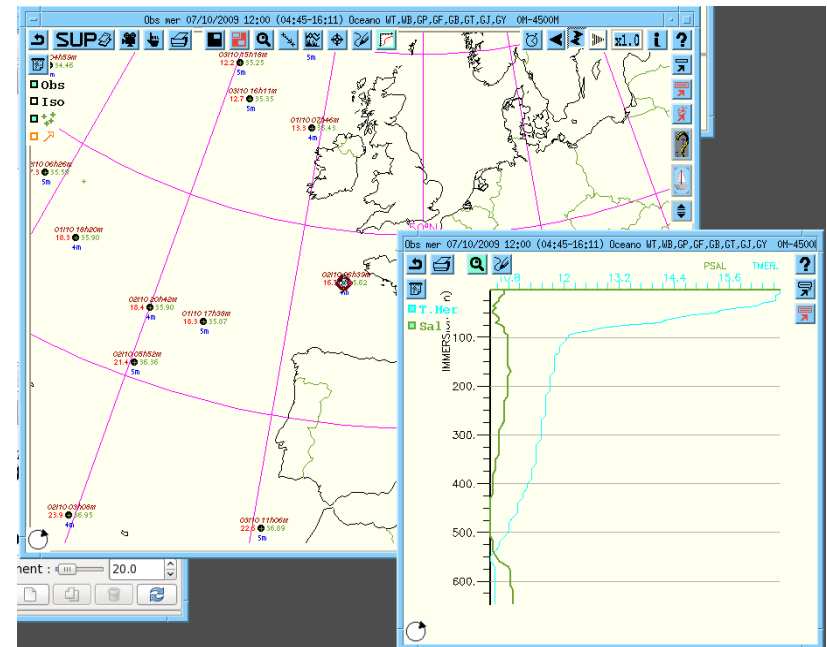
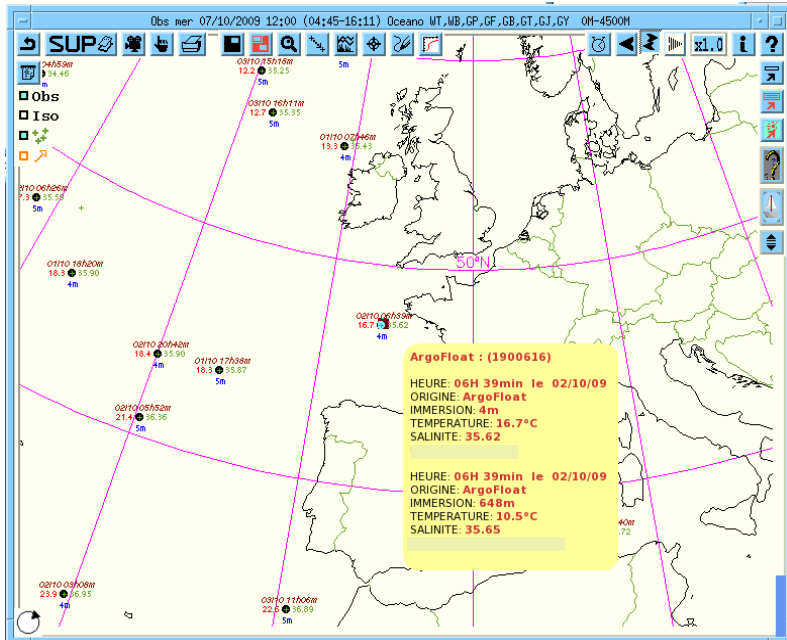
- Specific developpement made by Météo-France and Météo-France International (MFI) for the French Navy.
- Aim is to deal with both domains ocean and atmosphere on the same tool



# Synergie Metoc (Calypso)

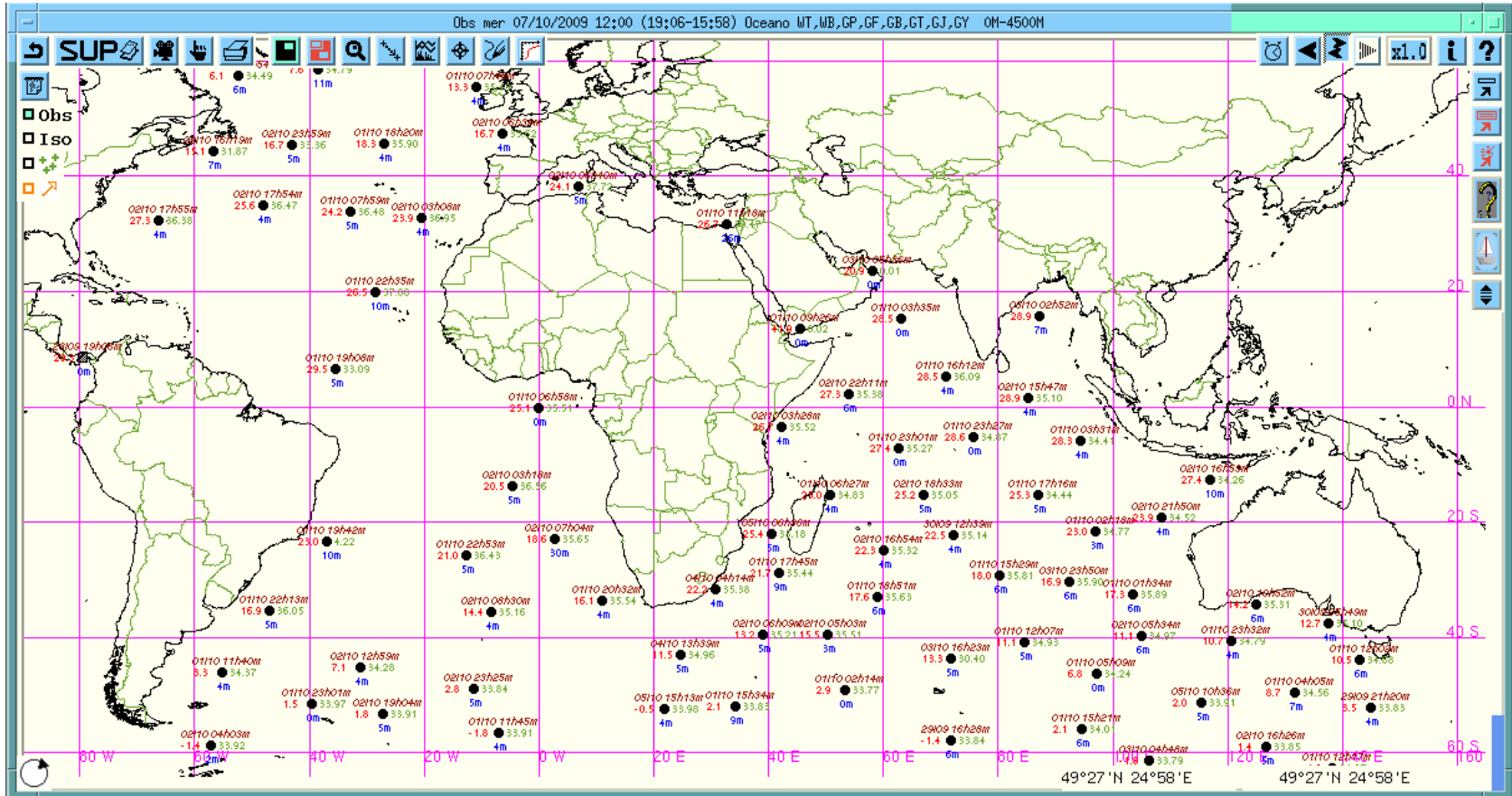
- Oceanographic observation data:
  - ❖ Argofloat

- Vertical profiles
- Sea temperature
- Sound velocity
- Salinity



# Synergie Metoc (Calypso)

## World wide processing



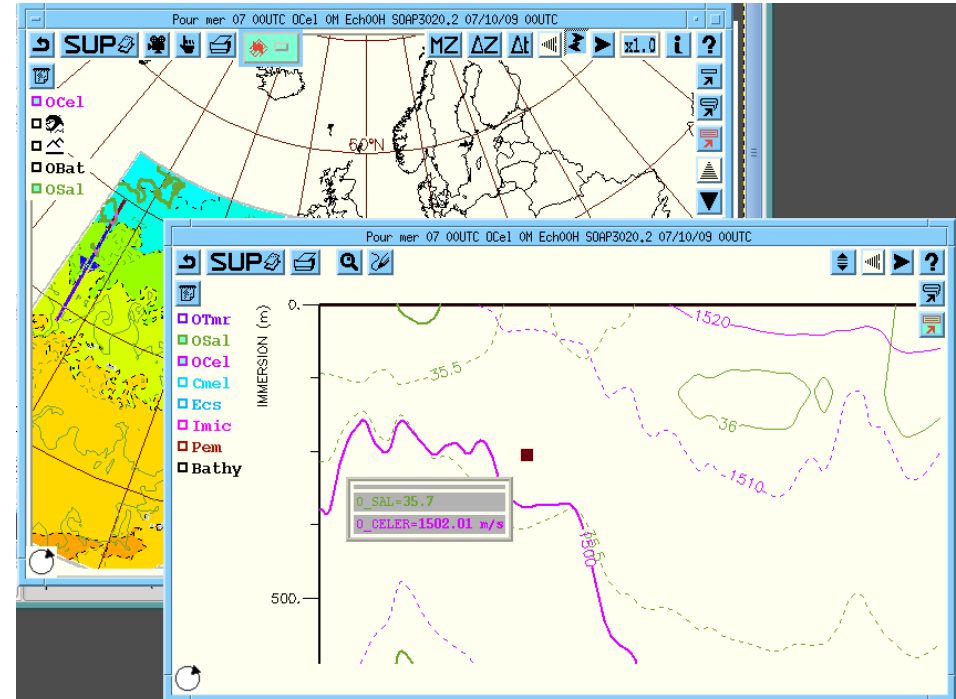
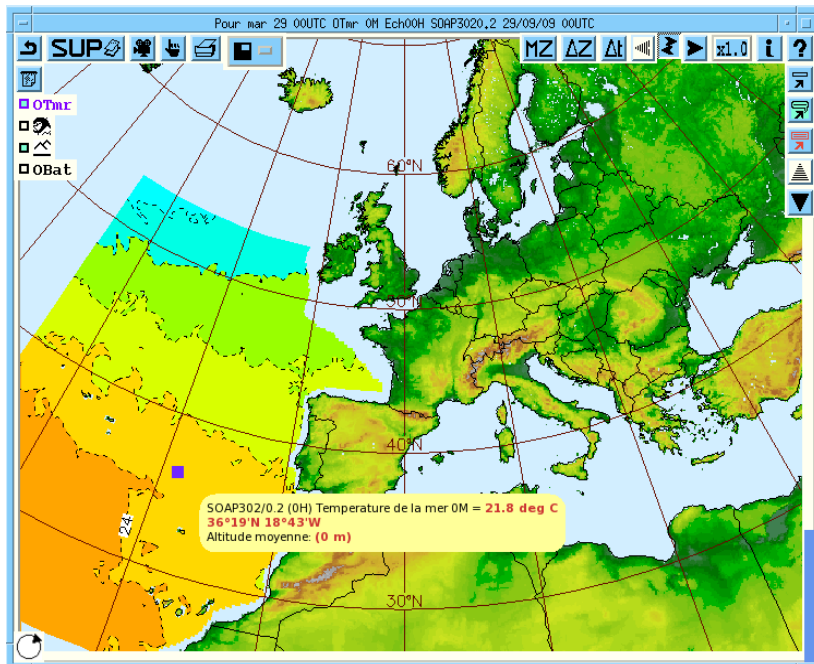


