SENTINEL-3 SLSTR DATA AND MARINE OPERATIONS

EUMETSAT

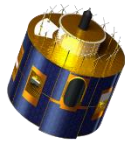
Anne.Ocarroll@eumetsat.int

GHRSST Science Team Meeting
20-24 July 2015
ESA-ESTEC, The Netherlands

Outline

- Products and formats
- Data access and Marine operations
- Cal/Val activities

EUMETSAT support for Copernicus Marine Service



YEAR 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39

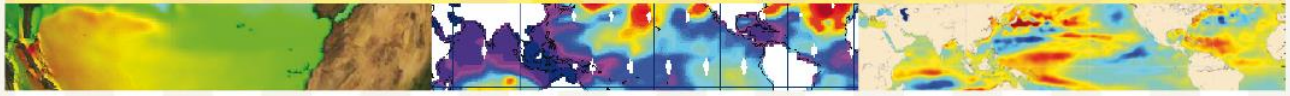
METEOSAT SECOND GENERATION (MSG) | METEOSAT THIRD GENERATION (MTG)

SEA SURFACE TEMPERATURE | WATER TURBIDITY SEVIRI | INCOMING RADIATIVE FLUXES | CASE-1 CHLOROPHYLL FCI

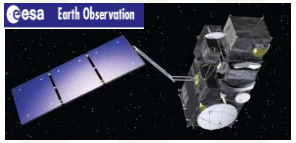
EUMETSAT POLAR SYSTEM (EPS) | EPS SECOND GENERATION (EPS-SG)

SEA SURFACE TEMPERATURE | SEA ICE | MULTI-VIEW POLARIMETER APPLICATIONS, 3MI | SEA SURFACE WIND | PRECIPITATION

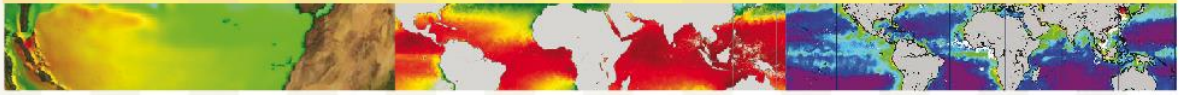
HPOA (JASON-2, -3) | HPOA (JASON-CS)



SEA SURFACE TOPOGRAPHY | WAVE HEIGHT | MEAN SEA LEVEL

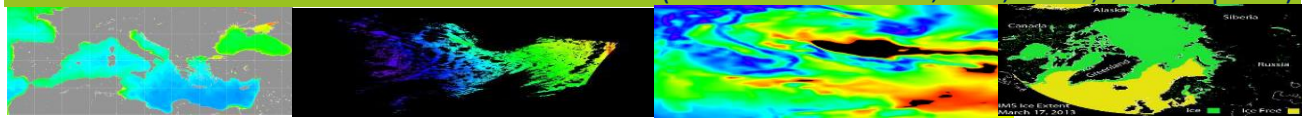


COPERNICUS SENTINEL-3



SEA SURFACE TOPOGRAPHY | SEA SURFACE TEMPERATURE | OCEAN COLOUR

COPERNICUS CONTRIBUTING THIRD PARTY DATA (US Suomi-NPP VIIRS, JPSS, China, India, Japan...)



