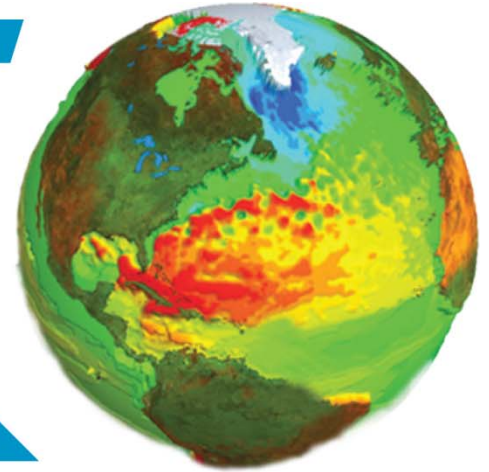


BRAT

BASIC RADAR ALTIMETRY TOOLBOX



Tools for all altimetry users

Basic Radar Altimetry Toolbox & Tutorial

- A Joint project between ESA and CNES, benefiting from years of Aviso and CLS's experience, and from Science & Technology scientific software development expertise
- Statements:
 - 17 years of altimetry and at least as many data formats as satellites,
 - A growing number of non-expert users of the data,
 - Scientists also need easy-to-use data products and tools!
- Version 1.0.0 released in April 2007
Version 2.0.0 in April 2009

Basic Radar Altimetry Toolbox & Tutorial

- Basic Radar Altimetry Toolbox (BRAT)
 - Data reading, processing and visualisation
 - All altimetry data from official data centres since ERS-1 (1991)
- Radar Altimetry Tutorial (RAT)
 - A tutorial describing altimetry, for the users
 - technique, applications and missions
 - Products fact sheets and data use cases
- Available on the web
(<http://www.altimetry.info>,
<http://earth.esa.int/brat/>), or on DVD



Basic Radar Altimetry Toolbox software

- Windows & Linux
- Open source

Data read & processed:

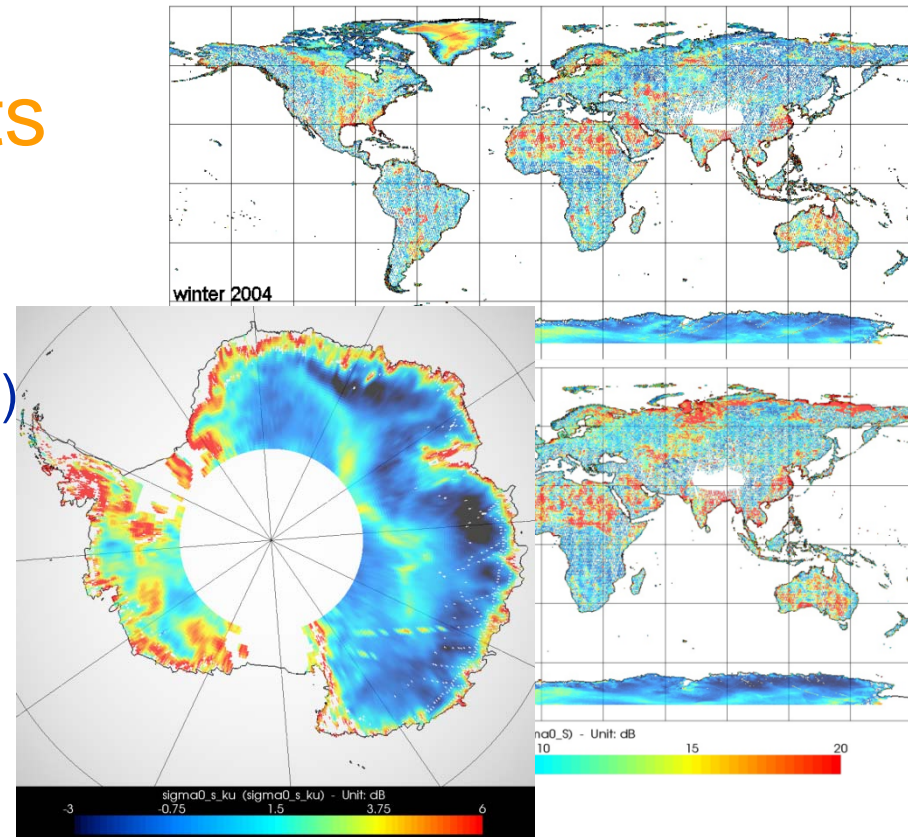
- From several satellites
ERS-1 and 2, Topex/Poseidon, Geosat Follow-on, Jason-1, Envisat, Jason-2 and Cryosat.
- From several data centres
Aviso, ESA, JPL/PoDaac, Noaa
- Of several processing levels
from Sensor Geophysical Data Record to gridded merged data
- Present version: **v2.0.1** (released June 19, 2009)

Users' feedback about version 1

- Real interest:
 - 600 persons subscribed to download it between June 2007 and April 2009 ; plus DVD distribution at meetings, and two Esa's workshops)
 - (158 persons (85 new ones) between April 22 and June 18 (version 2))
- Request for altimetric waveform visualization capabilities
- Need for easier ascii data export (possible previously, but not within the GUI)
- Processing time sometimes a bit long
- Need of ergonomoy improvement:
 - Very logical workflow once you get into it, but not self-explaining when you begin, and maybe a little tedious
 - Windows too crowded; users have problems knowing what and when filling some boxes or not, or even when they did it by mistake
- one of the problems is for people used to imagery data; however, altimetry is **not** imagery, but multi-parameter, along-track data...

Newest developments

- Tutorial upgrades:
 - Four more Data use cases (Hydrology, Land, Ice and Sea ice)
 - Tutorial additional information
- Toolbox upgrades:
 - Ergonomic improvements
 - Brat Direct product interface
 - Mac OS X version
 - Data Pre-Selection: select only the potentially relevant files for faster processing
 - Waveform plots
 - Generic 3D plots (plot of any field wrt any two other fields)
 - Geo-localised output images (to be merged with e.g. MERIS maps)
 - River & Lake products



Ergonomics improvements

The screenshot shows the Brat Interface software window titled "Brat Interface - my_workspace". The main window has a menu bar with "Workspace", "Datasets", "Operations", "Views", and "Help". Below the menu bar, there are tabs for "Datasets", "Operations", "Views", and "Logs". The "Operations" tab is active, showing an "Operation Name" dropdown set to "test_operation_copy" and several buttons: "Execute", "New", "Duplicate", "Delete", "Export...", "Edit Ascii export", and "Compute statistics".