# Synergie Metoc (Calypso)

## Oceanographic models

Sea temperature at different depths

Global overview and local analysis

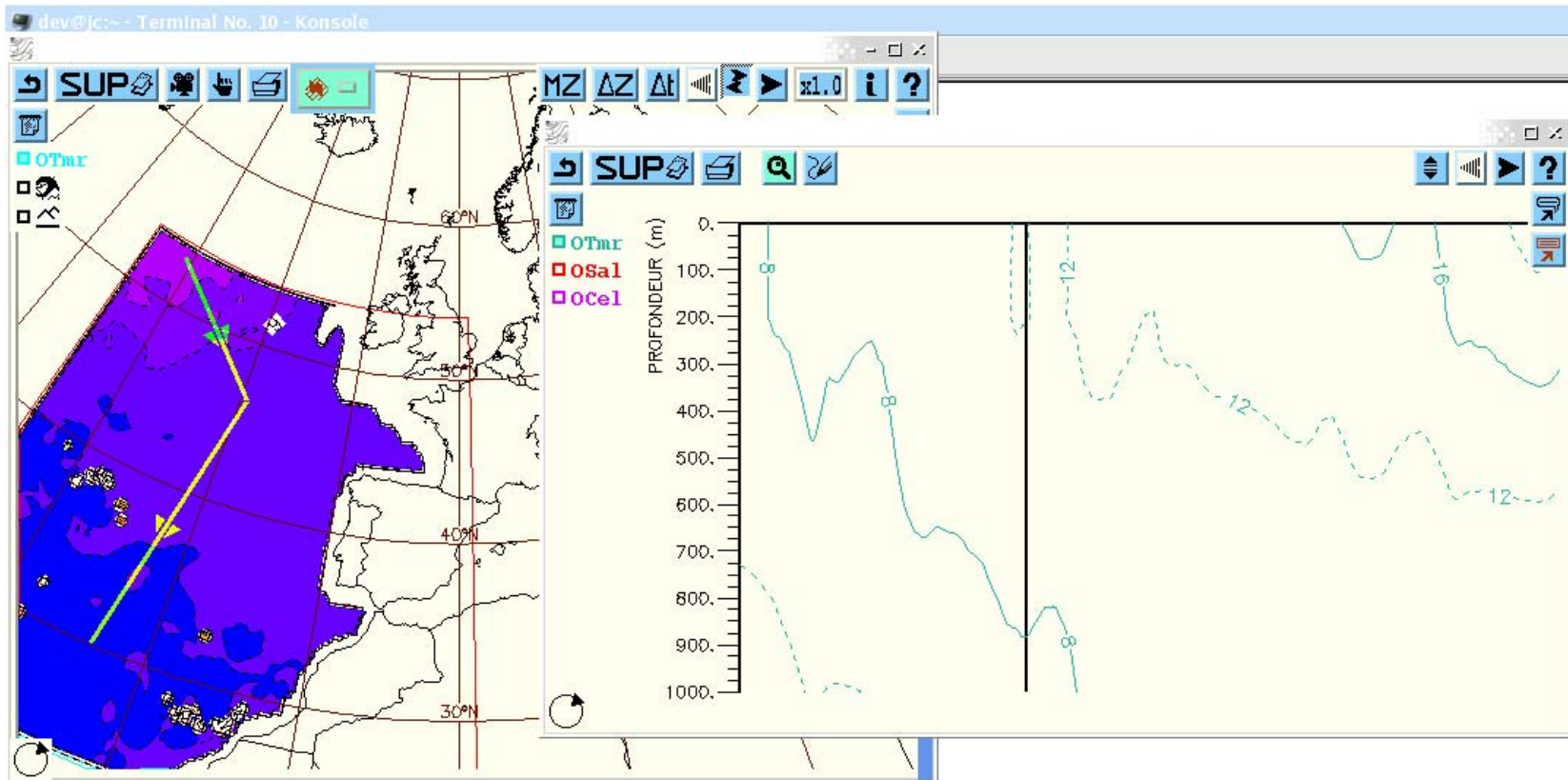


- Sea temperature
- Sound celerity
- Salinity
- Vertical cross section

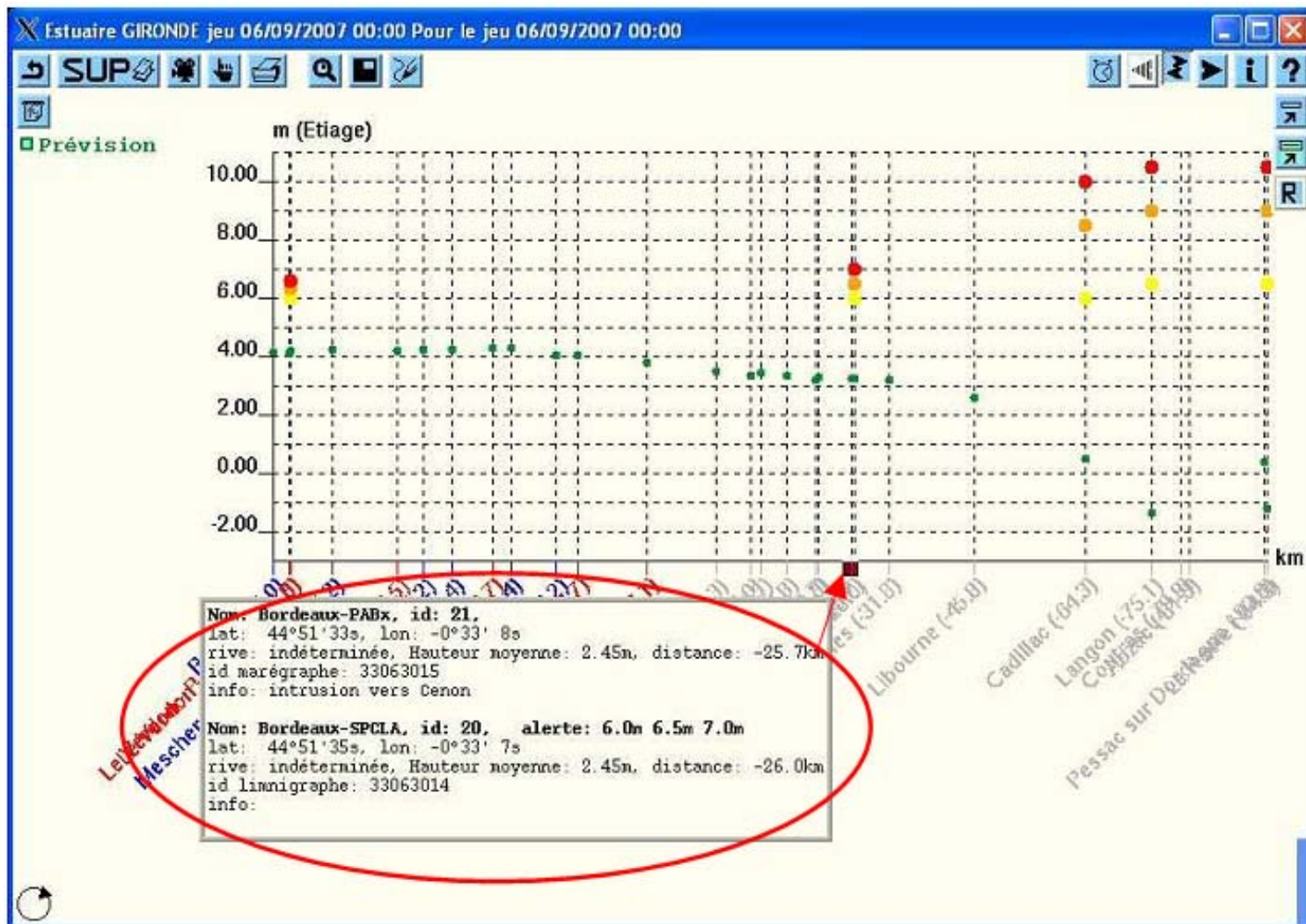
# Oceanography



Inherits Synergie kernel facilities :  
Ergonomics, zooms, panning, printing, macro, batch...

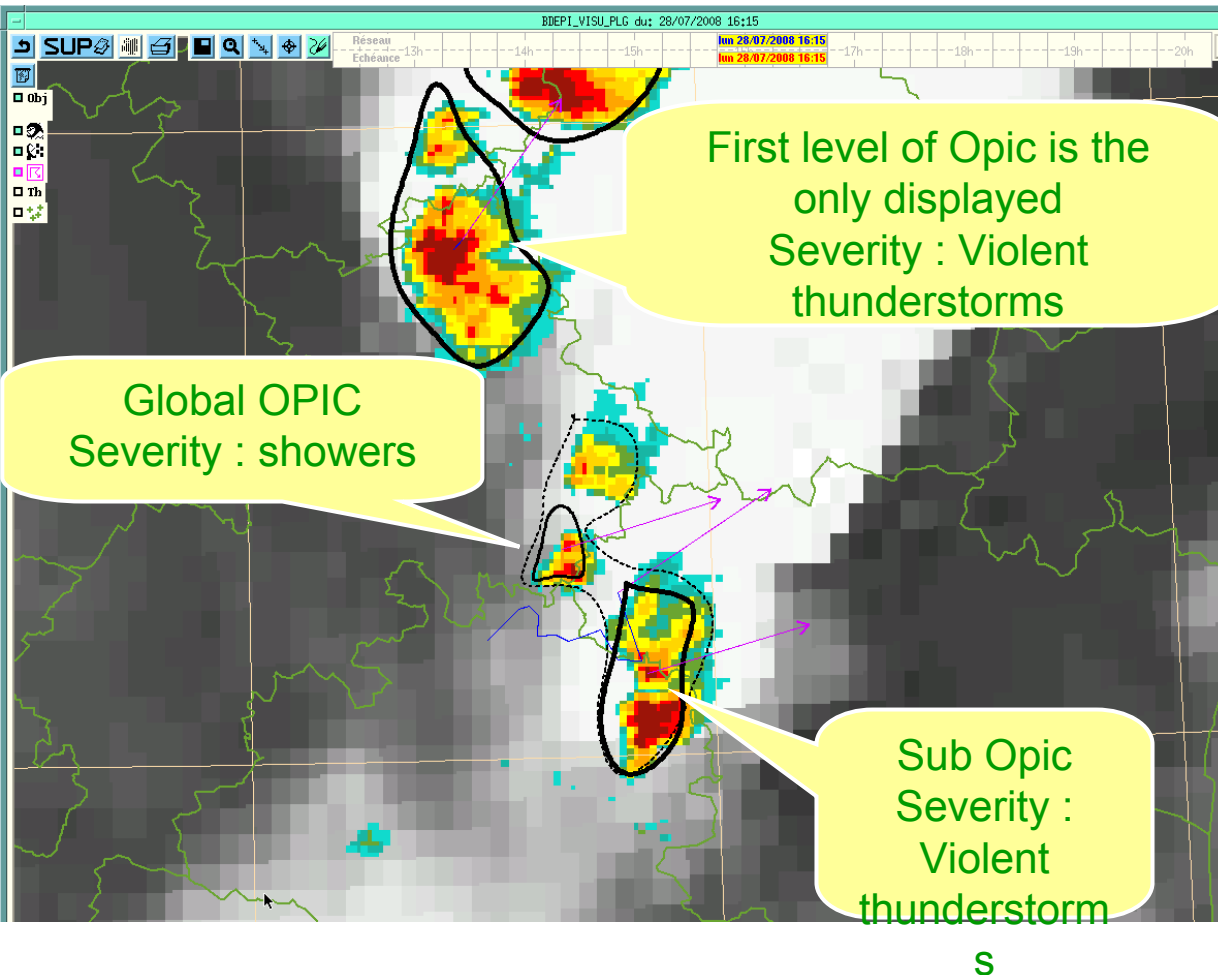


# Surge check along an estuary





# Nowcasting : 2 levels of active objects



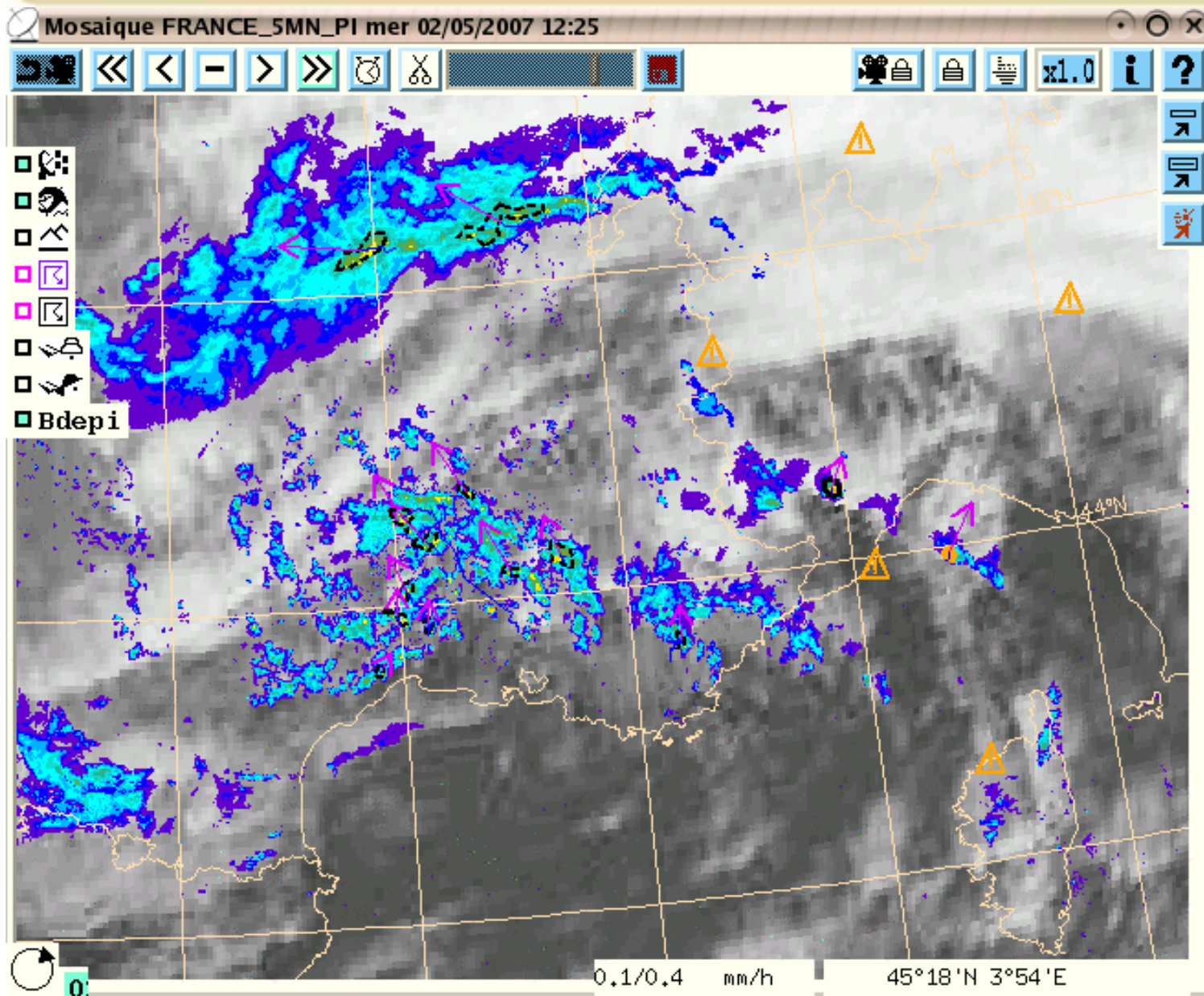
Thresholds have been optimised

Enhancement of sub cells when their severity is higher than global cell and when the surface difference between the cells is significant (50%)

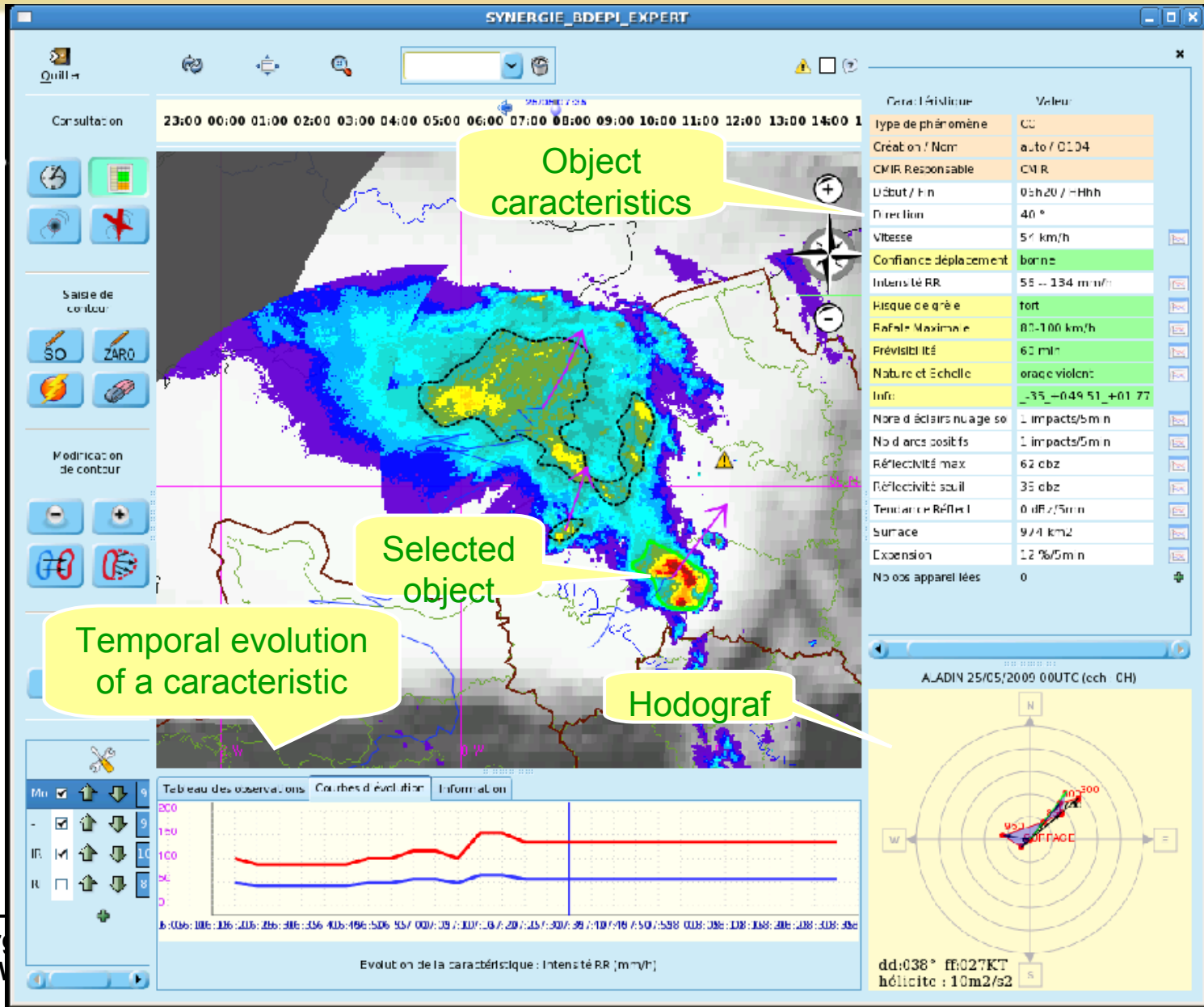
⇒ Better identification of the location of violent storms

