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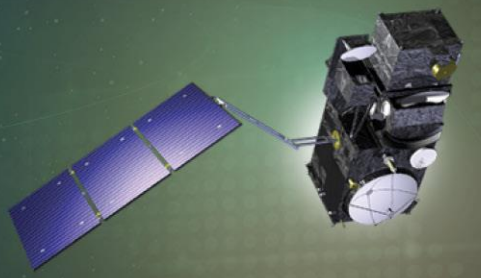


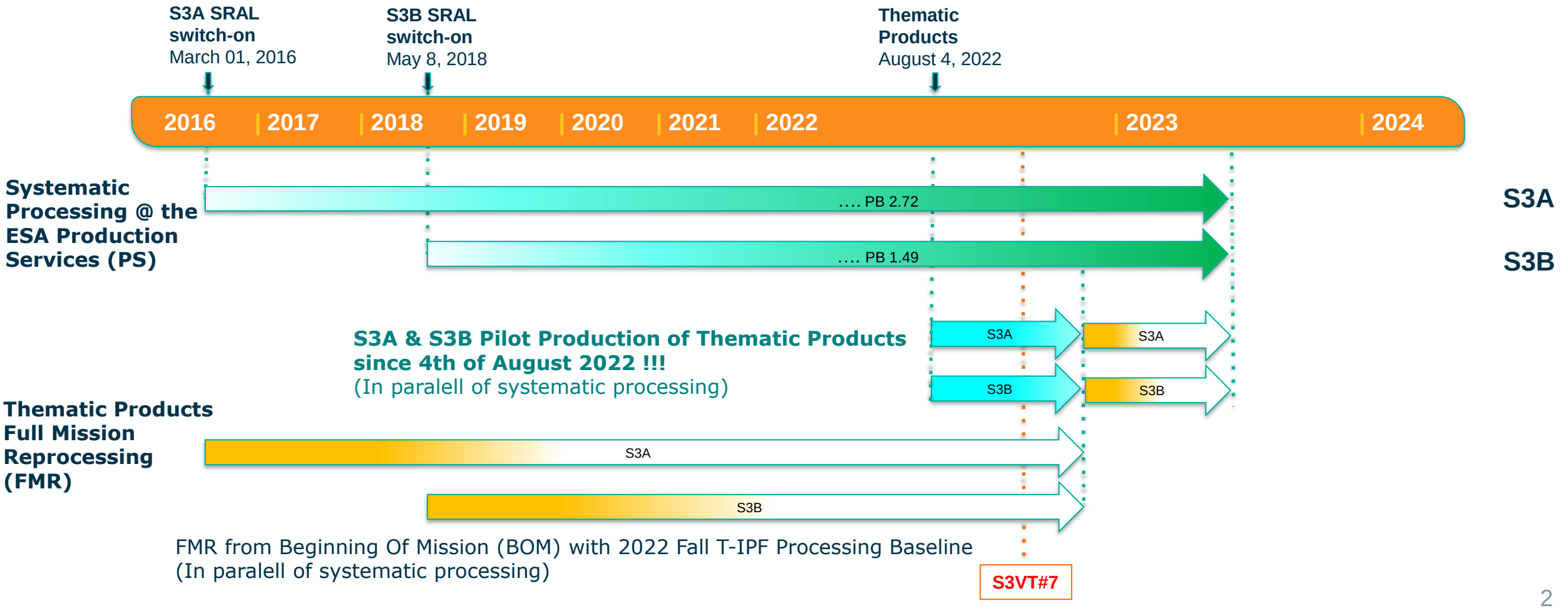
7th Sentinel-3 Validation Team Meeting 2022

