Half-Yearly Operations Report

1st half 2022

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Prepared by Météo-France, Ifremer, MET Norway, DMI and KNMI

Document Change record

Document version	Date	Author	Change description
0.1	04/07/2022	CH	
0.2	08/2022	CH	
1.0	25/08/2022	CH	First released version. HL IST/SST based on Metop (OSI-205-a) and medium resolution sea ice drift (OSI-407-a) will be added later.
1.1	12/10/2022	CH	Comments added for GEO SSI Results for HL IST/SST based on Metop (OSI-205-a) added Results for medium resolution sea ice drift (OSI-407-a) added

Table of contents

1. Introduction

1.1. Scope of the document

The present report covers from 1st of January to 30th June 2022.

The objective of this document is to provide EUMETSAT and users, in complement with the web site http://osi-saf.eumetsat.int, an overview on OSI SAF products availability and quality, main anomalies and events, product usage, users' feedback, and updated available documentation.

- Low and Mid latitude (LML) Centre (Sub-System 1, SS1), under Météo-France responsibility, processes and distributes the SST and Radiative Fluxes products covering LML, North Atlantic Regional (NAR) and Global areas. Ifremer contributes to the products distribution and archiving,
- High Latitude (HL) Centre (Sub-System 2, SS2), under MET Norway responsibility with the co-operation of DMI, processes and distributes the Global Sea Ice products, the High Latitude SST and the High Latitude Radiative Fluxes,
- Wind Centre (Sub-System 3, SS3), under KNMI responsibility, processes and distributes the Wind products.

1.2. Products characteristics

The characteristics of the current products are specified in the Service Specification (SeSp) Document [AD.1] available on http://osi-saf.eumetsat.int, the OSI SAF web site.

Three values are usually available for accuracy requirements, for each product:
- The threshold accuracy is the minimum acceptable
- The target (or breakthrough) accuracy is the desired performance level
- The optimal accuracy

In this report, the product performance is compared to the target accuracy. If the values do not meet the target accuracy but are compliant to the threshold accuracy, it is considered useful to distribute the product anyway.

According to OSI-SS-GEN-101 in SeSp [AD.1], operational OSI SAF products accuracy should be better than the value specified as threshold accuracy in the products tables when input satellite data are available with the nominal level of quality (on monthly basis).

1.3. Applicable documents

[AD.1] OSI SAF
Service Specification (SeSp)
SAF/OSI/CDOP3/MF/MGT/PL/003, version 1.12, 31/12/2021

1.4. Reference documents

[RD.1] ASCAT Wind Product User Manual
OSI-102, OSI-102-b, OSI-102-c, OSI-103 (discontinued), OSI-104, 0SI-104-b, 0SI-104-c
SAF/OSI/CDOP/KNMI/TEC/MA/126

[RD.2] RapidScat Wind Product User Manual
OSI-109 (discontinued)
SAF/OSI/CDOP2/KNMI/TEC/MA/227

[RD.3] ScatSat-1 wind Product User Manual
OSI-112-a, OSI-112-b
SAF/OSI/CDOP2/KNMI/TEC/MA/287

[RD.4] EUMETSAT OSI SAF
Product User Manual (PUM) for the HY-2 winds
OSI-114-a, OSI-114-b, OSI-115-a, OSI-115-b
SAF/OSI/CDOP3/KNMI/TEC/MA/392

[RD.5] ASCAT L2 winds Data Record Product User Manual
OSI-150-a, OSI-150-b
SAF/OSI/CDOP2/KNMI/TEC/MA/238

[RD.6] Reprocessed SeaWinds L2 winds Product User Manual
OSI-151-a, OSI-151-b
SAF/OSI/CDOP2/KNMI/TEC/MA/220

[RD.7] ERS L2 winds Data Record Product User Manual
OSI-152
SAF/OSI/CDOP2/KNMI/TEC/MA/279

[RD.8] Oceansat-2 L2 winds Data Record Product User Manual
OSI-153-a, OSI-153-b
SAF/OSI/CDOP3/KNMI/TEC/MA/297

[RD.9] Low Earth Orbiter Sea Surface Temperature Product User Manual
OSI-201-b, OSI-202-b, OSI-204-b, OSI-204-c, OSI-208-b
SAF/OSI/CDOP3/MF/TEC/MA/127

[RD.10]Northern High Latitude L3 Sea and Sea Ice Surface Temperature Product User Manual
OSI-203-a, OSI-203-b
SAF/OSI/CDOP3/met.no/TEC/MA/115

[RD.11]High Latitudes L2 Sea and Sea Ice Surface Temperature Product User Manual
OSI-205-a, OSI-205-b
SAF/OSI/CDOP3/DMI/TEC/MA/246

[RD.12]Geostationary Sea Surface Temperature Product User Manual
OSI-206-a, OSI-207-b, OSI-IO-SST
SAF/OSI/CDOP3/MF/TEC/MA/181

[RD.13]Product User Manual for Atlantic High Latitudes level 3 Radiative Flux products
OSI-301-b, OSI-302-b
SAF/OSI/CDOP3/MET-Norway/TEC/MA/373

[RD.14]MSG/SEVIRI Sea Surface Temperature data record Product User Manual
OSI-250
SAF/OSI/CDOP3/MF/TEC/MA/309

[RD.15]Geostationary Radiative Flux Product User Manual
OSI-303-a, OSI-304-a, OSI-305-b, OSI-306-b, OSI-IO-DLI, OSI-IO-SSI
SAF/OSI/CDOP3/MF/TEC/MA/182

[RD.16]Product User Manual for OSI SAF Global Sea Ice Concentration
OSI-401-b
SAF/OSI/CDOP3/DMI_MET/TEC/MA/204

[RD.17]Global Sea Ice Edge and Type Product User's Manual
OSI-402-d, OSI-403-d
SAF/OSI/CDOP2/MET-Norway/TEC/MA/205

[RD.18]50 Ghz Sea Ice Emissivity Product User Manual
OSI-404-a
SAF/OSI/CDOP3/DMI/TEC/MA/191

[RD.19]Low Resolution Sea Ice Drift Product User's Manual
OSI-405-c
SAF/OSI/CDOP/met.no/TEC/MA/128

[RD.20]Medium Resolution Sea Ice Drift Product User Manual
OSI-407-a
SAF/OSI/CDOP/DMI/TEC/MA/137

[RD.21]Product User Manual for the OSI SAF AMSR-2 Global Sea Ice Concentration
OSI-408
SAF/OSI/CDOP2/DMI/TEC/265

[RD.22]EUMETSAT OSI SAF
Product User Manual for the Global Sea Ice Concentration Level 2
OSI-410
SAF/OSI/CDOP3/DMI/TEC/377

[RD.23]Global Sea Ice Concentration Reprocessing Product User Manual
OSI-409, OSI-409-a, OSI-430
SAF/OSI/CDOP3/MET-Norway/TEC/MA/138

[RD.24]Global Sea Ice Concentration Climate Data Record Product User Manual
OSI-450, OSI-430-b
SAF/OSI/CDOP2/MET/TEC/MA/288

1.5. Definitions, acronyms and abbreviations

AHL	Atlantic High Latitude
ASCAT	Advanced SCATterometer
AVHRR	Advanced Very High Resolution Radiometer
BUFR	Binary Universal Format Representation
CDOP	Continuous Development and Operations Phase
CMEMS	Copernicus Marine Environment Monitoring Service
CMS	Centre de Météorologie Spatiale (Météo-France)
DLI	Downward Long wave Irradiance
DMI	Danish Meteorological Institute
DMSP	Defense Meteorological Satellite Program
ECMWF	European Centre for Medium range Weather Forecasts
EDC	EUMETSAT Data Centre
EPS	European Polar System
FTP	File Transfer Protocol
GBL	Global oceans
GOES	Geostationary Operational Environmental Satellite
GOES-E	GOES-East, nominal GOES at 75°W
GRIB	GRIdded Binary format
GTS	Global Transmission System
HIRLAM	High Resolution Limited Area Model
HL	High Latitude
HRIT	High Rate Information Transmission
Ifremer	Institut Français de Recherche pour l'Exploitation de la MER
KNMI	Koninklijk Nederlands Meteorologisch Instituut
LEO	Low Earth Orbiter
LML	Low and Mid Latitude
MAP	Merged Atlantic Product
MET	Nominal Meteosat at 0° longitude
MET Norway or MET	Norwegian Meteorological Institute
Metop	METeorological OPerational Satellite
MF	Météo-France
MGR	Meta-GRanule
MSG	Meteosat Second Generation
NAR	Northern Atlantic and Regional
NESDIS	National Environmental Satellite, Data and Information Service
NetCDF	Network Common Data Form
NMS	National Meteorological Service
NOAA	National Oceanic and Atmospheric Administration
NPP	NPOESS Preparatory Project
NPOESS	National Polar-orbiting Operational Environmental Satellite System

NRT	Near Real-Time
NWP	Numerical Weather Prediction
NIC	National Ice Center (USA)
OSI SAF	Ocean and Sea Ice SAF
R&D	Research and Development
RMDCN	Regional Meteorological Data Communication Network
RMS	Root-Mean-Squared
RSD	Robust Standard Deviation
SAF	Satellite Application Facility
SD	Standard Deviation
SEVIRI	Spinning Enhanced Visible and Infra-Red Imager
SSI	Surface Short wave Irradiance
SSMI	Special Sensor Microwave Imager
SSMIS	Special Sensor Microwave Imager and Sounder
SST/IST	Sea Surface Temperature/ sea Ice Surface Temperature
SST	Sea Surface Temperature
TBC	To Be Confirmed
TBD	To Be Defined
WMO	World Meteorological Organisation

2. OSI SAF products availability and timeliness

As indicated in the Service Specification Document [AD-1], operational OSI SAF products are expected to be available for distribution within the specified time in more than **95%** of the cases where input satellite data are available with the nominal level of quality, on monthly basis.
Section 2.1 shows the measured availability on the OSI SAF FTP servers.
Section 2.2 shows the measured availability via EUMETCast.
The dissemination of the OSI SAF products via EUMETCast implies an additional step, not under the strict OSI SAF responsibility, but general EUMETSAT's one.

Note: The timeliness of the wind products on the KNMI FTP server is not measured separately and therefore the figures in table 2 are copied from table 3 for the wind products. Since the EUMETCast transmission is known to add only a very small delay to the timeliness, the availabilities on the KNMI FTP server are very close to or slightly better than the figures measured via EUMETCast.

The measured availability of the Global **Sea Ice concentration (resp. edge, type)** products corresponds to the situation when a product file is provided within 5 hours, whatever if there are input data or not. The sea ice type is the last product being produced, therefore the most likely to be outside this 5 hour spec.

Please find in section 3 comments on the tables included in section 2.1 and 2.2.

2.1. Availability on FTP servers

Ref.	Product	JAN 2022	FEB 2022	MAR 2022	APR 2022	MAY 2022	JUN 2022
OSI-102-b	ASCAT-B 25 km wind	100	100	100	100	100	100
OSI-102-c	ASCAT-C 25 km wind	100	100	100	100	99.9	100
OSI-104-b	ASCAT-B Coastal wind	99.9	100	99.9	99.9	99.9	99.9
OSI-104-c	ASCAT-C Coastal wind	99.7	99.6	99.6	99.6	99.5	99.6
OSI-114-a	HY-2B 25 km wind vectors	99.8	99.2	94.0	96.5	98.7	97.7
OSI-114-b	HY-2B 50 km wind vectors	99.8	99.2	94.3	96.5	98.2	98.0
OSI-115-a	HY-2C 25 km wind vectors	98.8	99.2	98.8	99.0	98.8	96.1
OSI-115-b	HY-2C 50 km wind vectors	98.8	99.2	98.8	99.0	98.8	96.1
OSI-201-b	GBL SST	95.2	98.2	100	100	100	100
OSI-202-b	NAR SST	98.4	98.2	100	100	99.2	100
OSI-203-a	NHL SST/IST (L3)	98.0	98.2	100	100	100	100
OSI-203-b	NHL SST/IST (L3)	98.0	98.2	100	100	100	100
OSI-204-b	MGR SST (Metop-B)	63.1	98.8	99.8	99.9	100	100
OSI-204-c	MGR SST (Metop-C)	99.7	98.6	98.7	100	99.8	100
OSI-205-a	SST/IST (L2)	98.7	100	100	100	99.9	100
OSI-205-b	SST/IST (L2)	97.1	99.7	98.2	97.5	100	98.6
OSI-206-a	Meteosat SST	97.3	98.4	99.7	100	100	100
OSI-207-b	GOES-East SST	89.2	98.5	100	99.9	99.7	100
OSI-208-b	IASI SST	89.6	98.2	99.9	99.9	99.8	100
OSI-301-b OSI-302-b	AHL DLI + SSI	100	96.4	100	100	100	100
OSI-303-a	Meteosat DLI - hourly	98.8	98.4	99.9	99.9	100	100
	Meteosat DLI - daily	96.8	100	100	100	100	100
OSI-304-a	Meteosat SSI - hourly	98.8	98.4	99.9	99.9	100	100
	Meteosat SSI - daily	96.8	100	100	100	100	100
OSI-305-b	GOES-East DLI - hourly	99.5	98.4	99.9	99.9	100	100
	GOES-East DLI - daily	100	100	100	100	100	100
OSI-306-b	GOES-East SSI - hourly	99.5	98.4	99.9	99.9	100	100
	GOES-East SSI - daily	100	100	100	100	100	100
OSI-401-b	Global Sea Ice Concentration (SSMIS)	100	100	100	100	100	100
OSI-402-d	Global Sea Ice Edge	100	100	100	100	100	100
OSI-403-d	Global Sea Ice Type	100	100	100	100	100	100
OSI-404-a	Global Sea Ice Emissivity	100	100	100	100	100	100
OSI-405-c	Low Res. Sea Ice Drift	100	100	100	100	100	100
OSI-407-a	Medium Res. Sea Ice Drift	97.6	99.1	99.2	100	99.2	99.2
OSI-408	Global Sea Ice Concentration (AMSR-2)	100	100	100	100	100	100
OSI-410	Level 2 PMW sea ice concentration	98.8	97.8	95.1	98.2	98.1	99.8
OSI-430-a	Global Reproc Sea Ice Conc Updates	93.5	100	100	100	100	100

Table 1: Percentage of OSI SAF products available on the OSI SAF FTP servers within the specified time over 1st half 2022.

2.2. Availability via EUMETCast

Ref.	Product	JAN 2022	FEB 2022	MAR 2022	APR 2022	MAY 2022	JUN 2022
OSI-102-b	ASCAT-B 25 km wind	100	100	100	100	100	100
OSI-102-c	ASCAT-C 25 km wind	100	100	100	100	99.9	100
OSI-104-b	ASCAT-B Coastal wind	99.9	100	99.9	99.9	99.9	99.9
OSI-104-c	ASCAT-C Coastal wind	99.7	99.6	99.6	99.6	99.5	99.6
OSI-114-a	HY-2B 25 km wind vectors	99.8	99.2	94.0	96.5	98.7	97.7
OSI-114-b	HY-2B 50 km wind vectors	99.8	99.2	94.3	96.5	98.2	98.0
OSI-115-a	HY-2C 25 km wind vectors	98.8	99.2	98.8	99.0	98.8	96.1
OSI-115-b	HY-2C 50 km wind vectors	98.8	99.2	98.8	99.0	98.8	96.1
OSI-201-b	GBL SST	96.8	100	100	100	100	100
OSI-202-b	NAR SST	98.4	100	100	100	99.2	100
OSI-203-a	NHL SST/IST (L3)	100	98.2	100	100	100	100
OSI-203-b	NHL SST/IST (L3)	100	98.2	100	100	100	100
OSI-204-b	MGR SST (Metop-B)	97.4	99.7	99.9	100	99.9	100
OSI-204-c	MGR SST (Metop-C)	Not distributed on EUMETCast					
OSI-205-a	SST/IST (L2)	100	100	99.8	100	100	99.9
OSI-205-b	SST/IST (L2)	99.3	99.2	96.6	97.5	99.5	97.2
OSI-206-a	Meteosat SST	100	99.7	100	99.9	100	100
OSI-207-b	GOES-East SST	99.3	100	100	100	99.9	100
OSI-208-b	IASI SST	99.7	100	100	99.9	99.8	100
OSI-301-b OSI-302-b	AHL DLI + SSI	100	96.4	96.8	100	100	100
OSI-303-a	Meteosat DLI - hourly	100	99.9	100	100	99.9	100
	Meteosat DLI - daily	96.8	100	100	100	100	100
OSI-304-a	Meteosat SSI - hourly	100	99.9	100	100	99.9	100
	Meteosat SSI - daily	96.8	100	100	100	100	100
OSI-305-b	GOES-East DLI - hourly	100	100	100	100	99.9	100
	GOES-East DLI - daily	100	100	100	100	100	100
OSI-306-b	GOES-East SSI - hourly	100	100	100	100	99.9	100
	GOES-East SSI - daily	100	100	100	100	100	100
OSI-401-b	Global Sea Ice Concentration (SSMIS)	100	100	100	100	100	100
OSI-402-d	Global Sea Ice Edge	100	100	96.8	100	100	100
OSI-403-d	Global Sea Ice Type	100	100	96.8	100	100	100
OSI-404-a	Global Sea Ice Emissivity	100	100	100	100	100	100
OSI-405-c	Low Res. Sea Ice Drift	100	100	96.8	100	100	100
OSI-407-a	Medium Res. Sea Ice Drift	99.2	99.1	99.2	100	99.2	99.2
OSI-408	Global Sea Ice Concentration (AMSR-2)	100	100	100	100	100	100
OSI-410	Level 2 PMW sea ice concentration	98.8	98.0	95.2	98.2	99.7	99.8

Table 2: Percentage of OSI SAF products delivered via EUMETCast within the specified time over 1st half 2022.

Comments on the values below 95% in Tables 1 and 2:
Frequent outages and delays occur in the provision of HY-2B and HY-2C input data by the Chinese National Satellite Ocean Application Service (NSOAS). This leads to lower availabilities for the OSI-114-a and OSI-114-b wind products, especially in March for HY-2B. Although the end-to-end

availability is not met for HY-2B winds, the OSI SAF availability is met.
Several incidents are the cause of MGR SST (OSI-204-b) below 95 %: Outages on Ifremer LML ftp server and a production problem due to a problem on an internal server.
Outages on Ifremer LML ftp server also brought GOES-East SST (OSI-207-b) and IASI SST (OSI-208-b) to be below 95 %.

Two incidents in January lead to availability of Global Reproc Sea Ice Conc Updates (OSI-430-a) below 95%. One incident was caused by a corrupted input file. The other incident was caused by an outage of the main production system, and the activation of the backup system lead to delayed distribution.

3. Main anomalies, corrective and preventive measures

In case of anomaly (outage, degraded products…), service messages are made available in near-real time to the registered users through the Web site http://osi-saf.eumetsat.int.

3.1. At Low and Mid-Latitudes subsystem (Météo-France and Ifremer)

Date	Impacted products or services	Anomaly	Corrective and preventive measures
15 Dec to 06 January	All LML products	Outages on Ifremer LML ftp server	Data sent again after 6 January
08-10 January	Metop-B SST, Metop-C SST	Product unavailable, one internal server (midax) down	re-boot
17 January	Meteosat 0° DLI-SSI	Product unavailable, issue on processing chain after switch from Meteosat-11 to Meteosat-9	Remove data in spool “underway”
1 February to 9 May	All SST products processed at MF	Hunga Tonga volcano eruption and propagation of high concentration of sulfur dioxide	Deactivation of the Saharan dust correction in all LML SST processing chains
26 January	All LML products	From 08:00 to 15:00, outage on Ifremer LML ftp server	

3.2. At High Latitudes subsystem (MET Norway and DMI)

Date	Impacted products or services	Anomaly	Corrective and preventive measures
09-01-2022 and 15-01-2022	Sea ice conc ICDR (OSI-430-b)	Two incidents this month lead to availability below 95%. One incident was caused by a corrupted input file. The other incident was caused by an outage of the main production system, and the activation of the backup system lead to delayed distribution.	Improved the processing software to handle this kind of corrupted input files.
2/3-3/3 2022	OSI-410	Missing AMSR-2 input data from JAXA resulted in missing L2 AMSR SIC products	Message send to users.
04-04-2022	VIIRS L2 SST/IST product (OSI-205-b)	The cloud mask used for the OSI-205-b product experienced a production outside working hours and could not be fixed before the next day. The cloud mask and L1C preprocessor by mistake ingested each granule of VIIRS data, instead of the regional orbital products that should be distributed to the users. These granular files were distributed to the users by mistake before the problem was fixed.	

3.3. At Wind subsystem (KNMI)

Date	Impacted products or services	Anomaly	Corrective and preventive measures
6-3-2022	OSI-114-a, OSI-114-b OSI-115-a, OSI-115-b	The HY-2B and HY-2C winds have been unavailable or delayed between 6 March 0:00 and 7 March 8:00 UTC due to a data link issue.	
14-3-2022	OSI-102-c, OSI-104-c	The ASCAT-C wind products have been unavailable on 14 Mar between 7:15 and 12:48 UTC sensing time due to an instrument anomaly.	
2-4-2022	OSI-114-a, OSI-114-b OSI-115-a, OSI-115-b	The HY-2B and HY-2C winds have been unavailable or delayed between 2 April 0:00 and 4 April 6:00 UTC due to a data link issue.	
23-4-2022	OSI-114-a, OSI-114-b	The HY-2B winds have been unavailable between 23 April 22:30 and 25 April 8:30 UTC sensing time due to a satellite anomaly.	
22-5-2022	OSI-114-a, OSI-114-b	The HY-2B winds have been unavailable between 22 May 6:00 and 24 May 12:00 UTC due to a data link issue.	

4. Main events and modifications, maintenance activities

In case of event or modification, corresponding service messages are made available in near-real time to the registered users through the Web site http://osi-saf.eumetsat.int.

4.1. At Low and Mid-Latitudes subsystem (Météo-France and Ifremer)

Date	Impacted products or services	Events and modifications, maintenance activities
31 January	All LML data	Upgrade Ifremer LML FTP server
23 June	Geo SST-DLI-SSI	Switch from Meteosat-8 to Meteosat-9 over Indian ocean

4.2. At High Latitudes subsystem (MET Norway and DMI)

Date	Impacted products or services	Events and modifications, maintenance activities
07.06.2022	OSI-430-b, OSI-450	The OSI-430-b and OSI-450 files for southern hemisphere had a bug in one of the global attributes, containing a EPSG code describing the coordinate reference system. The archive of files was updated, both on OSI SAF FTP/THREDDS, in EDC and CMEMS archives. The actual product grid and position variable were not affected.

4.3. At Wind subsystem (KNMI)

NA

4.4. Release of software and new data records & ICDR

NA

5. OSI SAF products quality

5.1. SST quality

The comparison between SST products and Match up data bases (MDB) gathering in situ (buoy) measurements is performed on a routine basis for each satellite.

SST values are required to have the following target accuracy when compared to night time and daytime buoy measurements (see Service Specification Document [AD-1]):

	Monthly mean difference (mean difference req. in following tables) in the following ranges	Monthly standard deviation (SD req. in following tables) less than
Global low earth orbit products (GBL, NAR, MGR and IASI SST)	± 0.5 K	0.8 K
High latitudes low earth orbit products (SST in HL SST/IST products)	± 0.7 K	1.0 K
Geostationary products (Meteosat and GOES-East SST)	± 0.5 K	1.0 K

According to GHRSST-PP project, for IR derived products, the normalized Proximity Confidence Value scale shows 6 values: 0: unprocessed, 1: cloudy, 2: bad, 3: suspect, 4: acceptable, 5: excellent. A quality level is provided at pixel level. Those values are good predictors of the errors. It is recommended not to use the confidence value 2 for quantitative use. Usable data are those with confidence values 3, 4 and 5.

The list of blacklisted buoys over the concerned period is available here:
ftp://ftp.ifremer.fr/ifremer/cersat/projects/myocean/sst-tac/insitu/blacklist/

In the following maps, there are at least 5 matchups (satellite and in situ measurements) per box. Monthly maps of number of matchups in each box are available on the web site.

The number of cases might not be consistent in monthly and half-yearly statistics. There are two reasons responsible for this:

- the monthly statistics are run using the drifting buoy blacklist available for that month, whereas the map is produced at the end of the 6 month period using a more up to date black list.
- The blacklist is periodically update and therefore small differences are expected in the number of points - to produce a map we set up a threshold to the minimum number of records necessary for each 5x5° box.

<u>Robust statistics</u>
In the following, for the LML SST products (OSI-206-a, OSI-207-b, OSI-IO-SST, OSI-202-b, OSI-201-b, OSI-204-b, OSI-204-c), robust statistics (median and Robust Standard Deviation) are computed. The RSD is defined by Merchant and Harris (1999):

$$RSD = \frac{75^{th}\ percentile\ of\ \Delta SST - 25^{th}\ percentile\ of\ \Delta SST}{1,348} \quad \text{with} \quad \Delta SST = SST_{sat} - SST_{insitu}$$

Median and RSD are a little more stable than the mean and SD, and the RSD is lower than the SD.

Please note that the following figures show the map of median SST and the following tables show mean, SD, median and RSD.

For the validation of the Ice Surface Temperature (IST), which is a part of the SST/IST High Latitude products, there are some significant limitations. The only conventional in situ observations are drifting buoys that are placed on the sea ice and automatic weather stations on the Northern Hemisphere. These stations only observe air temperature or the temperature of the snow when they are covered by snow. So they do not directly measure the skin surface temperature that the satellite products estimate. A proper validation is therefore not possible on a routine basis. Still, comparison results are presented in this report, but the results must be read with this in mind. Occasionally, some in situ skin temperature data are available, and will be reported here. No in situ data are available for the Southern hemisphere and hence the IST for SH cannot be validated.

5.1.1. Meteosat SST (OSI-206-a) quality

The following maps indicate the median night-time and day-time SST median difference with respect to buoys measurements for quality level 3,4,5 over the reporting period. Monthly maps are available on http://osi-saf.eumetsat.int/lml/#qua_SST%Metop%20GBL%20SST_monthly%20map_monthly_Night%20time.

The operational SST retrieval from Meteosat and GOES-East updated chain validation report v1.1 (http://osi-saf.eumetsat.int/lml/#doc_SST) gives further details about the regional bias observed.

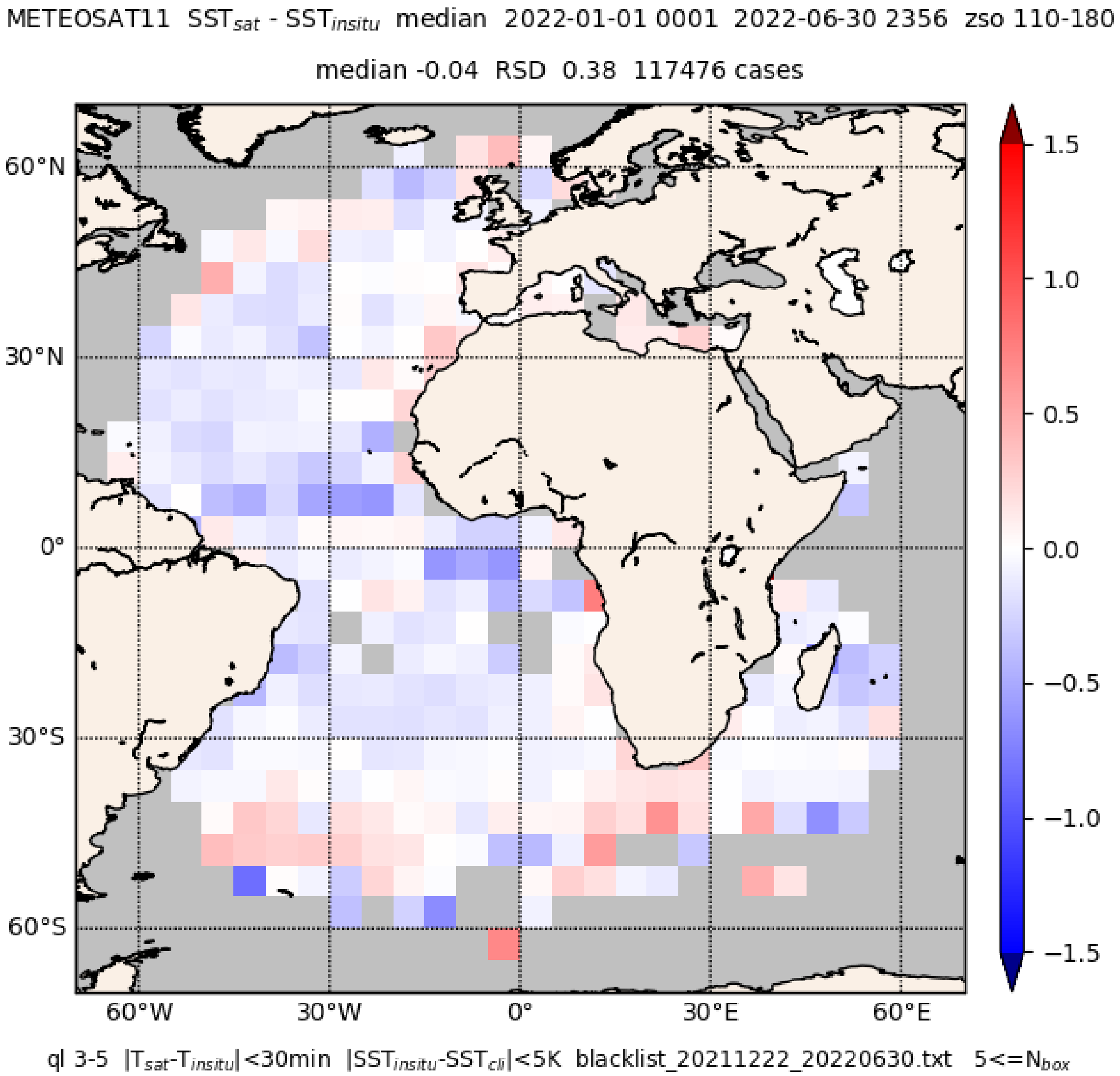


Figure 1: Meteosat night-time SST median difference with respect to buoys measurements for quality level 3,4,5

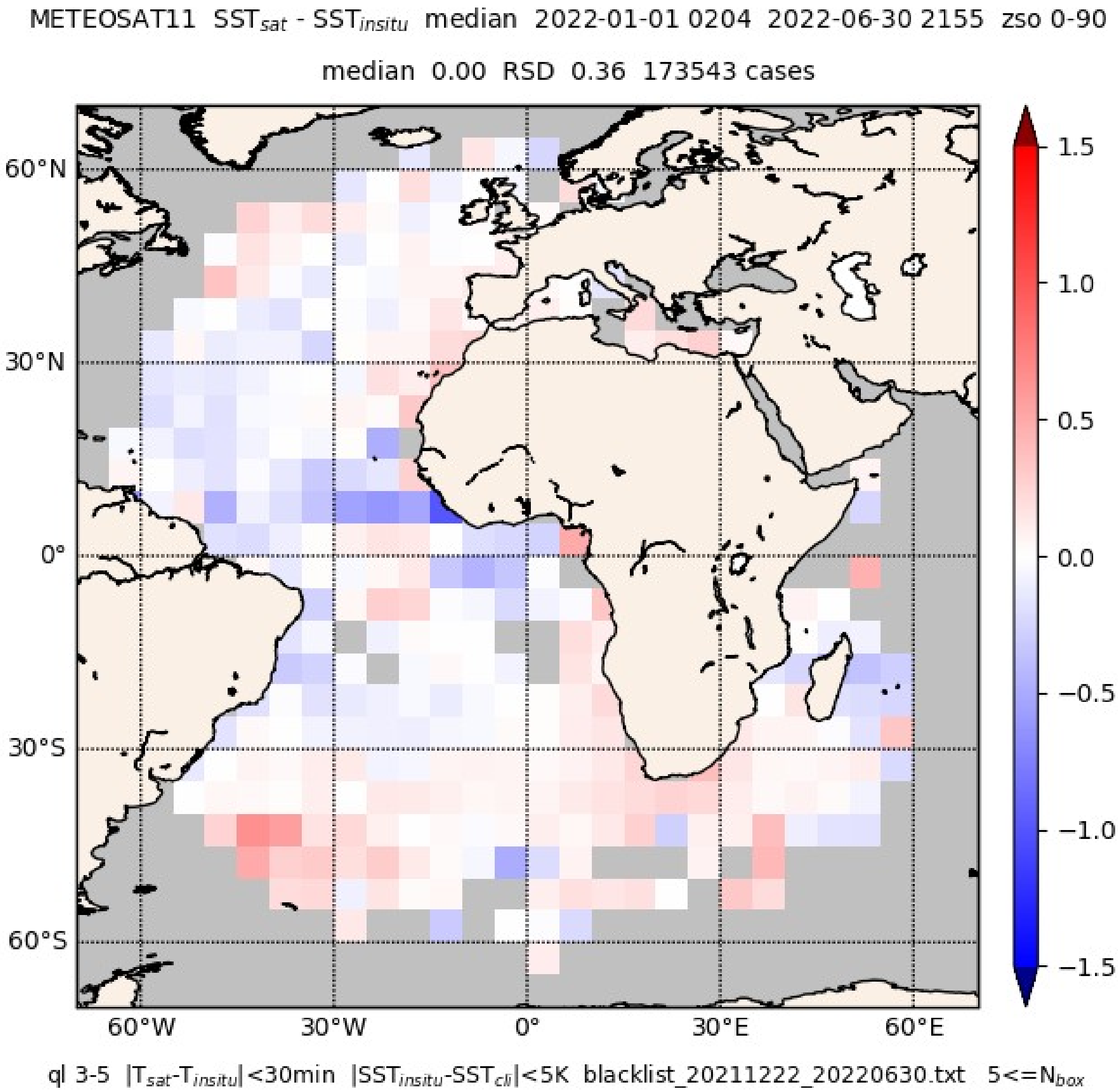


Figure 2: Meteosat day-time SST median difference with respect to buoys measurements for quality level 3,4,5

The following table provides the Meteosat-derived SST quality results over the reporting period.

Meteosat night-time SST quality results over 1st half 2022					
Month	Number of cases	Mean diff. in K (req.: ± 0.5 K)	SD in K (req.: ± 1 K)	Median in K	RSD in K
JAN 2022	11772	-0.05	0.42	-0.02	0.39
FEB 2022	21275	-0.09	0.40	-0.02	0.35
MAR 2022	20424	-0.09	0.39	-0.05	0.33
APR 2022	24037	-0.13	0.44	-0.08	0.37
MAY 2022	23687	-0.05	0.46	-0.03	0.42
JUN 2022	16281	-0.03	0.51	-0.01	0.43
Meteosat day-time SST quality results over 1st half 2022					
JAN 2022	14129	-0.01	0.42	0.02	0.36
FEB 2022	27827	-0.04	0.40	0.02	0.31
MAR 2022	25358	-0.02	0.37	0.01	0.30
APR 2022	37975	-0.10	0.42	-0.06	0.35
MAY 2022	39605	-0.01	0.47	0.02	0.40
JUN 2022	28649	-0.00	0.56	0.04	0.44

Table 3: Meteosat SST quality results over 1st half 2022, for 3, 4, 5 quality indexes.

Comments:
Overall statistics are good and within the requirement.

5.1.2. GOES-East SST (OSI-207-b) quality

The following maps indicate the median night-time and day-time SST median difference with respect to buoys measurements for quality level 3,4,5 over the reporting period. Monthly maps are available on http://osi-saf.eumetsat.int/lml/#qua_SST%GOES-E%20SST_monthly%20map_monthly_Night%20time.

The operational SST retrieval from MSG/SEVIRI and GOES-East updated chain validation report v1.1 (http://osi-saf.eumetsat.int/lml/#doc_SST) gives further details about the regional bias observed.

