



CTOH Altimeter Data Service

What's new in 2011 ?

S. Fleury F. Niño B. Picinbono F. Birol R. Morrow

with in CTOH team : Fabien Blarel, Caroline Delbecque, Marie-Claude Gennero, Laurent Roblou



Established in 1989, the **Center for Topographic studies of the Oceans and Hydrosphere (CTOH)** is a french national observation service dedicated to satellite altimetry. The main objective of the CTOH is to develop and maintain altimetric data bases with homogeneous, up-to-date corrections for the long term monitoring of sea level, lake and river levels, and the cryosphere for climate studies. The CTOH aids scientific users in the development of new altimetric products and applications.

Distributed Products

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

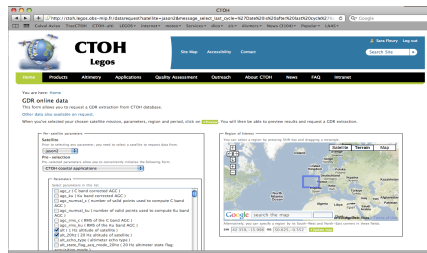
Alongtrack GDR altimetric data over oceans & continents available on-line within netcdf format for Jason1, Jason2 and Envisat

The CTOH maintains homogeneous altimetric GDR data bases for Topex/Poseidon (1992 – 2005); GFO (2000 – 2008); ENVISAT (2002 – today); Jason-1 (2002 – today); Jason-2 (2008 – today). Both 1 Hz and 18-20 Hz data are available over all possible oceanic and continental surfaces. In addition we add about 20 recent corrections in a homogeneous way to all the missions (see the list on right).

Our visualization and extraction web-tool is complementary to AVISO website and BRAT Toolbox, as it allows users to extract alongtrack GDR data and homogeneous corrections in regions where the standard products and data are not adapted: coastal zones, continental water surfaces (lakes, rivers, floodplains) and the cryosphere. Users can interactively select data using spatio-temporal criteria and visualize the different corrections before downloading.

New for 2011/2012:

- Topex and ERS within netcdf format (for end 2011).
- Retracking GRS1-2 waveform data is underway with the ICE-2 algorithm.
- Visualization and computation tools will be distributed with our products.
- Interactive visualization of our 2D products is under development.



Interactive WEB interface to visualize and extract alongtrack products.

Correction added to all GDR by CTOH :

- GIM ionospheric correction
- Wet Tropo CLS 01 – continental surfaces
- GOT00 / FES04 / GOT47 tide models
- Invert barometer ECMWF / MOG2D
- Mean Dynamic Topo MDT (RIO05 / RIO09)
- Mean Sea Surface (CLS_01 / CNES_CLS_2010)
- Geoids (GGM02, EGM2008, GOCE2010)
- Bathymetry (Gridone)
- Distance to nearest coast (Leuliette / Stump)

New for 2011/2012:

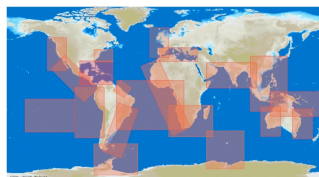
- Coastal Wet Tropo (JPL S. Brown 2010 – jason1&2)
- Geoid GOCE_EIGEN6_2011
- MDT 2010
- GOT 4.8 / FES2012
- Along track tidal constants

Coastal Products with X-Track (.../coastal-products)

Alongtrack data are available in a dozen regions, with specific X-TRACK processing in the coastal band, and the latest corrections available in the CTOH database. Sea level anomaly data (1 Hz) are available on a nominal groundtrack, as well as a high-resolution mean sea surface.

New for 2011/2012:

- High frequency (Jason:20 Hz for Jason1-2, T/P:10 Hz for T/P) SLA products, already available for some regions.
- Along-track tidal constants.
- New zones.



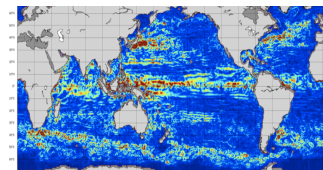
Available X-Track "Coastal" zones

Global Surface Currents Products (.../global-surface-currents)

Weekly surface current 1/4° combining geostrophic current anomalies (from AVISO – DT–2010), Ekman (from QuikScat) and the mean geostrophic circulation (from CNES CLS 09) up to 2009.

