



**First interannual experiments
using MARS3D model**

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Model configuration

	BACH4000
Code	MARS V10
Resolution	4 km / 40 levels
Domain	41°N – 52.5°N / -15°W – 4°E
Vertical coordinates	Generalized sigma
Bathymetry	Composite
Runoff	95 rivers
Vertical mixing	k-epsilon (Rodi et al., 1990)
Atmospheric forcings	ERA40 (1958-1978) and ERA-INTERIM (1979-2010)
Oceanic forcings	<ul style="list-style-type: none">• OGCM : ORCA025-GRD100 in hindcast mode at Open Boundaries• Tide : FES2004 harmonic composition
Bottom friction	Quadratic bottom friction (Z_0 formulation)
Bulk Formula	Solar flux (Gill, 1982) Infrared flux (Swimbank – EDF, Agoumi thesis) Turbulent fluxes: <ul style="list-style-type: none">- Clark et al. (1995) – latent flux + modifications- Elliot and Clark (1909) – sensible flux + modifications
Viscosity	implicit

The CINES environment

Implementation

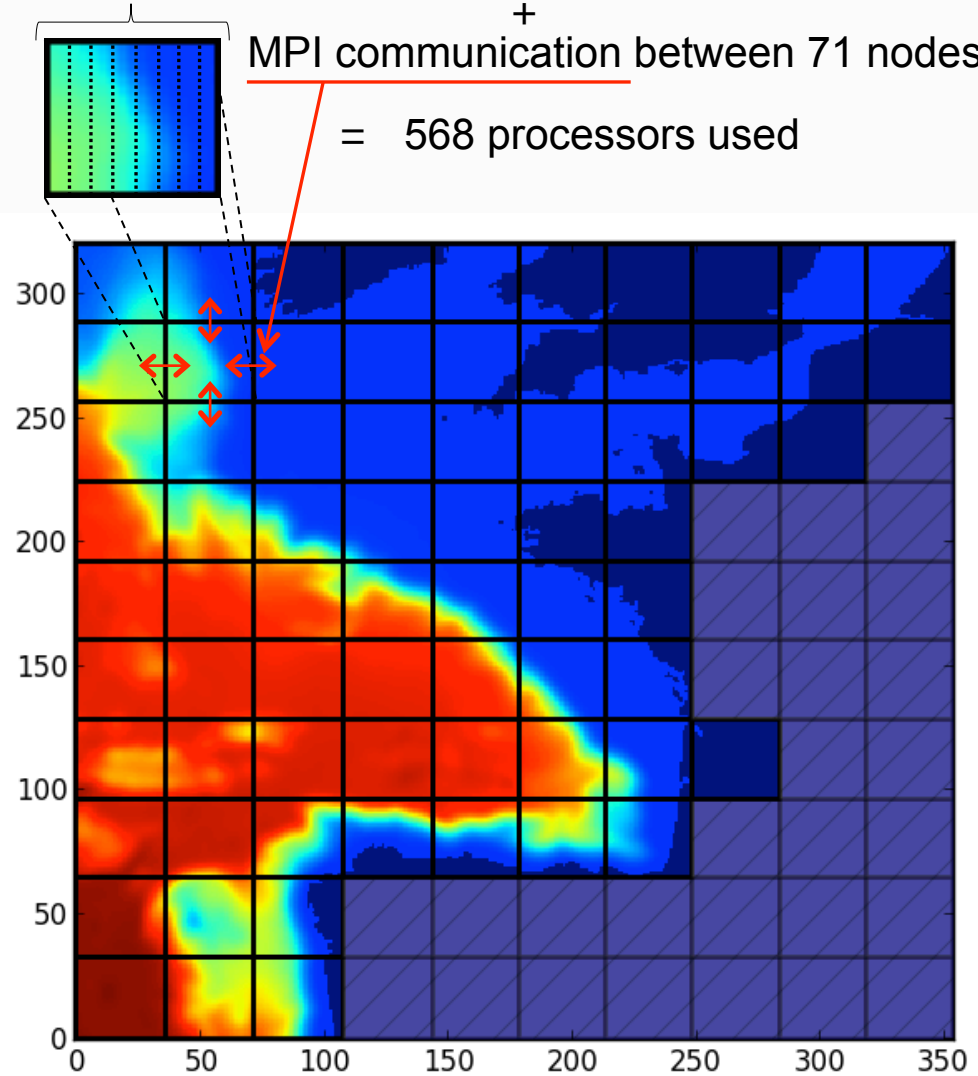
- Implementation in CINES (Jade)
- Domain decomposition
- Input/output issues
- Preliminary experiments – 10 years
- 53 years simulation – 1day output

OPENMP parallelization (8 processors by node)