OCEAN COLOUR | SEA SURFACE TEMPERATURE | SEA SURFACE WIND | SEA ICE

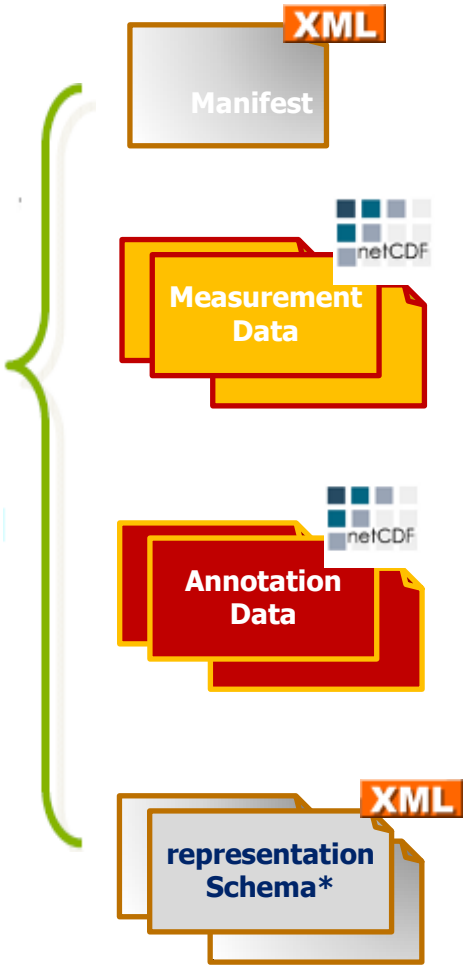
Products and formats

SLSTR marine products

Product	EUMETCast	ODA	Data Centre (UMARF)	Timeliness	Dissemination Unit size
SLSTR L1B RBT		✓	✓	NRT, NTC	Frame (3 min)
	-> Available from both ESA and EUMETSAT				
SLSTR L2 WST (following GHRSST L2P GDS2)	✓	✓	✓	NRT	Full orbit: dump *changed to 3mins*
		✓	✓	NTC	Full orbit: South Pole to South Pole
	-> Available from EUMETSAT				
SLSTR L2 WCT (individual algorithms)	Internal products		✓	NRT	Full orbit: dump *changed to 3mins*
			✓	NTC	Full orbit: South Pole to South Pole
	-> Available from EUMETSAT to Sentinel-3 Validation Team and special users				

Sentinel 3 SAFE Package Structure

A Sentinel-3 product package is a folder holding a collection of XML and binary files (either NetCDF and/or raw binary based)



XML file containing the package metadata (e.g. sensor name, sensing start/stop, etc.) and providing as well the hierarchic structure of the product.

netCDF4 file(s) containing data derived from measurements (also called geophysical product or scientific data).**

netCDF4 file(s) containing data that have not been derived from instrument measurements (e.g. geo-location, meteorological data, etc.); such information are applicable to multiple Measurements Data Files of the same package.**

XML file(s) containing the schema of the Measurement/annotation data

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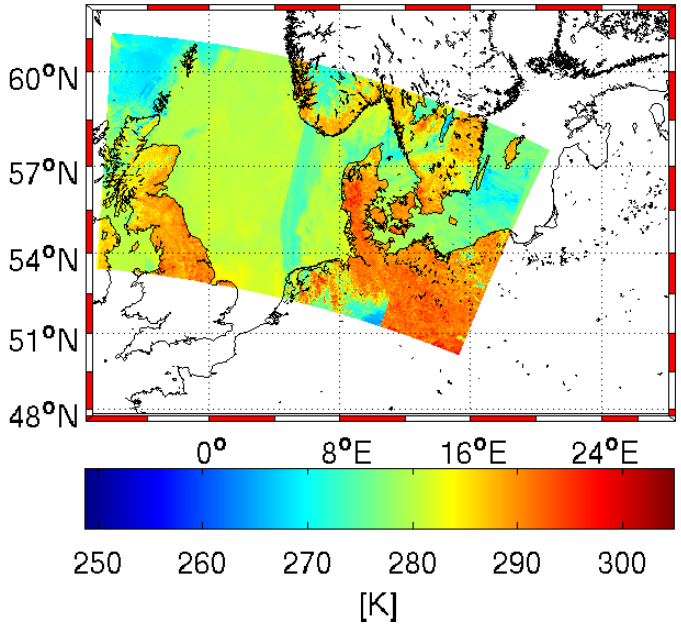
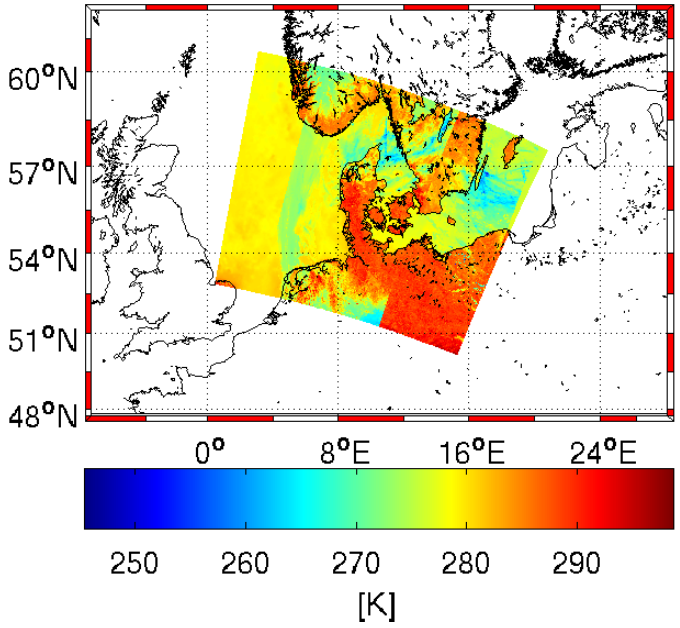
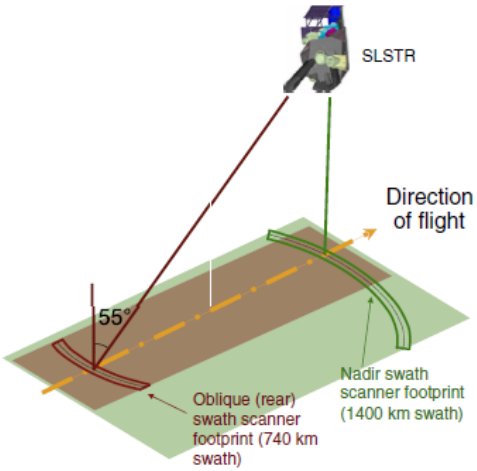
L1 RBT: Radiance and brightness temperature product

