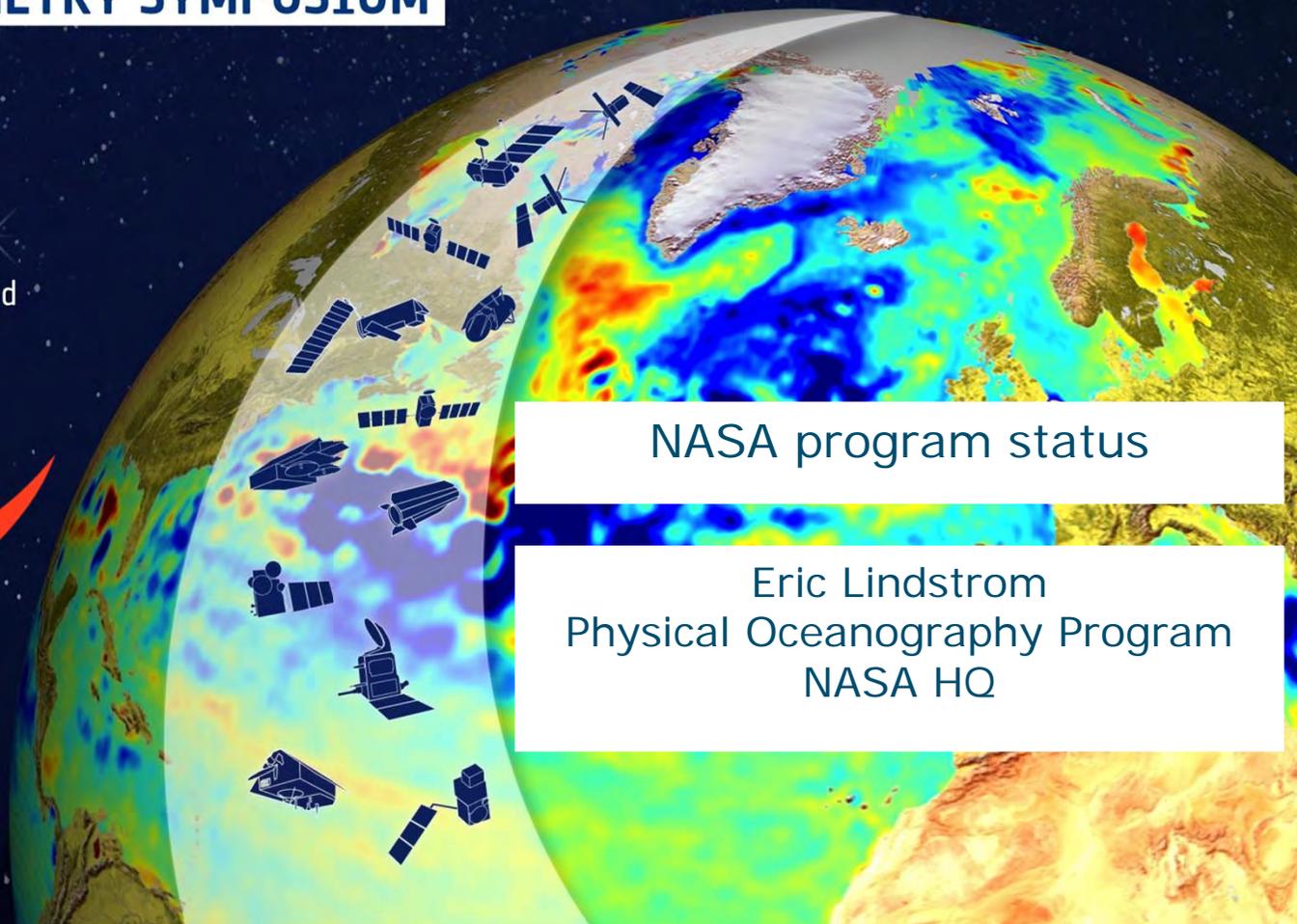


**→ 25 YEARS OF PROGRESS
IN RADAR ALTIMETRY SYMPOSIUM**

OSTST MEETING

24–29 September 2018
Ponta Delgada, São Miguel Island
Azores Archipelago, Portugal



NASA program status

Eric Lindstrom
Physical Oceanography Program
NASA HQ

NASA Mission status and progress will be supplied by others at this meeting.

The years ahead will involve renewal and evolution of OSTST, SWOT Science Team, and NASA Sea Level Change Team. Also we must engage the community in Cal/Val for Jason-CS and SWOT (LRD 9/21).

SWOT Science Team – Jointly with CNES (Oceanography&Hydrology)

Proposals in ~May 2019, New NASA Grants by January 2020. Anticipate doubling in size of team from last round.

OSTST – Jointly with NOAA and European Partners

Proposals in ~Oct 2020, New NASA grants by April 2021. Anticipate some shrinkage in NASA OSTST funding in favor of SWOT?

Academic Question: When will we merge SWOT Ocean into OSTST?

Field Programs – Converging on 2022!



SWOT Cal/Val – Planning underway for **first quarter 2022**.

Oceanography and Hydrology plans during One-Day Repeat Orbit Phase.

SWOT Ocean Science Campaign - Planning workshop next week near Washington DC.

How much coupling to SWOT Cal/Val? **Plan for work in 2022**.

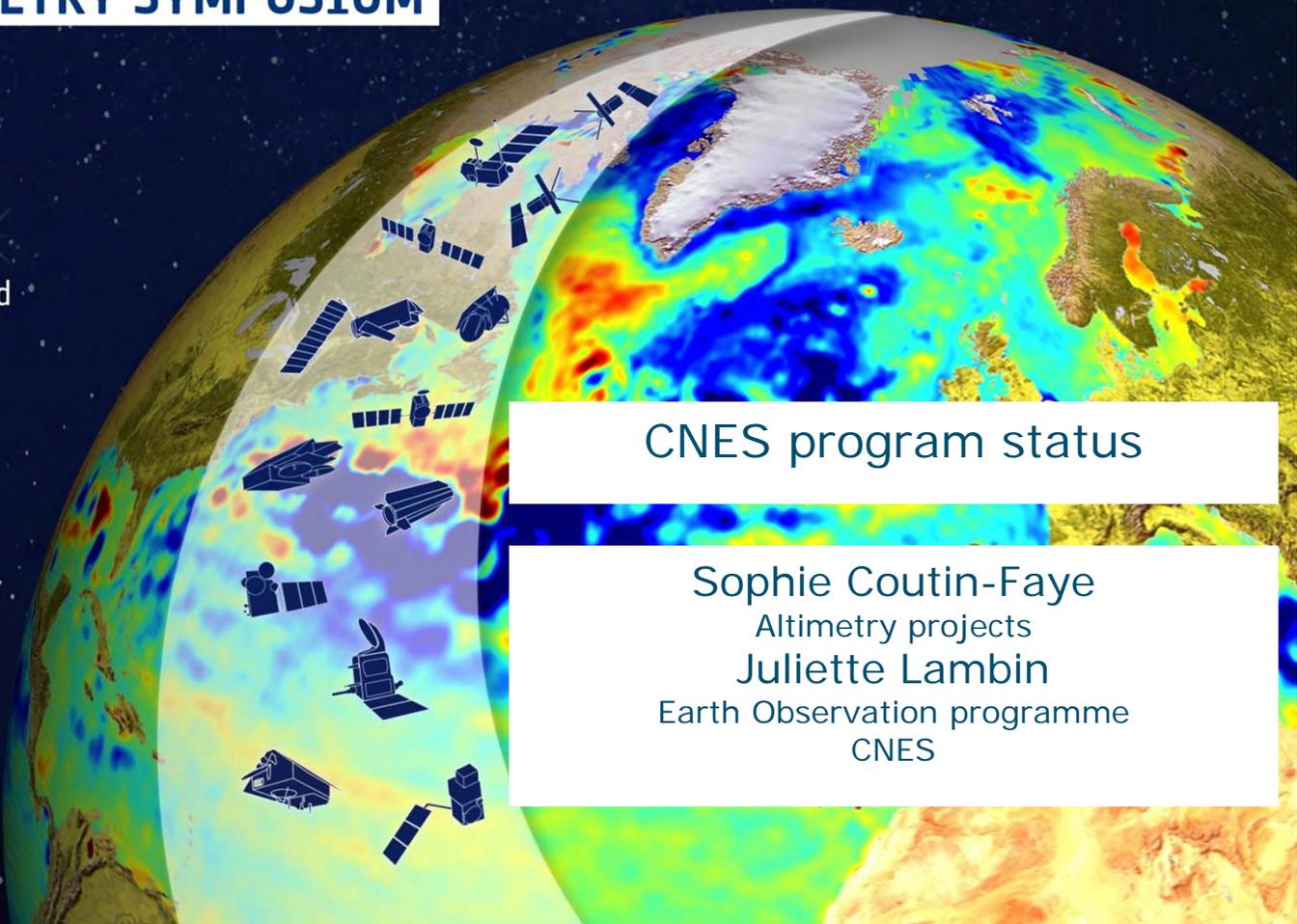
S-MODE (Sub-Mesoscale Ocean Dynamics Experiment) – Tom Farrar selected with week (with four others). To use DopplerScat airborne resources in intensive field campaign **circa 2022**. Scientific synergies and time coincidence with SWOT.

NASA Salinity Field Campaign – NASA Ocean Salinity Science Team will plan next field program **for 2022**.