+

MPI communication between 71 nodes

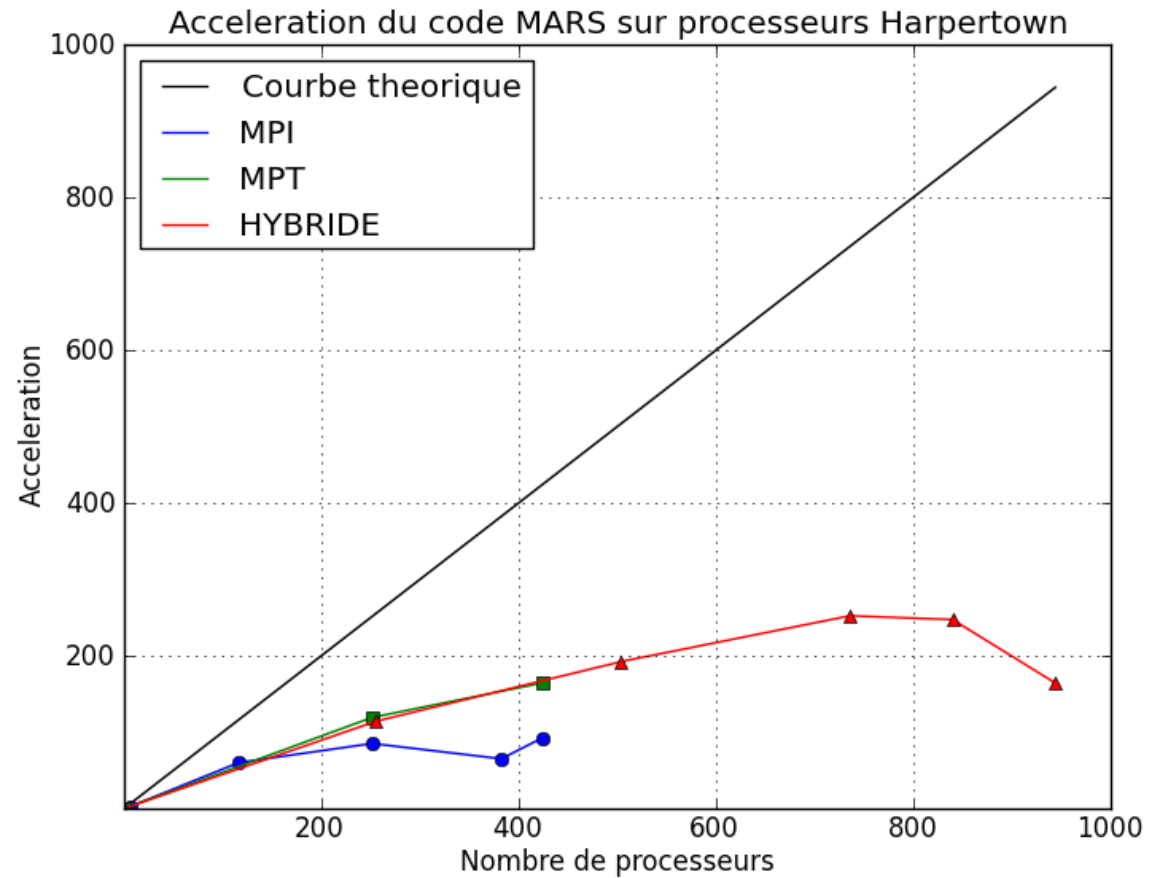
= 568 processors used



Domain decomposition for parallelizing in hybrid mode (OPENMP + MPI) over 568 procs.

The CINES environment

Performance tests



Experiments

Configuration	Run type	Run period
BACH4000-50	sponge layer and relaxation	04/01/2000 to 31/12/2010 (11 years)
BACH4000-51	no relaxation	04/01/2000 to 31/12/2010 (11 years)
BACH4000-52	no tide	04/01/2000 to 26/10/2005 (5 years and 10 months) *
BACH4000-53	no river	04/01/2000 to 25/10/2006 (6 years and 10 months) *
BACH4000-54	no precipitation	04/01/2000 to 07/03/2010 (10 years and 3 months) *
BACH4000-55 (same as BACH4000-50)	sponge layer and relaxation	06/01/1979 to 22/06/1994 (15 years and 6 months) *
Sol_BACH9	Tide and Demerliac filtering	03/01/2001 to 08/11/2003 (2 years and 11 months)

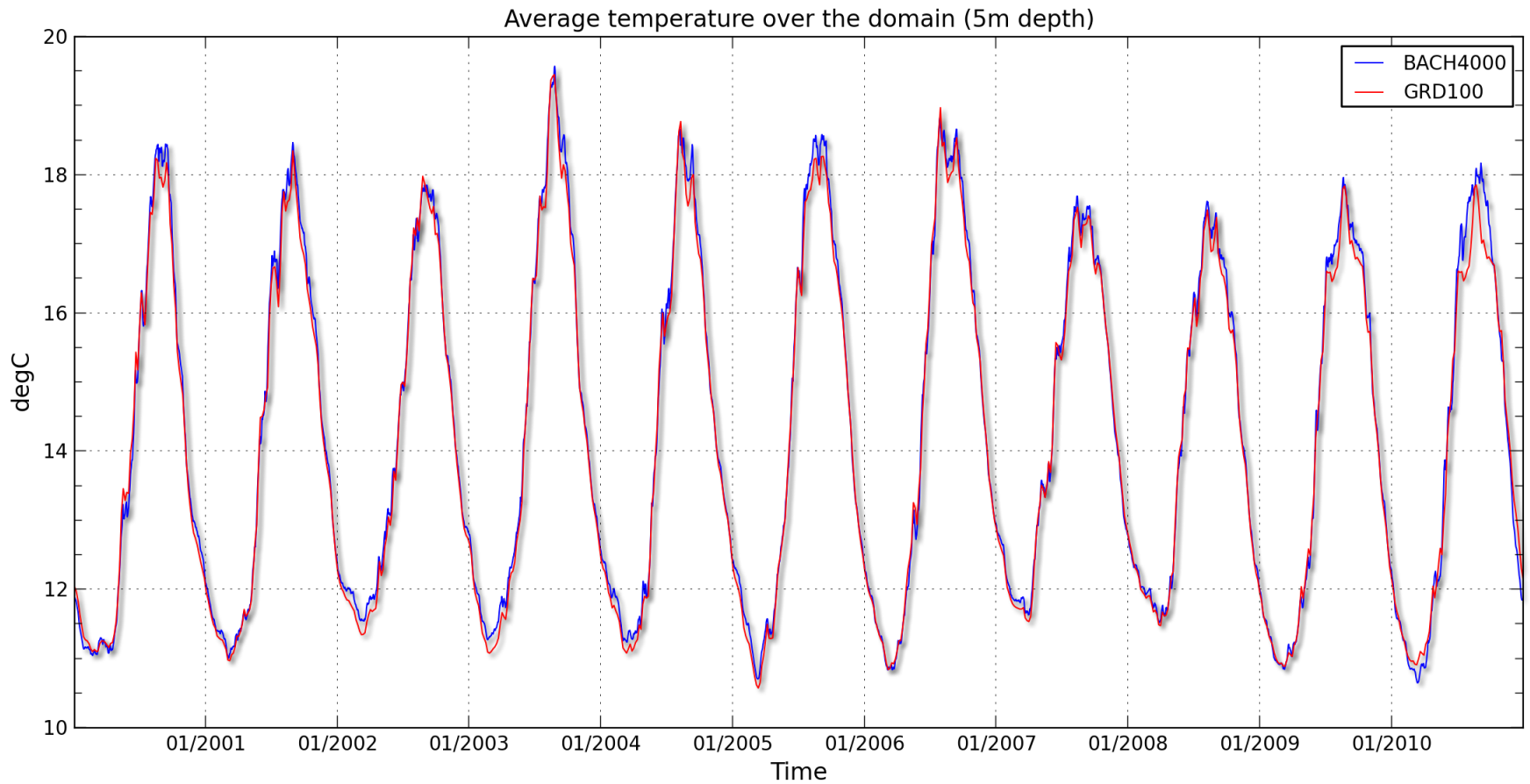
* : *stopped simulations due to technical problems on CINES computer (Jade).*