18-20 October 2022 | ESA-ESRIN | Frascati (Rm), Italy

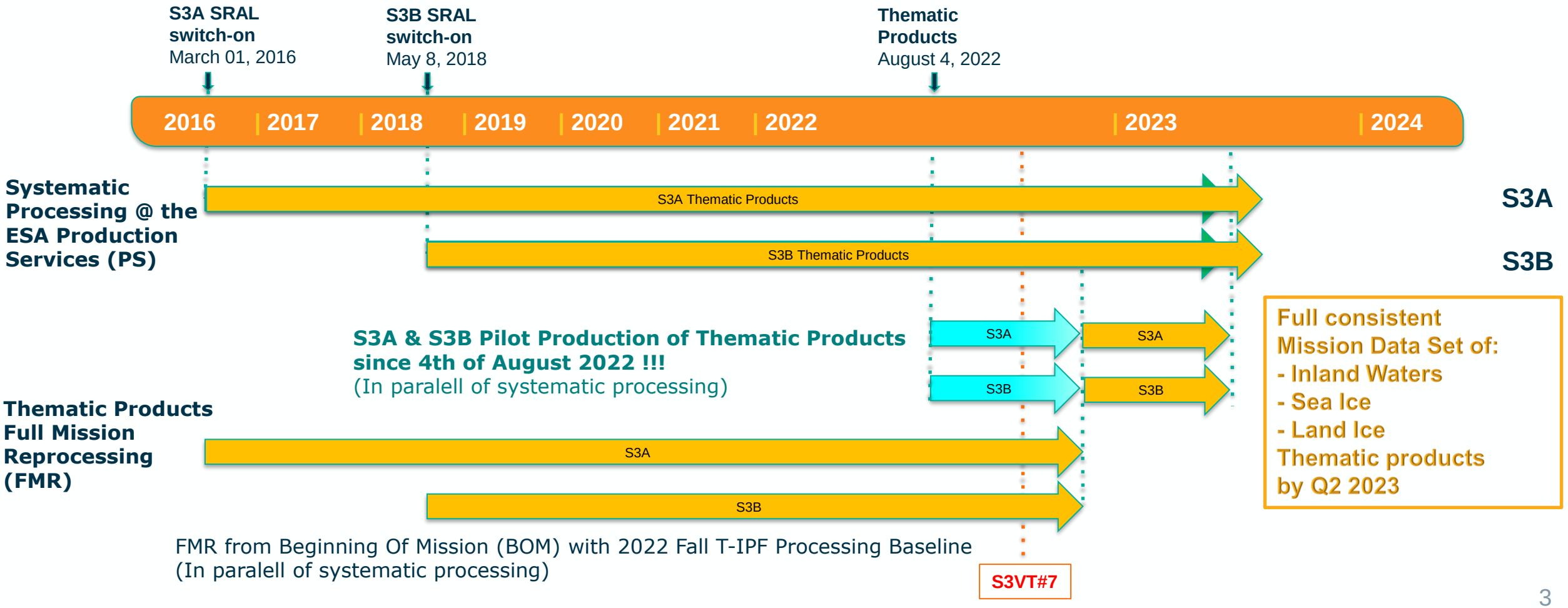
SRAL/MWR A-B Instruments and Products status – LAND part

Pierre Féménias ESA

S3A & S3B STM: LAND Mission Data Set



S3A & S3B STM: LAND Mission Data Set

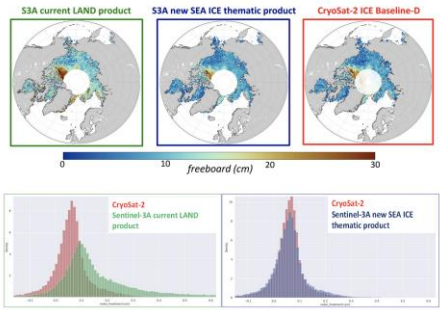


New Sentinel-3 LAND Altimetry Thematic Products

3 NEW processing chains with improved tailored algorithms !!!

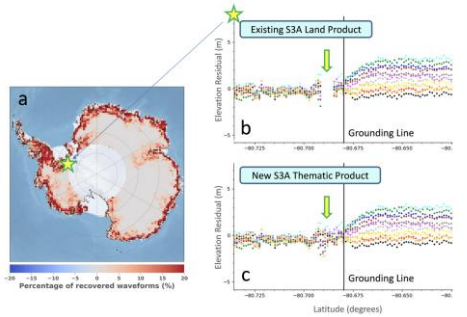
- **Independence and flexibility in evolution**
- **Independence in operations**
- **Dedicated and Tailored processing per surface**
- **Targeting end user needs**

L2 Sea Ice



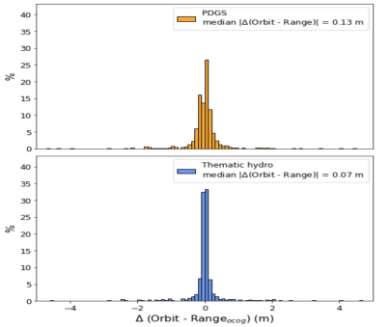
- Very good agreement between S3 NEW Sea Ice Thematic products and CryoSat-2
- Similar processing to CroySat-2
- Both SAR processing endowed with zero-padding and Hamming

L2 Land Ice



- Clear improvement in coverage at the ice shelf coastal margins thanks to the NEW extended window processing
- Glaciologically very important region!