⇒ Better description of the intensity of phenomenoms

# Nowcasting objects and animation



# New GUI for production



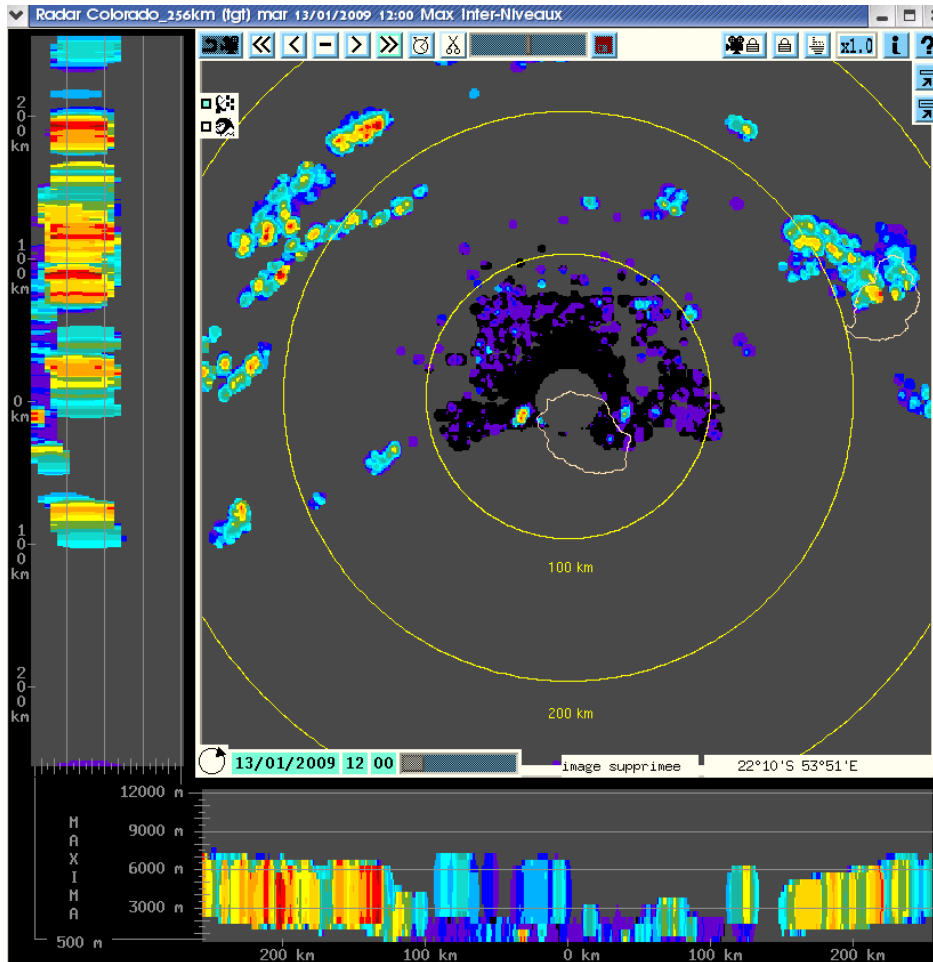
# A java component independant from Synergie

The screenshot displays the Synergie 4.2.3.1 [pise] en config FULL application window. The interface is divided into several sections:

- Top Bar:** Contains the title bar and a series of icons for navigation and system status.
- Toolbar:** A row of icons for various functions, including file operations, visualization, and data management.
- Left Panel (Applicatif Visualisation):**
  - ◆ plug-in Expertise BDEPI
  - ◆ plug-in Visualisation BDEPI
  - ◆ Opérationnel
  - Time selection: 28/08/2007 13:00
  - Time range: 28/08/2007 13:00
  - Weather icons: Four icons showing a cloud with a lightning bolt.
  - Buttons: OK and Quitter
- Right Panel (Mosaïque FRANCE\_5MN\_PI):**
  - Map title: Mosaïque FRANCE\_5MN\_PI mar 28/08/2007 13:00
  - Map content: A meteorological radar mosaic of France showing precipitation intensity in various colors (blue, green, yellow, red, purple).
  - Map controls: A toolbar with zoom and pan tools, and a legend for the BDEPI data.



# 3D Radar visualisation



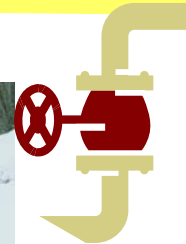
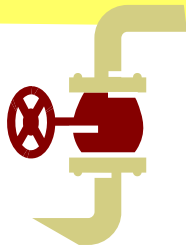
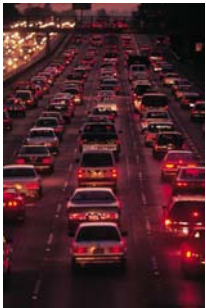
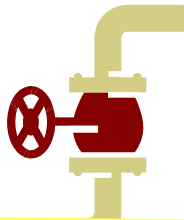
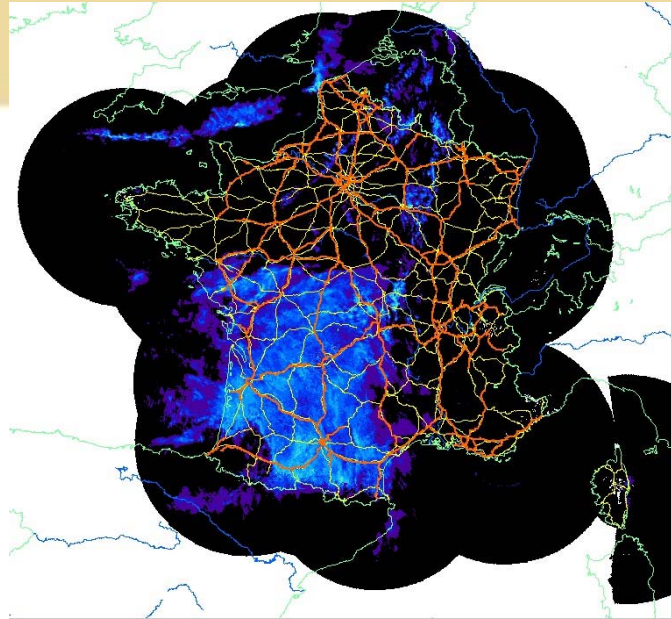
The user chooses the level or a composite visualisation with the maximum reflectivity

Maximum vertical projections are available and animate synchronously

# Web services

- A technical way to make systems interoperable
- Merge of heterogeneous data or visualisation
- First step : Web Map Services WMS
- Then WFS, WCS, etc...
- Meteo-France System Synergie can be a WMS server or a client for an external WMS

**Met institute  
(WMS MeteoFrance)**



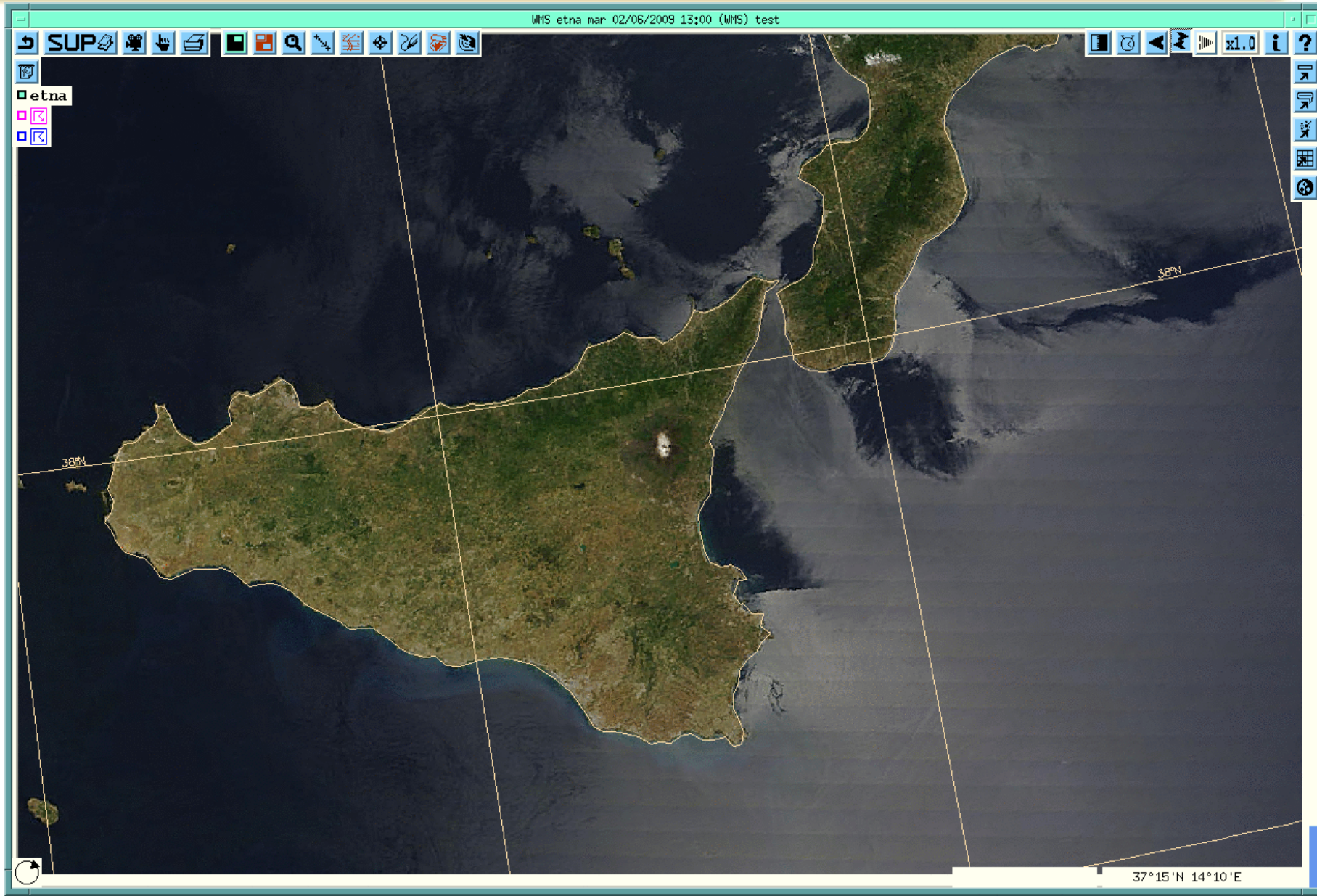
**Road network  
management application**

**Traffic Service  
(WFS CRIR)**

**State of the roads  
Service (WFS DDE)**

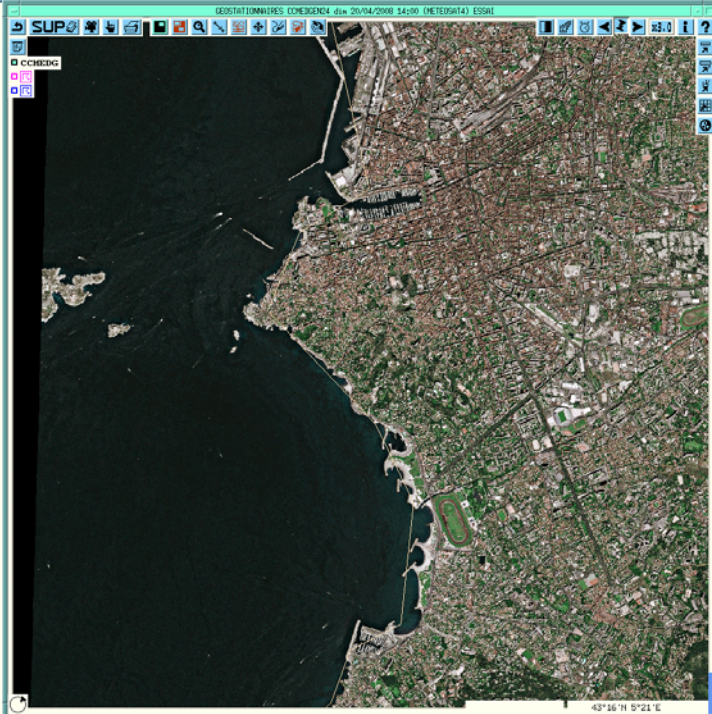
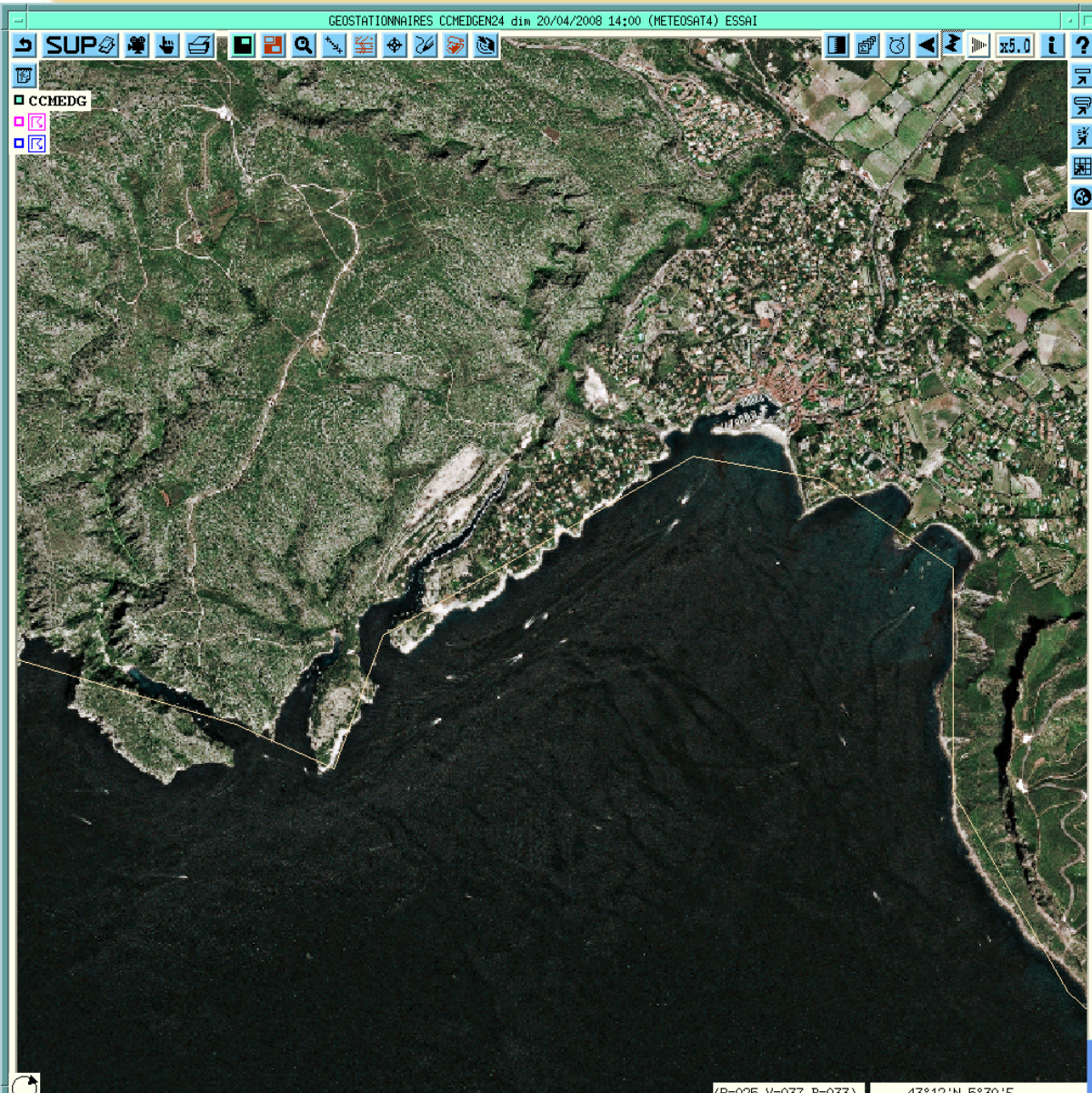