**→ 25 YEARS OF PROGRESS
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OSTST MEETING

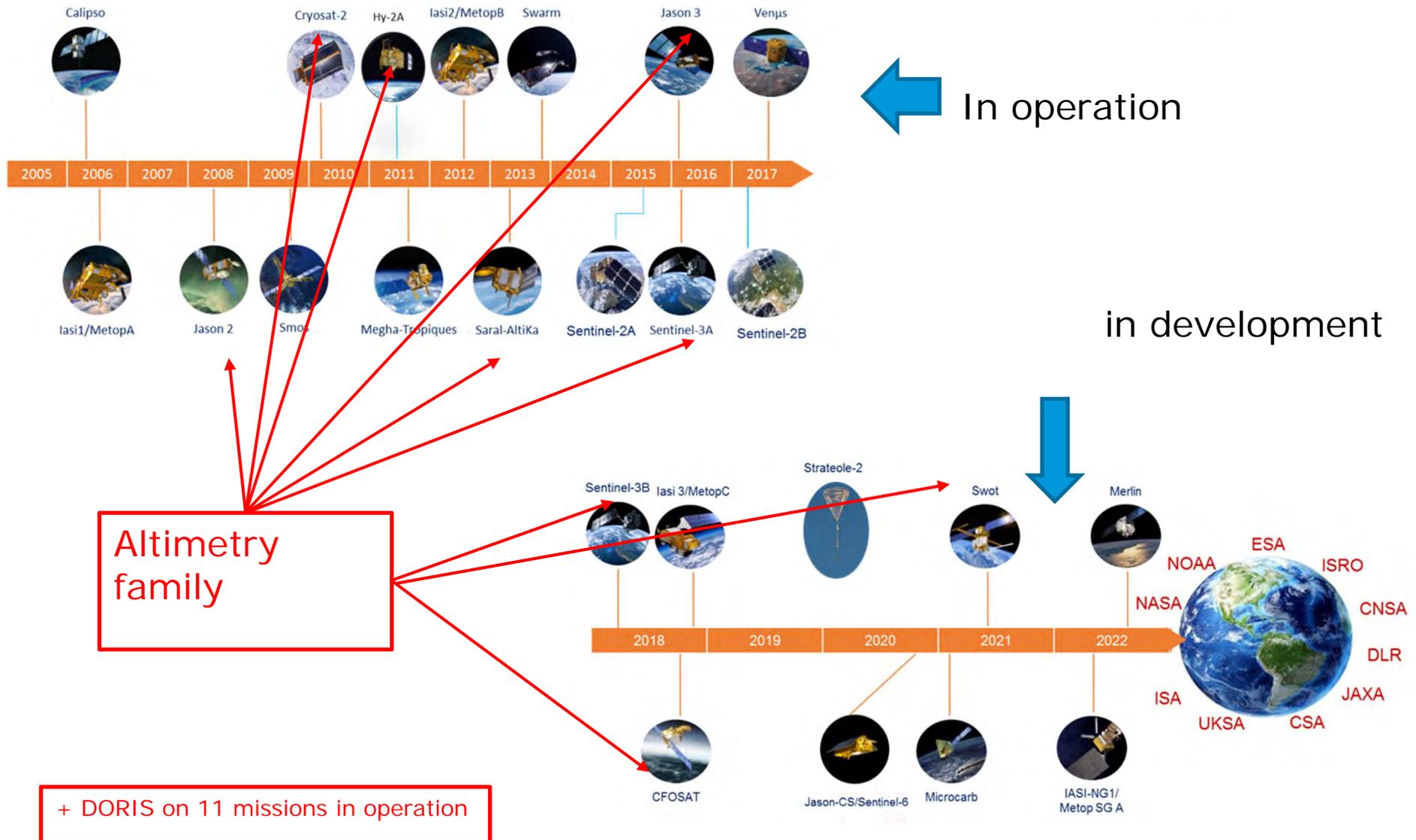
24–29 September 2018
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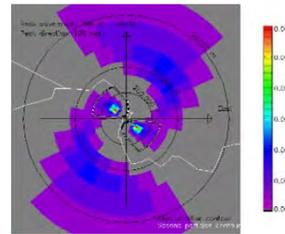
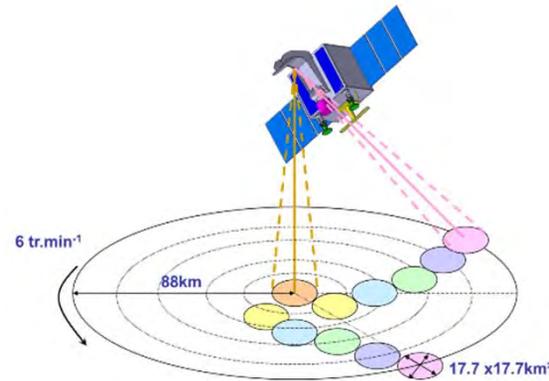
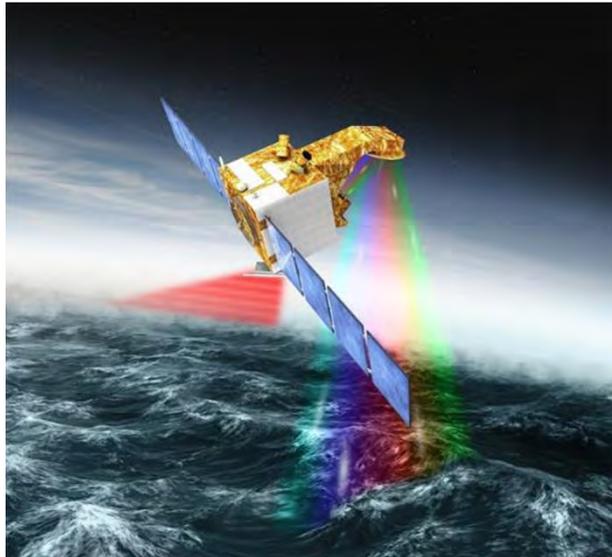
CNES program status

Sophie Coutin-Faye
Altimetry projects
Juliette Lambin
Earth Observation programme
CNES

CNES Earth Observation programme



Coming soon: CFOSAT



CFOSAT: China France Oceanography SATellite

- **Two payloads:**
 - SWIM: wave scatterometer
 - SCAT: wind scatterometer
- **Orbit**
 - Altitude = 519 km
 - SSO (13 days repeat cycle)
- **Mission : 3 years duration**

Launch schedule Oct 29 this year
Call for proposals to set up an international science team on going (oceano@cnes.fr)

Multi-mission exploitation

Missions operations:

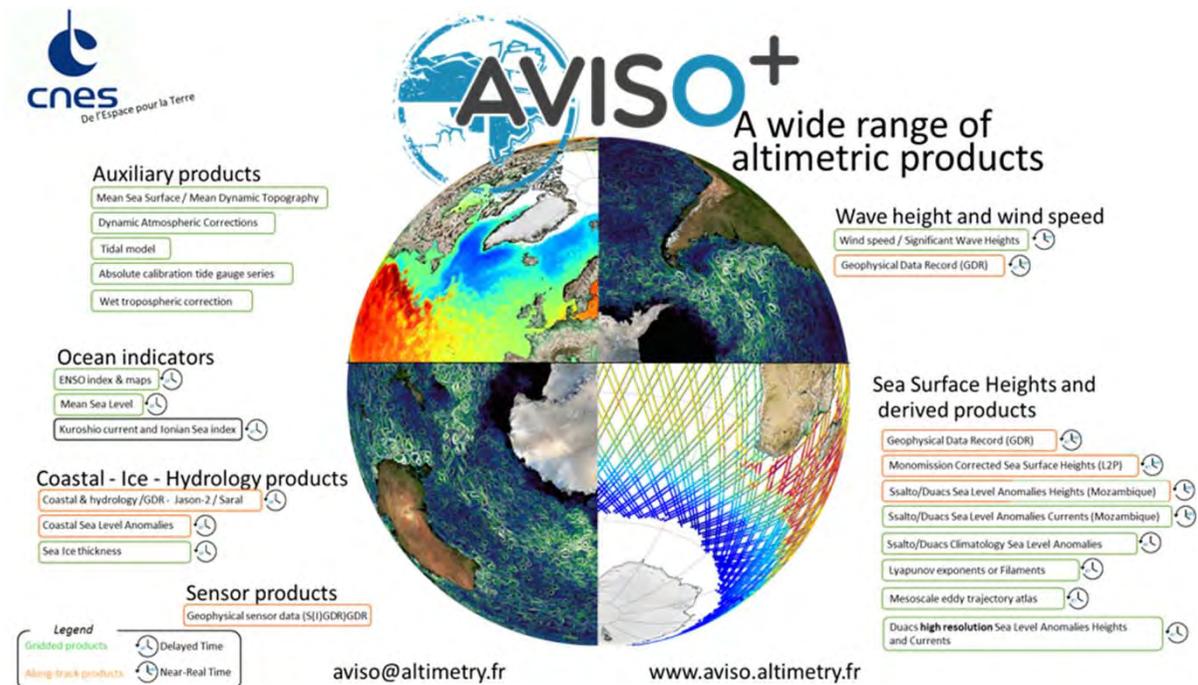
- SARAL OK > 99 % availability
- Jason-2 OK 2nd geodetic circle, good availability
- Jason-3 OK > 99% availability

DORIS and POD

- Same + Hy-2A, Cryosat-2, Sentinel-3
- Reprocessing of past and in-flight missions using new standards

Beyond GDRs:

- L2P products for CMEMS
- L3, L4 products =>
- MSS, MDT...
- Planned: Reprocessing of Hy-2B
- Expertise studies
- OSTST science projects



Copernicus:

- Contribution to Sentinel-3 (TOPO performance, DORIS/POD, level 2P products)
- Support to Sentinel 6 / Jason-CS project
- Continuing support to science studies through OSTST

SWOT

- KaRIN radiofrequency unit
- Poseidon altimeter, DORIS
- Satellite bus
- Algorithm & ground segment
- Science team

HY-2 series

- Agreement with China to continue cooperation

SKIM

- Support to ESA phase A/B1 study

Operational altimetry in a longer term

- WISA study (in coordination with ESA): swath altimetry concept for Copernicus NG (including hydrology)
- Alti-Cryo study: closed, convergence with PIST (Polar Ice and Surface Topography) candidate mission



Science Prospective Seminar: Contribute now!

- Will drive scientific and users priorities for CNES programmatics in the coming years
- Open call for contributions:
 - Research area & science questions recommendations
 - Observing systems / measurement concepts
 - Spaceborne/airborne experiments
 - New measurement techniques and/or data processing tools
 - Full satellite mission proposals
 - Any other commentary, critics, thoughts about CNES & Science for the future years.

⇒ Deadline for responses: **Oct 22nd, 2018 to Interfaces_Laboratoires@cnes**

For more information, guidelines, templates: Juliette.lambin@cnes.fr

The responses will serve as a basis of work of TOSCA panel for Earth sciences

Draft prospective document should be online in June/July time frame

Finalisation of document at the seminar itself in October 2019 **(mid-October 2019, Le Havre)**

More details in the CNES presentations later today:

- JASON-2 mission status (C Maréchal)
- JASON-3 mission status (C Maréchal)
- SARAL/ALtiKa mission status (N QuérueI)
- CFOSAT (C Tourain)

SWOT status to be presented by Lee Fu,
NASA/JPL

Enjoy the 2018 OSTST meeting!

OSTST 2018, Ponta Delgada, Azores, EUMETSAT Altimetry programmes status

Francois Parisot

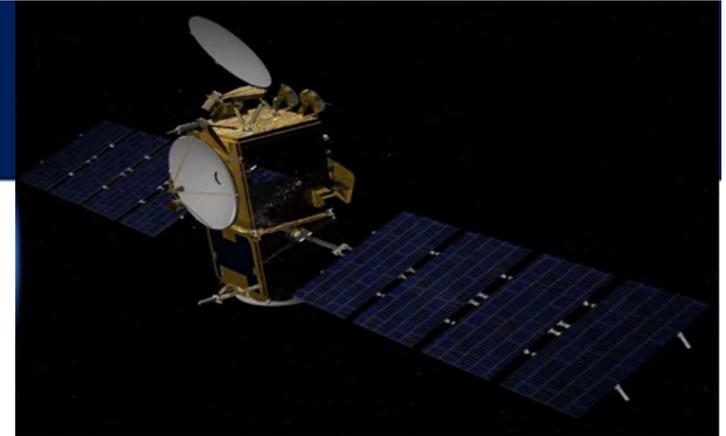


Jason-2



- Satellite launched on 20 June 2008.
- Operations carried out by the Jason-2 Partner Agencies: NOAA, NASA/JPL, CNES and EUMETSAT.
- Since July 2017, Jason-2 operates in a Long-Repeat Orbit (**LRO**), 27 km below the reference altimetry orbit.
- Since July 2018, Jason-2 operates in an **Interleaved-LRO** (ground track shifted by 4 km), further refining the 8 km LRO grid.
- Several data outages since March 2017 due an **anomaly with the gyros**: a strategy was agreed with the Jason-2 Partner Agencies in order to mitigate this anomaly (dedicated presentation).
- **EUMETSAT funding for Jason-2 secured until end of 2019.**
- **Jason-2 programme extensions beyond end of 2019 subject to:**
 - **Availability of budget and approval by EUMETSAT Council**
 - **Recommendation of the User Community useful**

Jason-3



- Satellite launched on 17 January 2016.
- Operations carried out by the **Jason-3 Partner Agencies**: NOAA, NASA/JPL, CNES and EUMETSAT.
- European part of the operations funded under the **Copernicus Programme** of the European Commission.
- Nominal status, compliant with the mission requirements.

