

# High frequency measurements of hydrological and biological parameters in the Western English Channel: Evidence for a *Karenia mikimotoi* bloom in July 2010

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# **Observation Time Series in the Western Channel**

**Description of the ferry box systems operating in the Western Channel and bay of Biscay**

**Hydrological and biological measurements in the Western Channel in 2010: evidence for a *Karenia mikimotoi* bloom**

**First results from measurements in the bay of Biscay in 2011**



# Time Series in the Western Channel: a long story

## Two Types of measurements

### Low Frequency



- 16 physico-chemical and biological parameters



Ferry Box

### High Frequency

(real time data)



Fixed Platforms

- **Low Frequency Observations:** interannual to seasonal variability

▶ Hydrological measurements using Niskin bottles

▶ CTD profiles

- **High Frequency Observations:** short term variability (semi monthly to semi-diurnal and hourly variability)

▶ Fixed platforms: multi instrumented buoy

▶ Voluntary Observatory Ship = ferry boxes onboard Brittany Ferries MV Armorique and Pont Aven

# High Frequency Measurements:

## HF Temporal Strategy:

### Fixed Platforms : buoys

with real time data transmission  
(every 30 minutes)



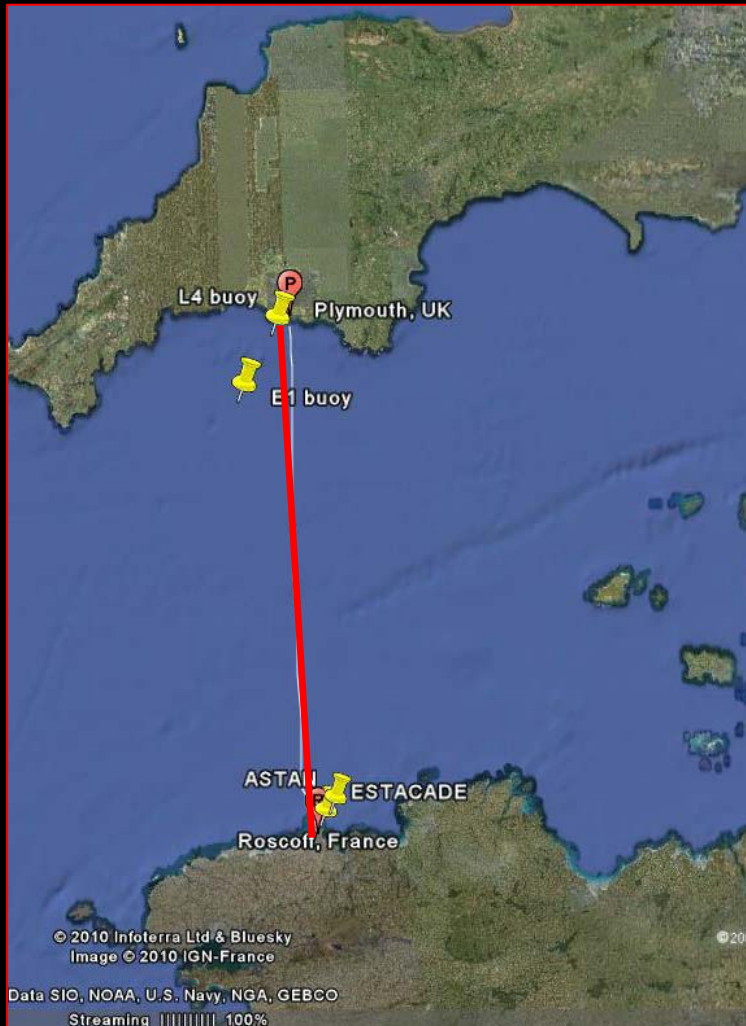
## HF Spatio-Temporal Strategy:

### Voluntary Observing Ships : Ferrys

with near real time data  
transmission (at each arrival at  
ports)



# EU Interreg Marinexus program (2010- 2013) :



Coordination of the observation activities in the northern and southern parts of the Western Channel :

- implementation of a Ferry box line between Roscoff and Plymouth

- High frequency measurements on fixed platforms at both ends of the ferry line

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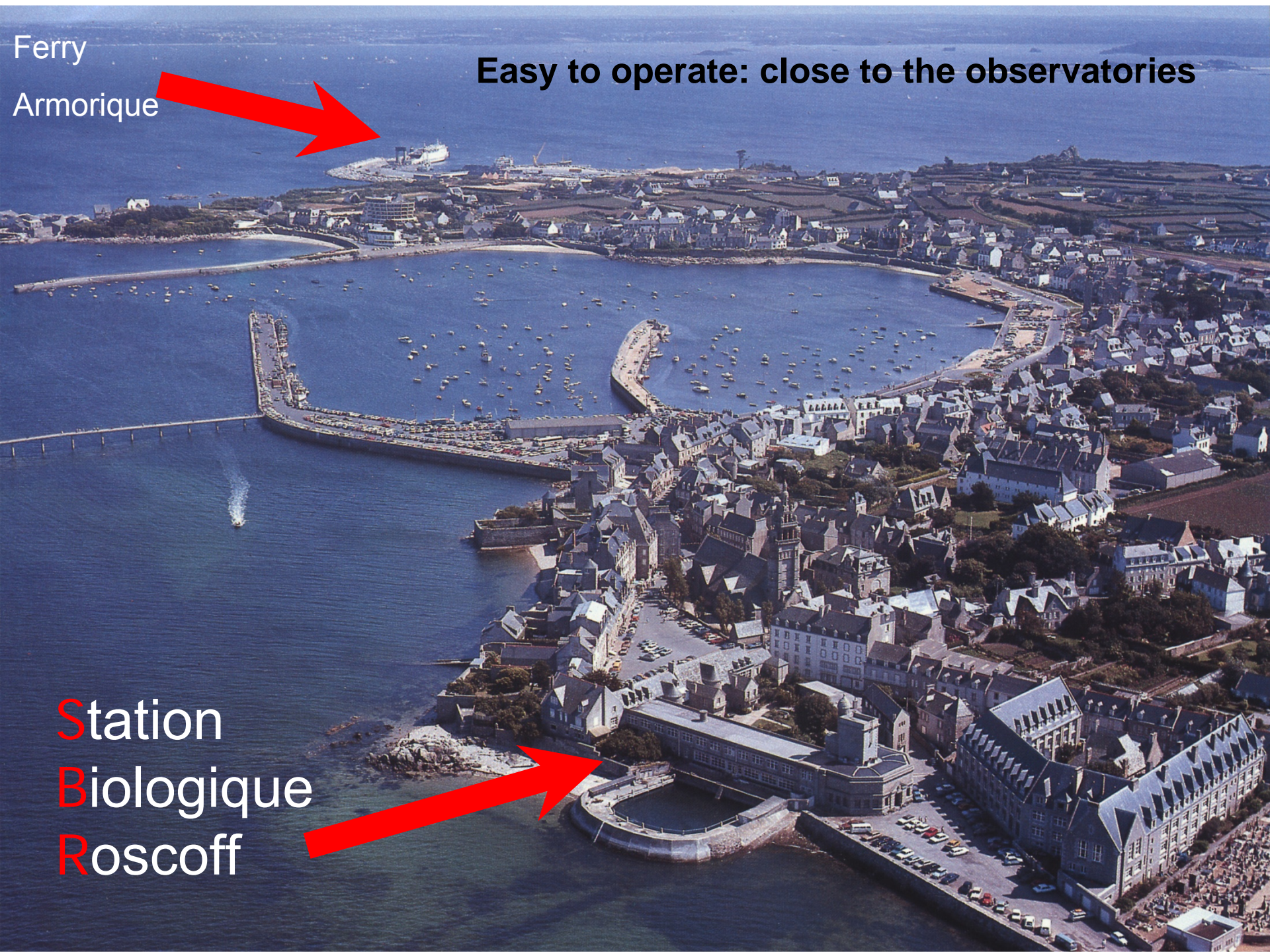