111 files in package: 34 measurement data files, 76 annotation data files, 3 different resolutions, oblique and nadir views, image grid (but with ability to go to instrument grid)







Poster -> Experiences with Sentinel-3 Optical Sensor L1 and L2 Products, Igor Tomazic et al

L2 WST: SLSTR L2P

Follows GHRSST L2P (GDS2r5)

- NetCDF4
- Level-2 swath product
- Skin Sea Surface Temperature (one of D3, N3, D2, N2, N3R)
- Auxiliary ECMWF wind-speed, sea-ice fraction, background SST
- Aerosol dynamic indicator – Saharan Dust Index
- Uncertainty estimates: SSES, pixel theoretical uncertainty
- Experimental fields: nedt, nadir BTs.

-> Distributed by EUMETSAT

L2 WCT: Single algorithm SST

- NetCDF4
- Level-2 swath product
- Skin Sea Surface Temperature
- Separate products for D3, N3, D2, N2, N3R
- Uncertainty estimates: pixel theoretical uncertainty

-> Internal products only, available to Sentinel-3 Validation Team and special users.

SLSTR Sea Surface Temperature

- Five single SST algorithms (view/time of day/aerosol) derived from weighted combinations of BTs measured in both views (nadir and oblique) by the thermal channels.

- Weights are functions of viewing geometry and WV loading.

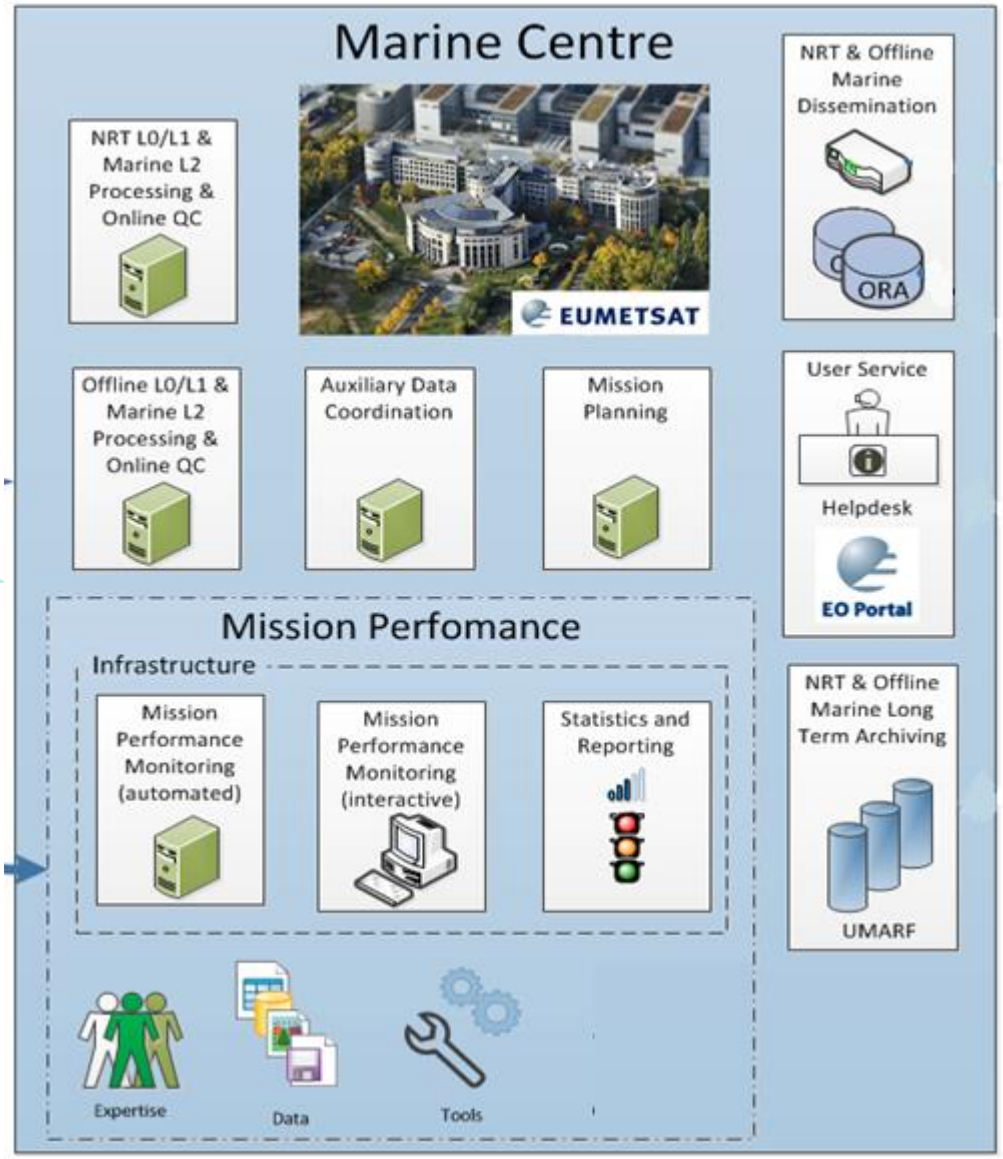
- Pre and post operational activities on inter-algorithm adjustments