- **Joint Steering Group has approved on 20 September 2018 the entry into the two years of Extended Routine Operations Phase:**
 - **Initial Routine Operations Phase (3 years):**
17 Jan 2016 – 17 Jan 2019
 - **Extended Routine Operations Phase (2 years):**
17 Jan 2019 – 17 Jan 2021
- Furthermore, all partners have indicated their willingness to further extend the mission duration after January 2021, should the satellite/system still be compliant with mission objectives.



OSTST - Copernicus Sentinel-3A Operations & Sentinel-3B Commissioning Status

Hilary K. Wilson



Sentinel-3A Operations Status

- Satellite
 - Operating nominally with a very good availability of the instruments (reaching 100%), with only few exceptions caused by OLCI anomalies in June and July
 - In addition throughout the summer months a series of coordinated activities were performed in support of S3B commissioning and tandem phase activities leading to some unavailability of the operational mission data
 - Routine activities such as orbit maintenance manoeuvres, security key changes and regular calibration activities are running smoothly
- Flight Operations Segment continues to support all routine S3A activities
 - S3 Mission Control System is performing the nominal satellite commanding activities
 - S3 Flight Dynamics Facility performs regular analyses and contributes to orbit maintenance and collision avoidance planning activities
 - S3 Mission Planning Facility performs the nominal and ad-hoc instrument commanding supporting e.g. regular calibration and validation tasks and ad-hoc investigation of instrument anomalies
- Marine PDGS
 - All Marine Products are operational
 - PDGS is now close to or exceeding availability targets for all products
- S3A Routine Operations Readiness Review completed on 16 October 2017 with ESA formalising the start of the full operations

Sentinel-3A Operational Product Release Status

- **SRAL/MWR** ► all products operational
- **Altimetry L2P/L3 Service** ► operational
- **SRAL/MWR Reprocessed Data**
 - **Second Reprocessing of L1 and Marine L2** user products for **SRAL/MWR** covering period from 01/03/2016 to 20/01/2018 available from CODA REP & EUMETSAT Data Centre
 - **Reprocessed Altimetry L2P** products covering the period of June 2016 to April 2017 completed and available from AVISO
 - **Reprocessed Altimetry L3** products covering the period of June 2016 to April 2017 completed and available with CMEMS V4

	ODA/CODA*			EUMETCast			Data Centre		
	NRT	STC	NTC	NRT	STC	NTC	NRT	STC	NTC
Level 0	√ (special users)						√ (special users)		
Level 1									
SRAL	√	√	√	√	√		√	√	√
MWR	√		√	√			√	√	√
Level 2									
SRAL/MWR	√	√	√	√	√		√	√	√
	AVISO/CMEMS			EUMETCast					
Level 2P									
SRAL	√ (AVISO)	√ (AVISO)	√ (AVISO)	√	√				
Level 3									
SRAL	√ (CMEMS)	√ (CMEMS)	√ (CMEMS)						

Production & Dissemination Status

Green = operational

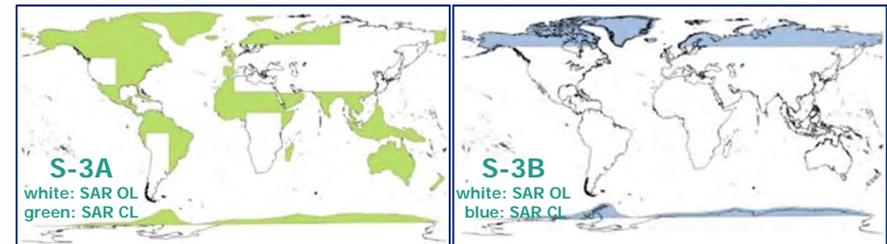
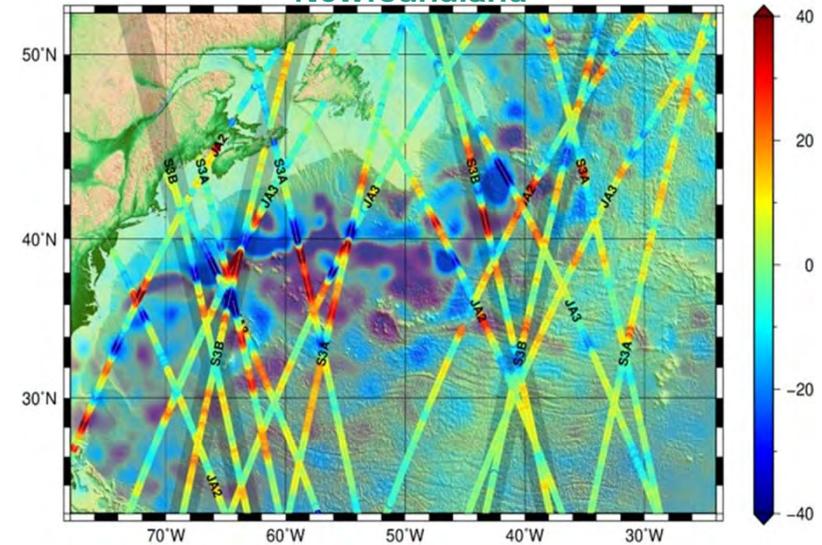
Orange = only for special users

Grey = not applicable

Sentinel-3B Commissioning Status

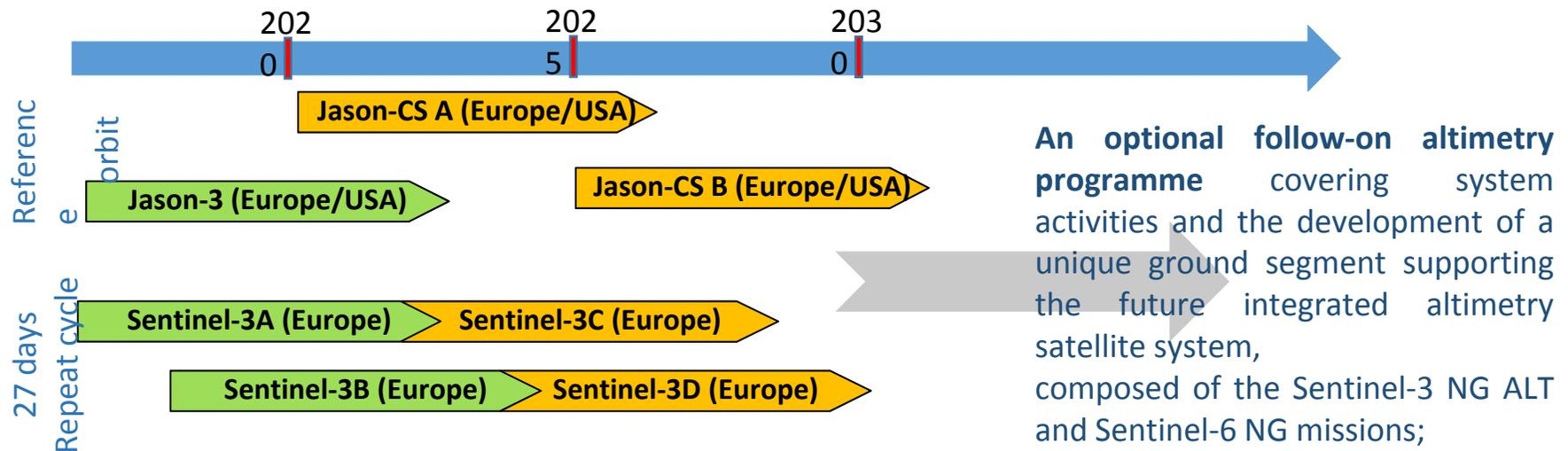
- **S3-B launched** on 25/4 from Plesetsk, Russia
- **LEOP, Platform and Payload AIV** successfully completed
- **All instruments on and working well** with comparable performance to S-3A
- **Phase E1 Cal/Val** started – 15/5
- **Tandem position** reached on 6/6 with S-3B 30s in advance of S-3A
- **Drift to nominal orbital position** from 16/10 to 24/11
- **In-Orbit Commissioning Review (IOCR)** marking end of commissioning phase – **17 October 18**
- **Handover of S3B spacecraft operations** to EUMETSAT once the nominal orbital position 140° in front of S3A reached – end **November 18**
- **OLTC validation** over one full cycle – **Dec 18 / Jan 19**
- **Routine Operations Readiness Review (RORR)** with full operational configuration for S3A and S3B reached – end **January 19**

S-3B SRAL 1st Data: Seal Level Anomaly (cm) from Sentinel-3A, Sentinel-3B, Jason-2 & Jason-3 off Newfoundland



S-3B Product Availability	Instrument	Product	Timeliness	Initial Release (to S3VT)	Operational Release (to all Users)
	SRAL/MWR	L1	NRT, STC, NTC	26/6/18	IOCR
		L2 Marine	NRT, STC, NTC	26/6/18	latest RORR

EUMETSAT planned future contribution



With European Commission and ESA, additional Sentinel “expansion” missions have been identified for monitoring the ocean, the atmosphere and the polar environment

- Anthropogenic CO2 Monitoring Mission,
- Polar Ice and Snow Topographic Mission (Cryosat FO)
- Passive Microwave Imaging Mission.

A major contribution to the Anthropogenic CO2 Monitoring Mission, and lower level contributions to the Polar Ice and Snow Topographic Mission (Cryosat FO) focussed on the processing of global ocean and atmospheric products involving synergies with Sentinel-3/-6 and EPS-SG.