Target period: 1958-2010

Preliminary results ...



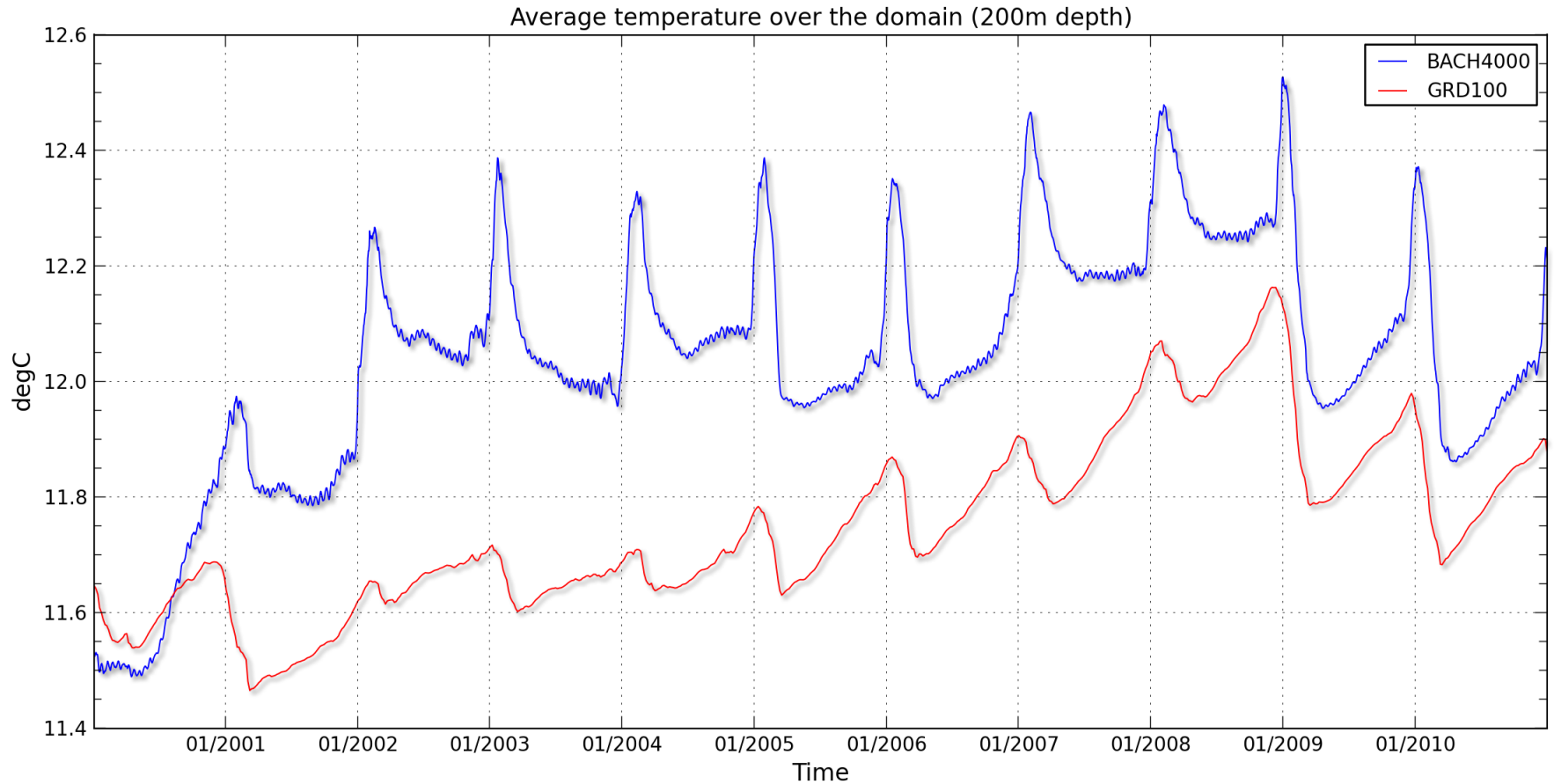
10 years of surface temperature ...



BACH4000: MARS3D simulation

GRD100: DRAKKAR $\frac{1}{4}^\circ$ global simulation (NEMO)

What's happening at 200m depth ?