Ferry

Armorique

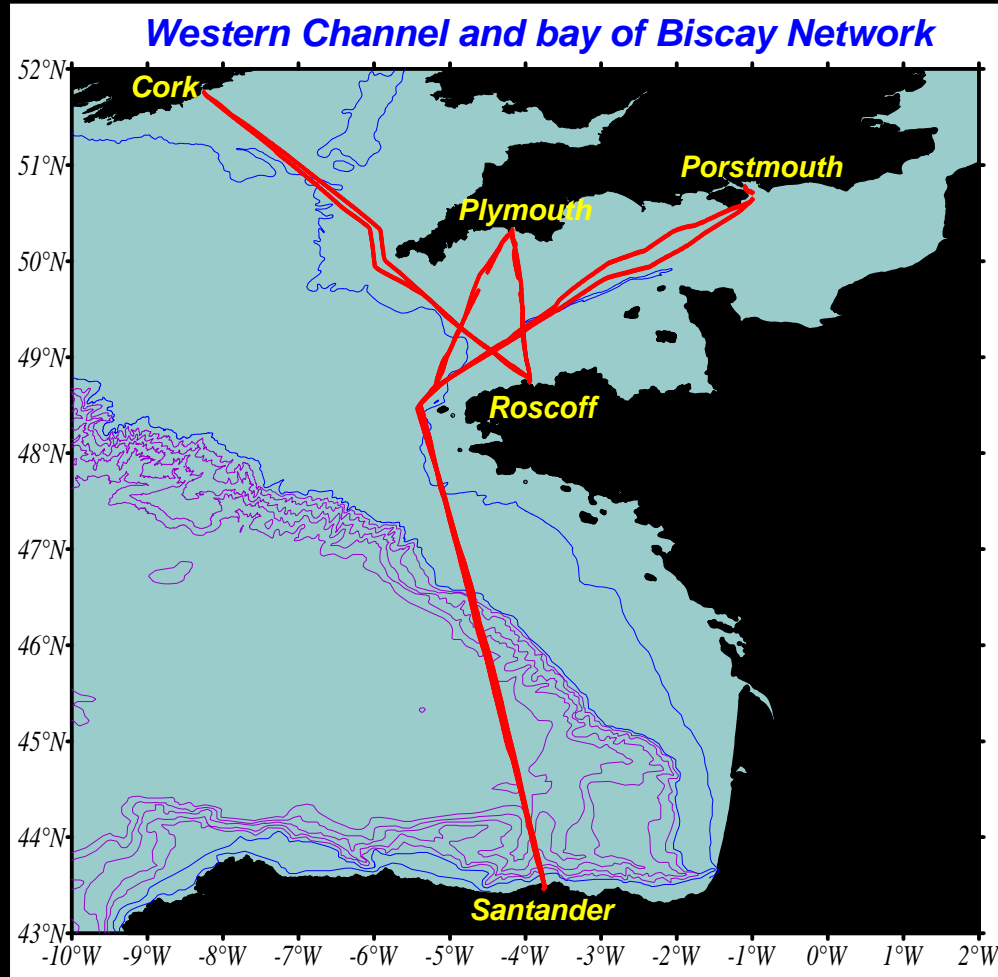
**Easy to operate: close to the observatories**

Station  
Biologique  
Roscoff





# Ferry Box lines in the Western Channel and Bay of Biscay



**MV Armorique**



**MV Pont Aven**

## **Brittany Ferries lines:**

**Armorique** (daily frequency = 2-3 transects)

**Pont Aven** (weekly frequency)

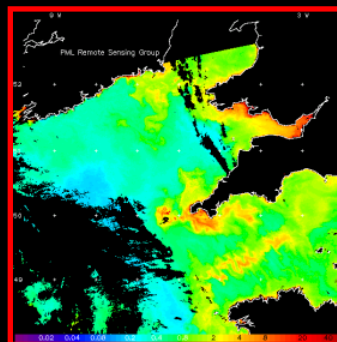
# Measurements along transects in the Western Channel and Bay of Biscay

Continuous measurements of physico-chemical and biological parameters in surface waters



6 parameters:

- Temperature
- Salinity
- Oxygen
- Fluorescence
- Turbidity
- CDOM





# Automatic sampler connected to the ferrybox

**24 bottles (1l)**

- **Refrigerated (4°C)**
- **Remotely piloted from laboratory**

**Analysis of additional parameters:**

- **Nutrients (nitrate, phosphate, silicate)**
- **chlorophyll a, pigments,...**

**Data qualification (salinity, chlorophyll,...)**

**2 transects realized per month with**  
**1 coordinated with CPR sampling**



# Data Base and Website



## HF - High Frequency Data Repository - Campaigns

User  
mhoebeke  
[Logout](#)

Devices

- ASTAN
- Ferry Box Armorique**
- Ferry Box Pont-Aven

▼ List of measurement campaigns/tracks for Ferry Box Armorique

Filter Available Campaigns/Tracks

All  Period Last 30 Days  Date Range From:  To:

Show Only Valid Campaigns/Tracks

[Redisplay](#)

Campaigns/Tracks

Export Records of Selected Rows [as CSV](#) [in Excel](#)

69 items found, displaying 1 to 40. [First/Prev] 1, 2 [Next/Last]

+/-	Name	Start Date	End Date	Charts
<input checked="" type="checkbox"/>	<a href="#">Plymouth to Roscoff</a>	2011-06-21 22:20:00.0	2011-06-22 05:05:00.0	
<input checked="" type="checkbox"/>	<a href="#">Roscoff to Plymouth</a>	2011-06-21 14:32:00.0	2011-06-21 20:07:00.0	
<input checked="" type="checkbox"/>	<a href="#">Plymouth to Roscoff</a>	2011-06-21 07:33:00.0	2011-06-21 12:43:00.0	
<input checked="" type="checkbox"/>	<a href="#">Roscoff to Plymouth</a>	2011-06-20 21:04:00.0	2011-06-21 05:10:00.0	
<input checked="" type="checkbox"/>	<a href="#">Plymouth to Roscoff</a>	2011-06-20 14:26:00.0	2011-06-20 19:24:00.0	
<input checked="" type="checkbox"/>	<a href="#">Roscoff to Plymouth</a>	2011-06-20 06:53:00.0	2011-06-20 12:09:00.0	
<input checked="" type="checkbox"/>	<a href="#">Plymouth to Roscoff</a>	2011-06-19 22:14:00.0	2011-06-20 04:44:00.0	
<input checked="" type="checkbox"/>	<a href="#">Roscoff to Plymouth</a>	2011-06-19 14:59:00.0	2011-06-19 20:08:00.0	

Data sources

Data transects







**Website:**

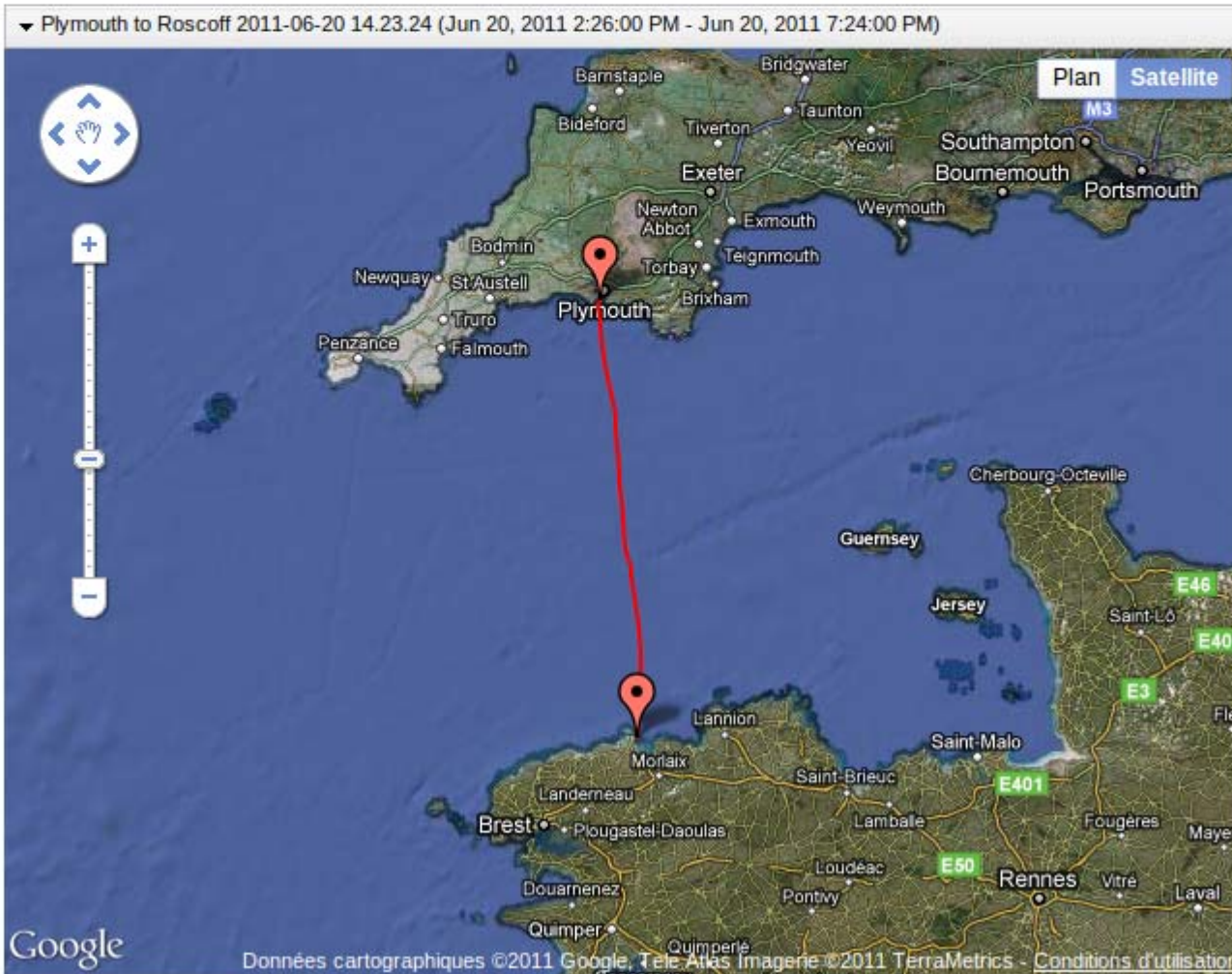
**Visualisation of the ferry transects**