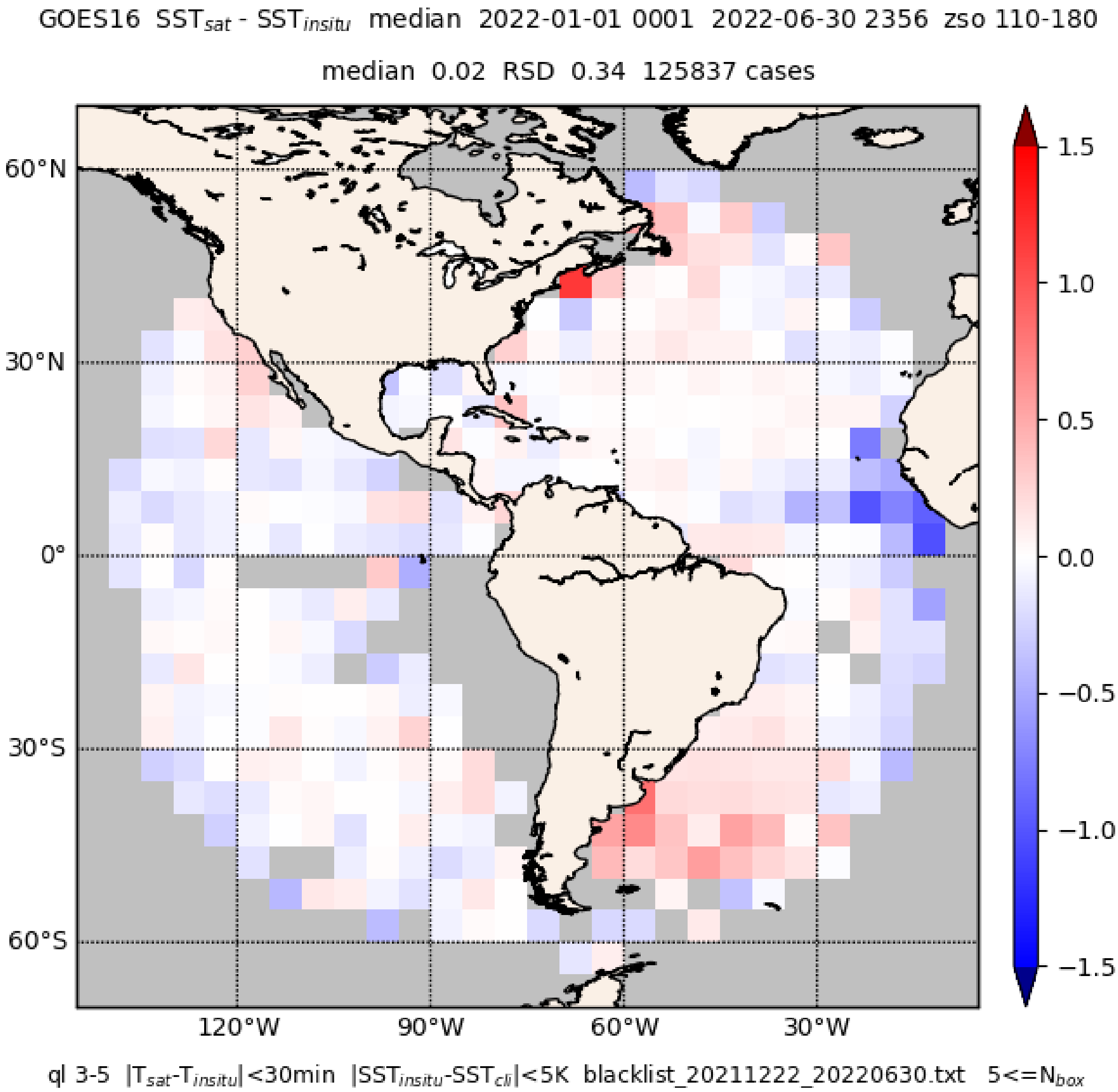


Figure 3: GOES-East night-time SST median difference with respect to buoys measurements for quality level 3,4,5

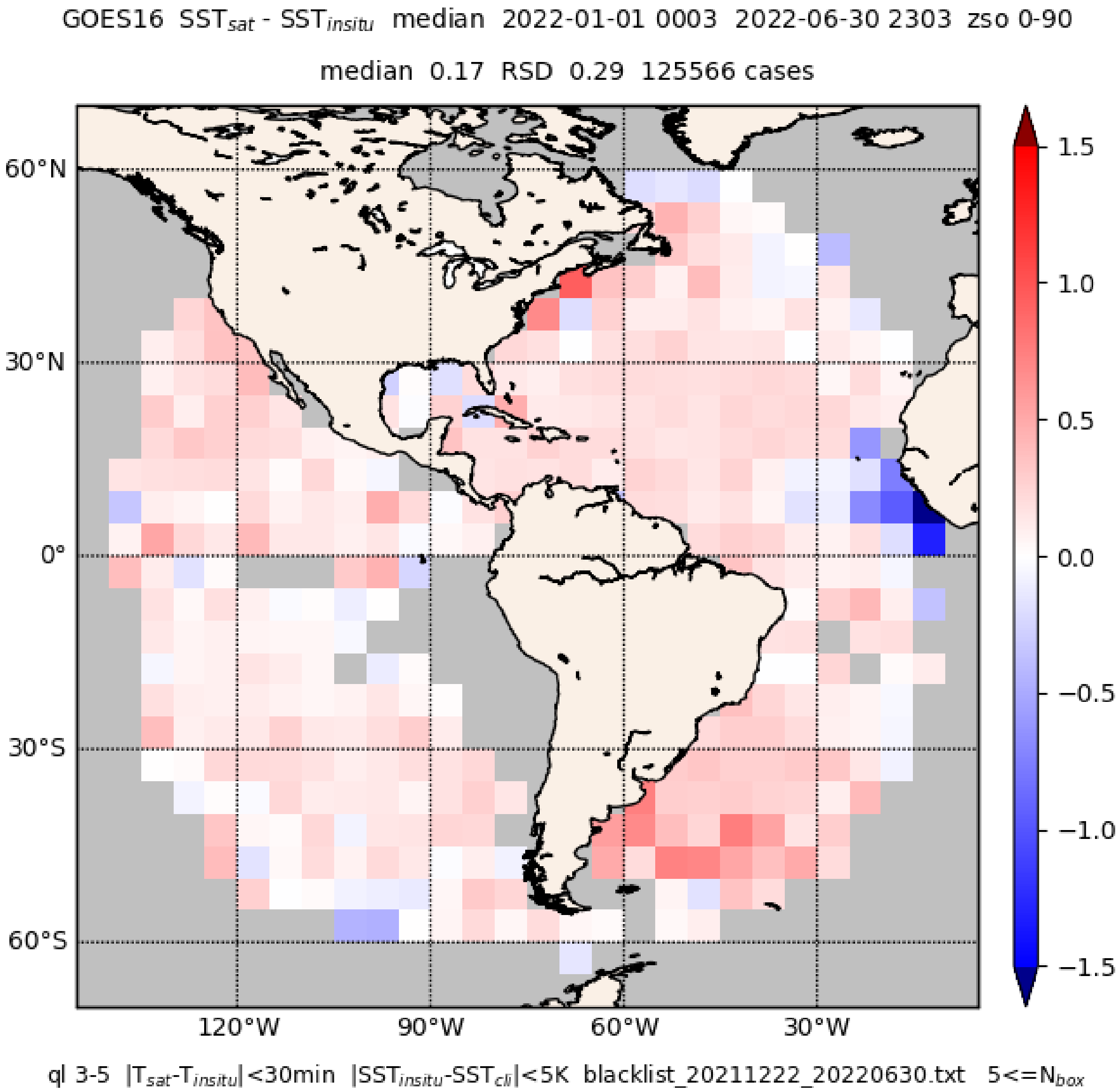


Figure 4: GOES-East day-time SST median difference with respect to buoys measurements for quality level 3,4,5

The following table provides the GOES-E-derived SST quality results over the reporting period.

GOES-East night-time SST quality results 1st half 2022					
Month	Number of cases	Mean diff. in K (req.: ± 0.5 K)	SD in K (req.: ± 1 K)	Median in K	RSD in K
JAN 2022	26251	0.00	0.39	0.05	0.32
FEB 2022	22242	0.01	0.40	0.05	0.35
MAR 2022	22335	-0.01	0.38	0.03	0.33
APR 2022	19668	-0.02	0.41	0.01	0.35
MAY 2022	19069	-0.07	0.40	-0.02	0.35
JUN 2022	16272	-0.07	0.41	-0.02	0.36
GOES-East day-time SST quality results 1st half 2022					
JAN 2022	23607	0.16	0.36	0.19	0.27
FEB 2022	20943	0.18	0.36	0.21	0.29
MAR 2022	22041	0.18	0.32	0.20	0.26
APR 2022	20214	0.15	0.37	0.17	0.29
MAY 2022	19787	0.10	0.38	0.12	0.30
JUN 2022	18974	0.07	0.40	0.11	0.33

Table 4: GOES-East SST quality results over 1st half 2022, for 3, 4, 5 quality indexes

Comments:
Overall statistics are good and within the requirement.

5.1.3. Meteosat Indian Ocean SST (OSI-IO-SST) quality

Since 2016, Meteosat-8 is in position 41.5 east for the Indian Ocean Data Coverage (IODC). Sea Surface Temperature is processed as a demonstration product.

From 23 June 2022, Meteosat-8 has been replaced by Meteosat-9, in position 45.5 East, as input data for OSI SAF products. The figures provided for June 2022 are therefore only on the period 1st to 22th June. In next half-yearly report, the figures will be calculated with Meteosat-9 data.

The following maps indicate the median night-time and day-time SST median difference with respect to buoys measurements for quality level 3,4,5 over the reporting period.

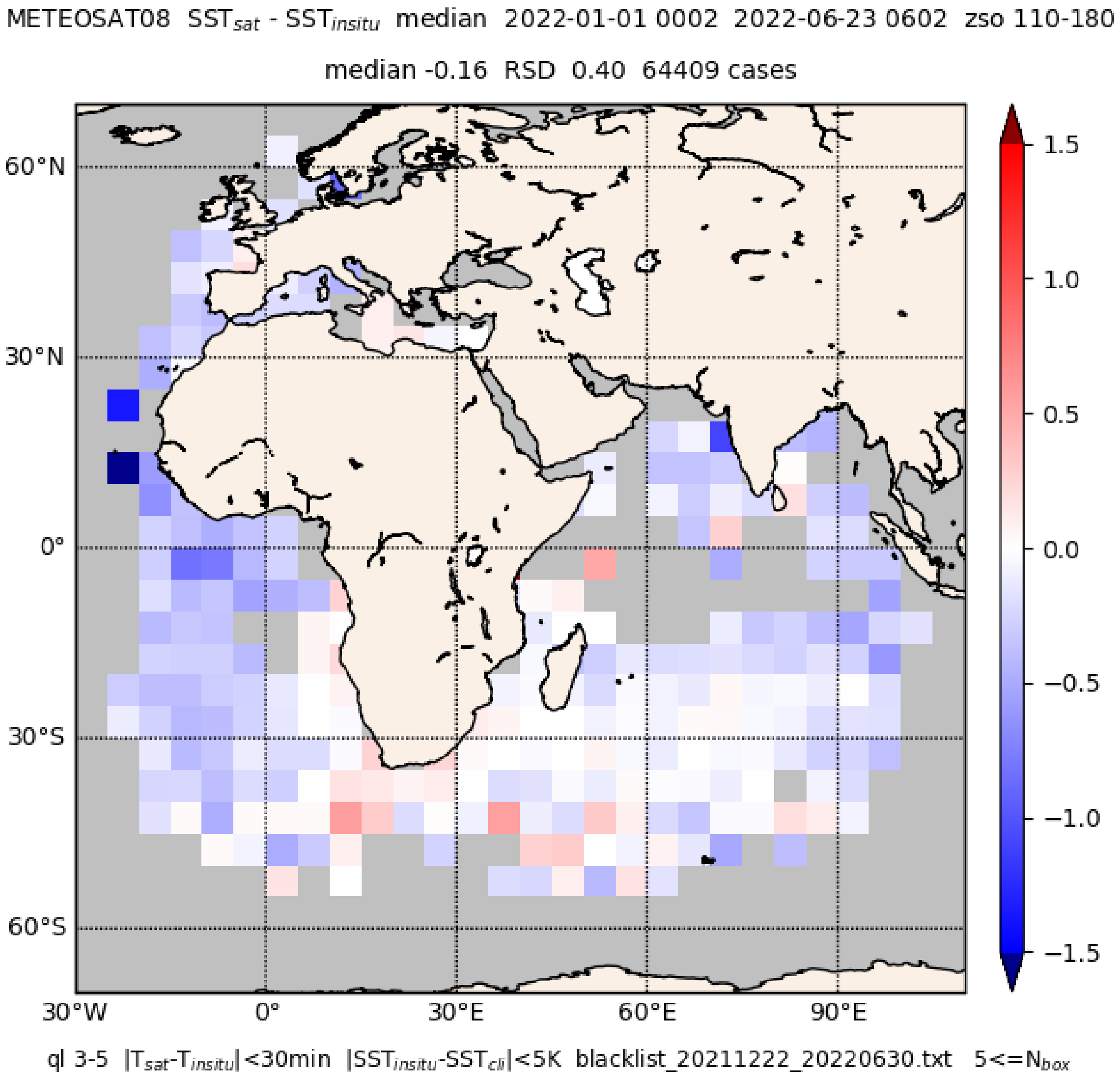


Figure 5: Meteosat Indian Ocean night-time SST median difference with respect to buoys measurements for quality level 3,4,5

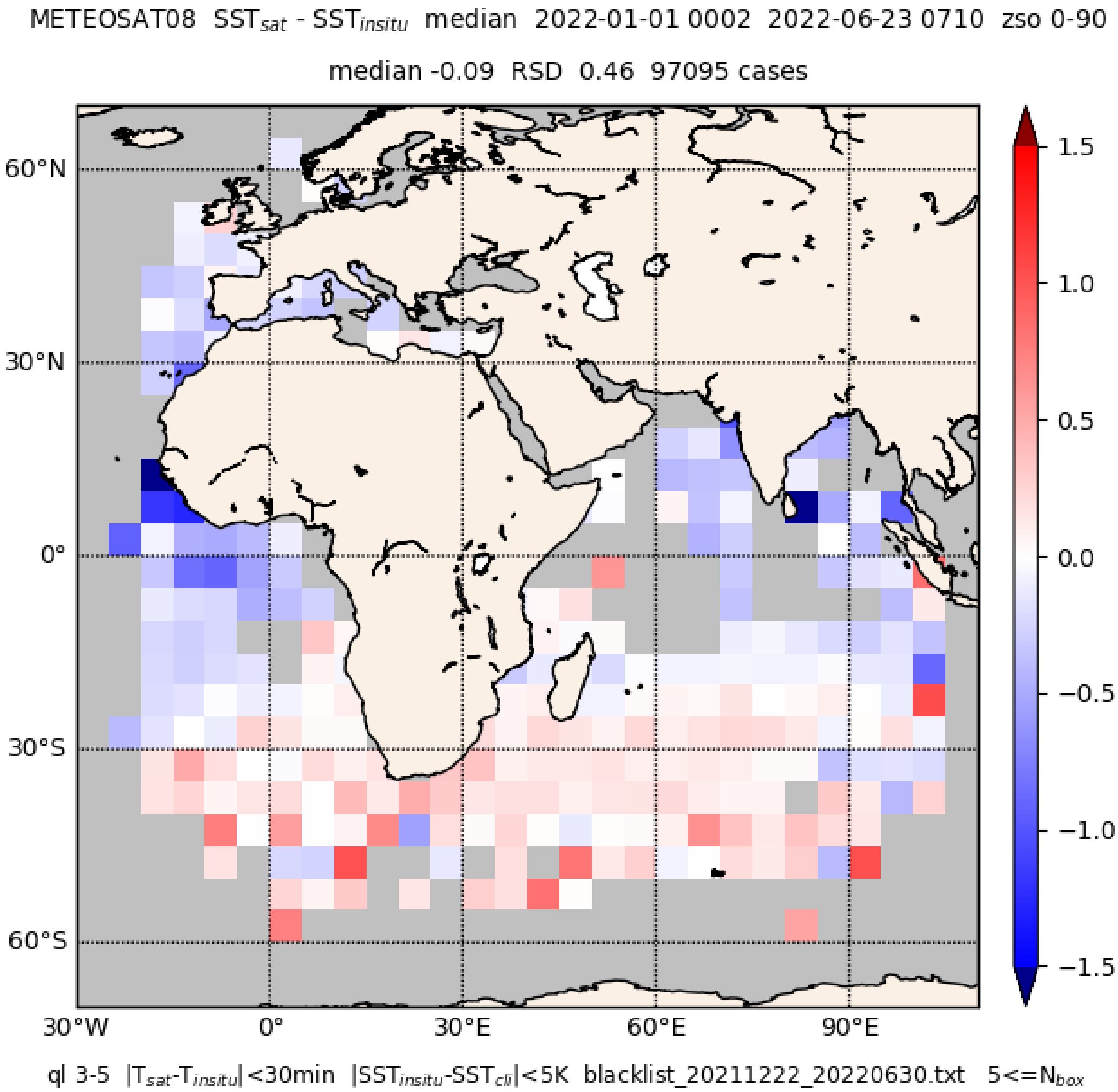


Figure 6: Meteosat Indian Ocean day-time SST median difference with respect to buoys measurements for quality level 3,4,5

The following table provides the Meteosat Indian Ocean-derived SST quality results over the reporting period.

Meteosat Indian Ocean night-time SST quality results over 1st half 2022					
Month	Number of cases	Mean diff. in K (req.: ± 0.5 K)	SD in K (req.: ± 1 K)	Median in K	RSD in K
JAN 2022	6537	-0.24	0.55	-0.19	0.51
FEB 2022	12286	-0.15	0.40	-0.09	0.31
MAR 2022	12965	-0.14	0.40	-0.13	0.31
APR 2022	14820	-0.22	0.45	-0.19	0.42
MAY 2022	12079	-0.33	0.54	-0.30	0.56
JUN 2022	5722	-0.12	0.48	-0.09	0.40
Meteosat Indian Ocean day-time SST quality results over 1st half 2022					
JAN 2022	11056	0.21	0.67	0.26	0.56
FEB 2022	16070	-0.10	0.47	-0.04	0.36
MAR 2022	15097	-0.05	0.45	-0.02	0.38
APR 2022	23066	-0.19	0.48	-0.15	0.43
MAY 2022	21986	-0.29	0.55	-0.27	0.52
JUN 2022	9820	-0.28	0.81	-0.10	0.52

Table 5: Meteosat Indian Ocean SST quality results over 1st half 2022, for 3, 4, 5 quality indexes.

Comments:
Overall statistics are good and within the requirement.

5.1.4. NAR SST (OSI-202-c) quality

The operational NAR SST is processed with AVHRR and VIIRS data, separately. Currently Metop-B and NOAA-20 are used.

The comparison between NAR SST products and Match up data bases (MDB) gathering in situ (buoy) measurements is performed on a routine basis for each operational Metop and NOAA-20 satellite. It is considered that if the accuracy requirements are met for both AVHRR and VIIRS separately, the accuracy requirements for OSI-202-b are fully met.

5.1.4.1. NOAA-20 NAR SST quality

The following maps indicate the median night-time and day-time SST median difference with respect to buoys measurements for quality level 3,4,5 over the reporting period. Monthly maps are available on https://osi-saf.eumetsat.int/low-and-mid-latitudes-processing-center/charts-display?product=SST&area=NAR%20NOAA-20&chart=Monthly%20statistics%2C%20night%20time

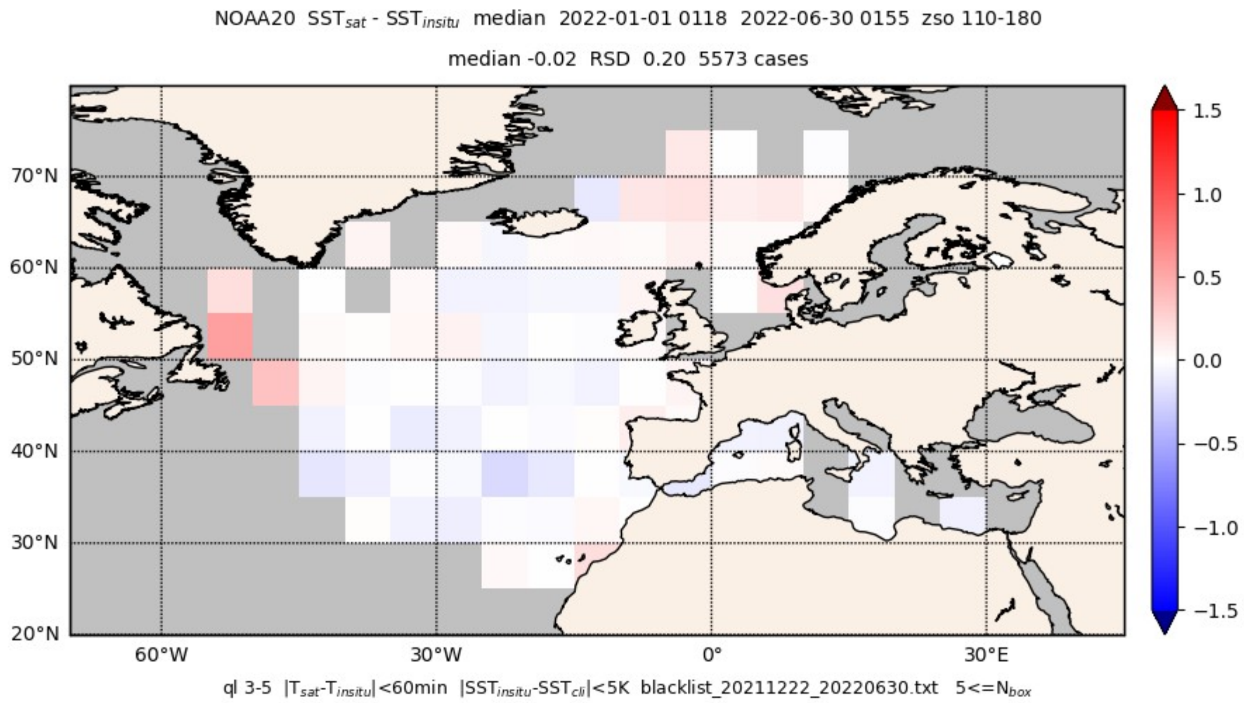


Figure 7: NOAA-20 NAR night-time SST median difference with respect to buoys measurements for quality level 3,4,5

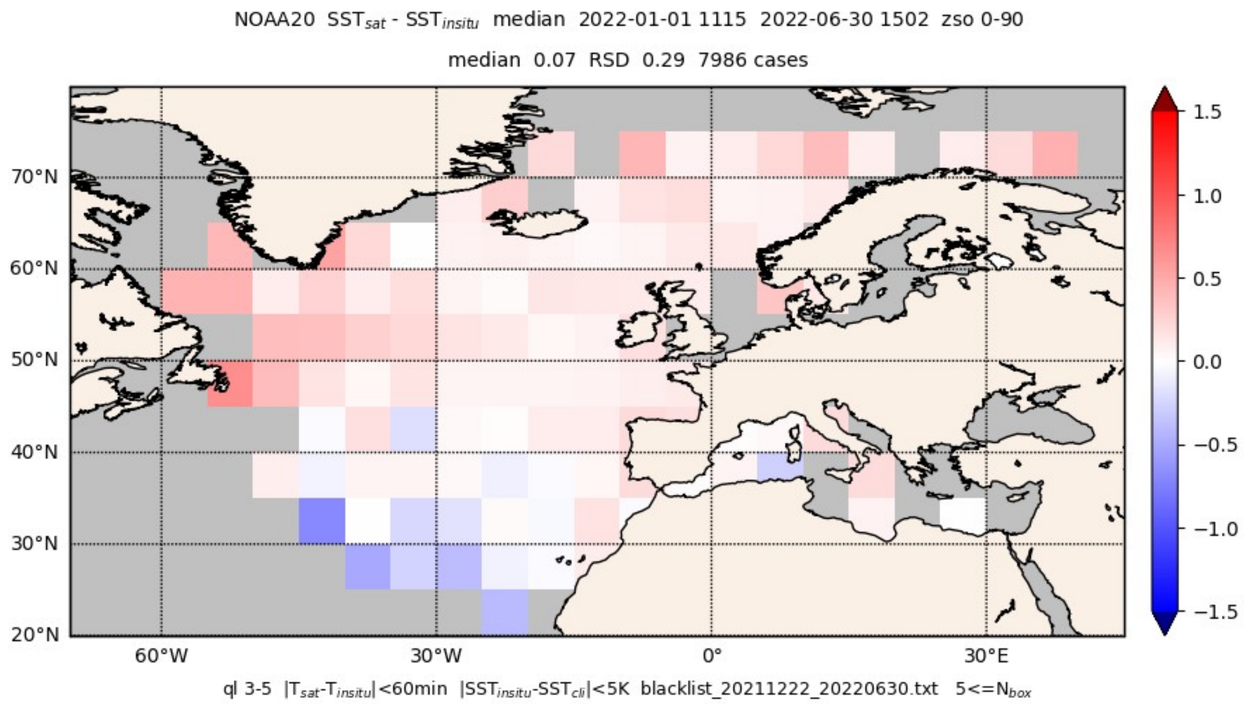


Figure 8: NOAA-20 NAR day-time SST median difference with respect to buoys measurements for quality level 3,4,5

The following table provides the NOAA-20-derived SST quality results over the reporting period.

Month	Number of cases	Mean diff. in K (req.: ± 0.5 K)	SD in K (req.: ± 0.8 K)	Median in K	RSD in K
NOAA-20 NAR night-time SST quality results over 1st half 2022					
JAN 2022	815	-0.02	0.24	0.01	0.19
FEB 2022	762	-0.04	0.28	-0.01	0.21
MAR 2022	1021	-0.04	0.28	-0.01	0.17
APR 2022	1272	-0.06	0.28	-0.02	0.21
MAY 2022	1154	-0.08	0.32	-0.06	0.22
JUN 2022	549	-0.09	0.39	-0.01	0.27
NOAA-20 NAR day-time SST quality results over 1st half 2022					
JAN 2022	689	0.03	0.33	0.06	0.25
FEB 2022	788	0.05	0.37	0.08	0.26
MAR 2022	1196	0.02	0.37	0.06	0.26
APR 2022	1597	0.01	0.43	0.06	0.24
MAY 2022	2029	0.04	0.47	0.08	0.33
JUN 2022	1687	-0.02	0.63	0.08	0.36

Table 6: Quality results for NOAA-20 NAR SST over 1st half 2022, for 3, 4, 5 quality indexes

Comments:
Overall statistics are good and within the requirement.

5.1.4.2. Metop NAR SST quality

The following maps indicate the median night-time and day-time SST median difference with respect to buoys measurements for quality level 3,4,5 over the reporting period. Monthly maps are available on http://osi-saf.eumetsat.int/lml/#qua_SST%Metop%20NAR%20SST_monthly%20map_monthly_Night%20time.

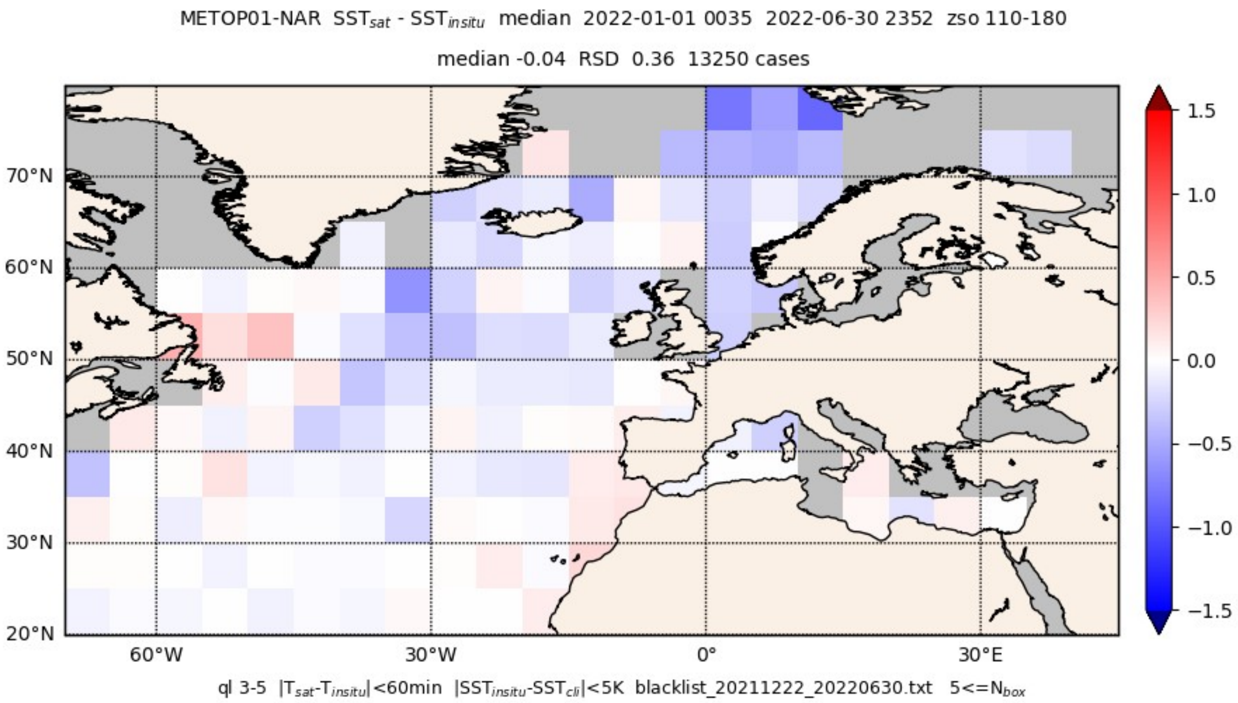


Figure 9: Metop-B NAR night-time SST median difference with respect to buoys measurements for quality level 3,4,5

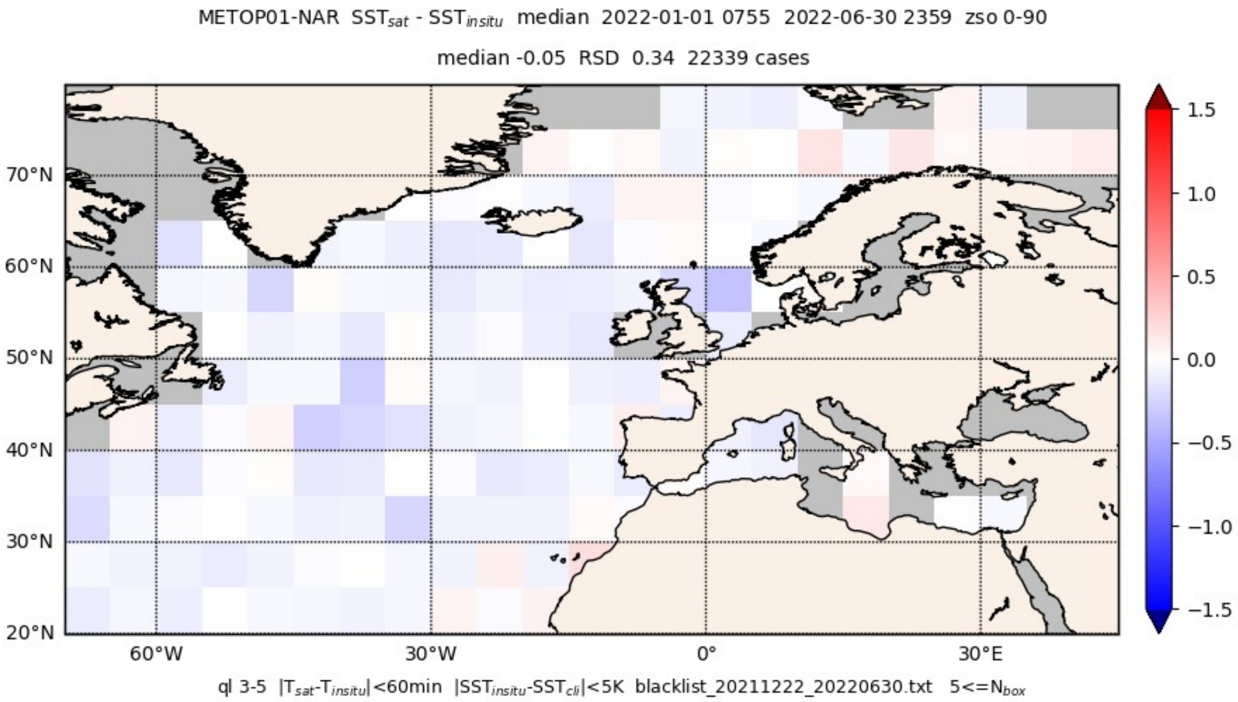


Figure 10: Metop-B NAR day-time SST median difference with respect to buoys measurements for quality level 3,4,5

The following table provides Metop-B-derived SST quality results over the reporting period.

Metop-B NAR night-time SST quality results over 1st half 2022					
Month	Number of cases	Mean diff. in K (req.: ± 0.5 K)	SD in K (req.: ± 0.8 K)	Median in K	RSD in K
JAN 2022	2909	-0.04	0.45	0.04	0.36
FEB 2022	2348	-0.09	0.45	-0.01	0.36
MAR 2022	2587	-0.11	0.43	-0.05	0.36
APR 2022	2347	-0.16	0.46	-0.09	0.39
MAY 2022	1875	-0.18	0.47	-0.12	0.36
JUN 2022	1184	-0.09	0.40	-0.03	0.30
Metop-B NAR day-time SST quality results over 1st half 2022					
JAN 2022	2701	-0.03	0.39	0.01	0.32
FEB 2022	2482	-0.09	0.38	-0.04	0.32
MAR 2022	3658	-0.07	0.43	-0.04	0.31
APR 2022	3852	-0.11	0.45	-0.08	0.33
MAY 2022	4921	-0.13	0.49	-0.07	0.36
JUN 2022	4725	-0.07	0.56	-0.03	0.37

Table 7: Quality results for Metop-B NAR SST over 1st half 2022, for 3, 4, 5 quality indexes

Comments:
Overall statistics are good and within the requirement.

5.1.5. GBL SST (OSI-201) and MGR SST (OSI-204) quality

The OSI SAF SST products on global coverage (GBL SST and MGR SST) are based on Metop/AVHRR data, currently Metop-B.
The following maps indicate the median night-time and day-time SST median difference with respect to buoys measurements for quality level 3,4,5 over the reporting period. Monthly maps are available on http://osi-saf.eumetsat.int/lml/#qua_SST%Metop%20GBL%20SST_monthly%20map_monthly_Night%20time.

The Metop/AVHRR SST validation report, available on http://osi-saf.eumetsat.int, gives further details about the regional bias observed and their origin.

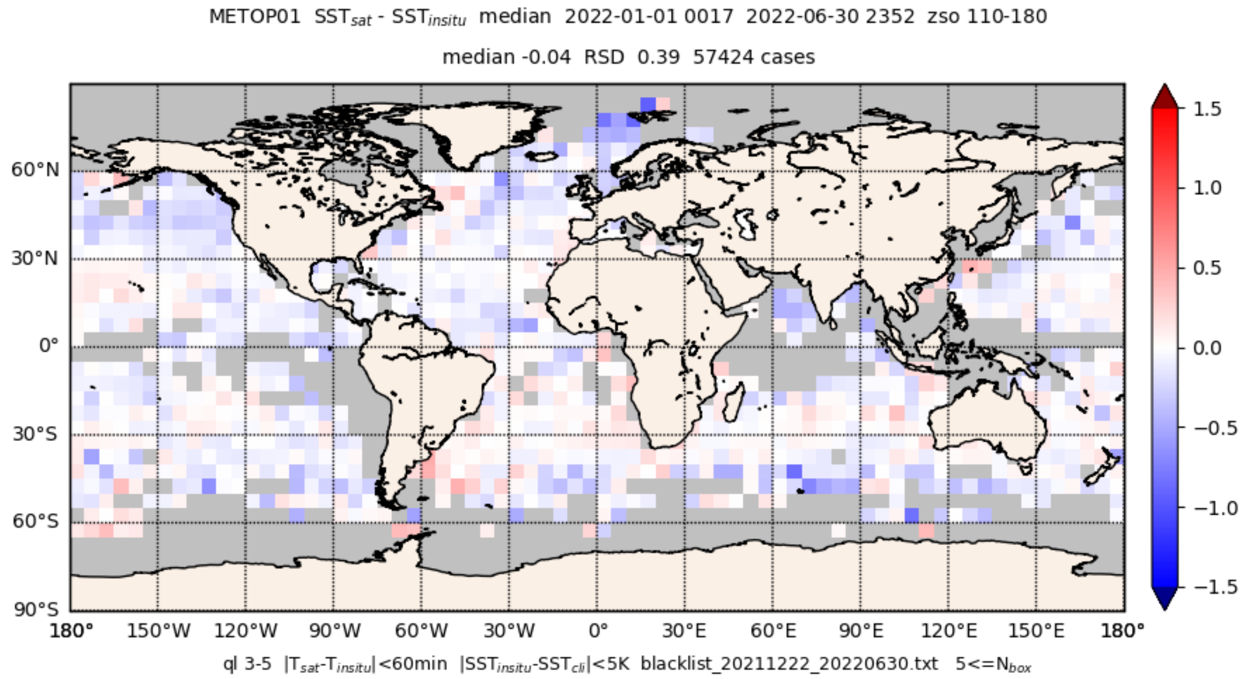


Figure 11: Metop-B night-time SST median difference with respect to buoys measurements for quality level 3,4,5

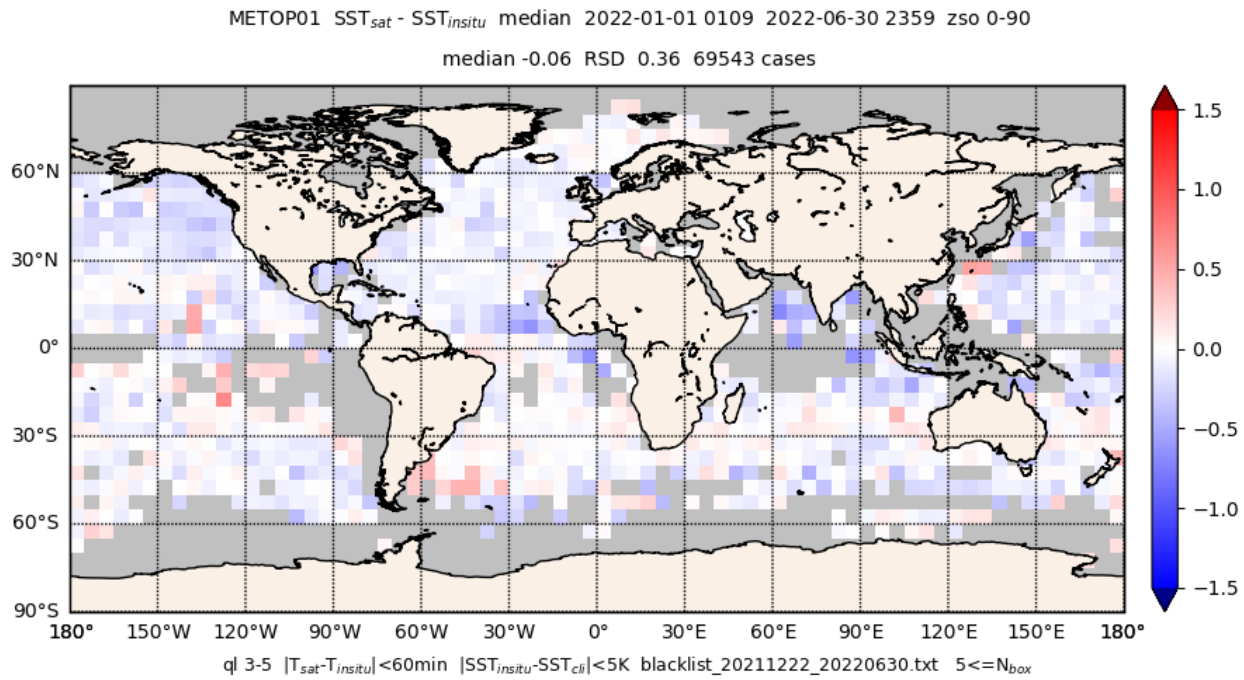


Figure 12: Metop-B day-time SST median difference with respect to buoys measurements for quality level 3,4,5

The following table provides the Metop-derived SST quality results over the reporting period.