- Lake Surface Water Temperature to be provided in the L2P (initially using SST retrieval).

-> Sentinel-3 SLSTR products guides and ATBD's available from https://sentinel.esa.int/web/sentinel/user-guides/sentinel-3-slstr

Data access and marine operations

EUMETSAT Sentinel-3 Marine Centre



User Support

User Registration & Support, Product Discovery Helpdesk, etc

EUMETCast

Traditional method of disseminating NRT data in EUMETSAT. Can involve satellite and terrestrial methods.

Online Data Access (ODA)

Rolling archive of 1 month of data supporting ftp/http access

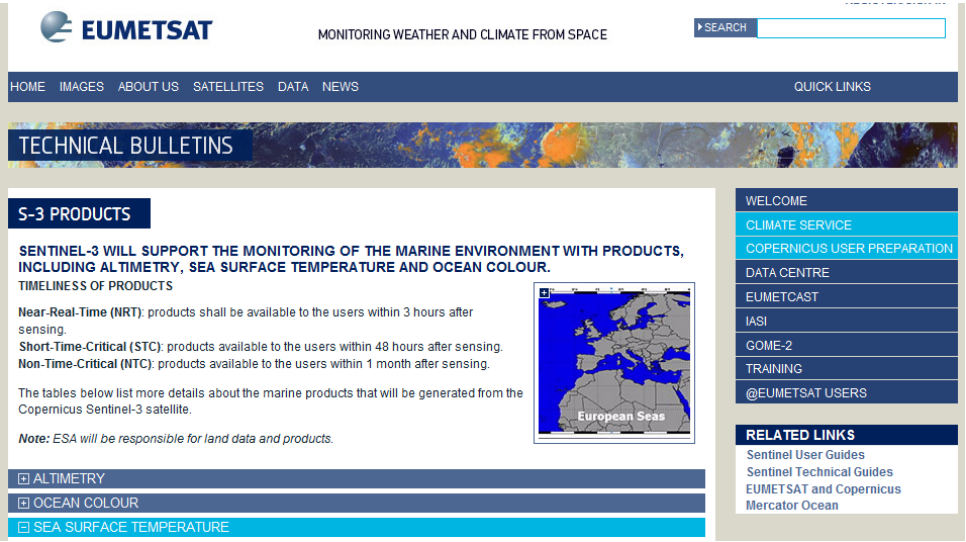
EUMETSAT Data Centre

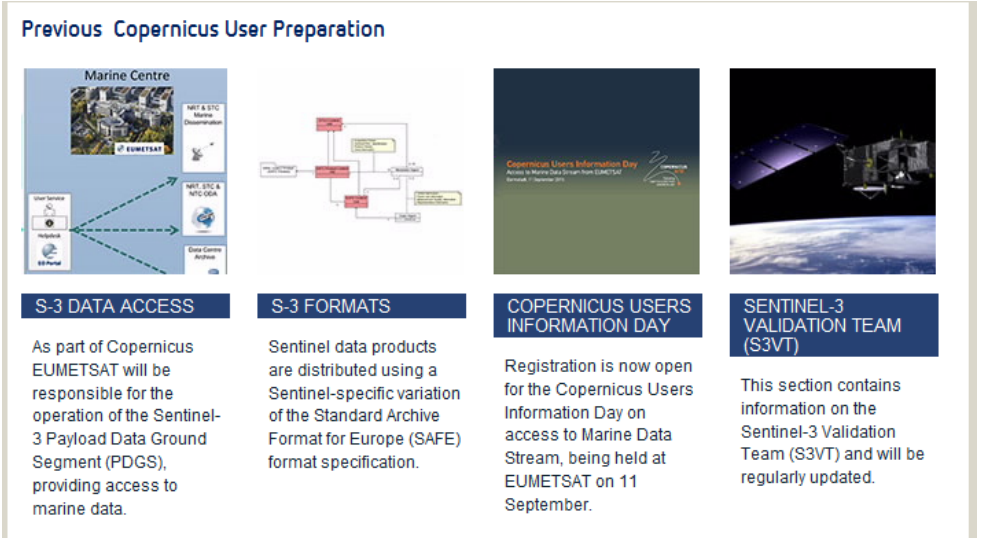
Complete historical archive of all EUMETSAT data including S-3 marine data