**Visualisation of spatial evolution of variables along the transects**

[View Track Data](#)
[View Aggregated Track Data](#)

[Other Data Sources](#)
[Examine Data](#)

juin						
L	M	M	J	V	S	D
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3
4	5	6	7	8	9	10
2010		2011		2012		

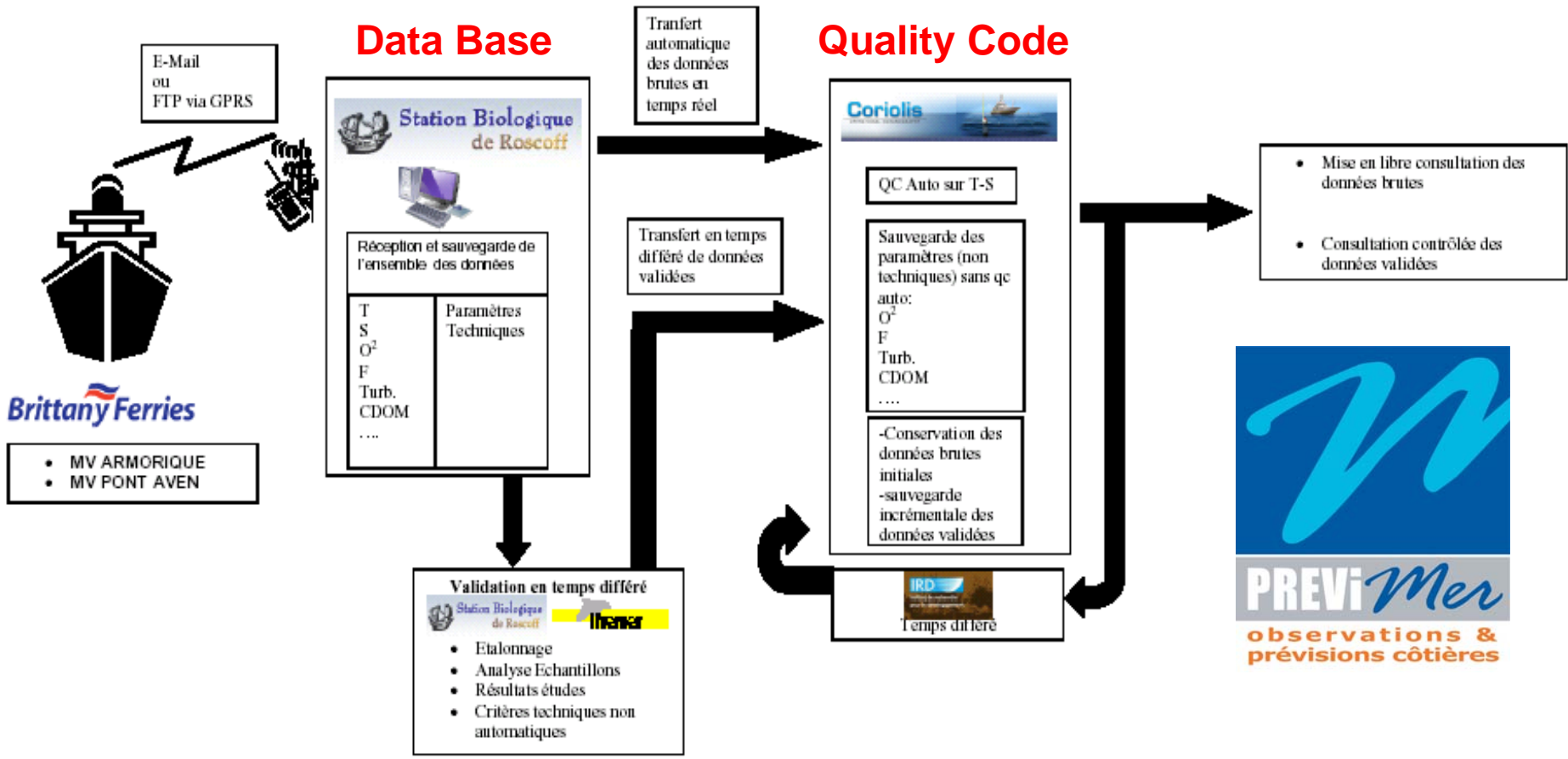


# Real Time Data Transmission to Operational Oceanography (Coriolis Data Center)

IFREMER-RDT-SMI-Plégou

PROJET NAVOP  
Ferrybox sur MV ARMORIQUE et PONT AVEN

## Synoptique de la gestion des données

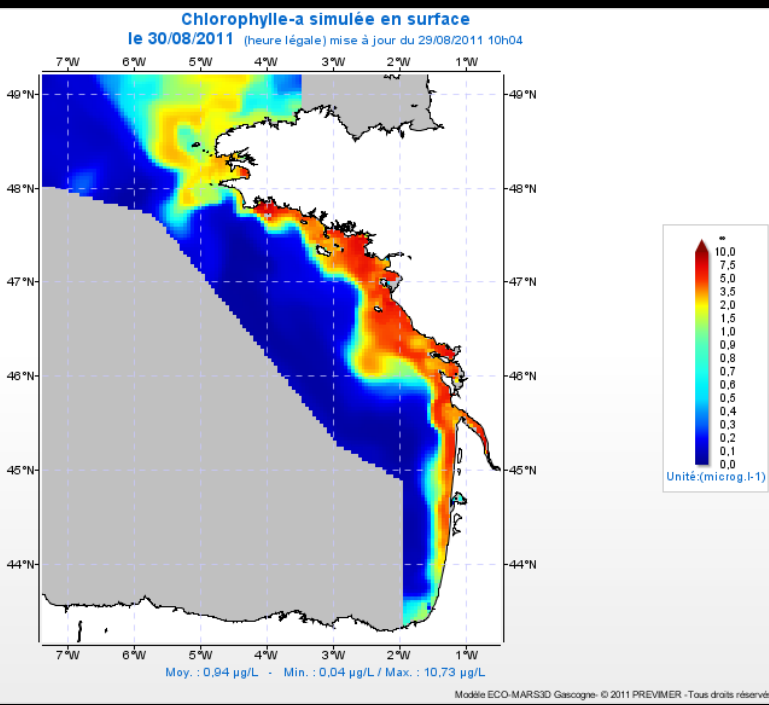
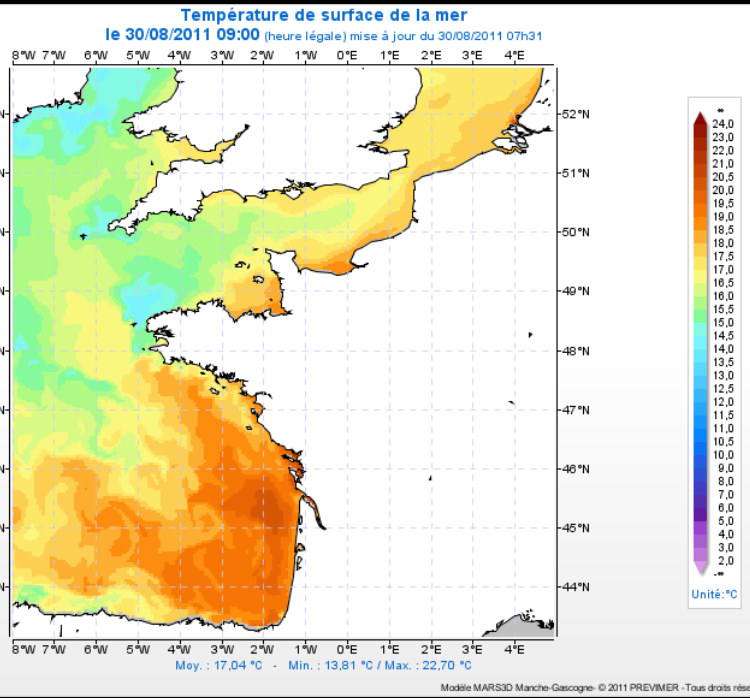
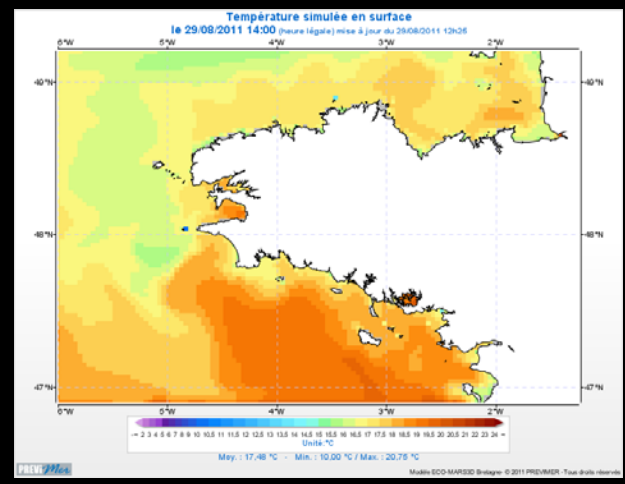