Global Metop-B night-time SST quality results over 1st half 2022					
Month	Number of cases	Mean diff. in K (req.: ± 0.5 K)	SD in K (req.: ± 0.8 K)	Median in K	RSD in K
JAN 2022	10410	-0.08	0.50	0.01	0.38
FEB 2022	9843	-0.14	0.53	-0.04	0.38
MAR 2022	10562	-0.14	0.51	-0.05	0.38
APR 2022	9664	-0.15	0.52	-0.06	0.40
MAY 2022	9188	-0.15	0.53	-0.05	0.39
JUN 2022	7757	-0.14	0.51	-0.03	0.36
Global Metop-B day-time SST quality results over 1st half 2022					
JAN 2022	10990	-0.06	0.42	-0.02	0.33
FEB 2022	10176	-0.09	0.40	-0.05	0.33
MAR 2022	12016	-0.10	0.43	-0.05	0.33
APR 2022	11522	-0.12	0.46	-0.07	0.36
MAY 2022	12790	-0.14	0.50	-0.08	0.38
JUN 2022	12049	-0.12	0.55	-0.06	0.39

Table 8: Quality results for global METOP SST over 1st half 2022, for 3,4,5 quality indexes

Comments:
Overall statistics are good and within the requirement.

5.1.6. MGR SST (OSI-204-c) quality

Following the request of the UK MET Office (for OSTIA in CMEMS) to have the SST from 2 Metops, the Full resolution Metop Sea Surface Temperature metagranules are also processed with Metop-C/AVHRR.
The following maps indicate the median night-time and day-time SST median difference with respect to buoys measurements for quality level 3,4,5 over the reporting period. Monthly maps are available on http://osi-saf.eumetsat.int/lml/#qua_SST%Metop%20GBL%20SST_monthly%20map_monthly_Night%20time.

The Metop/AVHRR SST validation report, available on http://osi-saf.eumetsat.int, gives further details about the regional bias observed and their origin.

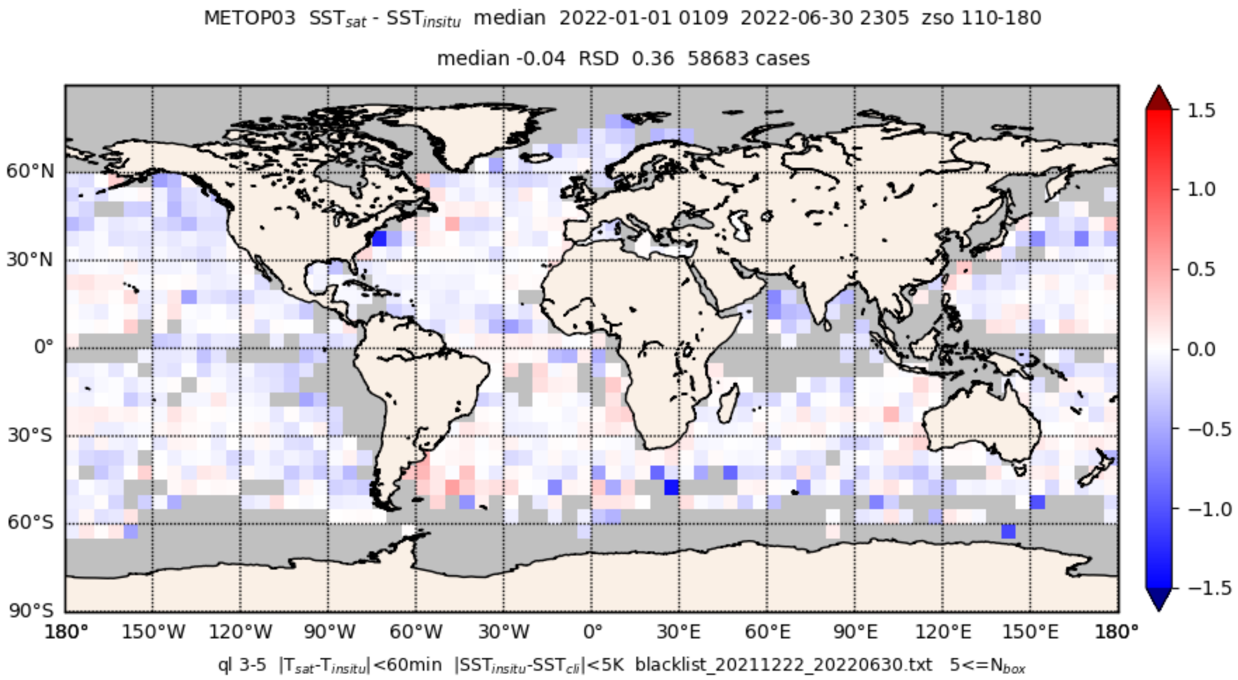


Figure 13: Metop-C night-time SST median difference with respect to buoys measurements for quality level 3,4,5

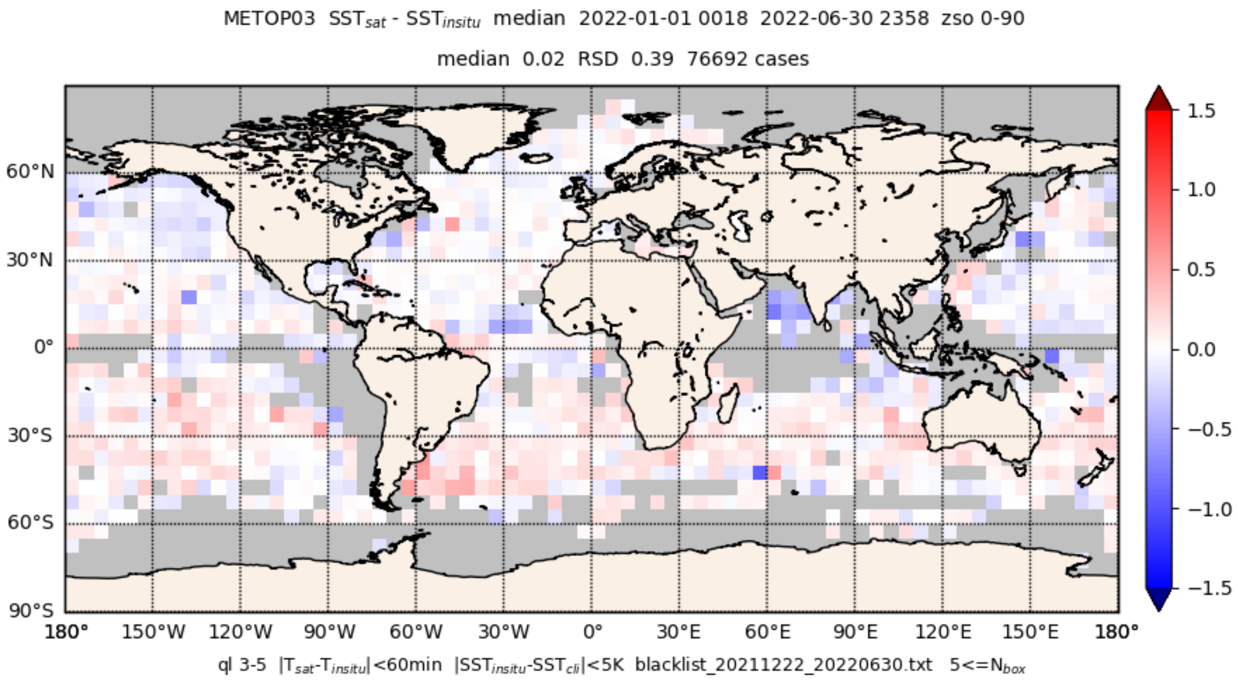


Figure 14: Metop-C day-time SST median difference with respect to buoys measurements for quality level 3,4,5

The following table provides the Metop-derived SST quality results over the reporting period.

Global Metop-C night-time SST quality results over 1st half 2022					
Month	Number of cases	Mean diff. in K (req.: ± 0.5 K)	SD in K (req.: ± 0.8 K)	Median in K	RSD in K
JAN 2022	10521	-0.13	0.52	-0.02	0.36
FEB 2022	10111	-0.16	0.54	-0.05	0.36
MAR 2022	10887	-0.15	0.53	-0.04	0.36
APR 2022	9999	-0.16	0.53	-0.06	0.38
MAY 2022	9263	-0.17	0.54	-0.06	0.36
JUN 2022	7902	-0.16	0.54	-0.03	0.35
Global Metop-C day-time SST quality results over 1st half 2022					
JAN 2022	12184	0.02	0.46	0.06	0.39
FEB 2022	11241	-0.00	0.45	0.04	0.37
MAR 2022	13002	-0.01	0.48	0.04	0.39
APR 2022	12783	-0.06	0.52	-0.01	0.39
MAY 2022	14102	-0.09	0.56	-0.02	0.41
JUN 2022	13380	-0.08	0.60	0.00	0.43

Tableau 9: Quality results for global Metop-C SST over 1st half 2022, for 3,4,5 quality indexes

Comments:
Overall statistics are good and within the requirement.

5.1.7. High Latitude SST/IST (OSI-203-a, OSI-203-b, OSI-205-a, OSI-205-b) quality

The OSI-203 and OSI-205 series are high latitude SST and global ice surface temperature (IST) and marginal ice zone surface temperature products.

Conventional measures as Standard Deviation of mean differences (SD) and mean differences are calculated for monthly averages for day-time and night-time. Data with quality levels 3, 4 and 5 are used for both the SST and IST validation. Daytime is defined for data with sun-zenith angles smaller than 90 degrees and night-time data is defined for sun-zenith angles greater than 90 degrees. For the OSI-205 products, the in-situ observations and the centre of the level-2 pixel must be within 3 km of each other and observation times must be within 15 minutes of the satellite crossing time. For the OSI-203 products the in-situ observation must be within the 5 km level-3 pixel and within the 12 hour period that the product covers.
Buoy data used for the SST validation is from the Copernicus Marine Environment Monitoring Service (In Situ TAC).

The IST accuracy requirements are split into two parts in the Product Requirement Document: Namely, surface temperatures from IR radiometers, or similar high quality surface temperature observations, and air temperatures from drifting buoys or similar. The primary reason for splitting IST performance requirements into skin and air temperature requirements is a well documented physical difference between air and skin temperatures (Nielsen-Englyst et al., 2019 (https://tc.copernicus.org/articles/13/1005/2019/)). Secondly, buoy temperatures are often associated with higher uncertainty due to unknown snow conditions around the buoy (discussed in the product ATBDs). In accordance with the OSISAF Product Requirement Document (PRD) the OSI-203 and OSI-205 IST target requirements against air temperature observations are: SD < 3 K and bias < 3.5 K; against surface temperature observations: SD < 2 K and bias < 1.5 K.

The air temperature requirements are applied to buoy reference data, including air temperatures from Ice Mass Balance Buoys (IMB), and air temperatures from land based weather stations, like the PROMICE stations on the Greenland Ice Sheet. The surface temperature requirements are applied for radiometric skin temperature measurements and surface temperature references from IMBs, when such data are available and to calculated surface temperature reference measurements for PROMICE stations. The PROMICE surface temperatures are calculated from Incoming and ourgoing lang wave radiation measurements at the PROMICE stations (https://essd.copernicus.org/preprints/essd-2021-80/essd-2021-80.pdf). These reference surface temperatures are considered of high quality.

Due to a 6 month delay on the release of PROMICE surface temperature data, the HYR reporting contains validation against both surface and air temperatures from PROMICE data. Currently only PROMICE data after the 9th April 2022 are available for the reporting period (January – June 2022), due to limited battery capacity.
PROMICE are currently working on upgrading battery capacity on selected or potentially all PROMICE stations by next winter, in order to make NRT data retrieval possible all year round.

5.1.7.1. Level 2 HL SST/IST based on Metop/AVHRR (OSI-205-a)

The Level 2 HL SST/IST (OSI-205-a) is derived from polar satellites data, currently from Metop-B. The following tables and figures provide the OSI-205-a SST quality results over the reporting period.

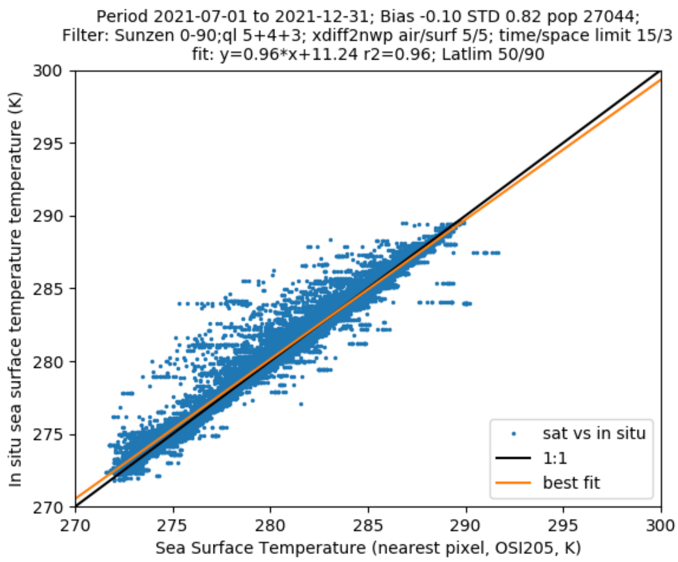


Figure 15: 2nd half 2021 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only daytime data for the northern hemisphere are shown.

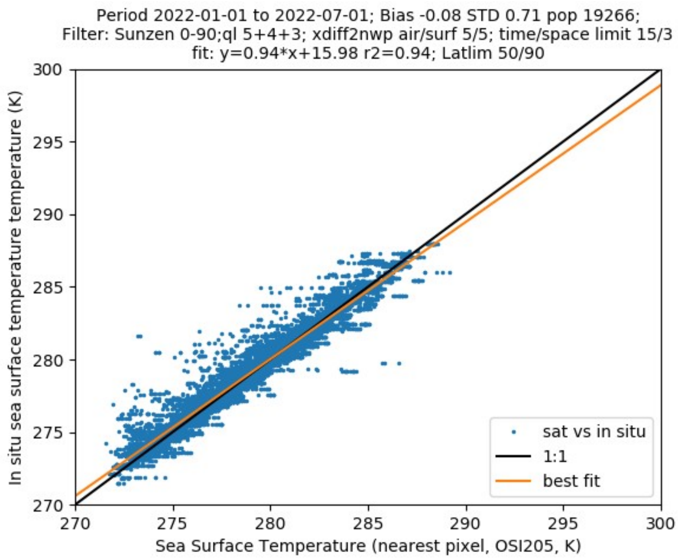


Figure 16: 1st half 2022 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only daytime data for the northern hemisphere are shown.

OSI-205-a AVHRR SST quality results over JUL 2021 to JUN 2022, night-time, NH					
Month	Number of cases	Mean diff. in K (req.: ± 0.7 K)	Mean diff. margin (*)	SD in K (req.: ± 1.0 K)	SD margin (**)
JUL 2021	N/A	N/A	N/A	N/A	N/A
AUG 2021	9	0.32	54.3	0.26	74.0
SEP 2021	1176	-0.45	35.7	0.92	8.0
OCT 2021	5596	-0.49	30.0	0.93	7.0
NOV 2021	4788	-0.58	17.1	0.95	5.0
DEC 2021	3549	-0.60	14.3	1.12	-12.0
2nd half 2021	15118	-0.54	22.9	0.98	2.0
JAN 2022	1983	-0.71	-1.4	1.00	0.0
FEB 2022	922	-0.74	-5.7	0.81	19.0
MAR 2022	934	-0.78	-11.4	0.72	28.0
APR 2022	100	-0.33	52.9	0.84	16.0
MAY 2022	N/A	N/A	N/A	N/A	N/A
JUN 2022	N/A	N/A	N/A	N/A	N/A
1st half 2022	3939	-0.73	-4.3	0.90	10.0
OSI-205-a AVHRR SST quality results over JUL 2021 to JUN 2022, day-time, NH					
Month	Number of cases	Mean diff. in K (req.: ± 0.7 K)	Mean diff. margin (*)	SD in K (req.: ± 1.0 K)	SD margin (**)
JUL 2021	5537	-0.16	77.1	1.14	-14.0
AUG 2021	3883	-0.07	90.0	0.96	4.0
SEP 2021	6658	-0.07	90.0	0.71	29.0
OCT 2021	6642	-0.08	88.6	0.62	38.0
NOV 2021	2810	-0.14	80.0	0.63	37.0
DEC 2021	1514	-0.10	85.7	0.58	42.0
2nd half 2021	*27044*	*-0.10*	*85.7*	*0.82*	*18.0*
JAN 2022	563	-0.38	45.7	0.66	34.0
FEB 2022	717	-0.20	71.4	0.34	66.0
MAR 2022	3315	-0.22	68.6	0.53	47.0
APR 2022	3313	-0.13	81.4	0.56	44.0
MAY 2022	4834	0.03	95.7	0.60	40.0
JUN 2022	6524	-0.03	95.7	0.90	10.0
1st half 2022	*19266*	*-0.08*	*88.6*	*0.71*	*29.0*
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the target requirement.					

Table 10: Quality results for OSI-205-a AVHRR SST, for the Northern Hemisphere, over JUL 2021 to JUN 2022, for quality level 5,4,3 by night and by day

Comments:
Validation values for the first half year of 2022 are presented in the table above and fulfil the requirements on mean error and standard deviation error. The values not satisfying the target accuracy are only slightly larger and still satisfy the threshold requirements of 1.5 K mean difference and standard deviation.
A visual inspection of extreme outliers has been carried out for the reporting period.
37 buoys were disqualified from the validation data, since they are supposedly grounded at coast lines:

- GL_TS_DB_6203760 stranded at west coast of Sweden
- GL_TS_DB_4801639 stranded at northern Canada
- GL_TS_DB_6402661 stranded at south coast of Iceland
- GL_TS_DB_4402614 stranded at west coast of Ireland
- GL_TS_DB_4401850 stranded at west coast of Norway
- GL_TS_DB_4402594 stranded at west coast of Ireland
- GL_TS_DB_4602523 stranded at Gulf of Alaska
- GL_TS_DB_4402584 stranded at west coast of Ireland
- GL_TS_DB_6402667 stranded at south coast of Iceland
- GL_TS_DB_4602724 stranded at Gulf of Alaska
- GL_TS_DB_6203748 stranded at west coast of Norway
- GL_TS_DB_6401875 stranded at south coast of Iceland
- GL_TS_DB_6402666 stranded at south coast of Iceland
- GL_TS_DB_4802539 stranded at northern Canada
- GL_TS_DB_4602524 stranded at Gulf of Alaska
- GL_TS_DB_4101643 stranded at west coast of Ireland
- GL_TS_DB_6401873 stranded at south coast of Iceland
- GL_TS_DB_6402663 stranded at north coast of Iceland
- GL_TS_DB_6401834 stranded at north coast of Iceland
- GL_TS_DB_6402554 stranded at north coast of Norway
- GL_TS_DB_4402616 stranded at north coast of Ireland
- GL_TS_DB_4602515 stranded at Gulf of Alaska
- GL_TS_DB_6402647 stranded at south coast of Iceland
- GL_TS_DB_4701658 stranded at Northwestern Passages
- GL_TS_DB_6402660 stranded at north coast of Iceland
- GL_TS_DB_6402716 stranded at north coast of Iceland
- GL_TS_DB_6203563 stranded at north coast of Finland
- GL_TS_DB_4601804 stranded at Gulf of Alaska
- GL_TS_DB_4801692 stranded at Bering Sea
- GL_TS_DB_6401874 stranded at west coast of Norway
- GL_TS_DB_4101842 stranded at west coast of Norway
- GL_TS_DB_4402654 stranded at Gulf of Alaska
- GL_TS_DB_4602511 stranded at Gulf of Alaska
- GL_TS_DB_4801723 stranded at west coast of Norway
- GL_TS_DB_6202624 stranded at Faroe Islands
- GL_TS_DB_6402659 stranded at north coast of Finland
- GL_TS_DB_6501689 stranded at Svalbard

For the validation period of July-December 2021, 66 buoys were disqualified from the validation data, since they are supposedly grounded at coast lines:

- GL_TS_DB_4601796 at coast of Russia at the Barents Sea
- GL_TS_DB_4801696 at north coast of Alaska
- GL_TS_DB_6203804 at south coast of Greenland
- GL_TS_DB_6402653 at south coast of Iceland
- GL_TS_DB_6402659 at south coast of Iceland
- GL_TS_DB_4801691 at north coast of Alaska
- GL_TS_DB_6203803 at south coast of Greenland
- GL_TS_DB_6203807 at south coast of Greenland
- GL_TS_DB_6401870 at north coast of Iceland
- GL_TS_DB_6301510 at north coast of Svalbard
- GL_TS_DB_2101797 at coast of Russia at the Barents Sea

- GL_TS_DB_4601820 at west coast of Svalbard
- GL_TS_DB_6402559 at south coast of Greenland
- GL_TS_DB_6402656 at east coast of Greenland
- GL_TS_DB_6501687 at west coast of Svalbard
- GL_TS_DB_6401844 at west coast of Iceland
- GL_TS_DB_4601799 at the coast of Alaska at the Gulf of Alaska
- GL_TS_DB_6402657 at south coast of Iceland
- GL_TS_DB_6402610 at south coast of Greenland
- GL_TS_DB_4401852 at the coast of Alaska at the Gulf of Alaska
- GL_TS_DB_6501547 at west coast of Svalbard
- GL_TS_DB_6401875 at south coast of Iceland
- GL_TS_DB_6402666 at south coast of Iceland
- GL_TS_DB_4802539 at north coast of Canada
- GL_TS_DB_4602725 at the coast of Alaska at the Gulf of Alaska
- GL_TS_DB_4401900 at north coast of Norway
- GL_TS_DB_6401845 at south coast of Iceland
- GL_TS_DB_2501667 at north coast of Russia at Laptev Sea
- GL_TS_DB_6401838 at south coast of Iceland
- GL_TS_DB_6203783 at Northern Canada
- GL_TS_DB_4402535 at north coast of Iceland
- GL_TS_DB_6401873 at south coast of Greenland
- GL_TS_DB_6501671 at west coast of Svalbard
- GL_TS_DB_4802504 at Northwestern Passages
- GL_TS_DB_6401861 at western Iceland
- GL_TS_DB_6402562 at southern Greenland
- GL_TS_DB_6401851 at the south coast Iceland
- GL_TS_DB_6401834 at coast of Iceland
- GL_TS_DB_4601599 at the coast of Alaska at the Gulf of Alaska
- GL_TS_DB_6402599 at southern Greenland
- GL_TS_DB_6203808 at southern Greenland
- GL_TS_DB_6501689 at coast of Svalbard
- GL_TS_DB_6402650 at coast of Iceland
- GL_TS_DB_6401866 at coast of Iceland
- GL_TS_DB_6402660 at coast of Iceland
- GL_TS_DB_6401860 at coast of Iceland
- GL_TS_DB_6203806 at coast of southern Greenland
- GL_TS_DB_4701735 at coast in the Northwest territory near Canada
- GL_TS_DB_6501680 at the east coast of Greenland
- GL_TS_DB_6401856 at the coast ofIceland
- GL_TS_DB_4402533 at the coast ofNorth Finnland
- GL_TS_DB_4602727 at the coast at Gulf of Alaska
- GL_TS_DB_6402649 at the coast of Iceland
- GL_TS_DB_6402651 at the coast ofIceland
- GL_TS_DB_6402554 at the coast ofNorway
- GL_TS_DB_6402647 at the coast ofIceland
- GL_TS_DB_6401832 at the coast ofIceland
- GL_TS_DB_6401836 at the coast ofIceland
- GL_TS_DB_6203585 at the coast of Russia at Barents Sea
- GL_TS_DB_6401871 at the coast of Iceland
- GL_TS_DB_6501688 at the coast of Svalbard

- GL_TS_DB_6501685 at the coast of Svalbard
- GL_TS_DB_6501545 at the coast of Svalbard
- GL_TS_DB_6203798 at the coast of Greenland
- GL_TS_DB_2101693 at the coast of Russia at Barent Sea
- GL_TS_DB_6203805 at the coast of Greenland

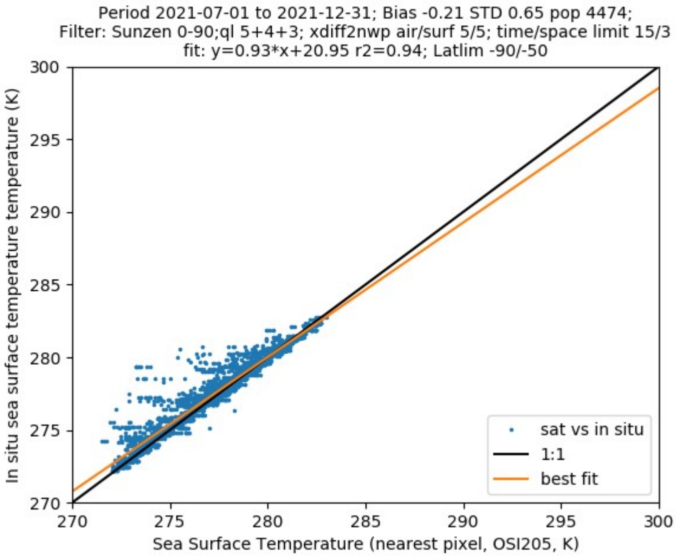


Figure 17: 2nd half 2021 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only daytime data for the southern hemisphere are shown.

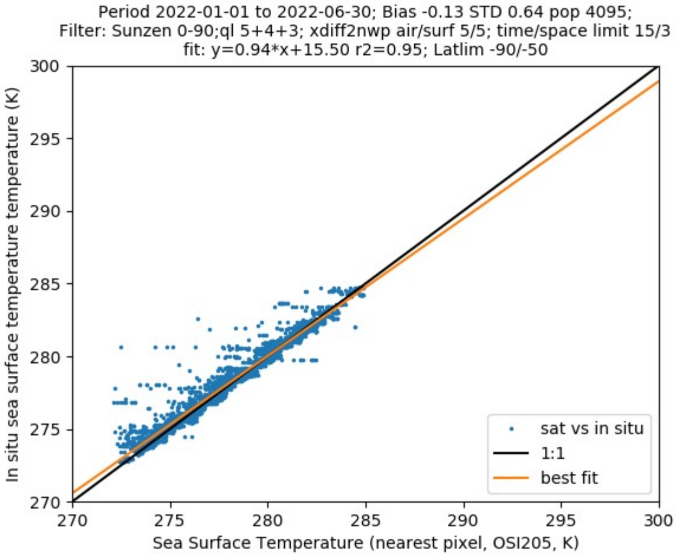


Figure 18: 1st half 2022 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only daytime data for the southern hemisphere are shown.

OSI-205-a AVHRR SST quality results over JUL 2021 to JUN 2022, night-time, SH					
Month	Number of cases	Mean diff. in K (req.: ± 0.7 K)	Mean diff. margin (*)	SD in K (req.: ± 1.0 K)	SD margin (**)
JUL 2021	1282	-0.95	-35.7	1.18	-18.0
AUG 2021	1028	-0.66	5.7	1.00	0.0
SEP 2021	879	-0.66	5.7	1.19	-19.0
OCT 2021	747	-0.37	47.1	0.89	11.0
NOV 2021	90	-0.12	82.9	0.75	25.0
DEC 2021	N/A	N/A	N/A	N/A	N/A
2nd half 2021	*4026*	*-0.68*	*2.9*	*1.10*	*-10.0*
JAN 2022	N/A	N/A	N/A	N/A	N/A
FEB 2022	68	-0.79	-12.9	1.35	-35.0
MAR 2022	1195	-0.38	45.7	1.08	-8.0
APR 2022	1095	-0.58	17.1	1.08	-8.0
MAY 2022	1050	-1.06	-51.4	1.26	-26.0
JUN 2022	1411	-0.77	-10.0	1.09	-9.0
1st half 2022	*4819*	*-0.69*	*1.4*	*1.15*	*-15.0*
OSI-205-a AVHRR SST quality results over JUL 2021 to JUN 2022, day-time, SH					
Month	Number of cases	Mean diff. in K (req.: ± 0.7 K)	Mean diff. margin (*)	SD in K (req.: ± 1.0 K)	SD margin (**)
JUL 2021	639	-0.44	37.1	1.00	0.0
AUG 2021	872	-0.38	45.7	0.74	26.0
SEP 2021	659	-0.24	65.7	0.69	31.0
OCT 2021	695	-0.16	77.1	0.39	61.0
NOV 2021	786	0.01	98.6	0.36	64.0
DEC 2021	823	-0.07	90.0	0.43	57.0
2nd half 2021	*4474*	*-0.21*	*70.0*	*0.65*	*35.0*
JAN 2022	724	0.01	98.6	0.65	35.0
FEB 2022	568	-0.01	98.6	0.38	62.0
MAR 2022	999	-0.05	92.9	0.42	58.0
APR 2022	723	-0.14	80.0	0.53	47.0
MAY 2022	589	-0.17	75.7	0.67	33.0
JUN 2022	492	-0.58	17.1	1.06	-6.0
1st half 2022	*4095*	*-0.13*	*81.4*	*0.64*	*36.0*
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 11: Quality results for OSI-205-a AVHRR SST, for the Southern Hemisphere, over JUL 2021 to JUN 2022, for quality level 5,4,3 by night and by day

Comments:
A visual inspection of extreme outliers has been carried out for the reporting period.
For the validation period of January-June 2022, 5 buoys were disqualified from the validation data, since they are supposedly grounded at coast lines:
GL_TS_DB_1601701 stranded at Drake Passage, tip of Antarctica
GL_TS_DB_5401758 stranded at the south coast of Argentina
GL_TS_DB_5401597 stranded at the south coast of Argentina
GL_TS_DB_5401552 stranded at the south coast of Argentina
GL_TS_DB_5401767 stranded at the south coast of Argentina

Validation values for the first half year of 2022 are fulfilling the requirements on mean error and standard deviation error. Day-time values all satisfy the target accuracy. The night-time values not satisfying the target accuracy are only slightly larger and still satisfy the threshold requirements of 1.5 K mean difference and standard deviation.

For the previous validation period, July-December 2021, 5 buoys were disqualified from the validation data, since they are supposedly grounded at coast lines:
GL_TS_DB_5401582 stranded at the south coast of Argentina
GL_TS_DB_5501578 stranded at the south coast of Argentina
GL_TS_DB_7301551 stranded at the south coast of Argentina
GL_TS_DB_5601646 stranded at the south coast of Argentina
GL_TS_DB_5401576 stranded at the south coast of Argentina

Validation values for the second half year of 2021 are fully satisfactory and fulfil the requirements on mean error and standard deviation error. The night-time values not satisfying the target accuracy still satisfy the threshold requirement of 1.5 K for mean difference and standard deviation.

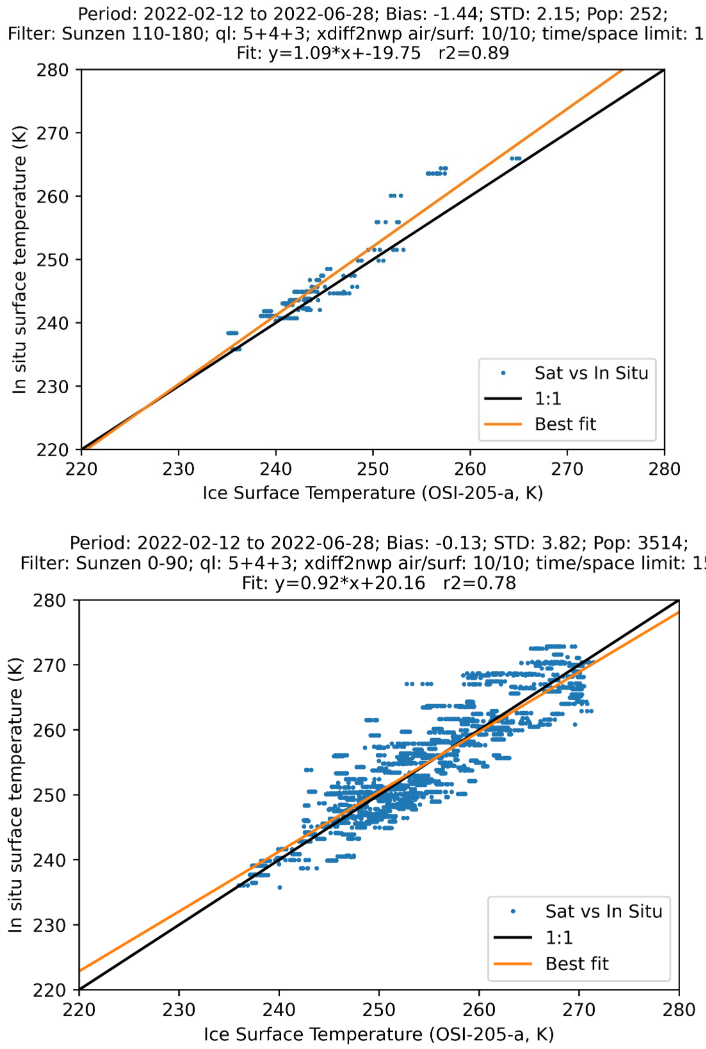


Figure 19: 1st half 2022 OSI-205-a monthly mean IST mean difference and bias with respect to conventional buoys measurements from the SIMB3 buoys (air temperature). Data with quality level 3, 4, 5 are shown. The graph on the left shows night-time data, while the plot on the right only shows day-time observations.

OSI-205-a IST quality results over 1st half 2022, night-time, air temperature, SIMB3					
Month	Number of cases	Mean diff. in K (req.: ± 3.5 K)	Mean diff. margin (*)	SD in K (req. : ± 3.0 K)	SD margin (**)
JAN 2022	137	-0.88	74.90	1.61	46.31
FEB 2022	109	-1.82	47.90	2.20	26.74
MAR 2022	6	-7.46	-113.24	0.48	84.05
APR 2022	N/A	N/A	N/A	N/A	N/A
MAY 2022	N/A	N/A	N/A	N/A	N/A
JUN 2022	N/A	N/A	N/A	N/A	N/A
OSI-205-a IST quality results over 1st half 2022, day-time, air temperature, SIMB3					
Month	Number of cases	Mean diff. in K (req.: ± 3.5 K)	Mean diff. margin (*)	SD in K (req. : ± 3.0 K)	SD margin (**)
JAN 2022	76	-0.12	96.69	3.70	-23.26
FEB 2022	230	-0.55	84.28	1.44	52.14
MAR 2022	1114	0.42	87.89	3.54	-18.06
APR 2022	1555	0.13	96.3	4.22	-40.52
MAY 2022	471	-1.83	47.75	3.40	-13.32
JUN 2022	68	-2.21	36.91	2.74	8.79
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 12: Quality results for OSI-205-a Metop AVHRR IST against SIMB3 for the Northen Hemisphere, over 1st half 2022, for quality levels 3, 4 and 5, by night and by day.

Comments:
For the validation against measured air temperatures of SIMB3 buoys in the Northern Hemisphere the target requirements for the mean difference are satisfied, except for night-time observations in March due to a low number of cases. The target requirements for the standard deviation are mostly satisfied, except for day-time observations. For the exceptions, indicated by the negative margin values in the margin column, all but the observations in April satisfy the threshold requirement of ±4.0K for the standard deviation.

Seven SIMB3 buoys from Cryosphere Innovation were active within the first six months of 2022. However, a single buoy has been omitted from the validation as it had a constant position in Utqiagvik, Alaska, and it measured a constant air temperature. The remaining six buoys were all located in the Northern Hemisphere and it has therefore not been possible to validate measurements for the Southern Hemisphere.