Sentinel-3 information from EUMETSAT

EUMETSAT pages being populated:

http://www.eumetsat.int/website/home/TechnicalBulletins/CopernicusUserPreparation/index.html



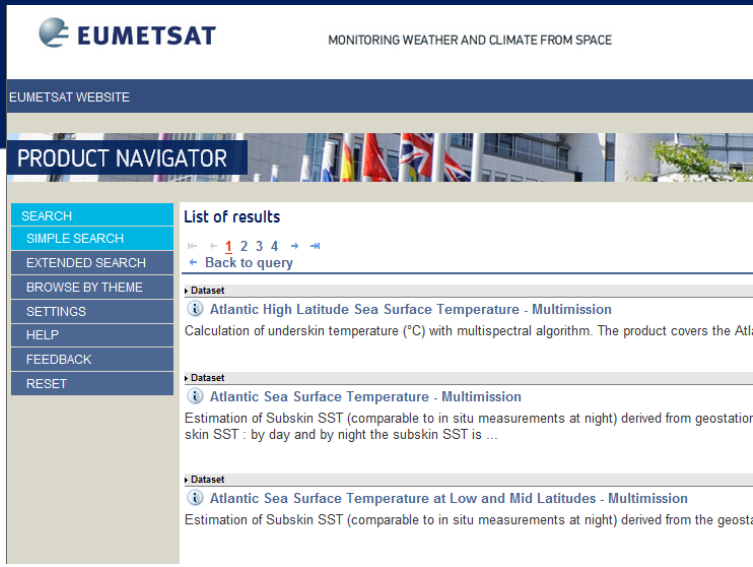


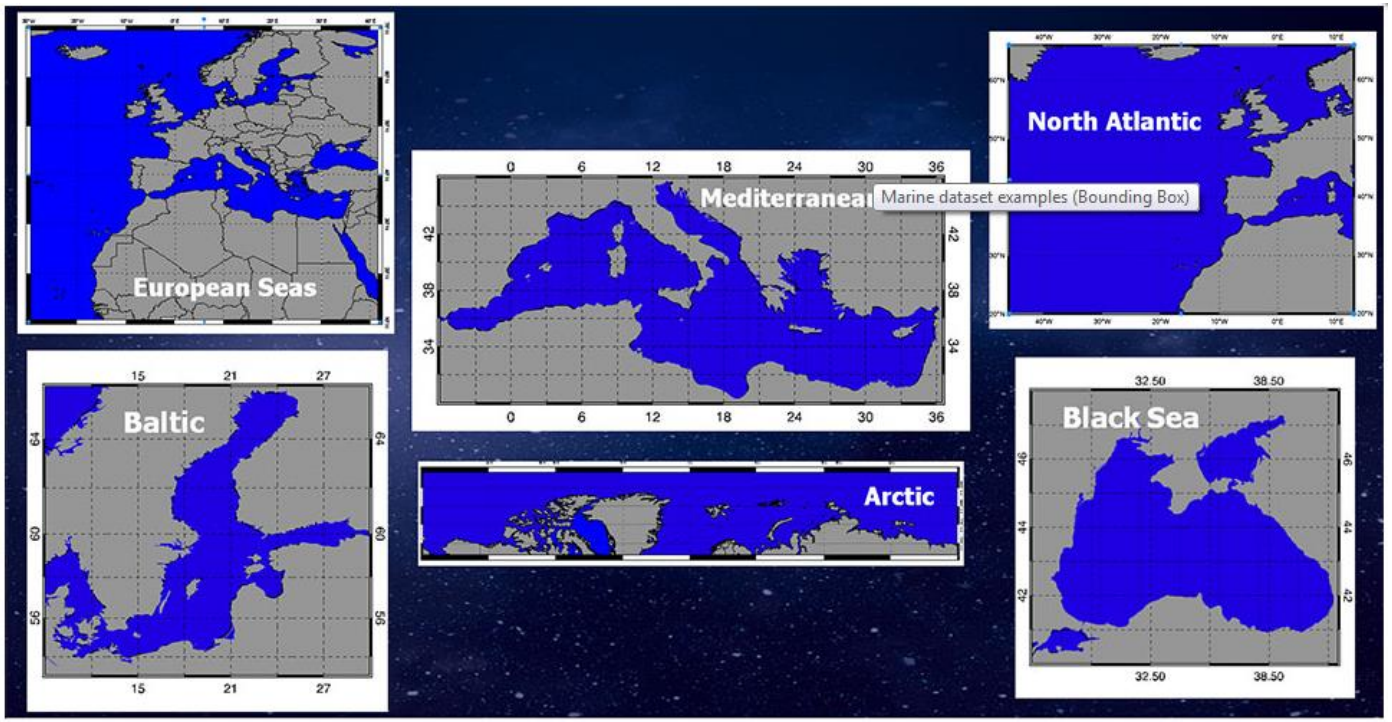
Look out for: test data sets; documentation; tools;