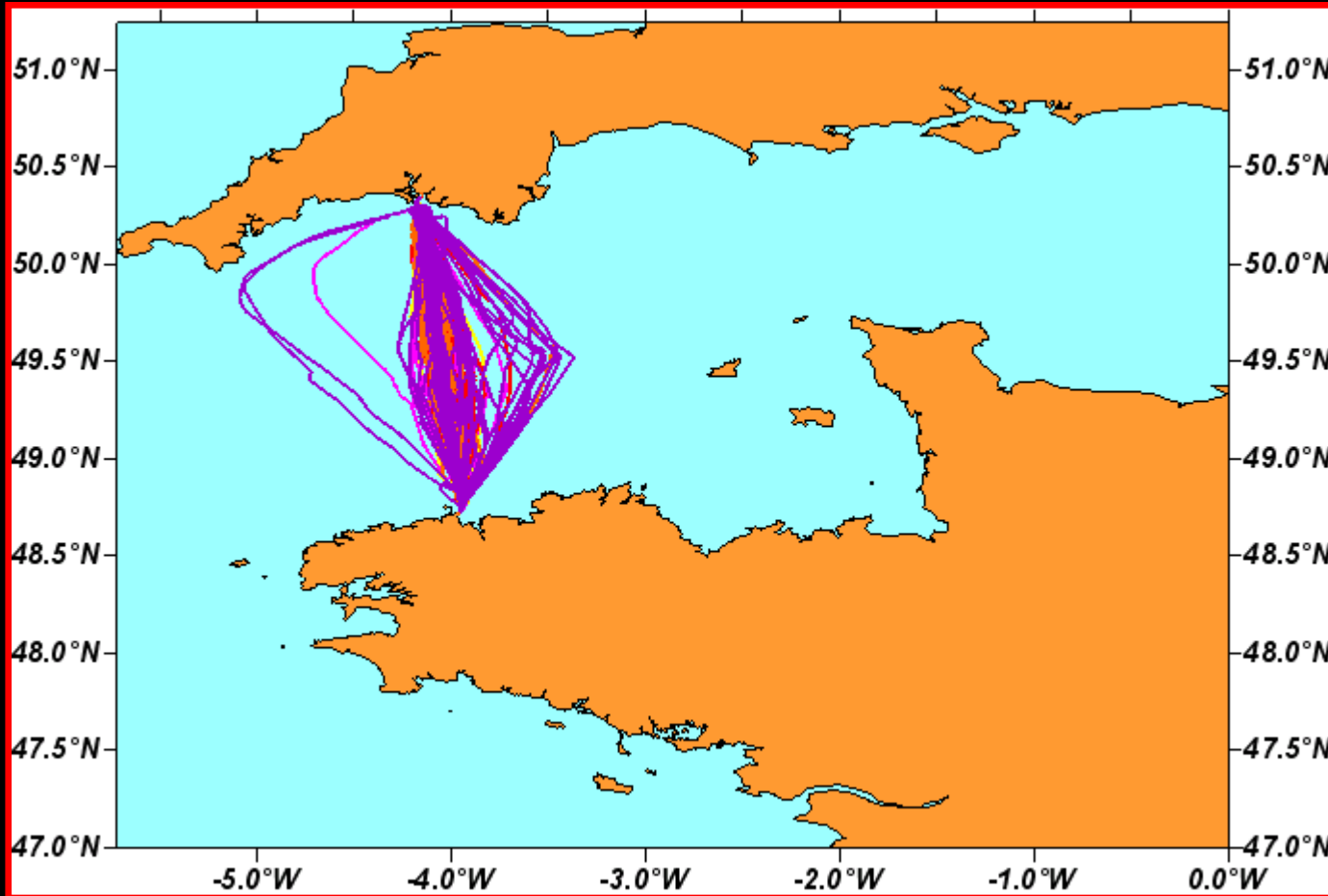
# Data assimilation in models for coastal prevision

## Exemples :

Prediction of the surface temperatures and chlorohyll a fields in the bay of Biscay and around Brittany for 30 August 2011



**MV Armorique transects realized between Roscoff and Plymouth  
from 28 may 2010 and end of october 2010**



**Total of 233 transects for the first  
year deployment in 2010**



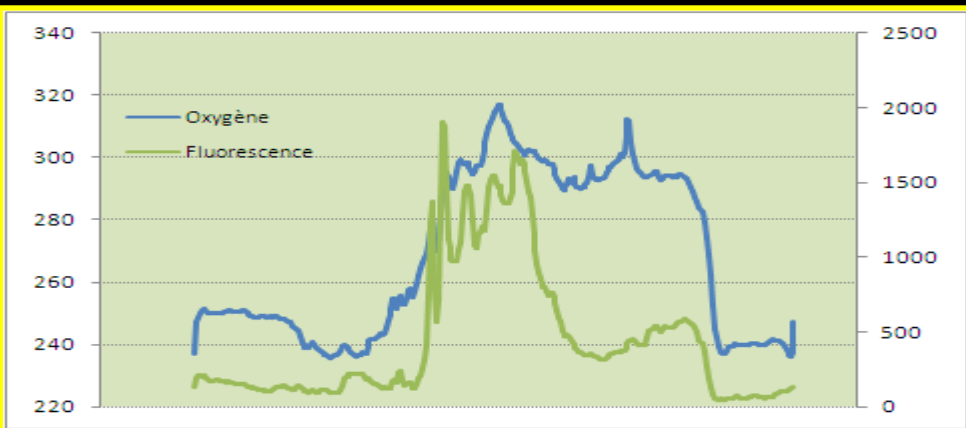
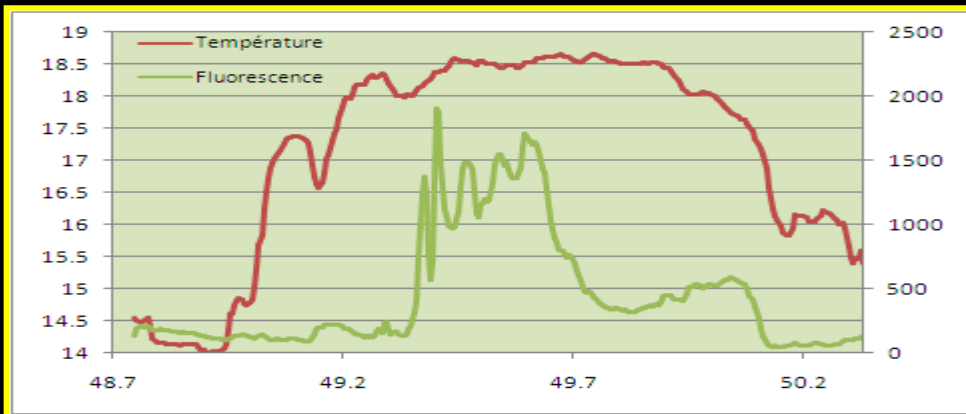
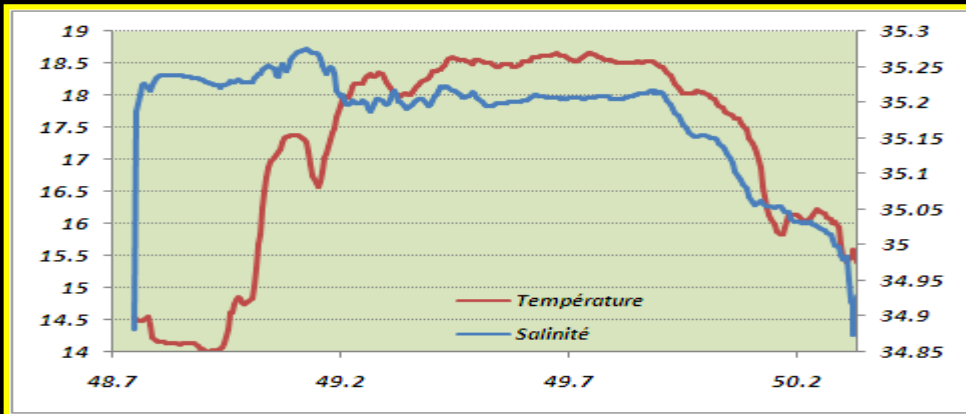
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## Exemple: 9th july 2010 transect



