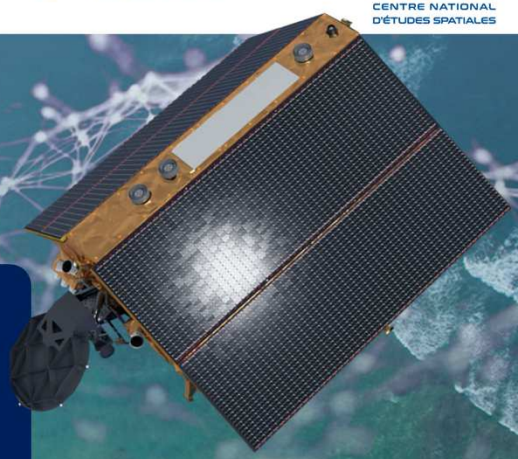
OSTST **2026**

Presentation

GDR-G deployment & reprocessing status



Join presentation CNES - EUMETSAT - ESA - JPL

François Bignalet-Cazalet ; Cyrille Boulanger ; Nicolas Picot (CNES)
Bruno Lucas ; Cristina Martin-Puig ; Salvatore Dinardo ; Remko Scharroo (EUMETSAT)
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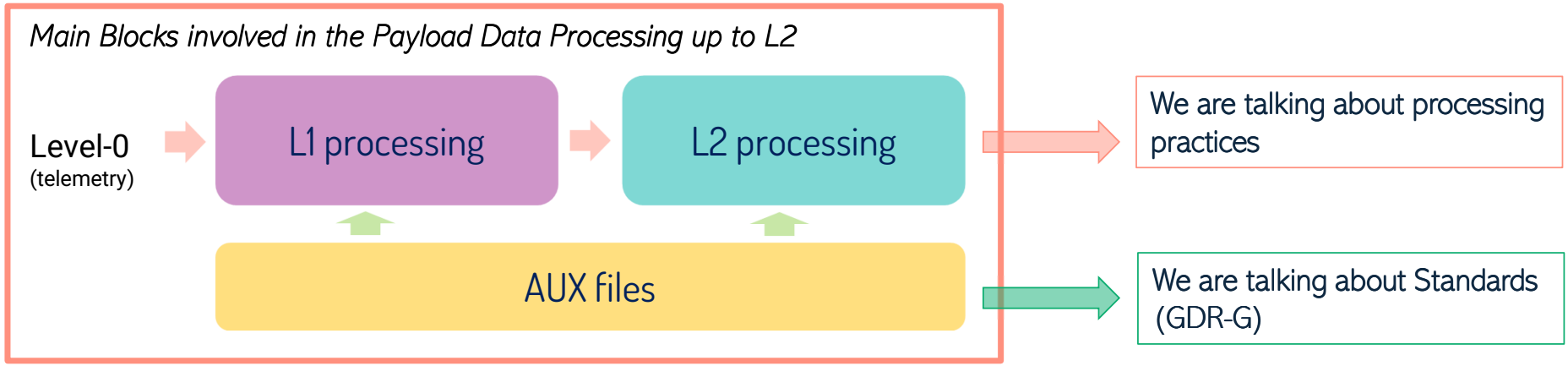
Shailen Desai (JPL)

IN PARTNERSHIP WITH

Standard vs Processing Practices

GDR (Geophysical Data Records) are the Level-2 products from space agencies



Static AUX files :
- MSS
- MDT
- Tide model : Ocean & Load Tides
- ..

Dynamic AUX files :
- Orbit
- Meteo Files : Dry & Wet Tropo Correction
- Dynamic Atmospheric Correction
- ..

- GDR-*G* (as GDR-*E*, GDR-*F*, GDR-*H*) refers to the GDR standard version
- All agencies are working together to harmonize the way to process Level-2 products, both processing practices and standard

GDR-G Standard

GDR-G presented at 30 Years of Progress in Radar Altimetry
"GDR-G Altimetry Standards", Lucas et al., 2024

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Standard definition & implementation