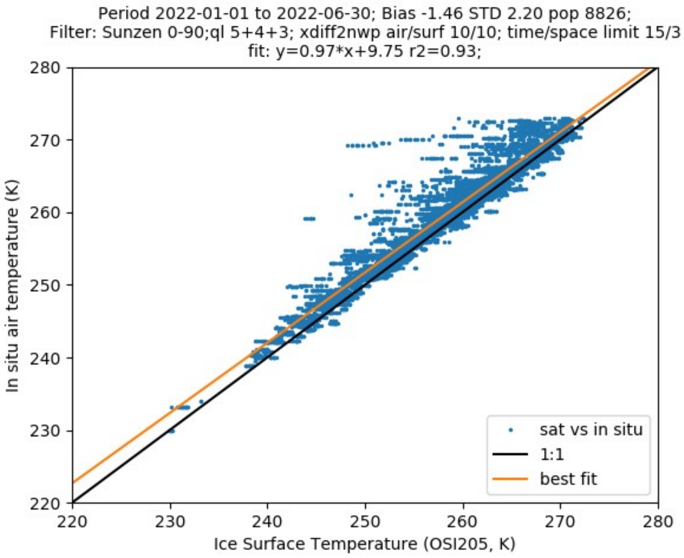


Figure 20: IST PROMICE air: 1st half 2022 OSI-205 monthly mean IST with respect to air measurements from PROMICE. Data with quality level 3, 4, 5 are shown. The graph shows day-time observations only, since not sufficient night-time observations are available yet for the reporting period.

OSI-205-a IST quality results over **1st half 2022**, night-time, air temperature, PROMICE					
Month	Number of cases	Mean diff. in K (target: ±3.5 K)	Mean diff. margin (*)	SD in K (target : ±3.0 K)	SD margin (**)
JAN 2022	N/A	N/A	N/A	N/A	N/A
FEB 2022	N/A	N/A	N/A	N/A	N/A
MAR 2022	N/A	N/A	N/A	N/A	N/A
APR 2022	N/A	N/A	N/A	N/A	N/A
MAY 2022	N/A	N/A	N/A	N/A	N/A
JUN 2022	N/A	N/A	N/A	N/A	N/A
OSI-205-a IST quality results over **1st half 2022**, day-time, air temperature, PROMICE					
Month	Number of cases	Mean diff. in K (target: ±3.5 K)	Mean diff. margin (*)	SD in K (target : ±3.0 K)	SD margin (**)
JAN 2022	N/A	N/A	N/A	N/A	N/A
FEB 2022	N/A	N/A	N/A	N/A	N/A
MAR 2022	N/A	N/A	N/A	N/A	N/A
APR 2022	2825	-1.93	-28.67	1.72	14.0
MAY 2022	3926	-1.22	18.67	2.41	-20.5
JUN 2022	2075	-1.26	16.00	2.28	-14.0
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. target|)) (**) SD margin = 100 * (1 - (SD / SD target)) 100 refers then to a perfect product, 0 to a quality just as targeted. without margin. A negative result indicates that the product quality does not fulfil the target requirement.					

Table 13: Quality results for OSI-205-a Metop AVHRR IST over 1st half 2022, for quality levels 3, 4 and 5, by night and by day. Compared to PROMICE measured air temperature

Comments:

(January – June 2022). For the validation against the measured PROMICE air temperatures, the

target requirements are only met for half of the validation values. However, the day-time results all lie within the threshold requirements of ±2.5K for the mean difference and ±3.0K for the standard deviation.
The used PROMICE stations are all located in the upper ablation around the equilibrium line, except for the EastGRIP station on the central ice cap. Some of the stations are therefore very close to the ice edge and hence some noise is expected. For the same reason, it is expected that the wind has not had time to cool down before it reaches the weather stations which would explain why the IST is generally colder than the observed air temperature.

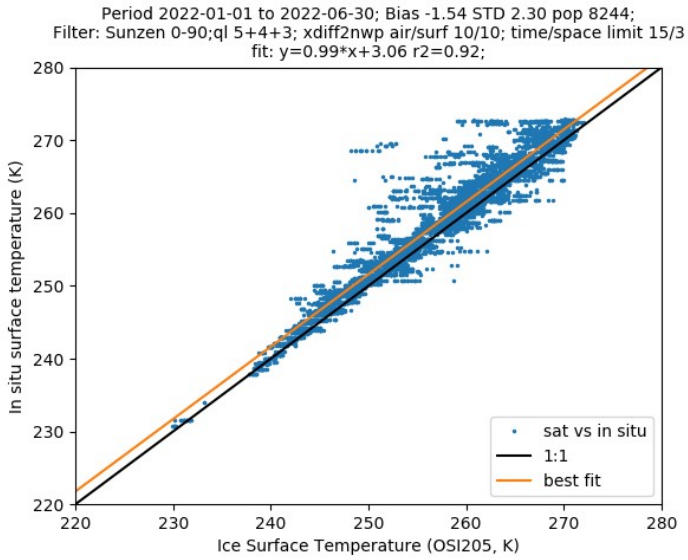


Figure 21: OSI-205-a IST mean difference and bias with respect to surface temperatures from the PROMICE stations. Data with quality level 3, 4, 5 are shown. The graph shows day-time observations only, since not sufficient night-time observations are available yet for the reporting period.

OSI-205-a IST quality results over **1st half 2022**, night-time, surface temperature, PROMICE					
Month	Number of cases	Mean diff. in K (target: ±3.5 K)	Mean diff. margin (*)	SD in K (target : ±3.0 K)	SD margin (**)
JAN 2022	N/A	N/A	N/A	N/A	N/A
FEB 2022	N/A	N/A	N/A	N/A	N/A
MAR 2022	N/A	N/A	N/A	N/A	N/A
APR 2022	N/A	N/A	N/A	N/A	N/A
MAY 2022	N/A	N/A	N/A	N/A	N/A
JUN 2022	N/A	N/A	N/A	N/A	N/A
OSI-205-a IST quality results over **1st half 2022**, day-time, surface temperature, PROMICE					
Month	Number of cases	Mean diff. in K (target: ±3.5 K)	Mean diff. margin (*)	SD in K (target : ±3.0 K)	SD margin (**)
JAN 2022	N/A	N/A	N/A	N/A	N/A
FEB 2022	N/A	N/A	N/A	N/A	N/A
MAR 2022	N/A	N/A	N/A	N/A	N/A
APR 2022	2775	-1.41	6.00	1.68	16.0
MAY 2022	3583	-1.41	6.00	2.51	-25.5
JUN 2022	1886	-1.99	-32.67	2.59	-29.5
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. target|)) (**) SD margin = 100 * (1 - (SD / SD target)) 100 refers then to a perfect product, 0 to a quality just as targeted. without margin. A negative result indicates that the product quality does not fulfil the target requirement.					

Table 14: Quality results for OSI-205-a Metop AVHRR IST over **1st half 2022**, for quality levels 3, 4 and 5, by night and by day. Compared to PROMICE measured surface temperature

Comments:
(January – June 2022). For the validation against the measured PROMICE surface temperatures, the target requirements are only met for half of the validation values. However, the day-time results all lie within the threshold requirements of ±2.5K for the mean difference and ±3.0K for the standard deviation.
The used PROMICE stations are all located in the upper ablation around the equilibrium line, except for the EastGRIP station on the central ice cap. Some of the stations are therefore very close to the ice edge and hence some noise is expected. For the same reason, it is expected that the wind has not had time to cool down before it reaches the weather stations which would explain why the IST is generally colder than the observed air temperature.

5.1.7.2. Level 2 NHL SST/IST based on NPP/VIRRS (OSI-205-b)

The Level 2 Northern High Latitude Sea and Ice Surface Temperature (NHL SST/IST, OSI-205-b) is based on VIIRS data from SNPP.

The following tables provides the OSI-205-b SST and IST quality results.

OSI-205-b NHL VIIRS SST quality results over JUL 2021 to JUN 2022, night-time					
Month	Number of cases	Mean diff. in K (req.: ± 0.7 K)	Mean diff. margin (*)	SD in K (req.: ± 1.0 K)	SD margin (**)
JUL 2021	852	-0.594	15.2	1.084	-8.4
AUG 2021	1234	-0.324	53.8	1.034	-3.4
SEP 2021	2382	-0.344	50.9	1.049	-4.9
OCT 2021	3623	-0.369	47.2	0.979	2.1
NOV 2021	2422	-0.425	39.3	0.966	3.4
DEC 2021	3203	-0.418	40.3	0.916	8.4
JAN 2022	790	-0.381	45.5	0.913	8.7
FEB 2022	567	-0.361	48.5	0.877	12.3
MAR 2022	646	-0.304	56.6	0.867	13.3
APR 2022	412	-0.482	31.1	0.956	4.4
MAY 2022	186	-0.542	22.6	0.928	7.2
JUN 2022	157	-0.287	59.1	0.944	5.6
OSI-205-b NHL VIIRS SST quality results over JUL 2021 to JUN 2022, day-time					
Month	Number of cases	Mean diff. in K (req.: ± 0.7 K)	Mean diff. margin (*)	SD in K (req.: ± 1.0 K)	SD margin (**)
JUL 2021	2804	-0.103	85.2	0.800	20.0
AUG 2021	2008	-0.119	83.0	0.826	17.4
SEP 2021	2908	-0.130	81.4	0.746	26.4
OCT 2021	3240	-0.147	79.0	0.733	26.7
NOV 2021	1328	-0.301	56.9	0.664	33.6
DEC 2021	1022	-0.383	45.3	0.735	26.5
JAN 2022	311	-0.289	58.7	0.695	30.5
FEB 2022	464	-0.399	43.0	0.699	30.1
MAR 2022	745	-0.341	51.3	0.653	34.7
APR 2022	695	-0.277	60.4	0.736	26.4
MAY 2022	504	-0.264	62.2	0.707	29.3
JUN 2022	889	-0.091	86.9	0.779	22.1
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 15: Quality results for OSI-205-b NHL VIIRS SST, over Northern Atlantic and Arctic Ocean, over JUL 2021 to JUN 2022, for 3,4,5 quality indexes, by night and by day. Comparison with drifting buoys.

Comment:
For the reporting period, the OSI-205-b SST is within target requirement for all months, both for mean difference and standard deviation.

OSI-205-b NHL VIIRS IST quality results over JUL 2021 to JUN 2022, night-time					
Month	Number of cases	Mean diff. in K (req.: ± 3.5 K)	Mean diff. margin (*)	SD in K (req.: ± 3.0 K)	SD margin (**)
JUL 2021	8	-0.287	80.8	1.085	45.7
AUG 2021	31	-1.630	-8.7	2.683	-34.1
SEP 2021	103	-1.099	26.8	2.208	-10.4
OCT 2021	38	-0.700	53.3	1.544	22.8
NOV 2021	-				
DEC 2021	-				
JAN 2022	-				
FEB 2022	-				
MAR 2022	-				
APR 2022	78	-0.267	82.2	1.843	7.8
MAY 2022	26	-1.187	20.9	1.795	10.2
JUN 2022	24	-1.008	32.8	1.707	14.6
OSI-205-b NHL VIIRS IST quality results over JUL 2021 to JUN 2022, day-time					
Month	Number of cases	Mean diff. in K (req.: ± 3.5 K)	Mean diff. margin (*)	SD in K (req.: ± 3.0 K)	SD margin (**)
JUL 2021	288	-1.385	7.7	1.723	13.8
AUG 2021	222	-1.478	1.5	1.686	15.7
SEP 2021	220	-1.619	-7.9	1.640	18.0
OCT 2021	49	-1.135	24.3	1.138	43.1
NOV 2021	-				
DEC 2021	-				
JAN 2022	-				
FEB 2022	-				
MAR 2022	-				
APR 2022	436	-1.989	-32.6	1.726	13.7
MAY 2022	735	-1.984	-32.3	1.786	10.7
JUN 2022	345	-2.292	-52.8	2.183	-9.1
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 16: Quality results for OSI-205-b NHL VIIRS IST, over Northern Atlantic and Arctic Ocean, over JUL 2021 to JUN 2022, for 3,4,5 quality indexes, by night and by day. Compared to PROMICE measured surface temperature. Data was not available for November to March.

Comments:
For this reporting period, data from January to March is missing, as these data must be collected manually at the stations, which will be done later.
The validation of the IST part of the OSI-205-b for this period shows a quality for the mean difference that is within the target requirement for all months at nighttime, but outside at daytime. For the standard deviation the quality is within the target requirement for all months at nighttime and daytime, except June at daytime. The values are all within the threshold requirement.

5.1.7.3. Level 3 NHL SST/IST based on Metop/AVHRR (OSI-203-a)

The Level 3 Northern High Latitude Sea and Sea Ice Surface Temperature (NHL SST/IST, OSI-203-a) is derived from the level 2 SST/IST product OSI-205-a, which is based on AVHRR data from Metop-B.

The following tables provide the OSI-203-a SST quality, then IST quality results.

OSI-203-a NHL AVHRR SST quality results over JUL 2021 to JUN 2022, night-time					
Month	Number of cases	Mean diff. in K (req.: ± 0.7 K)	Mean diff. margin (*)	SD in K (req.: ± 1.0 K)	SD margin (**)
JUL 2021	849	-0.509	27.3	1.240	-24.0
AUG 2021	1299	-0.231	67.0	1.016	-1.6
SEP 2021	2285	-0.445	36.5	0.906	9.4
OCT 2021	3586	-0.553	21.0	0.858	14.2
NOV 2021	3969	-0.628	10.2	0.844	15.6
DEC 2021	4537	-0.632	9.8	0.819	18.1
JAN 2022	10557	-0.745	-6.4	0.850	15.0
FEB 2022	6712	-0.714	-2.0	0.725	27.5
MAR 2022	6324	-0.689	1.6	0.808	19.2
APR 2022	4358	-0.566	19.1	0.879	12.1
MAY 2022	2210	-0.557	20.4	0.993	0.7
JUN 2022	1480	-0.393	43.9	1.177	-17.7
OSI-203-a NHL AVHRR SST quality results over JUL 2021 to JUN 2022, day-time					
Month	Number of cases	Mean diff. in K (req.: ± 0.7 K)	Mean diff. margin (*)	SD in K (req.: ± 1.0 K)	SD margin (**)
JUL 2021	3381	-0.111	84.1	0.885	11.5
AUG 2021	2760	-0.099	85.8	0.841	15.9
SEP 2021	4920	-0.060	91.4	0.692	30.8
OCT 2021	4847	-0.201	71.3	0.659	34.1
NOV 2021	3308	-0.262	62.6	0.649	35.1
DEC 2021	1806	-0.362	48.3	0.720	28.0
JAN 2022	3350	-0.310	55.8	0.840	16.0
FEB 2022	6771	-0.445	36.4	0.551	44.9
MAR 2022	10838	-0.289	58.7	0.650	35.0
APR 2022	10020	-0.252	64.0	0.655	34.5
MAY 2022	9983	-0.222	68.3	0.655	34.5
JUN 2022	12545	-0.054	92.3	0.796	20.4
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 17: Quality results for OSI-203-a NHL AVHRR SST over JUL 2021 to JUN 2022, for 3,4,5 quality indexes, by night and by day. Comparison with drifting buoys.

Comments:

For this period the SST validation results are within the target requirement for both mean difference and standard deviation for all months, except at nighttime in January and February for mean difference, and June for standard deviation (where it is within threshold requirement).

OSI-203-a NHL AVHRR IST quality results over JUL 2021 to JUN 2022, night-time					
Month	Number of cases	Mean diff. in K (req.: ± 3.5 K)	Mean diff. margin (*)	SD in K (req.: ± 3.0 K)	SD margin (**)
JUL 2021	0				
AUG 2021	10	-3.182	-112.1	2.302	-15.1
SEP 2021	52	-2.400	-60.0	2.507	-25.4
OCT 2021	108	-2.388	-59.2	2.509	-25.5
NOV 2021	-				
DEC 2021	-				
JAN 2022	-				
FEB 2022	-				
MAR 2022	-				
APR 2022	19	-1.977	-31.8	3.076	-53.8
MAY 2022	0				
JUN 2022	0				
OSI-203-a NHL AVHRR IST quality results over JUL 2021 to JUN 2022, day-time					
Month	Number of cases	Mean diff. in K (req.: ± 3.5 K)	Mean diff. margin (*)	SD in K (req.: ± 3.0 K)	SD margin (**)
JUL 2021	116	-2.414	-61.0	2.614	-30.7
AUG 2021	119	-2.791	-86.1	2.460	-23.0
SEP 2021	144	-0.988	34.1	3.097	-54.8
OCT 2021	96	-0.828	44.8	2.215	-10.8
NOV 2021	-				
DEC 2021	-				
JAN 2022	-				
FEB 2022	-				
MAR 2022	-				
APR 2022	179	0.350	76.7	3.013	-50.6
MAY 2022	313	0.333	77.8	2.792	-39.6
JUN 2022	212	-1.554	-3.6	2.788	-39.4
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 18: Quality results for OSI-203-a NHL AVHRR IST over JUL 2021 to JUN 2022, for 3,4,5 quality indexes, by night and by day. Compared to PROMICE measured surface temperature. Data was not available for November to March.

Comments:
For this reporting period, data from January to March is missing, as these data must be collected manually at the stations, which will be done later. The IST validation results for this period show that the mean difference is within the target requirement at daytime for April and May, but slightly outside for June. For nighttime the mean difference is outside for the one month with data. For standard deviation the validation results are outside the target requirement, but within or at the threshold requirement.
The validation is done against the mean of the in situ data over the 12 hour period covered by each L3 product. The ice surface temperature can have large daily variation, and satellite data contributing to the 12 hourly composites is not evenly distributed through the day, as for the in situ observations. The validation results can therefore be significant worse than the corresponding L2 validation results.

5.1.7.4. Level 3 NHL SST/IST based on NPP/VIRRS (OSI-203-b)

The Level 3 Northern High Latitude Sea and Ice Surface Temperature (NHL SST/IST, OSI-203-b) is derived from the Level 2 SST/IST product OSI-205-b, which is based on VIIRS data from SNPP.

The following tables provides the OSI-203-b SST and IST quality results.

OSI-203-b NHL VIIRS SST quality results over JUL 2021 to JUN 2022, night-time					
Month	Number of cases	Mean diff. in K (req.: ± 0.7 K)	Mean diff. margin (*)	SD in K (req.: ± 1.0 K)	SD margin (**)
JUL 2021	1716	-0.770	-10.0	1.128	-12.8
AUG 2021	1970	-0.628	10.3	1.144	-14.4
SEP 2021	4482	-0.488	30.3	0.991	0.9
OCT 2021	7159	-0.453	35.3	0.914	8.6
NOV 2021	8352	-0.452	35.5	0.854	14.6
DEC 2021	9117	-0.434	38.0	0.872	12.8
JAN 2022	16173	-0.328	53.2	0.901	9.9
FEB 2022	11306	-0.241	65.5	0.726	27.4
MAR 2022	11803	-0.254	63.7	0.897	10.3
APR 2022	8317	-0.559	20.2	0.900	10.0
MAY 2022	3082	-0.649	7.2	0.910	9.0
JUN 2022	2070	-0.459	34.5	1.077	-7.7
OSI-203-b NHL VIIRS SST quality results over JUL 2021 to JUN 2022, day-time					
Month	Number of cases	Mean diff. in K (req.: ± 0.7 K)	Mean diff. margin (*)	SD in K (req.: ± 1.0 K)	SD margin (**)
JUL 2021	3067	-0.128	81.7	0.744	25.6
AUG 2021	2374	-0.126	81.9	0.705	29.5
SEP 2021	4219	-0.168	75.9	0.636	36.4
OCT 2021	5810	-0.268	61.8	0.629	37.1
NOV 2021	4793	-0.382	45.4	0.624	37.6
DEC 2021	2746	-0,41	42.2	0.633	36.7
JAN 2022	5412	-0.428	38.8	0.747	25.3
FEB 2022	8290	-0.448	36.0	0.666	33.4
MAR 2022	10591	-0.388	44.5	0.677	32.3
APR 2022	9182	-0.468	33.2	0.750	25.0
MAY 2022	9119	-0.357	49.0	0.629	37.1
JUN 2022	10978	-0.165	76.4	0.682	31.8
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 19: Quality results for OSI-203-b NHL VIIRS SST over JUL 2021 to JUN 2022, for 3,4,5 quality indexes, by night and by day. Comparison with drifting buoys.

Comments:
For this period the SST validation results are within the target requirement for both mean difference and standard deviation for all months, except at nighttime in June for standard deviation (where it is within threshold requirement).

OSI-203-b NHL VIIRS IST quality results over JUL 2021 to JUN 2022, night-time					
Month	Number of cases	Mean diff. in K (req.: ± 3.5 K)	Mean diff. margin (*)	SD in K (req.: ± 3.0 K)	SD margin (**)
JUL 2021	0				
AUG 2021	13	-4.953	-230.2	1.468	26.6
SEP 2021	43	-3.781	-152.0	2.502	-25.1
OCT 2021	87	-2.030	-35.4	2.124	-6.2
NOV 2021	-				
DEC 2021	-				
JAN 2022	-				
FEB 2022	-				
MAR 2022	-				
APR 2022	36	-2.689	-79.2	2.617	-30.8
MAY 2022	0				
JUN 2022	0				
OSI-203-b NHL VIIRS IST quality results over JUL 2021 to JUN 2022, day-time					
Month	Number of cases	Mean diff. in K (req.: ± 3.5 K)	Mean diff. margin (*)	SD in K (req.: ± 3.0 K)	SD margin (**)
JUL 2021	75	-3.244	-116.3	1.892	5.4
AUG 2021	81	-3.080	-105.3	1.880	6.0
SEP 2021	97	-1.254	16.4	3.164	-58.2
OCT 2021	55	-0.341	77.3	1.839	8.0
NOV 2021	-				
DEC 2021	-				
JAN 2022	-				
FEB 2022	-				
MAR 2022	-				
APR 2022	124	-1.163	22.5	2.532	-26.6
MAY 2022	203	-2.233	-48.9	2.642	-32.1
JUN 2022	142	-3.620	-141.3	2.396	-19.8
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 20: Quality results for OSI-203-b NHL VIIRS IST over JUL 2021 to JUN 2022, for 3,4,5 quality indexes, by night and by day. Compared to PROMICE measured surface temperature. Data was not available for November to March.

Comments:
For this reporting period, data from January to March is missing, as these data must be collected manually at the stations, which will be done later.
The IST validation results for this period show that the mean difference is within the target requirement at daytime for April, but outside for May and June. For nighttime the mean difference is outside for the one month with data. For standard deviation the validation results are outside the target requirement, but within the threshold requirement.
The validation is done against the mean of the in situ data over the 12 hour period covered by each L3 product. The ice surface temperature can have large daily variation, and satellite data contributing to the 12 hourly composites is not evenly distributed through the day, as for the in situ observations. The validation results can therefore be significant worse than the corresponding L2 validation results.

5.1.8. IASI SST (OSI-208-b) quality

The product requirements for IASI SSTs are to have a target accuracy of 0.5 K mean difference and 0.8 K standard deviation compared to drifting buoy SSTs.

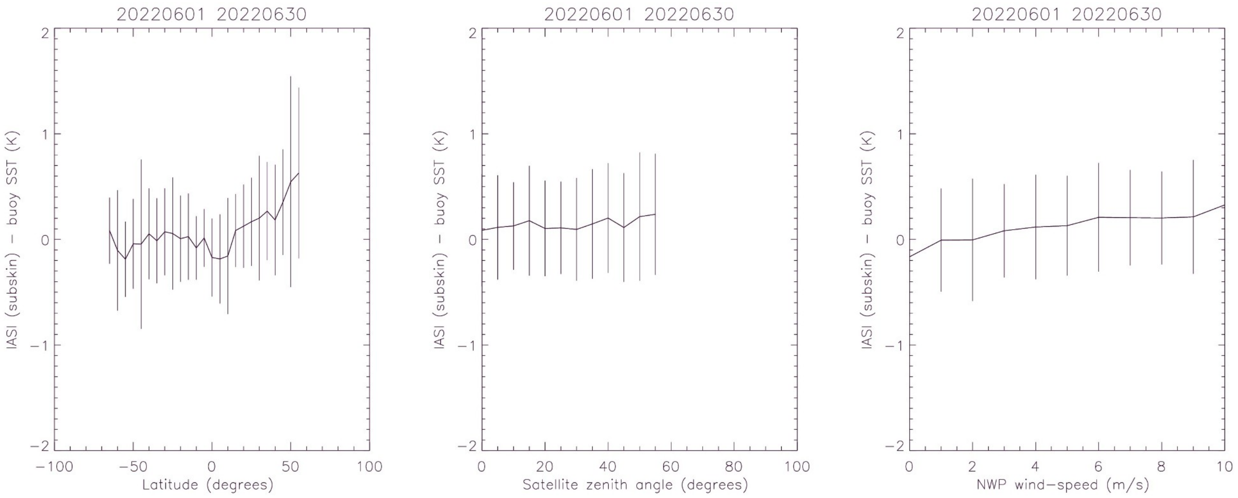


Figure 22: Mean Metop-B IASI night-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JAN 2022 to JUN 2022

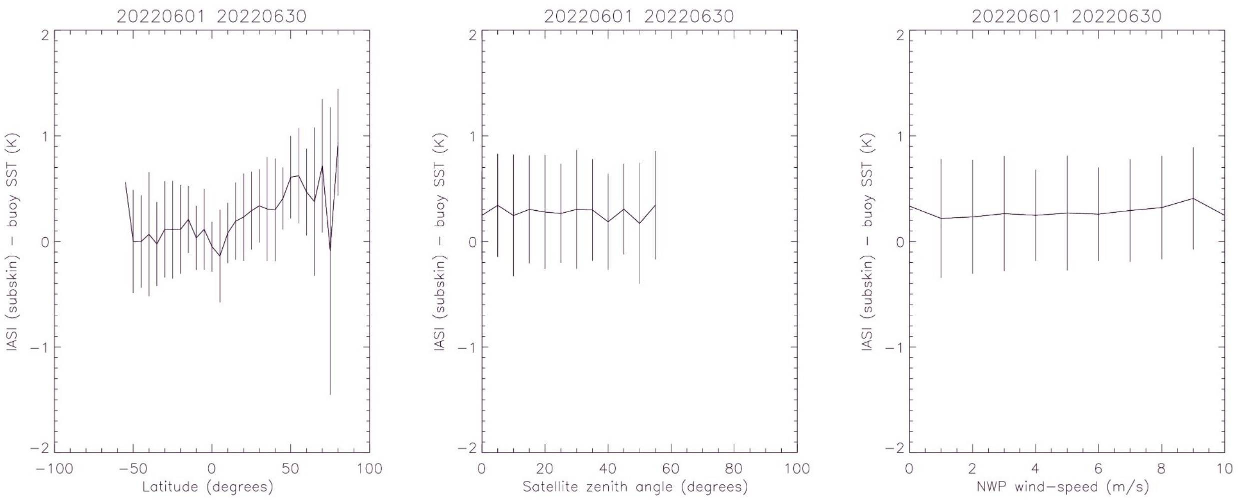


Figure 23: Mean Metop-B IASI day-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JAN 2022 to JUN 2022

The following table provides the Metop-B derived IASI SST quality results over the reporting period.

Global Metop-B IASI night-time SST quality results over 1st half 2022					
Month	Number of cases	Mean diff. in K (req. : ± 0.5 K)	Mean diff. margin (*)	SD in K (req. : ± 0.8 K)	SD margin (**)
1-8 JAN 2022	713	0.16	68	0.45	44
FEB 2022	2242	0.20	60	0.51	36
MAR 2022	1810	0.15	70	0.54	33
JUN 2022	2625	0.14	72	0.50	38
Global Metop-B IASI day-time SST quality results over 1st half 2022					
1-8 JAN 2022	568	0.24	52	0.39	49
FEB 2022	1887	0.28	44	0.49	39
MAR 2022	1446	0.19	62	0.46	43
JUN 2022	2224	0.27	46	0.50	38
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 21: Quality results for global Metop-B IASI SST over 1st half 2022, for Quality Levels 3, 4 and 5

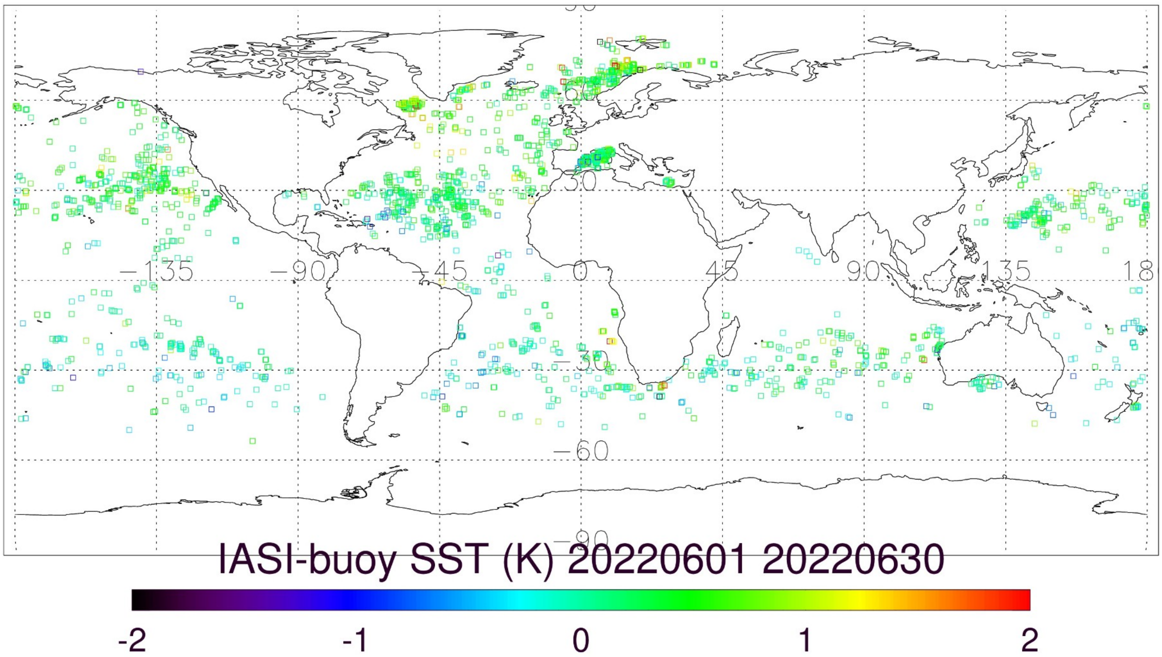


Figure 24: Mean Metop-B IASI night-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, DEC 2021 to JUN 2022

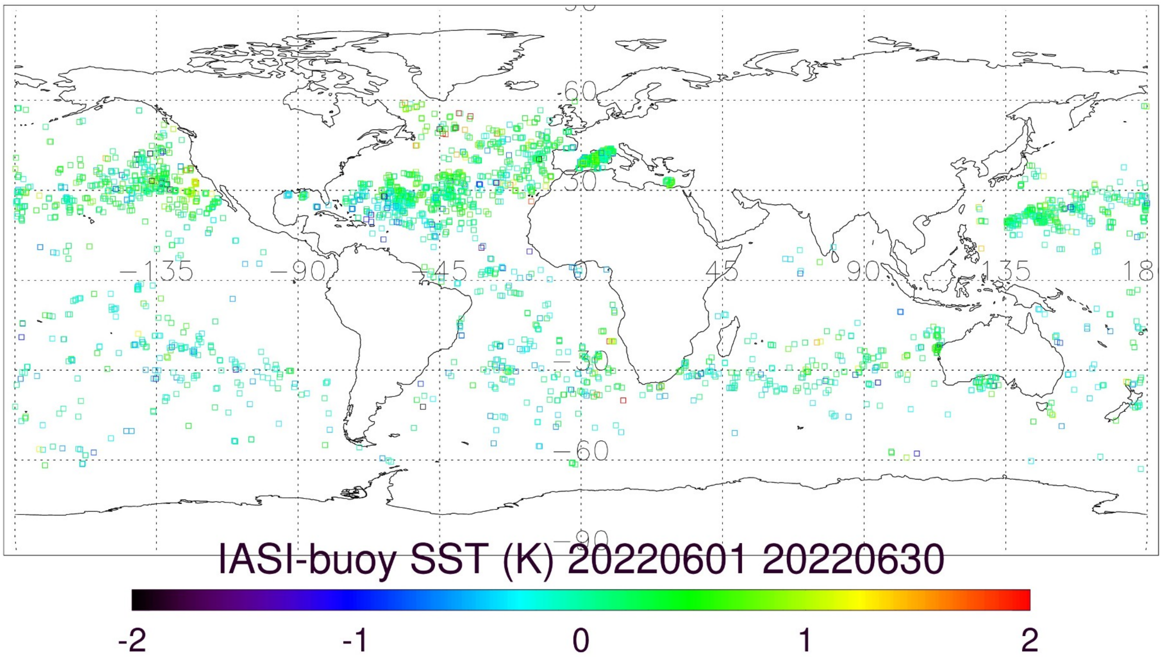


Figure 25: Mean Metop-B IASI day-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, DEC 2021 to JUN 2022

Comments:
Results from April and May are missing because of corrupted files.
The monthly validation results are within the specified requirements.

5.2. Radiative Fluxes quality

5.2.1. DLI quality

DLI products are constituted of the geostationary products (GOES-East, Meteosat 0°, Meteosat Indian Ocean) and the polar ones (Atlantic High Latitude). DLI values are required to have the following accuracy when compared to land pyrgeometer measurements:

- monthly relative mean difference less than 5%,
- monthly difference standard deviation less than 10%.

The match-up data base the statistics are based on is continuously enriched, so that, for the same period, results may evolve depending on the date when the statistics were calculated.

5.2.1.1. GOES-East DLI (OSI-305-b) quality

The list of pyrgeometer stations used for validating the geostationary DLI products is available on the OSI SAF Web Site from the following page:
http://osi-saf.eumetsat.int/lml/img/flx_map_stations.gif

The following table provides the hourly and daily DLI quality results over the reporting period.

GOES-East hourly DLI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean DLI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	2962	386.70	2.15	94.44	14.33	87.65	1.36	12.58
AUG 2021	2964	385.47	1.63	95.77	14.16	87.76	0.41	11.70
SEP 2021	3254	356.65	0.98	97.25	14.48	86.47	0.54	12.77
OCT 2021	3689	342.96	-3.61	89.47	14.94	85.48	-2.89	11.99
NOV 2021	2861	274.75	-1.55	94.36	14.77	82.08	0.05	12.99
DEC 2021	2974	277.85	-6.32	77.25	19.56	76.53	-4.08	16.80
JAN 2022	2954	244.27	-5.13	79.00	19.71	73.10	-5.00	15.04
FEB 2022	2631	253.28	-7.20	71.57	18.35	75.85	-6.11	16.15
MAR 2022	2963	280.83	-4.98	82.27	15.19	81.97	-4.20	13.94
APR 2022	2861	302.43	-2.80	90.74	15.01	83.46	-2.20	14.44
MAY 2022	2967	346.19	0.08	99.77	14.90	85.65	0.33	13.98
JUN 2022	2867	367.83	2.93	92.03	14.48	86.88	3.08	12.92

(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|))
with mean diff. in % = 100*Mean diff/Mean DLI
and mean diff. req. = 5 %
100 refers then to a perfect product, 0 to a quality just as required, without margin.
A negative result indicates that the product quality does not fulfil the requirement.

(**) SD margin = 100 * (1 – (SD in % / SD req. in %))
with SD req. = 10%
Same comment as for Mean diff. margin

Table 22: GOES-East hourly DLI quality results from JUL 2021 to JUN 2022.

GOES-East daily DLI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean DLI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	124	386.70	2.09	94.60	8.21	92.92	1.97	7.94
AUG 2021	123	385.53	1.66	95.69	7.36	93.64	1.47	6.53
SEP 2021	132	356.82	0.89	97.51	8.62	91.95	1.70	8.81
OCT 2021	153	343.05	-3.62	89.45	8.97	91.28	-3.05	8.24
NOV 2021	117	275.49	-1.57	94.30	8.21	90.07	-0.45	8.49
DEC 2021	124	277.87	-6.33	77.22	10.79	87.06	-6.31	11.52
JAN 2022	121	243.84	-5.17	78.80	11.42	84.39	-5.34	9.56
FEB 2022	107	253.89	-7.38	70.93	10.16	86.66	-7.75	10.87
MAR 2022	123	280.94	-5.02	82.13	8.40	90.03	-4.82	8.37
APR 2022	119	302.49	-2.84	90.61	7.86	91.34	-2.24	6.97
MAY 2022	124	346.41	0.12	99.65	8.40	91.92	0.10	9.41
JUN 2022	119	367.74	2.93	92.03	7.64	93.07	3.02	7.16

(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|))
with mean diff. in % = 100*Mean diff/Mean DLI
and mean diff. req. = 5 %
100 refers then to a perfect product, 0 to a quality just as required, without margin.
A negative result indicates that the product quality does not fulfil the requirement.

(**) SD margin = 100 * (1 - (SD / SD req.))
with SD req. = 10%
Same comment as for Mean diff. margin

Table 23: GOES-East daily DLI quality results from JUL 2021 to JUN 2022.

Comments:
Overall statistics are good and within the requirement.

5.2.1.2. Meteosat 0° DLI (OSI-303-a) quality

The following table provides the hourly and daily DLI quality results over the reporting period.