### Data Acquisition :

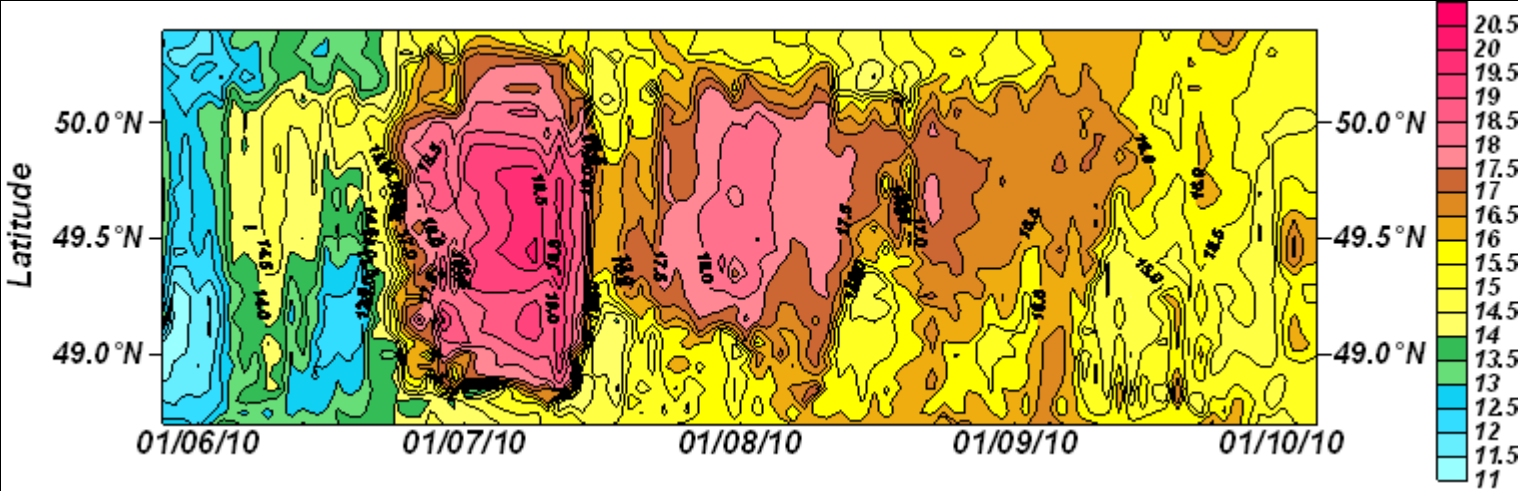
- Acquisition frequency = 1 minute
- Transect duration = about 6h
- Number of measurements = 360 for each transect
- Transect frequency = 2 daily transects

### Results :

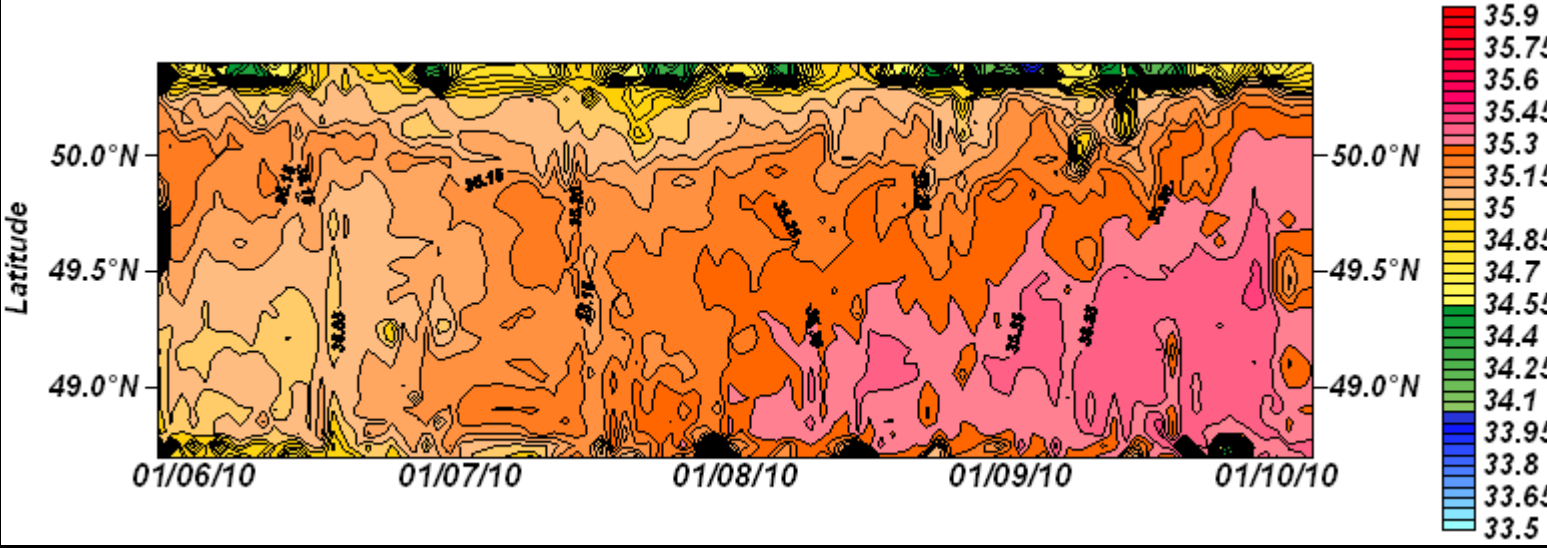
- Observation of **frontal systems** in the northern and southern parts of the Western Channel
- **Maximums of fluorescence** associated to phytoplankton in the center of the Western Channel corresponding to temperature gradients
- **Maximums in dissolved oxygen** associated to maximums in fluorescence