L2 Inland Water



- Noise reduction of the Inland Water products thanks to the NEW implementation of the zero-padding processing
- Improved range resolution of the measurements

→ **Operational release of the "S3 STM Land Thematic" data products since 04 Aug 2022**
→ **Available from ESA Copernicus Open Access Hub**
→ **Will be switched to nominal processing baseline after Full Mission Reprocessing (FMR)**

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EUMETSAT
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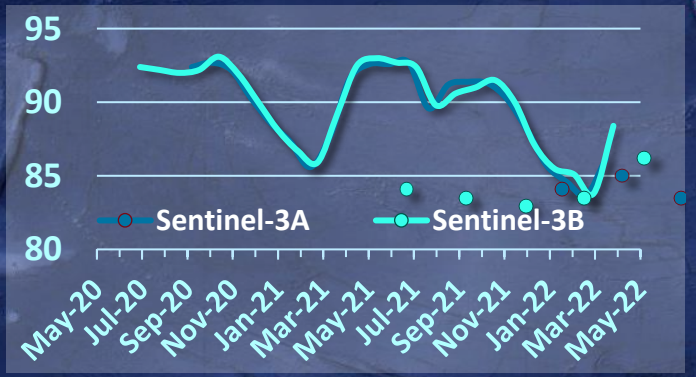
Sentinel-3 OLTC Tables Status
(CNES/LEGOS/NOVELTIS)

New updates in 2022 !
S3A v6.2 (Sept. 8) and **S3B** v3.2 (Sept. 15)

Signal quality performance is monitored every cycle



Jason-3-int.
≈ 60,000

Sentinel-3A Sentinel-3B
≈ 148,000 hydro targets

Sentinel-6-MF
≈ 64,000

Rivers Lakes Reservoirs

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Extending the S3 STM Absolute Calibration Infrastructures ...

Transponder Range & Datation:
- Crete. (Gr)
- Gavdos (Gr)
- Svalbard

Transponder Range, Datation, Sigma0, Ku & C:
- Catalina JPL (US)

Transponder Sigma0:
- Leonessa (It)

Corner Reflector:
Range, Datation, Sigma0
- Catalonia isardSAT (S)

St3TART project – Objectives

St3TART
FRM for Sentinel-3 Land Altimetry

Looking toward an operational provision of FRM !

- St3TART duration: 18m
- KOM: July 2021
- St3TART Follow-On to be initiated in 2023

	Land waters	Sea Ice	Land Ice	ScalSIT
				
Validation, FRM protocols & procedures	• Define and consolidate **methods and protocols for the validation** of the Sentinel-3 Altimetry Land products **with Fiducial Reference Measurements** (FRMs)			
Roadmap for S3 STM Land FRM operational provision	• Identify existing networks and **assess the needs** for permanent sensors and campaigns. • **Prepare a roadmap for the operational provision of FRM data to support the Sentinel-3 Altimetry Land validation**			
FRM campaign preparation and execution	• **Deploy and operate** in-situ sensors, perform campaigns to collect FRM data • **Provide FRM data** to the Copernicus Sentinel-3 STM validation teams			
 FRM Data Hub	• Web site, **for a centralized access** to FRM measurements • Fully characterized and **documented FRM processing** and measurements			
				• Super CAL/VAL site identifier tool for **inland waters** • Determines the **intersections** between **Water mask** and **satellite orbits** • Developped as a QGIS plugin

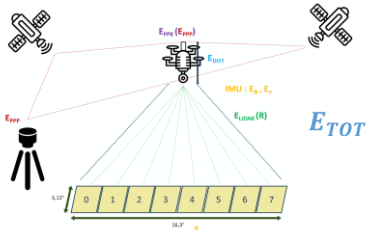
St3TART project – Towards a S3 Land STM roadmap for FRM provisionning

1

Correction	Average order of STD
Geoid height	Negligible impact if a sensor is +/- 1 km to the actual ground track
Pole tide, Solid Earth tide and Loading tide	Few milimeters
Orbit determination	< 1 cm
Ionosphere correction from models	< 1 cm
Dry tropospheric correction from models	< 1 cm
Wet tropospheric correction from models	~ 1.5 cm
Range estimation	Several cms or decimeters