Images can be inserted in our server and made available as WMS for the client



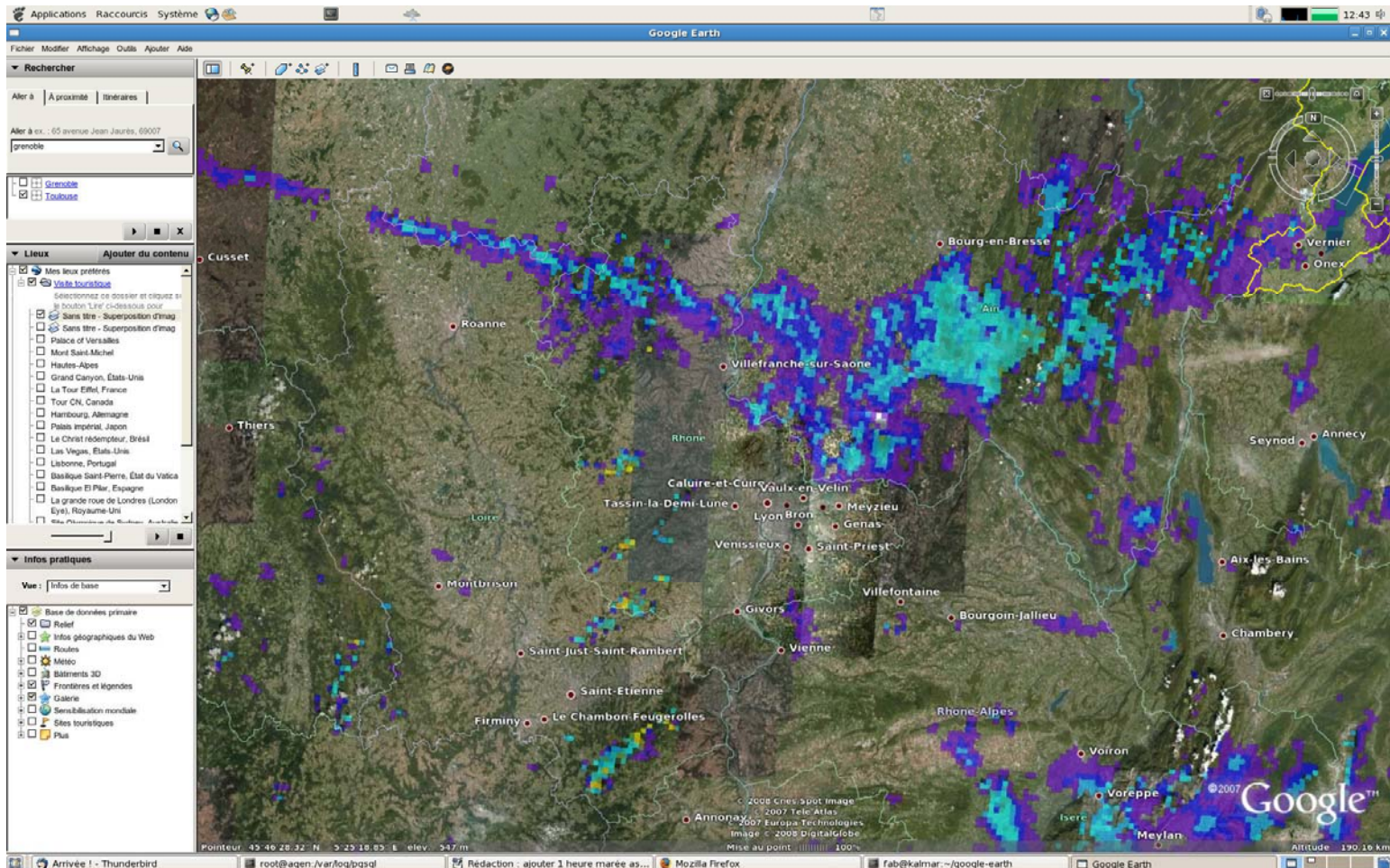


# SPOT images (Image simplified resolution of 10 m)



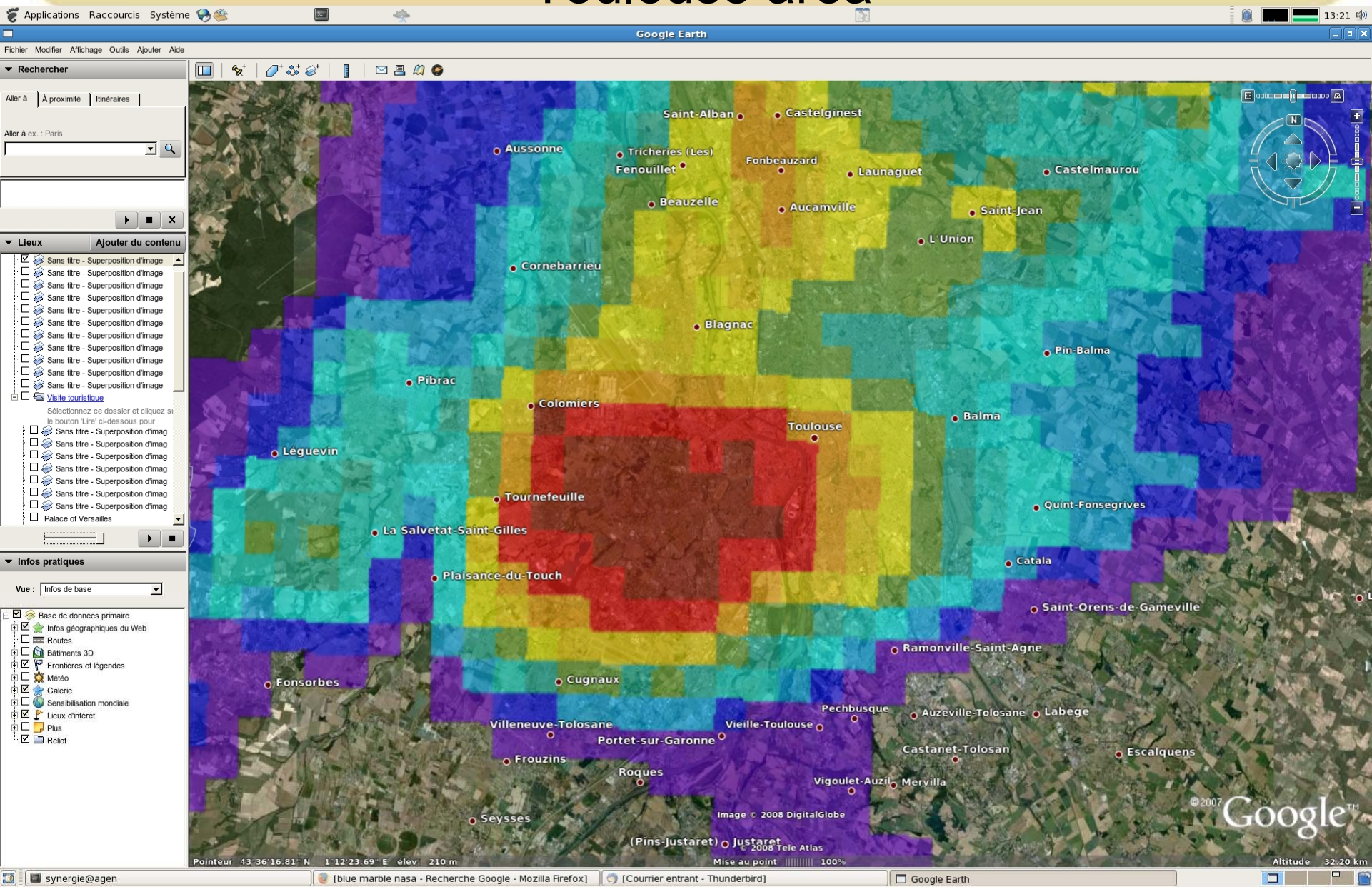


# WMS with Synergie(WMS server) and Google (WMS client)





# With transparency...hail kernel over Toulouse area



# Others developments done

- Introduction of GTK to replace Motif step by step.
  - For Vertical profile visualisation tool
  - For document (Fax) visualisation
  - For Tropical cyclone production tool
  - For model GUI
- Client-server communication proprietary protocol migrated on a Web base protocol
- Visualisation of AROME specifics products or data
- Visualisation of cold top accumulation
- Polar satellite expected images planning
- Various improvement for radar data
  - Calculation of pixel trajectories on local server
  - Water wave calculation on longer duration and automatic update
  - Finer accumulation areas
  - Water wave quality meta-data visualisation





# Introduction of GTK



- to replace MOTIF and improve ergonomics

**RADIOSONDAGE** **PROFILER** **EUROPROFIL** **VAD**

**Observation** **Prevision**

observations du

14/06/2007

a 12 UTC

**Items**

- 07110 BREST
- 07112 LA-FERTE-VIDAME
- 07130 RENNES
- 07145 TRAPPES
- 07149 PARIS-ORLY
- 07157 PARIS-AEROPORT-CHARLES-1
- 07180 NANCY-ESSEY
- 07190 STRASBOURG
- 07205 LANN-BIHOUE
- 07222 NANTES
- 07255 BOURGES
- 07299 BALE-MULHOUSE
- 07460 CLERMONT-FERRAND
- 07481 LYON-SATOLAS
- 07503 BISCARROSSE
- 07510 BORDEAUX
- 07602 BIARRITZ
- 07610 PAU
- 07621 TARBES-OSSUN
- 07630 TOULOUSE-BLAGNAC
- 07643 MONTPELLIER
- 07645 NIMES-COURBESSAC
- 07646 NIMES-GARONS

**Selection**

07110 BREST

Emagramme 761  
Emagramme Basses Couches  
Emagramme Redresse

OK Quitter Annuler Aide



Type de profil

**RADIOSONDAGE** PROFILER EUROPROFIL VAD

Nature du profil

Observation **Prevision**

Choix du site

code OMM	Site
6181	KOBENHAVN-JAEGER
6240	AMSTERDAM-AP-SCHI
6260	DE-BILT
6400	KOKSIJDE
6447	UCCLE
6476	ST-HUBERT
6610	PAYERNE
<b>7110</b>	<b>BREST</b>
7112	LA-FERTE-VIDAME
7130	RENNES
7145	TRAPPES
7149	PARIS-ORLY
7157	PARIS-AEROPORT-CH
7180	NANCY-ESSEY
7190	STRASBOURG
7205	LANN-BIHOUE
7222	NANTES

Reseau / echeance

Liste des modeles

ARP/1.5 ARP/0.5  
CTPINI/1.5 CTPINI/0.5  
CCIGRAD8/1.5 CCIGRAD9/1.5  
CCIGRAD8/0.5 CCIGRAD9/0.5  
CEP/0.5 CEP\_GLOB/0.5  
NIMES\_3D BOLLENE\_3D  
ARO-FRAN/0.04 ARO-NE/0.05

reseau du 13/06/2007 10:00

echeance 00

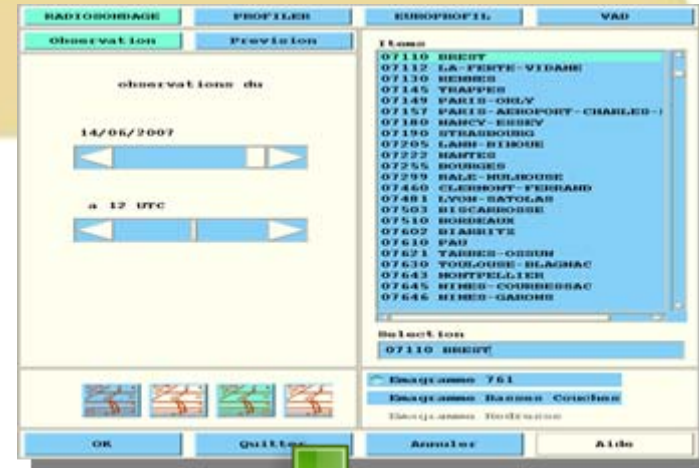
Ecran

Mode de visualisation

emagramme 761  
 emagramme basses couches  
 emagramme redresse  
 profil Z-t mode haut  
 profil Z-t mode bas

OK Quitter Annuler Aide

# Vertical Profil in GTK



Radio sondages
Pilots
Avions
Profileurs
Radar-VAD

### TYPE DE DONNEES

Observation  
 Prevision

Date:

Heure (UTC):

label:


### SELECTION DU SITE

Mode de selection:  Tous  Domaines  Favoris


<input type="checkbox"/>	Identifiant	Nom usuel	<input type="checkbox"/>
<input type="checkbox"/>	01001	JAN MAYEN	<input checked="" type="checkbox"/>
<input type="checkbox"/>	01004	NY-ALESUND II	<input type="checkbox"/>
<input type="checkbox"/>	01028	BJORNOYA	<input type="checkbox"/>
<input checked="" type="checkbox"/>	01152	BODO VI	<input type="checkbox"/>
<input checked="" type="checkbox"/>	01241	ORLAND III	<input type="checkbox"/>
<input type="checkbox"/>	01400	EKOFISK	<input type="checkbox"/>
<input type="checkbox"/>	01415	STAVANGER/SOLA	<input type="checkbox"/>
<input type="checkbox"/>	02185	LULEA-KALLAX	<input type="checkbox"/>
<input type="checkbox"/>	02365	TIMRA/MIDLANDA	<input type="checkbox"/>
<input checked="" type="checkbox"/>	02527	GOTEBORG/LANDVETTER	<input type="checkbox"/>
<input type="checkbox"/>	02591	VISBY AEROLOGISKA STATION	<input type="checkbox"/>
<input type="checkbox"/>	02836	SODANKYLA	<input type="checkbox"/>
<input type="checkbox"/>	02935	JYVASKYLA	<input type="checkbox"/>

Site selectionne:

### POINTAGE DES SITES



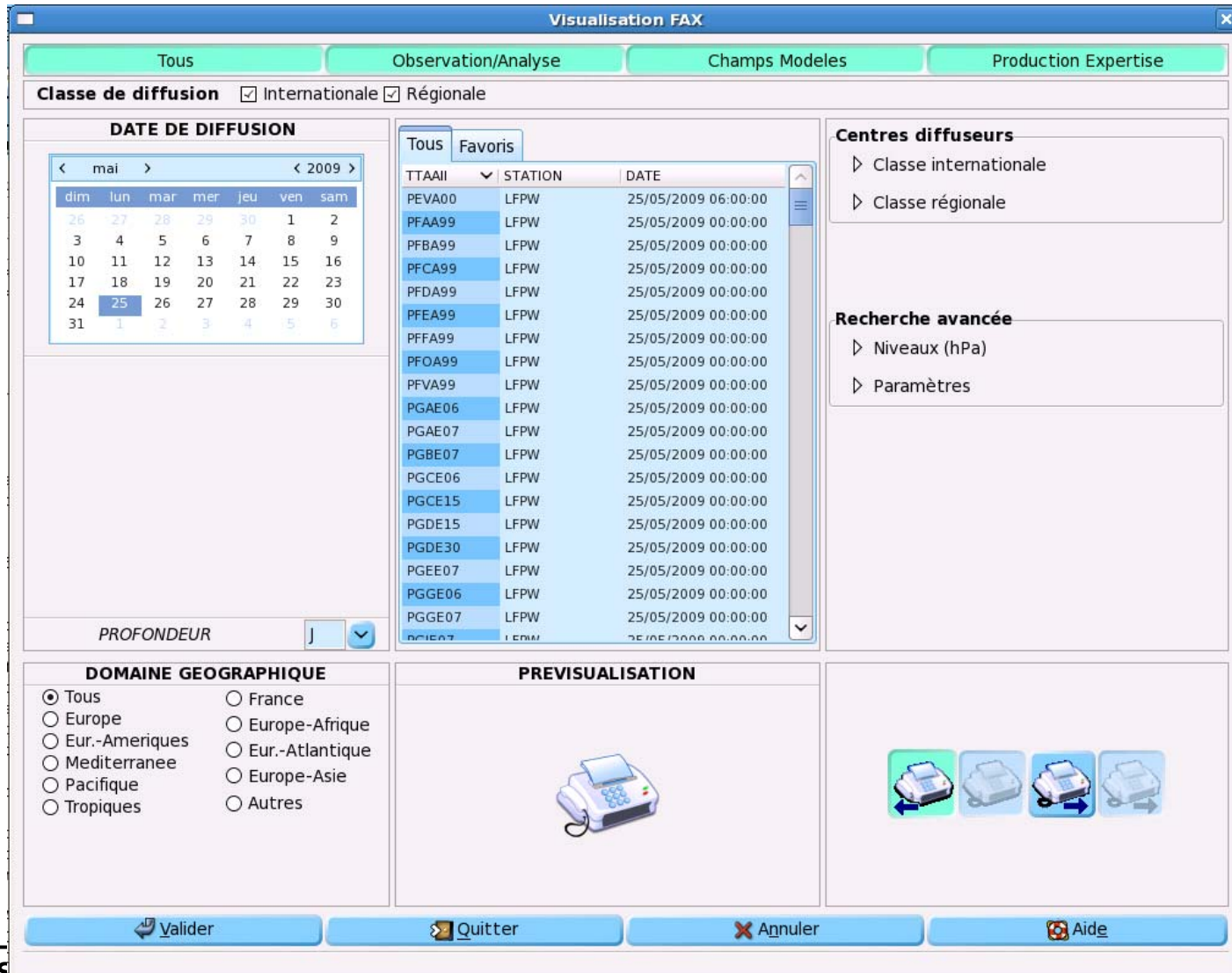
Preselection domaine:  domaine 1  
 domaine 2  
 domaine 3  
 domaine 4



Emagramme 761  
 Emagramme Basses Couches  
 Redresse  
 Tephigramme  
 Type profileur mode haut  
 Type profileur mode bas

Valider
 Quitter
 Annuler
 Aide

# Fax visu GUI in GTK with new facilities





# GTK Cyclone module GUI

SYNERGIE - CYCLONE

Quitter Enregistrer Défaire Refaire Zoom avant Zoom arrière

Ajouter Nommer

04/DEAN

Trajectoires...