# Temporal Evolution along the Roscoff Plymouth transect during 2010

99138  
measurements



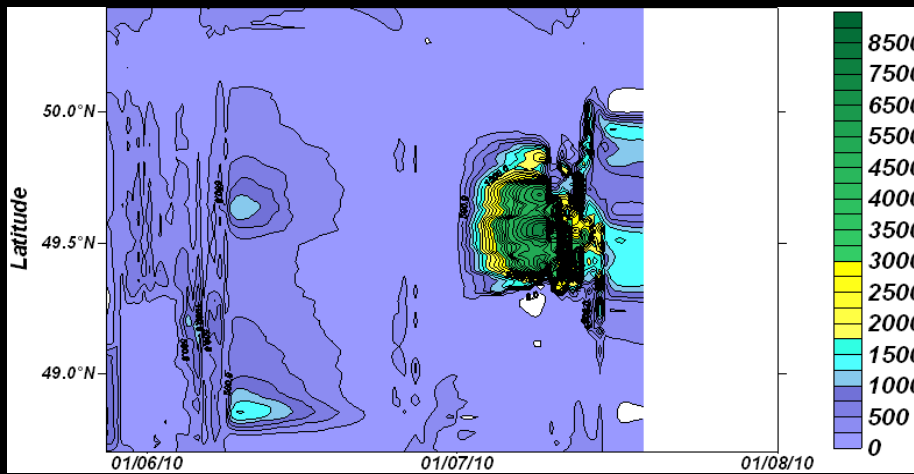
Temperature



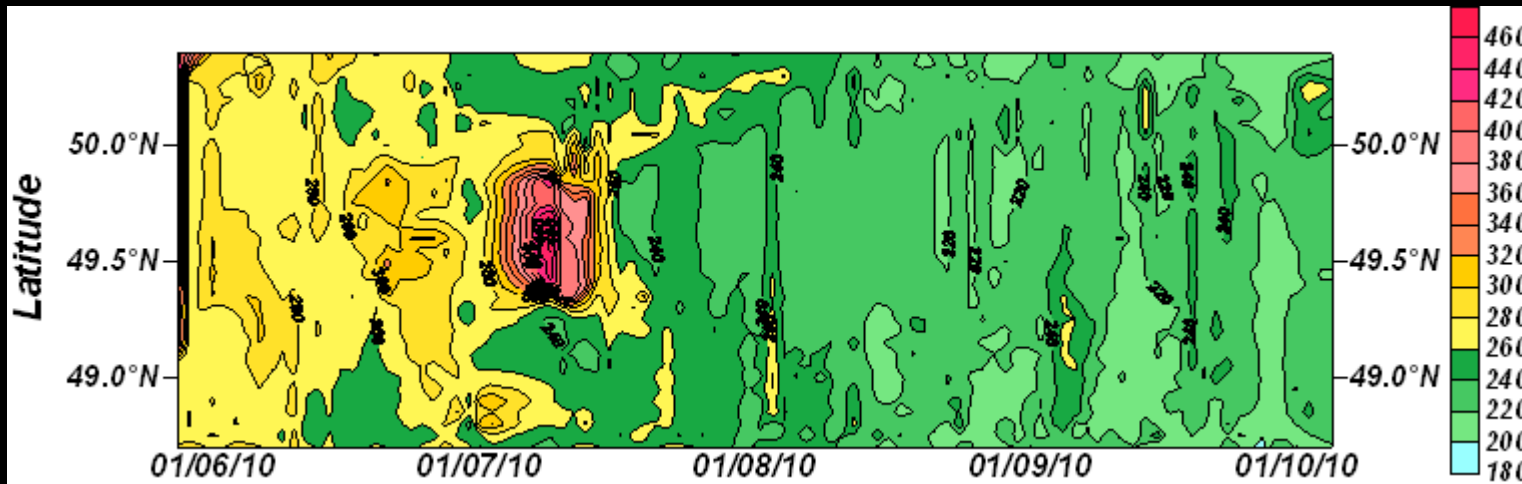
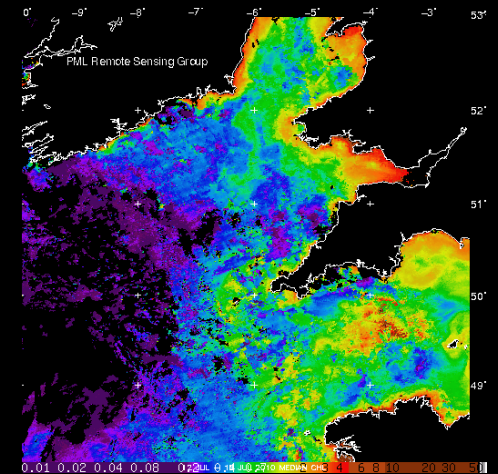
Salinity

Temperature maximums observed in early July and in August interrupted by a strong storm  
Regular increase in salinity beginning first in the southern side of the Western Channel and extending progressively towards the center of the Channel  
Permanent presence of low salinity waters off Plymouth



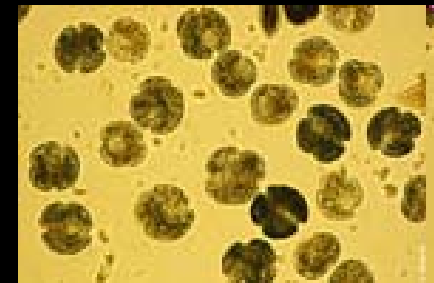


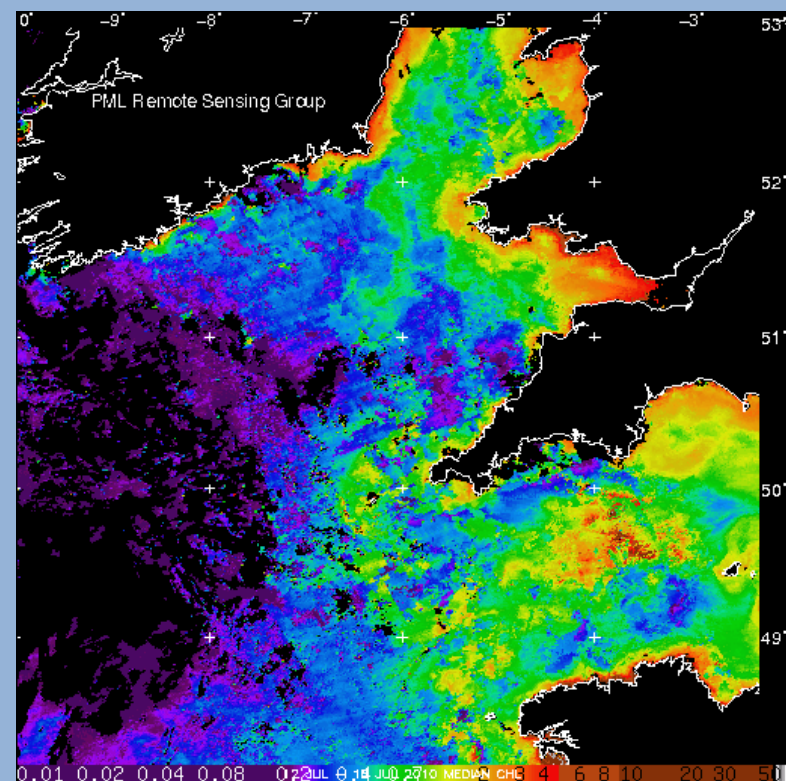
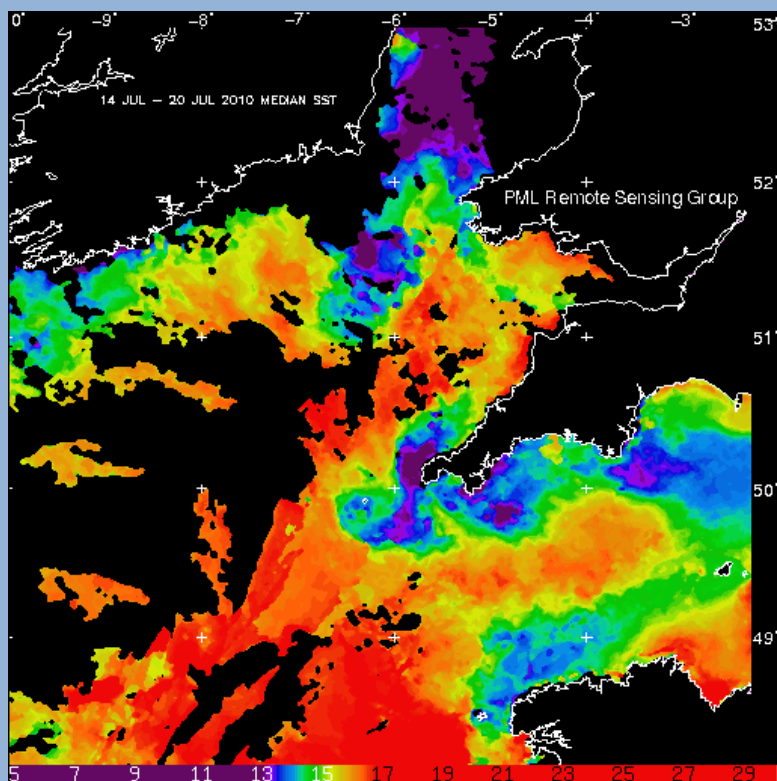
Fluorescence



Oxygen

Fluorescence maximum in early July (*bloom of the dinoflagellate Karenia mikimotoi*) associated to the temperature maximum  
 Maximum of concentrations in dissolved oxygen associated to the fluorescence maximum