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NOAA Jason Program

Eric Leuliette
NOAA Program Scientist
John Loving
NOAA Project Manager



NOAA Jason Ground System

- Continued Jason-2 and Jason-3 data production and distribution
- Technical refresh status

APOP_009 Jason-2 and Jason-3 Near Real Time Products Latency over the Past Year

ODS_001 NOAA Scientific Data Stewardship for Ocean Surface Topography Mission (OSTM)/Jason-2 and Jason-3 Products

NOAA Jason Science Program

- Project, National Weather Service, and OSTST support
- Ocean Remote Sensing Sea Ice Team products
- OceanWatch/CoastWatch/PolarWatch

Network Migration

- Jason-2&3 Operations transitioned to N-Wave network between Suitland NSOF and both Fairbanks and Wallops CDAS – August 2, 2018
- NJGS will transition to JEUNO network - 4Q calendar year 2018

NJGS Technical Refresh

- Deployment to NOAA December 17, 2018 - March 14, 2019
- On-Site Testing January 28 - April 12, 2019
- Operational Readiness Review May 31, 2019
- Transition to Operations July 24 – Sep 2, 2019
- System Acceptance Review August 26, 2019
- NOAA Commissioning October 26, 2019
- Decommissioning Nov 2019 - May 2020

Upgrade of altimetry data assimilation at the National Weather Service (NWS)

- NWS Environmental Modeling Center effort to improve hurricane intensity forecasting
- Implementation of LETKF-based DA in HYCOM of coupled HWRF system
- Joint Effort for Data assimilation Integration (JEDI)



Support of the OSTST

- Five PIs funded through 2017-2020
- Arctic circulation, EKE, Fully-Focused SAR, DA, and air-sea interaction
- Funded through NOAA Cooperative Institutes



NOAA/NESDIS Office of Projects, Planning, and Analysis (OPPA) is funding two Research & Technology Maturation Projects (\$540K)

1. Maturing Reflectometry Usefulness to the NOAA Observing System Portfolio for Winds and Altimetry applications

- "Phase-Delay Altimetry Study using Spire GNSS-RO Satellites



1. Dual-band radar satellite altimeter instrument studies for sea ice and sea state

- Ku/Ka-band and snow radar studies

NOAA LSA Sea Ice Data Products Webpage:

https://www.star.nesdis.noaa.gov/sod/lisa/SeaIce/DataProducts/products_SeaIce.php

- Visualization of NOAA satellite sea ice data products
- Currently an array of **daily** satellite products are visualized:
 - ASCAT Multi-year ice mask
 - ASCAT 10-day Backscatter Variability
 - ASCAT Daily normalized radar cross-sections
 - VIIRS & GCOM (AMSR-2) Sea Ice Concentration & Sea Ice Surface Temperature

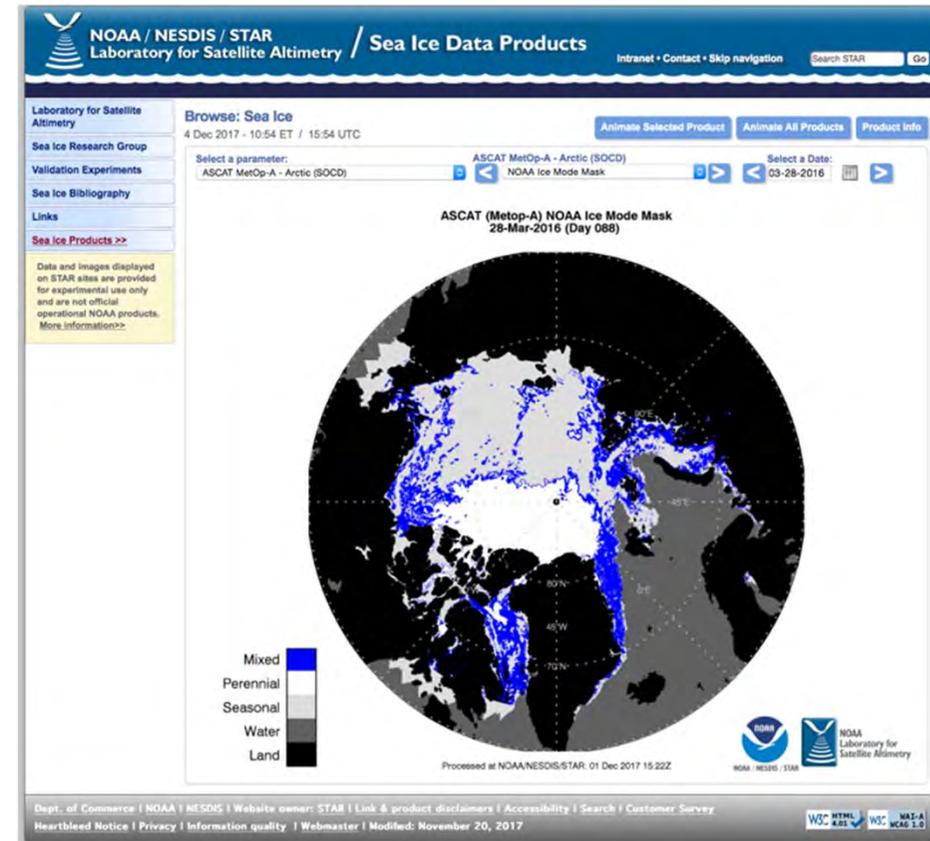
Access to NOAA LSA Sea Ice Products:

<ftp://ftp.star.nesdis.noaa.gov/pub/socd/lisa/SeaIceProducts/>

- Daily ASCAT ice type product available via LSA FTP
- IceBridge airborne products produced retrospectively for time periods for which historical source data are available

A look ahead:

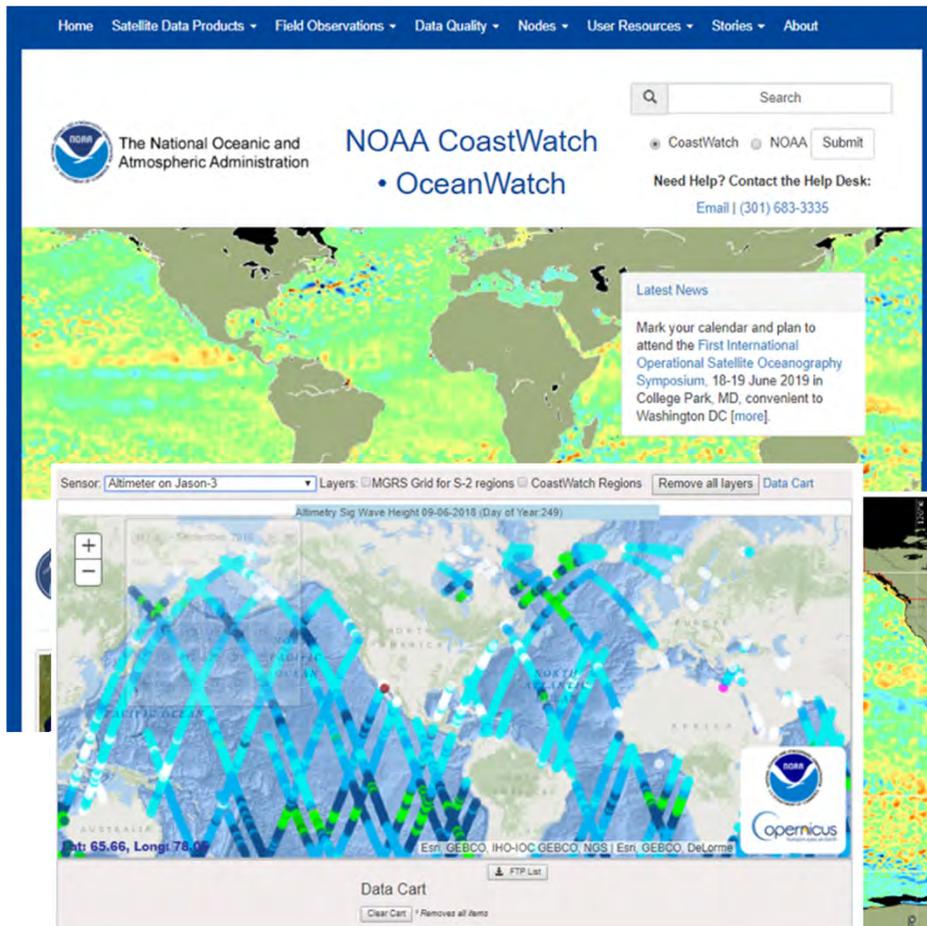
- New products page decided to airborne data sets coming soon, with new visualizations! To include IceBridge include snow depth on sea ice, ridge sail height distributions, ice surface roughness, sea ice freeboard, and sea ice thickness.
- CryoSat-2 and ICESat-2 sea ice data products coming online in the coming year (Arctic sea ice freeboard and thickness)



NOAA LSA sea ice products website

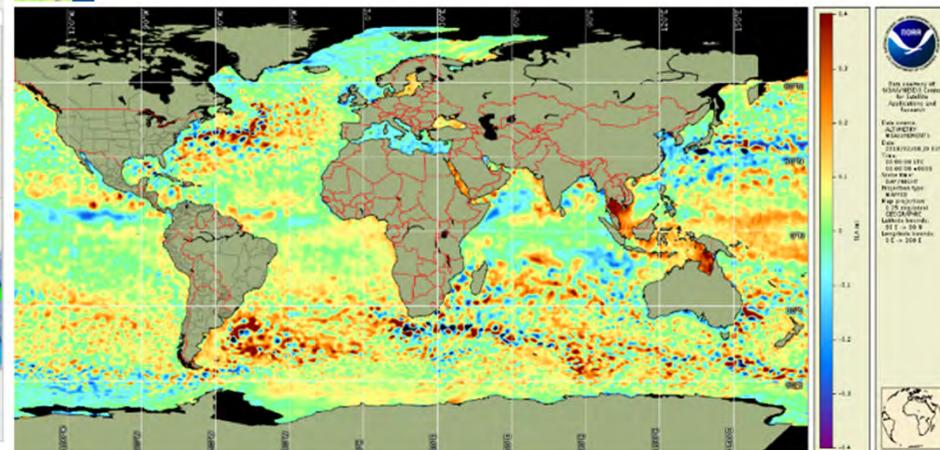
**POCs: Larry Connor & Sinead Farrell
NOAA Lab. for Satellite Altimetry, College
Park, MD, USA**

NOAA CoastWatch/OceanWatch/PolarWatch



NOAA
CoastWatch/OceanWatch/
PolarWatch

facilitates the use of ocean
satellite data for research,
applications and decision-
making. NOAA PolarWatch
launched in fall 2016.



Website Home:

CoastWatch.NOAA.gov

Help Desk:

CoastWatch.Info@NOAA.gov

18 to 20 June 2018 NOAA, Washington, DC The First Operational Satellite Oceanography Symposium

Aims to

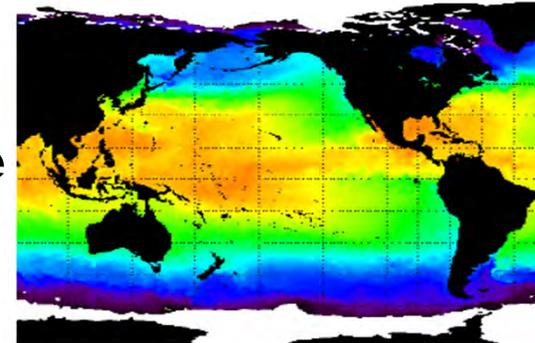
- enable the understanding of the barriers (perceived or actual) and
- facilitate the widespread incorporation of satellite ocean observations into the value chain from data to useful information across the range of operational applications.