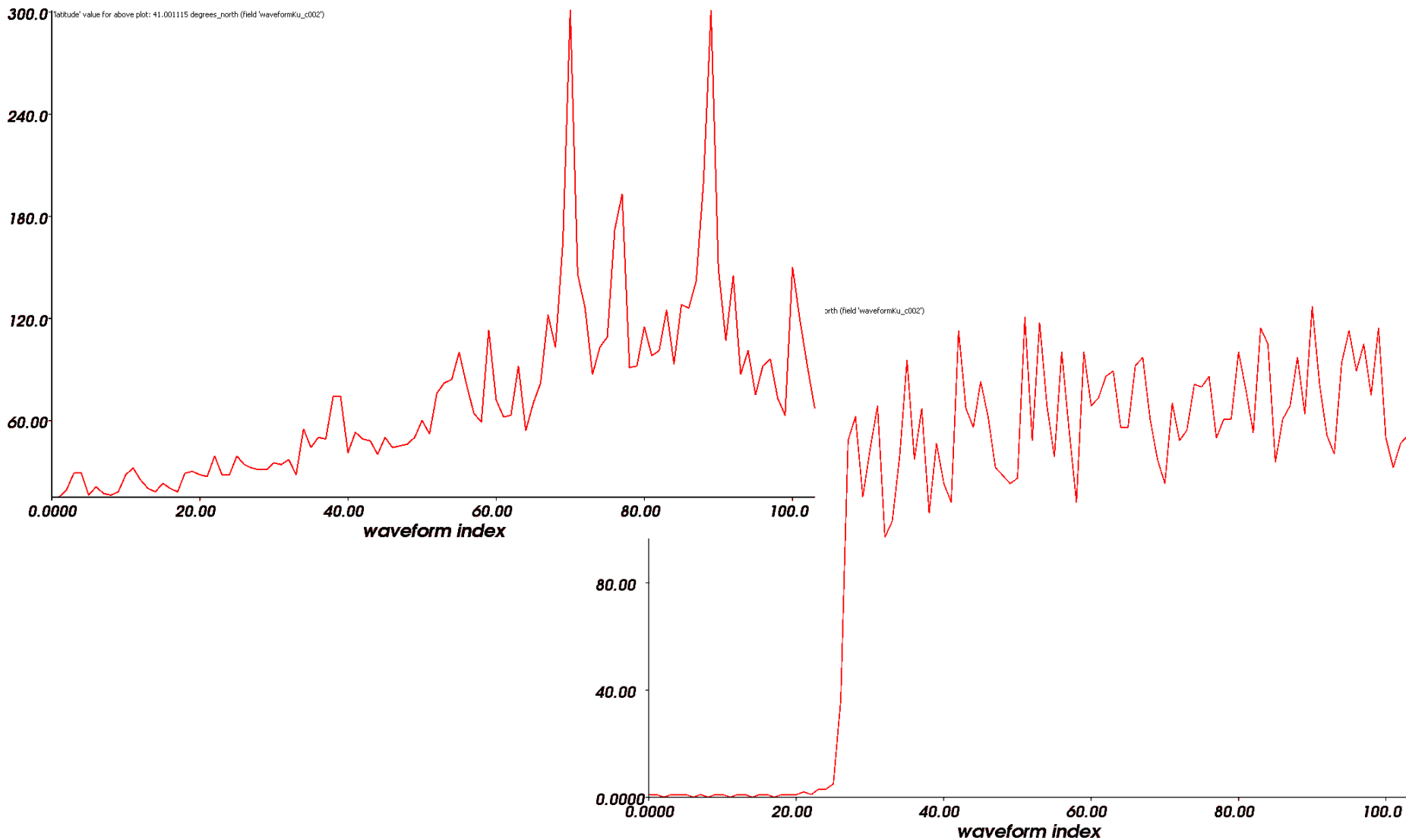
The interface is divided into several panels:

- Datasets:** A list of datasets including "test_dataset" and "dataset_NetCDF".
- Fields:** A list of fields including "src_pack_cnt", "instr_mode_id_flags", "meas_conf_data_flags", "alt_cog_ellip (mm)", "hz18_diff_1hz_alt (mm)", "instant_alt_rate (mm)", "hz18_ku_trk_cog (mm)", "hz18_s_trk_cog (mm)", "map_18hz_ku_trk_flags", "ku_band_ocean_range (mm)", "s_band_ocean_range (mm)", "hz18_ku_band_ocean (mm)", "hz18_s_band_ocean (mm)", "sd_18hz_ku_ocean (mm)", "sd_18hz_s_ocean (mm)", "num_18hz_ku_ocean", "num_18hz_s_ocean", "map_18hz_ku_ocean_flags", and "map_18hz_s_ocean_flags".
- Data expressions:** A tree view showing a hierarchy: "X" (containing "lat"), "Y (optional)", "Data" (containing "ku_band_ocean_range", "test", and "SSH"), and "Selection criteria (optional)".
- Expression:** A text area containing the formula: `alt_cog_ellip - ku_band_ocean_range - mod_dry_tropo_corr - inv_barom_corr - (tot_geocen_ocn_tide_ht_sol1) - solid_earth_tide_ht - geocen_pole_tide_ht - sea_bias_ku - ra2_ion_corr_ku - mwr_wet_tropo_corr`. The unit is set to "m".
- Data Computation:** A dropdown menu set to "MEAN" and buttons for "Check syntax", "Show info.", and "Title / Comment".