ARP/1.5 (Ana) Vent 1000HPA = 197° 6 kt, 3 m/s, 11 km/h  
 33°04'N 107°24'W  
 ARP/1.5 (Ana) Fmer SOL = 1014.1 hPa  
 Altitude moyenne: (1)  
 canal VS\_MTL= 38

Configuration du trace

Contenu Couleur Ligne

Couleur de la trajectoire:  Uniforme  Variation de l'intensité  Variation de la Pmin

rayon de vent < 27 kt

Teinte: 64  
 Saturation: 100  
 Valeur: 100  
 Nom de la couleur: #EEFF00

4/DEAN

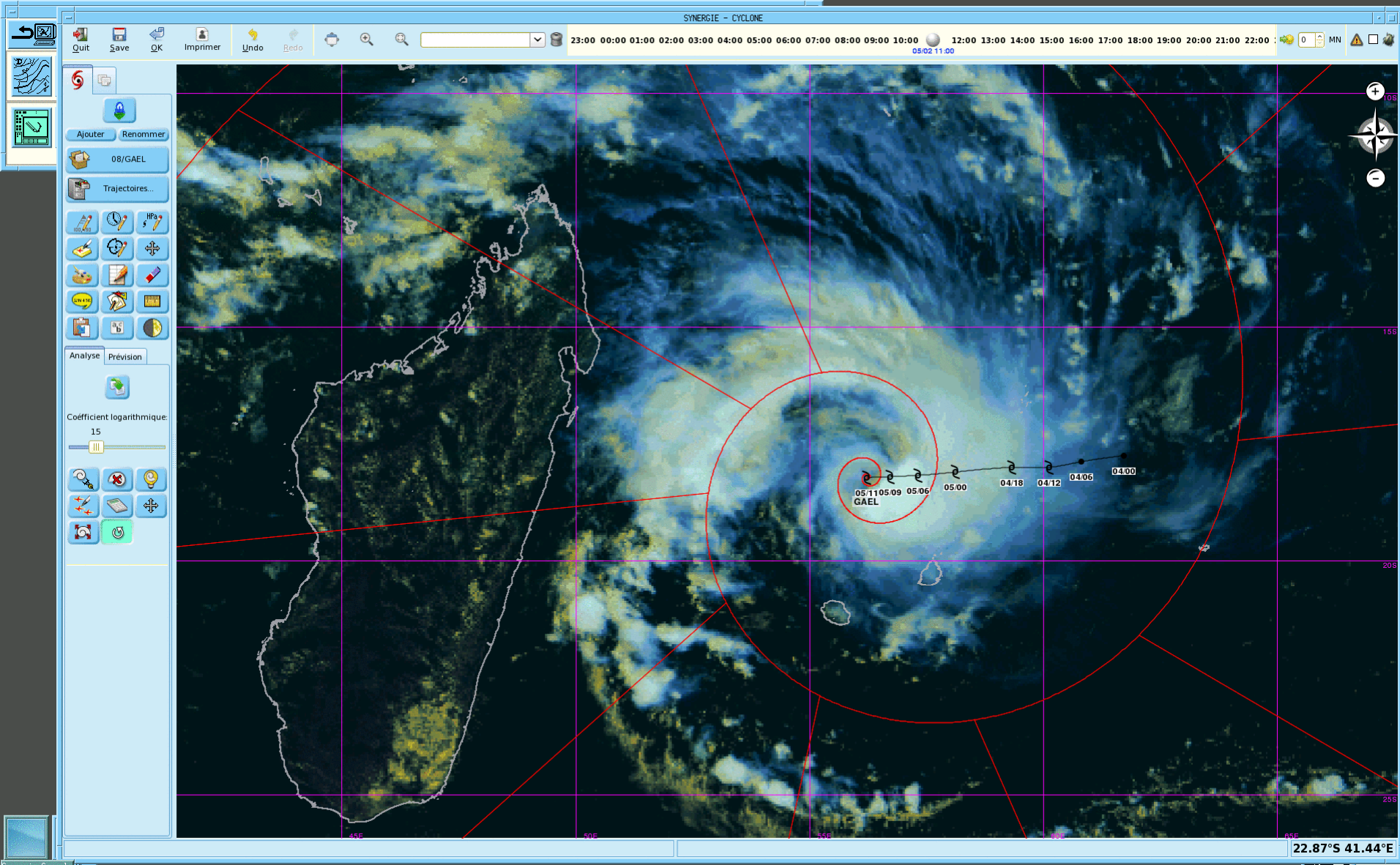
Trajectoire: Operationnelle de : 4/DEAN

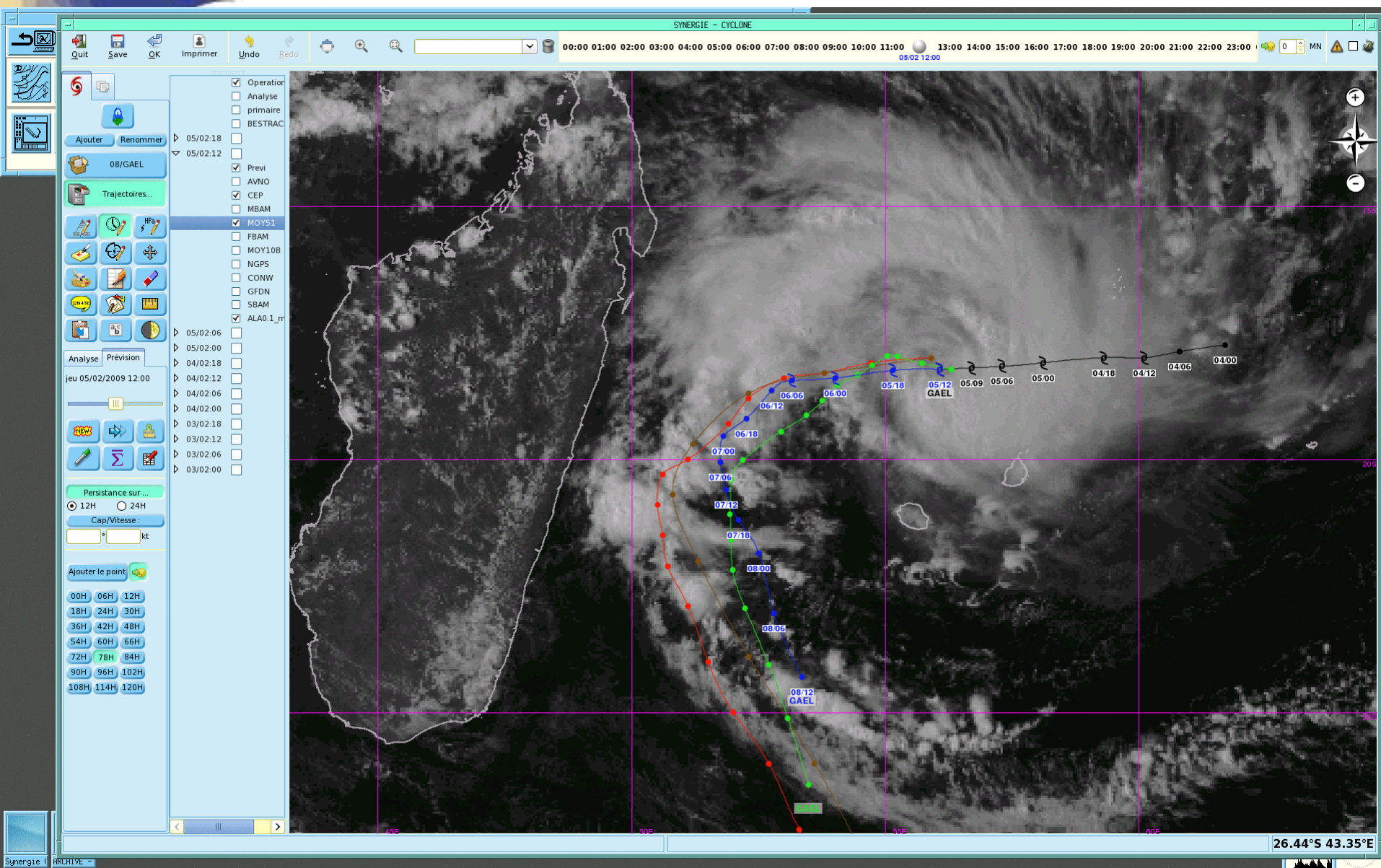
Num	Date	Origine	Lat	Lon	Confiance	Précision (NM)	Cap1 (°)	Vitesse1 (kt)	Cap1 (°)	Vitesse1 (kt)	Dt	Ci	Pmin (hPa)	FFmoyen	FFrafa
30	20/08/2007 18:00	AUTRE	18.00	-83.20	inconnu	10	/	16.5	/	16.3	/	5.0	918.0	130	160
31	21/08/2007 00:00	AUTRE	18.20	-85.10	inconnu	10	/	17.0	/	/	/	5.0	914.0	140	170
32	21/08/2007 06:00	AUTRE	18.60	-86.90	inconnu	10	/	17.6	/	/	/	5.0	906.0	145	175
33	21/08/2007 12:00	AUTRE	18.90	-88.70	inconnu	20	/	17.0	/	/	/	5.0	950.0	90	120
34	21/08/2007 18:00	AUTRE	19.20	-90.50	inconnu	20	/	17.0	/	/	/	5.0	970.0	70	90
35	22/08/2007 00:00	AUTRE	19.70	-92.20	inconnu	20	/	16.8	/	/	/	5.0	979.0	70	85
36	22/08/2007 06:00	AUTRE	20.10	-94.00	inconnu	20	/	17.4	/	17.1	/	5.0	979.0	70	85
37	22/08/2007 12:00	AUTRE	20.50	-95.50	inconnu	20	/	14.6	/	16.0	/	5.0	979.0	85	105
38	22/08/2007 18:00	AUTRE	20.50	-97.30	inconnu	30	/	16.9	/	15.6	/	3.0	975.0	60	75
39	23/08/2007 00:00	AUTRE	20.50	-99.00	inconnu	30	/	15.9	/	16.4	/	/	1000.0	30	40

