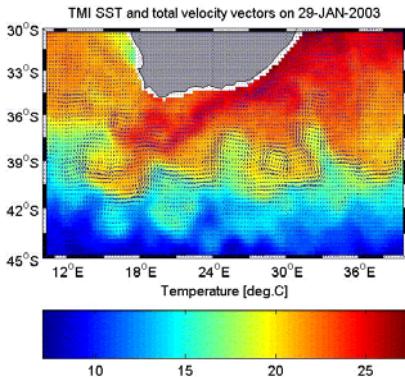


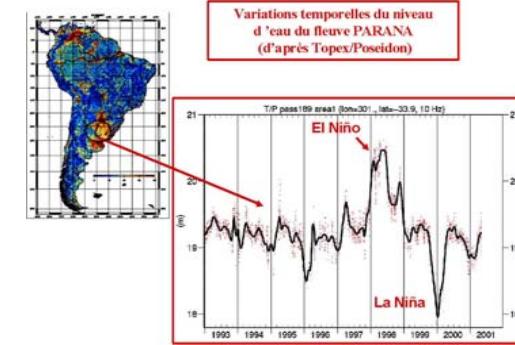
# CTOH ALTIMETER DATA SERVICE:

## DATA & PRODUCTS

Fernando Niño, Florence Birol, Mathilde Cancet, Sara Fleury,  
Marie-Claude Gennero, Rosemary Morrow, Christian Naskas,  
Renaud Dussurget, Guillaume Pernot, Laurent Roblou



CTOH – LEGOS, Toulouse





# CTOH - who are we?

- Centre de Topographie des Océans et de l'Hydroosphère

French data service supporting altimetric research

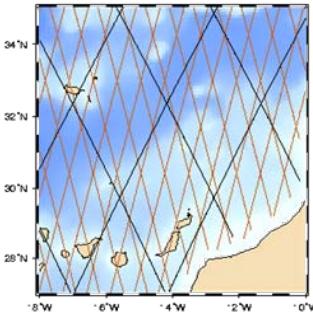
## Our Mission:

To support research teams who want to develop new altimetric applications

1. Maintain and distribute altimetric GDR data with improved corrections
  - over all surfaces (oceans + continents)
  - 1 Hz and 20 Hz data
2. Develop advanced altimetric products for users
3. centre of expertise for the operational data centres (AVISO-CNES, ESA)

Most oceanographers use the excellent AVISO products (we do too!).

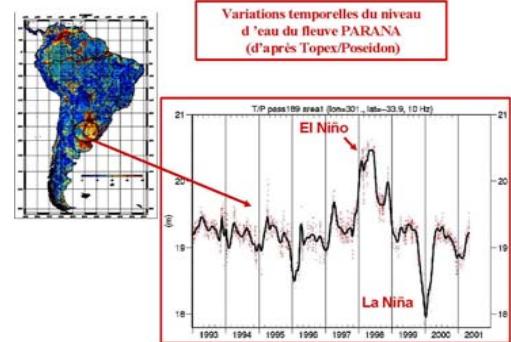
Our data bases are mainly used by research groups at LEGOS, in France, and internationally who want to develop **non-standard applications**.