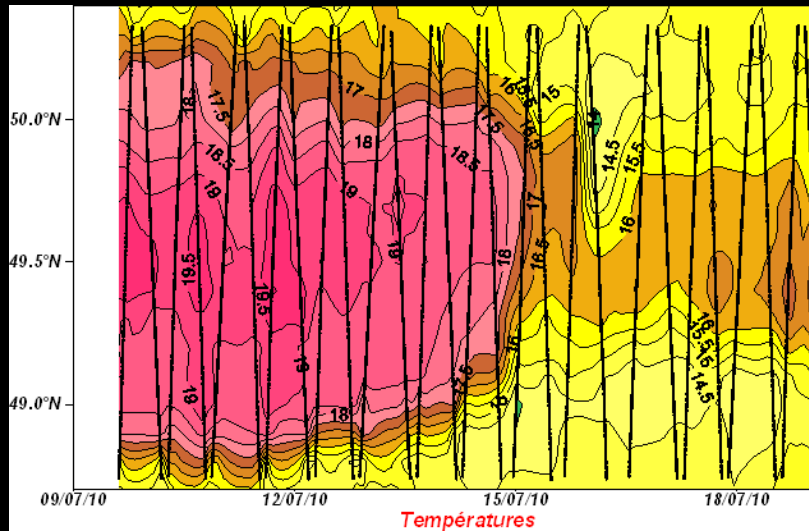




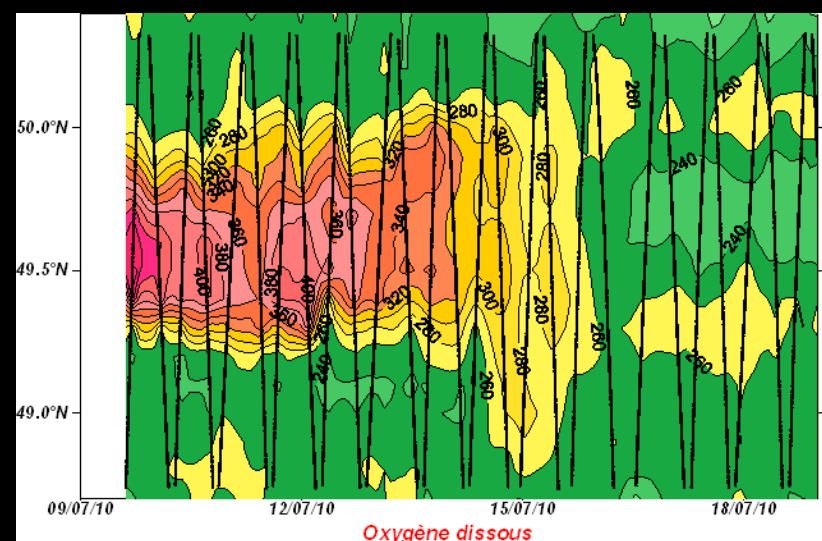
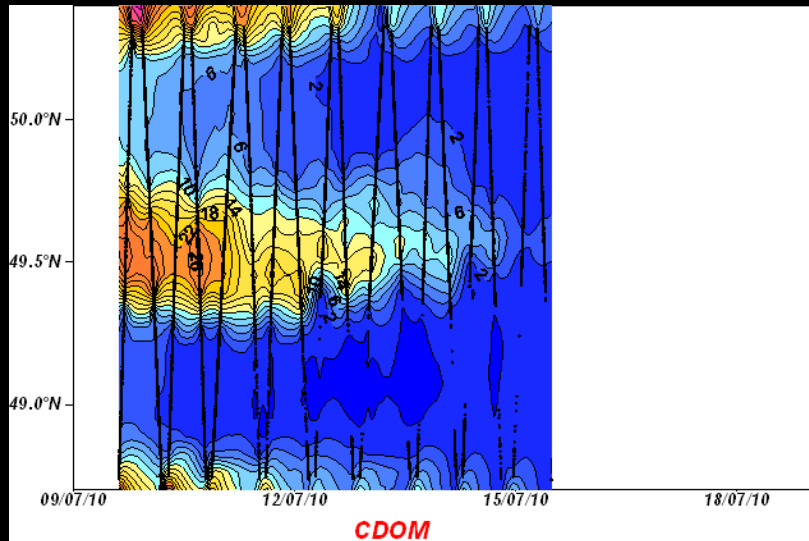
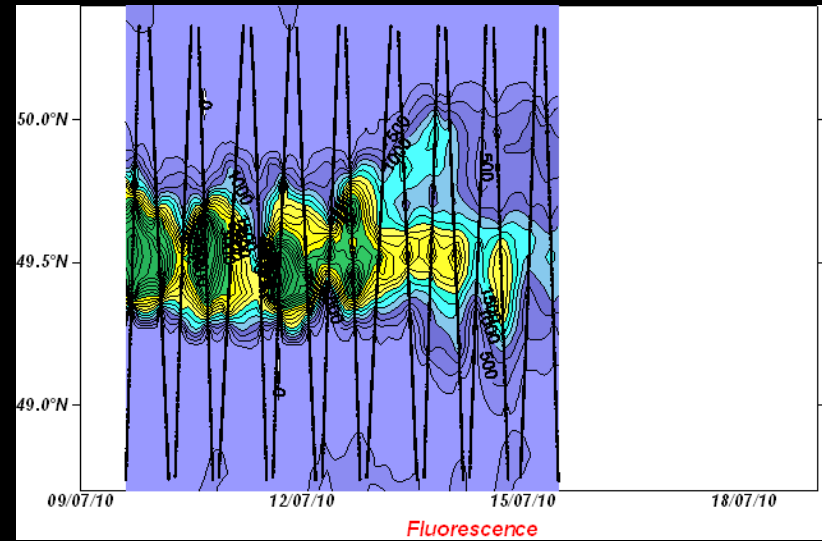
**Satellite Images (Infra Red and water colour from 14th July 2010 (data PML)).**

- Observation of warm waters in the center of the Western Channel and of frontal systems delimiting stratified and well-mixed waters,
- of a maximum of chlorophyll associated to the frontal systems (development of a *Karenia mikimotoi* bloom)
- Complementarity of satellite imagery and continuous surface measurements by ferrybox systems

## Temperature



## Fluorescence



## CDOM

## Dissolved Oxygen

Access to the *daily variability* with High Frequency measurements  
Maximum in fluorescence well correlated with high concentrations in CDOM and dissolved oxygen



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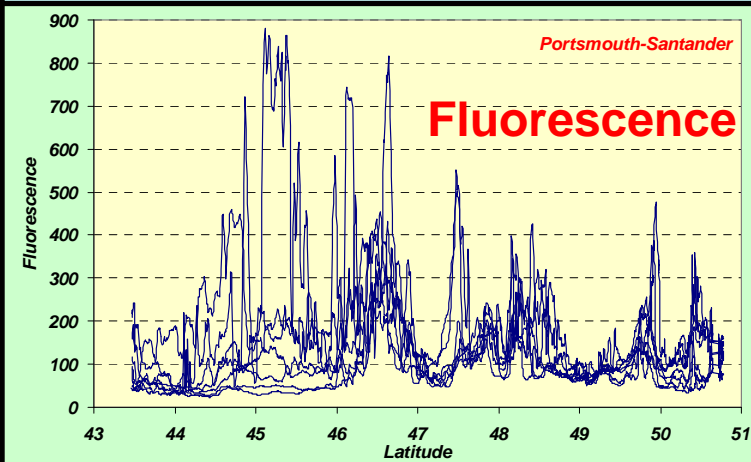
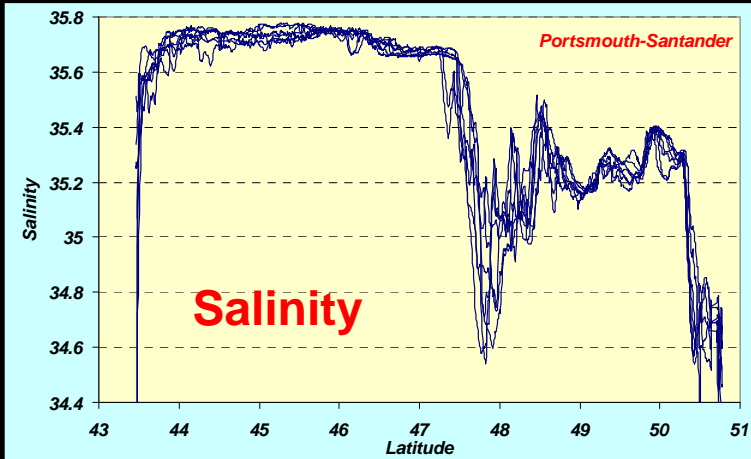
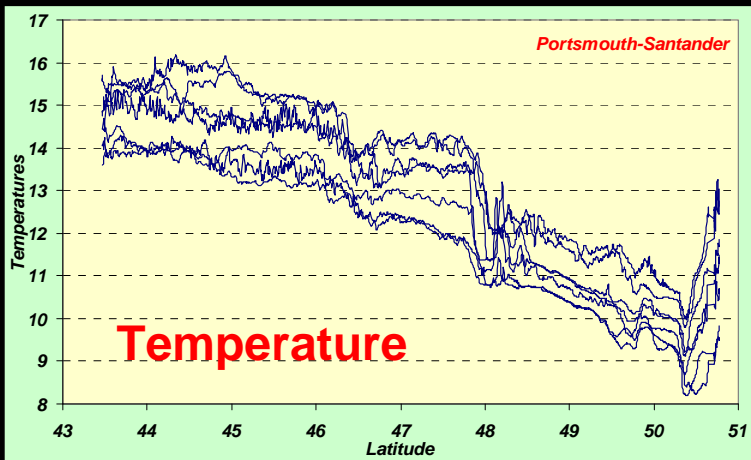


