Ocean Surface Topography Science Team Meeting (OSTST)

October 23-27, 2017

"The 25th Anniversary of TOPEX/Poseidon"

Jason-1/2/3 and SARAL GDR Status

CNES, NASA,
NOAA, EUMETSAT

From all 4 MSEs
Cristina (EUM),
Alejandro (NOAA),
Shailen (JPL),
Nicolas (CNES)

Reprocessing Plans

- **Two missions (JA3 and S3A) launched early 2016, generating a lot of activities (Calibration, Validation, …) and updates (in particular on S3A ground processing).**
- **Two missions on LRO orbits (SARAL in 2016, Jason-2 in 2017) have also required processing updates and additional validation efforts.**
- **Two new missions coming in 2018 (S3B, CFOSat) requiring some preparation and support.**
- **And the need to prepare (already …) SWOT and Jason-CS processing software.**
- **Currently 6 flying altimeters, with a quite homogenous processing baseline (thanks to coordination between all agencies) and overall very good data quality.**
- **Jason-1 reprocessed recently, ENVISAT and CryoSat about to be delivered.**

Reprocessing Plans

- **Thus:**
  - ✦ Reprocessing of Jason-2 and Jason-3 is not a high priority.
  - ✦ Topex and SARAL reprocessing will be performed in 2018.
  - ✦ We will also prepare the GDR-E standard to be applied on Jason-2, Jason-3, and SWOT altimeters.

TOPEX Reprocessing Plan

- Use original SDR, GDR
  - Search for missing cycles, pass data to make record as complete as possible. Both SDR and GDR are needed in retracking.
- Revisit retracking software.
  - Investigate use of separate PTR for Ku and C.
  - Validate with simulations.
- Include additional parameters on record
  - 20Hz Range at both Ku, C as available on SDR, with time tags, locations. (All corrections still at 1 Hz like Jason-1/2/3)
  - Key parameters for both original GDR and Retracked
- Regenerate some corrections, flags
  - Oscillator drift from long term fit (TBD)
  - Doppler shift and acceleration corrections (TBD from orbit or altimeter data)
  - Surface, rain, ice flags with Jason-like algorithms
- Use latest POE from GSFC (ITRF2014), new environmental corrections & geophysical fields from CNES, end-of-mission recalibrate TMR data.
- Refit SSB with all above improvements, perform CalVal analysis within the project with the support from key PIs
- Update format to Jason version E (as used for Jason-1 reprocessing)
- Deliver GDR products by mid 2018, then work on SGDR data files

SARAL GDR-E

- **GDR-E processing configuration is currently being finalized for SARAL mission, it will include (among other …about 60 Change Requests have been included in this version):**
  - Ice2 retracking accounting for the actual altimeter antenna aperture
  - Updated altimeter calibration scheme (CAL2 normalization, CAL1 not corrected by CAL2, updated gains values)
  - SSB based on 3D approach (SWH, wind and swell)
  - New Radiometer processing algorithm, developed by CLS in 2017 – performances are similar to Jason-2/3 methods (refer to CLS presentation)
  - Wet & Dry tropospheric correction based on 3D ECMWF fields
  - Updated geophysical correction (FES2014, GOT4.10, R. Ray internal tide model, S. Desai pole tide with new IERS linear mean pole, 2013 MDT)
  - Atmospheric correction derived from ECMWF fields
  - Platform mispointing angles
  - Netcdf v4 product format
  - Etc …

  A technical note will be circulated early 2018 to describe in details the evolutions.

Jason-2 and Jason-3 Mission Product Status

- **Jason-2 GDR_D** since March 2013.
  - Processing baseline described in the User Handbooks (available for example on https://www.aviso.altimetry.fr/fileadmin/documents/data/tools/hdbk_j3.pdf)

- **Jason-3 using the same GDR-D standard** :
  - JA3 also available as prototype products (PEACHI)

- Thanks in particular to Ka and SAR modes data sets, a large number of proposals could be envisaged for future Jason standard. Either in official data products and/or in a dedicated prototype. We still need to consolidate the list of updated in the GDR-E official products. The round robin exercise would provide valuable inputs on new retracking solutions.