2 4

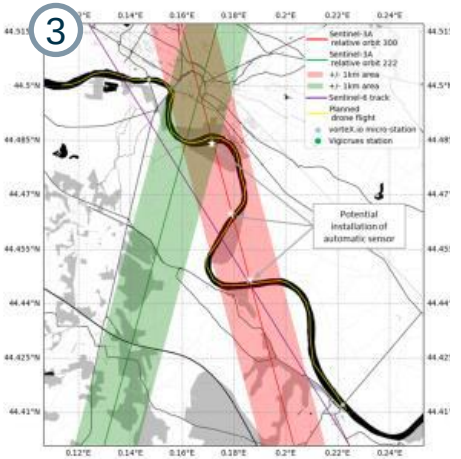
5

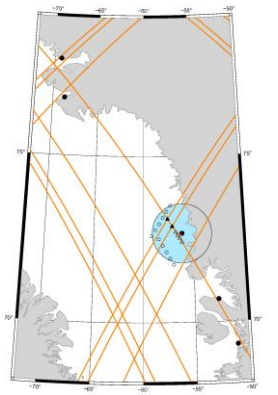


$$E_{TOT} = \sqrt{E_{PPK}^2 + E_{DIST}^2 + E_{AD_{TOT}}^2}$$

1. Identification of the measurand to focus on, reviewing altimetry measurement uncertainties
2. Review of in-situ sensors and their performance
3. Identification of super sites to deploy sensors
4. Deployment on the field
5. Comparison of measures with S3 data + analyse of uncertainties
6. Definition of the roadmap for FRM provisionning

3





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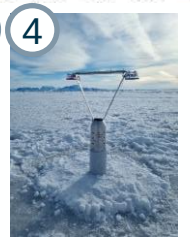

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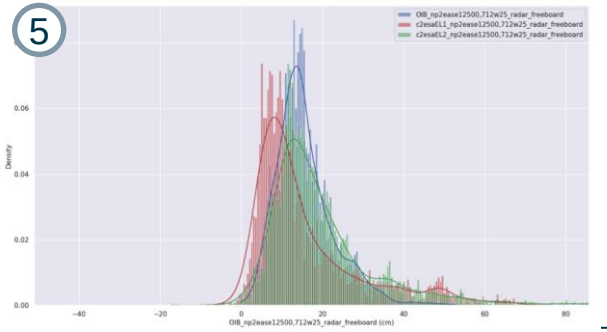
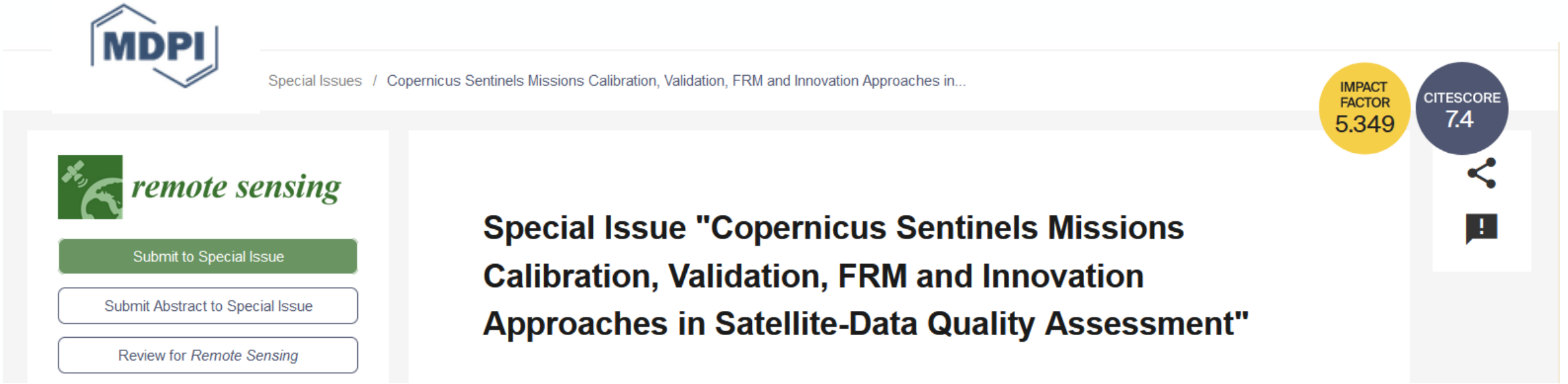


Invitation to submit Manuscript for a Special-Issue of Remote Sensing MDPI



Expected topic areas covered by Copernicus Sentinels missions but are not limited to:

- **remote sensing of atmospheric composition, land, ocean, snow and ice surface,**
- **calibration and sensors' intercomparison,**
- **validation of geophysical data products,**
- **innovations to products' retrieval algorithms and Cal/Val techniques,**
- **Fiducial Reference Measurements (FRM) for satellite data validation.**

https://www.mdpi.com/journal/remotesensing/special_issues/J3CYH3OQV0#editors

Guest-Editors:
Dr. B. Alhammoud, Dr. S. Clerc, Dr. S. Dransfeld, Dr. J-C. Lambert, Mr. P. Féménias

Deadline for manuscript submissions:
30 June 2023

Thanks !