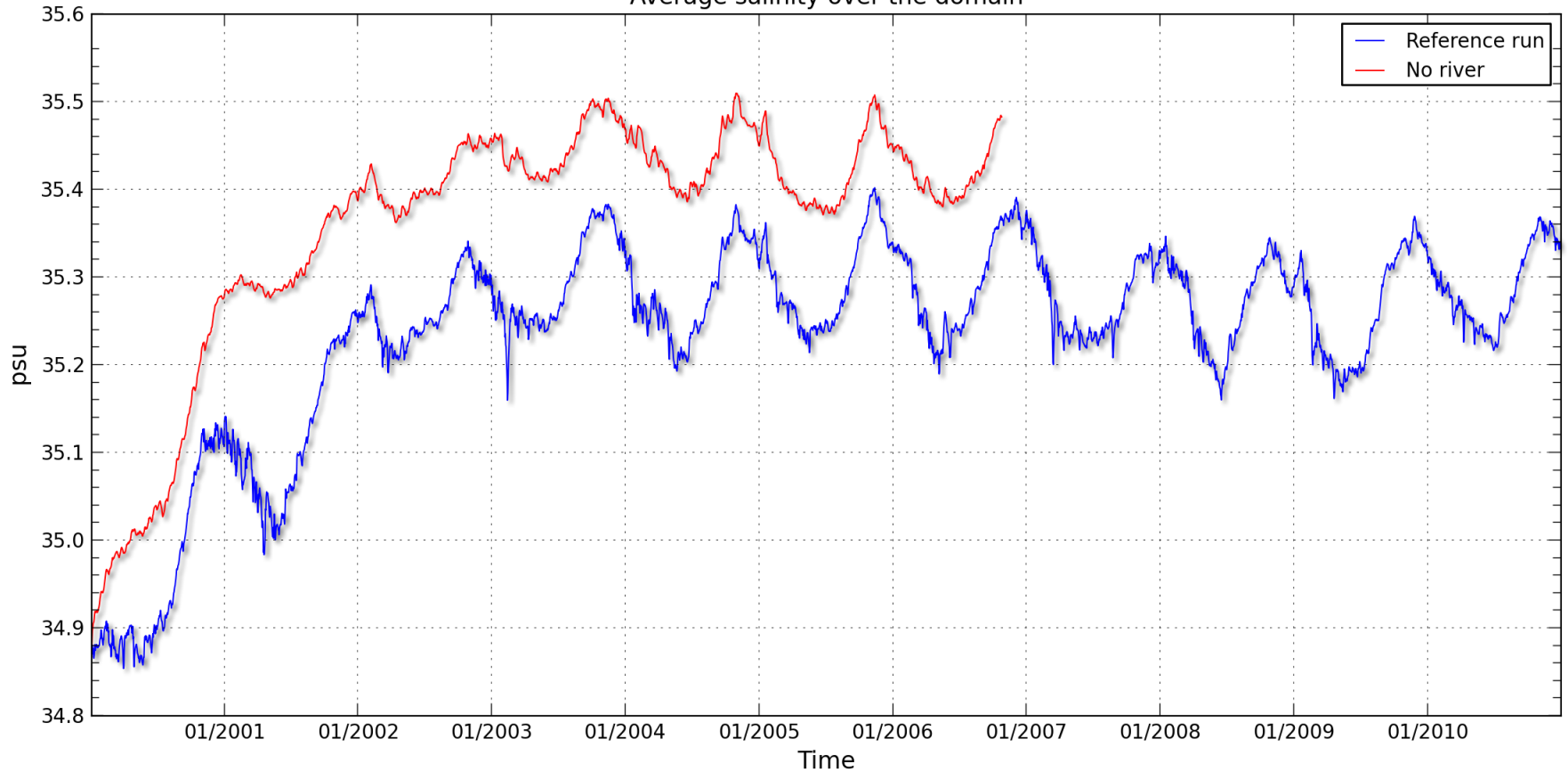


BACH4000: MARS3D simulation
GRD100: DRAKKAR $\frac{1}{4}^\circ$ global simulation (NEMO)

First sensitivity exploration: effect of rivers (1/2)