Satellite operators, information producers and users will exchange facts and ideas to

- understand user needs and expectations
- develop interoperability standards and establish best practices that will lead to more universal use of ocean satellite data

Training sessions to facilitate use of satellite data products will be offered

→ 25 YEARS OF PROGRESS IN RADAR ALTIMETRY SYMPOSIUM



18 to 20 June 2019 Washington, DC Area FIRST INTERNATIONAL OPERATIONAL SATELLITE OCEANOGRAPHY SYMPOSIUM

Satellite remote sensing of ocean properties is a technology of continuously increasing maturity and scope. Sea surface temperature, sea surface height, ocean color, sea ice, ocean winds, roughness-derived parameters (e.g., oil spills) and other measurements are now available on a routine and sustainable basis. Some of these products are integral to operational applications for routine and event-driven environmental assessments, predictions, forecasts and management. Yet ocean satellite data are still underutilized and have a huge potential for contributing further to societal needs and the “blue economy”.

The First Operational Satellite Oceanography Symposium aims to enable the understanding the barriers (perceived or actual) and facilitate the widespread incorporation of satellite ocean observations into the value chain from data to useful information across the range of operational applications. In this symposium, an international community of satellite operators, information producers and users will exchange facts and ideas to 1) understand user needs and expectations, and 2) develop interoperability standards and establish best practices that will lead to more universal use of ocean satellite data.

Training sessions to facilitate use of satellite data products will be offered.



**NOAA Center for
Weather and
Climate
Prediction**

**18 to 20 June 2019
College Park, MD
USA**

**Convenient
access from
Washington DC**

**HTTPS://
CoastWatch.NOAA.gov
/OSOSymposium**

STEERING COMMITTEE

Bojan Bojkov (EUMETSAT)
Christopher Brown (NOAA)
Paul DiGiacomo (NOAA)
Veronica Lance (NOAA)
Francois Montagner
(EUMETSAT)

Posted 20 September 2018 with extended dates.
Details to follow.



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ESA Programmes Status

Jérôme Benveniste



Mission: 5' to cover...

- Envisat and ERS Reprocessing
- CryoSat Mission Status
- GOCE Activities
- SMOS Mission Status
- Sentinel-3 Mission (Craig Donlon's talk @11:15)
- Jason-CS/Sentinel-6 (Pierrik Vuilleumier's talk @11:30)
- Altimetry R&D, Training, Outreach and User Consultation

Contributions from:

Susanne Mecklenburg, Tommaso Parinello, Rune Floberghagen,
Jérôme Bouffard, Pierre Féménias

Mission: 5' to cover...

→ **Envisat and ERS Reprocessing**

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ERS, Envisat, ... Altimetry related intended ITTs



Title: FDR4ALT (Fundamental Data Record for Altimetry)

Objective: Valorization and exploitation of the long-standing record of global altimetry measurements from ESA ERS-1, ERS-2 and ENVISAT heritage missions. Definition and generation of Fundamental Data record (FDR) & Thematic Data Products (TDP)

ITT Publication: Q4 2018

Duration: ~1 + 2 years

Price range: > 1.5 MEuro

Department: ESA ESRIN Ground Segment Dept / EOP-G

nb 197

ESA project FDR4ALT
Fundamental Data Records for ALTimetry

Pierre Féménias^[1], Jérôme Bouffard^[2], Gabriele Brizzi^[2], Mirko Albani^[1]

[1] European Space Agency (ESA) ESRI, Largo Galileo Galilei 1, 00044 Frascati, Italy
[2] Secon Italia spa, Via Salaria 24, 00044 Frascati, Italy

INFORMATION
EMITS <http://emits.sso.esa.int>
Ref. 947.18.187.08
ESA Invitation To Tender Expected Q4 2018

Part of ESA Long Term Data Preservation (LTP) programme aimed at valorizing and exploiting ESA's historical Earth Observation (EO) missions.
Resulting long-standing series of global altimetry observations from ERS-1/2 and Envisat with the objective of improving consistency and performance of existing data, ensuring interoperability and continuity towards current and future missions.
Entailing definition, generation, and validation of innovative 4th generation multi-instrument Earth System data records in the domain of satellite Radar Altimetry: Fundamental Data Records and Thematic Data Products.

Fundamental Data Record (FDR): unified and coherent multi-instrument long-term record of calibrated and quality-controlled EO sensor data (Level 1) addressing improvements for quality aspects exceeding the capabilities of the single satellite systems.

Thematic Data Product (TDP): Level 2+ product generated by blending different satellite observations, and including few targeted geophysical parameters to be used as inputs for high-level product generation, validation activities and data assimilation, whose processing is optimized with regards to the specificity of the considered data records.

ESA RA/R-A/2/SIRAL/SRAL and MWR Sensor Series
→ Consistent calibration and characterization
→ Continuity with current missions

Timeline: ERS-1 (Jul 1991), ERS-2 (Apr 1995), ENVISAT (Mar 2002), CryoSat-2 (Jul 2010), SARAL (Apr 2012), ALOS-3 (Feb 2015), Jason-3 (Apr 2016)

The generated long-term data records shall:

- Improve accuracy, consistency and traceability of the existing data holdings.
- Implement QA4EO guiding principles. <http://qa4eo.org>
- Pursue recalibration / harmonization of the different sensors.
- Enhance credibility of satellite-derived EO data with thorough uncertainty estimates based on rigorous metrological principles.
- Enhance accuracy and stability required for comprehension and monitoring of the Earth system.
- Support rigorous science, decision-making and climate-related services.

Accuracy Consistency Continuity Traceable Uncertainties

FDR4ALT for science community, for new users, for news applications, TRUST

"25 Years of Progress in Radar Altimetry" Symposium
Ponta Delgada, São Miguel Island, Azores Archipelago, Portugal - 24-29 September 2018

You saw the Poster!

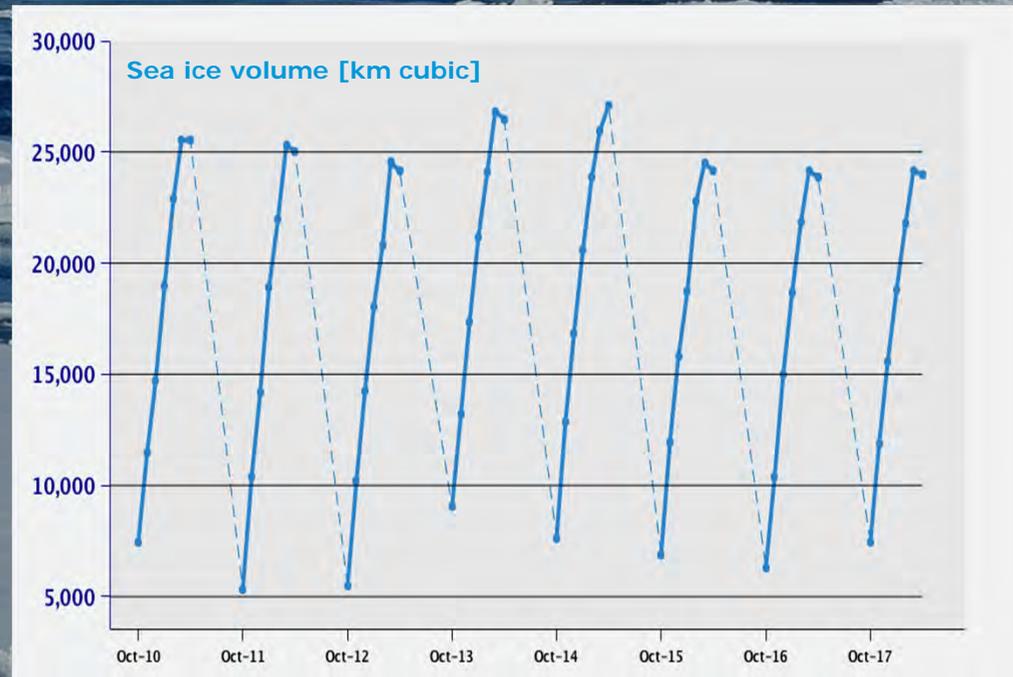
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Cryosat-2 Mission Status

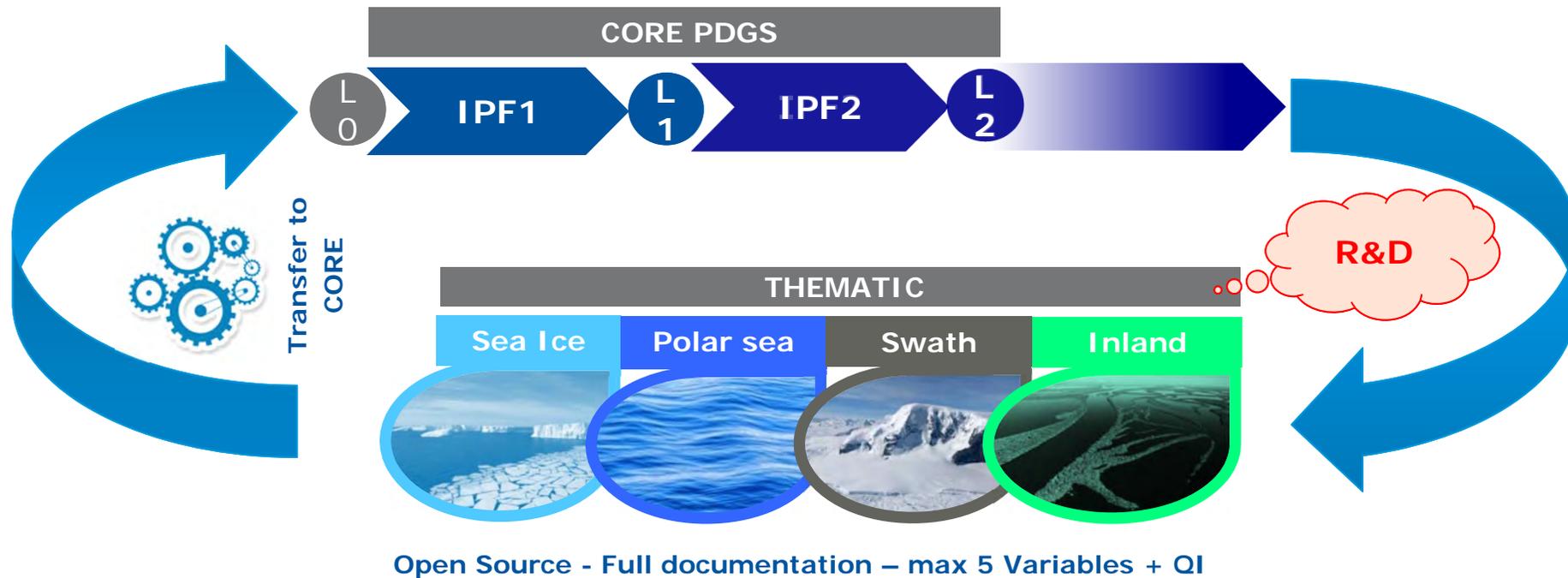


- Completed eight years of continuous measurements
- Baseline D ice to be released in spring 2019
- Reprocessing of Baseline C ocean started
- Funds until December 2019
- Space and Ground segment fit to continue operations until 2025
- Started preparations of mission extension [2020 – 2021] built on six new scientific challenges



