SLSTR matchup database

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Outline

- SLSTR matchup database (MDB)
  - S3VT, status, access, satellite and in situ data

- SLSTR MDB format

- Radiometer dataset: ship4sst(r1i1)

- SLSTR MDB next/evolutions

- Summary/discussion

SLSTR MDBs

- Main component in SLSTR SST validation
  - Matchups between satellite and in situ data (felyx)
  - Satellite: SLSTR-A/B, AVHRR-B, IASI-B, VIIRS-NPP
  - In situ: drifters, Argo, moored, trusted, radiometers, saildrone*

- Running (daily – 1 week delay)
  - SLSTR L1 data: 1 month rolling archive
    - Current time limit for full (L1+L2) MDB processing
  - SLSTR L2 WST/WCT available longer

- MDB access: sftp://s3calval.eumetsat.int
  - Available to Sentinel-3 Validation Team (S3VT)

Sentinel-3 Validation Team (S3VT)

- Aim:
  - "To engage world-class expertise and activities, through mutual benefit collaboration, that support the implementation of the Sentinel-3 validation activities and ensure the best possible outcomes for the Sentinel-3 mission"

- Objective:
  - "To provide independent validation evidence, experimental data and recommendations to the S3 Mission"

- S3VT sub-groups
  - Altimetry, Land, Ocean Colour, **Temperature**, Atmosphere

- SLSTR MDB is available to all Sentinel-3 Validation Team (S3VT) members
  - Existing S3VT-Temp PIs already received account (one account per PI/project)

- To become S3VT member please submit proposal (s3vt.org) and request access to SLSTR MDB
  - For more information send email to Anne.Ocarroll@eumetsat.int

Sentinel-3 Validation team - Temperature

PI	Country	Institution
Minnett Peter	USA	RSMAS
Nightingale Tim	UK	STFC
Saunders Roger	UK	Met Office
Beggs Helen	Australia	BoM
Høyer Jacob	Denmark	DMI
Mittaz Jonathan	UK	University of Reading / NPL
Wimmer Werenfrid	UK	University of Southampton
Dybkjær Gorm	Denmark	DMI
Corlett Gary	UK	University of Leicester
CMEMS	FRANCE	Mercator-Ocean
Ignatov Alexander	USA	NOAA-NESDIS
Bob Brewin	UK	PML
Aida Alvera-Azcarate	Belgium	University of Liege
Emmanuelle Autret	France	Ifremer
Harris Andrew	USA	University of Maryland

Activities range:

- Ship borne radiometers
- Drifting buoys / Argo
- Climate / NWP
- Coastal, fronts, high latitude / MIZ, lakes, new measurement techniques, calibration

MDB status: satellite data

- Near real time (NRT) (2018/04-now)
  - SLSTR-A WST NRT (+ AUX: WCT, MET, RBT i/a) (EUM)
  - SLSTR-B WST NRT (+ AUX: WCT, MET, RBT i/a) (EUM)
  - *AVHRR-B SST (internal) (OSI SAF)*
  - *IASI-B SST (internal) (OSI SAF)*
  - *VIIRS NPP SST (internal) (NOAA OSPO/v2.61)*

- Reprocessed (Aug 2016-Apr 2018)
  - SLSTR-A WST NTC (+ AUX: WCT, MET, RBT i/a) (EUM)

MDB status: In situ data

- From CMEMS:
  - Drifters (code: cmems_drifters)
  - Argo (code: cmems_argo)
  - Moored (code: cmems_moored)

- Radiometers from ISFRN:
  - ISAR, M-AERI, SISTeR
  - code: ship4sst(r1i1)

- From TRUSTED project:
  - HRSST (trusted)

- Saildrone (still in progress)
  - to be included with the next radiometer reprocessing

- Availability
  - < 1 week: drifter, Argo, moored
  - > 1 month: radiometers, saildrone (for discussion)

SLSTR MDB format (1/3)

- NetCDF4

- MDB split:
  - Satellite platform
  - Satellite data type
  - In situ type
  - Assembling period

- Satellite platform: S3A/S3B

- Satellite data types: core + 4 aux types
  - Core: WST (L2P)
  - Aux: WCT, MET, RBT-i, RBT-a

