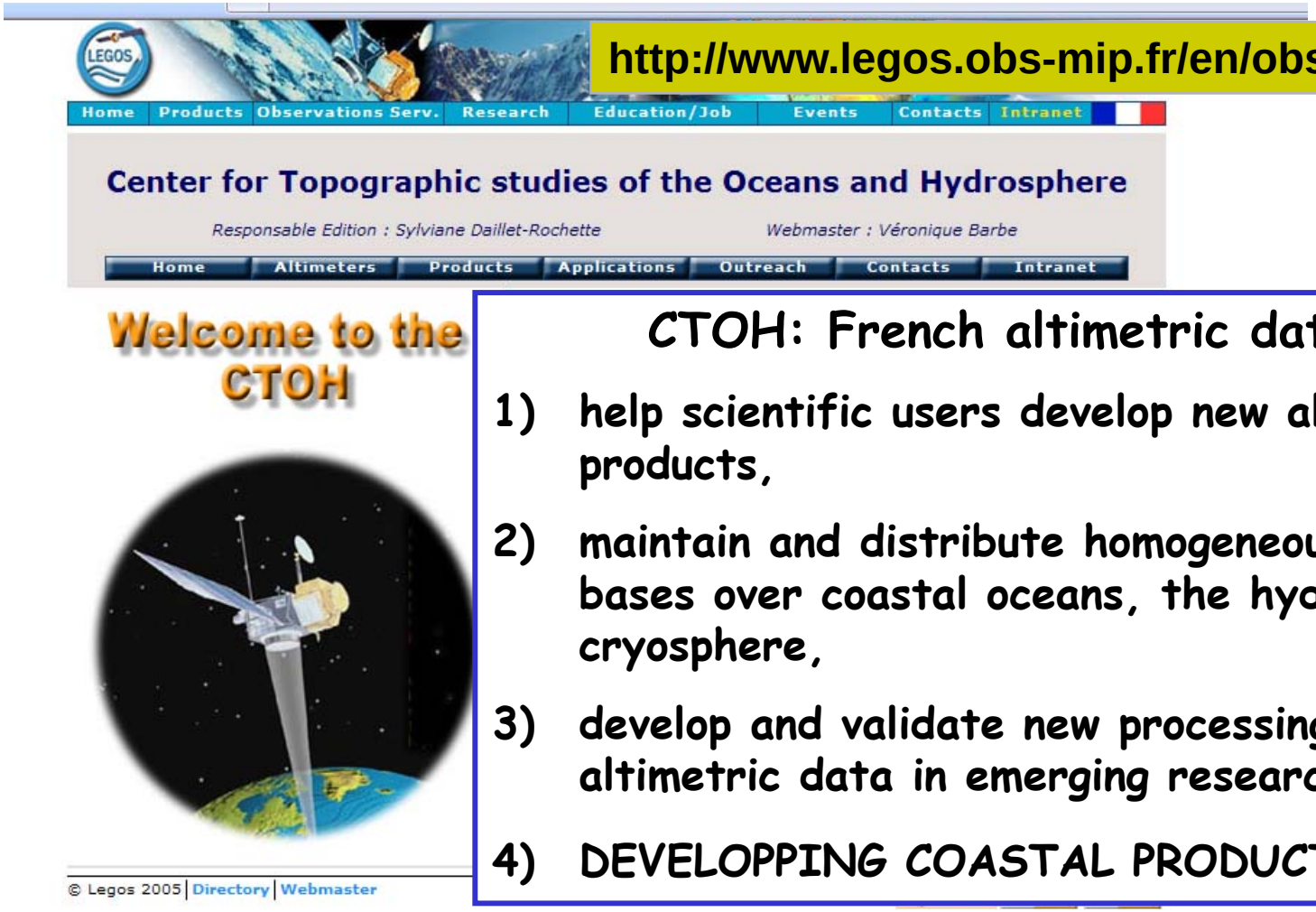
CTOH regional altimetry products: example of scientific applications