CryoSat Sea-ice Volume Trends - © CPOM/Leeds/ESA

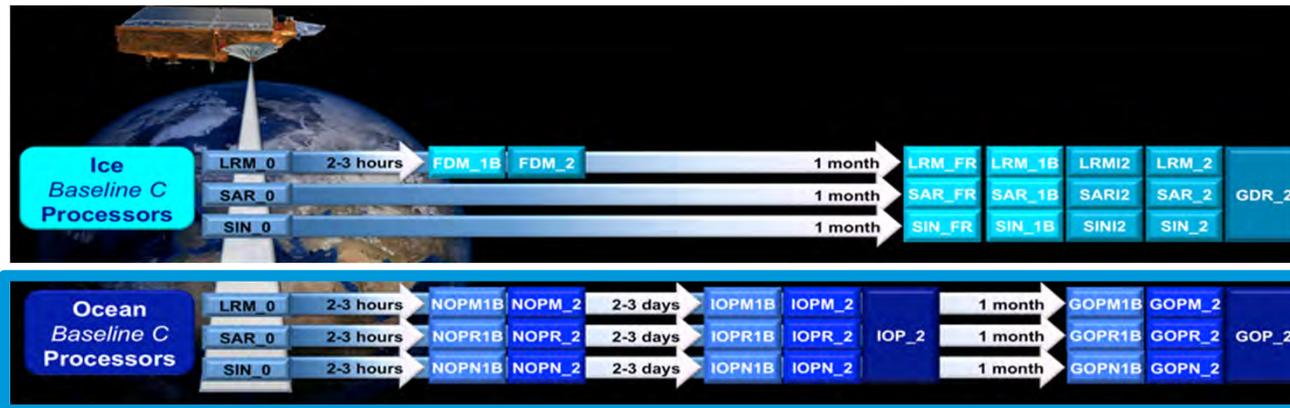
CryoSat-2 Thematic Products



Cryosat-2 over the Ocean

CryoSat-2 Ocean Product [COP]

- **Motivation: bridge the gap between previous/future ocean-oriented missions and contribute to a better knowledge of the polar circulation**
- **COP** : Very well suited for ocean applications; **new COP Baseline C** in operation since November 2017; full reprocessing campaign in Q1-2019



Details were given in

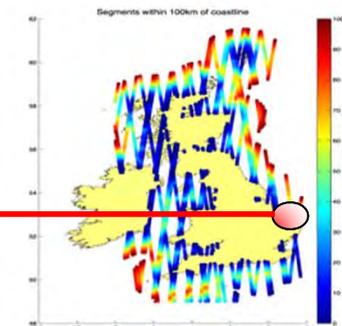
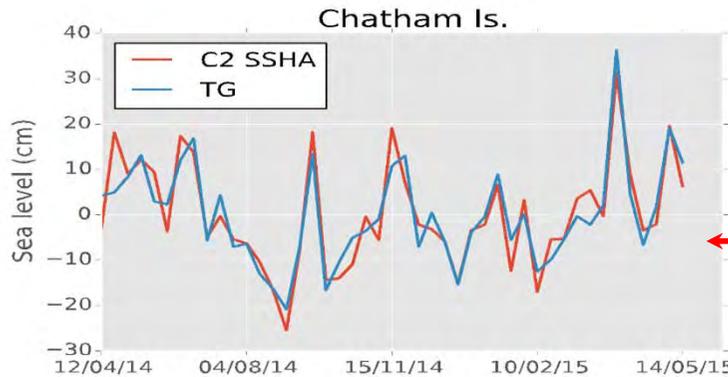
25-year altimetric record #1: Building the Climate Record: accuracy and precision over 25 years of altimetry data
📅 Tuesday, September 25, 2018
🕒 2:00 PM - 3:40 PM
👤 Bouffard J¹, Parrinello T¹, Féménias P¹
¹ ESA - European Space Agency, Frascati, Italy
Toward an Overview of CryoSat Data Quality over the Ice and the Ocean

- NOP/IOP/GOP generated in **3 h / 3 days / 30 days** from sensing and contain relevant variables for assimilation into models (SSHA, SWH, WIND)
- **COP are regularly Quality Controlled & Validated** by ESA with the support of the NOC & TUD.

Cryosat-2 over the Ocean

→ Exemple of ESA COP validation

- **Regional Results:** Excellent agreement between CryoSat & Tide Gauges signals

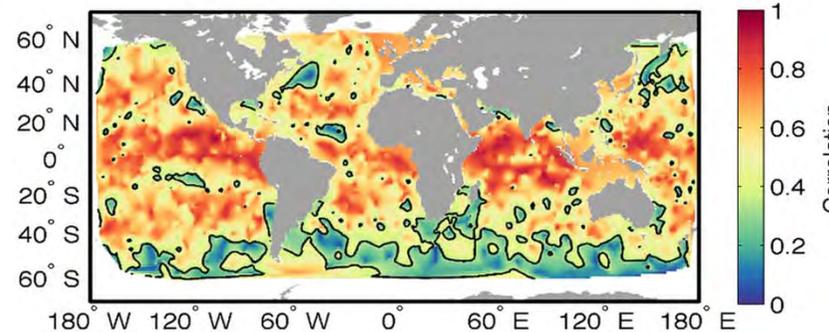


More details in and in :

Calafat et al (2017, RSE);
Parrinello et al (2018, ASR)
Bouffard et al (2017a, ASR)

- **Open Ocean Results:**

High correlation with the steric height derived from 2538 Argo floats T/S measurements (April 2014- June 2015.)



Poster Session
 Tuesday, September 25, 2018
 10:40 AM - 12:20 PM
 Banks C¹, Mir Calafat F¹,
 Cipollini P⁵, Snaith H³,
 Gommenginger C², Dayoub N²,
 Shaw A⁴, Bouffard J⁶,
 Féménias P⁷
¹ National Oceanography Centre,
 Liverpool, United Kingdom
² National Oceanography Centre,
 Southampton, United Kingdom
³ British Oceanographic Data
 Centre, Southampton, United
 Kingdom
⁴ SKYMAT Ltd., Southampton,
 United Kingdom
⁵ Telespazio Vega UK for ESA
 Climate Office - ECSAT, Harwell,
 United Kingdom
⁶ RHEA for ESA – European
 Space Agency, Frascati, Italy
⁷ European Space Agency,
 Frascati, Italy
 CryoSat-2 On-going Cal/Val and
 Oceanographic Studies from Pole to
 Equator

You saw the Poster!



CryoSat Special Issue

Just Published!

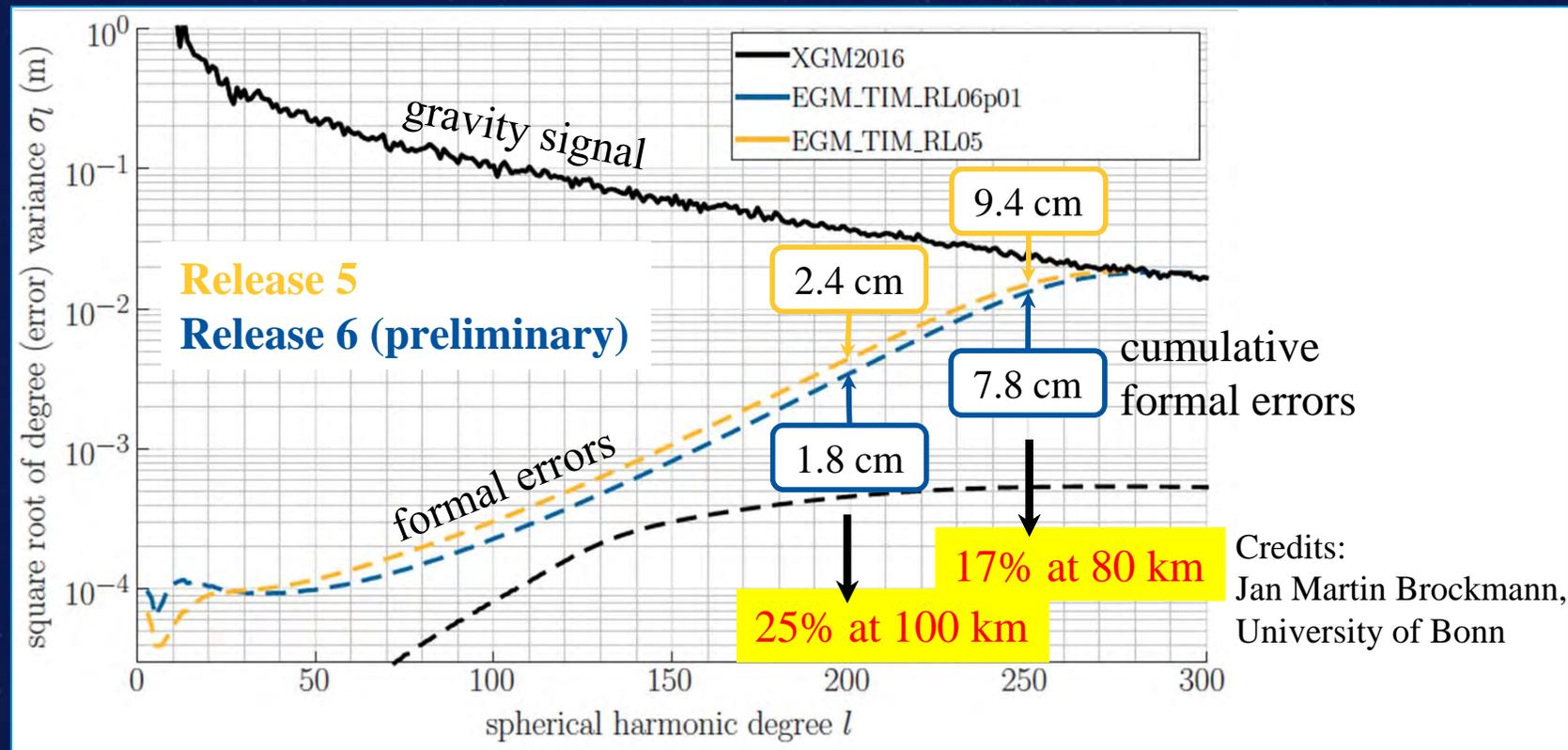
Mission: 5' to cover...