	Mission	Jason-2 & 3	Sentinel-6-MF & 6-B	Sentinel-3 Marine	Swot-Nadir	Swot-LR Karin
	Implementation name	GDR-G01/G02	PB G01	G62	GDR-S2	PID0/PGD0
Auxiliary Data	GDR-G standard	Mission compliance				
Ellipsoid	WGS84					
Geoid	EGM 2008					
Ocean Depth and Land Elevation (Bathymetry)	ACE-2					
Distance and Angle to coast	[Scharroo 2019] based on GSHHG_v2.3.7					
Orbit	GDR/NTC : CNES POE-G					
MSS (1)	2023 Hybrid MSS					
MSS (2)	DTU 2021					
MDT	HYBRID_MDT_CNES_CLS22_CMEMS2020					
Ocean & Load Tides (1)	GOT 4.10C					
Ocean & Load Tides (2)	FES 2022B					
Solid Earth Tide	Cartwright and Edden [1973]					
Internal Tides	[Zaron, 2019] HRET v8.1					
Pole Tide	[Desai, 2015] with CNES Restitued Pole Location					
DAC	TUGO & ECMWF-OP/ERA5					
Meteo Files (Dry & Wet Tropo Cor)	OGDR/NRT : ECMWF-OP Forecast IGDR/SCT : ECMWF-OP Analysis GDR/NTC : ECMWF-OP Analysis					
Barometric Tides (Dry & Wet Tropo Cor)	[Ray & Ponte 2003]					
Iono Model Correction	GIM based on JPL TEC					
Wave Model Files	MeteoFrance WMA / Waverys					

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OSTST **2026**

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	Implementation name	GDR-G01/G02	PB G01	G62	GDR-S2	PID0/PGD0
Auxiliary Data	GDR-G standard	Mission compliance				
Ellipsoid	WGS84	Ok	Ok	Ok	Ok	Ok
Geoid	EGM 2008	Ok	Ok	Ok	Ok	Ok
Ocean Depth and Land Elevation (Bathymetry)	ACE-2	Ok	Ok	Ok	Ok	Ok
Distance and Angle to coast	[Scharroo 2019] based on GSHHG_v2.3.7	Ok	Ok	Ok	Ok	GSHHG_v2.3.7
Orbit	GDR/NTC : CNES POE-G	Ok	Ok	Ok (+ CPOD)	CNES POE-F *	CNES POE-F *
MSS (1)	2023 Hybrid MSS	Ok	Ok	Ok	Ok	Ok
MSS (2)	DTU 2021	Ok	Ok	Ok	Ok	Ok
MDT	HYBRID_MDT_CNES_CLS22_CMEMS2020	Ok	Ok	Ok	Ok	Ok
Ocean & Load Tides (1)	GOT 4.10C	Ok	Ok	Ok	Ok	Ok
Ocean & Load Tides (2)	FES 2022B	Ok	Ok	Ok	Ok	Ok
Solid Earth Tide	Cartwright and Edden [1973]	Ok	Ok	Ok	Ok	Ok
Internal Tides	[Zaron, 2019] HRET v8.1	Ok	Ok	Ok	Ok	Ok
Pole Tide	[Desai, 2015] with CNES Restitued Pole Location	Ok	Ok	Ok	Ok	Ok
DAC	TUGO & ECMWF-OP/ERA5	Ok	Ok	Ok	Ok	Ok
Meteo Files (Dry & Wet Tropo Cor)	OGDR/NRT : ECMWF-OP Forecast IGDR/SCT : ECMWF-OP Analysis GDR/NTC : ECMWF-OP Analysis	Ok	Ok	Ok	Ok	Ok
Barometric Tides (Dry & Wet Tropo Cor)	[Ray & Ponte 2003]	Ok	Ok	Ok	Ok	Ok
Iono Model Correction	GIM based on JPL TEC	OK	Ok	Ok	Ok	Ok
Wave Model Files	MeteoFrance WMA / Waverys	Ok	Ok	Ok	Ok	Ok

* SWOT switches to MOE/POE-G in July 2026

cnes EUMETSAT esa NASA

GDR-G Processing Practices

Outside the standard : Processing Practices

OSTST **2026**

Mission Implementation name	Jason-2 & 3 GDR-G01/G02	Sentinel-6-MF & 6-B PB G01	Sentinel-3 Marine G62	Swot-Nadir GDR-S2
Processing Practices				
Retracking	LRM Ku-MLE4 LRM Ku-Adaptive LRM C-MLE3	LR Ku-ML4 LR Ku-NR HR Ku-SAMOSA HR Ku-NR C-MLE3	SAR/HR Ku SAMOSA+ PLRM Ku MLE4 C MLE4	LRM Ku-MLE4 LRM Ku-Adaptive LRM C-MLE3
allow negative SWH	G01 : No G02 : Yes	Yes	Yes	No
SSB	G01 : [Tran 2020] computed on J3 GDR-F data G02 : [Tran 2020] computed on J3 GDR-G data (3 years)	[Tran 2020] computed on J3 GDR-F data	[Tran 2026] computed on S3 GDR-G62 data	[Tran 2020] computed on J3 GDR-F data
Wind Tables	2D (Gourrion et al. 2002; Collard 2005)	2D (Gourrion et al. 2002; Collard 2005)	1D Abdalla 2007 + 2D (Gourrion et al. 2002; Collard 2005)	2D (Gourrion et al. 2002; Collard 2005)