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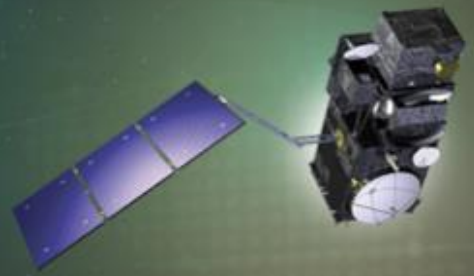


7th Sentinel-3 Validation Team Meeting 2022

18-20 October 2022 | ESA-ESRIN | Frascati (Rm), Italy

SRAL/MWR A-B Instruments and Marine Products status

Bruno Lucas and the ALT team @ EUMETSAT
s3.stm@eumetsat.int

Agenda

Space segment

Altimetry focused

Ground segment

Altimetry focused

Processing Baselines

Past, present, future

Reprocessing

User information and Data access

Space segment

- Regular operations
  - SRAL Transponders
    - Crete
    - Gavdos (added 2021/11)
    - Catalina (added 2022/03)
  - KREMS safe
    - 100 KMs around KREAMS military radar for MWR
  - OLTC Updates (impacting in-land waters mostly)
    - S3A: 12/09/2022 (first new data)
    - S3B: 19/09/2022 (first new data)
  - SRAL Annual Calibrations
    - Continue to show stability of the instrument
  - Routine manoeuvres to keep the ground track

- No major issue with the Altimetry payloads
  - S3A SRAL Thermistor retired (2022/06)

- Special operations:
  - Lunar Calibrations (in 2022, each month one Sat, announced to the user via UNS: https://uns.eumetsat.int/
  - For altimetry outage of about 30 min (current) to 1:30 hours (older processing)

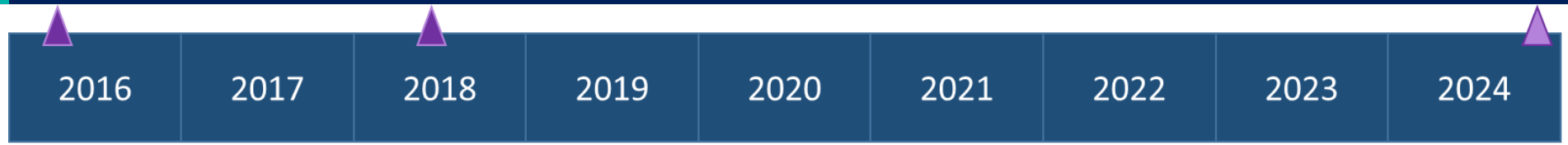
Ground Segment (Altimetry)

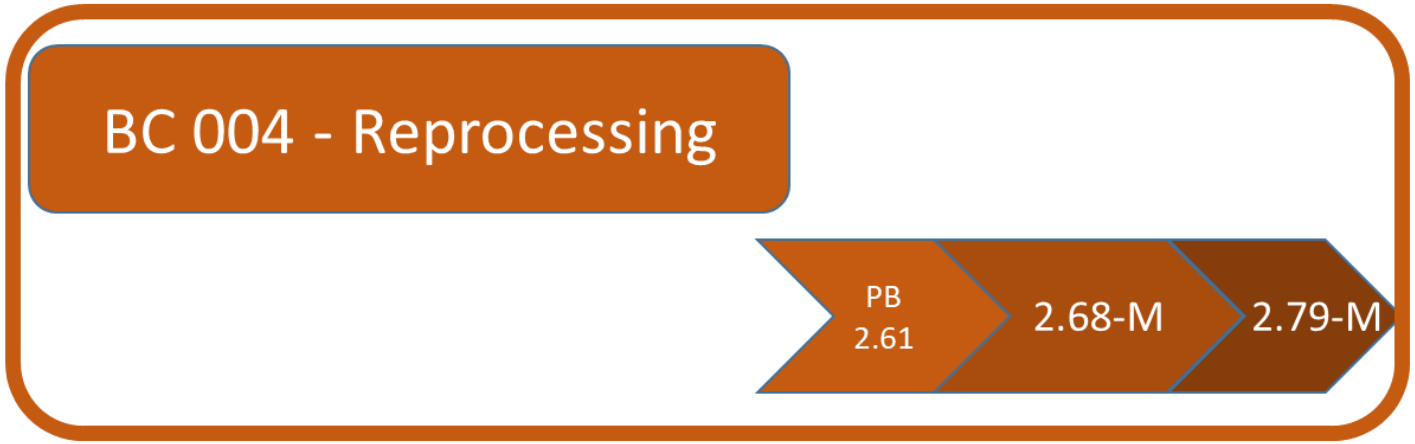
- No systematic issues with production
- Above the KPIs for timeliness and completeness
- Dataset meets quality requirements