In coastal regions



Over the cryosphere

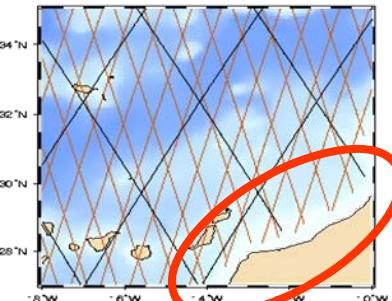


Over lakes, rivers, flood plains

# CTOH – who are we?

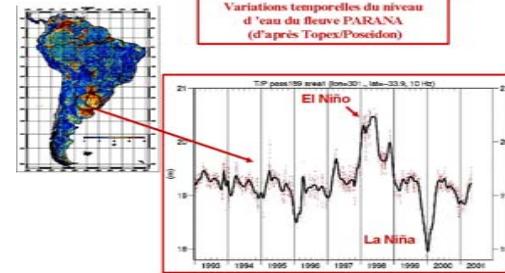
LEGOS, Toulouse

## Coastal Products



*Birol, Roblou, Cancet  
(Posters)*

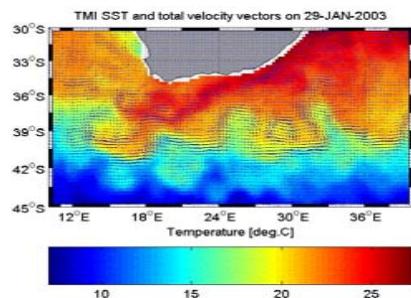
## Continental Hydrology



*Cazenave, Crétaux, Gennaro*

- **HYDROWEB** (Posters)

## Mesoscale - submesoscale



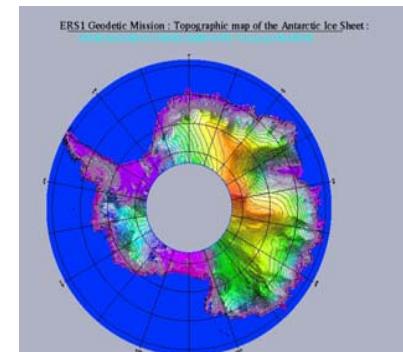
*Morrow, Sudre, Dussurget*

- Global surface currents
- Altimetric Filament positions (Poster)

CTOH  
Data base + products

GDR data  
(T/P, GFO, ENVISAT, J1, J2)  
+ improved corrections

## Cryosphere Products



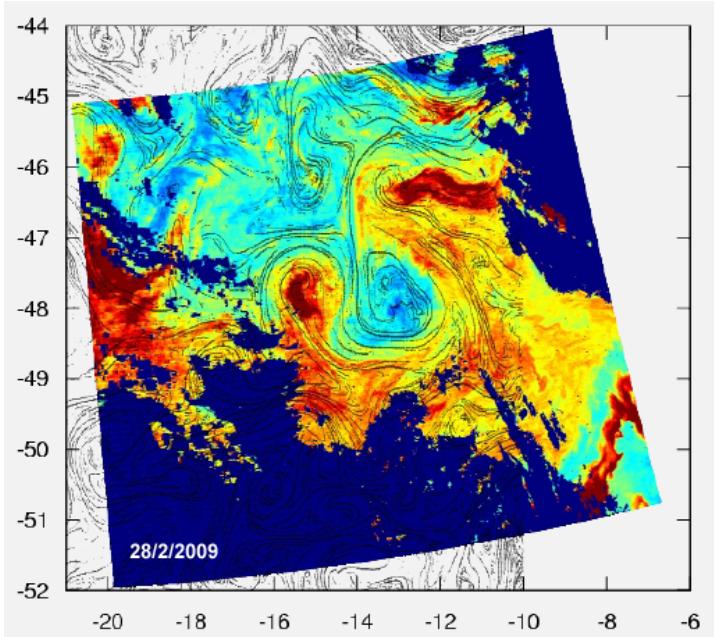
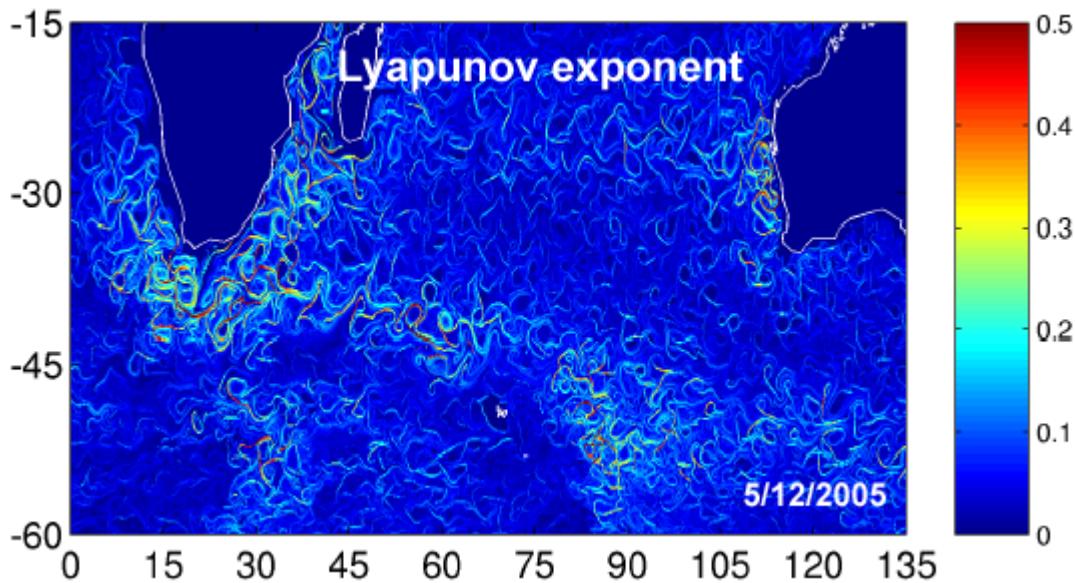
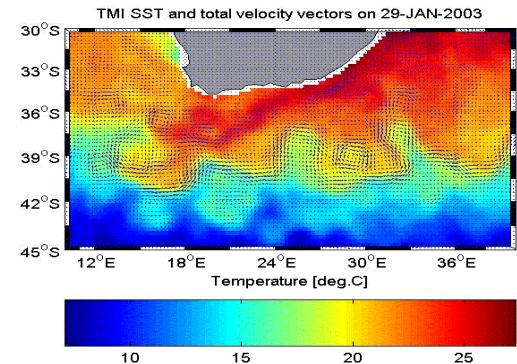
*Rémy, Legresy, Blarel*