New for 2011/2012:

- ECMWF Ekman currents from 2010 onwards
- Direct visualization and download from web



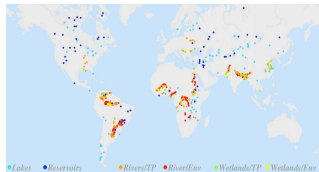
Mean amplitude of surface currents over the period 2000-2009

Continental Hydrology Products with Hydroweb (.../hydroweb)

Hydroweb provides near real-time time series of water level on the lakes (about 150), rivers and flooded plains (about 1300 virtual stations). We use altimeter measurements from Topex, ERS-1 & 2, GFO, Envisat, Jason1 & 2.

New for 2011/2012:

- Ranges from Pistach project (thanks to CLS)
- Topex overlaid from CASH project and CLS
- ERS 1&2 overlaid from OSCAR project (thanks to ESA)
- Snow depth based on SSM/I data



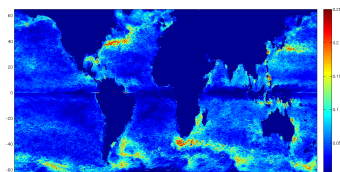
Map of the virtual stations available from hydroweb

Global Sub-Mesoscale Filaments (.../submesoscale-filaments)

FSLE position and strength based on analyses by F. D'Ovidio (LOCEAN, Paris) calculated from gridded AVISO surface current and using Finite-Size Lyapunov Exponents (FSLE), at 4km resolution, every 4 days from 1993 to today.

New for 2011/2012:

- Interactive web access (visualization and download)

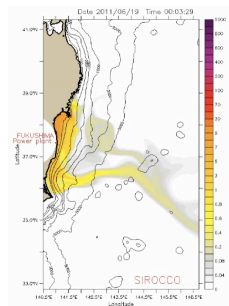


2003-2006 average of the stirring rates derived from FSLEs over the global oceans (km/days).

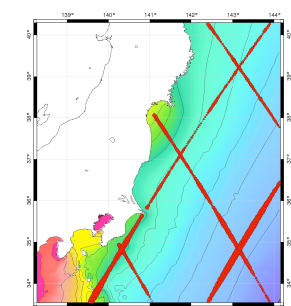
Examples of Applications

FUKUSHIMA Radioactive Dispersion Forecast

Realistic ocean dispersion of radioactive pollutants have been tracked using the SYMPHONIE coastal ocean circulation model which includes tides (left Figure). The T-UGOM tidal atlas provides accurate tidal boundary conditions for this model. In addition, the tide model has been validated with tide gauge and altimetry data. The long time series of Topex/Poseidon and Jason-1/2 alongtrack altimetry data have been harmonically analyzed, and corrected for solid and loading tides, in order to extract the ocean tide constants at 7 km resolution along each groundtrack. The tide solutions show very small misfits with the independent altimetry-derived tidal constants (right Figure). Work financed by the CNES through the OSTST SWG and the COMAPI project.



A dynamic animation of the forecast of the dispersion of radioactive pollutants.

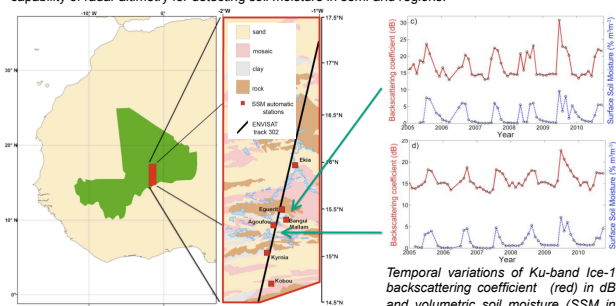


A zoom of the M2 misfits computed between the altimetry-derived data and the M2 regional solution.

Estimating Surface Soil Moisture Over Sahel Using ENVISAT Radar

C. Fatras, F. Frappart, E. Mougin, M. Grippa – submitted in *Measurements, Remote Sensing of Environment*

The radar altimetry backscattering coefficient is related to surface properties, especially soil moisture and surface roughness, and their temporal evolution. 8 years of backscattering coefficients variations from Envisat in Ku and S bands over the AMMA meso-scale site of Gourma, Sahel, were analyzed and related to the nature of the soil and its hydrological status (presence of moisture, open water, ...). Comparisons were made with in-situ superficial soil moisture measurements and satellite-derived soil moisture estimates. Good correlations were found especially over sandy surfaces, showing the capability of radar altimetry for detecting soil moisture in semi-arid regions.



The AMMA-CATCH mesoscale site in Mali, with the location of 6 automatic soil moisture stations (squares) and ENVISAT path 302 (black line).

Temporal variations of Ku-band Ice-1 backscattering coefficient (red) in dB and volumetric soil moisture (SSM in %) at 10cm depth (blue) over the period January 2005 - October 2010 at Bangui Mallam (c) and Agoufou (d)



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