- **Altimeter Instrument processing :**
  - JA2 : Apply the 18 cms bias on all retracking estimates (currently done only for ocean retracking)
  - Accounting for the CNG steps to improve sigma0 and wind stability
  - Numerical retracking and/or Adaptative retracking (Peachi JA3) accounting for real antenna aperture (in addition to MLE4 ? only for GDRs ? Only in prototype)
  - Accounting for SST impacts on sigma0 values (Ka band, but not null as well on Ku band)
  - DCore and/or 2 pass retracker
  - Waveform classification (J.C. Poisson)

- **Altimeter Instrument processing :**
  - New SSB table on JA2 (inline with JA1 ..) and updated ionospheric correction (CLS JA1 poster), define the best way to fix the mean of the SSB tables (JPL ‘Zero significance’ method)
  - SSB 3 parameters (Peachi SRL and JA3)
  - Compute the SSB from SWH and sigma0 instead of SWH and wind
  - 1Hz averaging (which degrades the data quality - W. Smith)
  - Filtering, editing including rain flag.

- **POD:**
  - Just follow the improvements ….(ITRF2014, ….) GDR-F
  - And provide tools to update past products with new POE standards (or different orbits : JPL, GSFC, …)
- **Geophysical correction :**
  - New tides solutions (FES2014b – GOT v4.10xx)
  - New MSS (DTU15 and CNES&CLS_2015)
  - New geoid model (same as JA1)
  - Distance to the coast, inline with SAR instrument expectation (along track – cross track – angle of attack)
  - Add the DAC in OGDR products
  - Compute the wet and dry tropo correction from ECMWF 3D fields (for inland water and ice).
  - New pole tide solution with new IERS linear mean pole (S. Desai and co).
  - Add one Internal tide model (R. Ray)

BACKUP SLIDES

JA1 GDR Reprocessing Status

- **Jason-1 GDR_E** : reprocessing completed end April 2016

De : Desai, Shailen D (335A) <shailen.d.desai@jpl.nasa.gov> Date : lun. 09/05/2016 17:25
À : ostst; ostst-users
Cc :
Objet : Jason-1 Version E GDR Release Notice

Dear OSTST,

We are pleased to announce that reprocessing of all Jason-1 data, as version "E", is now complete and available for download. This release includes reprocessed data from primary, tandem, and geodetic mission phases, which spans 2002-2013 and includes repeat cycles 1-373, 500-537.