**ICE2 algorithm**

USERS, AVISO / CNES - ESA

# Mesoscale and sub-mesoscale Products:

- Global surface currents (geostrophy + Ekman  $\frac{1}{4}^\circ$  resolution)
- Lyapunov Exponent filament positions derived from AVISO and CTOH surface currents (**poster – this session**).



# Users who want to analyse altimetry data in non-standard regions

## Who for ?

Research groups working on  
coastal projects, or continental  
surfaces (lakes, rivers, flood  
plains, cryosphere, ...)

## Today :

Extraction by request :

[ctoh\\_products@legos.obs-mip.fr](mailto:ctoh_products@legos.obs-mip.fr).

## September 2010 :

### CTOH Web Toolbox :

On-line Extraction and  
visualisation

<http://ctoh.legos.obs-mip.fr>

### GDR data available :

T/P, GFO, ENVISAT, J1, J2

Oceans & Continental Surfaces

1 Hz et 20 Hz

### Improved Corrections for all bases :

- Tide Models : FES2004, GOT2000, GOT4.7
- High-frequency : ib\_ECMWF (BF) + ib\_MOG2D (HF) ([LEGOS](#))
- Non-parametric EM\_bias for each mission ([CLS](#))
- MSS CLSO1 ([CLS](#))
- NCEP Wet – tropo correction over continental surfaces ([CLS](#))
- GRACE Geoid GGM02C ([GRGS](#))
- GIM ionospheric correction ([JPL](#))
- Coastal radiometer corrections ([JPL](#))



**CTOH**  
Legos

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## News

[Coastal products reprocessed with GOT4.7](#)

May 14, 2009

[New available coastal products](#)

May 13, 2009

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## Home

Welcome to the CTOH website; here you will find information about this team, its goals, its products, and the applications we work on.

Also available in presentation mode...