- In situ types: drifters, Argo, moored, radiometers, …

- Assembling period:
  - Drifters (in NRT):   6 h (4/day/data type)
  - All other in situ types: 1 day (1/day/data type

SLSTR-A/B SST MDB

Core: SL2 WST
- L2P variables

Aux: SL2 WCT
- L2 SST algorithms

Aux: MET
- meteorological information

Aux: RBT-i (1 km)
- L1 IR channels

Aux: RBT-a (500 m) - L1 VIS/SWIR channels

SLSTR MDB format (2/3)

- Variable names format:
  - <parent_id><variable> (e.g. "s3a_sl_2_wst____o_nr__lat")
  - <parent_id> is always the same (core product name)

- Extracts are all 21x21 or 401x401 (ship4sstr1i1) pixels in size for i-grid
  - a-grid (500 m) is twice the size (42x42)
  - exception is MET/ECMWF data
    - only TCWV is provided for full extract
    - all other variables are centre pixel (i-grid) only

SLSTR MDB format (3/3)

- Tie-point grid variables (e.g. MET data and solar/satellite angles) provided only for i-grid

- Not all fields from WCT and RBT are provided – only key fields specified by EUM

- Note: Added new radiometer variables
  - see backup slides for the full list of radiometer variables

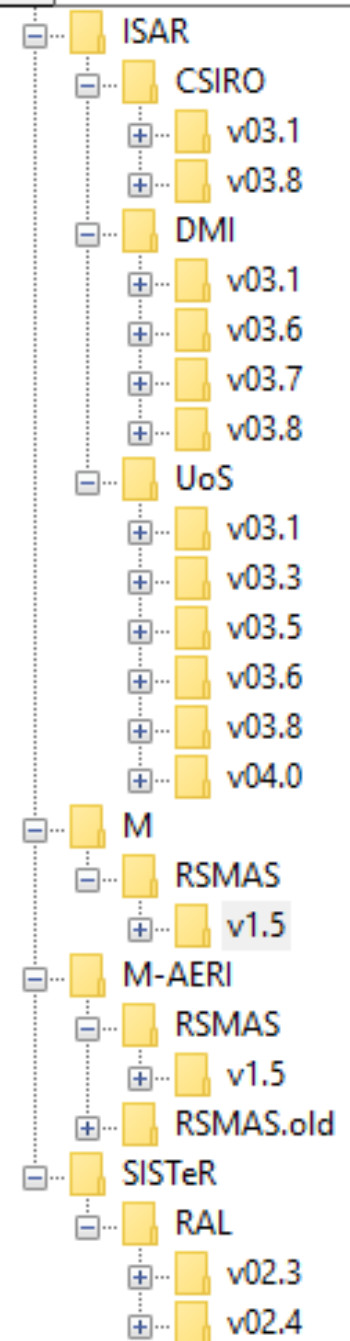- Note: MDB product format specification is (still) in preparation

Radiometer dataset: ship4sst(r1i1)