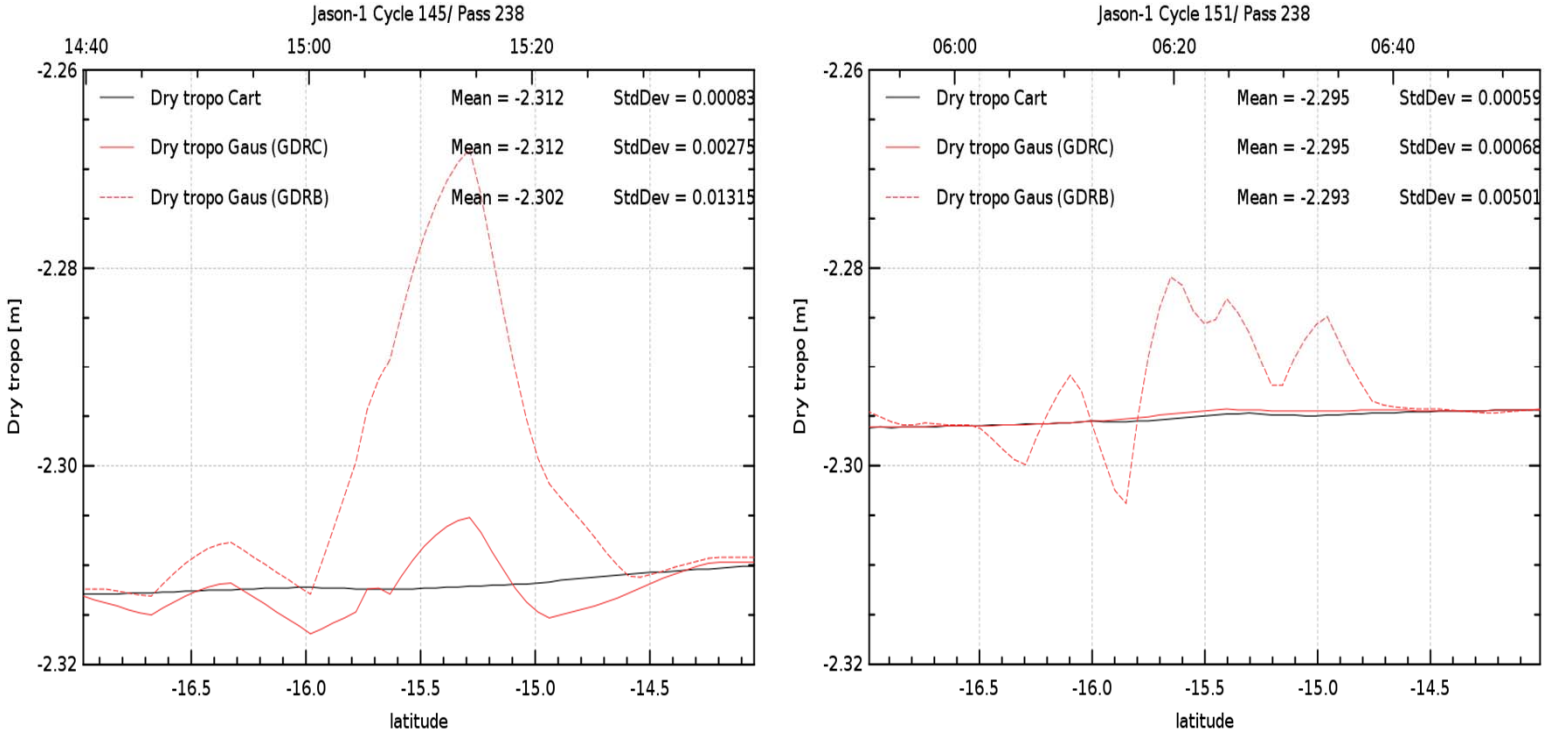
This new release takes into account user and cal/val feedback from last year's beta release.
Products from this updated release have creation dates ("history" parameter on products) of January 2016 and later.
Products from the last year's beta release have creation dates in 2015, and should be discarded.

The reprocessed data are now available as version "E" GDR data products at the AVISO and PODAAC ftp sites as follows:
ftp://avisoftp.cnes.fr/AVISO/pub/jason-1/
ftp://podaac.jpl.nasa.gov/allData/jason1/L2/

  - One anomaly on the dry tropospheric (see next slides)
  - Validation report will be issued by end 2016