Comments:
Overall statistics are good and within the requirement.

Meteosat 0° hourly DLI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean DLI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	669	361.73	3.32	90.82	11.64	89.27	3.53	11.11
AUG 2021	694	359.47	3.02	91.60	12.10	88.78	3.30	10.65
SEP 2021	538	352.58	1.80	94.89	11.58	89.05	1.94	10.99
OCT 2021	597	314.06	1.60	94.91	14.67	84.43	1.62	13.21
NOV 2021	646	293.05	-5.68	80.62	17.38	80.23	-3.58	14.81
DEC 2021	615	292.28	-16.19	44.61	22.48	74.36	-13.66	23.72
JAN 2022	373	286.62	-9.48	66.92	16.86	80.39	-10.91	16.42
FEB 2022	670	290.55	-4.72	83.75	17.34	80.11	-2.98	15.68
MAR 2022	744	294.47	1.13	96.16	17.80	79.85	0.45	16.37
APR 2022	720	304.50	2.70	91.13	14.71	83.90	2.31	13.07
MAY 2022	719	330.79	3.30	90.02	11.88	88.03	3.55	11.32
JUN 2022	720	351.09	4.78	86.39	13.10	87.56	4.88	12.88

(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|))
with mean diff. in % = 100*Mean diff/Mean DLI
and mean diff. req. = 5 %
100 refers then to a perfect product, 0 to a quality just as required, without margin.
A negative result indicates that the product quality does not fulfil the requirement.

(**) SD margin = 100 * (1 - (SD / SD req.))
with SD req. = 10%
Same comment as for Mean diff. margin

Table 24: Meteosat 0° hourly DLI quality results from JUL 2021 to JUN 2022.

Meteosat 0° daily DLI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean DLI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	28	361.72	3.30	90.88	4.71	95.66	3.82	5.18
AUG 2021	29	359.46	3.06	91.49	4.86	95.49	2.44	3.98
SEP 2021	22	352.39	1.62	95.40	5.42	94.87	0.92	6.11
OCT 2021	25	314.12	1.58	94.97	6.15	93.47	2.96	5.91
NOV 2021	27	293.09	-5.73	80.45	8.88	89.90	-3.67	10.11
DEC 2021	25	291.94	-16.42	43.76	15.57	82.22	-11.05	15.55
JAN 2022	16	286.52	-9.65	66.32	8.06	90.62	-11.36	8.60
FEB 2022	28	290.45	-4.73	83.71	10.65	87.78	-4.20	9.93
MAR 2022	31	294.46	1.15	96.09	11.18	87.34	1.80	9.27
APR 2022	30	304.50	2.68	91.20	8.32	90.89	2.52	7.55
MAY 2022	30	330.83	3.25	90.18	4.10	95.87	3.08	4.35
JUN 2022	30	351.10	4.79	86.36	5.54	94.74	4.39	5.37

(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|))
with mean diff. in % = 100*Mean diff/Mean DLI
and mean diff. req. = 5 %
100 refers then to a perfect product, 0 to a quality just as required, without margin.
A negative result indicates that the product quality does not fulfil the requirement.

(**) SD margin = 100 * (1 - (SD / SD req.))
with SD req. = 10%
Same comment as for Mean diff. margin

Table 25: Meteosat 0° daily DLI quality results from JUL 2021 to JUN 2022.

5.2.1.3. *Meteosat Indian Ocean DLI (OSI-IO-DLI) quality*

Since 2016, Meteosat-8 is in position 41.5 East for the Indian Ocean Data Coverage (IODC). Downward Long wave Irradiance is processed as a demonstration product.

The following table provides the hourly and daily DLI quality results over the reporting period.

From 23 June 2022, Meteosat-8 has been replaced by Meteosat-9, in position 45.5 East, as input data for OSI SAF products. The figures provided for June 2022 are therefore only on the period 1st to 22th June. In next half-yearly report, the figures will be calculated with Meteosat-9 data.

Meteosat Indian Ocean hourly DLI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean DLI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	669	365.73	7.32	79.99	14.34	86.93	6.34	12.34
AUG 2021	694	362.27	5.82	83.93	13.80	87.30	5.14	11.98
SEP 2021	538	354.16	3.38	90.46	15.49	85.42	2.93	12.60
OCT 2021	597	317.41	4.95	84.41	19.37	79.66	2.29	16.28
NOV 2021	646	296.14	-2.58	91.29	21.32	76.00	-1.98	18.98
DEC 2021	633	295.50	-13.53	54.21	23.43	73.57	-11.89	24.09
JAN 2022	717	290.96	-10.07	65.39	18.24	79.10	-9.61	15.30
FEB 2022	670	292.83	-2.44	91.67	22.01	74.95	-1.47	19.42
MAR 2022	744	297.23	3.89	86.91	20.48	77.03	2.99	19.43
APR 2022	720	306.70	4.91	83.99	15.94	82.68	4.40	14.06
MAY 2022	719	335.69	8.20	75.57	16.66	83.46	6.61	13.33
JUN 2022	528	354.61	8.81	75.16	15.19	85.72	8.75	15.17
(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|)) with mean diff. in % = 100*Mean diff/Mean DLI and mean diff. req. = 5 % 100 refers then to a perfect product, 0 to a quality just as required, without margin. A negative result indicates that the product quality does not fulfil the requirement. **(**) SD margin = 100 * (1 - (SD / SD req.))** with SD req. = 10% Same comment as for Mean diff. margin								

Table 26: Meteosat Indian Ocean hourly DLI quality results from JUL 2021 to JUN 2022.

Meteosat Indian Ocean daily DLI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean DLI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	28	365.71	7.29	80.07	7.21	93.43	6.58	8.15
AUG 2021	29	362.23	5.83	83.91	5.53	94.91	5.56	5.73
SEP 2021	22	354.06	3.30	90.68	7.68	92.77	1.22	7.63
OCT 2021	25	317.45	4.92	84.50	7.58	92.04	6.06	5.10
NOV 2021	27	296.15	-2.67	90.98	10.00	88.74	-2.53	11.80
DEC 2021	27	295.99	-13.50	54.39	16.05	81.93	-8.94	19.17
JAN 2022	30	290.98	-10.02	65.56	10.08	88.45	-9.70	9.99
FEB 2022	28	292.72	-2.46	91.60	13.51	84.62	-0.69	14.84
MAR 2022	31	297.25	3.94	86.75	13.43	84.94	4.48	16.42
APR 2022	30	306.70	4.87	84.12	8.78	90.46	5.04	10.52
MAY 2022	30	335.72	8.14	75.75	6.29	93.75	8.14	8.08
JUN 2022	22	354.68	8.78	75.25	6.49	93.90	7.91	6.93

(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|))
with mean diff. in % = 100*Mean diff/Mean DLI
and mean diff. req. = 5 %
100 refers then to a perfect product, 0 to a quality just as required, without margin.
A negative result indicates that the product quality does not fulfil the requirement.

(**) SD margin = 100 * (1 - (SD / SD req.))
with SD req. = 10%
Same comment as for Mean diff. margin

Table 27: Meteosat Indian Ocean daily DLI quality results from JUL 2021 to JUN 2022.

Comments:
Overall statistics are good and within the requirement.

5.2.1.4. AHL DLI (OSI-301-b) quality

The pyrgeometer stations used for quality assessment of the AHL DLI product are briefly described at http://nowcasting.met.no/validering/flukser/. More information on the stations is provided in 5.2.2.4.

The following table provides the AHL DLI quality results over the reporting period.

AHL DLI quality results from JUL 2021 to JUN 2022						
Month	Number of cases	Mean DLI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)
JUL 2021	137	333.43	-0.35	97.92	18.39	44.86
AUG 2021	122	331.54	-3.28	80.23	14.65	55.80
SEP 2021	118	313.04	-5.49	64.90	15.19	51.47
OCT 2021	122	299.65	-2.90	80.67	15.90	46.95
NOV 2021	118	272.14	-0.48	96.45	16.19	40.51
DEC 2021	122	256.68	-0.44	96.57	19.79	22.90
JAN 2022	134	262.43	-2.22	55.64	17.81	32.69
FEB 2022	135	265.48	0.89	82.23	15.39	41.83
MAR 2022	147	267.10	2.20	55.98	15.00	43.36
APR 2022	148	276.48	3.21	35.86	16.67	38.99
MAY 2022	153	301.08	3.84	23.11	17.76	40.24
JUN 2022	148	328.89	3.04	39.12	18.29	43.87

(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|))
with mean diff. in % = 100*Mean diff/Mean DLI
and mean diff. req. = 5 %
100 refers then to a perfect product, 0 to a quality just as required, without margin.
A negative result indicates that the product quality does not fulfil the requirement.

(**) SD margin = 100 * (1 - (SD / SD req.))
with SD req. = 10%

Table 28: AHL DLI quality results from JUL 2021 to JUN 2022.

Comments:
For the reporting period the target requirement on mean difference and standard deviation are met for all months.

5.2.2. SSI quality

SSI products are constituted of the geostationary products (GOES-East, Meteosat 0°, Meteosat Indian Ocean) and polar ones (Atlantic High Latitude). SSI values are required to have the following accuracy when compared to land pyranometer measurements:

- monthly relative mean difference less than 10 %,
- monthly difference standard deviation less than 30 %.

The match-up data base the statistics are based on is continuously enriched, so that, for the same period, results may evolve depending on the date when the statistics were calculated.

5.2.2.1. GOES-East SSI (OSI-306-b) quality

The following table provides the hourly and daily SSI quality results over the reporting period.

GOES-East hourly SSI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean SSI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	3684	474.86	8.63	81.83	82.99	41.74	6.54	61.82
AUG 2021	3400	487.14	5.58	88.55	92.78	36.51	1.93	57.36
SEP 2021	3194	473.23	5.31	88.78	82.33	42.01	-2.19	48.39
OCT 2021	3254	400.06	6.05	84.88	71.88	40.11	-0.88	43.73
NOV 2021	2505	377.18	9.31	75.32	74.31	34.33	0.51	41.88
DEC 2021	2370	311.17	-5.28	83.03	72.30	22.55	-6.79	47.18
JAN 2022	2507	329.33	-7.73	76.53	83.00	15.99	-4.32	53.46
FEB 2022	2537	347.97	-10.84	68.85	93.53	10.40	-8.78	52.05
MAR 2022	3124	393.08	-3.44	91.25	81.54	30.85	-1.29	51.45
APR 2022	3229	434.56	-6.07	86.03	87.26	33.07	-3.53	50.79
MAY 2022	3624	447.64	-7.78	82.62	84.44	37.12	-10.73	56.05
JUN 2022	1909	500.22	-10.97	78.07	72.83	51.47	-13.31	40.70

(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|))
with mean diff. in % = 100*Mean diff/Mean SSI
and mean diff. req. = 10 %
100 refers then to a perfect product, 0 to a quality just as required, without margin.
A negative result indicates that the product quality does not fulfil the requirement.

(**) SD margin = 100 * (1 - (SD / SD req.))
with SD req. = 30%
Same comment as for Mean diff. margin

Table 29: GOES-East hourly SSI quality results from JUL 2021 to JUN 2022.

GOES-East daily SSI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean SSI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	150	218.29	0.15	99.31	22.04	66.34	-0.10	22.16
AUG 2021	161	230.54	4.58	80.13	22.75	67.11	2.86	20.72
SEP 2021	211	211.43	3.37	84.06	20.45	67.76	2.79	13.39
OCT 2021	287	165.51	2.06	87.55	16.33	67.11	0.50	12.65
NOV 2021	289	136.18	2.08	84.73	16.44	59.76	0.58	9.87
DEC 2021	303	103.98	-3.05	70.67	15.09	51.63	-2.98	10.48
JAN 2022	281	117.85	-2.52	78.62	19.27	45.50	-0.44	14.90
FEB 2022	226	141.06	-1.60	88.66	23.13	45.34	-0.78	15.68
MAR 2022	208	168.82	-2.56	84.84	23.16	54.27	-1.02	14.17
APR 2022	174	187.15	-3.89	79.21	21.95	60.90	-2.40	20.14
MAY 2022	154	210.68	-2.39	88.66	23.67	62.55	-3.54	17.59
JUN 2022	150	229.81	1.45	93.69	23.04	66.58	1.37	21.38

(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|))
with mean diff. in % = 100*Mean diff/Mean SSI
and mean diff. req. = 10 %
100 refers then to a perfect product, 0 to a quality just as required, without margin.
A negative result indicates that the product quality does not fulfil the requirement.

(**) SD margin = 100 * (1 - (SD / SD req.))
with SD req. = 30%
Same comment as for Mean diff. margin

Table 30: GOES-East daily SSI quality results from JUL 2021 to JUN 2022.

Comments:
Overall statistics are good and within the requirement.

5.2.2.2. *Meteosat 0° SSI (OSI-304-a) quality*

The following table provides the hourly and daily SSI quality results over the reporting period.

Meteosat 0° hourly SSI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean SSI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	4411	444.11	-15.07	66.07	59.68	55.21	-12.06	42.44
AUG 2021	4238	438.19	-14.47	66.98	59.30	54.89	-12.68	42.95
SEP 2021	3655	456.34	-14.08	69.15	58.97	56.93	-11.90	41.35
OCT 2021	3428	412.37	-6.07	85.28	65.38	47.15	-6.94	38.69
NOV 2021	2922	361.23	6.10	83.11	76.46	29.44	4.06	40.73
DEC 2021	2630	346.69	-2.79	91.95	61.19	41.17	-1.65	32.68
JAN 2022	1553	325.02	1.05	96.77	76.38	21.67	1.11	40.74
FEB 2022	3021	368.18	1.35	96.33	61.13	44.66	3.34	37.37
MAR 2022	3718	430.14	8.68	79.82	73.66	42.92	10.43	44.53
APR 2022	4011	463.44	2.62	94.35	62.82	54.82	2.22	47.37
MAY 2022	4004	498.78	-4.97	90.04	64.76	56.72	-6.59	44.92
JUN 2022	388	480.70	-14.83	69.15	73.90	48.76	-16.25	44.40
(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|)) with mean diff. in % = 100*Mean diff/Mean SSI and mean diff. req. = 10 % 100 refers then to a perfect product, 0 to a quality just as required, without margin. A negative result indicates that the product quality does not fulfil the requirement. **(**) SD margin = 100 * (1 - (SD / SD req.))** with SD req. = 30% Same comment as for Mean diff. margin								

Table 31: Meteosat 0° hourly SSI quality results from JUL 2021 to JUN 2022.

Meteosat 0° daily SSI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean SSI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	365	225.98	-8.41	62.78	14.30	78.91	-7.38	12.00
AUG 2021	366	211.56	-8.16	61.43	14.93	76.48	-8.84	14.65
SEP 2021	340	200.98	-7.44	62.98	12.86	78.67	-6.17	12.53
OCT 2021	365	163.97	-3.79	76.89	14.51	70.50	-3.28	8.65
NOV 2021	355	126.71	1.22	90.37	16.97	55.36	-0.16	9.10
DEC 2021	342	112.64	-1.75	84.46	12.98	61.59	-1.29	6.12
JAN 2022	189	108.15	-0.38	96.49	17.92	44.77	-0.12	8.32
FEB 2022	335	141.10	-0.26	98.16	13.97	67.00	0.43	9.37
MAR 2022	360	183.52	2.79	84.80	19.07	65.36	4.58	13.55
APR 2022	359	218.33	0.11	99.50	15.76	75.94	1.05	13.82
MAY 2022	330	255.60	-3.51	86.27	16.86	78.01	-2.57	15.18
JUN 2022	30	265.43	-7.48	71.82	16.38	79.43	-5.81	11.63

(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|))
with mean diff. in % = 100*Mean diff/Mean SSI
and mean diff. req. = 10 %
100 refers then to a perfect product, 0 to a quality just as required, without margin.
A negative result indicates that the product quality does not fulfil the requirement.

(**) SD margin = 100 * (1 - (SD / SD req.))
with SD req. = 30%
Same comment as for Mean diff. margin

Table 32: Meteosat 0° daily SSI quality results from JUL 2021 to JUN 2022.

Comments:
Overall statistics are good and within the requirement.

5.2.2.3. Meteosat Indian Ocean SSI (OSI-IO-SSI)

Surface Solar Irradiance from Meteosat-8 (in position 41.5 East) is processed as a demonstration product since 2016.

The following table provides the hourly and daily SSI quality results over the reporting period.

From 23 June 2022, Meteosat-8 has been replaced by Meteosat-9, in position 45.5 East, as input data for OSI SAF products. The figures provided for June 2022 are therefore only on the period 1st to 22th June. In next half-yearly report, the figures will be calculated with Meteosat-9 data.

Meteosat Indian Ocean hourly SSI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean SSI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	4409	449.67	-9.63	78.58	62.56	53.63	-7.78	43.68
AUG 2021	4249	441.21	-10.47	76.27	63.47	52.05	-9.56	44.67
SEP 2021	3660	458.65	-11.29	75.38	64.14	53.38	-8.48	43.71
OCT 2021	3433	417.85	-0.13	99.69	67.55	46.11	-4.37	42.36
NOV 2021	2920	366.33	10.94	70.14	71.53	34.91	5.36	43.54
DEC 2021	2705	352.90	3.95	88.81	60.96	42.42	-0.06	34.20
JAN 2022	2936	333.88	3.80	88.62	64.84	35.27	1.46	41.42
FEB 2022	3005	374.93	6.34	83.09	61.05	45.72	6.05	41.57
MAR 2022	3723	434.01	12.97	70.12	69.62	46.53	12.48	45.32
APR 2022	4015	464.05	3.47	92.52	62.79	54.90	3.67	47.37
MAY 2022	4007	498.33	-5.13	89.71	65.95	55.89	-5.29	45.27
JUN 2022	286	495.56	-16.74	66.22	78.87	46.95	-13.82	45.43

(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|))
with mean diff. in % = 100*Mean diff/Mean SSI
and mean diff. req. = 10 %
100 refers then to a perfect product, 0 to a quality just as required, without margin.
A negative result indicates that the product quality does not fulfil the requirement.

(**) SD margin = 100 * (1 - (SD / SD req.))
with SD req. = 30%
Same comment as for Mean diff. margin

Table 33: Meteosat Indian Ocean hourly SSI quality results from JUL 2021 to JUN 2022.

Meteosat Indian Ocean daily SSI quality results from JUL 2021 to JUN 2022								
Month	Number of cases	Mean SSI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)	Median	RSD
JUL 2021	365	228.72	-5.66	75.25	15.56	77.32	-4.58	14.24
AUG 2021	366	213.55	-6.17	71.11	16.74	73.87	-6.94	17.03
SEP 2021	340	202.43	-5.99	70.41	15.36	74.71	-4.74	14.36
OCT 2021	365	166.46	-1.30	92.19	16.06	67.84	-2.85	11.28
NOV 2021	355	128.59	3.10	75.89	17.94	53.50	0.81	11.28
DEC 2021	354	114.20	0.43	96.23	13.14	61.65	-1.01	8.00
JAN 2022	356	113.95	0.4	96.49	15.7	54.07	-1.11	9.93
FEB 2022	335	143.06	1.71	88.05	13.44	68.68	1.3	12.14
MAR 2022	360	182.95	4.67	74.47	16.99	69.04	5.12	12.18
APR 2022	359	218.92	0.71	96.76	15.11	76.99	1.96	13.34
MAY 2022	330	255.61	-3.51	86.27	17.32	77.41	-1.13	15.79
JUN 2022	22	274.99	-8.44	69.31	19.89	75.89	-5.45	9.61
(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|)) with mean diff. in % = 100*Mean diff/Mean SSI and mean diff. req. = 10 % 100 refers then to a perfect product, 0 to a quality just as required, without margin. A negative result indicates that the product quality does not fulfil the requirement. **(**) SD margin = 100 * (1 - (SD / SD req.))** with SD req. = 30% Same comment as for Mean diff. margin								

Table 34: Meteosat Indian Ocean daily SSI quality results from JUL 2021 to JUN 2022.

Comments:
Overall statistics are good and within the requirement.

5.2.2.4. AHL SSI (OSI-302-b) quality

The pyranometer stations used for quality assessment of the AHL SSI and DLI products are shown in the following table.

Station	StId	Latitude	Longitude		Status
Apelsvoll	11500	60.70°N	10.87°E	SSI	In use, under examination due to shadow effects.
Løken	23500	61.12°N	9.07°E	SSI	Not used currently
Landvik	38140	58.33°N	8.52°E	SSI	In use
Særheim	44300	58.78°N	5.68°E	SSI	Not used currently
Fureneset	56420	61.30°N	5.05°E	SSI	In use
Tjøtta	76530	65.83°N	12.43°E	SSI	Not used currently
Holt	90400	69.67°N	18.93°E	SSI	In use
Bjørnøya	99710	74.52°N	19.02°E	SSI, DLI	In use, Arctic station with snow on ground much of the year.

Station	StId	Latitude	Longitude		Status
Hopen	99720	76.51°N	25.01°E	SSI, DLI	Not in use currently, Arctic station with snow on ground much of the year. Strong shadow effect by mountains.
Jan_Mayen	99950	70.93°N	-8.67°E	SSI, DLI	In use, Arctic station with snow on ground much of the year, volcanic ash deteriorates instruments in periods.
Schleswig	10035	54.53°N	9.55°E	SSI, DLI	In use
Hamburg-Fuhlsbuettel	10147	53.63°N	9.99°E	SSI, DLI	Not used currently
Jokioinen	1201	60.81°N	23.501°E	SSI, DLI	In use. DLI was added to this station during the spring of 2016.
Sodankylä	7501	67.37°N	26.63°E	SSI, DLI	In use, temporarily disabled for SSI validation. Problems likely to be connected with snow on ground.
Kiruna	02045	67.85°N	20.41°E	SSI, DLI	Not used currently
Visby	02091	57.68°N	18.35°E	SSI, DLI	Not used currently
Svenska Högarna	02492	59.45°N	19.51°E	SSI, DLI	Not used currently

Table 35: Validation stations that may be used for AHL radiative fluxes quality assessment.

The stations listed in table 35 are owned and operated by the Norwegian Meteorological Institute, University of Bergen, Geophysical Institute, Bioforsk, Finnish Meteorological Institute (FMI), Swedish Meteorological Institute (SMHI) and Deutscher Wetterdienst (DWD). Data from DWD and SMHI are extracted from WMO GTS, data from the other sources are received by email or through other direct connections. More stations are being considered for inclusion.

The pyranometer stations used for validation of the AHL SSI product are the stations listed in table 35. There are some differences in the stations used for SSI validation compared to DLI. The reason for this is partly the observation programme at stations, but also that SSI validation is more sensitive to station characteristics than DLI.

A report from OSI SAF about the validation data used for validating the high latitude surface radiative flux products is available here: http://osisaf.met.no/docs/osisaf_cdop2_ss2_rep_flux-val-data_v1p0.pdf

The following table provides the AHL SSI quality results over the reporting period.

AHL SSI quality results from JUL 2021 to JUN 2022						
Month	Number of cases	Mean SSI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. margin in % (*)	SD in Wm^{-2}	SD margin in % (**)
JUL 2021	210	192.92	4.43	77.06	40.08	30.75
AUG 2021	215	141.93	1.73	87.83	32.95	22.62
SEP 2021	208	75.13	-3.31	55.91	20.08	10.91
OCT 2021	160	35.08	-2.63	24.98	12.20	-15.94
NOV 2021	72	19.69	-4.53	-130.21	7.13	-20.65
DEC 2021	-	-	-	-	-	-
JAN 2022	51	15.94	-5.04	49.60	7.43	-18.04
FEB 2022	135	30.13	-8.08	19.15	16.10	-40.46
MAR 2022	240	75.21	-9.11	8.86	29.72	-17.48
APR 2022	238	141.14	-11.02	-10.20	33.16	27.36
MAY 2022	246	173.85	-13.67	-36.73	41.72	25.84
JUN 2022	238	209.88	2.92	70.85	51.38	17.25

(*) Mean diff. margin = 100 * (1 - (|mean diff. in %/ mean diff. req. in %|))
with mean diff. in % = 100*Mean diff/Mean SSI
and mean diff. req. = 10 %
100 refers then to a perfect product, 0 to a quality just as required, without margin.
A negative result indicates that the product quality does not fulfil the requirement.

(**) SD margin = 100 * (1 - (SD / SD req.))
with SD req. = 30%

Table 36: AHL SSI quality results from JUL 2021 to JUN 2022.

Comments:
For the reporting period the target requirement on mean difference is met all months expect April and May, and for standard deviation the target requirement is met in April-June, but not in Jan-March. The months not within target requirements are all within threshold requirement.

5.3. Sea Ice quality

5.3.1. Global sea ice concentration (OSI-401-b) quality

The OSI SAF sea ice concentration product is validated against navigational ice charts, as these are believed to be the best independent source of reference data currently available. These navigational ice charts originates from the operational ice charting divisions at DMI, MET Norway and National Ice Center (NIC). The ice charts are primarily based on SAR (Radarsat and Sentinel-1) data, together with AVHRR and MODIS data in several cases. The quality assessment results are shown separately for the three different sets of ice charts.

For the quality assessment at the Northern Hemisphere, performed twice a week, the concentration product is required to have a mean difference and standard deviation less than 10% ice concentration on an annual basis. For the weekly quality assessment at the Southern Hemisphere the concentration product is required to have a mean difference and standard deviation less than 15% ice concentration on an annual basis.

For each ice chart concentration level the deviation between ice chart concentration and OSI SAF ice concentration is calculated. Afterwards deviations are grouped into categories, i.e. ±10% and ±20%. Furthermore the mean difference and standard deviation are calculated and reported for ice (100% ice concentration) and for water (0% ice concentration). We use conventional mean difference and standard deviations for all calculations.

In addition, statistics from manual evaluation (on the confidence level of the products) are shown as additional information. There is no requirement on these statistics. The error codes for the manual evaluation are shown below.

Error code	Type	Description
1	area	missing data
2	point	open water where ice was expected
3	area	false ice where open water was expected
4	point	false ice induced from SSM/I processing errors
5	point	other errors
6	point	noisy false ice along coast

Table 37: Error codes for the manual registration

For the Northern Hemisphere, these quality assessment results are given for the Greenland area. This area is the area covered by the Greenland overview ice charts made by DMI used for the comparison to the sea ice concentration data. The charts can be seen at http://www.dmi.dk/hav/groenland-og-arktis/iskort/.

They cover the waters surrounding Greenland including the Lincoln Sea, the Fram Strait, the Greenland Sea, the Denmark Strait and Iceland, the Southern Greenland area including Cape Farewell, the Davis Strait and all of Baffin Bay.

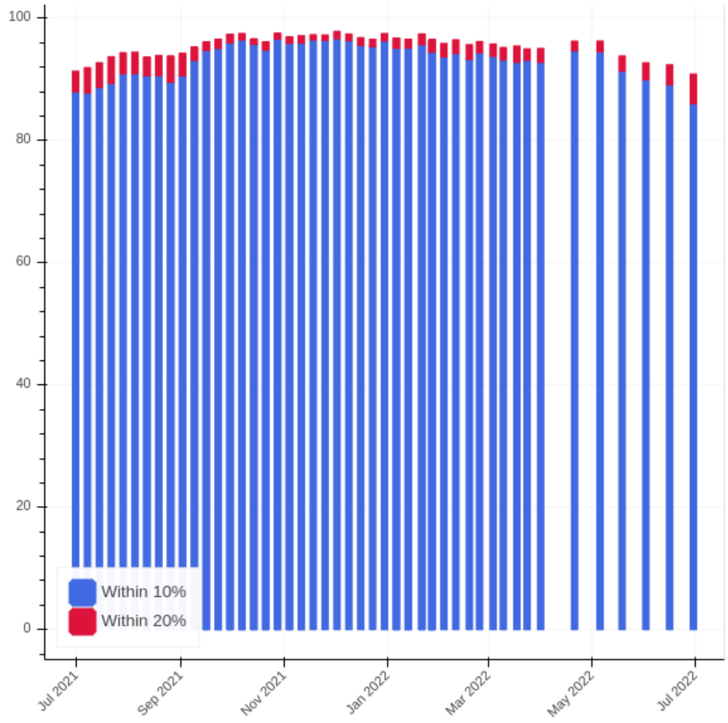


Figure 26: Comparison of ice concentrations from NIC ice analysis and the OSI SAF concentration product. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%.

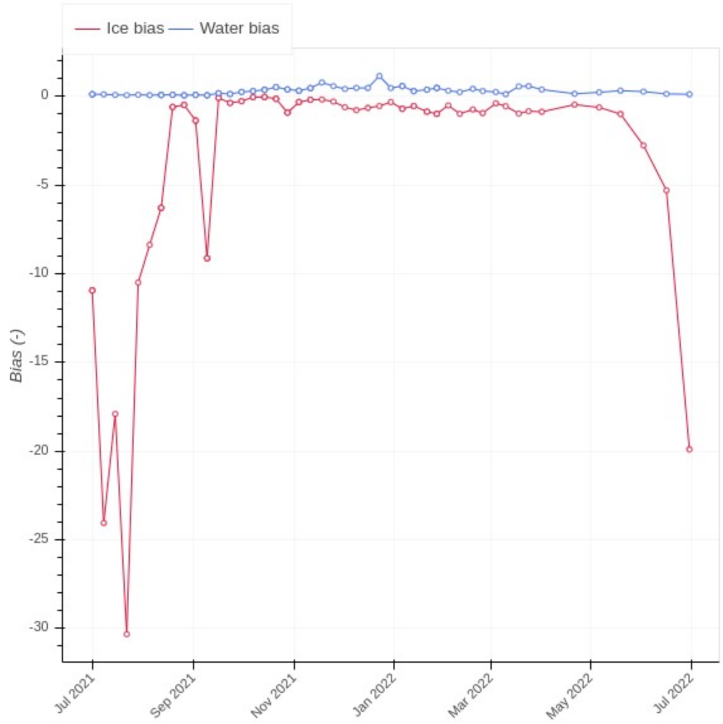


Figure 27: Difference between ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Northern hemisphere.

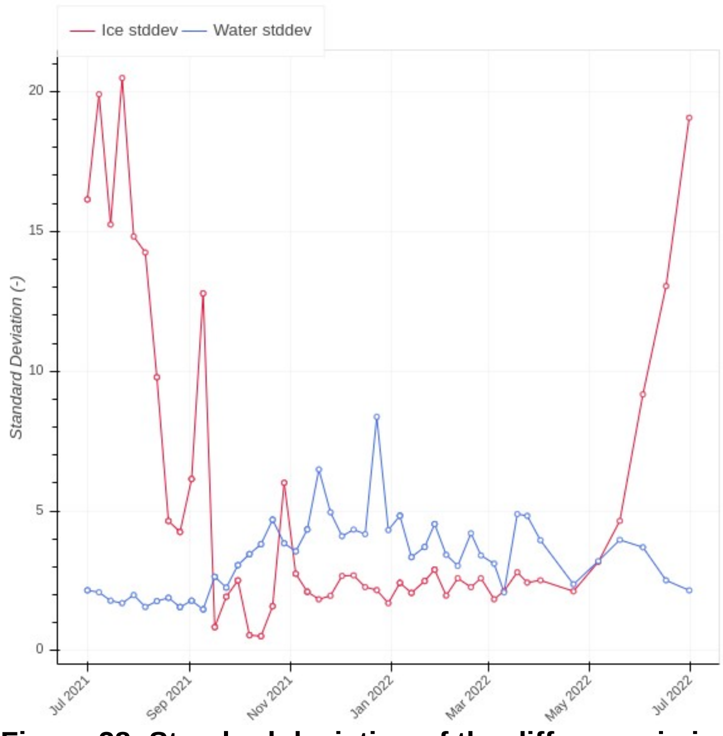


Figure 28: Standard deviation of the difference in ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice. Northern hemisphere.

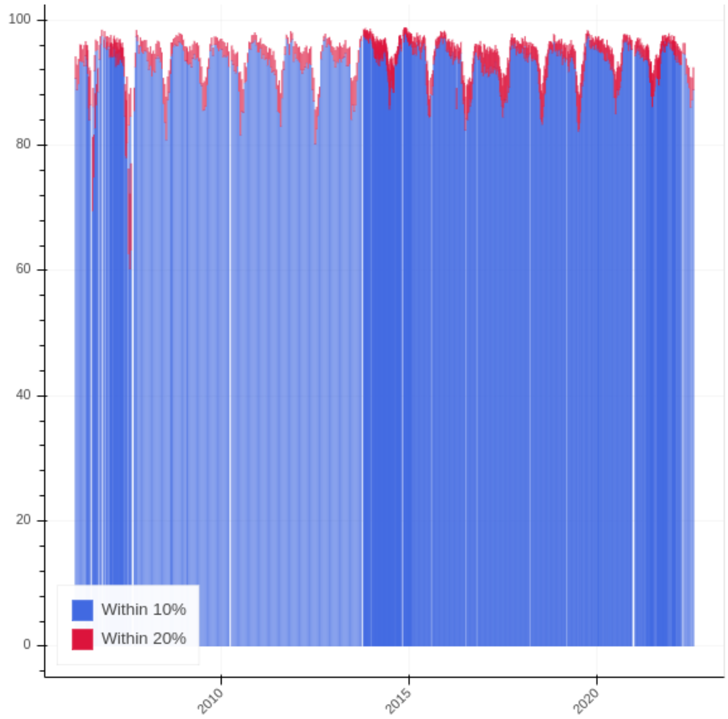


Figure 29: Multiyear variability. Comparison between ice concentrations from NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Northern hemisphere.

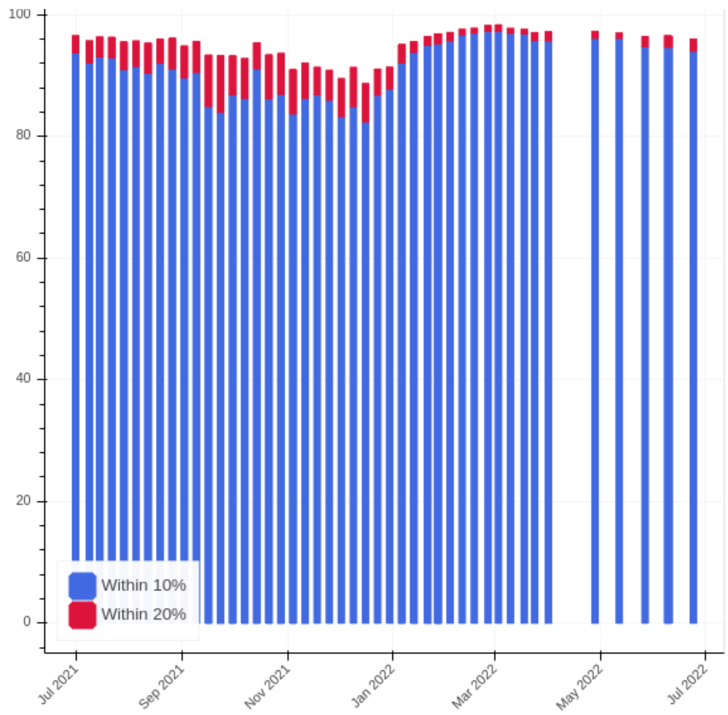


Figure 30: Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/-10%, and likewise for +/-20%. Southern hemisphere.

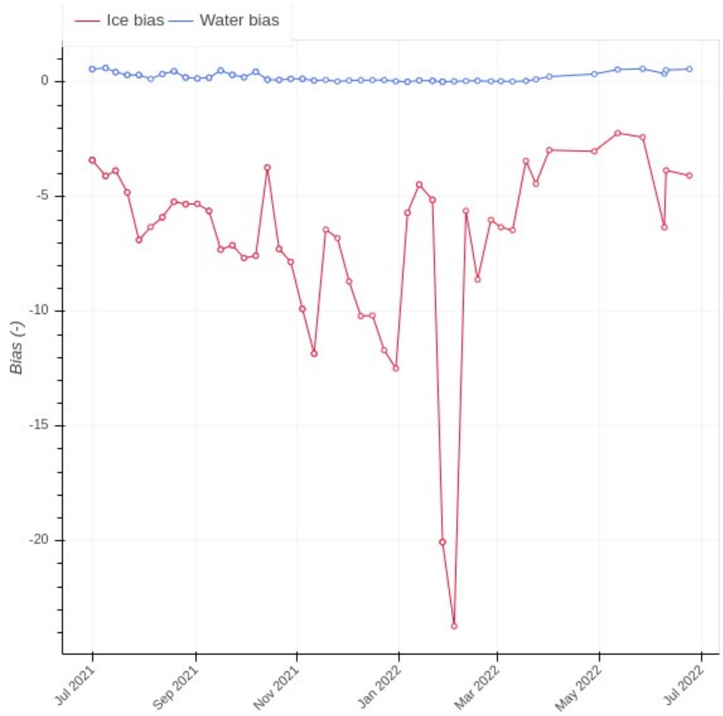


Figure 31: Difference between the ice concentrations from the NIC ice analysis and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Southern hemisphere.