Apply Print

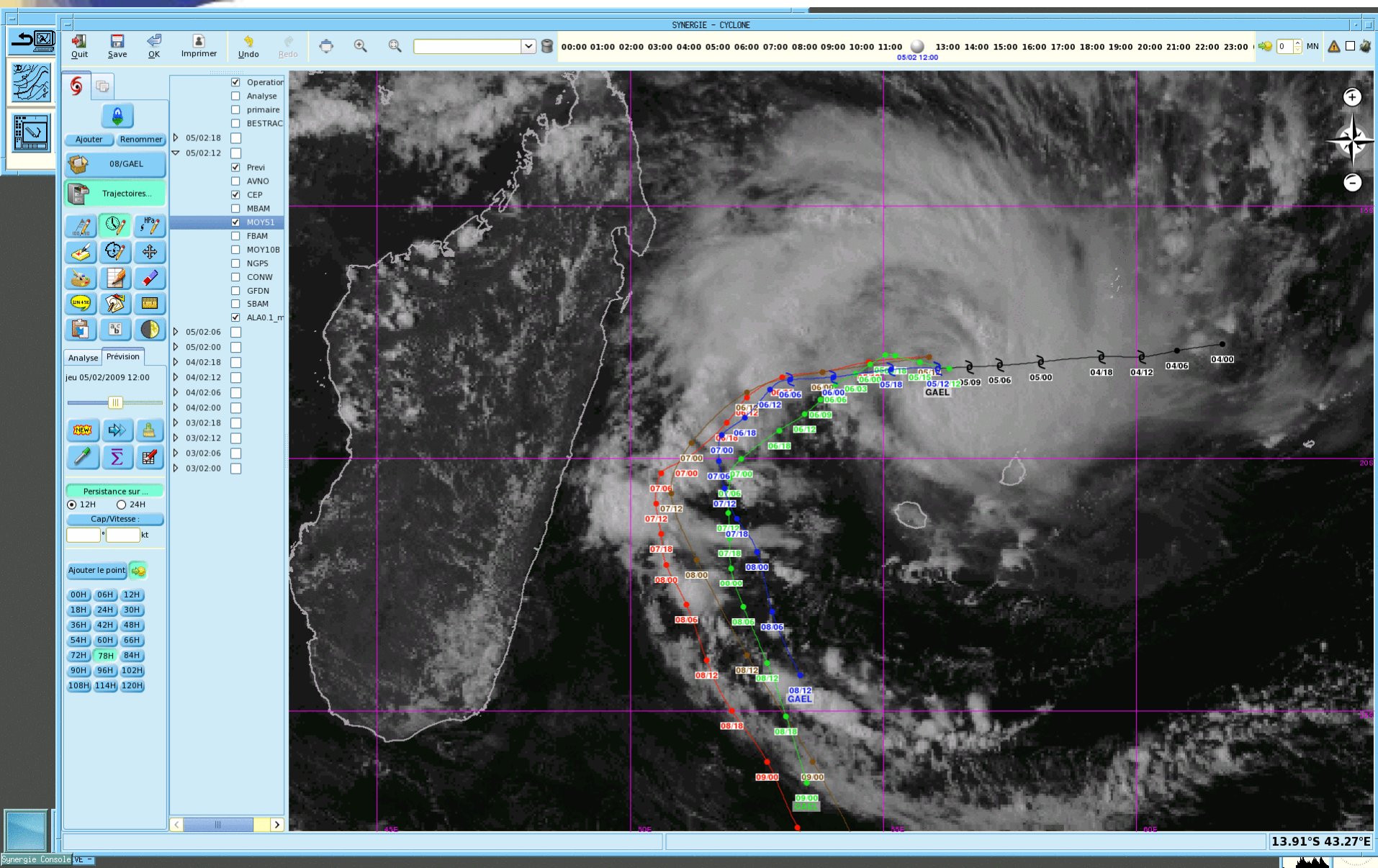


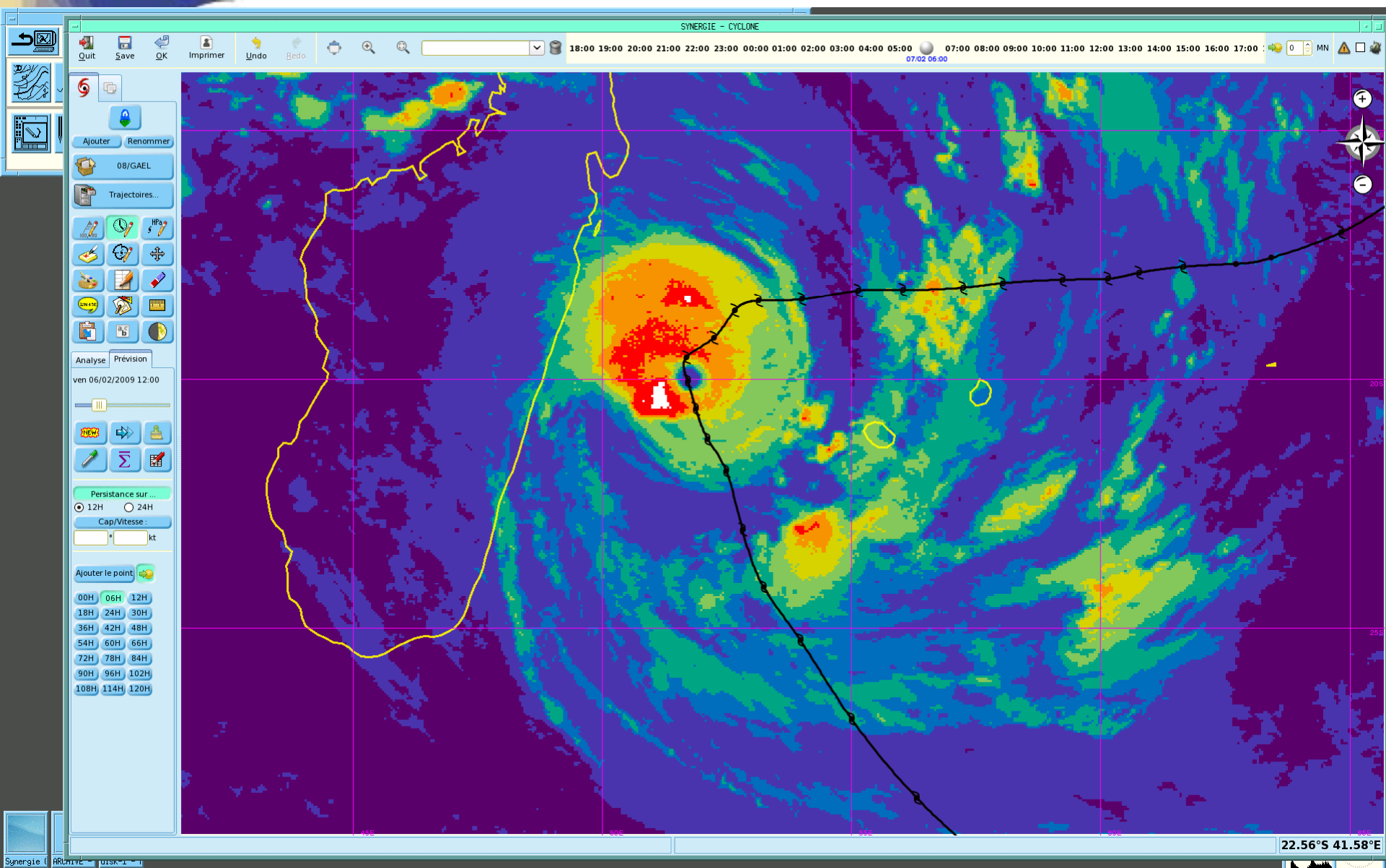
# Production for Tropical cyclone











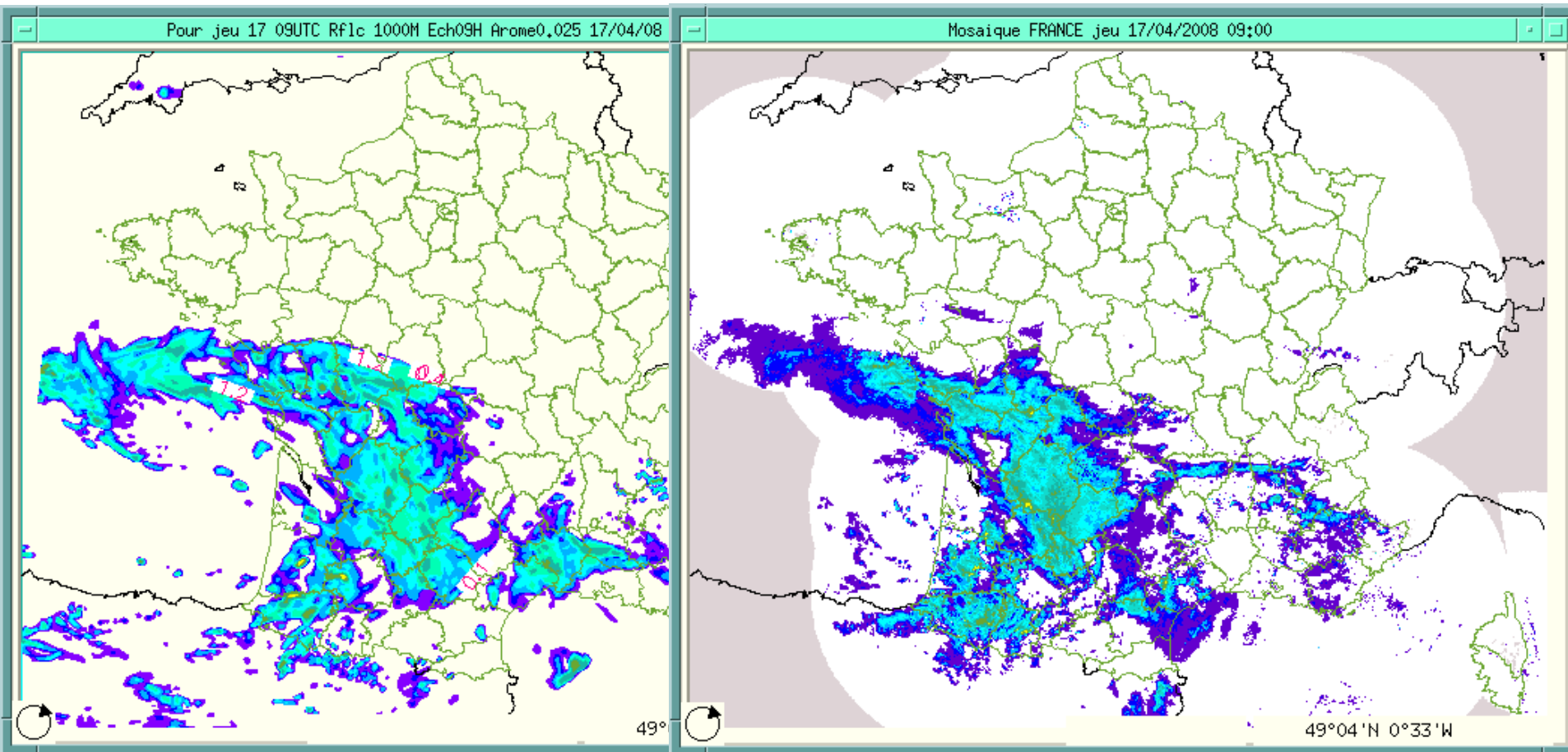


# Numerical Model AROME Simulated reflectivities

AROME (ech 09 h)

vs

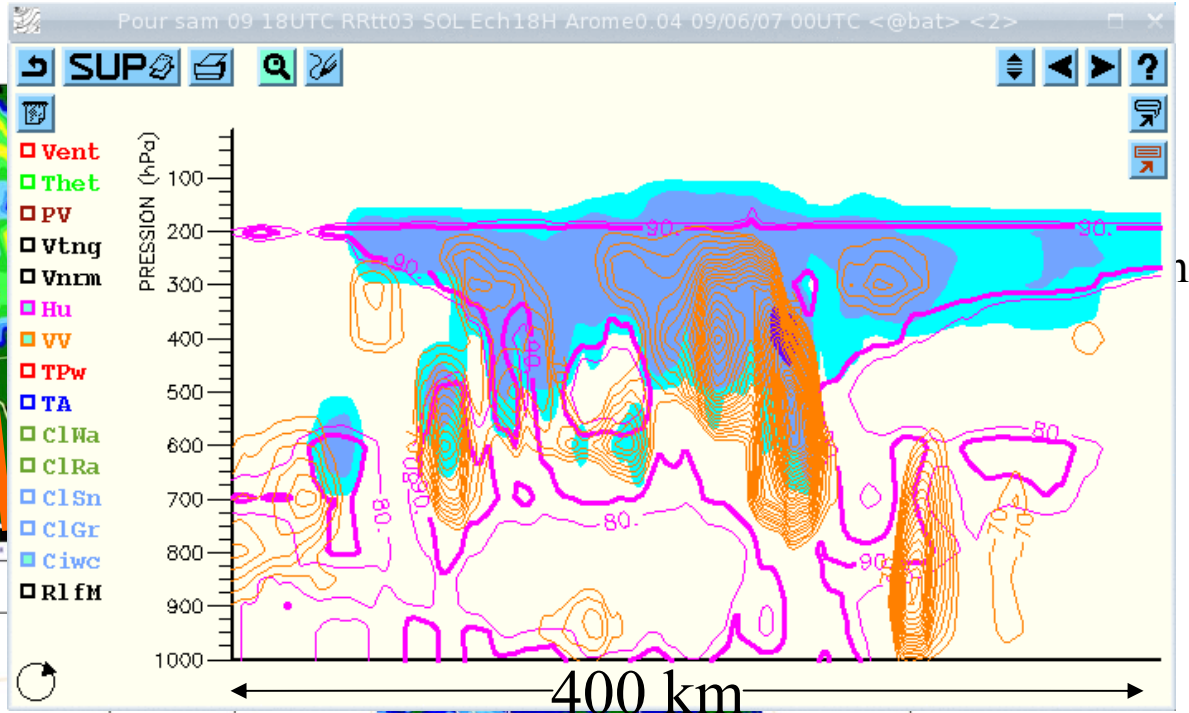
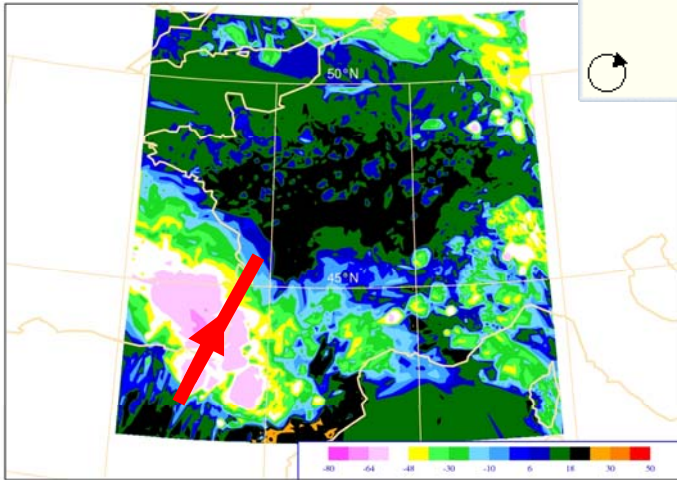
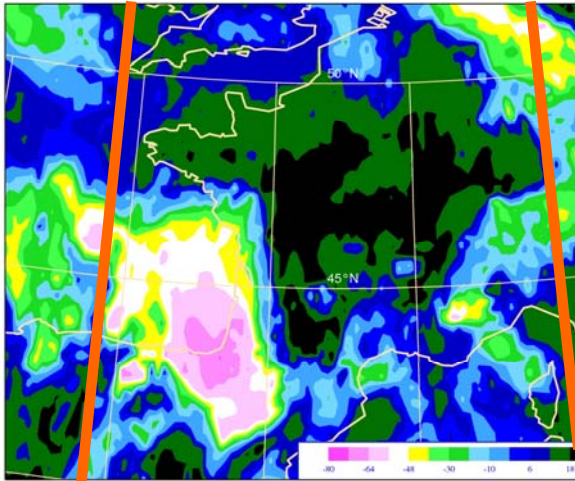
Radar vd 09 UTC 17 Apr 2008



# Forecast Satellite Images AROME : 9-6-07

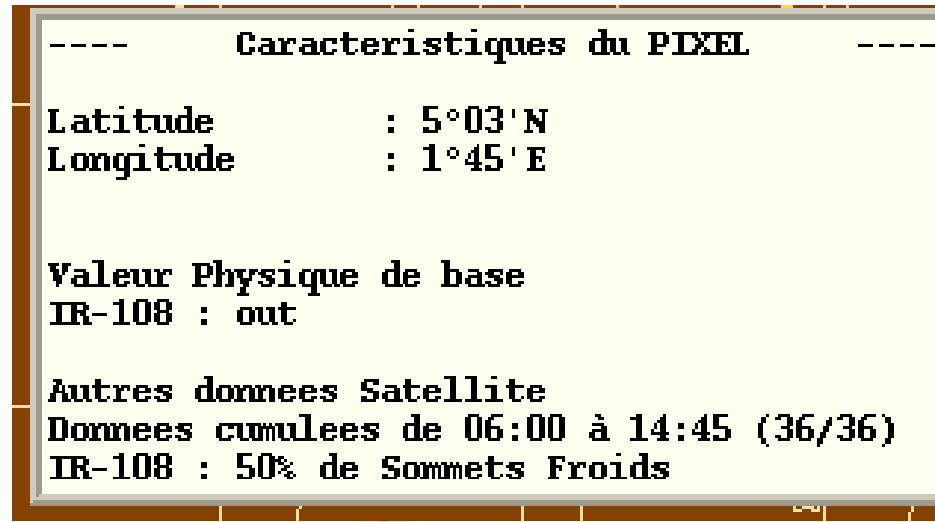
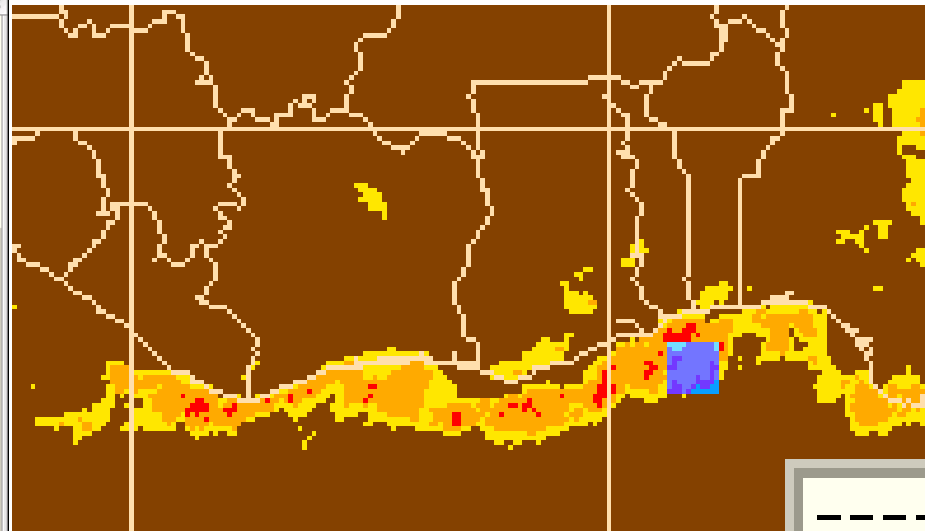
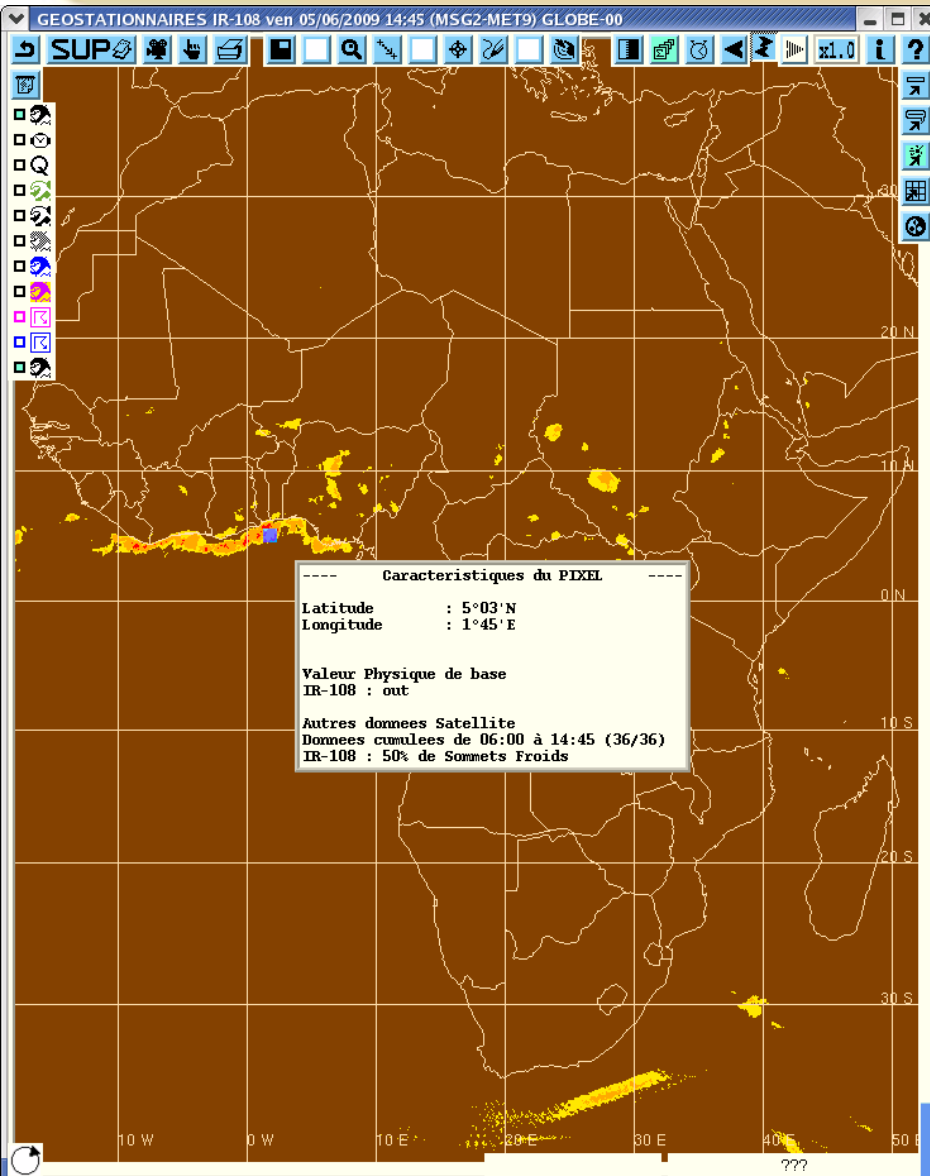
IR, canal 10,8 micromètres