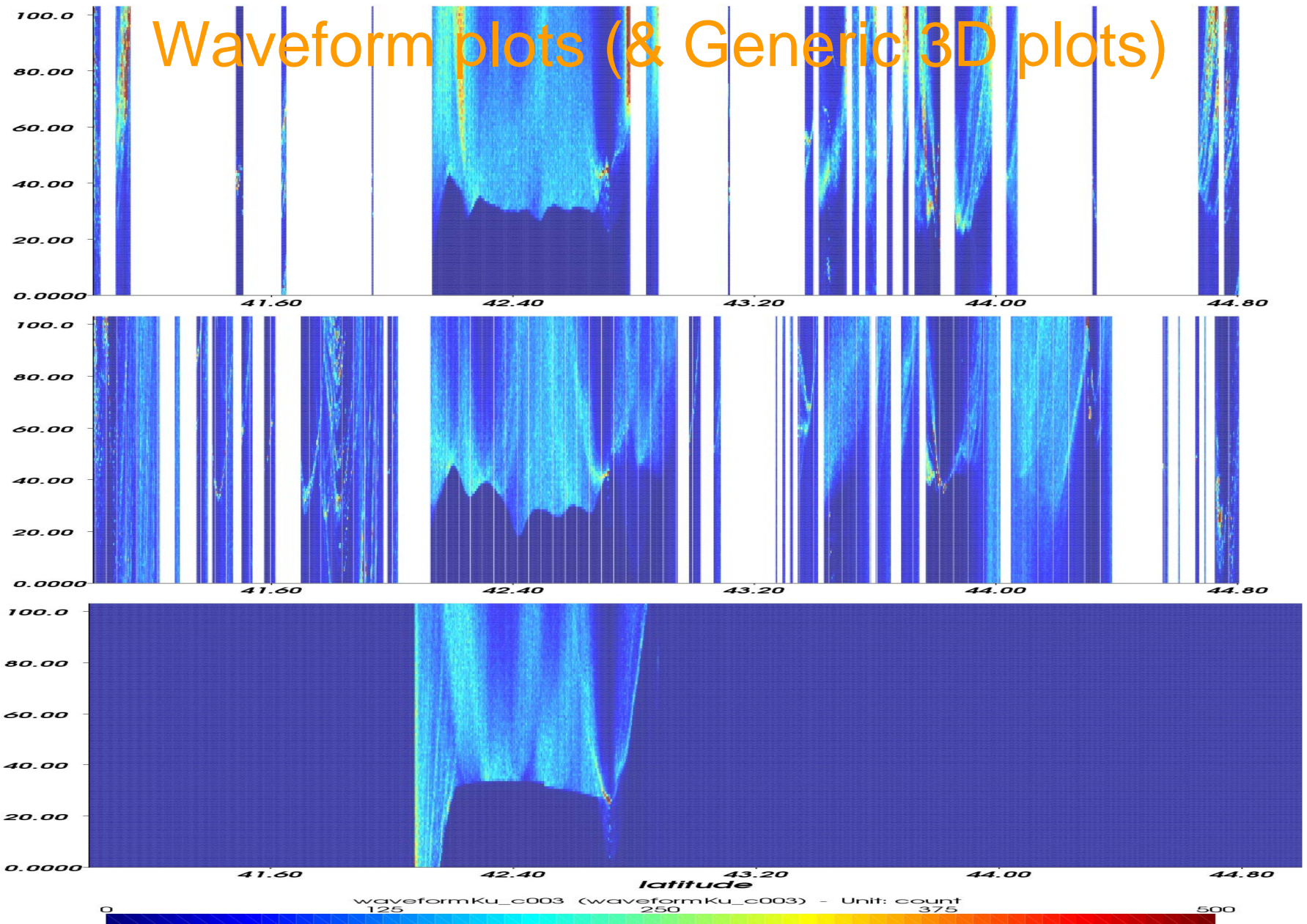
Buttons for "Insert expression", "Insert field", "Insert function...", "Insert formula...", "Save as formula...", and "Delete expression" are located above the expression text area.

- Optional information as pop-ups appearing when clicking on a button (→interface less crowded)
- Drag&Drop to fill information
- "Export" button