- Envisat and ERS Reprocessing
- CryoSat Mission Status
- **• GOCE Activities**
- SMOS Mission Status
- Sentinel-3 Mission (Craig Donlon's talk @11:15)
- Jason-CS/Sentinel-6 (Pierrik Vuilleumier's talk @11:30)
- Altimetry R&D, Training, Outreach and User Consultation

GOCE Release 6 Activities



Geoid height formal errors



Credits:
Jan Martin Brockmann,
University of Bonn

"It can still get better. We are working on that..."
(R. Floberghagen, pers. comm, Sept. 2018)

GOCE++Dynamic Topography at the Coast and Tide Gauge Unification (DYCOT)

Prime company: TECHNICAL UNIVERSITY OF DENMARK (DK)

The objective of this activity is a consolidated and improved understanding and modelling of coastal processes and physics responsible for sea level changes on various temporal/spatial scales. In practice, this study shall combine several elements: Propose and develop an approach to estimate a consistent DT at tide gauges, coastal areas, and open ocean Validate the ...

[PROJECT DETAIL](#)

Mission: 5' to cover...

- Envisat and ERS Reprocessing
- CryoSat Mission Status
- GOCE and Swarm Activities

→ **SMOS Mission Status**

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ESA's Soil Moisture and Ocean Salinity Mission



- ❑ Measurement principle: MIRAS (Microwave Imaging Radiometer using Aperture Synthesis instrument): **passive microwave interferometric radiometer measuring in L-Band (1.4GHz, 21cm)**
- ❑ Orbit: altitude of 758 km; inclination of 98.44°; low-Earth orbit, polar, sun-synchronous.

IN SUMMARY

- ✓ Launched November 2009
- ✓ SMOS is in **excellent technical conditions.**
- ✓ **High data availability ~99%**
- ✓ **Large variety of operational applications** supported by SMOS data products
- ✓ **New operational products** continuously developed
- ✓ **RFI contamination worldwide much reduced**

Missions driven by user needs
European Copernicus initiative. These satellite developed in partnership with the EU include C-band Sentinel-1, high-resolution optical (Sentinel-2), radar radiometer (Sentinel-3) and atmospheric monitoring capability (Sentinel-4 & Sentinel-5 on missions MTG and EPS-SG respectively).

Earth Explorer Missions driven by Scientific needs to advance our understanding of how the ocean, atmosphere, hydrosphere, cryosphere and Earth's interior operate and interact as part of an interconnected system. These Research missions, exploiting Europe's excellence in technological innovation, pave the way towards new development of future EO applications.

Data from non-ESA Missions **EOP Operated Missions**

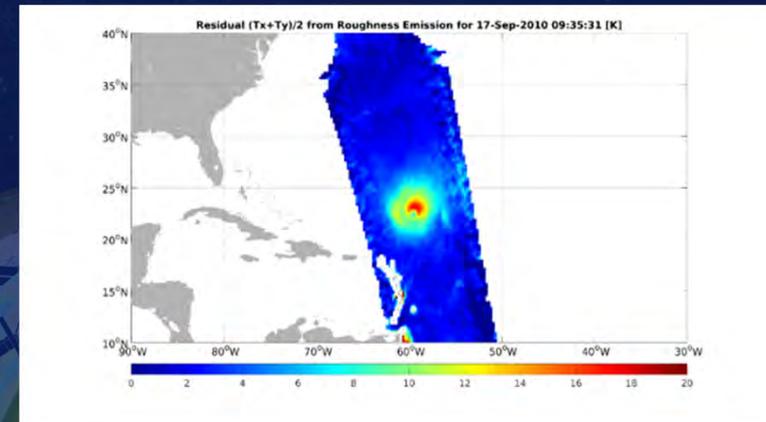
Copernicus Programme

Earth Observation Envelope Programme

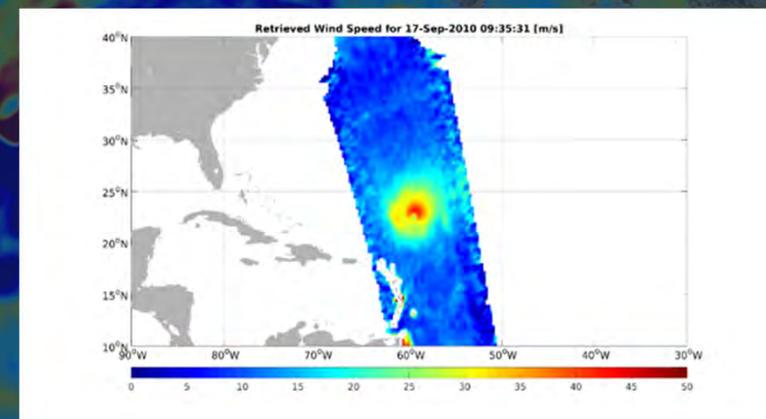
Severe winds – new operational product

Product available in near-real time from end 2018 from IFREMER/ODL and ESA

Tag name	Description
wind_speed (time,lat,lon)	Gridded swath of Sea surface wind speed from SMOS
wind_speed_error (time,lat,lon)	Uncertainty of the Sea surface wind speed from SMOS
time (time,lat,lon)	UTC time at each pixel
lon(lon)	Longitude of the gridded SMOS wind speed data
lat(lat)	Latitude of the gridded SMOS wind speed data
cross_track_distance (time,lat,lon)	Across track distance at each node of the wind speed product expressed in the xi coordinate of the director cosine of SMOS antenna plane
quality_level (time,lat,lon)	Quality level associated with the pixel measurements
rejection_flags (time,lat,lon)	processing flags



SMOS brightness temperature excess

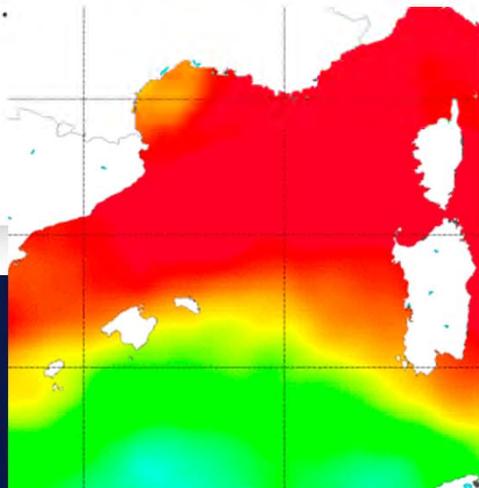


Retrieved SMOS wind speed

SMOS+ Med: Sea Surface Salinity in the Mediterranean

Prime company: UNIVERSITY OF LIEGE (BE)

Ocean salinity reflects precipitation and evaporation rates, river runoff and ice formation and melting. It is an essential variable for the Earth's climate, because it influences ocean circulation, convection and mixing, through its effect on water density, playing an important role in the global heat exchange between ocean and atmosphere (Lagerloef and Font, 2010), a



[PROJECT DETAIL](#)

Mission: 5' to cover...

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EO Scientific Data Exploitation



Workshops & conferences



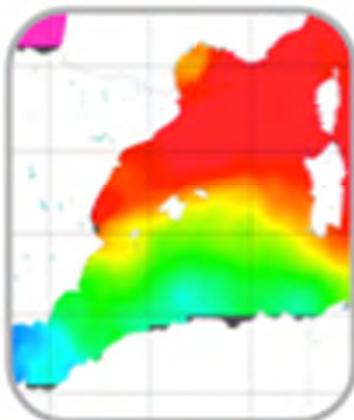
Training and Education



Toolboxes



Open Science



New methods & products



Earth system science



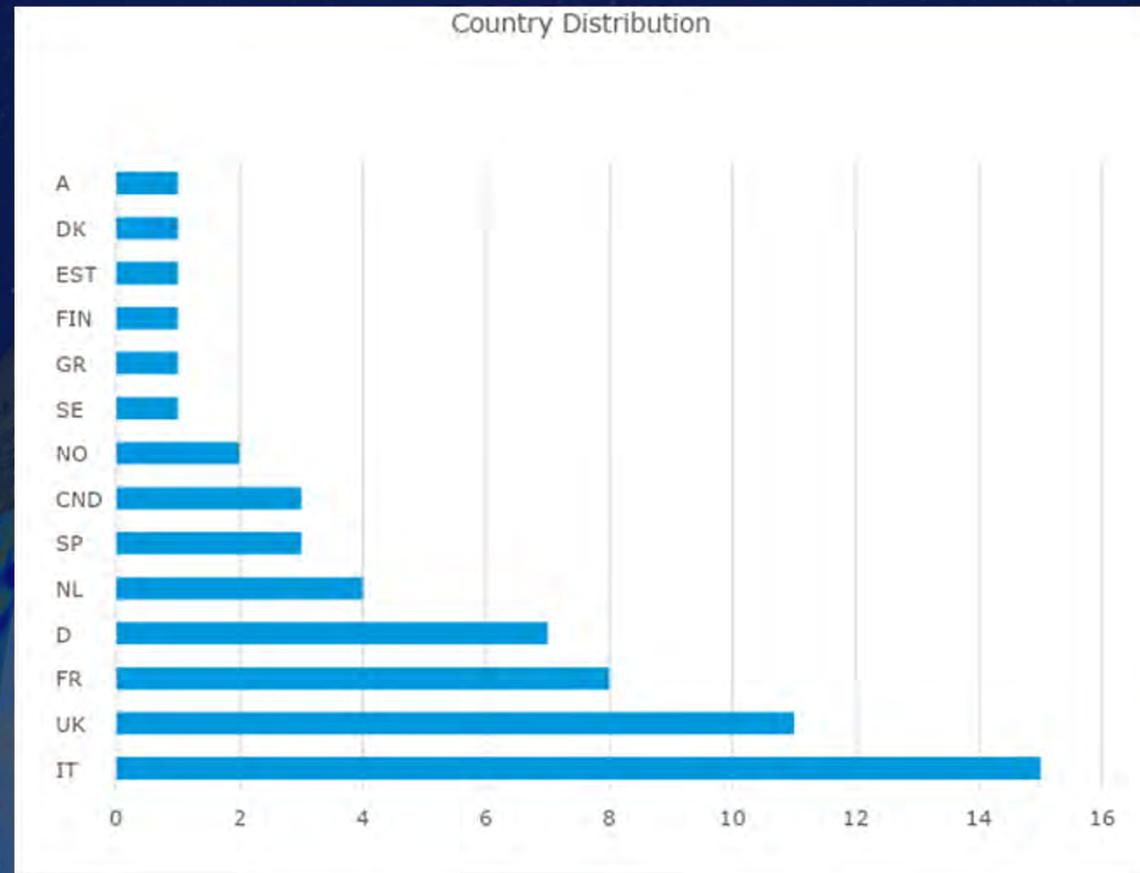
Future missions



Campaigns

The Living Planet Fellowship call 2018

✓ 60 proposals received!!