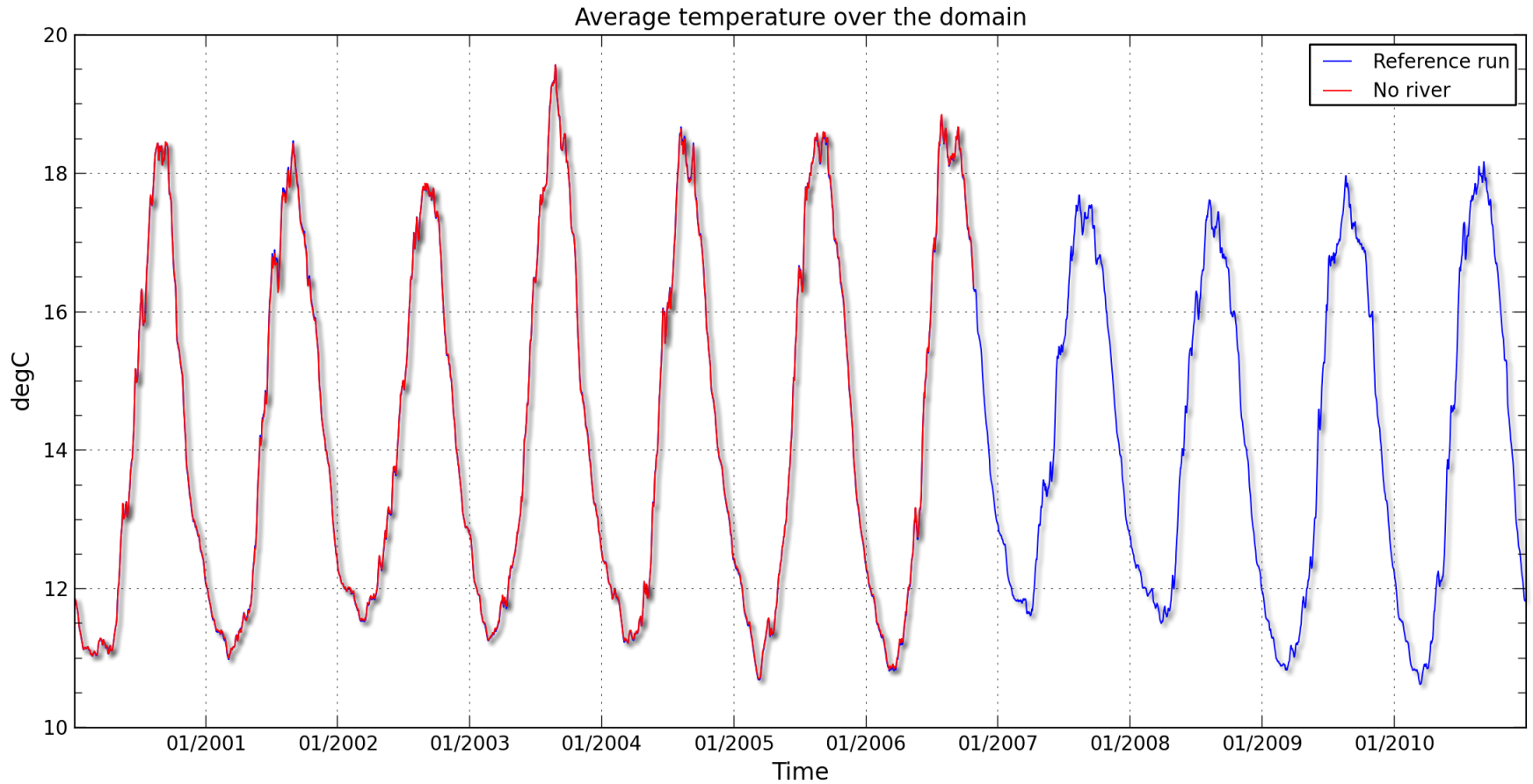
Salinity

Average salinity over the domain

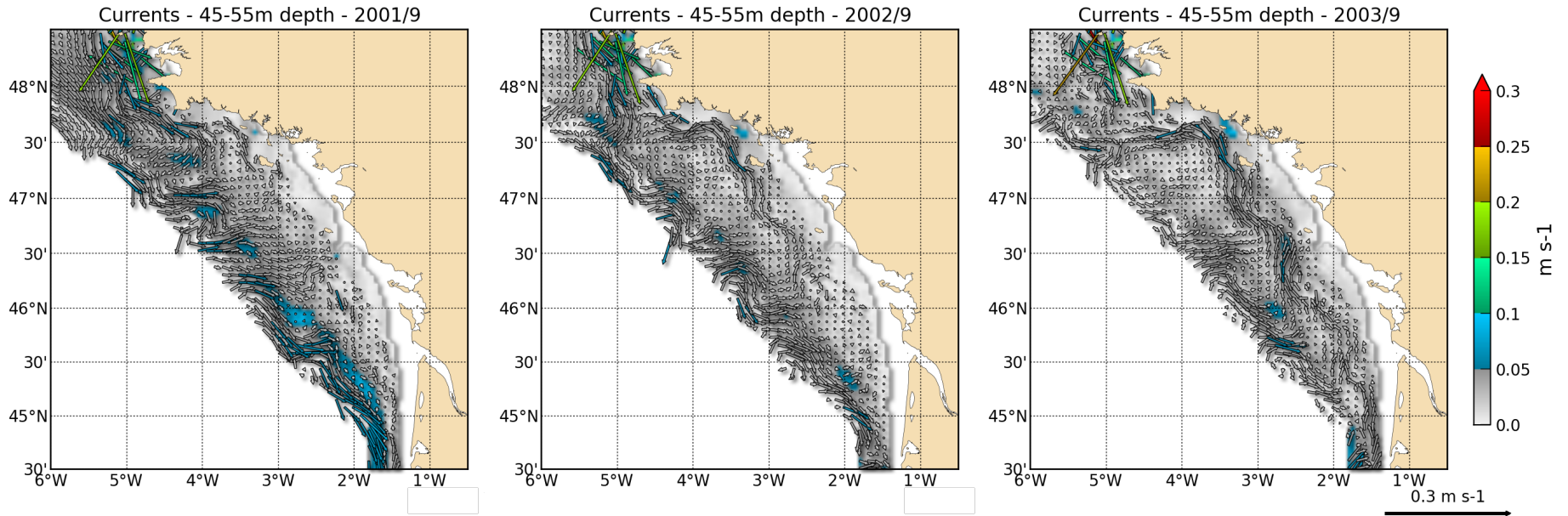


First sensitivity exploration: effect of rivers (2/2)