- Revised radiometer dataset (ship4sstr1i1)
  - New radiometer dataset version "ship4sstr1i1"
    - Selected the latest available processor version
  - Added new in situ radiometer fields (backup slide)
  - Fix in felyx for names with forward slash (e.g R/V) (backup slide)
  - Processed
    - Repro MDB: 2016/04-2018/04 (full)
    - NRT MDB: 2018/04 – 2018/12 (S3A)
  - In progress/next:
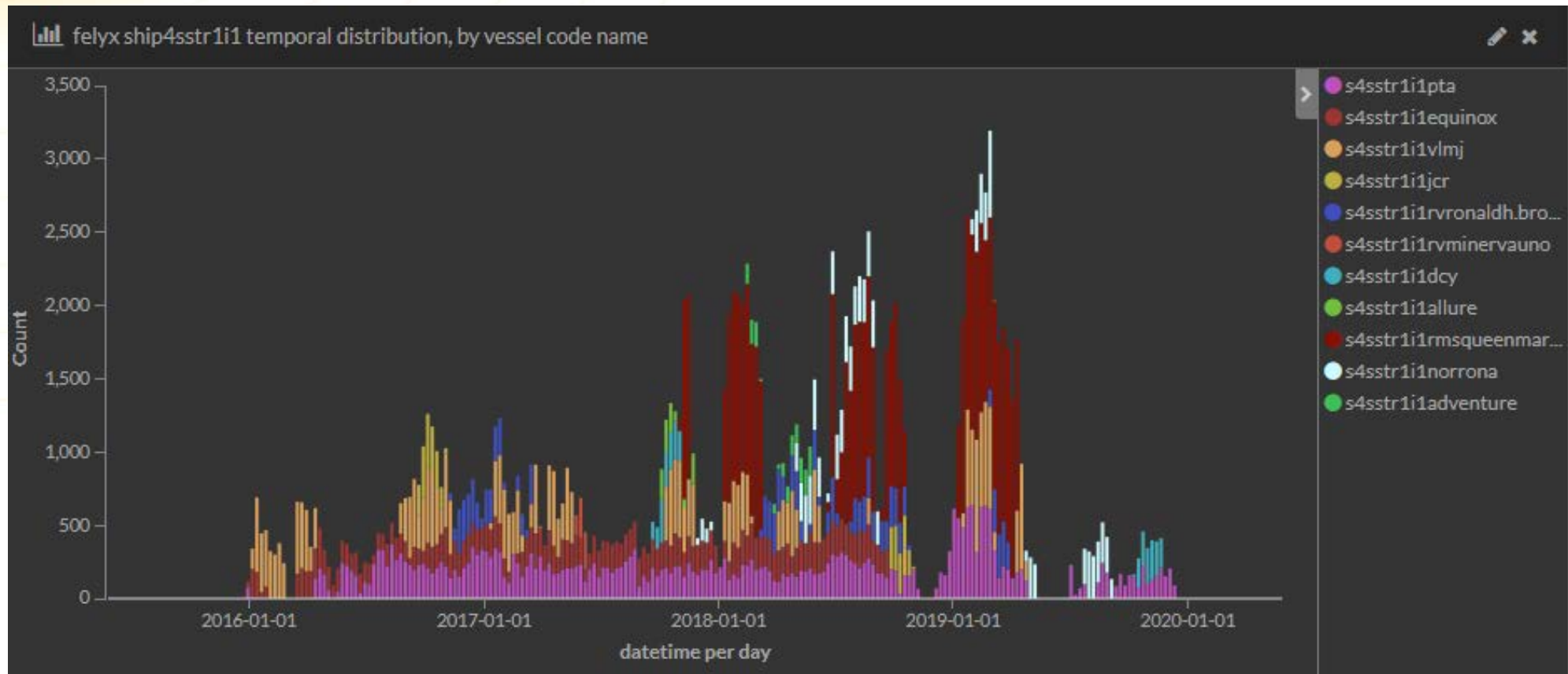   - Full 2019 SLSTR SST MDB (core + aux: WCT/MET)

Ship4sst(r1i1) version

- 'SISTeR/RAL/v02.3/2017/'
- 'SISTeR/RAL/v02.4/2018/'
- 'SISTeR/RAL/v02.4/2019/'

- 'ISAR/UoS/v03.8/2016/'
- 'ISAR/UoS/v03.8/2017/'
- 'ISAR/UoS/v03.8/2018/'
- 'ISAR/UoS/v04.0/2018/'
- 'ISAR/UoS/v04.0/2019/'

- 'ISAR/CSIRO/v03.1/2016/'
- 'ISAR/CSIRO/v03.1/2017/'
- 'ISAR/CSIRO/v03.8/2018/'
- 'ISAR/CSIRO/v03.8/2019/'

- 'ISAR/DMI/v03.1/2017/'
- 'ISAR/DMI/v03.7/2017/'
- 'ISAR/DMI/v03.6/2018/'
- 'ISAR/DMI/v03.8/2018/'
- 'ISAR/DMI/v03.8/2019/'

- 'M/RSMAS/v1.5/2016/'
- 'M/RSMAS/v1.5/2017/'
- 'M/RSMAS/v1.5/2018/'
- 'M/RSMAS/v1.5/2019/'