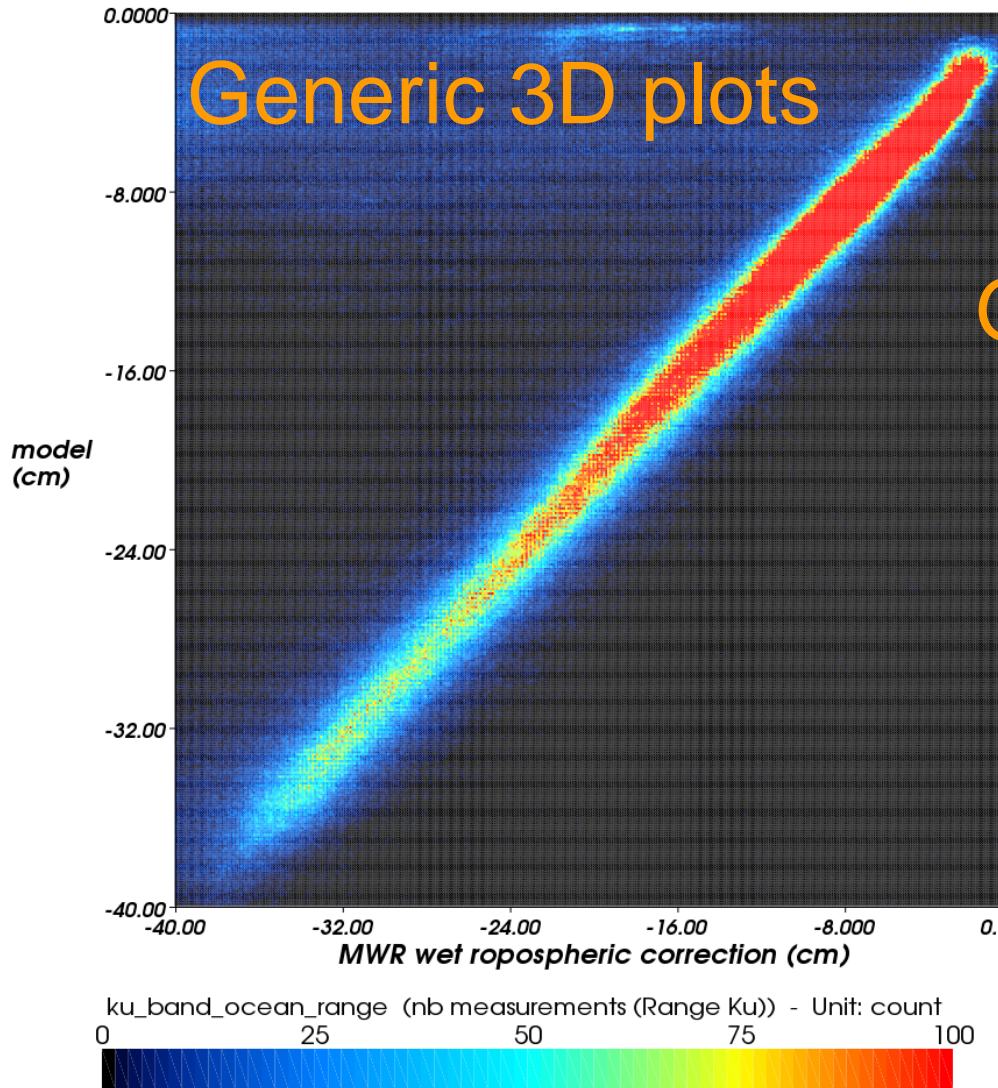
Waveform plots



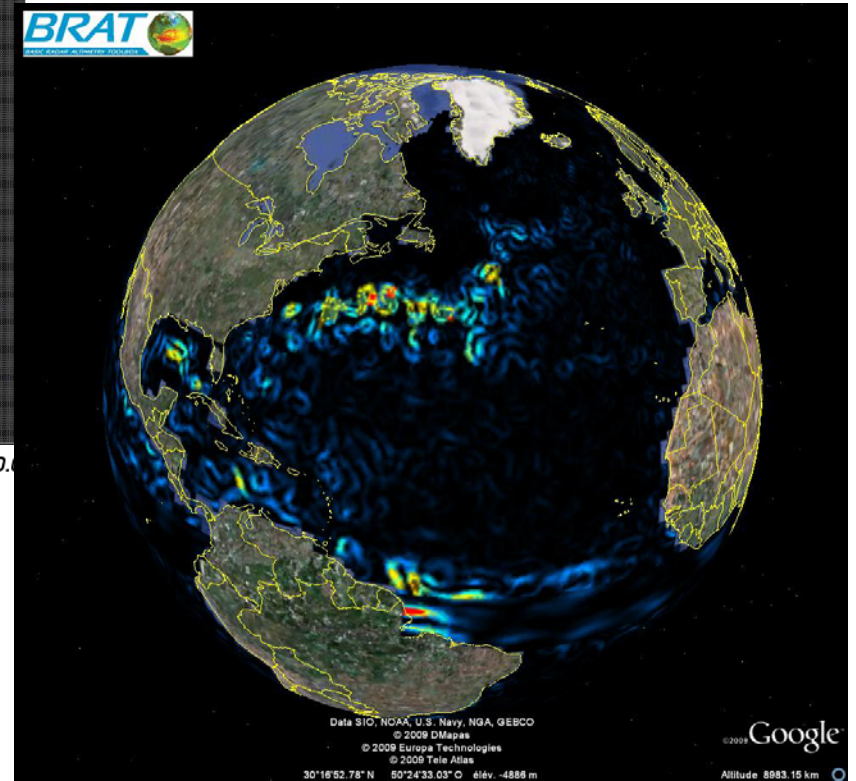
Waveform plots (& Generic 3D plots)



Generic 3D plots



GeoTiff & Google Earth output



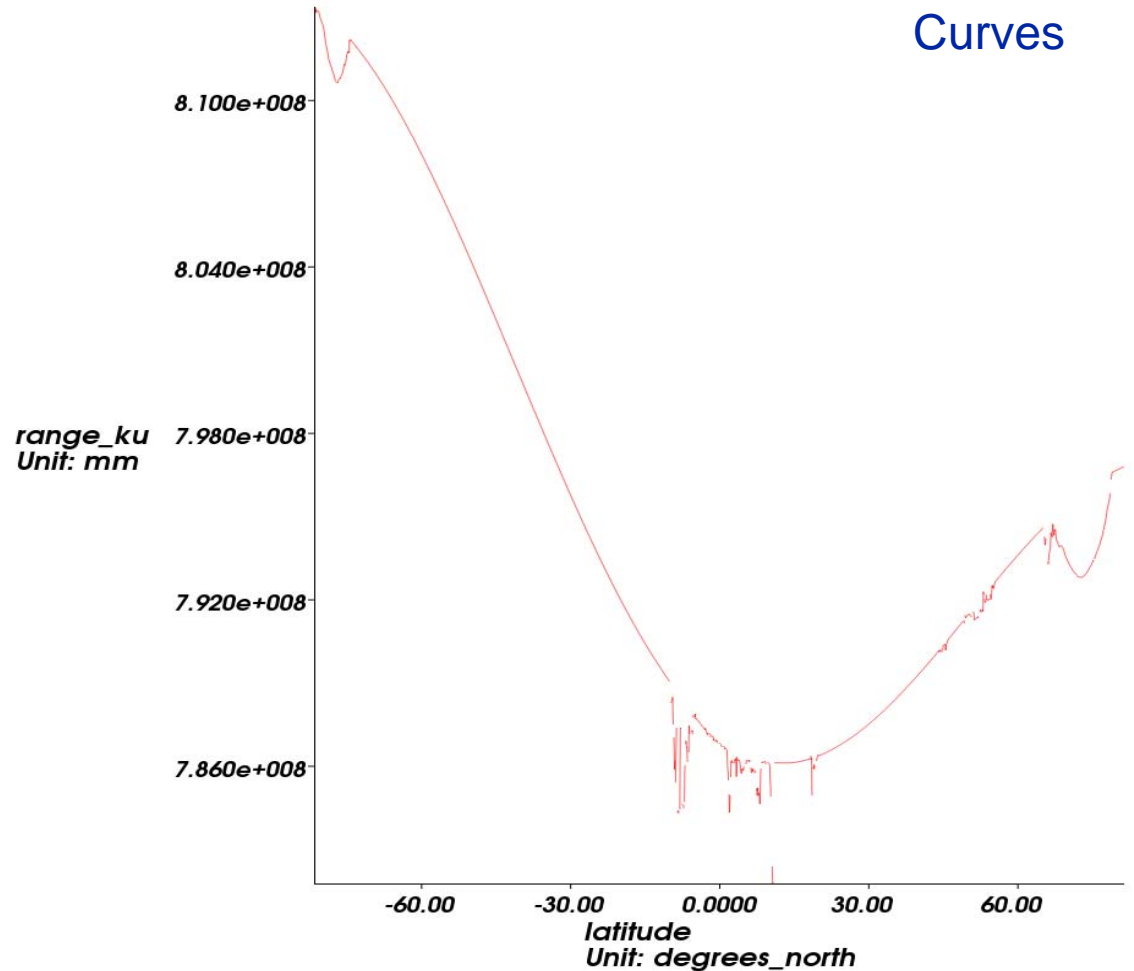
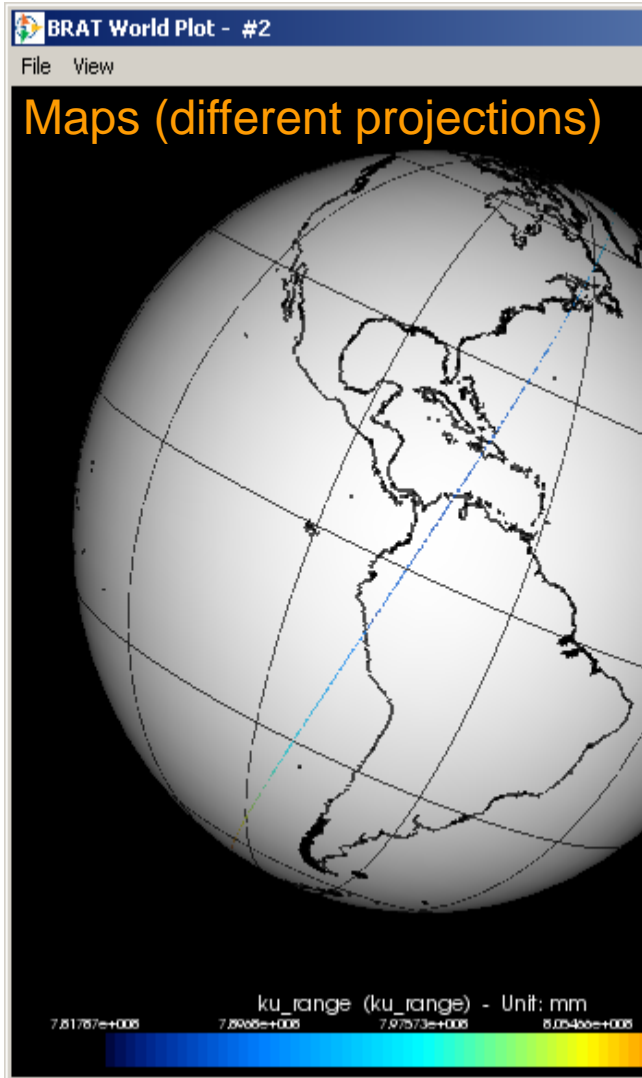
For more information