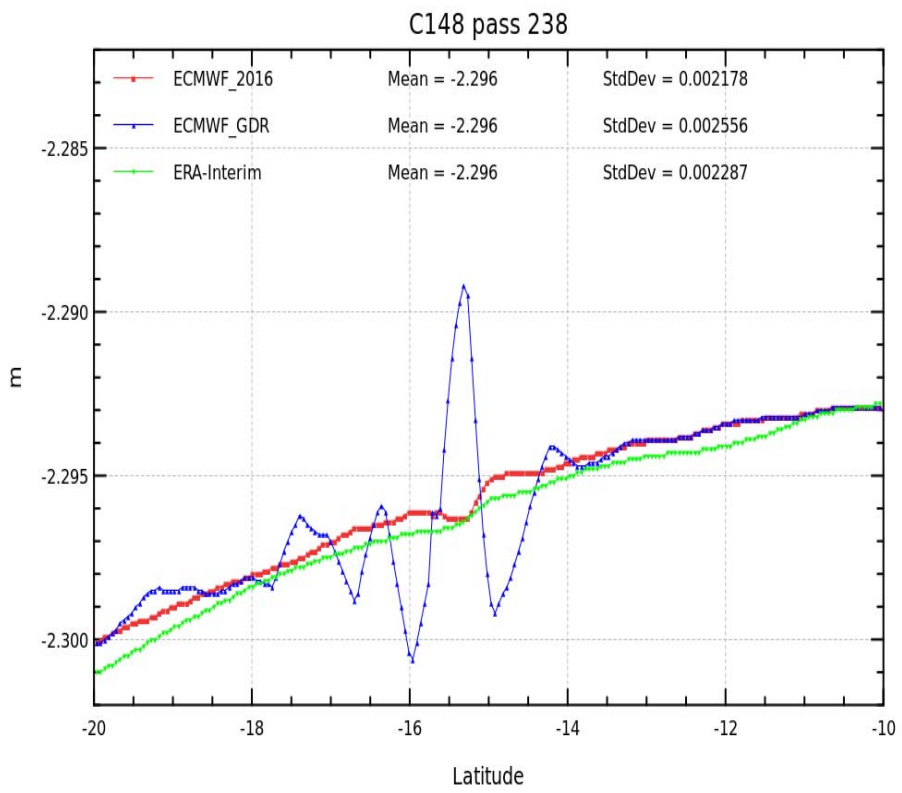
JA1 GDR Reprocessing Status – Dry Tropo

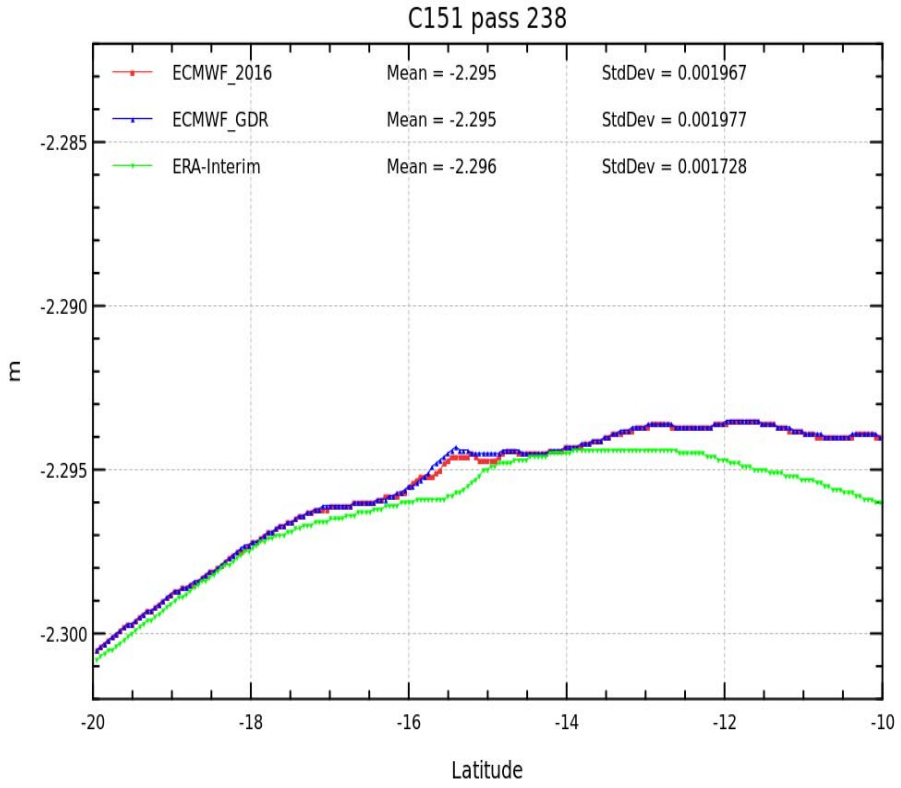
- Oscillations in dry troposphere correction **were clearly visible in Jason-1 GDR-B** data when approaching coasts. The amplitude of these oscillations were more important before the change of ECMWF grids model on 2006-02-01 (corresponds to cycle 150)
- These oscillations were reduced but still visible before cycle 150 (and they disappeared after cycle 150) in GDR-C data thanks to the use of reprocessed ECMWF **(update 'Met Script' no modifications of the ECMWF fields)** data between 2002-01 and 2007-03-07)
- As dry troposphere correction were copied from GDR-C in GDR-E, **this phenomenon is also visible in GDR-E**



JA1 GDR Reprocessing Status – Dry Tropo

The use of the sea pressure fields over ocean allows to correct these oscillations (red curve)





JA1 GDR Reprocessing Status – Dry Tropo

➢ Oscillations that were visible on ECMWF minus ERA-Interim difference near coasts before cycle 150 (light blue) are no more visible when sea pressure fields are use over ocean

➢ We propose to patch Jason-1 GDR-E netCDF with a recomputed dry troposphere correction solution.

➢ We propose to compute dry troposphere correction with:

- ✓ the surface pressure ECMWF fields over land
- ✓ the sea pressure ECMWF fields over ocean