# Examples of results obtained in april 2011 along the line Portsmouth to Santander

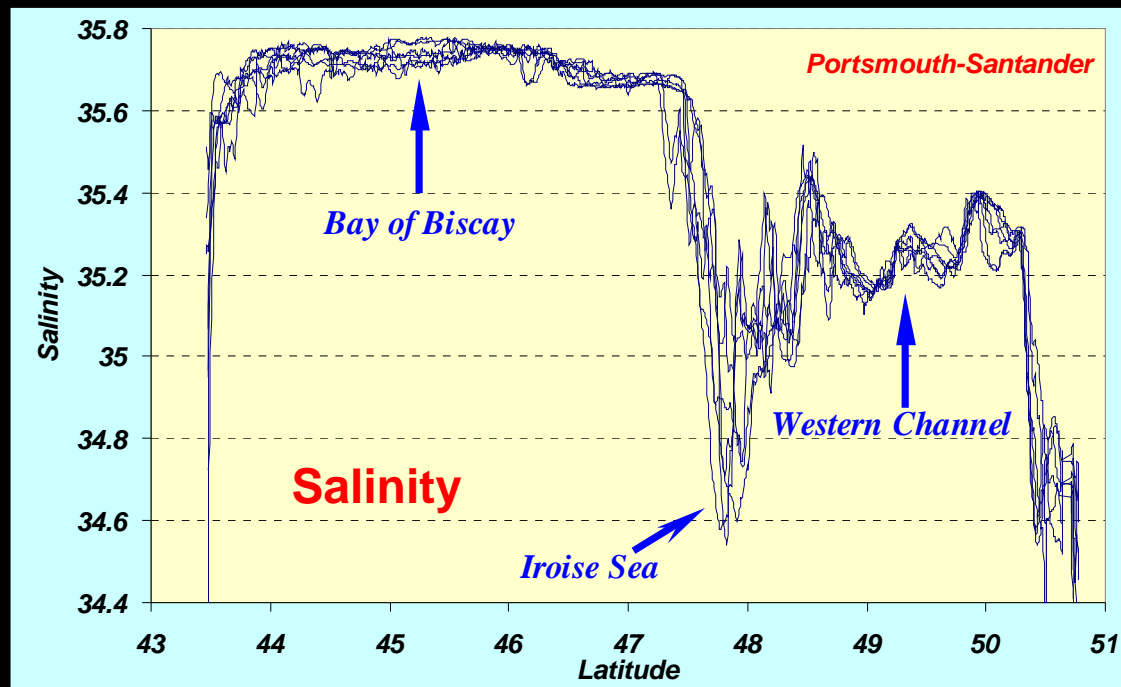
General increase of temperatures along the section during April

Low salinities values at 48°N

Observation of numerous peaks of fluorescence with maximums values observed in the bay of Biscay

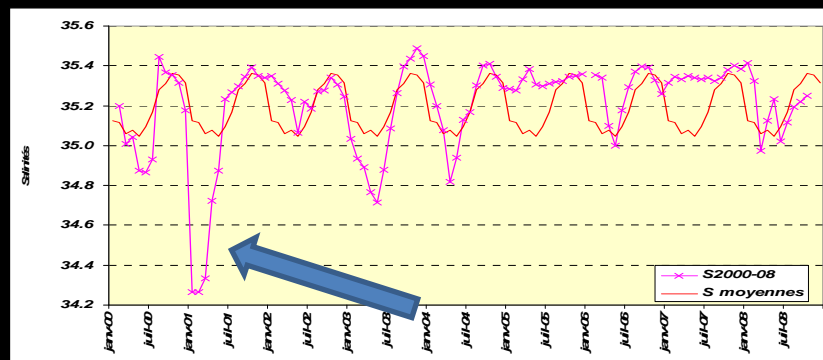






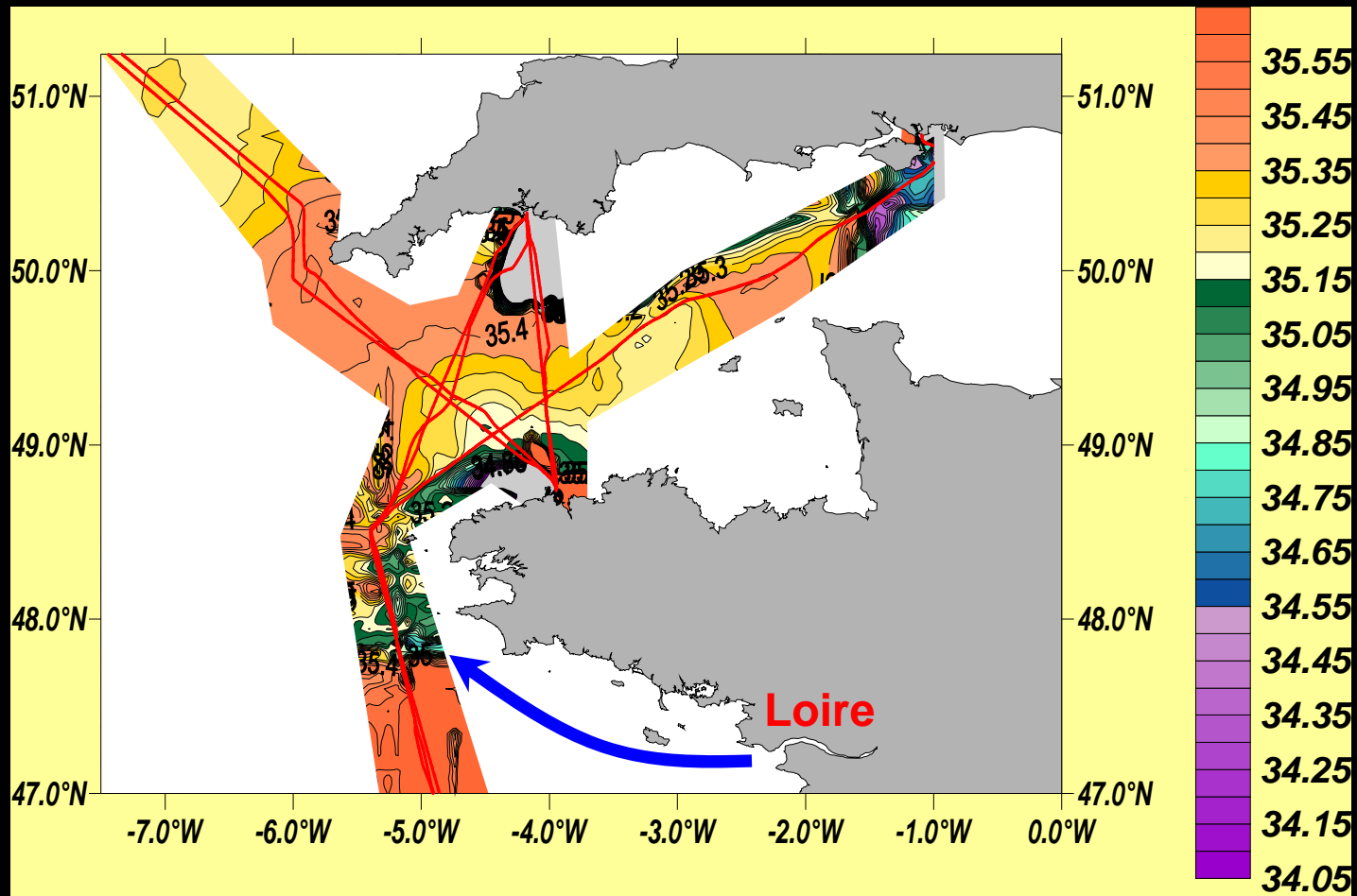
Minimum of salinity observed at 48°N in the Iroise Sea  
 derived from the Loire river outputs

Mean river discharge < 450 m<sup>3</sup>/s, 3 times lower than mean April  
 river discharge



Salinity evolution off Roscoff between 2000 and 2010

# Sea Surface Salinity in the Western Channel (1-6 April 2011)



**Presence of relatively low salinity waters off the west and north coast of Brittany :**

**Data from the different sections will give access to the spatial extension of the Loire river influence**

## Summary

- Observation of a bloom of the dinoflagellate *Karenia mikimotoi* in the Western Channel in July 2011 associated with high oxygen values
- Interruption of the phytoplankton bloom by a strong storm
- Regular increase of the salinity in the southern part of the Western Channel extending progressively northward to the center of the Western Channel
- Spatial coverage by different lines will give access to a better definition of the spatial extension of the low salinity waters originating from the Loire river in the Western Channel



*Thank you*