<http://www.altimetry.info>

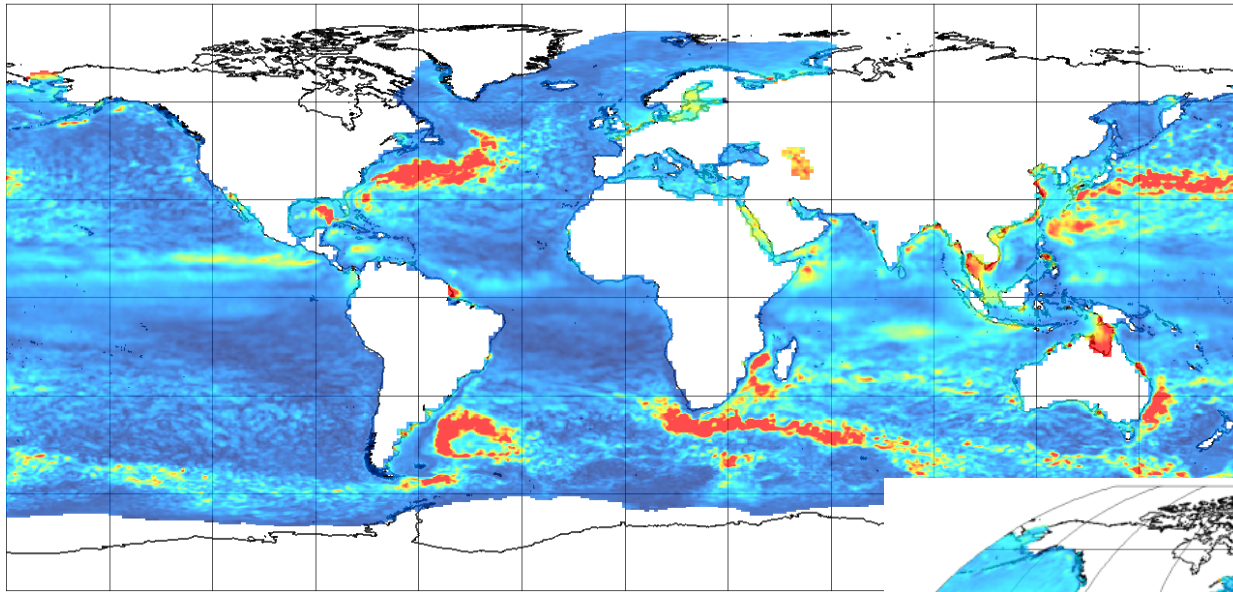
(mirror on <http://earth.esa.int/brat/>)