- Recently timeliness improved for NRT due to the usage of the CPOD Service NRT orbits – same quality as before
  - Products are available 3-4 minutes earlier than before

- Recent ALT PB updates (SR1+MW1+SM2):
  - 2021/12/14 - PB 2.79-Marine (old nomenclature, BC004)
  - 2022/07/07 - SM__WAT.005.01 (new nomenclature, BC005)

Processing Baselines – Past, present, future



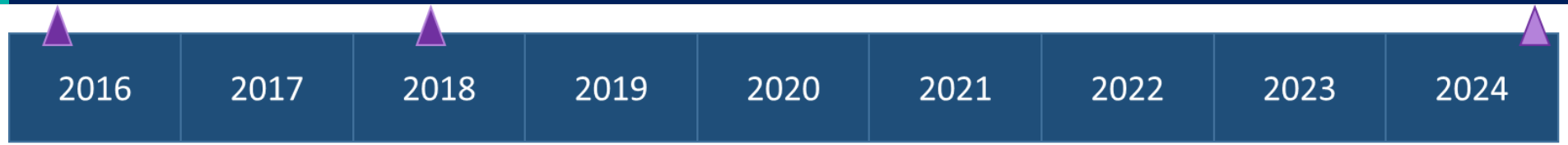


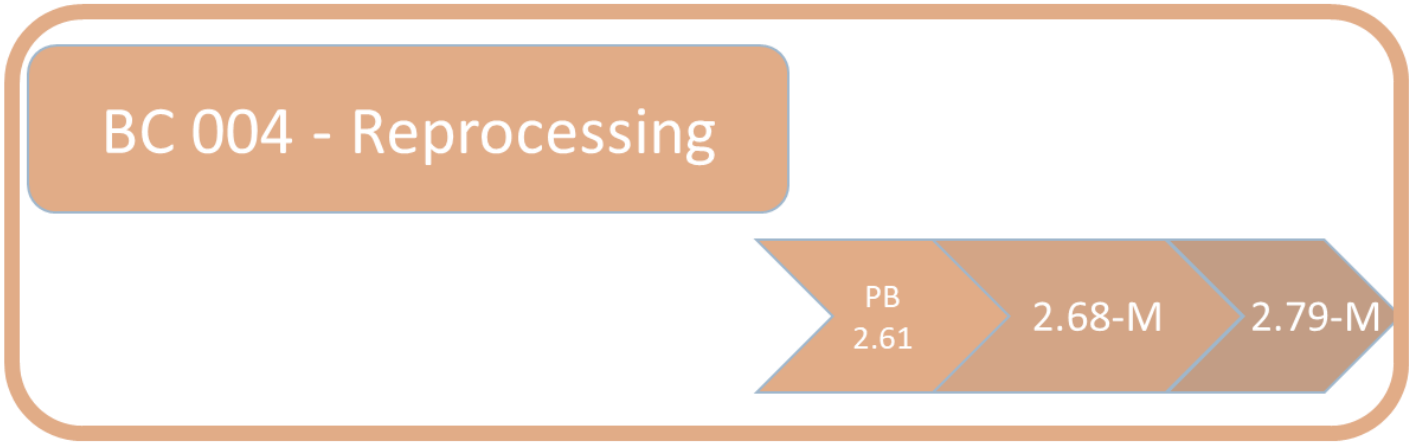
Reprocessing BC 004 - released in 2020

Followed up by several minor/medium PBs

Consistency between beginning of mission and “live” Operational data

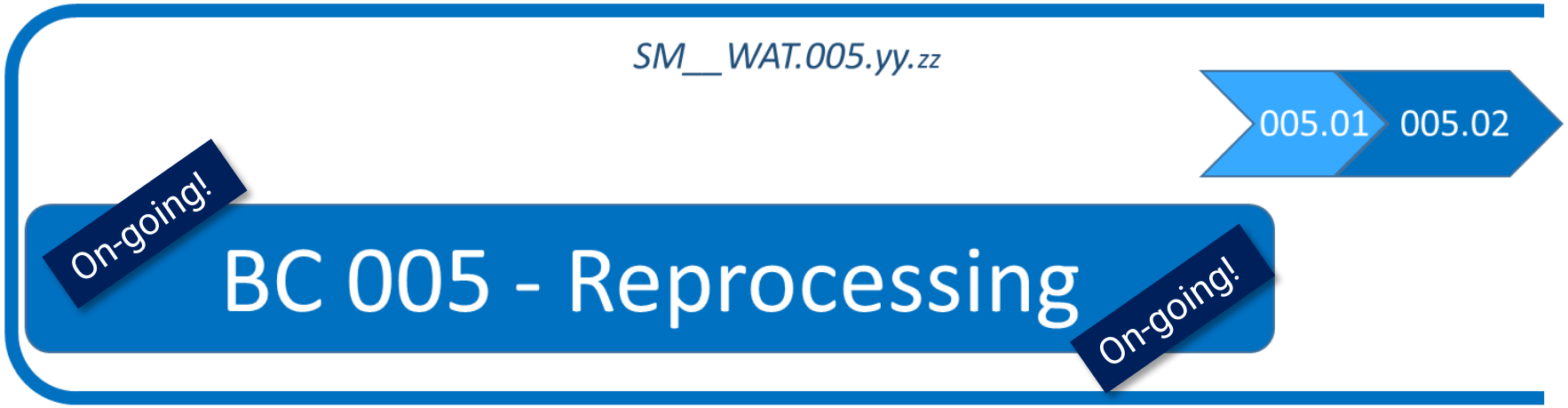
Processing Baselines – Past, present, future





Reprocessing BC 005
- preview released to S3VT (2022)
- Final release Q1/2023 for all users

Consistency between beginning of mission and “live” Operational data (once the reprocessing is done)



New Baseline Collection (005) for S3 Marine Altimetry