- 8 versions: **v1.5, v02.3, v02.4, v03.1, v03.6, v03.7, v03.8, v04.0**
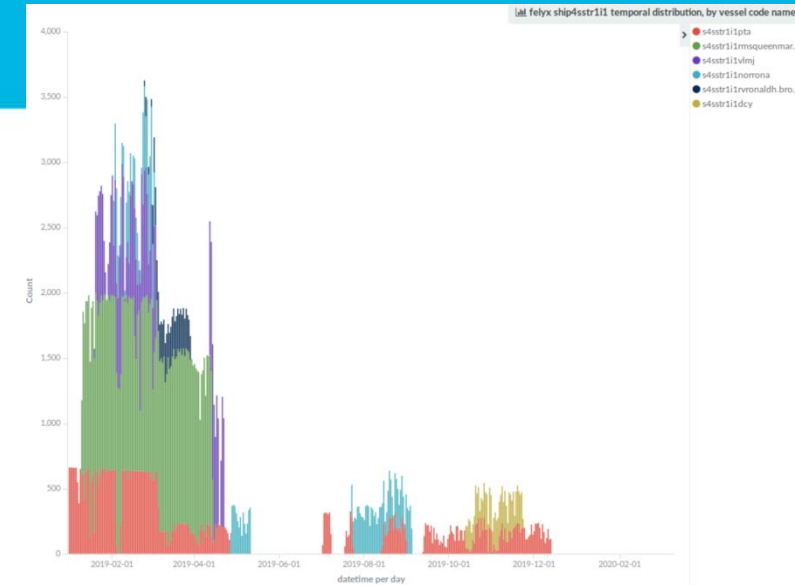
Many different versions

Ship4sstr1i1: grouped by vessel

Next + evolutions

In progress (Q4/2020):
- Radiometers: process 01/2019 – today
  - Only ISAR from 04/2019-
  - Include saildrone
- MDB format specification (TEN) + product notice (for changes)
- GHRSST MDB TaskTeam
- Preparation of TRUSTED-MDB (→ Sep/Oct 2020)
  - To share with S3VT and interested GHRSST participants
  - TRUSTED / HRSST international review workshop: 2-4th March 2021, Meteo-France, Paris.

Early next year (>> 1 month):
- MDB in S3A early commissioning (05-07/2016)
- S3A/S3B tandem phase (for S3B) – all in situ types
- RTM (RTTOV) and FKC (SST adjustments)

Long term (> 1 y)
- improving MDB reliability and robustness, monitoring
- Simplify installation and maintenance

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Summary

- Consistent MDB between **SLSTR-A/B (L1/L2)**, AVHRR-B, IASI-B, VIIRS-NPP (exp) and drifters, Argo, moored, radiometers, (saildrone)

- Updated and consolidated SLSTR MDB format
  - Split by platform/data type/in situ type/assembling time
  - Data type split: Core WST + AUX: WCT, MET, RBT-i, RBT-a
  - Repro: 04/2016 – 04/2018
  - NRT: 04/2018 - onwards

- Ship4sstr1i1 radiometers:
  - Reprocessed 04/2016-04/2018 (NTC) + 04/2018-12/2018 (NRT)
  - In progress: 2019-

- Changed ftp to sftp (s3calval.eumetsat.int) + MDB migration

- Fixed issues (but only radiometers are reprocessed)

- Open issues for discussion: processor versions, naming convention, data availability

Discussion: radiometer datasets

- **Different processor versions**
  - 8 versions: **v1.5, v02.3, v02.4, v03.1, v03.6, v03.7, v03.8, v04.0**
    - Is it possible to have it more consistent?
  - Currently not possible to reprocess MDB only for single radiometer version
    - Also, not convenient to reprocess full radiometer MDB if one radiometer dataset was updated
  - *For discussion*: Version consistency

- **Naming conventions in MDB processing/reprocessing**
  - MDB (currently) not designed to have different versions of the same in situ types → new version of the same in situ type needs new name (→ e.g. ship4sstr1i1)
  - *For discussion*: issue new revision number for each full reprocessing

- **Data availability**
  - Radiometers: > 1 month or more
  - SLSTR L2 SST: All
  - SLSTR L1 < 1 month: No L1 data in radiometer MDB
  - *For discussion*: Process only SLSTR MDB core + aux: WCT/MET (no RBT-i/a) with new radiometer data (e.g. once per year?!); full SLSTR ship4sst MDB (with L1 RBT-i/a) when SLSTR L1/SST is reprocessed

Thank you!