at 18 UTC



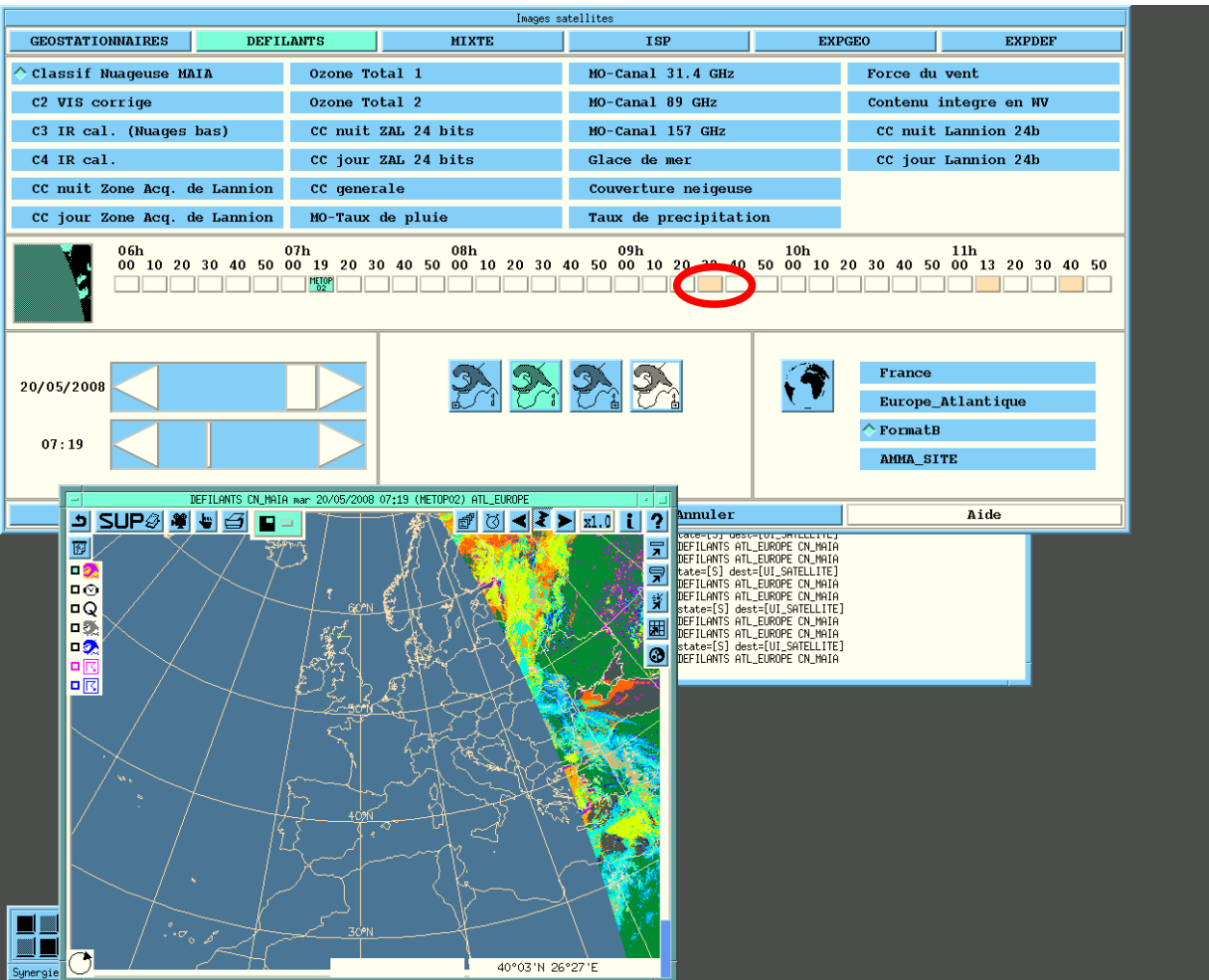
AROME

# Interactive cold top accumulations



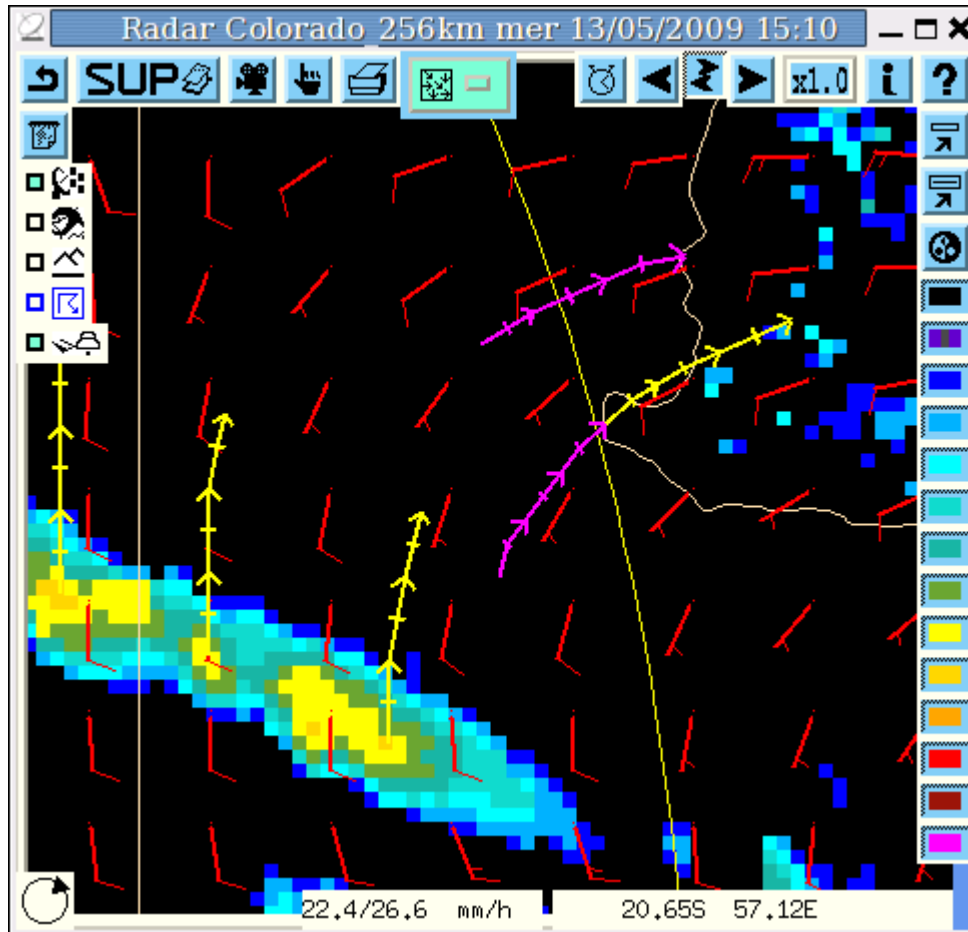


# Polar satellite expected images planning



Informations sent twice a day to inform about the expected images (announced by the beige boxes)

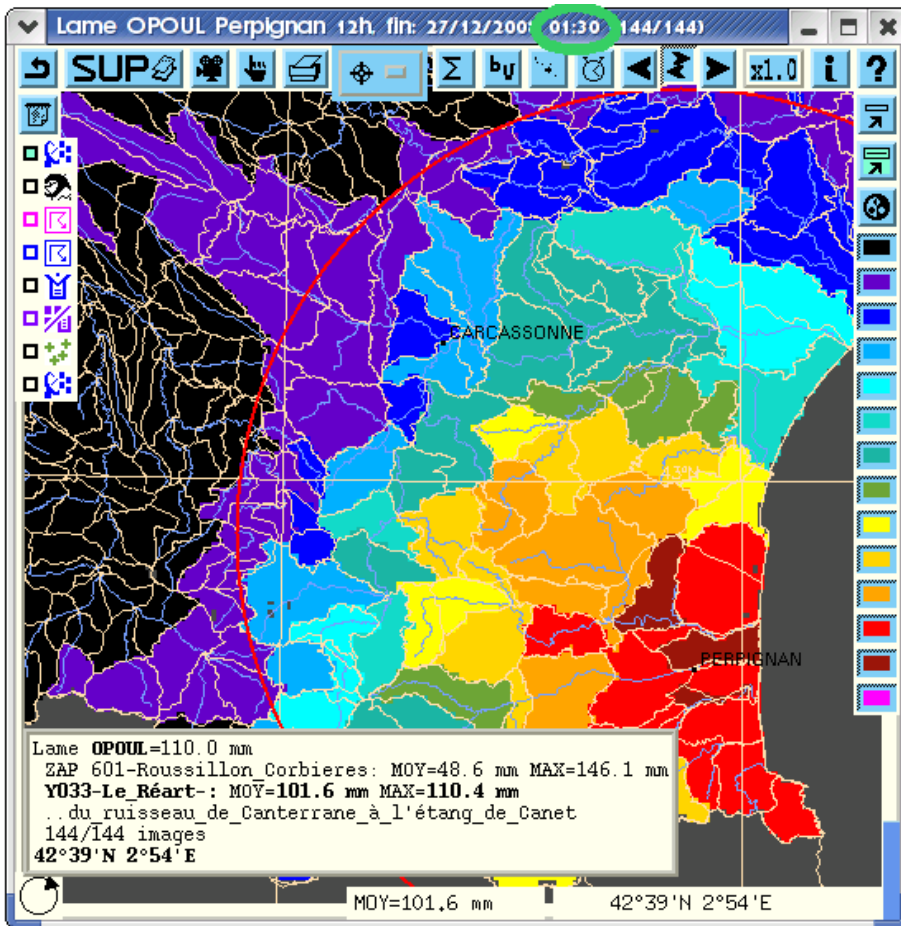
## 2 PI R Radar pixel trajectories for the next 60mn



Existed : Calculations made on a central application and computer in Toulouse for Continental radars

New : Made on Synergie servers for oversea territories or mobile radars

# Water wave = accumulation of radar informations

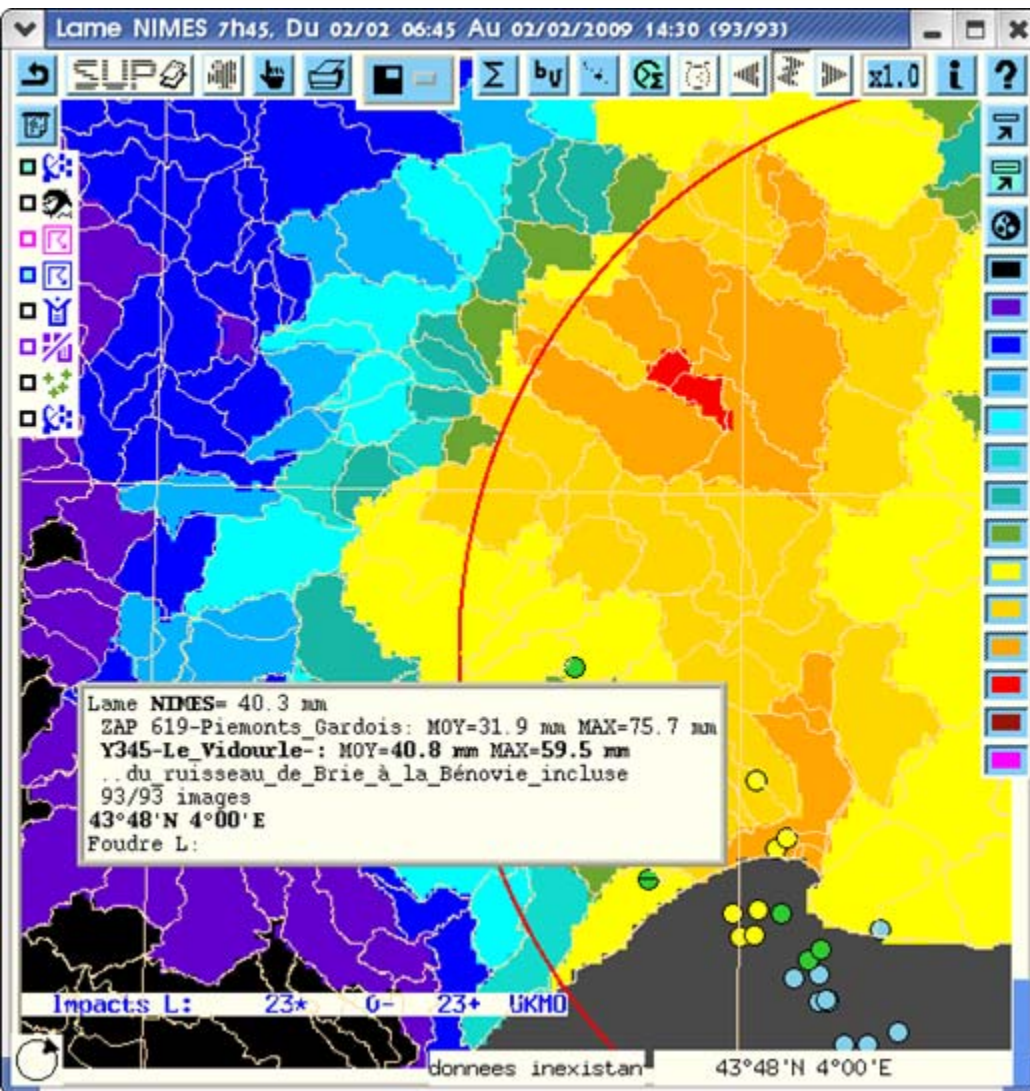


Available over more period lengths





# Water wave automatic update

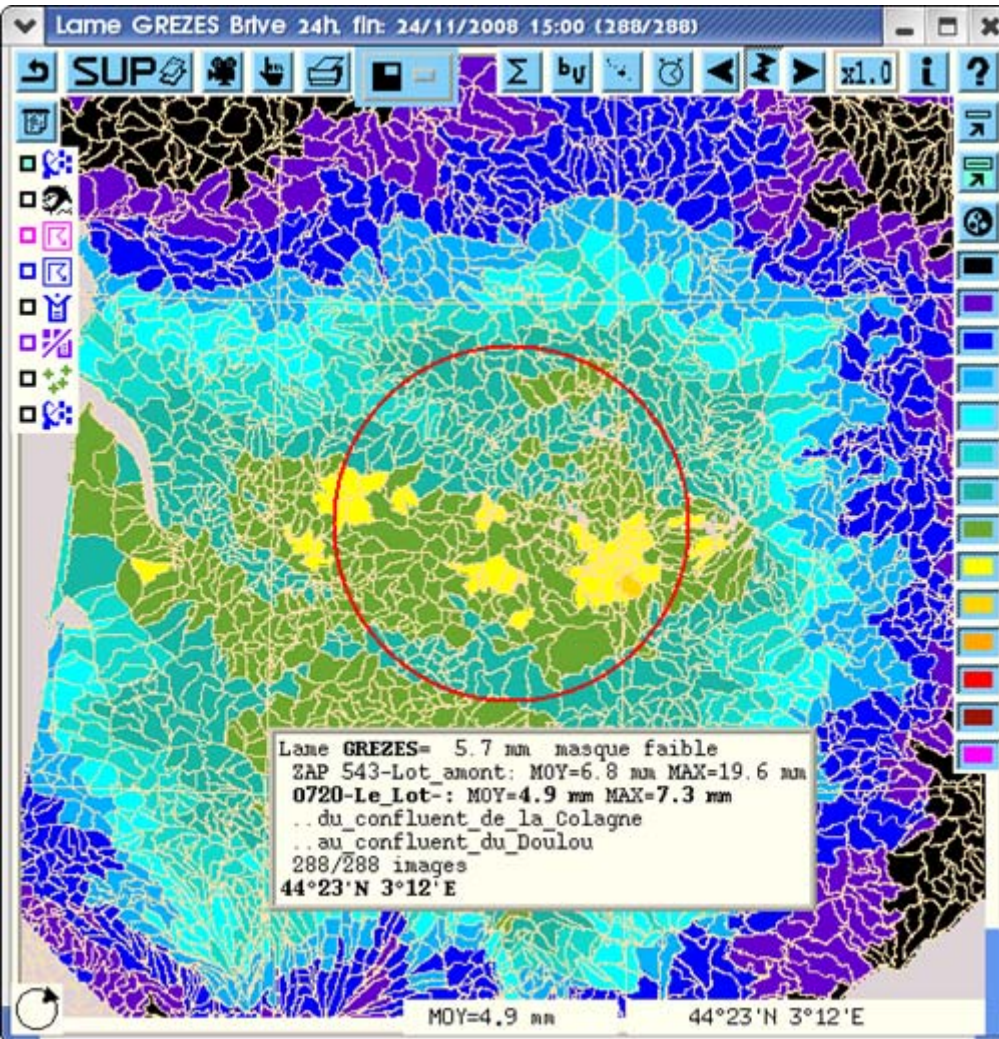


Water wave = accumulation of radar informations

Two types of update :