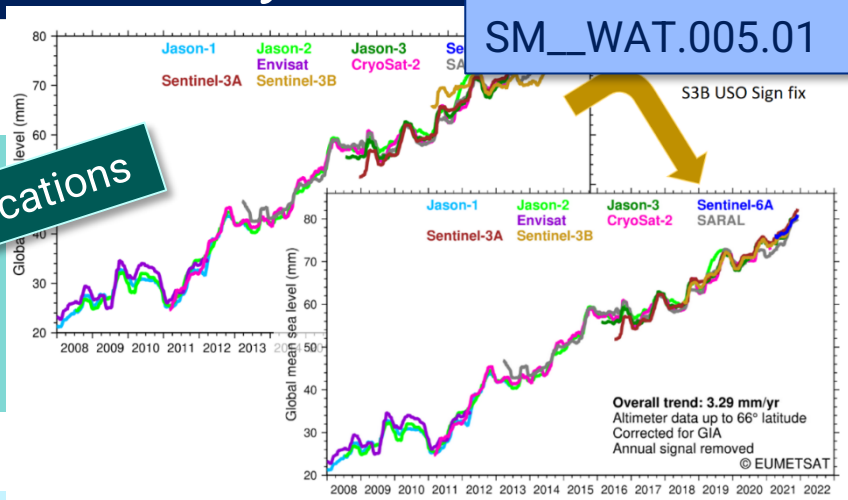
Processing Baseline

SM__WAT.005.01

Major update for Sea Level retrievals

- Correction of SAR Range drift (mostly impacting S3A)
  - Range Walk (applied at SAR L1, only NTC).
  - Adapted CoG CAL1
- Correction of USO sign (impacting only S3B)
  - Correct reading at L1

More stable for climate applications



- GPD+ WTC correction applied at NTC
  - If used instead radiometer WTC allows for the recovery of about 10-15% more valid data points
  - https://www.eumetsat.int/new-algorithm-gpd-improves-s3-sral-mwr-wtc

- Dynamic Atmospheric Correction (DAC/MOG2D) available in NRT and applied to the SSHA.
  - SLA error reduction of X
- New Mean Sea Surface Models
  - Combined 21 (SIO, CNES/CLS 15, DTU 15) – new default model
  - DTU 21
- Tide updates
  - New Pole Tide (Desai 2017)
  - Internal tides and long tide non-equilibrium now applied to calculate SSHA.