F. Birol, M. Cancet, L. Roblou, R. Morrow and F. Lyard



CTOH: French altimetric data service

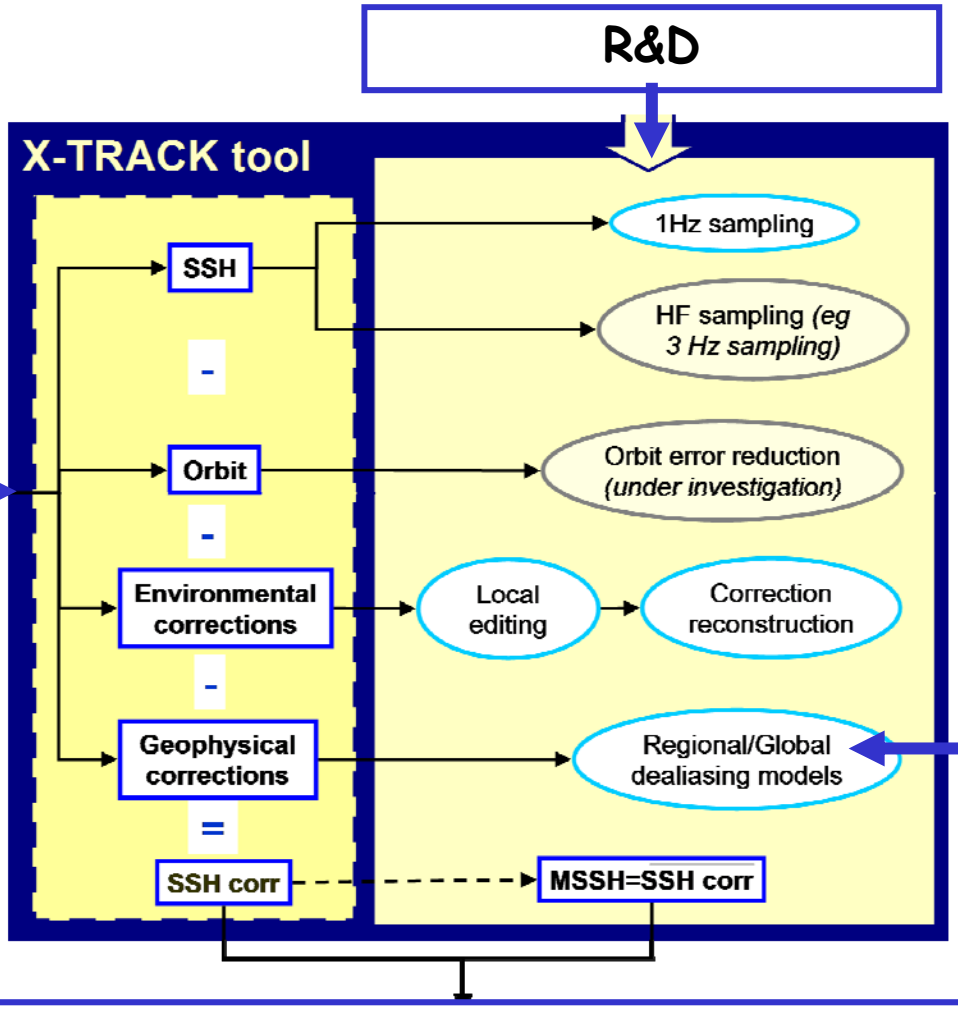
1) help scientific users develop new altimetry derived products,
2) maintain and distribute homogeneous altimetric data bases over coastal oceans, the hydrosphere and cryosphere,
3) develop and validate new processing techniques for altimetric data in emerging research domains.
4) DEVELOPPING COASTAL PRODUCTS SINCE 2002

CTOH coastal tools and products

Topex
Jason-1
GFO
Envisat
Jason-2

CTOH global data base:

Merged GDR and additional corrections



Development of regional dealiasing models (see poster Lyard et al.)

Validation (see poster Roblou et al.)