Functionalities

Data quick-look & visualisation



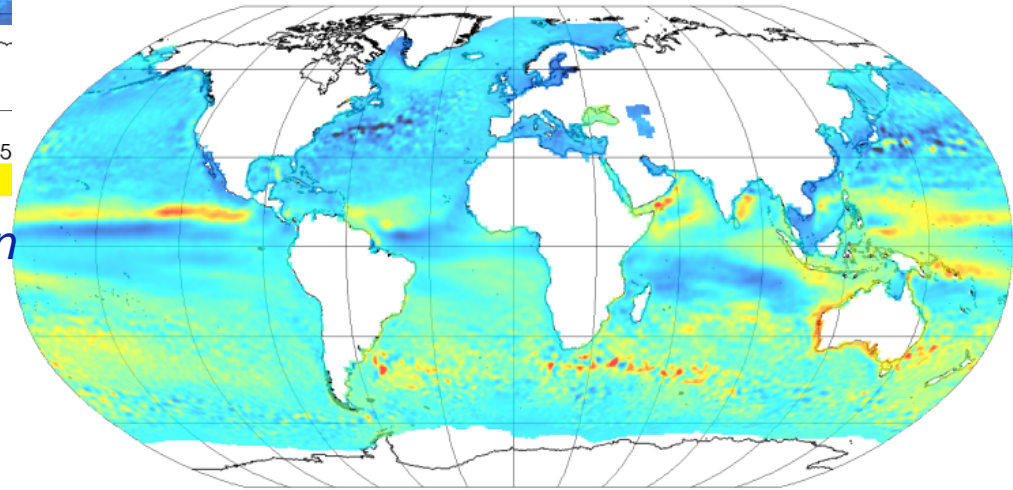
Statistics



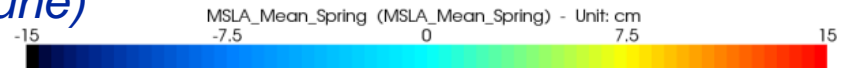
+ *Minimum,
Maximum*



Sea Level Anomalies Standard deviation

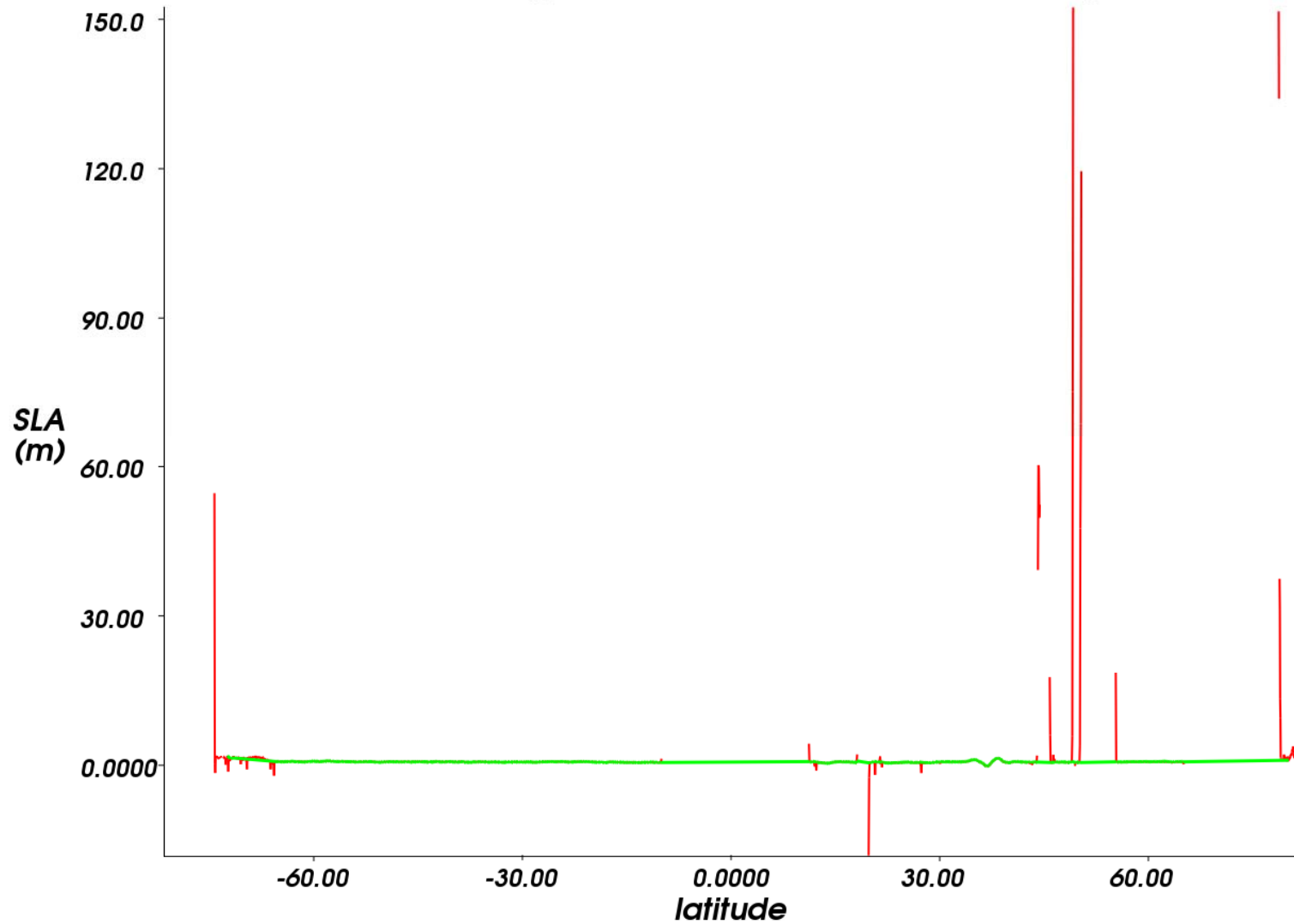


*Mean of Sea Level Anomalies over the
Springs 1993-2006 (April-May-June)*



Data editing

SLA with (green) and without (red) editing



examples

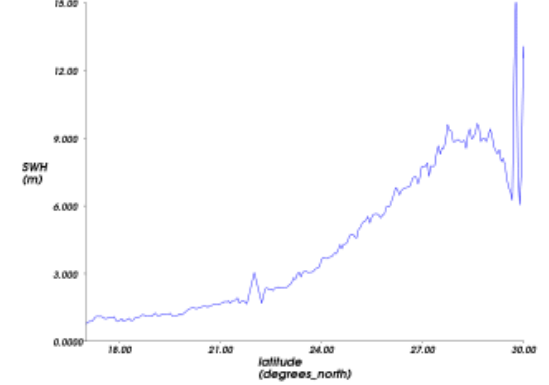
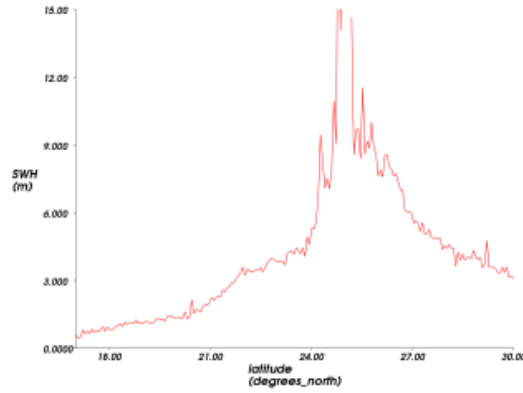
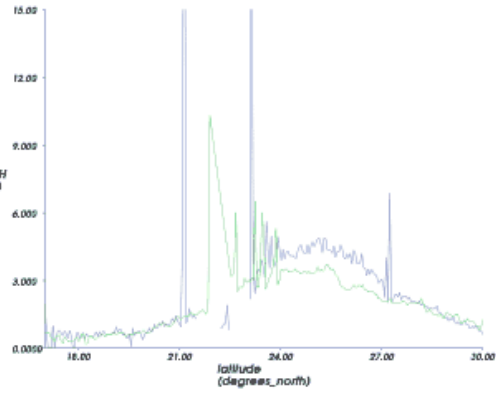
Jason-1 & T/P

Hurricane Katrina

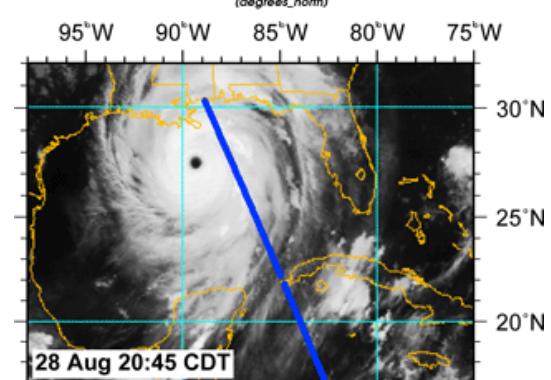
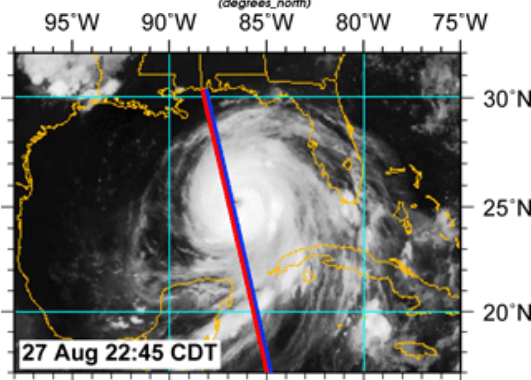
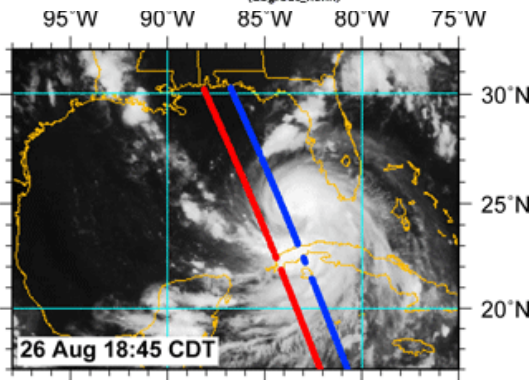
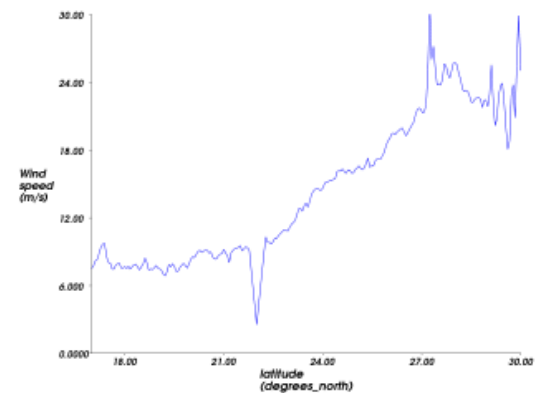
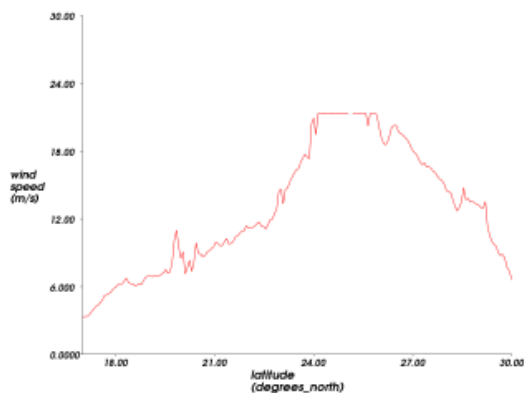
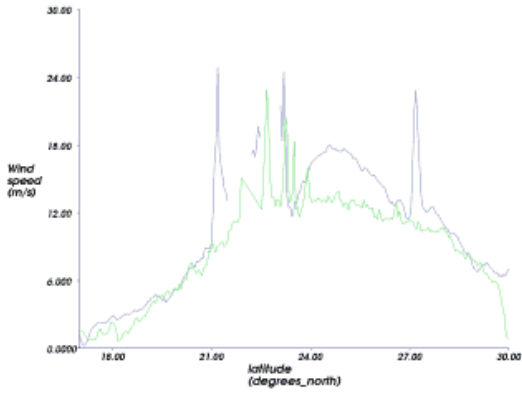
Envisat