GDR-G – Other missions

- Cryosat-2
  - Ocean Processor (COP):
    - will have an updated baseline (Baseline-E) expected in 2028, where GDR-G will be used
- CRISTAL
  - Ocean Products (EUM):
    - Will follow GDR-G standards for Day-1 products
  - Hydro-Cryo Products (ESA):
    - Partial adoption of the GDR-G standard when relevant for the domain
- Sentinel-3
  - Thematic Hydro-Cryo products (ESA):
    - Partial adoption of the GDR-G standard when relevant for the domain

Processing Evolutions

"G" refers to GDR-G standard
"01" or "02"or "62" is mission dependent and only affects processing practices, not standards

Jason-3 G02 (wrt G01):
[S2 2026]

- Allow negative SWH
- New instrumental LUT for low SWH
- SSB computed using 3 years of GDR-G data
- Ready to switch to GRIB2 ECMWF meteo files

Sentinel-6 G02 (wrt G01):
[late 2026/early 2027]

- Ready to switch to GRIB2 ECMWF meteo files
- 20Hz corrections
- Additional quality flags

Sentinel-3 G62 (wrt G61):
[already in operations]

- Polar Ocean
- Fast time complex calibration
- Samosa+
- ….

GDR-G reprocessing status – Reference Missions

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Schedule & Status for reference missions

	Topex/ Poseidon	Jason-1	Jason-2	Jason-3	Sentinel-6MF	Sentinel-6B
Operational baseline	-	-	-	GDR-G G01 (will switch to G02 in 2026)	GDR-G PB G01	GDR-G PB G01
Last available reprocessing	GDR-F	GDR-E	GDR-F	GDR-F	GDR-G PB G01 (completed in 2025)	-
GDR-G confirmed reprocessing plans	none	2028	2027	G02 on-going available end-2026	-	Commissioning phase reprocessing end-2026 / start-2027

GDR-G reprocessing status – Non-Reference

OSTST **2026**

Schedule for other missions

	Saral	Sentinel-3A/B Marine	Swot Nadir	Swot LR
Operational baseline	GDR-F	GDR-G « G62 »	GDR-S2	PID0
Last available reprocessing	GDR-F	GDR-G « G62 » (release to S3VT 2026/03 and General public 2026/06)	GDR-S2	PGD0
GDR-G confirmed reprocessing plans	End of life	-	-	-

Sentinel-3 Marine G62 Reprocessing (completed)

Focus on Sentinel-3 A/B "G62" reprocessing assessment

Released to S3VT users on 2026/02 and to the general users in 2026/06 via EUMETSAT Data Store

Key improvements:

- GDR-G Standards for complete mission timeline
- Fast Time Complex Calibration – accounting for instrumental PTR evolution → improved SWH stability
- Polar Ocean dedicated processing (Polar SSHA, new Surface Classification based on Neural Network …)
- SAMOSA+ Retracking: Improvements over Polar Ocean and Coastal Zone, continuity on Open Ocean
- SAR SWH now corrected for vertical wave motion
- SSHA corrected with updated SSB, including delta-SSB to account for wind direction impact on SAR

- Updated dynamic inputs for reprocessing:
  - POE-G (CNES), DAC [TUGO+ERA5] (CNES), MFWAM Wave Model (MeteoFrance), Sea Ice Concentration [OSI-450/OSI-430a] (OSI-SAF/EUM), GPD+ (Univ. Porto)

Sentinel-6MF G01 reprocessing (completed)

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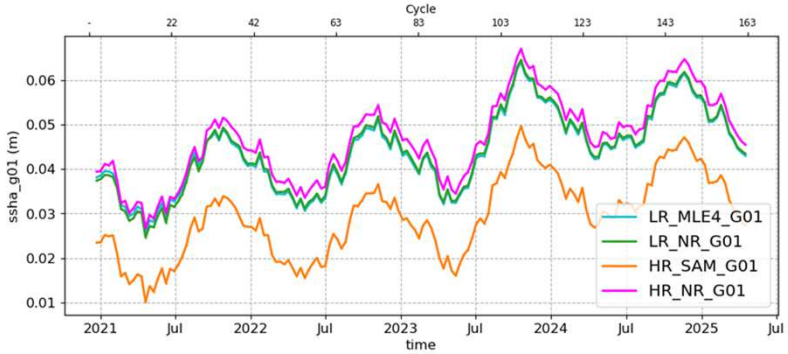
Focus on Sentinel-6MF G01 reprocessing assessment