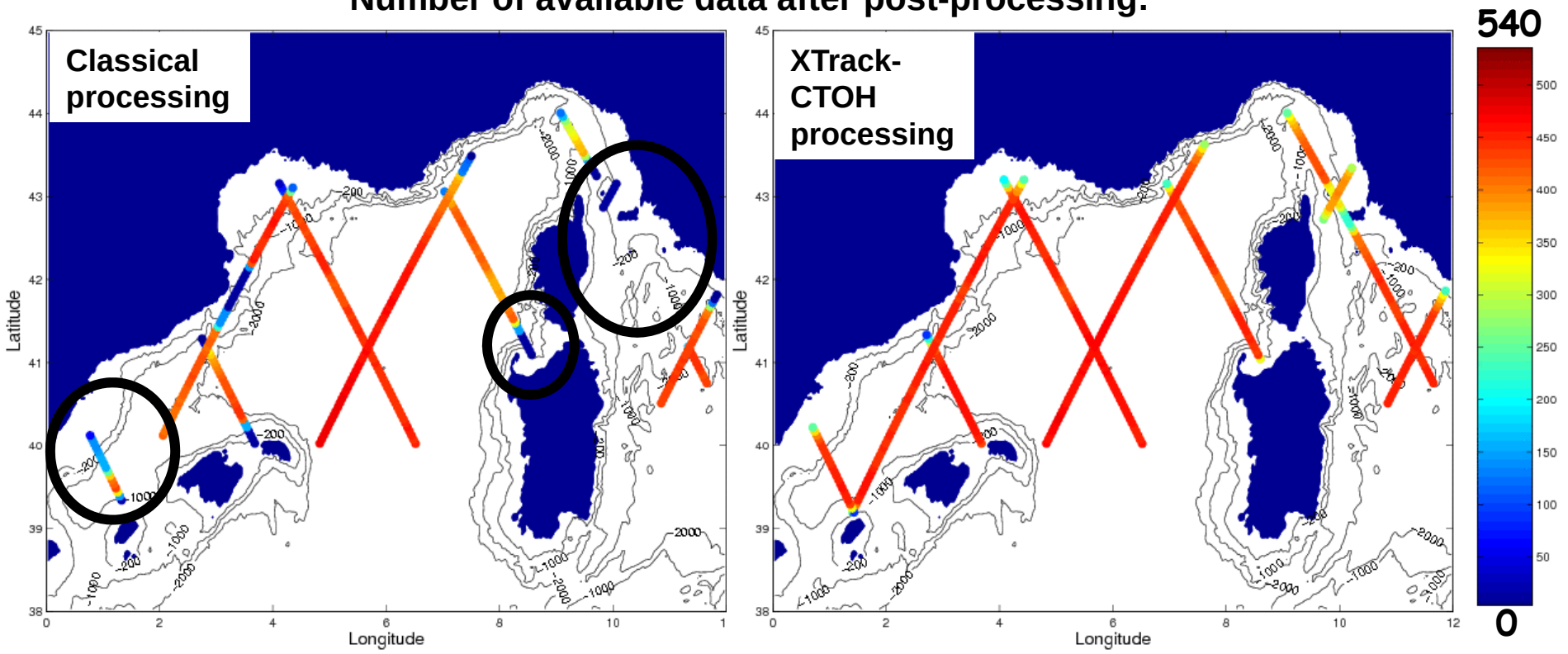
Post-processing based on user defined criteria

Regional SLA products on reference groundtracks (1Hz/HF) with associated geophysical corrections, MSSH

Example of resulting product

Data availability – T/P and Jason-1 (March 1993- October 2007)

Number of available data after post-processing:



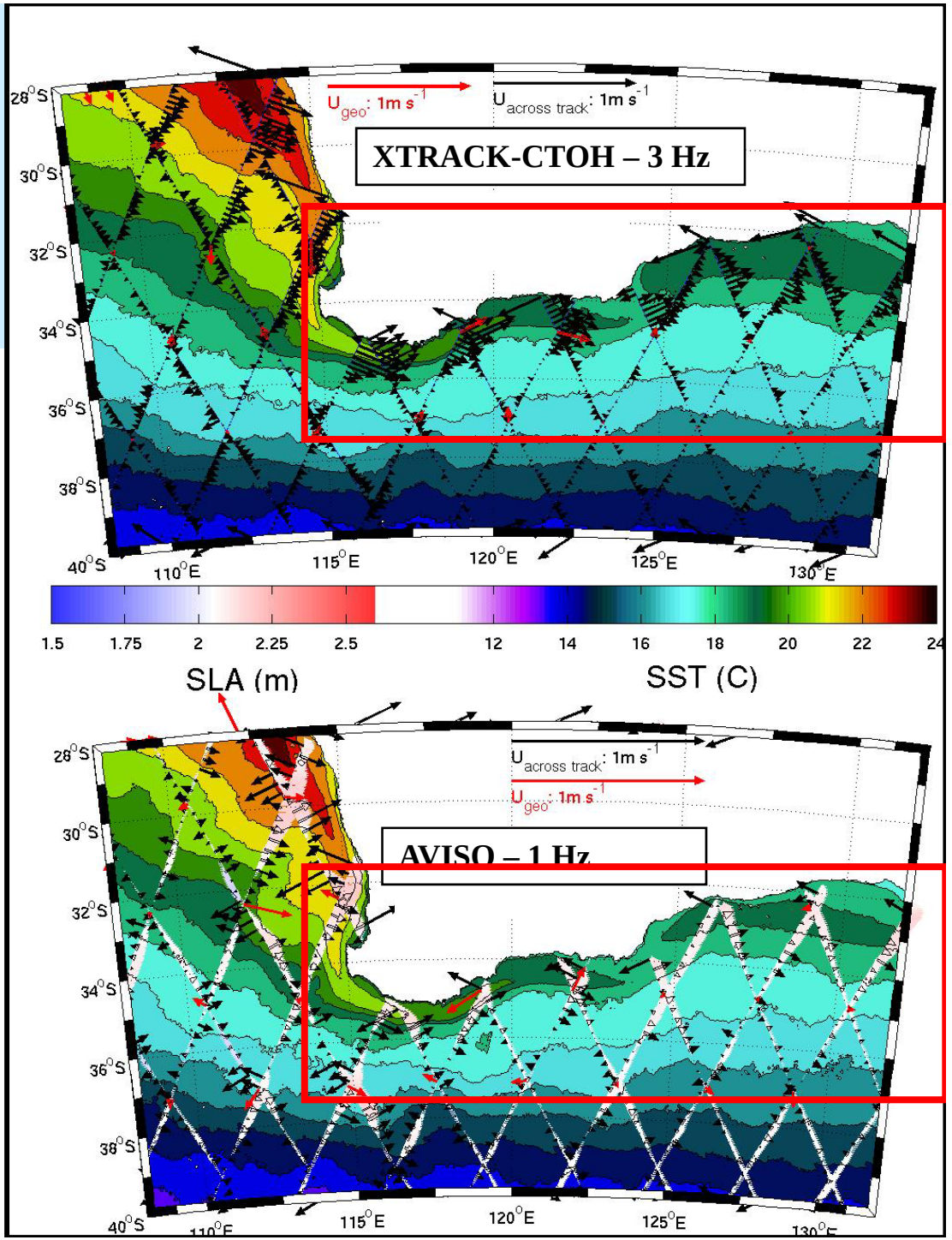
Question addressed: What can be done with altimetric data in coastal areas ?

Example 1: Study of the variability of the Leeuwin current, South-west Australia

K. Guiou, C. Langlais, P. Oke.
R. Coleman

Seasonal cycle – March/June:

- SST from AVHRR
-Current anomalies derived from Jason-1 X-Track (3 Hz product) and from AVISO SLA