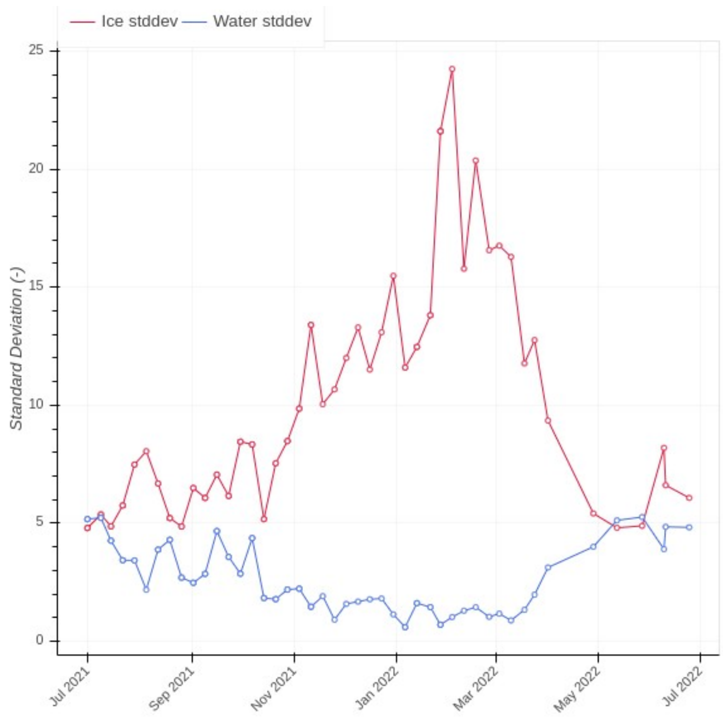


Figure 32: Standard deviation of the difference in ice concentrations from the NIC ice analysis and OSI SAF concentration product for two categories: water and ice. Southern hemisphere.

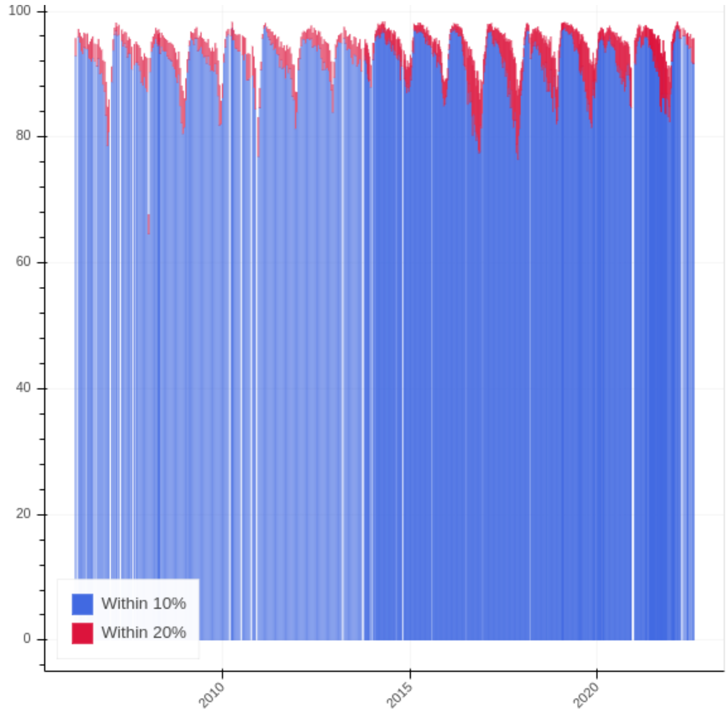


Figure 33: Multiyear variability. Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Southern hemisphere.

Concentration product					
Month	+/- 10% [%]	+/- 20% [%]	Mean difference [%]	SD [%]	Number of obs.
JUL 2021	93.23	93.97	-2.89	9.15	516871
AUG 2021	95.22	95.86	-1.97	8.05	581821
SEP 2021	97.17	97.65	-1.17	5.44	652607
OCT 2021	98.91	99.25	-0.47	3.00	545448
NOV 2021	97.92	98.69	-0.82	4.39	433093
DEC 2021	97.27	98.11	-1.27	5.99	350722
JAN 2022	94.48	95.90	-2.11	7.12	187652
FEB 2022	94.85	96.24	-2.01	6.95	193681
MAR 2022	94.82	96.18	-2.12	7.55	212910
APR 2022	95.54	96.77	-1.69	6.39	138288
MAY 2022	92.56	94.29	-2.66	8.30	174187
JUN 2022	92.10	93.52	-3.03	9.45	267182

Table 38: Monthly quality assessment results from comparing the OSI SAF sea ice concentration product to MET Norway ice service analysis for the Svalbard area. From DEC 2021 to JUN 2022. First two columns shows how often there is agreement within 10 and 20% concentration.

Comments:
Figure 28 and Figure 32 provide the essential information on the compliance of the sea ice concentration product accuracy, showing the std. dev. of the difference in ice concentration

between the OSI SAF product and the NIC ice analysis for NH and SH, respectively.
For the period March to June the NIC ice analysis is only available every second week instead of weekly. This affect the bias and standard deviation of the difference, since the NIC ice analysis is based on older data than the OSI SAF concentration.
Average yearly SD for the period can be seen in the table just below. The product are with target accuracy of 10 % and 15 % for the NH and SH products, respectively.

Average yearly standard deviation		
	Average SD Ice	Average SD Water
Northern Hemisphere	5.16	3.32
Southern Hemishpere	9.63	2.74

5.3.2. Global sea ice concentration (OSI-408) quality

The OSI-408 Global Sea Ice concentration is based on AMSR-2 data. Two ice concentration fields are computed: the primary on which is computed with the OSI SAF Hybrid Dynamic (OSHD) algorithm similar to the SSMIS Sea Ice Concentration (OSI-401-b) and a second which is computed using the Technical University of Denmark (TUD) algorithm which utilizes the high frequency channels. It is validated against ice charts as described under the previous section on Global SSMIS Sea Ice Concentration.

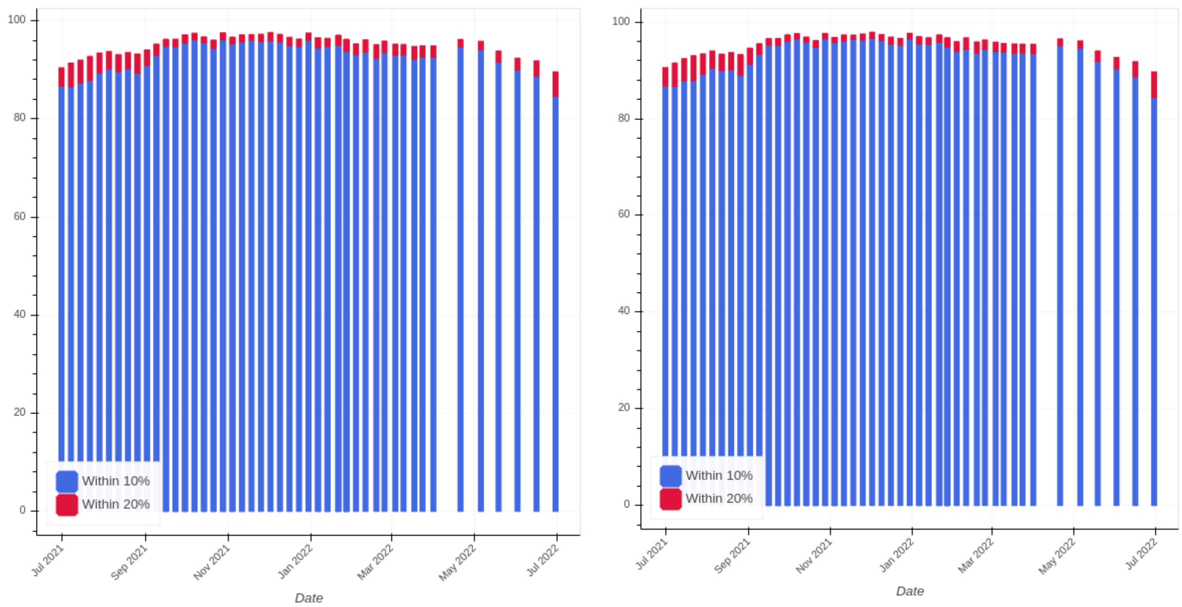


Figure 34: Comparison of ice concentrations from the NIC ice analysis and the OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%

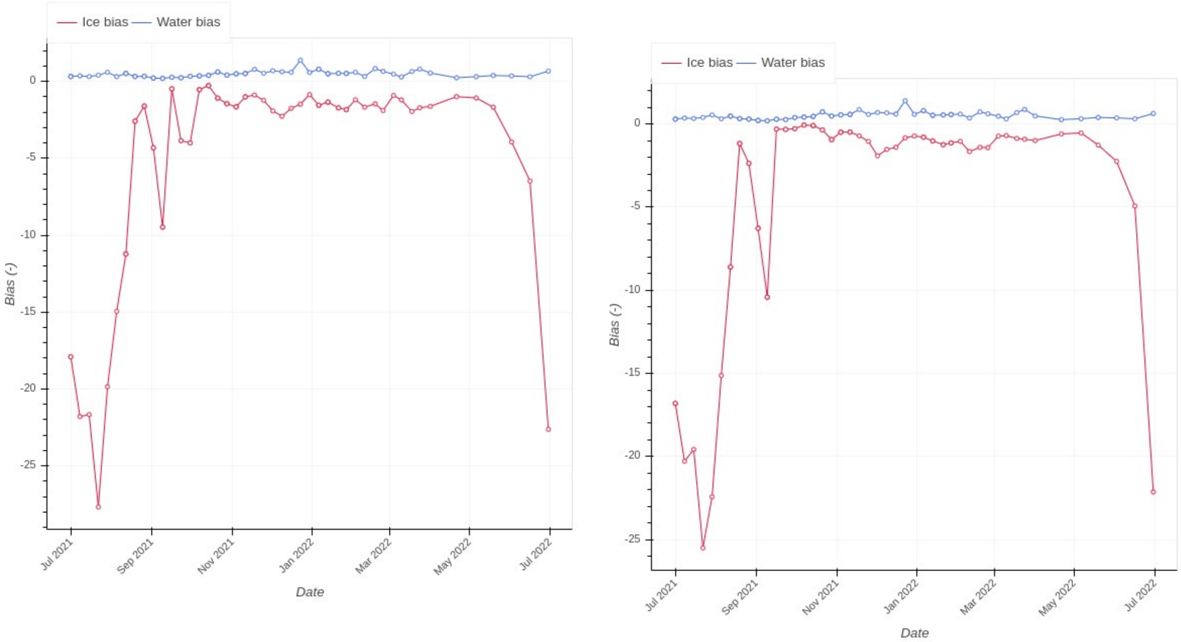


Figure 35: Difference between ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern Hemisphere

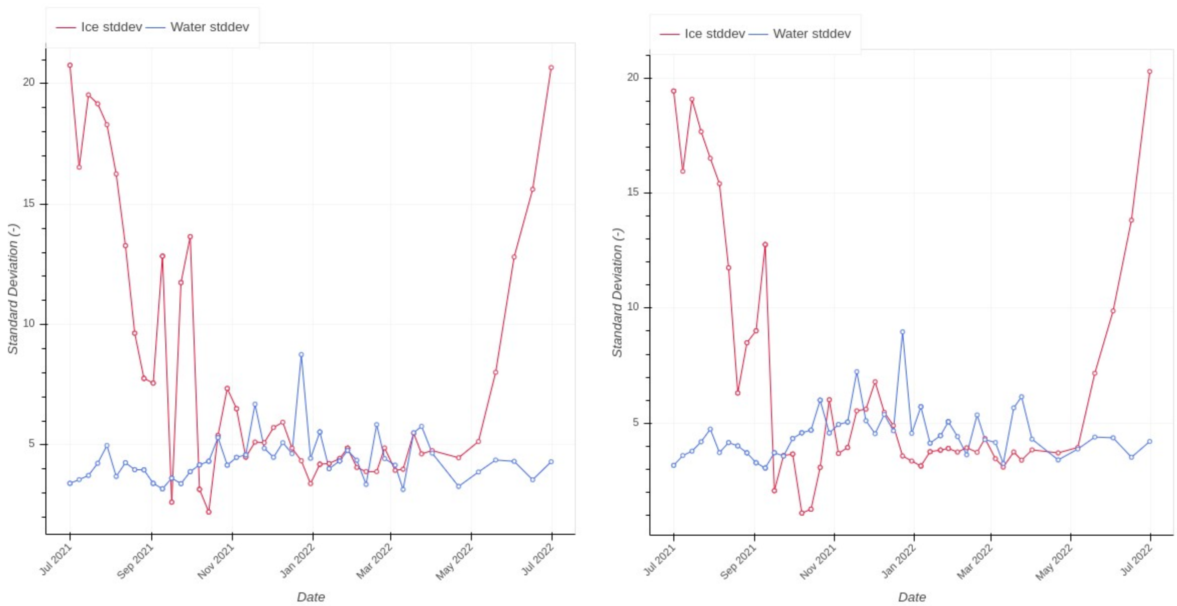


Figure 36: Standard deviation of the difference in ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern hemisphere.

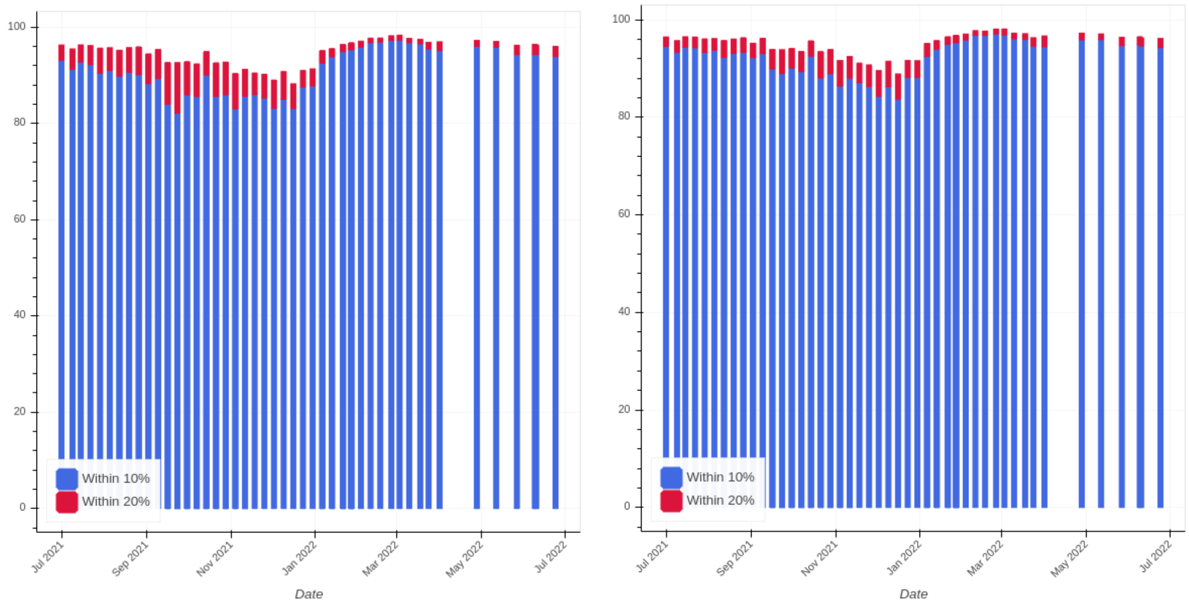


Figure 37: Comparison of ice concentrations from the NIC ice analysis and the OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right. Southern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%

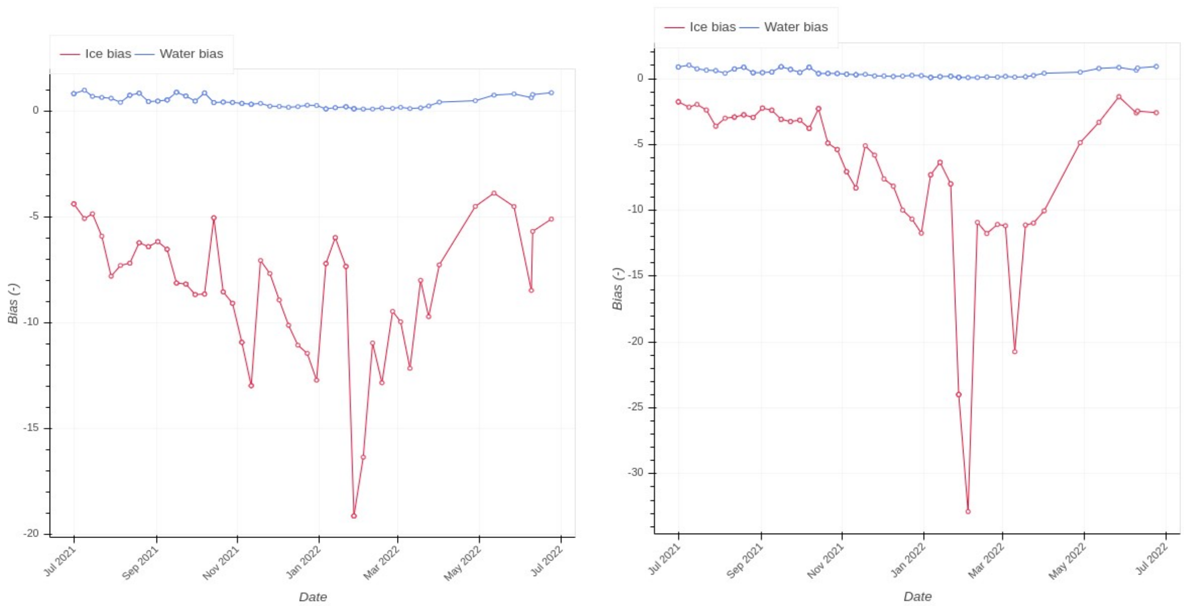


Figure 38: Difference between ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Southern Hemisphere

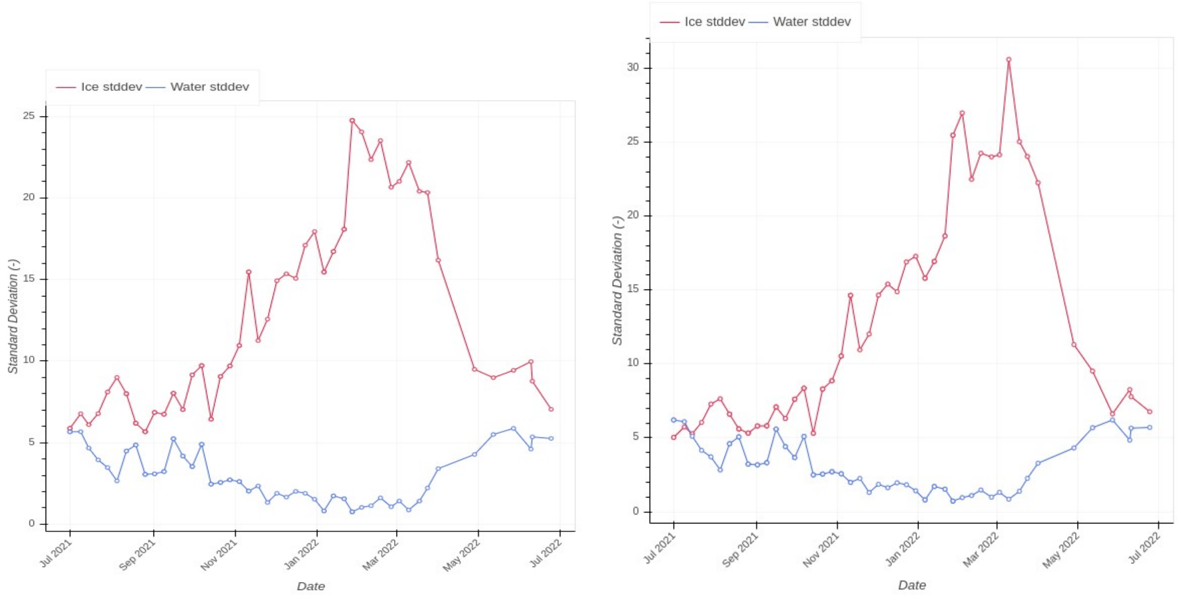


Figure 39: Standard deviation of the difference in ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and, ice. Southern hemisphere.

Comments:

Figure 36 and Figure 39 provide the essential information on the compliance of the sea ice concentration product accuracy, showing the std. dev. of the difference in ice concentration between the OSI SAF product and the NIC ice analysis for NH and SH, respectively. For the period March to June the NIC ice analysis is only available every second week instead of weekly. This affect the bias and standard deviation of the difference, since the NIC ice analysis is based on older data than the OSI SAF concentration. Average yearly SD for the period can be seen in the table just below. The product are with target accuracy of 10 % and 15 % for the NH and SH products, respectively.

5.3.3. Global sea ice edge (OSI-402-d) quality

The OSI SAF sea ice edge product is validated against navigational ice charts, as explained under the previous section on ice concentration.

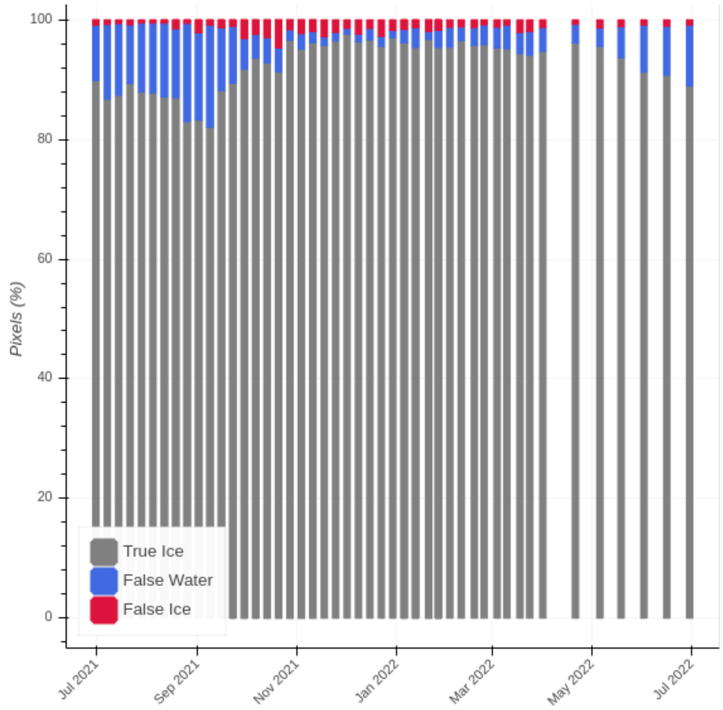


Figure 40: Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Northern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'False Ice' category.

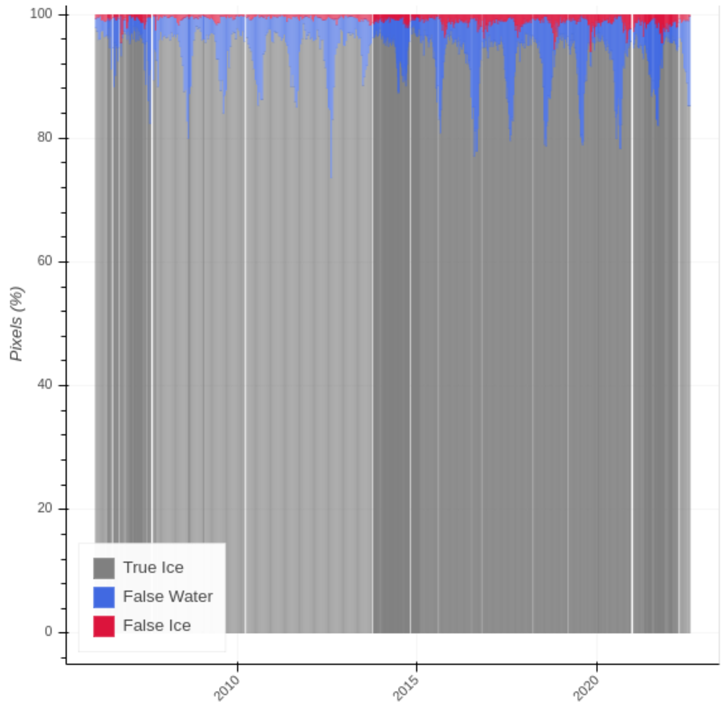


Figure 41: Multiyear variability. Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Northern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'False Ice' category.

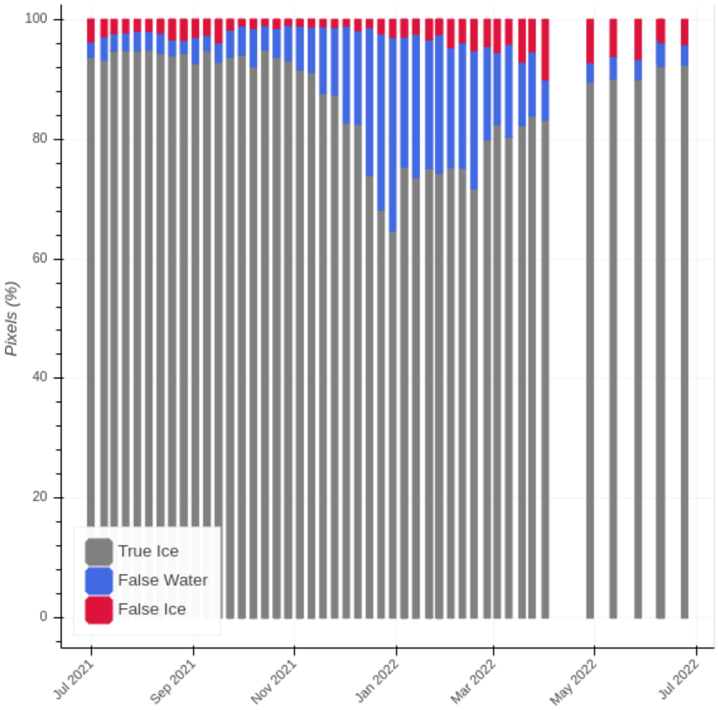


Figure 42: Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'False Ice' category.

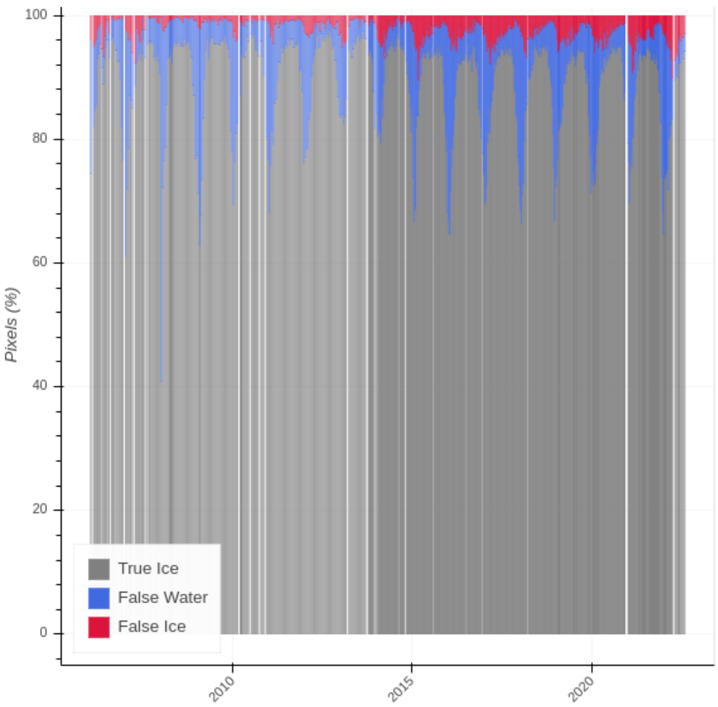


Figure 43: Multiyear variability. Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'False Ice' category.

Month	Correct [%]	SAF lower [%]	SAF higher [%]	Mean edge diff [km]	Number of obs.
JUL 2021	97.14	2.59	0.27	31.00	672329
AUG 2021	97.87	1.92	0.21	32.50	689123
SEP 2021	98.96	0.73	0.31	28.93	752933
OCT 2021	99.18	0.23	0.59	9.31	688621
NOV 2021	98.62	0.67	0.71	10.28	675794
DEC 2021	98.02	0.91	1.07	8.82	646648
JAN 2022	97.18	1.53	1.30	12.36	287693
FEB 2022	97.21	1.38	1.42	13.28	354818
MAR 2022	96.82	1.85	1.33	12.72	390862
APR 2022	97.37	1.48	1.15	13.68	294164
MAY 2022	96.89	2.05	1.06	18.42	368726
JUN 2022	96.56	2.29	1.15	20.72	424190

Table 39: Monthly quality assessment results from comparing OSI SAF sea ice products to MET Norway ice service analysis for the Svalbard area, from JUL 2021 to JUN 2022. Mean edge diff is the mean difference in distance between the ice edges in the OSI SAF edge product and MET Norway ice chart.

Month	Correct [%]	SAF lower [%]	SAF higher [%]	Mean edge diff [km]	Number of obs.
JUL 2021	-	-	-	-	-
AUG 2021	-	-	-	-	-
SEP 2021	-	-	-	-	-
OCT 2021	98.54	1.24	0.21	31.02	277299
NOV 2021	97.58	2.31	0.11	30.00	462165
DEC 2021	93.60	5.91	0.49	54.80	369808
JAN 2022	NA	NA	NA	NA	NA
FEB 2022	NA	NA	NA	NA	NA
MAR 2022	NA	NA	NA	NA	NA
APR 2022	NA	NA	NA	NA	NA
MAY 2022	-	-	-	-	-
JUN 2022	-	-	-	-	-

Table 40: Monthly quality assessment results from comparing OSI SAF sea ice products to MET Norway ice service analysis for the Weddell Sea area, from JUL 2021 to JUN 2022. Mean edge diff is the mean difference in distance between the ice edges in the OSI SAF edge product and MET Norway ice chart. Ice charts are not drawn during the period May to September.

Comments:
In Table 39, the Northern Hemisphere OSI SAF sea-ice edge product is compared with navigational ice charts from the Svalbard region (MET Norway ice service). The yearly averaged edge difference for the recent 12 months in 2021/2022 is 17.7 km and the target accuracy requirement of 20 km edge difference per year is therefore met. As previous years, the monthly differences are well below the yearly requirement all months except the summer months of June-September when melting of snow and ice makes the product quality worse.

Table 40, for the Southern Hemisphere OSI SAF sea-ice edge product is missing values for the January-April 2022 due to software problems that unfortunately can not be fixed in due time for the delivery of this HYR. These numbers will be included and commented upon in the HYR 2022-H2. Still, the performance looks similar to other years, when looking at Figure 42 and Figure 43.

5.3.4. Global sea ice type (OSI-403-d) quality

The sea ice type quality assessment is done as a monitoring of the monthly variation of the multi year ice area coverage, as presented in the table below. The monthly standard deviation (st dev) in the difference from the running mean of the multi-year ice (MYI) area coverage shall be below 100.000km2 to meet the target accuracy requirement.

Month	SD wrt running mean [km²]	Mean MYI coverage [km²]
JUL 2021	-	-
AUG 2021	-	-
SEP 2021	-	-
OCT 2021	111,269	2,671,888
NOV 2021	33,364	2,676,821
DEC 2021	70,297	2,381,007
JAN 2022	66,641	2,176,424
FEB 2022	63,042	1,831,016
MAR 2022	113,854	1,615,458
APR 2022	22,966	1,394,768
MAY 2022	-	-
JUN 2022	-	-

Table 41: Monitoring of NH sea ice type quality by comparing the multi year coverage with the 11-days running mean, from JUL 2021 to JUN 2022.

Month	SD wrt running mean [km²]	Mean MYI coverage [km²]
JUL 2021	88,077	824,266
AUG 2021	126,627	1,145,150
SEP 2021	-	-
OCT 2021	-	-
NOV 2021	-	-
DEC 2021	-	-
JAN 2022	-	-
FEB 2022	-	-
MAR 2022	24,765	552022
APR 2022	33,701	453573
MAY 2022	68,824	564932
JUN 2022	89,592	702576

Table 42: Monitoring of SH sea ice type quality by comparing the multi year coverage with the 11-days running mean, from JUL 2021 to JUN 2022.

Comments:
Table 41 shows the sea-ice type monitoring for NH. The mid-column represents the monthly standard deviations of the daily MYI coverage variability. All months have values well below the requirement of 100.000 km2, except October 2021 and March 2022 which have values just above the requirement. The high number in March is caused by a large warm-air intrusion in mid-March, starting 13th of March in the Fram Strait and for the following five days this affected the MYI classification across the Arctic Ocean.
Table 42 shows the monitoring of the sea-ice type product for SH. All months have values below the requirement of 100.000 km2, except August 2021 which had a value just above the requirement.

5.3.5. Sea ice emissivity (OSI-404) quality

The near 50 GHz sea ice emissivity product is compared to the 50.3 GHz and 52.8 GHz vertical polarized surface emissivity (which is the same at these two frequencies) at an incidence angle at 50 degrees. The product emissivity covers all incidence angles from nadir to 60 degrees but the validation product is derived from measurements at 50 degrees. The validation emissivity product is derived from NWP data and SSMIS satellite data. Both the OSI SAF product and the validation products cover the entire northern and southern hemisphere sea ice cover, including all ice types and seasons. The total mean difference plot in figure 44 is the difference between the hemispheric OSI SAF product and the validation product.

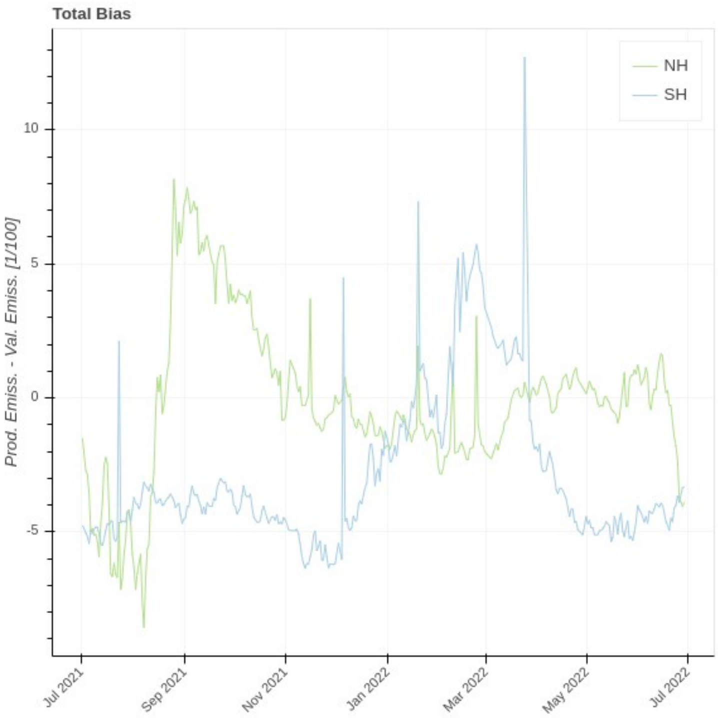


Figure 44: The mean hemispheric difference between the OSI SAF operational product and the validation product derived from NWP and SSMIS data. The y-axis unit is in hundreds (1/100)

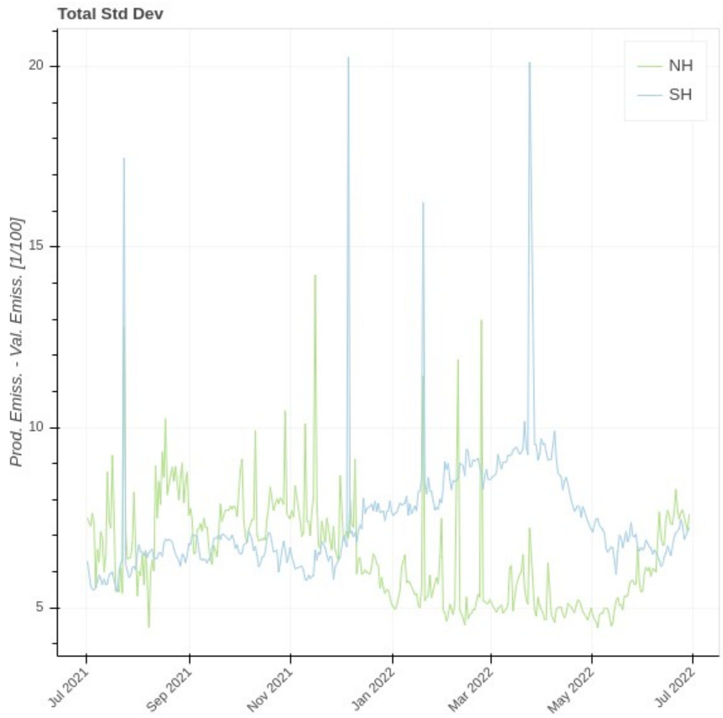


Figure 45: The standard deviation of the difference between the OSI SAF operational product and the validation product for the northern and southern hemispheres. The y-axis unit is in hundreds (1/100)

Comments:
The mean annual difference on the Northern Hemisphere is -0.002 and on the Southern Hemisphere it is -0.03. There is no clear seasonal cycle neither on the northern nor southern hemisphere. The standard deviation is just above the target accuracy, but below the threshold accuracy.

	Mean difference	SD	Target accuracy	Threshold accuracy
NH	-0.002	0.07	± 0.05	± 0.15
SH	-0.03	0.07	± 0.05	± 0.15

5.3.6. Low resolution sea ice drift (OSI-405-c) quality

Quality assessment dataset

Quality assessment is performed by collocation of the drift vectors with the trajectories of in situ drifters. Those drifting objects are generally buoys (e.g. the Ice Tethered Profilers) or ice camps (e.g. the Russian manned stations) that report their position at typically hourly intervals. Those trajectories are generally made available in near-real-time or at the end of the mission onto the ice. Position records are recorded either via the GPS (e.g. those of the ITPs) or the Argos Doppler-shift system (those of the iABP). GPS positions are very precise (< 50 m) while those obtained by Argos have worse accuracy (approx. 350 m for 'high quality' records) and are thus not used in our reporting.