Quick-looks; Cal/Val monitoring analysis plots and time-series

Product navigator and “datasets”

- Global products available from EUMETCast, ODA, and/or archive
- Regional “datasets” available from ODA





Marine dataset examples (Bounding Box)

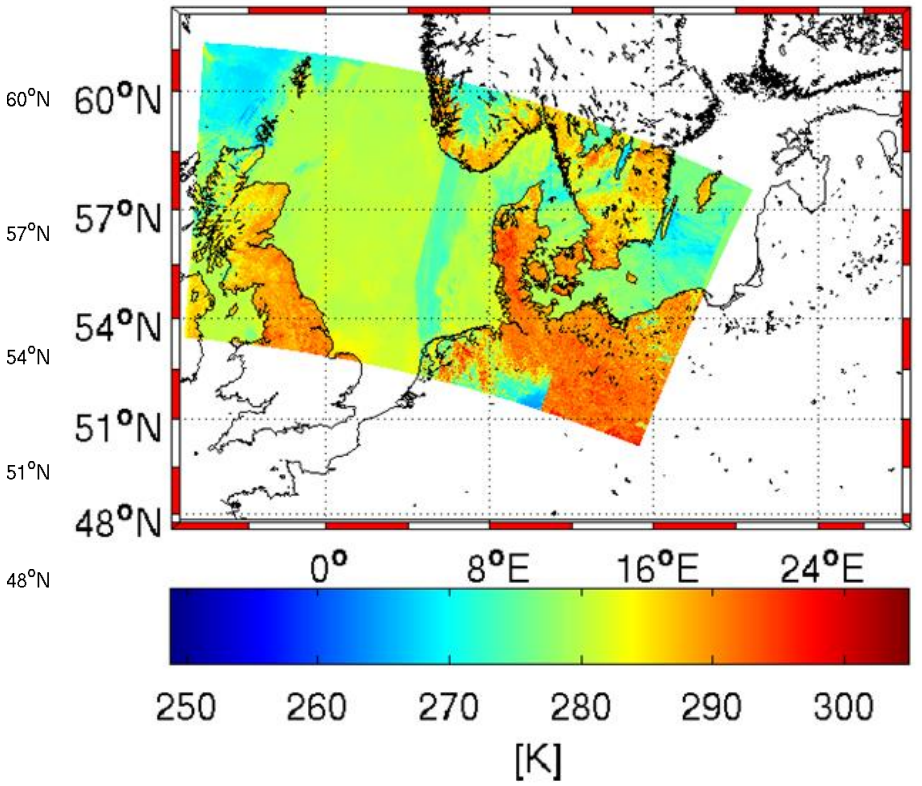
Sentinel-3 SLSTR test data overview

Three sources:

- ESA TDS -> Available soon by ftp and samples from http://sentinel.esa.int
- EUM TDS -> Available from ftp://ftp.eumetsat.int/pub/EUM/out/RSP/EUM_TDS
- 35 orbits will be processed to Level-1 and Level-2

  -> Coming soon from EUM, when processors fully integrated in ground segment

SL_1_RBT___	TDS EUM	TDS
AATSR based	Yes (based on month of data)	Yes (based on single AATSR orbit)
Duration	2 min	Orbit or 3 min
Full SLSTR swath	Yes	No (AATSR width) + missing values
Orphans	Yes	No
Duplicates, cosmetic	Yes	No
Cloud flags	Partially	Yes
Pointing flags	No	No
Extra bands	No	No