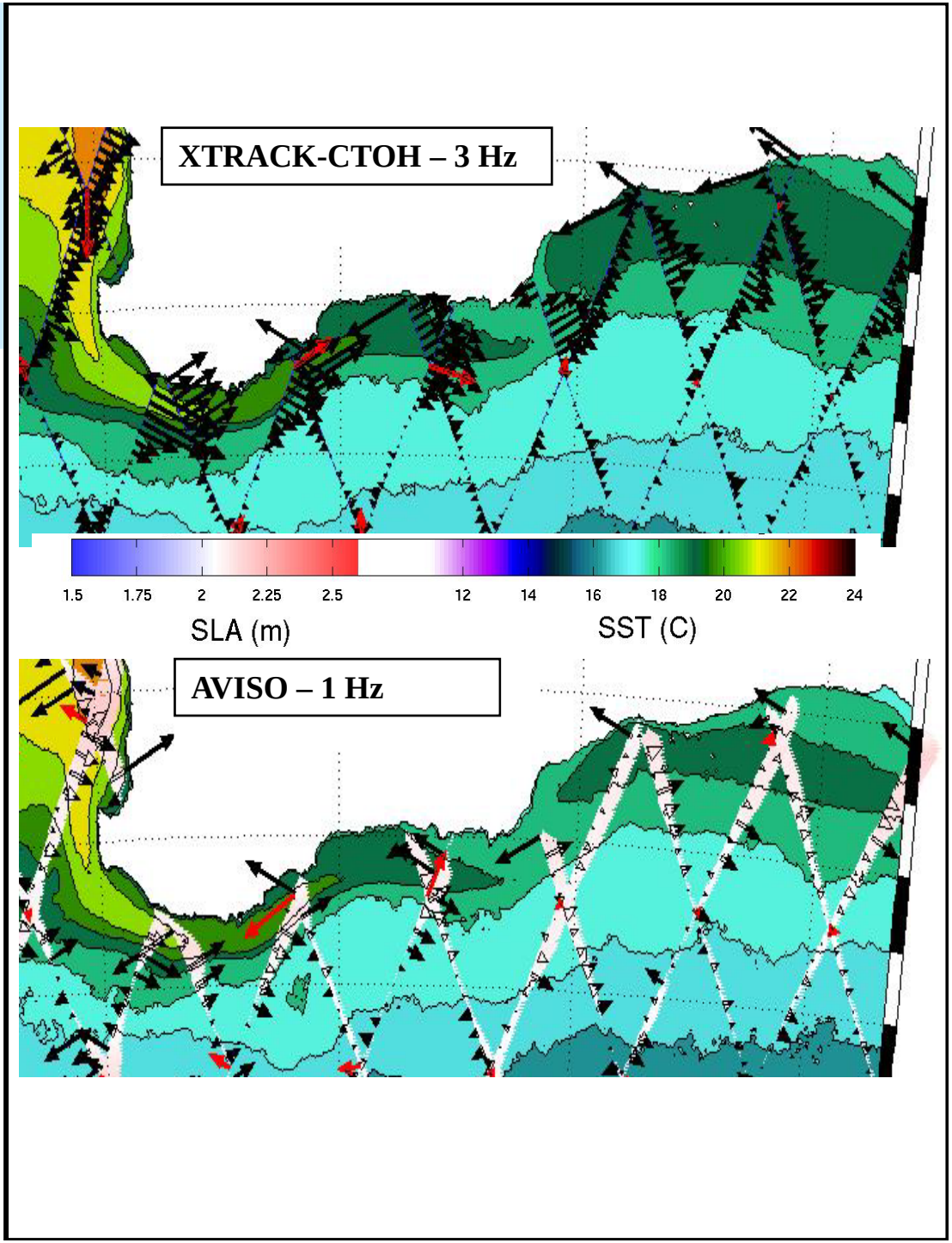
Example 1: Study of the variability of the Leeuwin current, South-west Australia

K. Guiou, C. Langlais, P. Oke.
R. Coleman

Better representation of:

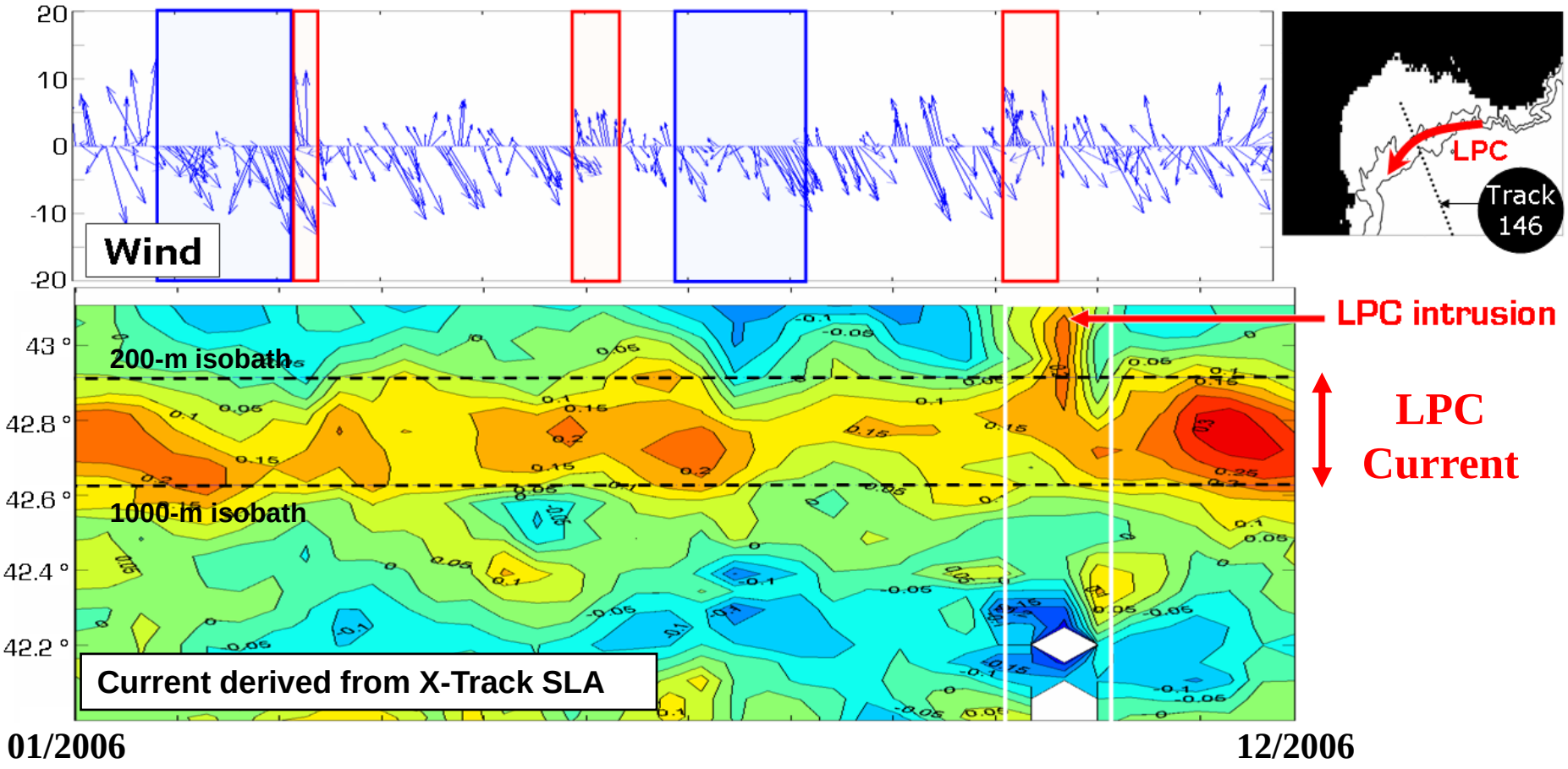
- the LC on the shelf: seasonal formation of the south branch,

- the mesoscale structures: improvement onshore and offshore



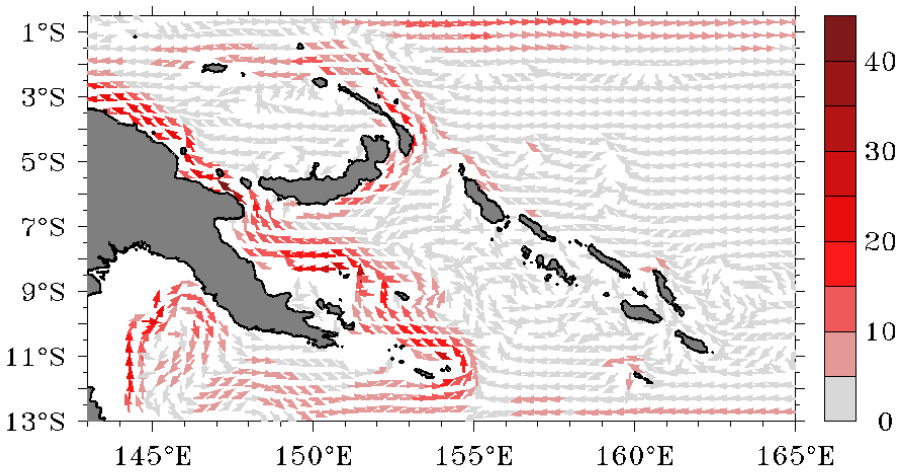
Next step → HF altimetric data assimilation in Bluelink ReANalysis (BRAN)