- Shifting over time, with a static depth
- Static begin time, increasing accumulation depth

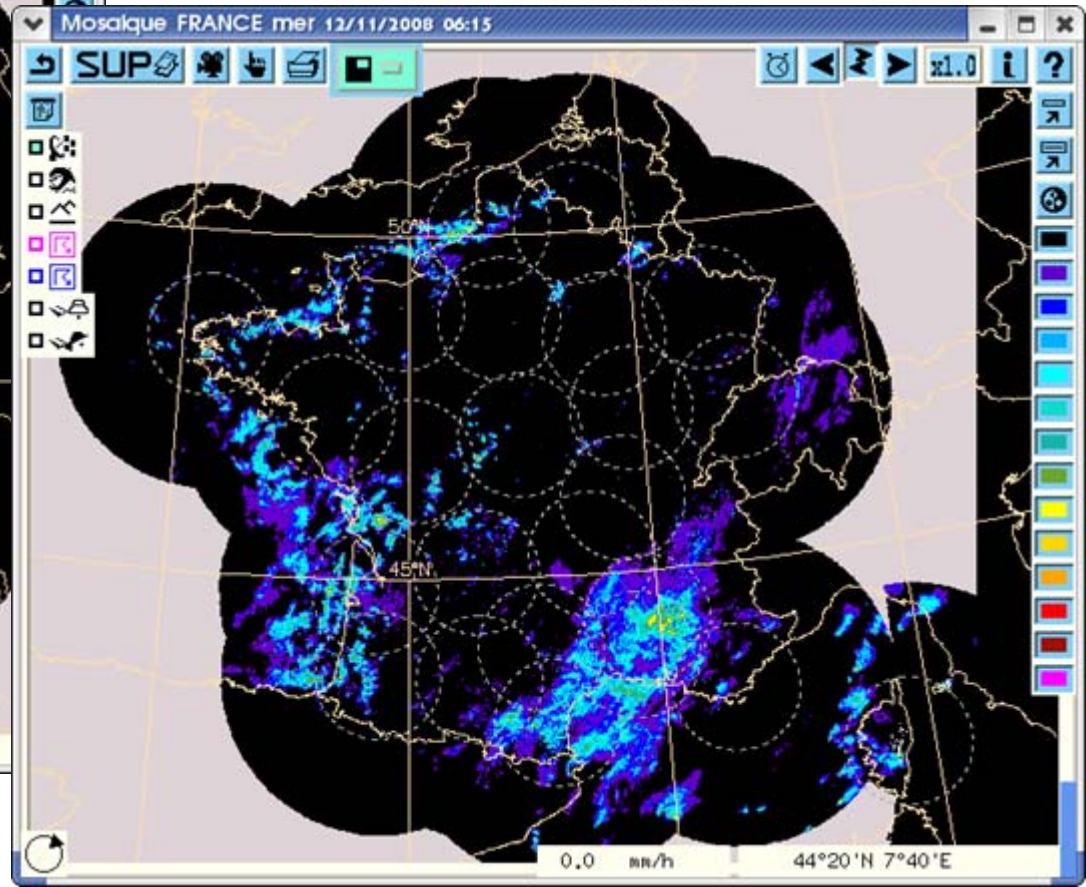
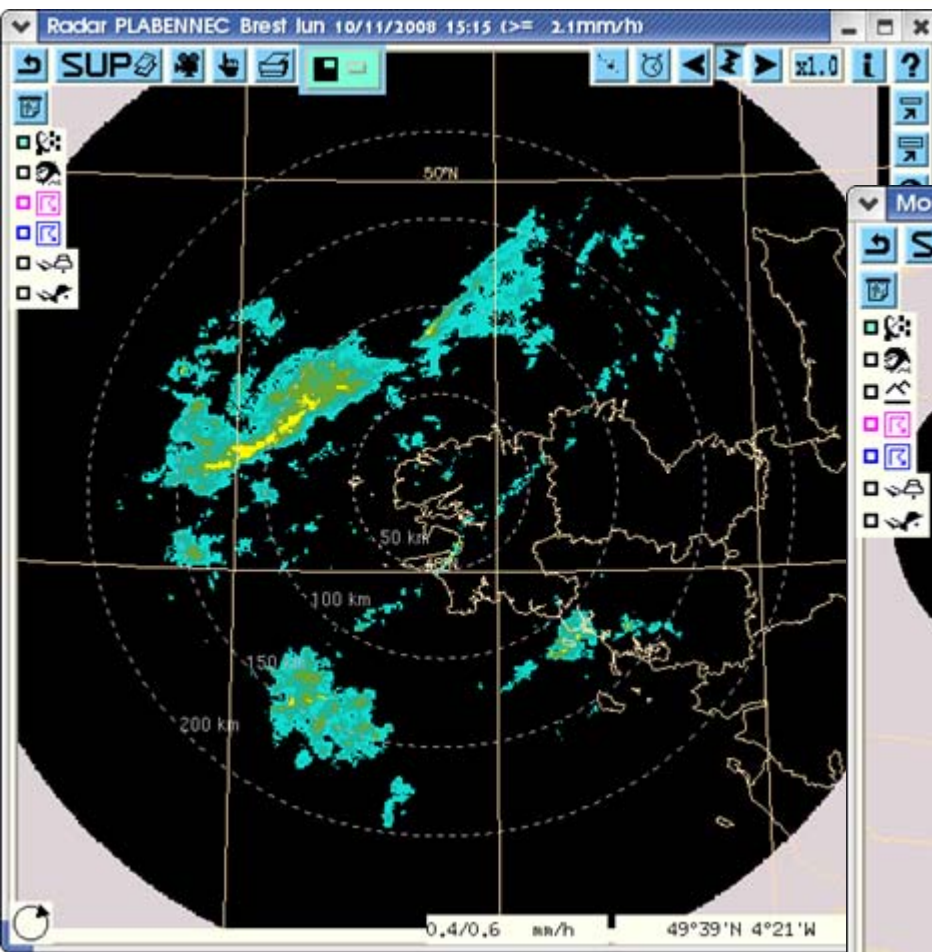
# New areas defined for precipitations alerts



These new areas have been defined by the Central Service for Hydrology who is Synergie user.

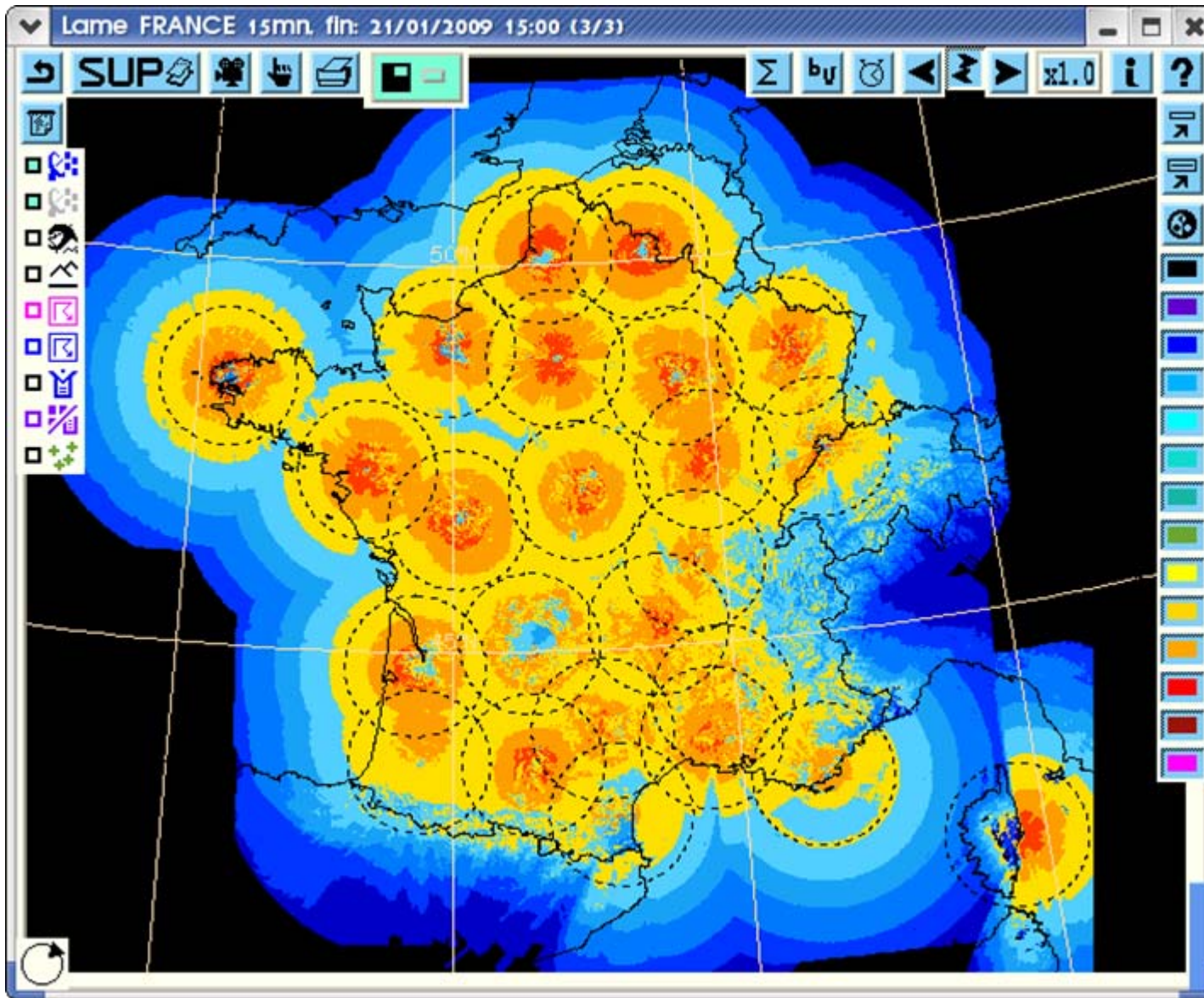


# Enhancement of the distance to the radar



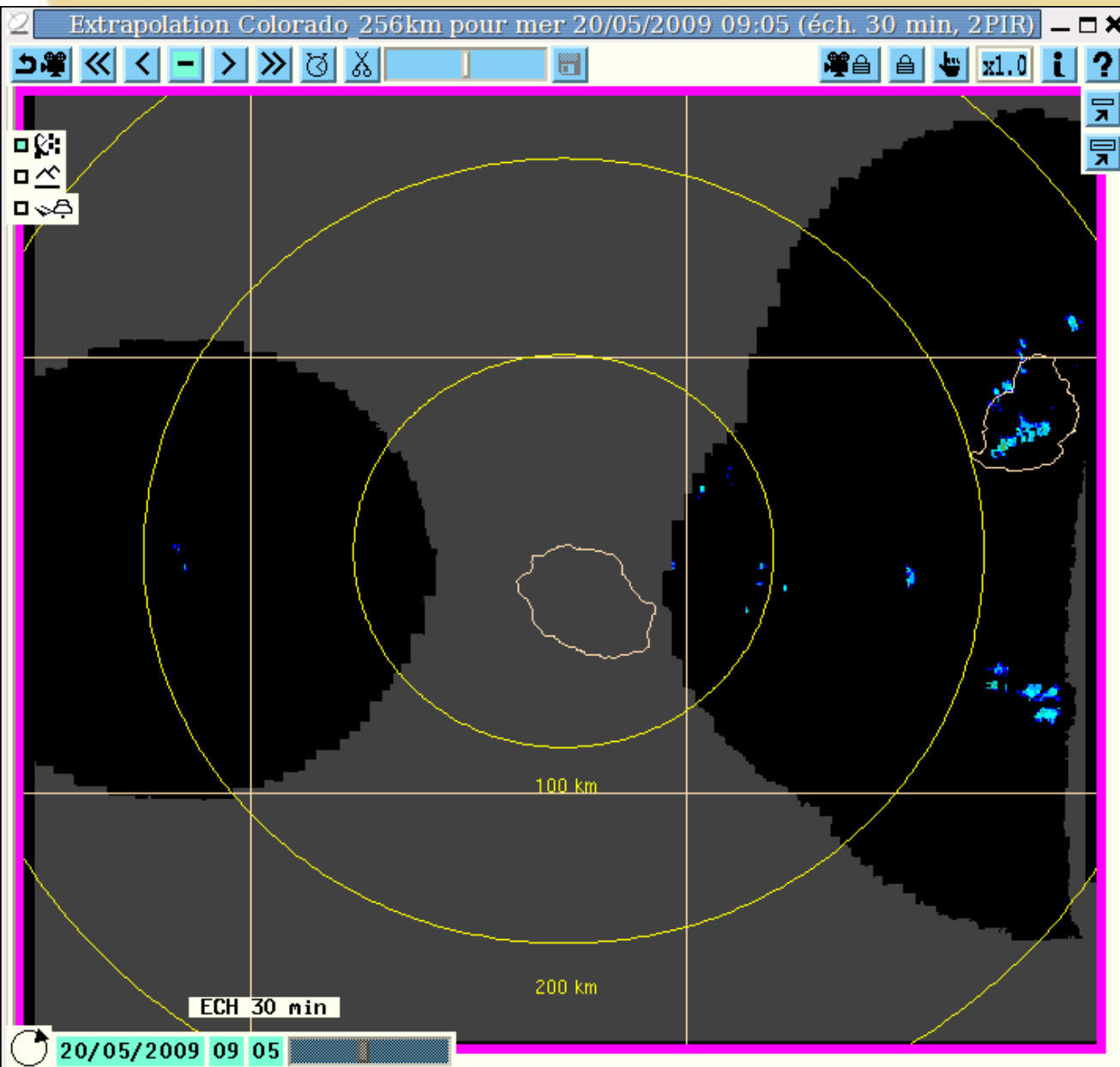


# Water wave quality metadata visualisation



The visualisation can be overlaid with transparency level option

# Radar observed and extrapolated animations



When the image is an extrapolation a magenta frame appears to inform the user

# Synergie Roadmap : further look

- Visualisation
  - New products for flood warning in term of risk
  - Improvement of 3D products for local radar and mosaics
  - New zooming and de-zooming
  - New vertical cross-section including more refinement data near surface
  - Improvement of EPS visualisation products via WMS protocol
- Technical issues
  - Introduction of GRIB2
  - Treatment of new WMO BUFR instead of ASCII messages
  - Introduction of MAGICS++ via SOA
  - Continue to work on WxS for a full web interface



# Conclusion

- Synergies 4.4
  - New client/server communication protocol on web services
  - Synergie server or a client technically open to WMS available evry where. The first step of an Service oriented architecture (SOA)
  - New production modules and visualisation in GTK
  - Interaction with Java independent system (for Nowcasting production)
  - 3D radar module available for now casting
- Synergie 4.5 and after ....
  - Server open to New client in other languages (PHP, Java, ...)
  - Client open to new server via WxS protocol, for visualisation of experimental production with a specific SLA (Service Level Agreement)

..... New client open to New server .....



Thank you for your attention

Any Question ?