GFO

SWH



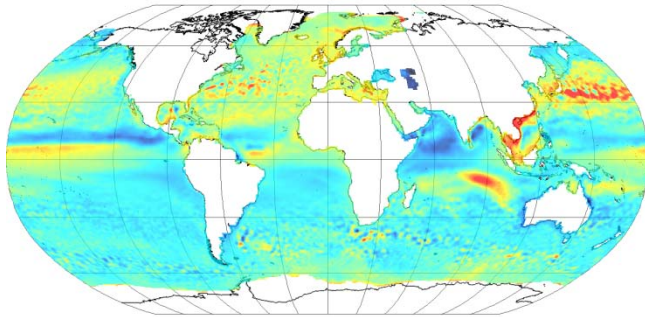
Wind



SERVICE
ALTIMETRIE
&
LOCALISATION
PRECISE

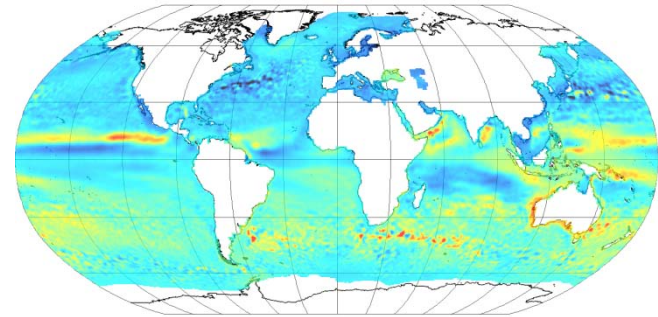
Sea level anomaly seasonal variations

Autumn



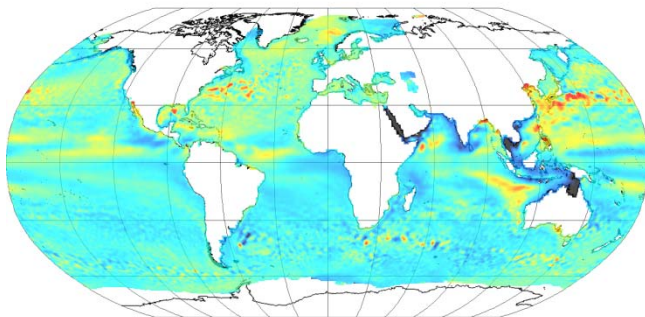
MSLA_Mean_Autumn (MSLA_Mean_Autumn) - Unit: cm
-15 -7.5 0 7.5 15

Spring



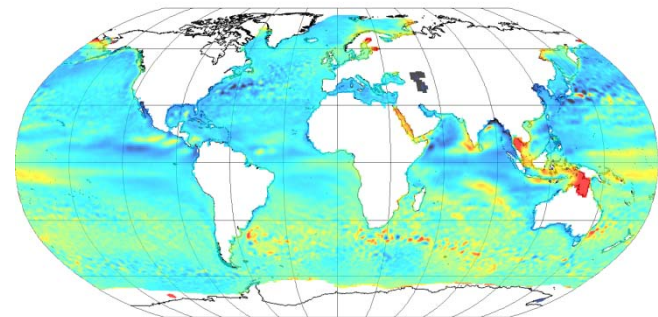
MSLA_Mean_Spring (MSLA_Mean_Spring) - Unit: cm
-15 -7.5 0 7.5 15