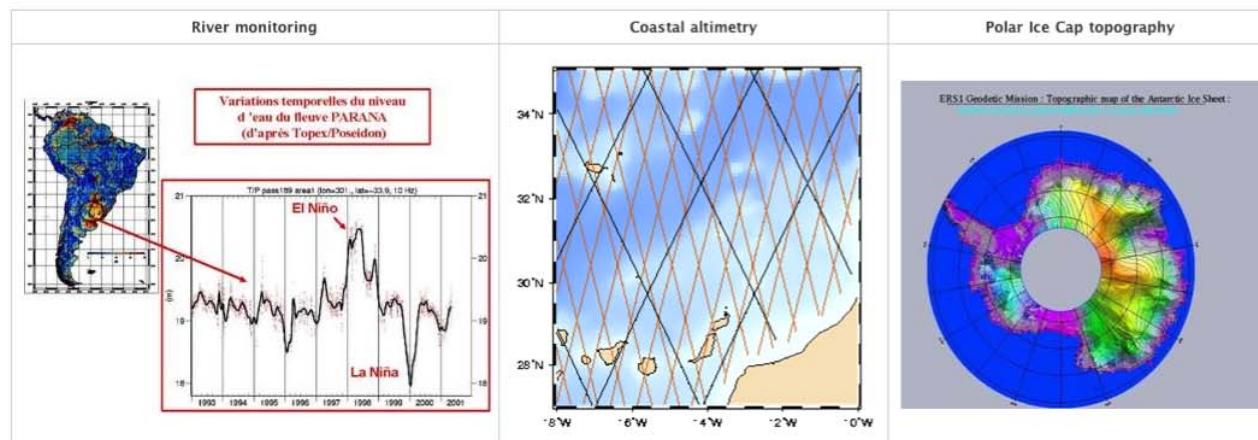
The CTOH is a French Observation Service dedicated to satellite altimetry studies. The CTOH aims to help scientific users develop new altimetric products and applications.

Within this framework, the CTOH maintains homogeneous altimetric data bases for the long-term monitoring of sea level and ocean currents, lake and river levels, the cryosphere, and the planet's climate.

Scientific users can extract :

- [alongtrack GDR data with up-to-date corrections](#) (link), over oceans and continental surfaces, for different altimetric missions (Topex/Poseidon, Jason-1, Jason-2, GFO, ENVISAT).
- [coastal alongtrack GDR data with specific processing](#) (link)
- [global surface currents](#) (Geostrophic and Ekman) from 1999-2008

The CTOH works in close collaboration with scientific research groups at LEGOS to develop new altimetric products, for [monitoring lake and river levels](#) (HydroWeb link), and over the [cryosphere](#) (OSCAR link).



Established in 1989, the CTOH is an INSU service, supported by the Centre National de la Recherche Scientifique (CNRS), Centre National d'Etudes Spatiales (CNES), Observatoire Midi-Pyrénées (OMP), Bâle Crème Altimétrie Climat (BCAC)



### Navigation

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### Coastal Products

#### Alongtrack Sea Level Anomalies – Regional Products

The CTOH along-track sea level anomalies are computed for each cycle of each altimetry mission (Topex/Poseidon (TP), Jason-1, Geosat Follow on (GFO) and Envisat), using the Sea Surface Heights (SSH) provided by the X-TRACK processing tool, and the latest corrections available in the CTOH database. The data are projected onto a nominal track with a spatial interval of about 7 km between points (1 second).

The mean sea surface is computed at each point, based on the mission period currently available, and subtracted from the observed sea surface heights in order to form the sea level anomalies. The latter are spatially filtered using a 3-point Loess filter in order to remove the background noise (wavelengths shorter than 20 km), after a post-processing technique adapted specifically for coastal regions (see the method below).

**Note:** Data from the different altimetry missions are not currently intercalibrated at the crossover points. They should therefore not be used directly as a multi-mission product. Moreover long wavelengths errors are not corrected (on-going work) thus orbit errors may be significant for some cycles of the GFO and Envisat missions.

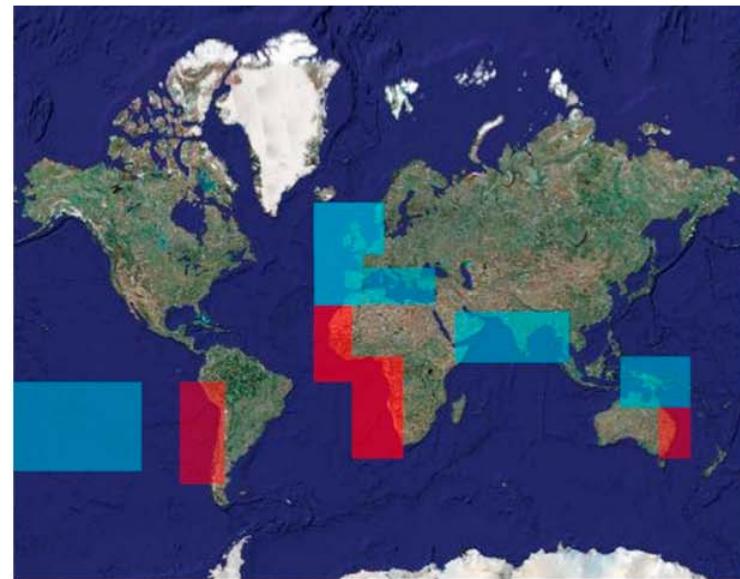
#### Acknowledgements:

Please do not forget to mention the following sentence in all publications or communications referring to a work based on the CTOH/LEGOS altimetry dataset:

*"Altimetry data used in this study were developed, validated, and distributed by the CTOH/LEGOS, France".*

#### Method

#### References



Click on the map to obtain the available data (Google Maps)



## Navigation

[Medsea](#)[NEA](#)[Topex](#)[Jason-1](#)[TP & Jason 1 combined data](#)[Nindian](#)[Solomon](#)[SouthPacific](#)[References](#)

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May 14, 2009

[New available coastal products](#)

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## NEA

### North East Atlantic Ocean

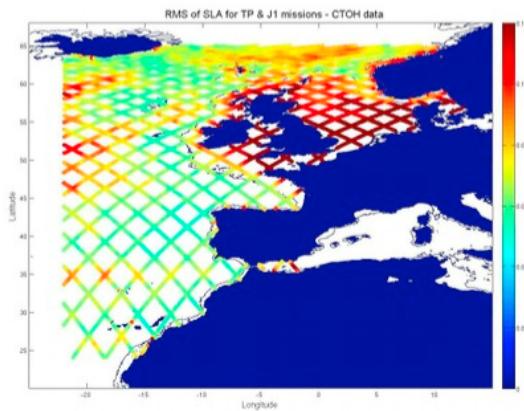


Figure: RMS of SLA for CTOH data (TP new orbit & Jason-1 missions) in the North East Atlantic Ocean

The available area stretches from 24°N to 65°N and from 22°W to 10°E.

Available period and map of the nominal tracks for each satellite mission:

Nota: The data have been processed with two different tide corrections (FES04 or GOT4.7), therefore, two datasets are available for each mission (see table below).

FES04 tide correction	GOT4.7 tide correction
<input checked="" type="checkbox"/> Topex	<input checked="" type="checkbox"/> Topex
<input checked="" type="checkbox"/> Jason-1	<input checked="" type="checkbox"/> Jason-1
<input checked="" type="checkbox"/> TOPEX & Jason-1 combined data	<input checked="" type="checkbox"/> TOPEX & Jason-1 combined data

Topex data on its interlaced orbit soon available !

The data for the other altimeter missions (Jason-1, GFO and Envisat) are not validated yet but can be distributed on demand. To obtain them, please contact us at: xxxxctoh\_products@legos.obs-mip.frxxxx (without the 'x').

# Data visualisation and extraction

## GDR extraction request form

This form allows you to request a GDR extraction from CTOH database.

When you've selected wanted satellite, parameters, region and period, click on **•Preview**. You will then be able to preview results and request GDR extraction.

Satellite  
Parameter  
Zone



Per-satellite parameters

**Satellite**  
Prior to select any parameter, you need to select a satellite to request data from.

**Pre-selection**  
Pre-selected parameters allow you to conveniently initialize the following form.

**Parameters**  
Select parameters in this list.

- agc\_c ( C band corrected AGC )
- agc\_ku ( Ku band corrected AGC )
- agc\_numval\_c ( number of valid points used to compute C band AGC )
- agc\_numval\_ku ( number of valid points used to compute Ku band AGC )
- agc\_rms\_c ( RMS of the C band AGC )
- agc\_rms\_ku ( RMS of the Ku band AGC )
- alt ( 1 Hz altitude of satellite )
- alt\_20hz ( 20 Hz altitude of satellite )
- alt\_echo\_type ( altimeter echo type )
- alt\_state\_flag\_acq\_mode\_20hz ( 20 Hz altimeter state flag: acquisition mode )
- alt\_state\_flag\_band\_seq ( altimeter state flag: Ku/C band sequencing )

Region of Interest

You can select a region by pressing Shift key and dragging a rectangle.