Backup slide: List of radiometer variables

- "air_near_surface_mean_uncertainty"
- "air_near_surface_standard_deviation"
- "air_near_surface_temperature"
- "ambient_blackbody_temperature"
- "course_over_ground"
- "day_of_year"
- "distance_to_land"
- "julian_day"
- "Latitude"
- "Longitude"
- "platform_azimuth_angle"
- "platform_azimuth_angle_stdev"
- "platform_pitch_angle"
- "platform_pitch_angle_stdev"
- "platform_roll_angle"
- "platform_roll_angle_stdev"
- "quality_level"
- "sea_surface_temperature"
- "sky_brightness_temperature"
- "sky_nadir_angle"
- "solar_azimuth_angle"
- "solar_azimuth_angle_isar"
- "solar_zenith_angle"
- "speed_over_ground"
- "sst_flags"
- "sst_instrument_uncertainty"
- "sst_mean_uncertainty"
- "sst_measurement_uncertainty"
- "sst_random_uncertainty"
- "sst_standard_deviation"
- "sst_systematic_uncertainty"
- "sst_total_uncertainty"
- "surface_brightness_temperature"
- "Time"
- "view_azimuth_angle"
- "view_nadir_angle"

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- Platform names with forward slash (fixed)
  - Only issue for some ship radiometers
    - E.g. R/V Ronald H. Brown, R/V Minerva Uno
  - Reprocessed radiometers for 2016-2018

table - ship4sst, by vessel **ship4sst**		table - ship4sstr1, by v **ship4sstr1**		table - ship4sstr1i1, by vessel **ship4sstr1i1** ×	
site_code: Descending ⇕ Q	Count ⇕	site_code: Descending ⇕ Q	Count ⇕	site_code: Descending ⇕ Q	Count ⇕
s4sstPtA	264,132	s4sstr1RMSQueenMary2	316,588	s4sstr1i1RMSQueenMary2	316,588
s4sstRMSQueenMary2	226,465	s4sstr1PtA	219,083	s4sstr1i1PtA	219,083
s4sstAllure	204,714	s4sstr1VLMJ	176,697	s4sstr1i1VLMJ	176,697
s4sstVLMJ	170,352	s4sstr1Equinox	165,346	s4sstr1i1Equinox	165,346
s4sstEquinox	132,670	s4sstr1R/VRonaldH.Brown	68,425	s4sstr1i1RVRonaldH.Brown	68,425
s4sstR/VRonaldH.Brown	60,030	s4sstr1Norrona	43,203	s4sstr1i1Norrona	43,203
s4sstRonald_H._Brown	60,030	s4sstr1Adventure	11,171	s4sstr1i1Adventure	11,171
s4sstRonaldH.Brown	38,354	s4sstr1DCY	10,692	s4sstr1i1DCY	10,692
s4sstNorrona	25,392	s4sstr1JCR	8,712	s4sstr1i1JCR	8,271
s4sstAdventure	11,518	s4sstr1Allure	6,702	s4sstr1i1Allure	6,702
s4sstDCY	10,692	s4sstr1R/VMinervaUno	4,611	s4sstr1i1RVMinervaUno	4,611
s4sstJCR	9,108	s4sstr1RVMinervaUno	2,401		
s4sstMinerva_Uno	4,611				
s4sstR/VMinervaUno	4,611				

Backup slide: Example of SLSTR core NRT MDB (one day)

- Radiometers: 1 per day/per sensor
- 1 core + 4 aux files

Core:
s3a_sl_2_wst____r_nt_006_ship4sstr1i1_20180401000000_20180402000000.nc

Aux:
s3a_sl_2_wst____r_nt_006_ship4sstr1i1_aux_met_20180401000000_20180402000000.nc
s3a_sl_2_wst____r_nt_006_ship4sstr1i1_aux_rbt-a_20180401000000_20180402000000.nc
s3a_sl_2_wst____r_nt_006_ship4sstr1i1_aux_rbt-i_20180401000000_20180402000000.nc
s3a_sl_2_wst____r_nt_006_ship4sstr1i1_aux_wct_20180401000000_20180402000000.nc