Temperature



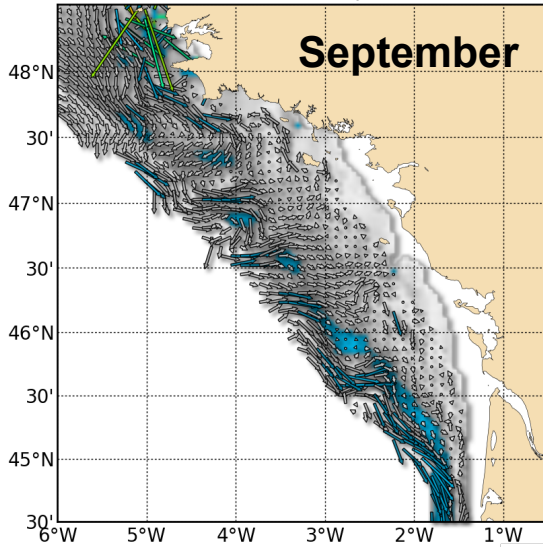
And the current ? *the autumn current*



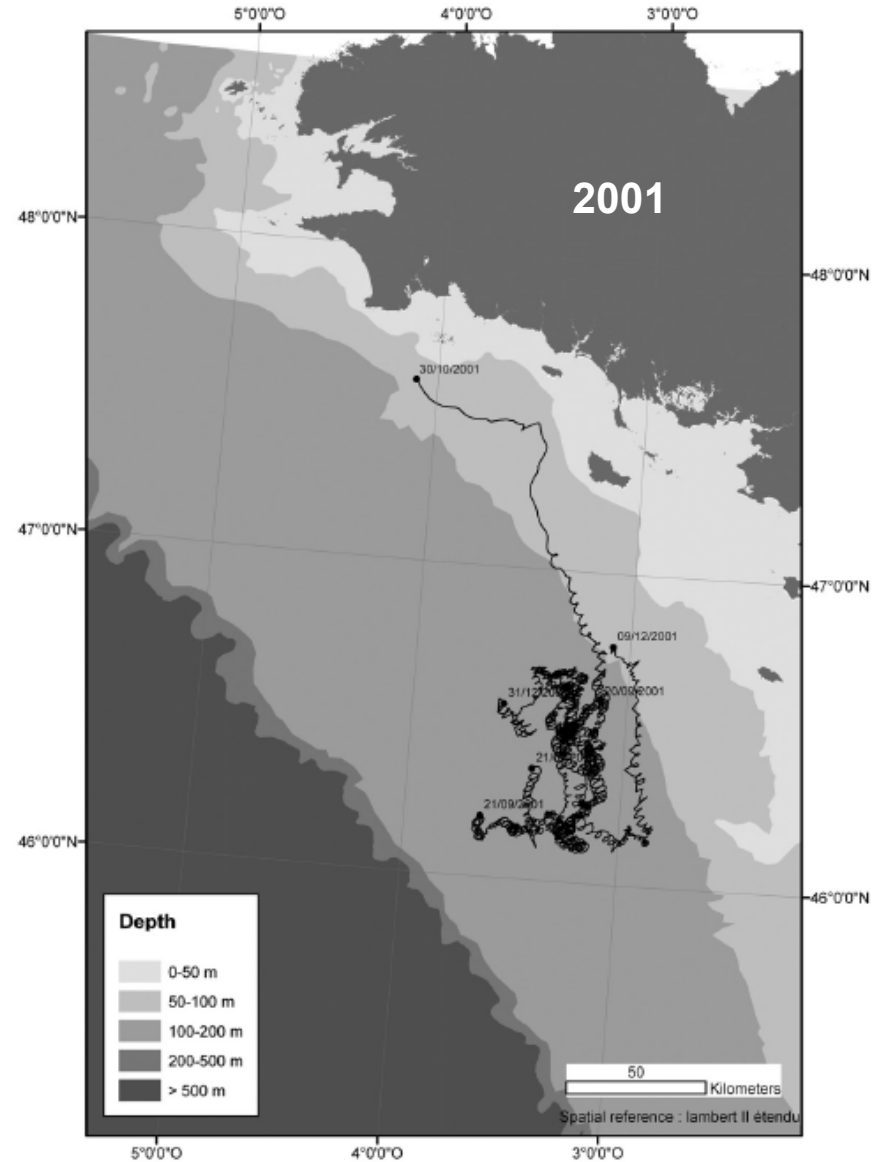
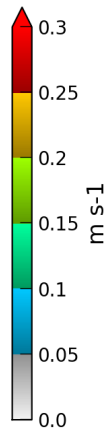
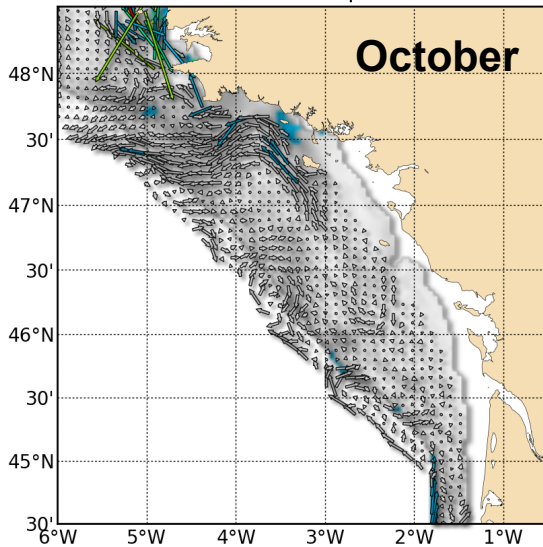
- Filtered (Demerliac) currents -