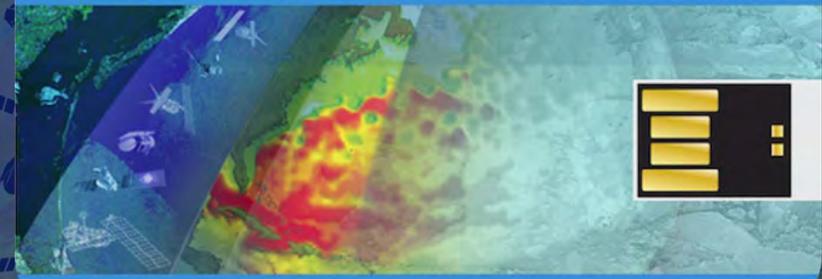
EO Science for Society



#EO4society
eo4society.esa.int



BROADVIEW RADAR ALTIMETRY TOOLBOX



www.altimetry.info

EO Science for Society



#EO4society
eo4society.esa.int

EO Industry

Invitations to Tender

Regional Initiatives

Scientists

Invitation to Tender: “Black Sea and Danube Regional Initiative – Science”

AUGUST 30, 2018

This Activity aims at contributing to the new ESA Black Sea and Danube Initiative, with the ultimate goal to foster a coordinated approach to advance EO-based science, novel applications and data exploitation infrastructures serving the specific needs of the Black Sea and Danube basin community through a strong collaboration among institutions and related national and ...

[READ MORE](#)

EO Science for Society



#EO4society
eo4society.esa.int

Procurement title	SAR and SARin modes for INLAND WATER - RIVER DISCHARGE – and COASTAL ALTIMETRY
OBJECTIVES	Develop innovative Delay-Doppler processing algorithms for CryoSat SAR and SARin modes and Sentinel-3 SAR mode, Improve the error characterization over inland water and in the Coastal Zone
DELIVERABLES	Prototypes of innovative algorithms, Datasets, Publications
Amount /DURATION	1500 K Euros/ 24 Months
ITT /Kick Off	Q4 2018 / Q1 2019

EO Science for Society - Training



#EO4society eo4society.esa.int

Training/Education

EO Summer School 2018

📅 July 30 - August 10

📍 ESA-ESRIN, Largo Galileo Galilei, 1
Frascati, RM 00044 Italy

Global Observing Systems – Earth System Modelling – Data Assimilation – Global Change: these are the main topics for the yearly appointment with EO data, science and applications open to early career scientists (i.e. Ph.D. students, young post-doctoral scientists) who are specialised in a variety of Earth Science disciplines and wish to expand and improve their knowledge and ...

[EVENT DETAILS](#)

EO Science for Society



Training and User Consultation



→ 11th COASTAL ALTIMETRY WORKSHOP

Coastal Altimetry Training

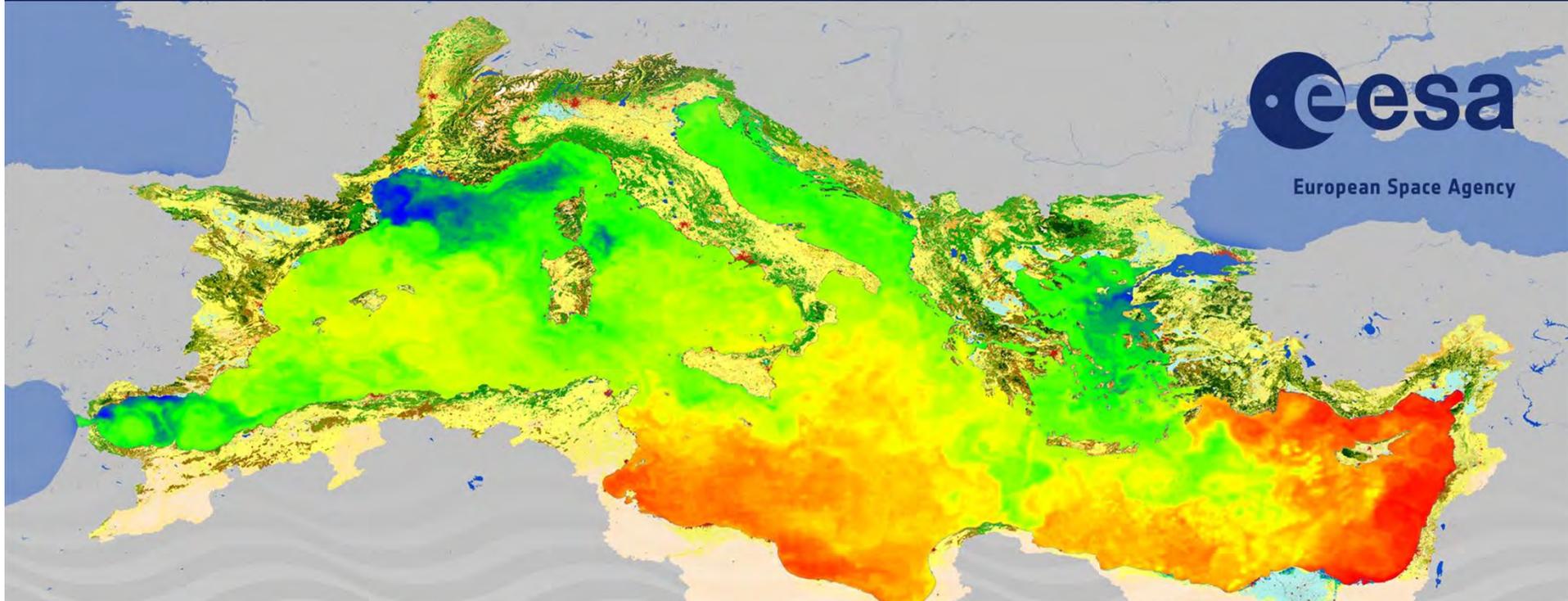


12–15 June 2018 | ESA-ESRIN | Frascati (Rome), Italy

USER CONSULTATION



Regional Initiatives



→ MED 2018

11-13 December 2018
ESA-ESRIN | Frascati (Rome), Italy



→ 25 YEARS OF PROGRESS IN RADAR ALTIMETRY SYMPOSIUM

24-29 September 2018 | Ponta Delgada, São Miguel Island | Azores Archipelago, Portugal

USER CONSULTATION

Regional Initiatives



→ ATLANTIC FROM SPACE WORKSHOP

23–25 January 2019
National Oceanography Center
Southampton, UK

www.eo4atlantic.info

www.esa.int

European Space Agency

23–25 January 2019
National Oceanography Centre, Southampton, UK

→ 25 YEARS OF PROGRESS IN RADAR ALTIMETRY SYMPOSIUM

24–29 September 2018 | Ponta Delgada, São Miguel Island | Azores Archipelago, Portugal

USER CONSULTATION



living planet symposium | MILAN 13-17 May 2019

UNDERSTANDING THE EARTH SYSTEM

SPACE 4.0 AND EARTH OBSERVATION

BENEFITS FOR A RESILIENT SOCIETY

PUBLIC AND PRIVATE SECTOR INTERACTIONS



Deadlines

Session Proposals
17 June 2018

Abstracts
11 November 2018

Registration
April 2019

lps19.esa.int

European Space Agency

→ 25 YEARS OF PROGRESS IN RADAR ALTIMETRY SYMPOSIUM

24-29 September 2018 | Ponta Delgada, São Miguel Island | Azores Archipelago, Portugal

Mission: 5' to cover...

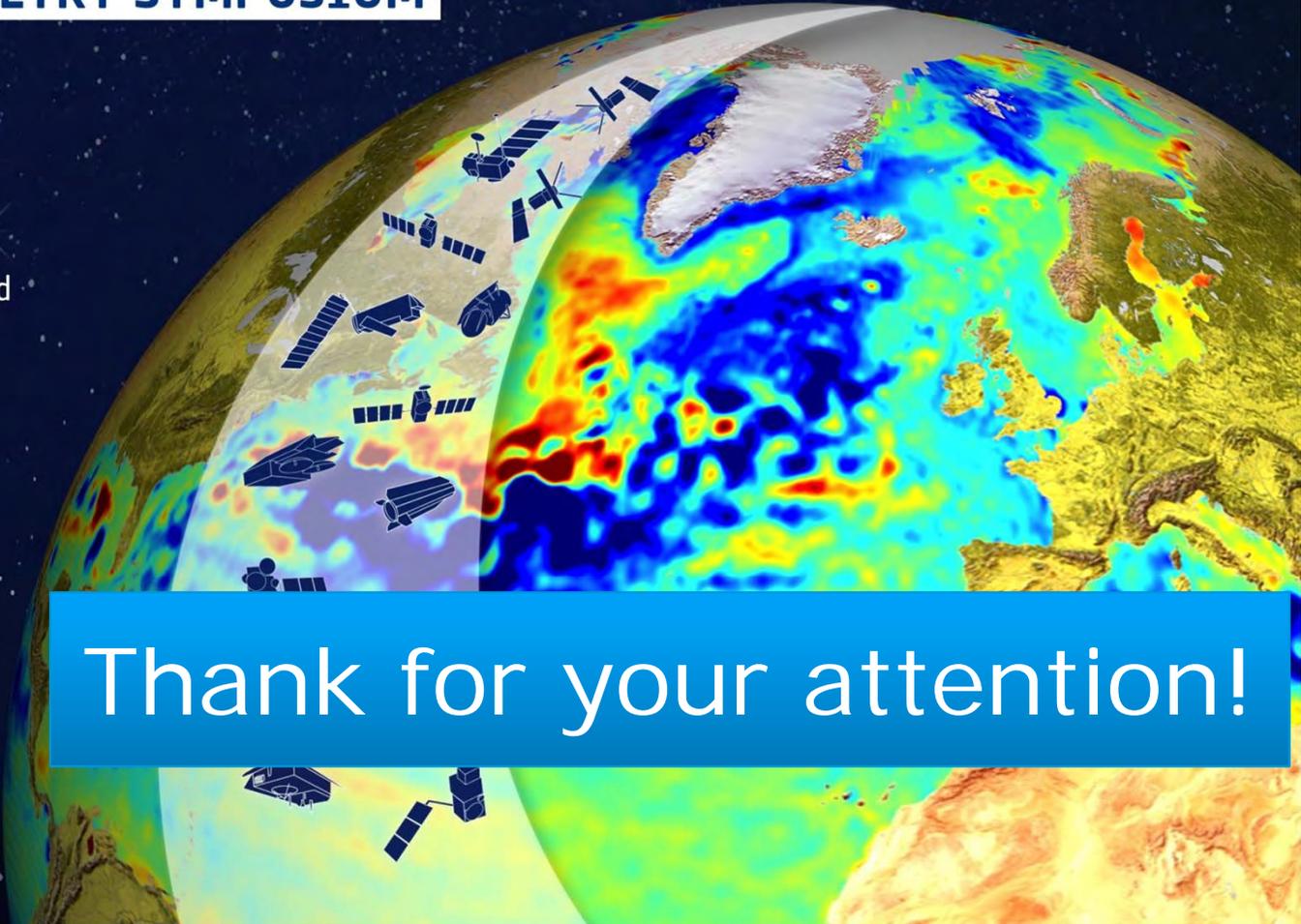
→ NEW MISSIONS

- Already mentioned in 25YPRA Opening and previous Managers
- SKIM
- STERIODS
- Polar Altimetry
- Swath Altimetry

**→ 25 YEARS OF PROGRESS
IN RADAR ALTIMETRY SYMPOSIUM**

OSTST MEETING

24–29 September 2018
Ponta Delgada, São Miguel Island
Azores Archipelago, Portugal



Thank for your attention!