Better L2 out-of-the-box (closer to L2P)

New Baseline Collection (005) for S3 Marine Altimetry

Processing Baseline

SM__WAT.005.01

More info: https://www.eumetsat.int/new-sentinel-3-altimetry-processing-baseline-collection-005

Better instrumental Processing

- New Sea State Bias (Tran 2021) derived from S3A SAR/PLRM for Ku-band, instead of Jason-2. For C-band J2 SSB remains.
- Real Zero Masking from L1B data applied at SAR L2 (all timeliness).

- Removal of CAL2 application to CAL1.
- New CAL2 normalization, by plateau instead of max

- Wind and Waves: Updates to mean values of SWH and Wind Speed due to Range Walk, Zero Masking and system bias updates for better alignment

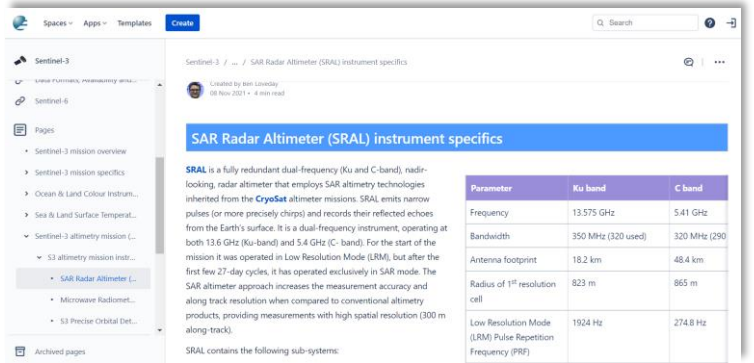
- More information to the user:
- Processing Baseline; All system bias; etc.
- No-more (land-)ice variables being generated by Marine products.

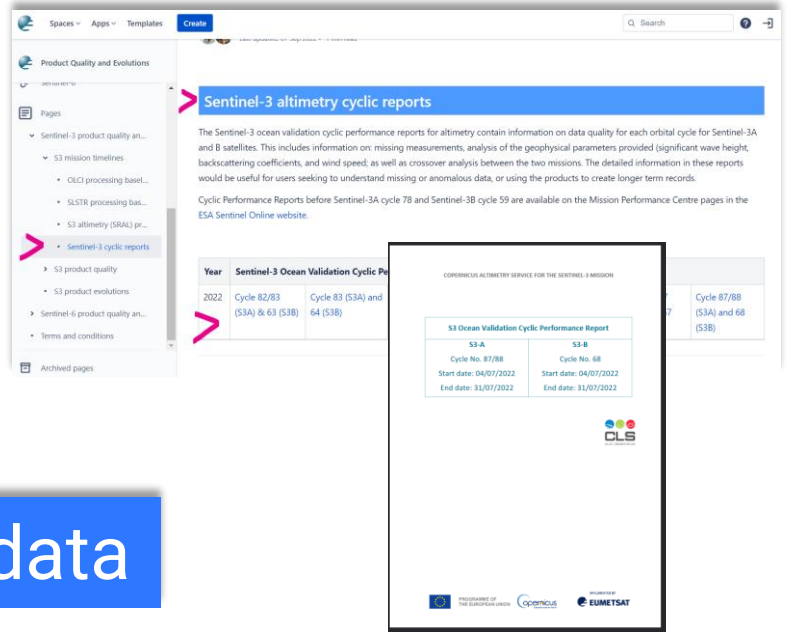
Future

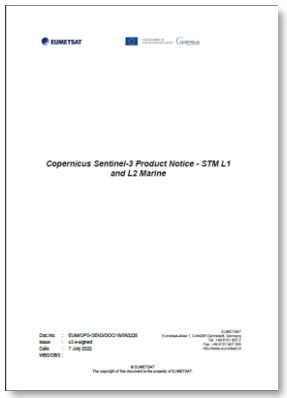
- Medium Term (BC 006) ~2024
  - Improved Polar Ocean retrievals
    - Sea Level in to the Sea Ice leads, consistent with “open” ocean
  - Improved Coastal Processing
    - Dedicated processing
  - Improve Sea Level for Climate quality (even more)
    - Numerical retracking for SAR (and PLRM)
  - Improved models
    - MSS, Tides, etc.

New Knowledge Base

- New Knowledge Base website for Altimetry
  - Replaces Product Handbook
  - Contains new Cyclic and Annual Reports
    - Sentinel-3 cyclic reports - Product Quality and Evolutions - Confluence
  - Contains Product Notices
    - Still available at: https://www.eumetsat.int/altimetry-resources







Check new data access to marine data

Thank you!

Questions are welcome.