And the current ? *the autumn current*

Currents - 45-55m depth - 2001/9

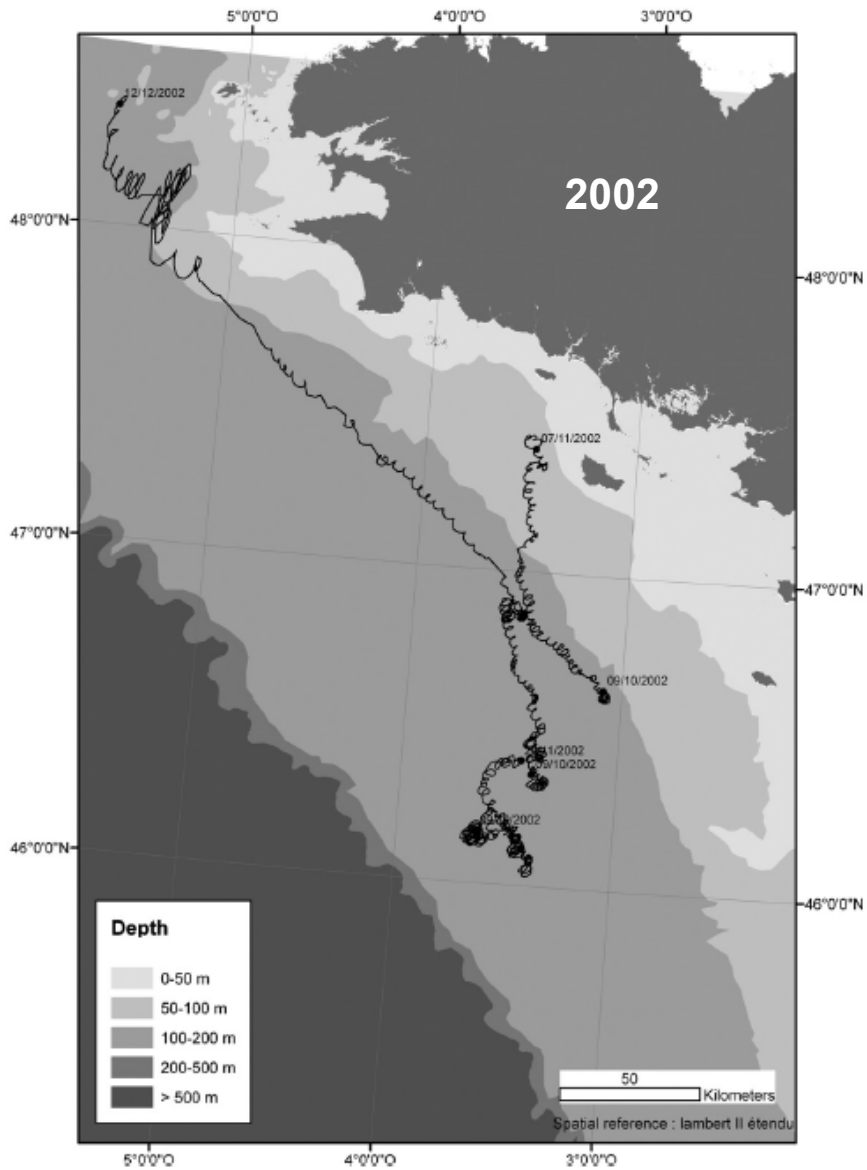


Currents - 45-55m depth - 2001/10

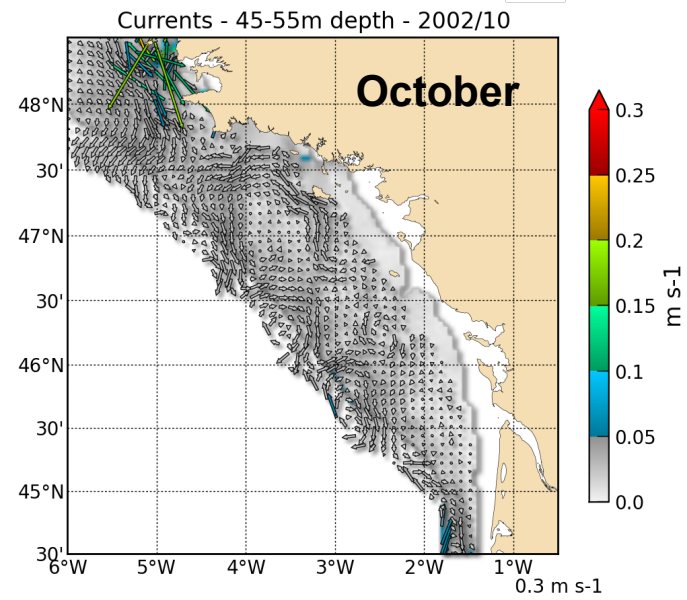
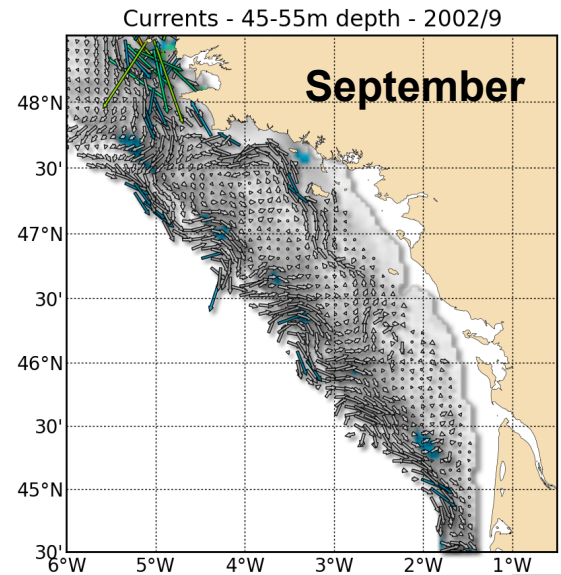


(Lazure et al., 2008)

