



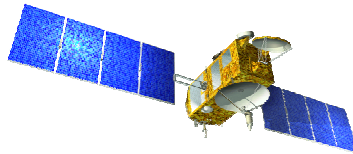
An observational service dedicated to satellite altimetry

Centre de Topographie des Océans et de l'Hydrosphère

Established in 1989, the Centre for Topographic studies of the Oceans and Hydrosphere (CTOH) is a French national observational service dedicated to satellite altimetry studies.

Within this framework, the CTOH is a :

- > Centre for the development and maintenance of up-to-date altimetric data bases for scientific applications
> Centre for data distribution, analysis and expertise,
> Training Centre for altimetric techniques and applications.



Altimetric data bases

- > Along-track GDRs (over the oceans and continents), for :
> Topex/Poseidon (10/1992 - today),
> Jason-1 (01/2002 - today),
> GFO (01/2000 - today)
> ENVISAT (03/2003-today)

These alongtrack GDRs (T/P, Jason, GFO, ENVISAT) incorporate the most recent corrections, including :

- > the FES2004 and GOT2000 tide models
> High-frequency barotropic response from the MOG2D model
> Mean sea surface CLSMSS01 referenced for each mission
> Non-parametric SSB corrections for each mission
> NCEP wet tropospheric correction over continents for T/P

Coming soon : GIM ionospheric correction, GRACE geoids

> ERS 1-2 data over the continental surfaces and coastal regions (0-500 km from coasts), retracked using the ICE2 algorithm (1991-2003).

Open ocean altimetric products

Advanced data products available

- > Alongtrack T/P, Jason, GFO and ENVI SAT data over the oceans and/or continents, with the improved CTOH corrections, or corrections « à la carte ».
> Global or regional maps of sea level anomaly (SLA) on a 1° grid for each satellite T/P, Jason, GFO, ENVI SAT, every 10, 17 or 35 days (with the most recent corrections).- Figure 1
> Global SLA maps 1/3° from combined T/P+Jason+GFO with surface geostrophic velocities (including equatorial zones) every 7 days - Figure 2.
> Alongtrack geostrophic velocities for the tandem mission T/P_Jason.
> Global 1° maps of surface Ekman transport from the ERS and QuickScat scatterometers (on demand)

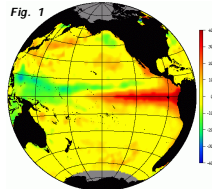
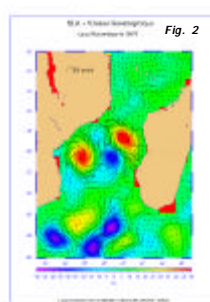


Figure 1: SLA map showing the anomalous sea level in the eastern Pacific during the 1997 El Nino event. This increase (in red) is also associated with higher surface temperatures.

Figure 2: SLA map with the surface geostrophic velocity field superimposed as vectors, for the Mozambique Channel. Two strong anticyclones (positive SLA in red) surround a cyclone (negative SLA in blue). The vector length denote the current speed, for comparison a vector of 25 cm/s is placed on the African continent.



Distribution of Products, training and personnel

- > En 2002 : 307 Extractions alongtrack (280 internal, 27 external)
> En 2003 : 680 Extractions alongtrack (580 internal, 100 external)

Training and Outreach

Each year, the CTOH trains French and international scientists in the techniques and applications of altimetric data, for oceanographic and geophysical applications.

Members of the CTOH teach altimetry techniques to graduate and postgraduate students, in France and at international summer schools.

Personnel

- R. Morrow : Scientific projects
J. Sudre : Technical projects; T/P + Jason data bases
M. Faillot : GFO, ENVI SAT data bases; multi-satellite applications
S. Daillet : Outreach.

Emerging applications : coastal / continental hydrology / cryosphere

Coastal Regions

Satellite altimetry missions with their standard corrections are not adapted to observing the coastal zone (-50 km from the coast), radiometer data and altimetric range degrade strongly approaching the coast.

The CTOH is currently working on improving the quality and coverage of altimetric corrections in the coastal zone (tides, response to atmospheric forcing, wet tropo, iono, ...) for T/P, Jason, GFO and ENVI SAT.

The CTOH also has available retracked ERS waveforms in the coastal and continental zones, the same algorithm is used on ENVI SAT, providing > 14 years of corrected altimeter range just to the coast. Figure3.

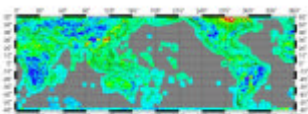


Figure 3 : Region of retracked waveforms from ERS1-2, data are available over the continents, up to 200 km from the coast and at high latitudes north and south of 60°.

Hydrology from Space

Satellite altimetry also allows us to mesure the levels of large rivers, lakes and flood plains (Figure 4). As in the coastal zone, the altimetry waveforms and the necessary corrections are not well-adapted for this new thematic, and require special treatment.

In collaboration with LEGOS scientists (A. Cazenave et al.), we are currently working on :

- > improving the corrections for T/P, Jason, GFO and ENVI SAT in our data bases over the continental zones.
> Validating the ERS retracked data over selected continental hydrology zones.

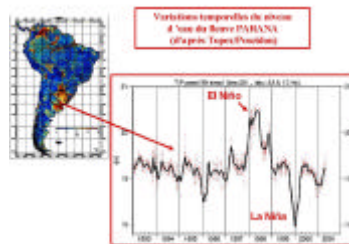


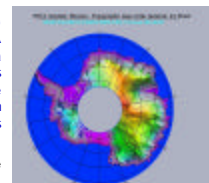
Figure 4 : Temporal variations of the level of the Parana River in the Basin de la Plata, from Topex/Poseidon (Maheu et al., 2003).

Cryosphere

Altimetry is a major tool for observing the polar ice caps, for studying the ice dynamics, and for monitoring their volume. Altimetry allows us to mesure sea ice extent or detect underground lakes, and gives information on the quantity of snow cover. Coupling altimetry with radiometry also offers new possibilities for estimating the thickness of continental snow cover.

The processing techniques developed at LEGOS for retracking the ERS1-2 waveforms (Rémy et al) have been adopted by ESA for ENVI SAT, providing a homogeneous time series from 1991-today. The CTOH is working on improving the corrections for these data sets.

Figure 5. Antarctic surface topography from ERS



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