Ocean LR data product

N. Steunou, S. Gille
T. Farrar, G. Dibarboure

8 July, 2015
SWOT SDT - Toulouse
Introduction

- SWOT L2 ocean data overview has been circulated to the ADT members and then to the SDT

- It is focused on KaRIn data over ocean
  - Nadir altimeter product is not described in this document
  - The description is based on the Jason & SARAL mission product description for topics in common with the SWOT mission

- Present version assumes several hypotheses
  - L2 level product produces SSH images with 1 km² pixels, after beam combination
  - L2 product gridding is as close as possible to the native instrument grid
L2 product: structure

- Organized in pass files (pole-to-pole pass)
- Product can contain multiple files
  - Nadir data are not included in the SSH KaRIn image, but provided over the same pass and same time
  - Corrections could be provided in a separate file
- Gridded on a swath-oriented nadir-centered grid
  - All the parameters and their corrections are provided on the same grid
  - All SWOT sensors use a satellite-fixed geometry (consistent and comprehensive)
  - Interpolation and smoothing are minimized
  - See also splinter presentation on gridding
Swath-oriented native grid

- Oriented with instrument angles (along and across-track), and aligned with the pixels of the central beam of KaRIn

- Due to repeat orbit requirements, the nadir track will remain within ± 1 km at least 90% of each year, and ± 2.5 km max. The grid will be displaced accordingly

- Images from consecutive cycles are not perfectly aligned
L2 product: content

Image of SSH, SWH, sigma0, associated corrections and various flags

2D data provided in swath
- Latitude, Longitude
- Surface type
- SSH, o0, SWH
- Associated uncertainties, quality indicators
- Ice and rain flags
- Corrections (geophysical and calibration)
- Geophysical parameters (MSS, tides, ...)

High resolution σ0 at 250 m x 250 m are provided in the product

From KaRIn central beam amplitude
Impacts of possible changes

- Many discussions related to product gridding. SRD requires an Earth fixed grid, but depending on application, native grid could be preferable
  
  - See splinter session

- What changes in product definition with the SRD fixed grid?
  
  - Empty pixels to take into account track variations (instead of 3-61 km varying in position, would be ~ 0-64 km for each swath)
  
  - All parameters produced on the same grid => impact of the reinterpolation has to be assessed on all the estimated parameters (e.g. on σ0)
  
  - Loss of consistency between KaRIn data and nadir data gridding => do we have to envisage a nadir L2 product on a fixed grid?
  
  - Less consistency between 250m σ0 and 1 km² σ0 product
  
  - Impact on uncertainties?
Impacts of possible changes

- **What changes with resolution?**
  - If 500m resolution at 250 m posting becomes the baseline, does it affect this L2 product?
    - Higher resolution data used to produce as clean as possible 1 km product
      ⇒ Is L2 released with 1-km resolution?
      ⇒ Or do we build a L2 product with native 500-m resolution?
  
- A 9-beam product has been discussed (see expert products presentation)
  - As a complement to 1 km after beam combination
    - In the same product? → analogous to 20-Hz data contained in Jason IGDRs in addition to 1-Hz data
    - In another product? → as an expert sensor product, equivalent to Jason S-GDR approach
  
- Might have major implications for other L2 products (e.g., how to handle geophysical correction fields? 9x more? Apply only to merged 1km product?, what about SWH, σ0, ...?).
Remaining work

✓ Product definition is to be refined before PDR
  • After decisions on resolution, grid, expert product ...
  • Consolidated estimate of product volume
  • Content consolidation
    ▪ Missing items?
    ▪ Do we expect mitigation OBP algorithms to provide some additional products? Or only for processing and producing data with highest quality?
    ▪ Details to be changed?

✓ Uncertainties
  • Each LR algorithm flow function will produce its uncertainties
    ▪ To be worked through all algorithm steps: processing, meaning, impact of further functions, ...
    ▪ We have to address how to use these individual uncertainties to produce product level uncertainties
Remaining work

Next steps

- LR is a global product: what does not work for non-ocean surfaces?
- Estuaries and coastal areas
  - How to manage areas with both HR and LR data?
  - What about ocean patches?

Distribution tool

- To be addressed after PDR
- What are the needs?