Conditions d'utilisation

Alternatively, you can specify a region by its South-West and North-East corners in these fields.

sw  ne

Spatial  
Criteria

Temporal  
Criteria: date/cycle

Cycles selection

Fill in these fields with valid cycle number, or special keyword **first** or **last**.

**Orbit**  
Select an orbit.

**First Cycle**  
Select first cycle.

**Last Cycle**  
Select last cycle.

**•Preview**

# Satellite Parameter choice

Per-satellite parameters

**Satellite**

Prior to select any parameter, you need to select a satellite to request data from.

jason2

**Pre-selection**

Pre-selected parameters allow you to conveniently initialize the following form.

CTOH continental hydrology

Parameters

Select parameters in this list.

- agc\_c ( C band corrected AGC )
- agc\_ku ( Ku band corrected AGC )
- agc\_numval\_c ( number of valid points used to compute C band AGC )
- agc\_numval\_ku ( number of valid points used to compute Ku band AGC )
- agc\_rms\_c ( RMS of the C band AGC )
- agc\_rms\_ku ( RMS of the Ku band AGC )
- alt ( 1 Hz altitude of satellite )
- alt\_20hz ( 20 Hz altitude of satellite )
- alt\_echo\_type ( altimeter echo type )
- alt\_state\_flag\_acq\_mode\_20hz ( 20 Hz altimeter state flag: acquisition mode )
- alt\_state\_flag\_band\_seq ( altimeter state flag: Ku/C band sequencing )

# Spatial criteria

Region of Interest

You can select a region by pressing Shift key and dragging a rectangle.

Satellite   Relief   Plan

Google   Données cartographiques ©2009 Europa Technologies - [Conditions d'utilisation](#)

Alternatively, you can specify a region by its South-West and North-East corners in these fields.

sw  ne  • [Update map](#)

# Temporal selection

- Dates are indicated *after* typing in the cycle number;
- « first » and « last » keywords are also admitted

Cycles selection

---

Fill in these fields with valid cycle number, or special keyword **first** or **last**.

**Orbit**  
Select an orbit.

**First Cycle**  
Select first cycle.

**Last Cycle**  
Select last cycle.

---

# Preview parameters

Log in  
Zone

You are here: Home

(i) You must be logged in to process the request extraction. Please use the log-in box on the left to do so.

### Request Preview and Extraction

Your request

Satellite: jason2

Orbit: 2008/07/04

Region (SW,NE): (28.304,-28.828), ( 59.889,40.781)

Parameters: ['alt\_20hz', 'ice\_range\_20hz\_ku', 'iono\_corr\_gim\_ku', 'lat\_20hz', 'lon\_20hz', 'model\_dry\_tropo\_corr', 'model\_wet\_tropo\_corr', 'pole\_tide', 'range\_20hz\_ku', 'sig0\_20hz\_ku', 'solid\_earth\_tide', 'time\_20hz']

Period: cycle 20 to last

You can save your request by bookmarking the following link : [CTOH : jason2 extraction of Jun 19, 2009 2:10 pm](#)

[Edit your request](#)

Preview

Please Note: You can only preview ONE parameter at a time. A maximum of 10 images are displayed. Please select the parameter to preview below; when requesting the extraction, your complete request will be processed, not only your preview selection.

Parameter

Select the parameter to preview.

Select one...

