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

Validation (see poster Roblou et al.)

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

Post-processing based on user defined criteria

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

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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

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

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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.
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
<table>
<thead>
<tr>
<th>Correction</th>
<th>T/P</th>
<th>J1</th>
<th>GFO</th>
<th>ENVISAT</th>
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</thead>
<tbody>
<tr>
<td>Ionosphere</td>
<td>Dual-frequency ionospheric correction + GCP (GDR Correction Product) correction</td>
<td>Altimeter ionospheric correction</td>
<td>Ionospheric correction from the GIM model</td>
<td>Altimeter ionospheric correction on Ku-band</td>
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<tr>
<td>Dry troposphere</td>
<td>Computed from the ECMWF model</td>
<td>From ECMWF atmospheric pressures and model for S1 and S2 atmospheric tides</td>
<td>Derived from the NCEP model surface pressure</td>
<td>Computed from the ECMWF model</td>
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<tr>
<td>Wet troposphere</td>
<td>Radiometer wet tropospheric correction + GCP correction of radiometer drift effects + GCP correction of yaw effects</td>
<td>Radiometer wet tropospheric correction on Ku-band</td>
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<tr>
<td>Atmospheric forcing</td>
<td>T-UGOm 2D regional configuration if available*, global otherwise, for periods smaller than 20 days + Inverted barometer for periods greater than 20 days</td>
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<td>Solid tides</td>
<td>Pole tides</td>
<td>Loading effect</td>
<td>Sea state bias</td>
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<tr>
<td><strong>Solid tides</strong></td>
<td>Solid earth tide height formula</td>
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<td><strong>Loading effect</strong></td>
<td>Load tide height for geocentric ocean tide FES1999</td>
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<td><strong>Sea state bias</strong></td>
<td>Electromagnetic bias Ku-band correction (BM4) + GCP correction (Chambers, 2003) + GCP correction of non parametric electromagnetic bias (Gaspar, 1994)</td>
<td>Sea state bias correction on Ku-band</td>
<td>Sea state bias correction calculated as 4.5% of the Significant Wave Height (SWH)</td>
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Recomputed correction terms or coming from the CTOH database in blue, correction terms from the GDR in white.