A nearest-neighbor approach is implemented for the collocation, and any collocation pair whose distance between the product and the buoy is larger than 30 km or the mismatch at start time of the drift is more than 3 hours is discarded. The duration of the drifts must also match within 1 hour.

Reported statistics

Because of a denser atmosphere and surface melting, the OSI-405 accuracy is worse during the summer melt period (from 1st May to 30th September in the Arctic).

The Low Resolution Sea Ice Drift product comprises several single-sensor (e.g. SSMIS F18 or AMSR2 GW1 or ASCAT Metop-B) and a merged (or multi-sensor) products that are all processed and distributed on a daily basis. The quality assessment and monitoring results are thus presented for the multi-sensor product (multi-oi) and a selection of the single-sensor ones.

Most of the ice-drifting buoys are deployed and live in the Arctic Ocean. Only few Southern Hemisphere buoys are available. Hence most of the validation results below are for the NH maps, including monthly statistics. For SH, the number of buoys is insufficient, and we report only statistics over a full year (last 12 months). SH statistics are reported for completeness as the number of buoys is generally not enough to quantitatively assess the performance of OSI-405-c against the target requirements.

Quality assessment statistics

In the following tables, quality assessment statistics for the NH and SH products using multi-sensor (multi-oi) and SSMIS only (SSMIS-F17) are reported upon. In those tables, X(Y) are the X and Y components of the drift vectors. b() is the mean difference and σ() the standard deviation of the $\varepsilon(X) = X_{prod} - X_{ref}$. Columns α, β and ρ are respectively the slope and intercept of the regression line between Prod and Ref data pairs and the Pearson correlation coefficient. N is the number of collocation data pairs. Maps are also included that show the repartition of ice-drifter data for the given period.

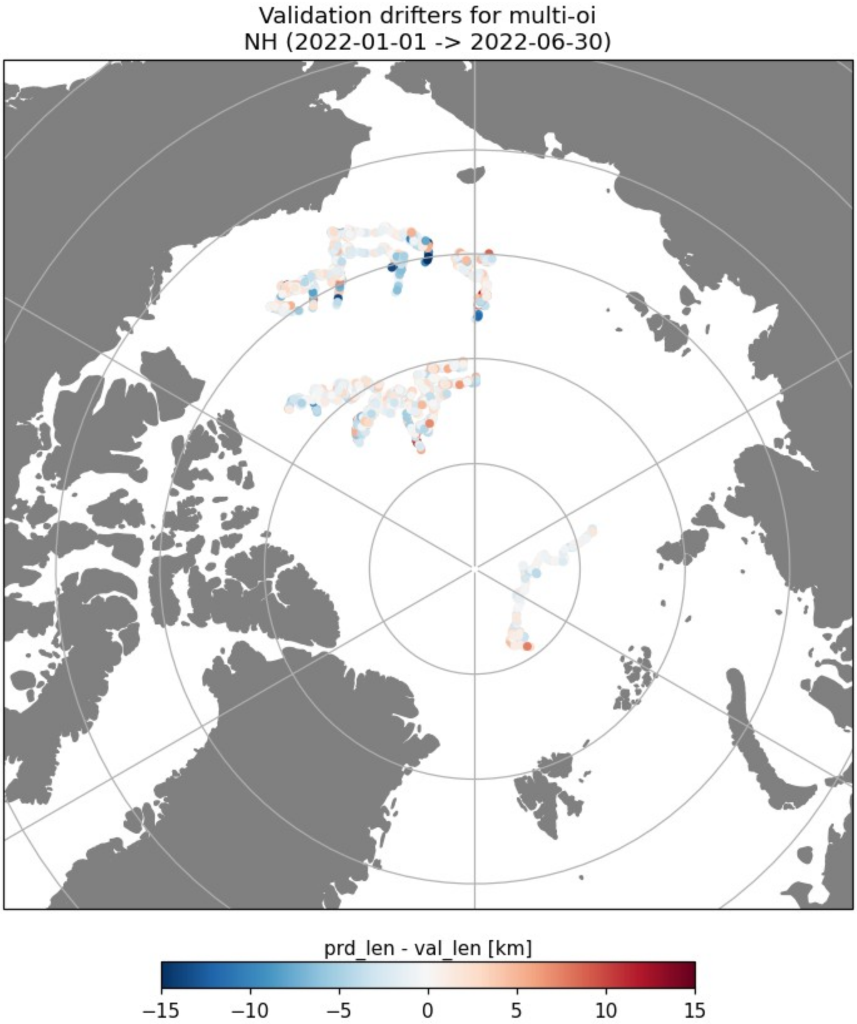


Figure 46: Location of GPS drifters for the quality assessment period (JAN to JUN 2022) in NH. The shade of each symbol represents the mean difference (prod-ref) in drift length (km over 2 days) for the multi-oi product.

Month	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
JUL 2021	1,72	-1,13	6,43	6,21	0,86	0,45	0,91	135
AUG 2021	0,66	-0,21	5,58	4,79	0,8	0,1	0,93	97
SEP 2021	-1,58	1,63	5,81	4,44	0,84	0,37	0,96	119
OCT 2021	0,22	0,02	3,17	4,18	0,92	0,02	0,97	263
NOV 2021	-0,21	0,22	2,02	2,73	0,97	0,04	0,98	319
DEC 2021	-0,03	0	2,36	2,38	0,96	-0,07	0,99	330
JAN 2022	0,08	-0,06	2,27	2,57	0,98	0,02	0,98	320
FEB 2022	0,23	0,02	1,59	1,6	1	0,13	0,98	284
MAR 2022	0,03	-0,4	1,77	1,76	0,99	-0,17	0,99	324
APR 2022	0,19	0,05	1,52	1,76	0,99	0,14	0,98	328
MAY 2022	-0,08	0,01	3	2,73	0,96	0,05	0,96	320
JUN 2022	-0,02	-1,02	4,24	4,41	0,9	0,01	0,93	318
Last 12 months	0,07	-0,11	3,17	3,22	0,94	0,05	0,97	3157

Table 43: Quality assessment results for the LRSID (multi-oi) product (NH) for JUL 2021 to JUN 2022.

Month	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
JUL 2021	--	--	--	--	--	--	--	0
AUG 2021	--	--	--	--	--	--	--	0
SEP 2021	--	--	--	--	--	--	--	0
OCT 2021	-0,08	-0,22	3,85	4,15	0,96	-0,18	0,96	248
NOV 2021	-0,3	0,08	3,02	3,83	0,97	-0,08	0,97	311
DEC 2021	-0,04	-0,53	2,45	3,11	0,99	-0,3	0,98	328
JAN 2022	0,18	0,11	2,55	3,52	1	0,15	0,97	326
FEB 2022	0,13	-0,13	2,85	3,11	1	0,01	0,94	258
MAR 2022	-0,09	-0,24	3,46	3,74	0,99	-0,16	0,96	323
APR 2022	0,16	-0,15	2,36	3,07	0,99	0,03	0,96	319
MAY 2022	--	--	--	--	--	--	--	0
JUN 2022	--	--	--	--	--	--	--	0
Last 12 months	0	-0,15	2,95	3,51	0,98	-0,07	0,97	2113

Table 44: Quality assessment results for the LRSID (SSMIS-F18) product (NH) for JUL 2021 to JUN 2022.

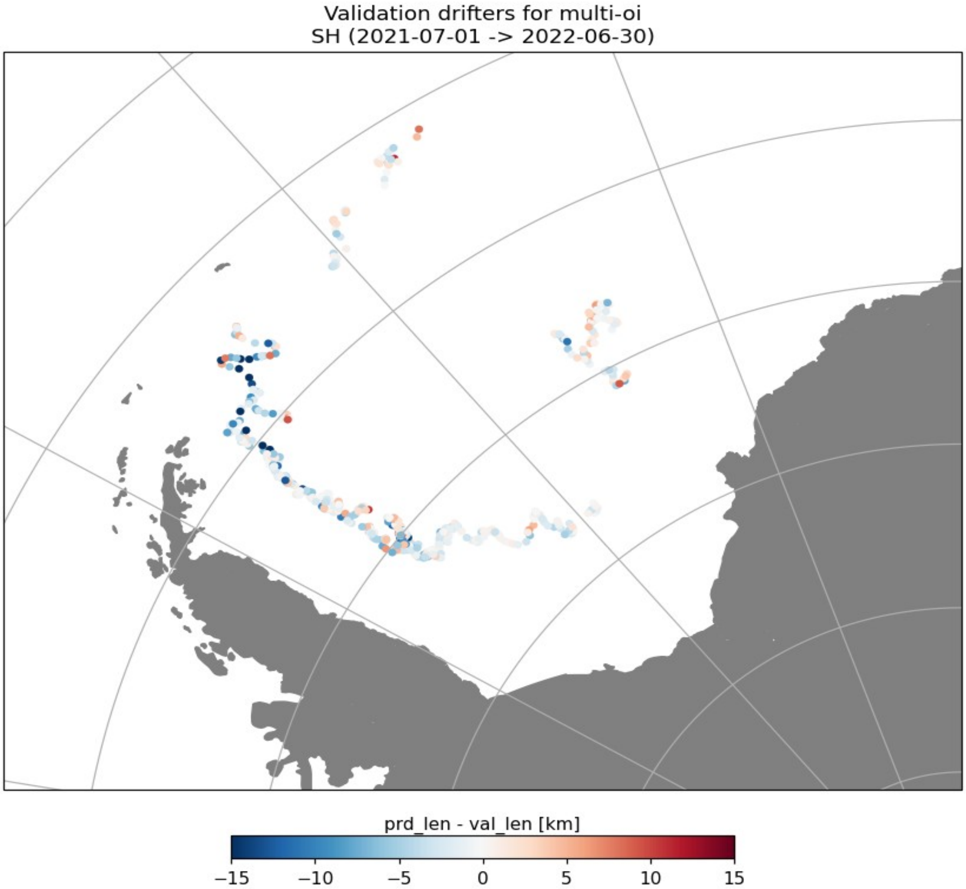


Figure 47: Location of GPS drifters for the quality assessment period (JUL 2021 to JUN 2022) in SH. The shade of each symbol represents the mean difference (prod-ref) in drift length (km over 2 days) for the multi-oi product.

Products	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
multi-oi	-0,42	-0,04	5,22	4,96	0,87	-0,9	0,95	570
ssmis-f18	0,69	0,09	6,16	5,96	0,9	-0,31	0,93	323
amsr2-gw1	0,35	0,05	4,53	4,22	0,9	-0,37	0,96	335

Table 45: Quality assessment results for selected OSI-405-c products (SH) for the last 12 months (JUL 2021 to JUN 2022).

Comments:
OSI-405-c has had nominal quality for the period within target requirement. In the Arctic, the validation statistics are remarkably good for the core winter months (Jan – Apr) with RMSEs around and below 2 km. We note that all the MOSAiC buoys are now flushed out of the Arctic Ocean, and that we are back to more regular amount of drifters. In the Antarctic, the only source of assessment are Weddell Sea drifters, documenting nominal quality for this product.

5.3.7. Medium resolution sea ice drift (OSI-407-a) quality

Quality assessment dataset

Quality assessment is performed by collocation of the drift vectors with the trajectories of in situ drifters. Those drifting objects are buoys (e.g. the Ice Tethered Profilers) or ice camps (e.g. the Russian manned stations) that report their position at typically hourly to 3 hourly intervals. They are made available in near-real-time via the GTS network at DMI. Argos data in the DMI GTP data have no quality flags and accuracy can be greater than 1500 m. It has been shown that the MR ice drift mean difference statistics improves significantly when validation is performed against high accuracy GPS drifters only (OSI-407 validation report and Phil Hwang, 2013. DOI: 10.1080/01431161.2013.848309).

A nearest-neighbor approach is implemented for the collocation and any collocation pair whose distance between the product and the buoy is larger than 20 km or temporal difference greater than ±60 minutes from the satellite start time and, likewise, satellite end time is disregarded. The temporal mismatch between satellite pairs and the corresponding buoy data is thus maximum 2 hours, but zero in average.

The product requirements for the MR ice drift product on threshold accuracy, target accuracy and optimal accuracy is 5 km, 2 km and 1 km yearly standard deviation, respectively.

Reported statistics

The Medium Resolution Sea Ice Drift product comprises two production modes, a summer mode from May to August, and a winter mode from September to April. These modes are using Visible (AVHRR channel 2) and Thermal Infra-Red (AVHRR channel 4), respectively.

Quality assessment statistics

Table 45 below, show selected mean difference statistics against drifting buoys from this period and the previous half year period. Mean differences i.e. bias (b) and standard deviation of mean differences (σ) are shown, in meters, for the 2 perpendicular drift components (X,Y). Statistics from the best fit between OSI-407-a and buoy data are shown as slope of fit (α) and a constant (β) together with the correlation coefficient (r). N, indicate the number of data pairs that are applied in the mean difference statistics. The correlation scatter plot in figure 49 shows the data used in the statistics for the most recent half year period.

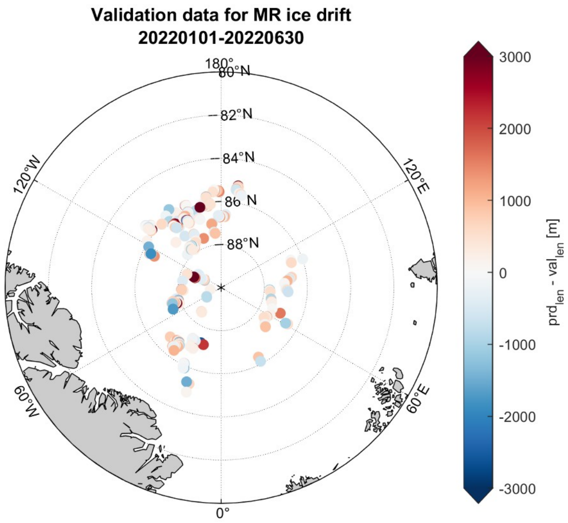


Figure 48: Location of GPS drifters for the quality assessment period (1st half 2022). The shade of each symbol represents the difference (prod-def) in drift length in meters

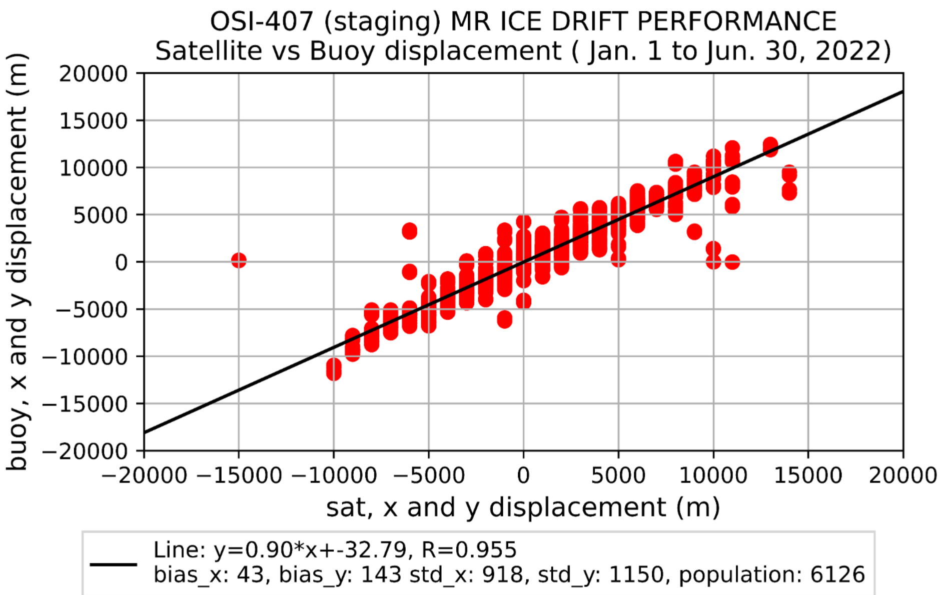


Figure 49: Scatter plot for all the observations of the buoys shown in the previous figure (1st half 2022).

Month	b(X) [m]	b(Y) [m]	σ(X) [m]	σ(Y) [m]	α	β [m]	ρ	N
JUL 2021	232	-323	670	4	0.95	277	0.997	30
AUG 2021	NA	NA	NA	NA	NA	NA	NA	NA
SEP 2021	-504	-825	1689	1215	1.05	692	0.970	40
OCT 2021	539	-179	366	505	0.86	-154	0.977	82
NOV 2021	-192	117	983	509	1.00	33	0.997	38
DEC 2021	319	39	650	715	0.97	120	0.980	1352
JAN 2022	181	206	737	997	0.94	89.42	0.967	2038
FEB 2022	-141	-92	862	2119	0.83	139.81	0.903	242
MAR 2022	59	30	782	1117	0.92	-69.49	0.951	1382
APR 2022	-42	174	1111	1138	0.87	-22.59	0.937	2188
MAY 2022	-766	45	1160	538	0.94	226.99	0.986	108
JUN 2022	125	302	534	1441	0.92	-13.13	0.957	168
Last 12 months	94	114	887	1080	0.92	-31.17	0.963	7668

Table 46: MR sea ice drift product (OSI-407-a) performance, JUL 2021 to JUN 2022

Comments:
The product requirement target accuracy of 2 km standard deviation is met in all cases. For the whole period, a quality control has been carried out based on close inspection of correlation plots for individual buoys and individual days, relating them to their geographic location. Besides that, eventual matchups with drift displacements exceeding a threshold of 40 km were automatically disqualified. This has led to numerous of the buoys being disqualified and they have therefore not been included in the validation. A total of 11 different buoys have been used, which is only 4 buoys less than in the previous half year period. An overview of the disqualified data is given below.

Based on a visual inspection of the buoy positions relative to the coastline and the buoy drifts, buoys with the following ID's were disqualified as they were assumed to be grounded:

6203585, 6402548, 2501666, 4402712, 4402717, 4801639, 4802589, 6401576, 6401578, 6501674, 6501689.

Based on a visual inspection of the buoy positions relative to the ice edge, buoys with the following ID's were disqualified as they were assumed to be in open water:

4101654, 4101657, 4101659, 4101842, 4101843, 4401850, 4601820, 4801723, 4801727, 6202623, 6202637, 6202658, 6203551, 6203563, 6203749, 6203750, 6203751, 6204586, 6301003, 6301004, 6301572, 6301576, 6301577, 6301578, 6301611, 6301613, 6301620, 6301621, 6401575, 6401592, 6401762, 6401763, 6401830, 6401834, 6401835, 6401836, 6401839, 6402544, 6402550, 6402552, 6402554, 6402557, 6402560, 6402561, 6402563, 6402648, 6402650, 6402652, 6402655, 6402659, 6402660, 6402663, 6402665, 6402668, 6402710, 6402711, 6402712, 6402713, 6402714, 6402715, 6402716, 6402717, 6402718, 6402719, 6402720, 6402721, 6501670, 6501671, 6501675, 6501679.

Furthermore, a few incidents of unusual behaviour in the satellite matchups were found. The satellite showed a constant displacement of 180 m for all buoys it passed, all over the Arctic. The anomaly was found in all the matchups during 2022.05.19 and 2022.05.20, but also during 2022.03.19 and 2022.04.04 onwards from 10 PM and 4 PM, respectively. The reason is a program bug (a "pointer" bug) in the date/time information in the C-code that runs the validation. We will fix the problem before next HYR reporting.

5.4. Global Wind quality (OSI-102 series, OSI-104 series)

The wind products are required to have an accuracy of better than 2.0 m/s in wind component standard deviation with a mean difference of less than 0.5 m/s in wind speed.

The scatterometer winds are monitored against forecast winds of the ECMWF global model. Forecasts of +3 to +15 hours are used and the model winds are interpolated with respect to time and location. The monitoring of relevant quality parameters as a function of time yields a sensitive method of detecting deviations of normal operation. However, one must be careful to regard the difference with reference background NWP model winds as the 'true' accuracy of the product, since both the NWP model winds and the scatterometer winds contain errors. Deviations in product quality usually appear as a step in one or more of the plots. See section 5.4.1 for the monthly averages.

The scatterometer winds are also compared to in situ equivalent neutral wind data from moored buoys, monthly averages are shown in section 5.4.2.

Seasonal weather variations imply differences in mean atmospheric stability, differences in dynamics, and differences in the distribution of wind speeds. These differences cause variations in the spatial representativeness errors associated with scatterometer wind quality assessment and in the difference statistics. Such effects cause seasonal oscillations that appear mainly in the wind speed mean differences plots against both model winds and buoy winds. For more background information we refer to: Hans Hersbach (2010) *Comparison of C-band scatterometer CMOD5.N equivalent neutral winds with ECMWF*, J. Atmos. Oceanic Technol., 27, 721–736.

We have studied the scatterometer wind speed mean differences against buoy winds for the tropics and the Northern Hemisphere mid latitudes separately. It appears that the mean differences in the tropics are fairly constant throughout the year, whereas the wind speed mean differences in the NH are higher in the winter than in the summer. Hence the seasonal cycles are mainly caused by weather variations in the mid latitudes.

5.4.1. Comparison with ECMWF model wind data

The figure below shows the monthly results of July 2020 to June 2022.

It is clear from the plots in this section, that the products do meet the accuracy requirements from the Service Specification Document [AD-1] (mean difference less than 0.5 m/s and wind component standard deviation accuracy better than 2 m/s) in most cases when they are compared to buoy winds. Note that local small scale wind variations, which are resolved by the buoys but not by the scatterometer, contribute to the standard deviations. The scatterometer errors are therefore smaller than what is shown in the plots as we know from triple collocation analysis. The OSI SAF winds are routinely compared to Met Office NWP model data in the NWP SAF project. Monthly statistics of the products are available as e.g. 2D histograms and map plots, see https://nwp-saf.eumetsat.int/site/monitoring/winds-quality-evaluation/scatterometer-mon/.

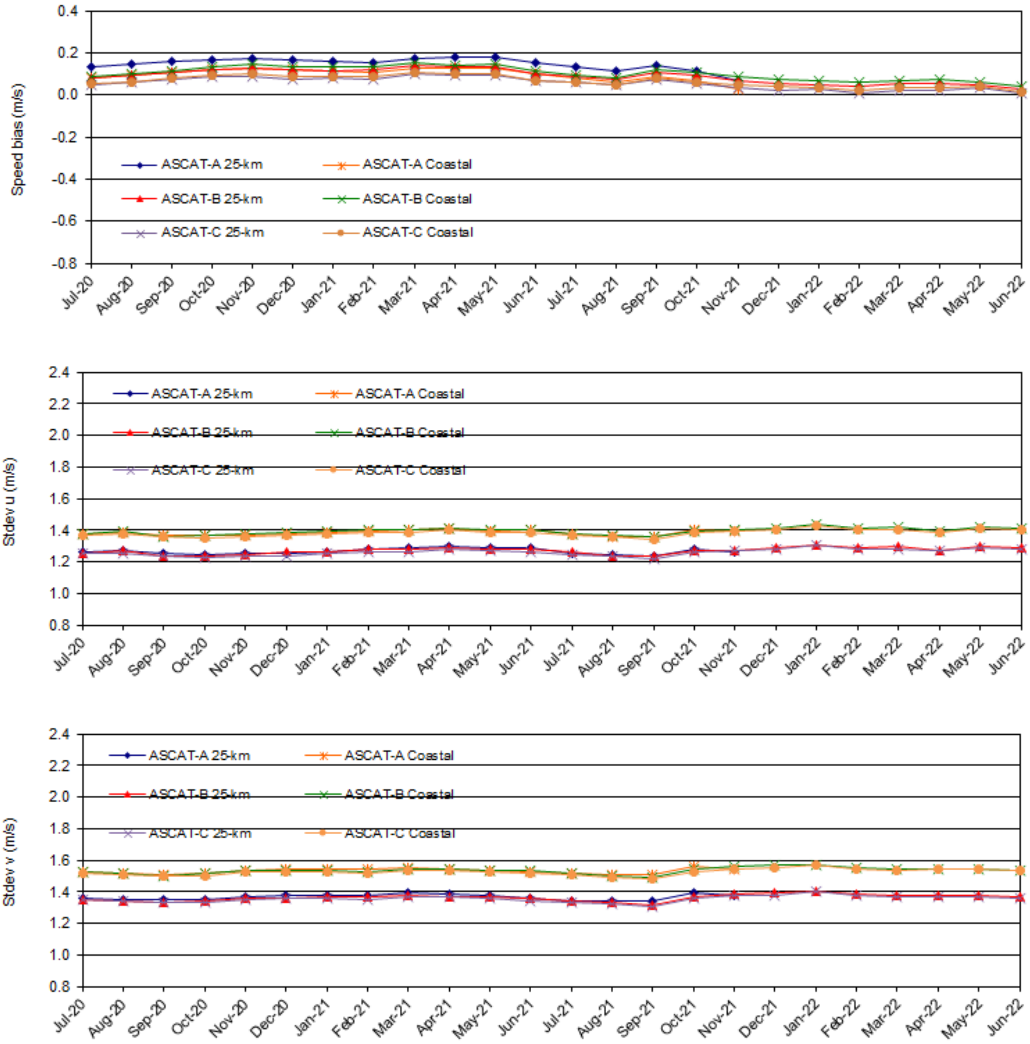


Figure 50: Comparison of ASCAT scatterometer winds against ECMWF NWP forecast winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus ECMWF, top), wind u component standard deviation (middle) and wind v component standard deviation (bottom) are shown.

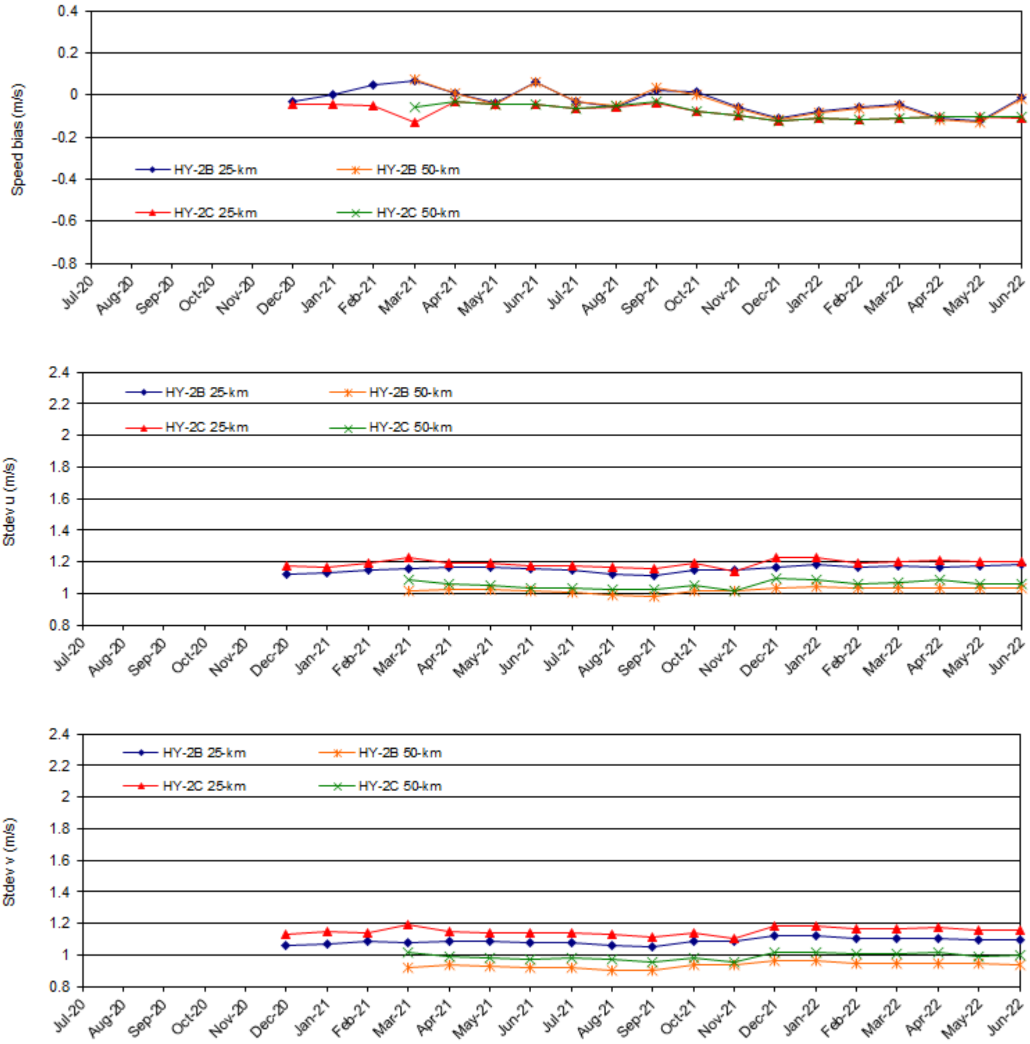


Figure 51: Comparison of HY-2B and HY-2C scatterometer winds against ECMWF NWP forecast winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus ECMWF, top), wind u component standard deviation (middle) and wind v component standard deviation (bottom) are shown.

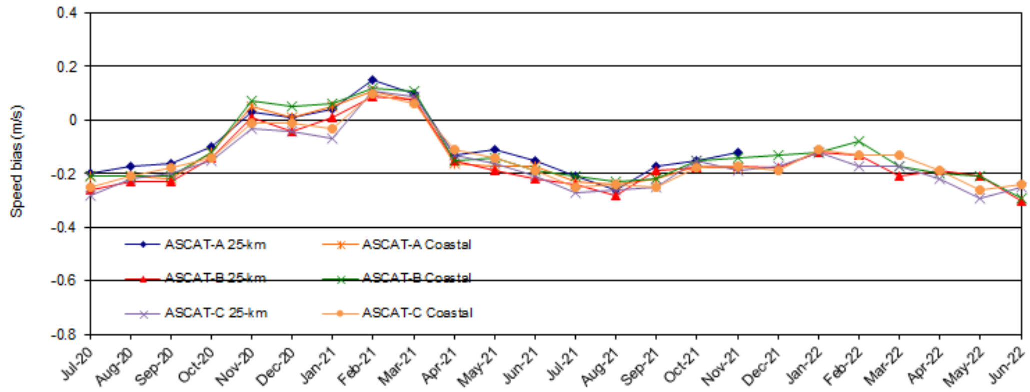
5.4.2. Comparison with buoys

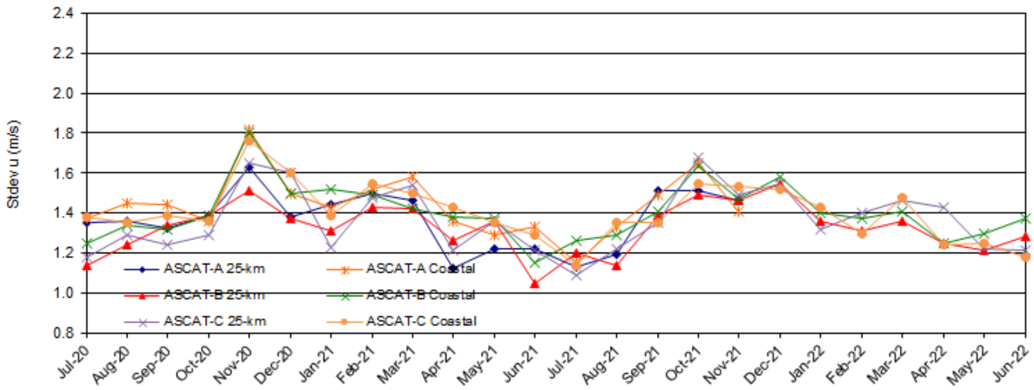
We compare the scatterometer winds with wind data from moored buoys on a monthly basis. The buoy data of approximately 150 buoys spread over the oceans (most of them in the tropical oceans and near Europe and North America) are retrieved from the ECMWF MARS archive and collocated with scatterometer winds. The buoy winds are converted to 10-m neutral winds using the LKB model, see Liu, W.T., K.B. Katsaros, and J.A. Businger, *Bulk parameterization of air-sea exchanges of heat and water vapor including the molecular constraints in the interface*, J. Atmos. Sci., vol. 36, 1979.

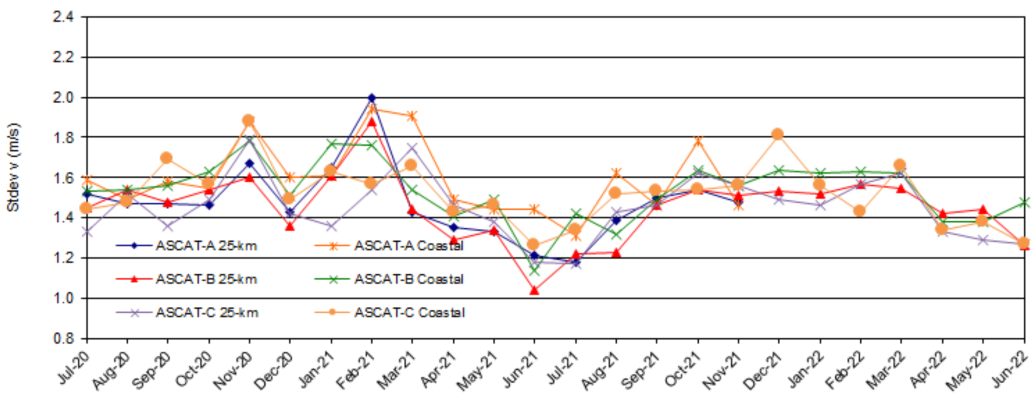
The figure below shows the monthly results of July 2020 to June 2022. This time the complete reporting period could be covered since all blacklists from ECMWF were available.

Note that the statistics as shown for the different ASCAT products are not from a common set of buoy measurements. So the number of scat/buoy collocations differs per product, in some cases we do have an ASCAT coastal wind but no 12.5 km or 25 km wind due to (small) differences in quality control. Also the number of available buoys changes over time as is shown in the bottom plot. This sampling issue gives rise to different mean difference and standard deviation scores in the plots below.

It is clear from the plots in this section, that the products do meet the accuracy requirements from the Service Specification Document [AD-1] (mean difference less than 0.5 m/s and wind component standard deviation accuracy better than 2 m/s) when they are compared to buoy winds.







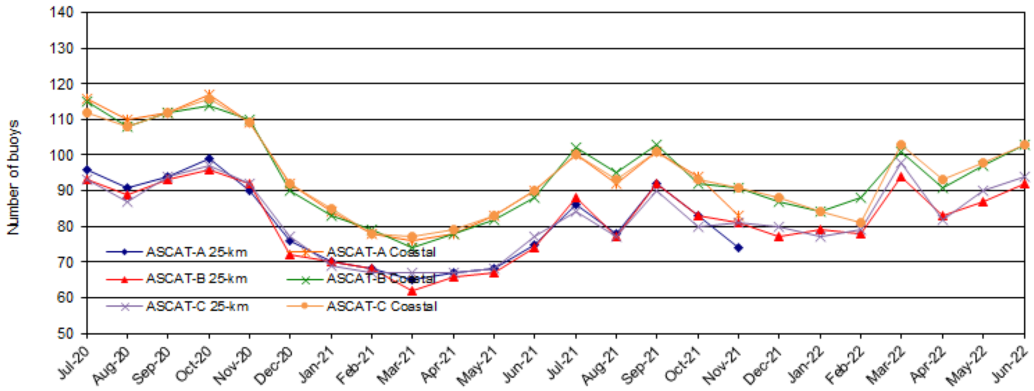
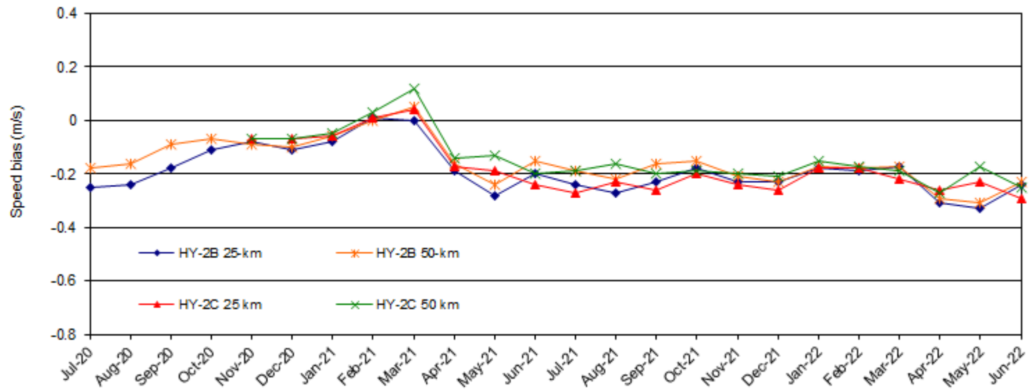
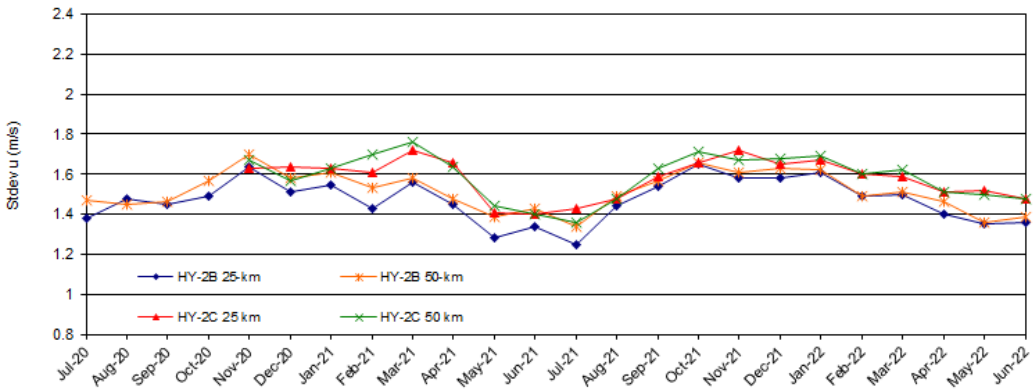


Figure 52: Comparison of ASCAT scatterometer winds against buoy winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus buoy, top), wind u component standard deviation (2nd plot) and wind v component standard deviation (3rd plot) are shown. Also the number of buoys available for the comparisons is shown (bottom).