- Excellent availability and quality of G01 S6-MF data
- Full compliance to system requirements
- Homogeneous time series for all retrackers, no longer discontinuity between POS4 sides A and B
- Improvement of consistency between retrackers, but still some slight geographic and long-term discrepancy remains between LR and HR

Sea Surface Height Anomaly (mean)

	nbr	min	mean	median	max	std
LR_MLE4_G01	160	0.02558	0.04405	0.0441	0.06413	0.008752
LR_NR_G01	160	0.02461	0.04427	0.04451	0.06456	0.009046
HR_SAM_G01	160	0.0101	0.02929	0.02908	0.04962	0.008978
HR_NR_G01	160	0.02668	0.04676	0.04678	0.06705	0.009187



See more :

- Full assessment in [Courcol et al, 2026] Sentinel-6 MF : G01 Reprocessing Calval Assessment
- Synthesis in [Bignalet-Cazalet et al, 2026] : OSTST 2026 poster

Jason-3 GDR-G “G02” reprocessing (on going)

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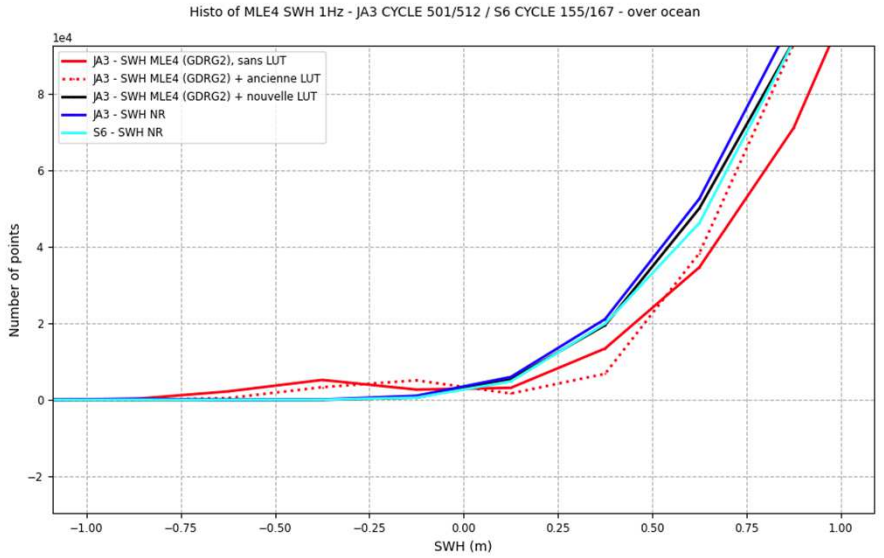
Focus on Jason-3 G02 reprocessing status

Jason-3 current operational standard is GDR-G (baseline G01)

Full reprocessing (baseline G02) is in progress :

- 3 years of data have been reprocessed for SSB computing
- New SBB is now available and will be injected for the full reprocessing
- Full Calval assessment will be done before data release
- Data shall be available for users end 2026

Jason-3 operational standard will upgrade to baseline G02 in parallel of reprocessing



G02 Jason-3 low SWH will be aligned on S6

GDR-H: the next GDR

OSTST **2026**

GDR-H

Agencies start in 2026 to work on GDR-H definition

Possible candidates are :

- New MSS using SWOT data (CNES-CLS-2025, DTU25,…)
- New tide model (GOT 5.x, EOT..)
- …

Tell us your propositions/needs

For feedback/suggestions on GDR-G or GDR-H contact:
francois.bignalet-cazalet@cnes.fr & bruno.lucas@eumetsat.int

Agencies also continues to work for homogenise :

→ standards

- MSS/Geoid Slopes Map for doppler correction
- Meteo from ERA5 rather than ECMWF operational distribution
- Wave models
- Sea Ice concentration models

→ and processing practices

- SSB method & data
- Dual frequency iono filtering method
- MSS compression applied to range
- Best way to scale the GIM iono correction
- Surface Slope correction

Conclusions & Outlook

Conclusions

Agencies work together to ensure homogeneous Level-2 data between all altimetric missions for the users

Current Level-2 multimission standard is GDR-G, with mission-dependent processing baseline (G01, G02, S2, G62, …)

GDR-G reprocessing campaigns are done for Sentinel-6, Sentinel-3 Marine and Swot ; in progress for Jason-3; planned for Jason-2 and Jason-1

Work for GDR-H definition begins this year

For feedback/suggestions on GDR-G or GDR-H contact:
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