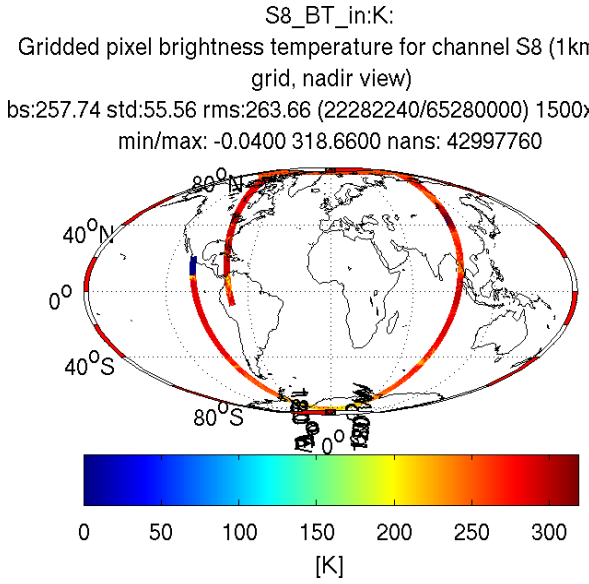


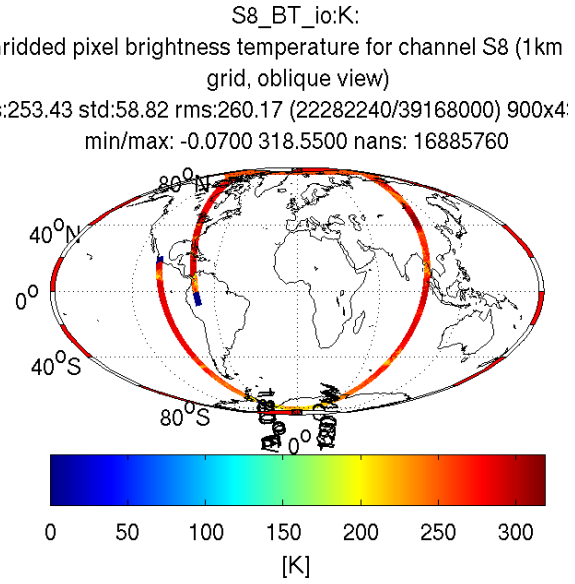
Tools available

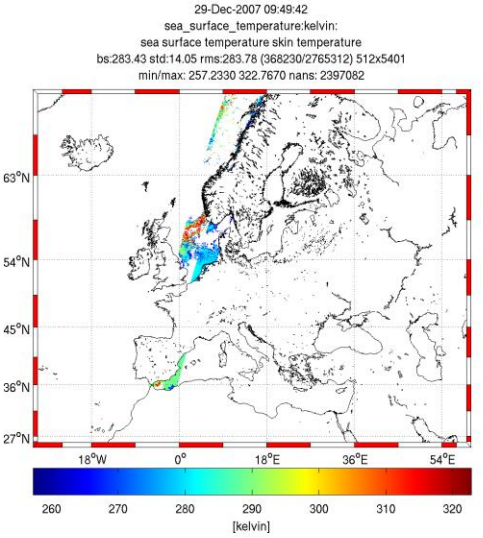
- Manifest & filename reader (available)
- Optical S3 reader in octave/matlab & python (coming soon)

-> from EUMETSAT web-page or email igor.tomazic@eumetsat.int

- Conversion of image to instrument grid (poster)
- Calculating time of every pixel (poster)
- Others available from http://sentinel.esa.int e.g.S3TBX/BEAM, Felyx...
- http://www.ifremer.fr/cerweb/docs/cerbere/







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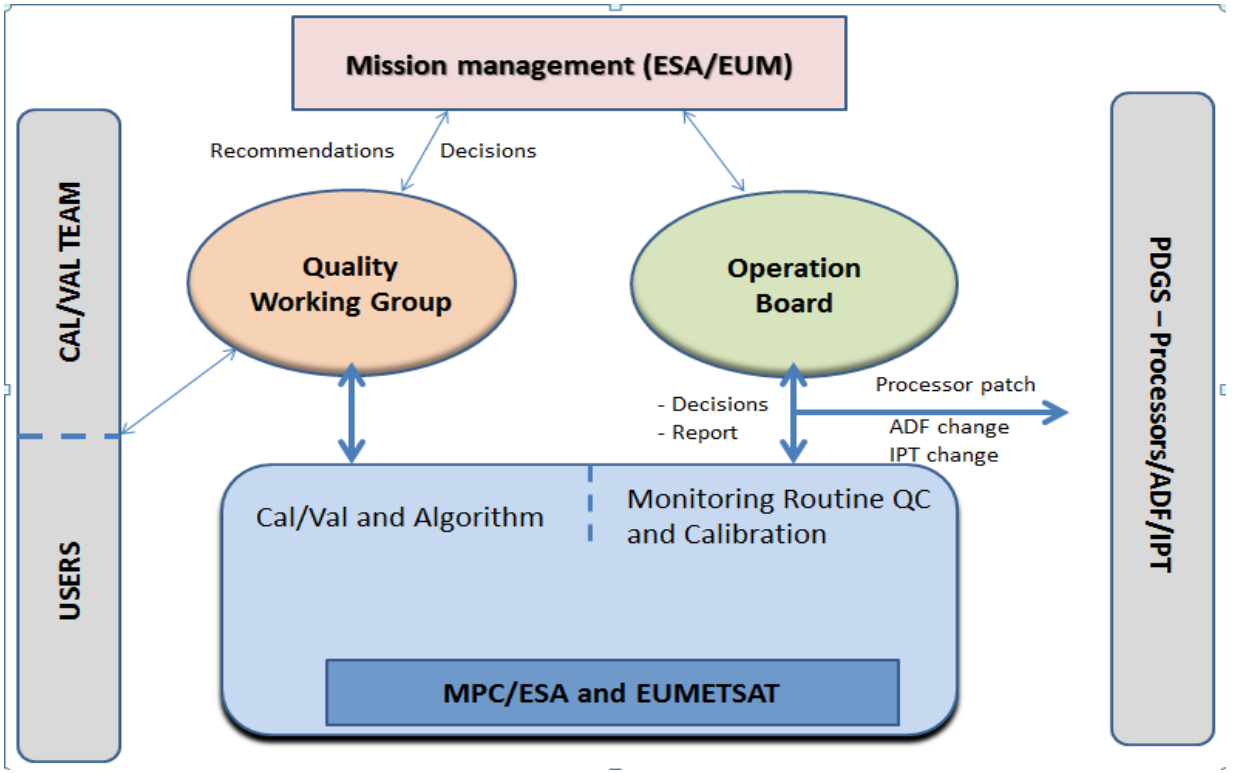
Cal/Val activities