Example 2: Cross shelf exchanges in the Gulf of Lion - NW Mediterranean Sea



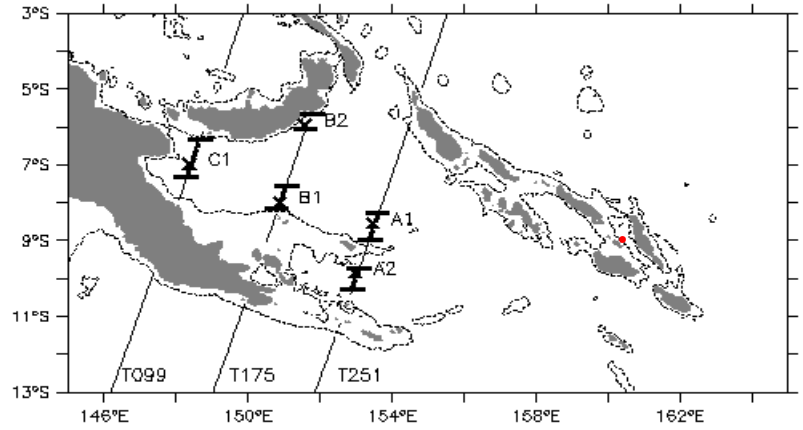
From Bouffard et al., 2009

Example 3: Variability of Solomon Sea Western Boundary Current



1986–1998 S18 circulation ($m^2.s^{-1}$) for σ_ϑ 24.4 to 25.2

Mean modeled circulation and the New Guinea Coastal Current (NGCC)



Location of the NGCC variability inferred from altimetric X-Track data

Altimetry is able to detect and monitor the NGCC variability

See the poster: Variability of the Solomon Sea circulation from altimetric sea level data by L. Gourdeau, A. Melet and J. Verron

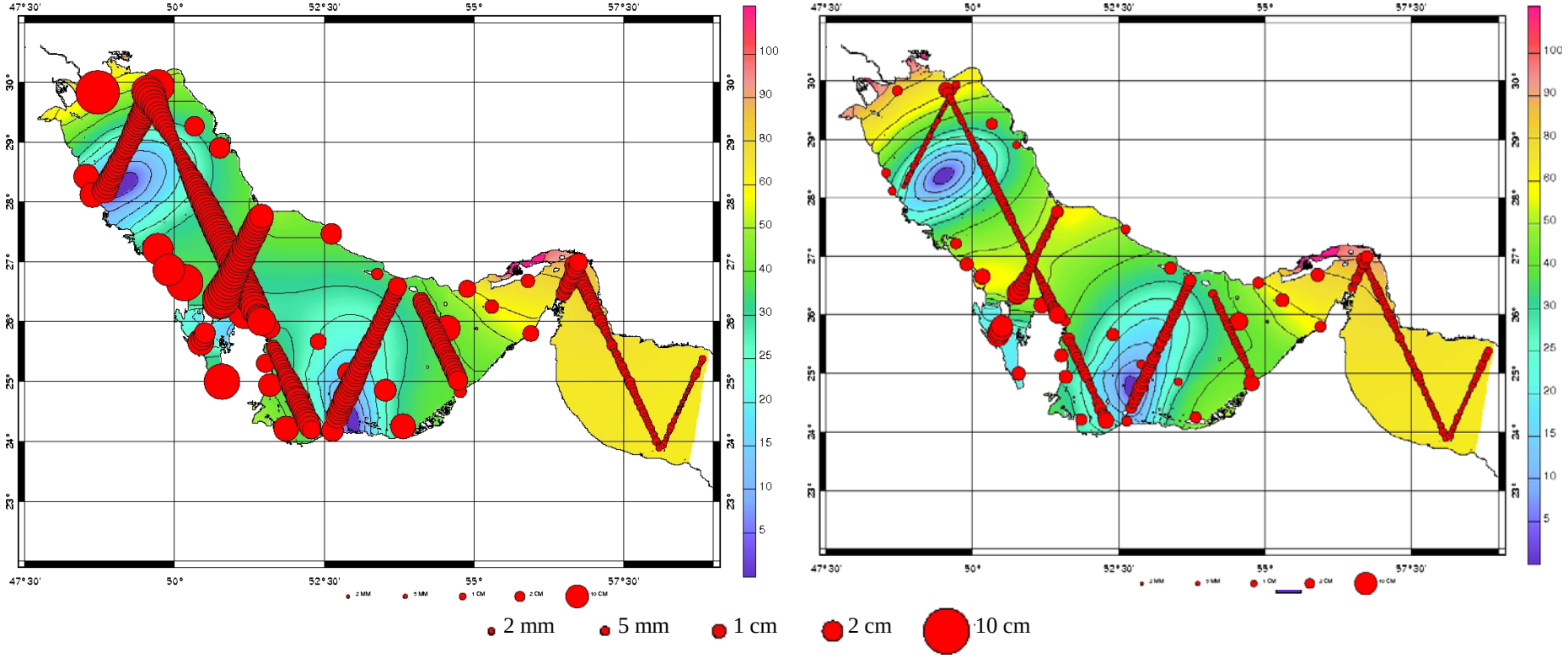
Example 4: Assimilation of Xtrack coastal data to improve tidal modelling in coastal and shelf seas