Summer



MSLA_Mean_Summer (MSLA_Mean_Summer) - Unit: cm
-15 -7.5 0 7.5 15

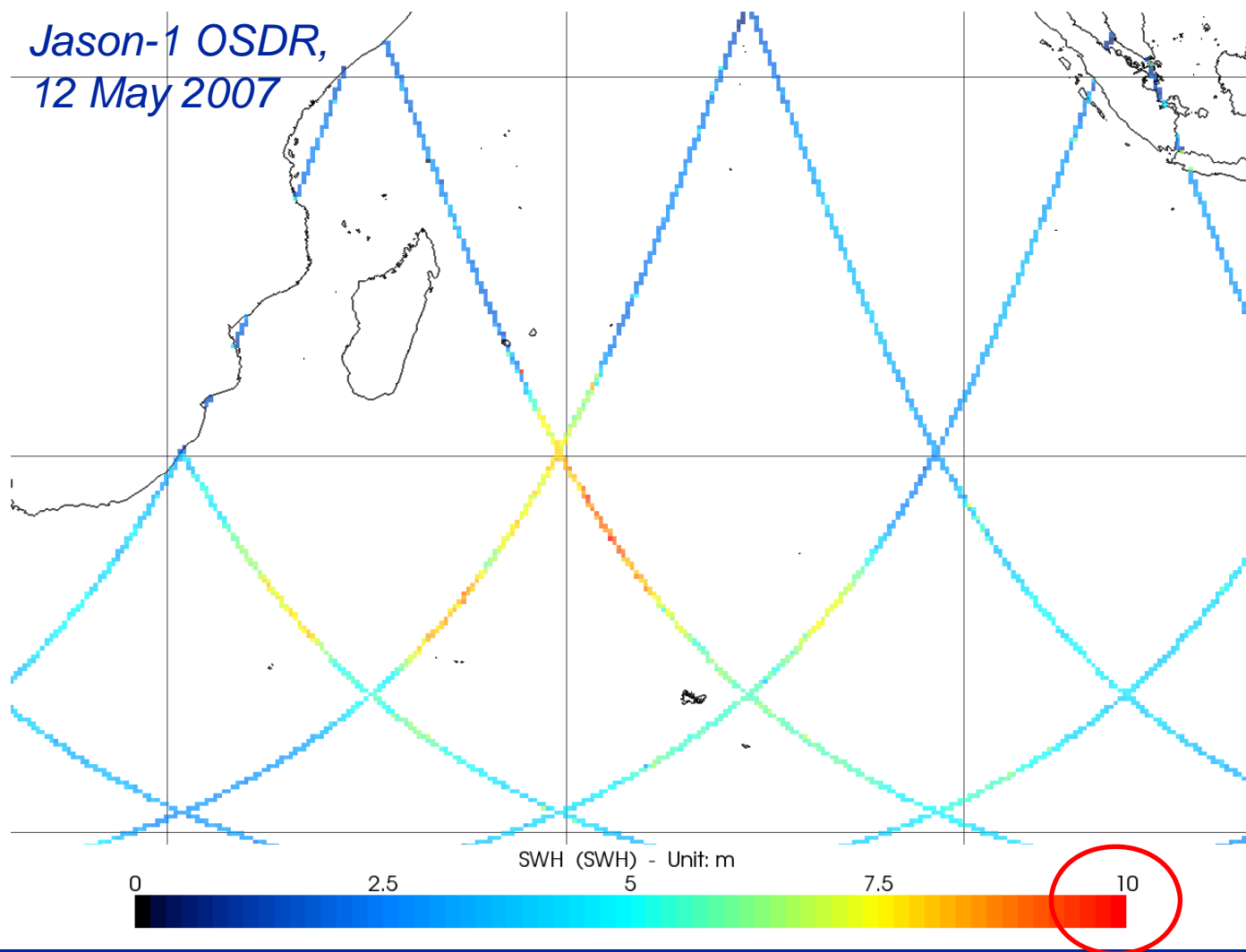
Winter



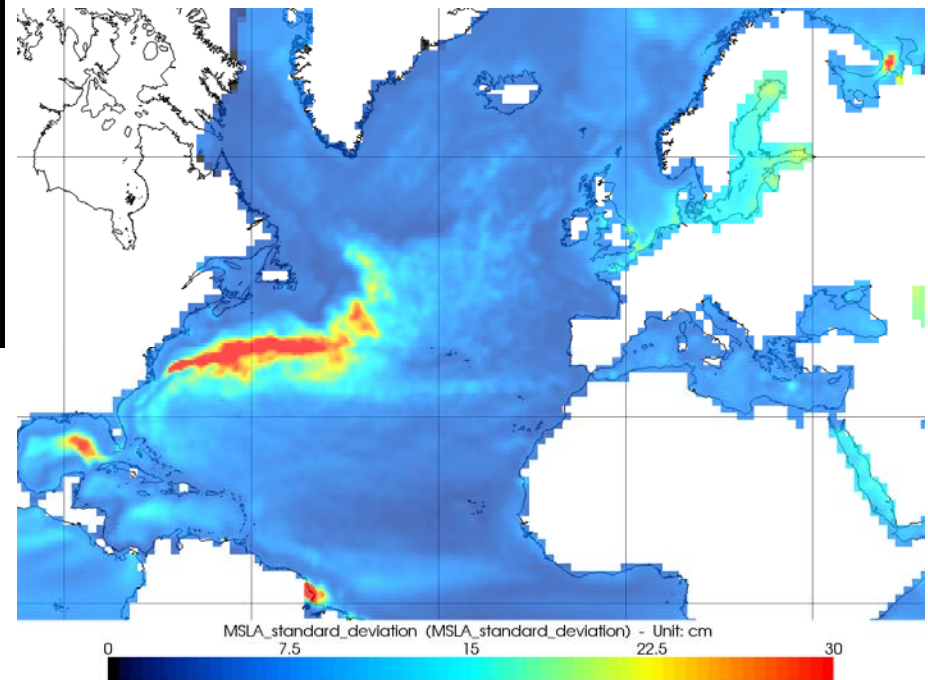
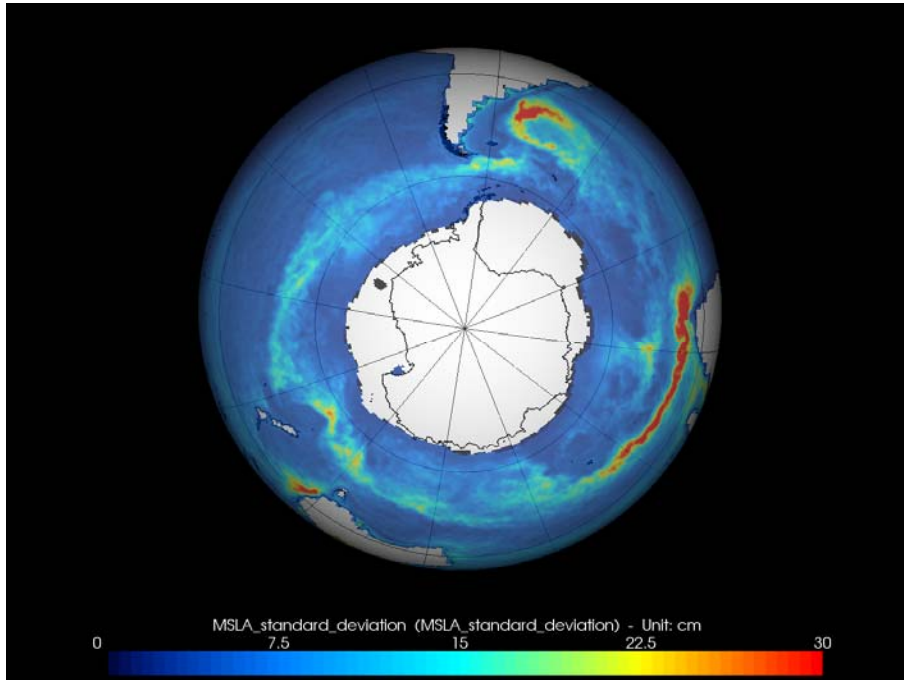
MSLA_Mean_Winter (MSLA_Mean_Winter) - Unit: cm
-15 -7.5 0 7.5 15

Southern swell, May 2007

Jason-1 OSDR,
12 May 2007



Ocean variability (SLA standard deviation over 15 years)



Aral Sea level - T/P pass 107 (Dec 1992 - June 2002)