Mission Performance Framework

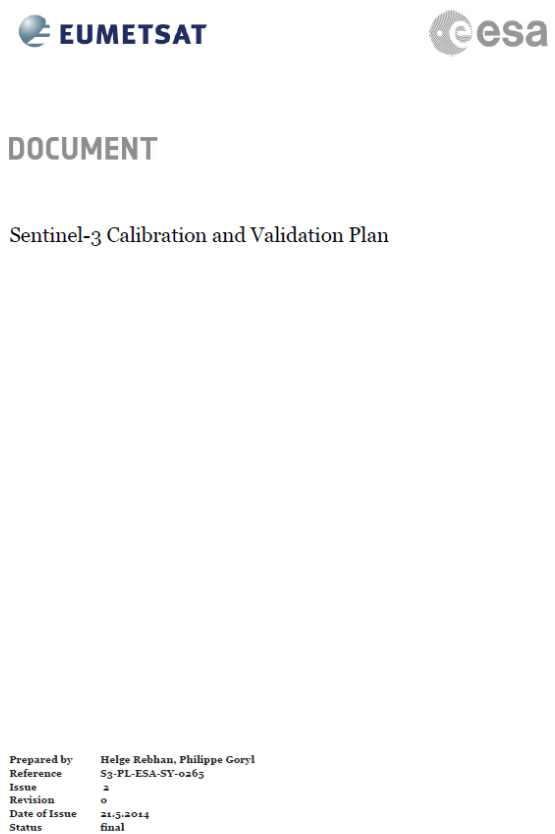


- QWGs under preparation (ESA and EUMETSAT)
- Incorporating experts from Copernicus User Community, ESA-MPC, S3VT and other relevant scientific experts and users
- To provide advice on data quality and algorithmic issues

Sentinel-3 SLSTR Cal/Val

- Operational and offline marine monitoring and validation, multi-mission approach, working together with ESA and ESA-Mission Performance Centre. Includes:
  - Mission Performance Monitoring Facility (MPMF)
  - L1 AVHRR/IASI/SLSTR NRT inter-comparisons
  - L123 tool for NRT and offline, global and regional analysis
  - OSI-SAF SLSTR MDB – NRT/NTC validation and monitoring

- Interactions with Sentinel-3 Validation Team and…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DOCUMENT

Sentinel-3 Calibration and Validation Plan

Prepared by	Helge Rebhan, Philippe Goryl
Reference	S3-PL-ESA-SY-0265
Issue	2
Revision	0
Date of Issue	21.5.2014
Status	final

The EUMETSAT Network of Satellite Application Facilities

OSI SAF
Ocean and Sea Ice

Felyx
felyx

GSICS
Global Space-based Inter-Calibration System

esa

Fiduceo

Copernicus

Sentinel-3 Validation Team for Temperature

12 groups currently participating on validation using ship-board radiometers; in situ data; analysis/ model system.

- Access to SLSTR SST data (including internal products) in NRT through EUMETSAT ODA and EUMETCast, plus archive services.

More teams always welcome, please contact: Anne.Ocarroll@eumetsat.int or Craig.Donlon@esa.int for more information on how to participate

Last meeting: http://www.eumetsat.int/website/home/News/ConferencesandEvents/DAT_2326254.html

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Evolutions

In progress:

- Bayesian/probabilistic cloud detection scheme (sea and land)
- L1 Uncertainty improvements
- Additional experimental fields: dual_nadir_sst_difference & nadir_sst_theoretical_error

Considerations (including interactions with ESA MPC, QWG, S3VT):

- Dust and volcanic aerosol flags
- Utilisation of Bayesian Cloud flags in L2P
- SSES; algorithm adjustment
- Ice edge; sea-ice cloud detection

Future possibilities:

- Tailored Lake Surface Water Temperature (with SST retrieval update)
- L2P_nadir

Any questions?