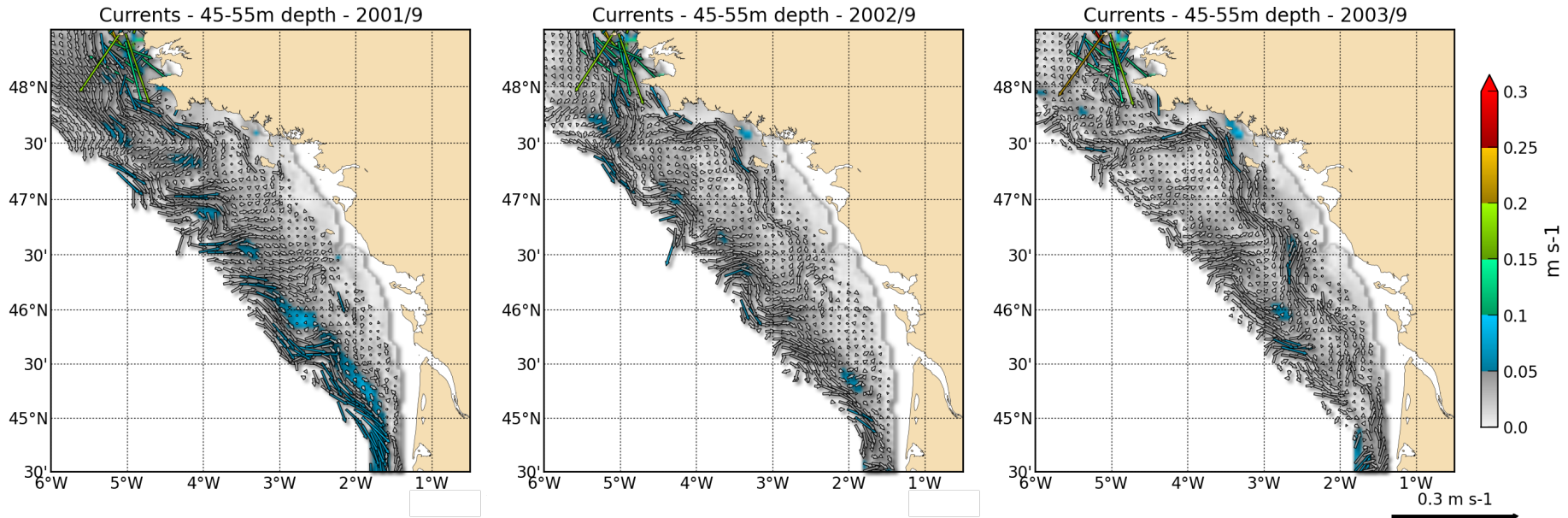
And the current ? *the autumn current*



(Lazure et al., 2008)



And the current ? *the autumn current*



*No autumn current
along coast
(in agreement with
autumn current
observations later in
the year – Lazure et
al., 2008)*

*Underestimated autumn current
compared to Lazure et al. (2008)
but ...*

Coherent autumn circulation with interannual variability

- Filtered (Demerliac) currents -

Conclusions

Experiments

First simulations on long periods (10 to 15 years)

Configurations to improve (*i.e.* boundary conditions, ...) and influence of the parameterization to test

Results

Promising time series on thermal and haline contents

Current shelf dynamics coherent with literature
(before complete improvement of the configuration)

Perspectives

In the frame of the ENIGME projet ...

Future simulations:

- **53 years – 4Km**
- **53 years – 2.5Km**

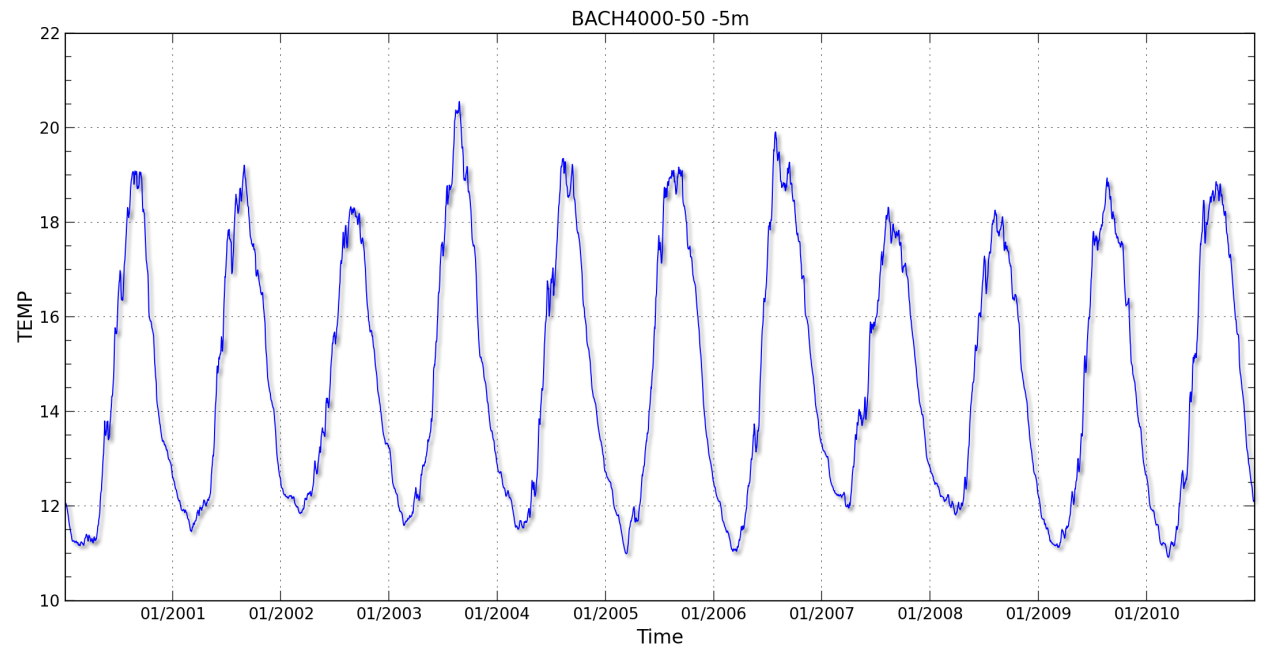
Analysis:

- **Interannual evolutions (haline and thermal budget, currents)**
- **Shelf/slope current systems and (sub)mesoscale dynamics**
- **Sea level in regional models**

Merci pour votre attention ...



**Reduced domain
(-10W/2E – 42N/50N)**



Full domain