Solution for M2 tidal constituent – Persian Gulf

Difference between the model and tide gauge and altimetric data

Before assimilation

After assimilation of X-Track SLA + TG



See the poster: Robust methods for high accuracy tidal modelling in coastal and shelf seas by F. Lyard and L. Roblou

Data distribution:

Data available via ftp

Under validation

Already processed:

1 Hz products

Netcdf outputs

HF and regional products can be provided for other areas on request at *ctoh_products@legos.obs-mip.fr*.

Conclusion

- ✓ Ongoing project: other applications under analysis
- ✓ Strong connection with different scientific groups/projects
- ✓ The feedback we get from CTOH coastal data users for marginal/coastal applications helps us:

  → to understand the users needs

  → to identify the problems to solve

  → to analyze the potential applications and/or limitations
- ✓ If you have new corrections or scientific applications you want to test, do not hesitate to contact us!!!

ctoh_products@legos.obs-mip.fr

Correction	T/P	J1	GFO	ENVISAT
Ionosphere	Dual-frequency ionospheric correction + GCP (GDR Correction Product) correction	Altimeter ionospheric correction	Ionospheric correction from the GIM model	Altimeter ionospheric correction on Ku-band
Dry troposphere	Computed from the ECMWF model	From ECMWF atmospheric pressures and model for S1 and S2 atmospheric tides	Derived from the NCEP model surface pressure	Computed from the ECMWF model
Wet troposphere	Radiometer wet tropospheric correction + GCP correction of radiometer drift effects + GCP correction of yaw effects	Radiometer wet tropospheric correction on Ku-band	Radiometer wet tropospheric correction	Radiometer wet tropospheric correction
Atmospheric forcing	T-UGOm 2D regional configuration if available*, global otherwise, for periods smaller than 20 days + Inverted barometer for periods greater than 20 days	T-UGOm 2D regional configuration if available*, global otherwise, for periods smaller than 20 days + Inverted barometer for periods greater than 20 days	T-UGOm 2D regional configuration if available*, global otherwise, for periods smaller than 20 days + Inverted barometer for periods greater than 20 days	T-UGOm 2D regional configuration if available*, global otherwise, for periods smaller than 20 days + Inverted barometer for periods greater than 20 days

Solid tides	Solid earth tide height formula	Solid earth tide height formula	Solid earth tide height formula	Solid earth tide height formula
Pole tides	Geocentric pole tide height (Wahr, 1985)	Geocentric polar tide height (Wahr, 1985)	Geocentric pole tide height (Wahr, 1985)	Geocentric pole tide height (Wahr, 1985)
Loading effect	Load tide height for geocentric ocean tide FES1999	Load tide height for geocentric ocean tide FES1999	Load tide height for geocentric ocean tide FES1999	Load tide height for geocentric ocean tide FES1999
Sea state bias	Electromagnetic bias Ku-band correction (BM4) + GCP correction (Chambers, 2003) + GCP correction of non parametric electromagnetic bias (Gaspar, 1994)	Sea state bias correction on Ku-band	Sea state bias correction calculated as 4.5% of the Significant Wave Height (SWH)	Sea state bias correction on Ku-band
Ocean tides	T-UGOm 2D regional configuration if available*, FES2004 otherwise (Letellier et al, 2004)	T-UGOm 2D regional configuration if available*, FES2004 otherwise (Letellier et al, 2004)	T-UGOm 2D regional configuration if available*, FES2004 otherwise (Letellier et al, 2004)	T-UGOm 2D regional configuration if available*, FES2004 otherwise (Letellier et al, 2004)

Recomputed correction terms or coming from the CTOH database in blue, correction terms from the GDR in white.