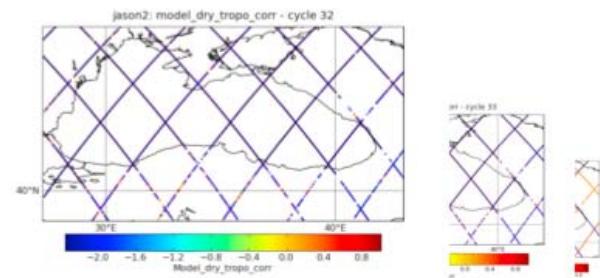
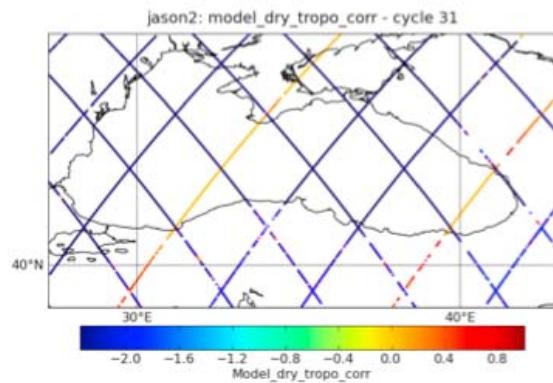
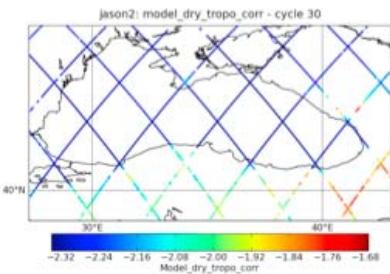
Request  
Summary



Select ONE  
Parameter  
to preview

# Preview using ImageFlow

## Model Dry Tropo correction



model\_dry\_tropo\_corr 31

---

# Extraction

- Extraction is only possible for registered users;
- Preview is always possible.

User Account Information for Site test guillaume

The screenshot shows a window titled "User Account Information for Site test guillaume". The menu bar includes standard Mac OS X icons. Below the title is a toolbar with icons for Relever, Écrire, Adresses, Répondre, Rép. à tous, Transférer, Étiquette, Supprimer, Indésirable, and Imprimer. The main content area displays the following text:

Sujet : User Account Information for Site test guillaume  
De : Site Administrator <plone>  
Date : 14:16  
Pour : fernando.nino+rm2@legos.obs-mip.fr

Welcome Rosemary Morrow,

your user account has been created. Please activate it by visiting

<http://localhost:20000/ctohertest/passwordreset/0020e64eea0056c0b1e5ee447d55509c?userid=rosemary>

You must activate your account within 168 hours, so before Jun 26, 2009 02:16 PM

With kind regards,

--

Site Administrator

# How to access our data and products ?

**TODAY** : still via our Website : [www.legos.obs-mip.fr/observations/ctoh](http://www.legos.obs-mip.fr/observations/ctoh)

If you cant remember : Google 'CTOH'

By email : ctoh\_products@legos.obs-mip.fr



The screenshot shows a web browser window displaying the CTOH (Centre Topographique des Océans et de l'Hydroosphère) website. The address bar shows the URL <http://www.legos.obs-mip.fr/fr/observations/ctoh>. The page features a banner with the LEGO logo and various oceanographic imagery. The main menu includes Accueil, Produits, Serv.Observations, Recherches, Formation/Emploi, Evénements, Contacts, Intranet, and a language switcher. A sub-menu for 'Produits' is open, listing Accueil, Altimètres, Produits, Applications, Outreach, Contacts, and Intranet. A prominent orange banner at the top says 'Bienvenue sur le CTOH'. Below it, a circular graphic shows a satellite in space above Earth. Text on the page describes the CTOH's role in maintaining a homogenous altimetry database for ocean, land, and cryosphere monitoring, its collaboration with scientific investigators, and its focus on emerging scientific objectives like snow and ice studies. It also mentions its role as an independent expertise center for distribution primaries (AVISO for Topex/Poseidon, Jason-1, ENVISAT) and its support by various French research organizations.

# Timeline

- **end June 2010:** bêta version of the website:
  - Jason-2 standard GDRs available
- **July 2010** [\*\*http://ctoh.legos.obs-mip.fr\*\*](http://ctoh.legos.obs-mip.fr)
  - Adding CTOH corrections for automatic extraction
  - Optimisation and improved interfaces
- **September 2010**
  - Adding other satellite data bases (J1, ENV, GFO, T/P, ...)

**Your comments and suggestions are welcome !**