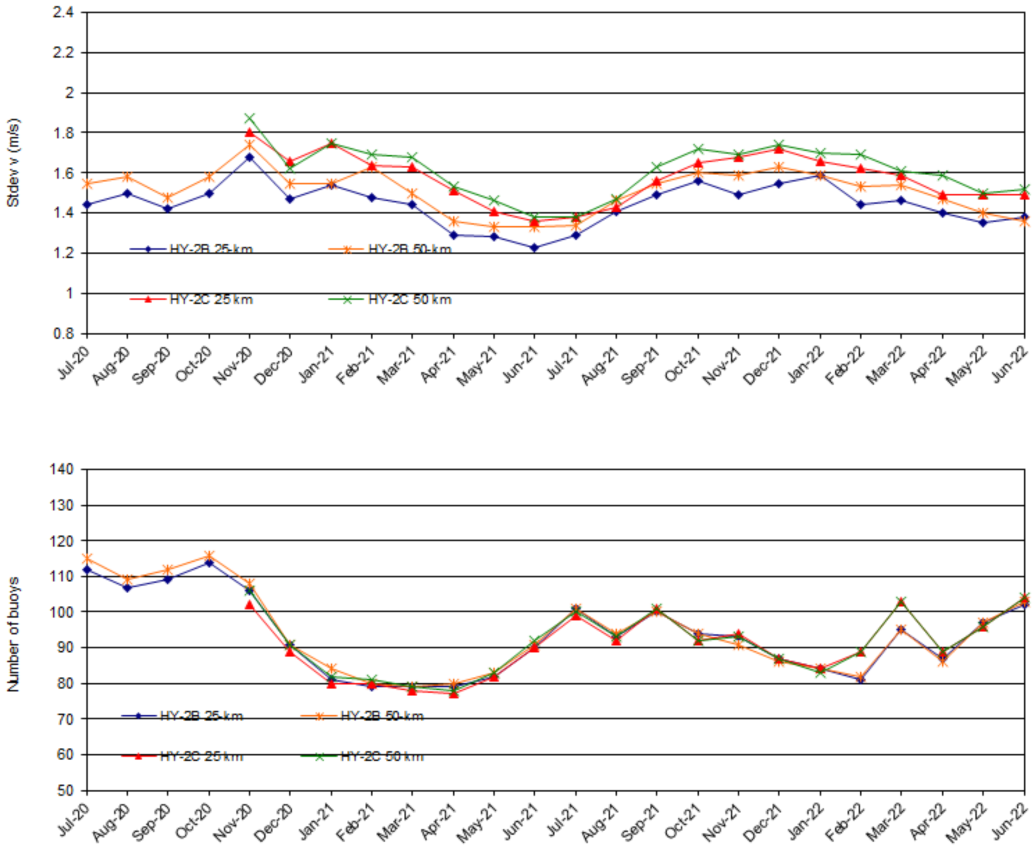


Figure 53: Comparison of HY-2B and HY-2C scatterometer winds against buoy winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus buoy, top), wind u component standard deviation (2nd plot) and wind v component standard deviation (3rd plot) are shown. Also the number of buoys available for the comparisons is shown (bottom).

6. Service and Product usage

6.1. Statistics on the web site and help desk

The OSI SAF offers to the users

- a central web site, http://osi-saf.eumetsat.int, managed by MF/CMS,
- a web site for LML, http://osi-saf.eumetsat.int/lml/, managed by MF/CMS,
- a web site for HL, http://osisaf.met.no/, managed by MET Norway,
- a web site for WIND, https://scatterometer.knmi.nl/osisaf/ managed by KNMI.

Users are recommended to make requests preferably through the central web site Help desk, with the guarantee that their demand will be acknowledged or answered quickly. However for requests concerning the HL or Wind products they may get access to direct contact points at MET Norway or KNMI.

6.1.1. Statistics on the registered users

Statistics on the central Web site use		
Month	Registered users	Pages
JAN 2022	2134	3340
FEB 2022	2138	2028
MAR 2022	2146	2314
APR 2022	2149	1721
MAY 2022	2154	2237
JUN 2022	2158	NA

Table 47: Statistics on central OSI SAF web site use over 1st half 2022.

In June 2022, we had a problem with the web statistics recording, this was corrected at the beginning of July.

The following graph illustrates the evolution of external registered users on the central web site.

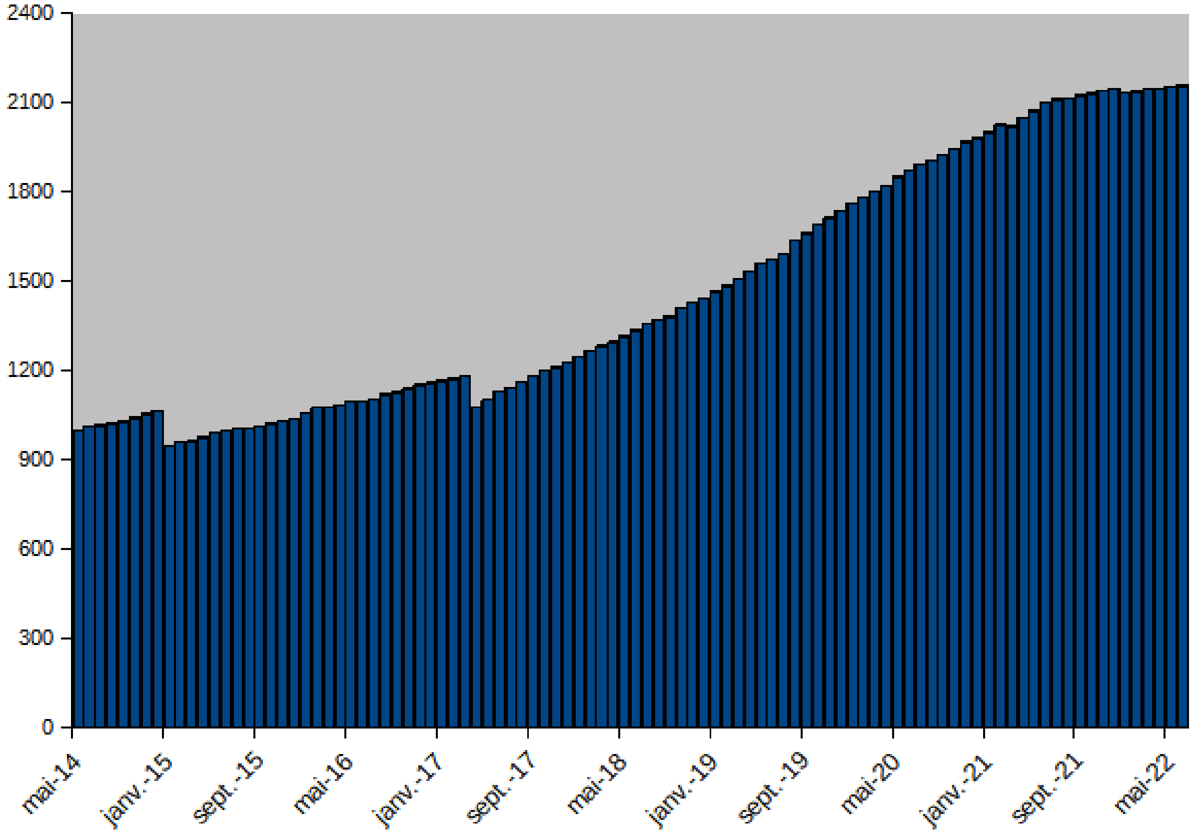


Figure 54: Evolution of external registered users on the central Web Site from April 2014 to June 2022.

Comments:
nothing special to report on the period.

The following table lists the institutions or companies the new registered users (over 1st half 2022) are from.

Country	Institution, establishment or company
Canada	University of Alberta
Chile	Universidad de Conception
China	China Meteorological Administration
China	National Satellite Ocean Application Service
Denmark	Danish Technical University
Denmark	GO Forlag
Denmark	Danish Meteorological Institute
France	Solaïs
France	Collecte localisation Satellites
Germany	Oldenburg University
Germany	Tübingen Universität
Germany	Bundesanstalt für Gewässerkunde (Germany)
Germany	University of Leipzig
Germany	Innoflair UG
Germany	European Organisation for the Exploitation of Meteorological Satellites

Country	Institution, establishment or company
Germany	European Organisation for the Exploitation of Meteorological Satellites
Italy	University of Bologna
Japan	Japan Meteorological Agency
Japan	Japan Agency for Marine-Earth Science and Technology
Korea (South)	Yonsei University
Korea (South)	National Institute of Meteorological Sciences
Netherlands	Delft University of Technology
Russian Federation	Russian Federal Research Institute of Fisheries and Oceanography
United Kingdom	Spire Global
United Kingdom	European Centre for Medium-Range Weather Forecasts
United Kingdom	Centre for Polar Observation and Modelling
United Kingdom	Institute for Environmental Analytics
United States of America	Harvard University
United States of America	Boston University

Table 48: List of institutes of the newly registered users over 1st half 2022 on the central Web Site

Moreover 12 new individual users, i.e. persons independent from any institute, establishment or company, registered on the period.

The following table gives the list of the newly registered wind users at KNMI.

Country	Institution, establishment or company
China	Chinese Academy of Meteorological Sciences
Korea	Korea Meteorological Agency
Phillipines	Philippine Atmospheric, Geophysical, and Astronomical Services Administration
Spain	Private user

Table 49: List of institutes of the newly registered wind users at KNMI

6.1.2. Status of user requests made via the helpdesk

The user requests are split into 4 categories:

- Unavailable: one or several product(s) are unavailable
- Anomaly: anomaly in one or several product(s)/services
- Archive: request for archived data
- Information: request for information

	Total number of helpdesk inquiries	Number of inquiries acknowledged within3 working days	Inquiries categorized as 'information'	Inquiries categorized as 'archive'	Inquiries categorized as 'unavailable'	Inquiries categorized as 'anomaly'
LML subsystem	15	15	11	0	3	1
HL subsystem	14	14	9	2	1	2
WIND subsystem	21	21	18	2	0	1

Table 50: Helpdesk inquires over 1st half 2022

6.1.3. Visitors statistics

Since the respective websites and technologies differ, and also the tools to get the statistics, it is not easy to compare the statistics. The following statistics are mainly useful to see changes over time.

The following graph shows the evolution of page views on the central web site (https://osi-saf.eumetsat.int/) which includes the pages for the LML processing center (https://osi-saf.eumetsat.int/lml-processing-center).

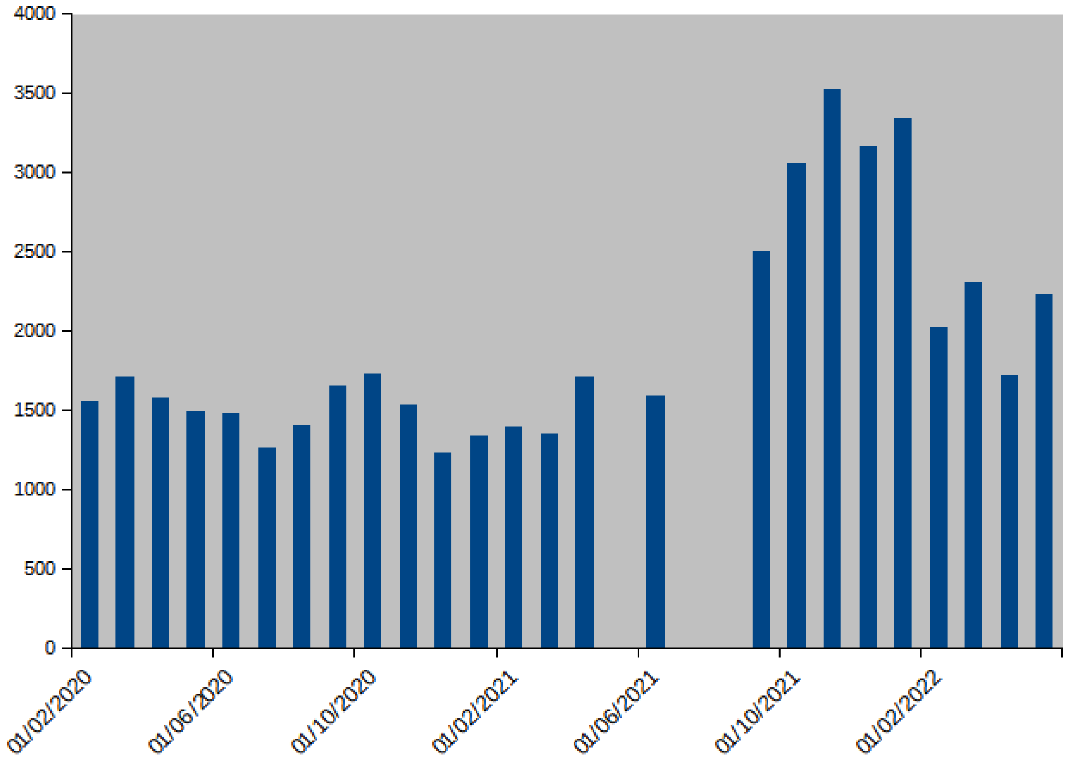


Figure 55: Evolution of page views on the central OSI SAF web site over the past 2 years

The following table shows the number of pages view by the top countries on the central OSI SAF web site.

Country	pages	Country	pages	Country	pages
France	1665	Denmark	621	Spain	245
China	1517	Russia	385	South Korea	235
Germany	1146	Netherlands	326	Hong Kong	219
Norway	869	Italy	310	Portugal	201
United States	717	Japan	266	Belgium	154
United Kingdom	702	Finland	260	Australia	149

Table 51: Pages_view by country

The following graph illustrates the evolution of page views on the OSI SAF High Latitude portal (http://osisaf-hl.met.no).

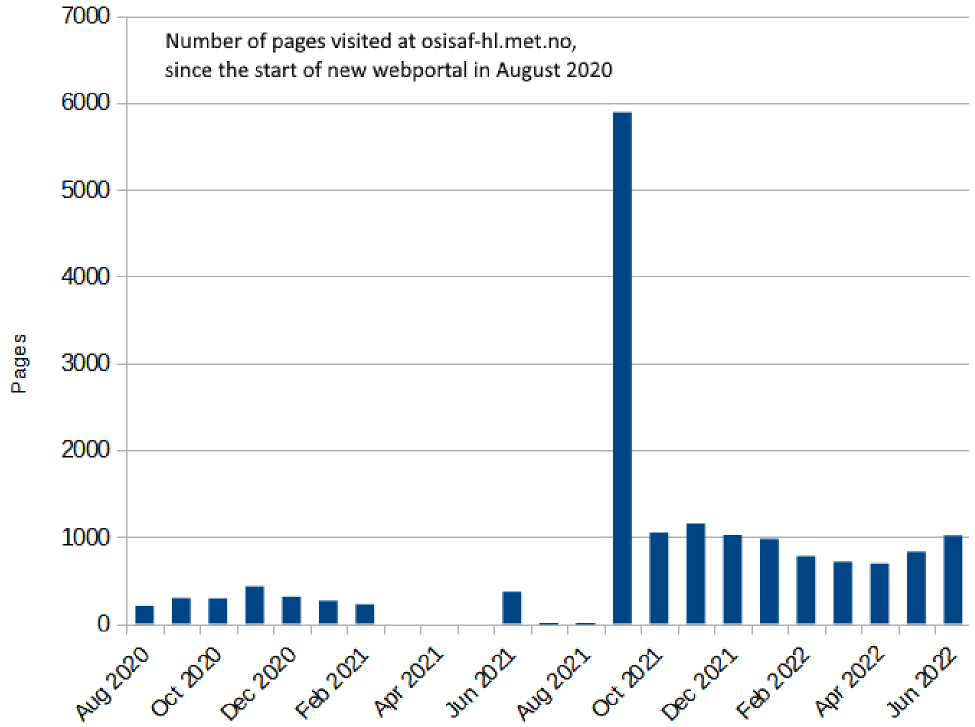


Figure 56: Evolution of page views on the HL OSI SAF Sea Ice portal over the past 2 years

The following graph illustrates the evolution of page views on the KNMI scatterometer web pages (https://scatterometer.knmi.nl/home/), which are partly devoted to the OSI SAF wind products. Note: each click in a product viewer (to zoom in on a specific region) results in a new page view, That's why there are so many page views.

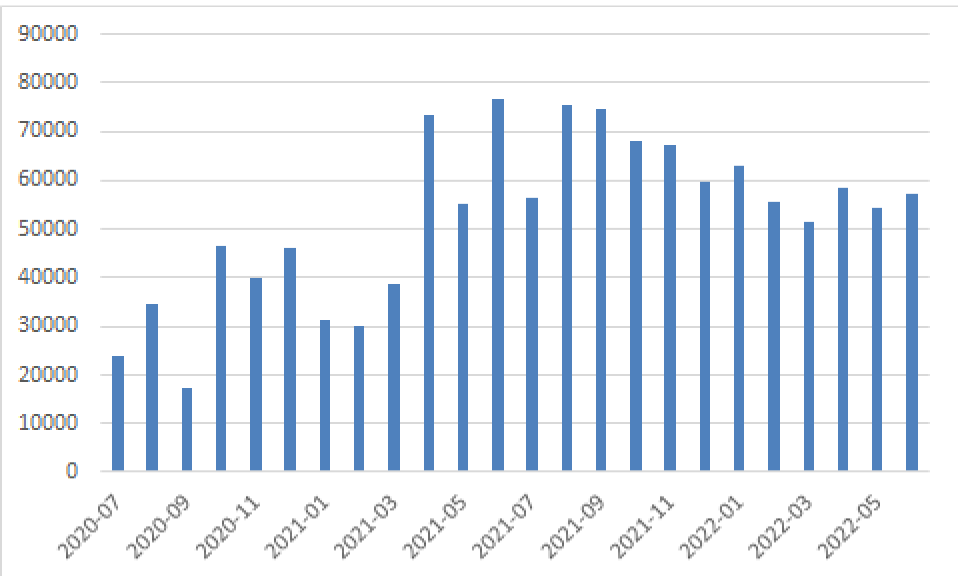


Figure 57: Evolution of page views on KNMI scatterometer website over the past 2 years

6.2. Statistics on the OSI SAF FTP servers use

6.2.1. Downloads statistics from the OSI SAF LML subsystem and from PO.DAAC

SST and Fluxes products are available from Ifremer: by FTP, by HTTP and by Thredds which offers the OpenDap service, the Web Coverage service (WCS) and the Web Mapping Service (WMS). WCS and WMS allow to directly view the data online, WCS allows to access to all the content of the data whereas WMS allows aonly to get the image.
Some SST products are also available at the PODAAC. Although outside the OSI SAF the PODAAC kindly provides the OSI SAF with statistics on the downloading of the OSI SAF products on their server.

For Ifremer, the numbers indicated are for FTP/ HTTP/ OpenDap/WCS/WMS		JAN 2022		FEB 2022		MAR 2022		APR 2022		MAY 2022		JUN 2022	
		Ifremer	PO.DAAC	Ifremer	PO.DAAC	Ifremer	PO.DAAC	Ifremer	PO.DAAC	Ifremer	PO.DAAC	Ifremer	PO.DAAC
OSI-201 series	GBL SST	1699 718 500 252 234	9569	116 707 402 236 216	297	117 743 444 257 253	132	136 993 410 353 390	7473	218 528 459 122 103	75	149 814 598 296 265	60
OSI-202 series	NAR SST	365 322 0 136 144	57	366 304 0 148 135	64	338 328 0 122 146	63	383 499 0 216 289	4376	359 169 0 90 94	16	580 370 0 145 166	1
OSI-204 series	MGR SST	156003 18 0 3 1	27020	133356 9 0 0 2	30537	200420 525 0 0 0	92370	249121 193 0 0 0	81053	463070 0 0 0 0	34213	229525 8 0 0 0	34322
OSI-206 series	Meteosat SST	4921 1800 0 907 903	68922	4084 1601 0 801 836	2635	13308 1673 0 838 869	5010	13298 2624 0 1346 1318	163093	8920 36165 0 436 613	1619	14380 2563 0 960 980	2861
OSI-207 series	GOES-East SST	2031 1581 0 763 772	22	2028 1519 0 746 746	29	2090 1517 0 713 701	29	2158 2243 0 1162 1121	2797	2093 854 0 442 412	284	2018 1693 0 874 869	1746
OSI-IO-SST	Meteosat-8 SST	26223	11759	12133	823	12688	517	13219	259	12765	171	9259	133

OSI-208 series	IASI SST	1053322 282 0 151 121	58	23665 261 0 124 109	59	27212 256 0 115 133	63	28252 378 0 203 182	3901	27567 162 0 71 71	33	27385 289 0 162 158	31
OSI-250	Meteosat SST Data record	0 26955 0 12955 13264	33	0 25044 0 12323 12424	32	0 24961 0 12118 12368	31	0 39596 0 19356 19239	146	0 14354 0 7151 6909	12	0 29823 0 14390 14579	31
OSI-303 series	Meteosat DLI	69222 3540 1 1673 1856	x	80415 3477 0 1603 1633	x	135384 3341 0 1594 1558	x	86800 5259 0 2562 2536	x	84436 1993 0 909 938	x	81533 4084 0 1898 1886	x
OSI-304 series	Meteosat SSI	69222 3540 1 1673 1856	x	80415 3477 0 1603 1633	x	135384 3341 0 1594 1558	x	86800 5259 0 2562 2536	x	84436 1993 0 909 938	x	81533 4084 0 1898 1886	x
OSI-305 series	GOES-East DLI	23770 12486 1 5524 5652	x	4533 11879 0 5319 5382	x	66375 11719 0 5380 5297	x	13623 18441 0 8259 8380	x	29045 6747 0 3006 2973	x	28231 13783 0 6224 6278	x
OSI-306 series	GOES-East SSI	23770 12486 1 5524 5652	x	4533 11879 0 5319 5382	x	66375 11719 0 5380 5297	x	13623 18441 0 8259 8380	x	29045 6747 0 3006 2973	x	28231 13783 0 6224 6278	x
OSI-IO-DLI	Meteosat-8 DLI	3208 4495 0 2252 2283	x	2381 4226 0 2130 2180	x	9884 4202 0 2052 2057	x	2581 6530 0 3283 3345	x	2495 2377 0 1228 1224	x	1807 5034 0 2555 2480	x
OSI-IO-SSI	Meteosat-8 SSI	3208 4495 0 2252 2283	x	2381 4226 0 2130 2180	x	9884 4202 0 2052 2057	x	2581 6530 0 3283 3345	x	2495 2377 0 1228 1224	x	1807 5034 0 2555 2480	x

Table 52: Number of OSI SAF products downloaded from Ifremer FTP server and PO.DAAC server over 1st half 2022.

Note: PO.DAAC statistics about the NAR SST product is the sum of NOAA-17, NOAA-18, NOAA-19, Metop-A and Metop-B NAR SST products.

6.2.2. Downloads statistics from the OSI SAF HL subsystem, and from CMEMS and C3S

Sea Ice, SST and Flux products are available on MET Norway FTP server. Some products are also made available through Copernicus CMEMS, and statistics are kindly made available for these products.

OSI SAF HL FTP server		JAN 2022	FEB 2022	MAR 2022	APR 2022	MAY 2022	JUN 2022
OSI-401 series	Global Sea Ice Concentration (SSMIS)	92409	47815	114828	53045	101816	79237
OSI-402 series	Global Sea Ice Edge	43073	16154	9454	9617	6621	8236
OSI-403 series	Global Sea Ice Type	57833	12221	32789	41861	9008	17883
OSI-404 series	Global Sea Ice Emissivity	77	0	2340	21	11	16
OSI-405 series	Low resolution Sea Ice Drift	11605	13363	59108	29006	17374	23476
OSI-407 series	Medium resolution Sea Ice Drift	219	251	24667	4574	3362	1355
OSI-408 series	Global Sea Ice Concentration (AMSR-2)	4604	4067	21502	8058	7332	3957
OSI-410	Level 2 PMW sea ice concentration	3801	3016	10631	23351	2568	2935
OSI-409	Ice Concentration Data Record v1.2	3	10949	6544	1638	0	155
OSI-430	Ice Concentration ICDR v1.2	6942	1791	0	0	64	61
OSI-430-b	Ice Concentration ICDR v2.0	21800	13741	27500	13965	1573	35847
OSI-450	Ice Concentration Data Record v2.0	48408	55401	48493	117603	97647	68024
OSI-203 series	AHL SST	205	359	2729	4777	224	1047
OSI-205 series	L2 SST/IST	19290	14971	14297	13719	14830	54898
OSI-301/2 series	AHL DLI-SSI	521	520	504	490	519	506

Table 53: Number of OSI SAF products downloaded from OSI SAF HL FTP server over 1st half 2022

Redistribution by CMEMS and C3S		JAN 2022		FEB 2022		MAR 2022		APR 2022		MAY 2022		JUN 2022	
		CMEMS	C3S	CMEMS	C3S	CMEMS	C3S	CMEMS	C3S	CMEMS	C3S	CMEMS	C3S
OSI-401 series	Global Sea Ice Concentration (SSMIS)	17896	x	10429	x	31307	x	17987	x	25472	x	33150	x
OSI-402 series	Global Sea Ice Edge	14894	x	10297	x	27899	x	14071	x	21848	x	28611	x
OSI-403 series	Global Sea Ice Type	14655	x	8176	x	27674	x	13711	x	21244	x	28257	x
OSI-405 series	Low resolution Sea Ice Drift	13590	x	8067	x	30736	x	17079	x	25682	x	29877	x
OSI-409	Ice Concentration Data Record v1.2	x	280	x	730	x	958	x	2762	x	0	x	0
OSI-430	Ice Concentration ICDR v1.2	x	132	x	0	x	128	x	1044	x	0	x	0
OSI-430-b	Ice Concentration ICDR v2.0	6	15611	23	12923	11	18123	4	28407	10	3068	45	55128
OSI-450	Ice Concentration Data Record v2.0	3804	43443	3786	61717	4392	41701	4355	59339	4544	53609	62	220784

Table 54: Number of OSI SAF products redistributed by CMEMS (downloads/product/day) and C3S (number of files) over 1st half 2022

6.2.3. Downloads statistics from the OSI SAF WIND subsystem and from PO.DAAC

Wind products are available on KNMI FTP server. The products are also available at the PODAAC in NetCDF. Although outside the OSI SAF the PODAAC kindly provides the OSI SAF with statistics on the downloading of the OSI SAF products on their server.

The numbers for the KNMI FTP server are the average number of downloads per product file of the near-real time products. The numbers for PO.DAAC are the downloaded number of archived product files (containing one orbit each) which may cover the whole product history. Note that the BUFR products are also disseminated through EUMETCast.

From the KNMI FTP server we get loggings of the number of downloads of a certain product (i.e., all files of a product) per day. These numbers are fairly constant over a period of one month. The reported number of downloads is obtained by dividing the number of downloads per day by the number of product files produced per day. The KNMI FTP server contains a rolling archive of the last 3 days so these numbers reflect the real NRT usage and we believe it should be close to the number of product users.

For PO.DAAC the situation is different since it contains the full history of products. The downloaded files can be recent or they can be from the past. Also, PO.DAAC contains ASCAT files in full orbits whereas the KNMI FTP sever contains ASCAT files in 3 minute PDUs for BUFR format and full orbits for NetCDF format. This makes comparing of the numbers difficult.

	JAN 2022		FEB 2022		MAR 2022		APR 2022		MAY 2022		JUN 2022	
	KNMI FTP	PO.DAAC	KNMI FTP	PO.DAAC	KNMI FTP	PO.DAAC	KNMI FTP	PO.DAAC	KNMI FTP	PO.DAAC	KNMI FTP	PO.DAAC

OSI-102-b	ASCAT-B 25 km	20 per file (BUFR), 37 per file (NetCDF)	47040	20 per file (BUFR), 37 per file (NetCDF)	17521	20 per file (BUFR), 37 per file (NetCDF)	29826	18 per file (BUFR), 37 per file (NetCDF)	73423	18 per file (BUFR), 37 per file (NetCDF)	27049	18 per file (BUFR), 37 per file (NetCDF)	379184
OSI-102-c	ASCAT-C 25 km	22 per file (BUFR), 21 per file (NetCDF)	26162	22 per file (BUFR), 21 per file (NetCDF)	3649	22 per file (BUFR), 21 per file (NetCDF)	12084	20 per file (BUFR), 23 per file (NetCDF)	4157	20 per file (BUFR), 23 per file (NetCDF)	6307	20 per file (BUFR), 23 per file (NetCDF)	12136
OSI-114-a	HY-2B 25 km wind vectors	5 per file (BUFR), 11 per file (NetCDF)		5 per file (BUFR), 11 per file (NetCDF)		5 per file (BUFR), 11 per file (NetCDF)		10 per file (BUFR), 16 per file (NetCDF)		10 per file (BUFR), 16 per file (NetCDF)		10 per file (BUFR), 16 per file (NetCDF)	
OSI-114-b	HY-2B 50 km wind vectors	3 per file (BUFR), 11 per file (NetCDF)		3 per file (BUFR), 11 per file (NetCDF)		3 per file (BUFR), 11 per file (NetCDF)		5 per file (BUFR), 16 per file (NetCDF)		5 per file (BUFR), 16 per file (NetCDF)		5 per file (BUFR), 16 per file (NetCDF)	
OSI-115-a	HY-2C 25 km wind vectors	5 per file (BUFR), 11 per file (NetCDF)		5 per file (BUFR), 11 per file (NetCDF)		5 per file (BUFR), 11 per file (NetCDF)		10 per file (BUFR), 17 per file (NetCDF)		10 per file (BUFR), 17 per file (NetCDF)		10 per file (BUFR), 17 per file (NetCDF)	
OSI-115-b	HY-2C 50 km wind vectors	3 per file (BUFR), 10 per file (NetCDF)		3 per file (BUFR), 10 per file (NetCDF)		3 per file (BUFR), 10 per file (NetCDF)		4 per file (BUFR), 16 per file (NetCDF)		4 per file (BUFR), 16 per file (NetCDF)		4 per file (BUFR), 16 per file (NetCDF)	
OSI-104-b	ASCAT-B Coastal	9 per file (BUFR), 36 per file (NetCDF)	4639	9 per file (BUFR), 36 per file (NetCDF)	39059	9 per file (BUFR), 36 per file (NetCDF)	15013	7 per file (BUFR), 36 per file (NetCDF)	8441	7 per file (BUFR), 36 per file (NetCDF)	8347	7 per file (BUFR), 36 per file (NetCDF)	34236
OSI-104-c	ASCAT-C Coastal	11 per file (BUFR), 21 per file (NetCDF)	4379	11 per file (BUFR), 21 per file (NetCDF)	20517	11 per file (BUFR), 21 per file (NetCDF)	7735	10 per file (BUFR), 23 per file (NetCDF)	1670	10 per file (BUFR), 23 per file (NetCDF)	1909	10 per file (BUFR), 23 per file (NetCDF)	15300

Table 55: Number of OSI SAF products downloaded from KNMI FTP server and PO.DAAC server over 1st half 2022

6.3. Statistics from EUMETSAT central facilities

6.3.1. Users from EUMETCast

Here below the list of the OSI SAF users identified by EUMETSAT for the distribution by EUMETCast. The table below shows the overall number of OSI SAF users by country on the 12 January 2022.

Albania	4	Greece	18	Qatar	3
Algeria	9	Guinea	2	Reunion	1
Angola	3	Guinea-Bissau	3	Romania	11
Austria	24	Hong Kong	1	Russian Federation	7
Azerbaijan	3	Hungary	9	Rwanda	6
Bahrain	1	Iceland	2	San Marino	1
Belgium	11	India	3	Sao Tome And Principe	2
Benin	4	Iran, Islamic Republic Of	34	Saudi Arabia	4
Bosnia And Herzegovina	1	Iraq	1	Senegal	9
Botswana	6	Ireland	8	Serbia	2
Brazil	6	Israel	6	Seychelles	3
Bulgaria	6	Italy	300	Sierra Leone	2
Burkina Faso	4	Jordan	2	Slovakia	8
Burundi	2	Kazakhstan	5	Slovenia	1
Cameroon	6	Kenya	14	Somalia	1
Canada	1	Korea, Republic Of	1	South Africa	22
Cape Verde	3	Kuwait	3	South Sudan	1
Central African Republic	2	Kyrgyzstan	1	Spain	52
Chad	4	Latvia	1	Sudan	4
China	5	Lebanon	3	Sweden	6
Comoros	2	Lesotho	4	Switzerland	17
Congo	3	Liberia	3	Syrian Arab Republic	1
Congo, The Democratic Republic Of The	5	Libyan Arab Jamahiriya	1	Tajikistan	1
Cote D'Ivoire	6	Lithuania	2	Tanzania, United Republic Of	6
Croatia	2	Luxembourg	1	Togo	4
Cyprus	1	Madagascar	6	Tunisia	5
Czech Republic	22	Malawi	4	Turkey	7
Denmark	7	Mali	3	Turkmenistan	1
Djibouti	2	Malta	2	Uganda	4
Egypt	6	Mauritania	5	Ukraine	3
Equatorial Guinea	2	Mauritius	8	United Arab Emirates	6
Eritrea	2	Morocco	10	United Kingdom	143
Estonia	3	Mozambique	5	United States	4

Eswatini	4	Namibia	6	Uzbekistan	1
Ethiopia	9	Netherlands	29	Viet Nam	1
Finland	6	Niger	8	Yemen	1
France	67	Nigeria	6	Zambia	4
Gabon	4	North Macedonia	1	Zimbabwe	4
Gambia	3	Norway	4		
Georgia	1	Oman	5		
Germany	130	Pakistan	2		
Ghana	10	Poland	14		
		Portugal	6		

Table 56: Overall number of EUMETCast users by country on the 12 January 2022.

6.3.2. Users and retrievals from EUMETSAT Data Center

Orders Summary over the 1st half 2022

The table below lists the products downloaded from the EUMETSAT Data Center (EDC), the volume of the downloaded data in megabytes (MB) and the number of files over the **1st half 2022**.

Product id or series	Item	Volume in MB	Number of files
OSI-401	F-15_OSICOGB_OPE	141	546
OSI-410	F-16_OSICOL2_OPE	43	28
OSI-401	F-17_OSICOGB_OPE	1	2
OSI-410	F-17_OSICOL2_OPE	43	26
OSI-410	F-18_OSICOL2_OPE	43	29
OSI-404	F-18_OSIEMGB_OPE	1749	66
OSI-306	GOES-13_OSIDSSI_OPE	25445	2222
Daily OSI-305/OSI-306	GOES-16_ODDLISSI_OPE	1229	96
Hourly OSI-305/OSI-306	GOES-16_OHDLISSI_OPE	276737	39578
OSI-207	GOES-16_OSIHSSTN_OPE	96567	8729
OSI-408	GW-1_OSICOAMSRGB_OPE	16745	1236
OSI-410	GW-1_OSICOL2_OPE	168	57
OSI-102-b	M01_OAS025_OPE	21247	11603
OSI-104-b	M01_OASWC12_OPE	212472	22861
OSI-407	M01_OMRSIDRN_OPE	12561	1648
OSI-201	M01_OSSTGLBN_OPE	75358	1982
OSI-205	M01_OSSTIST2_OPE	13	1
OSI-203	M01_OSSTIST3A_OPE	366	26
OSI-202	M01_OSSTNARN_OPE	895	34
OSI-102-a	M02_OAS025_OPE	50034	48037
OSI-104-a	M02_OASW012_OPE	1308	438
OSI-104-a	M02_OASWC12_OPE	64048	4197

Product id or series	Item	Volume in MB	Number of files
OSI-201	M02_OSSTGLB_OPE	160	8
OSI-102-c	M03_OAS025_OPE	3315	941
OSI-104-c	M03_OASWC12_OPE	4025	353
OSI-301/OSI-302	MML_ODLISSIAHL_OPE	46	4
OSI-401	MML_OSICOGB_OPE	4	1
OSI-401	MML_OSICOGBN_OPE	84982	6123
OSI-405	MML_OSIDRGB_OPE	3597	5115
OSI-402	MML_OSIEDGB_OPE	59	684
OSI-402	MML_OSIEDGBN_OPE	33386	3335
OSI-403	MML_OSITYGB_OPE	1	2
OSI-403	MML_OSITYGBN_OPE	17318	1577
Daily OSI-303/OSI-304	MSG2_ODDLISSI_OPE	42365	64
Hourly OSI-303/OSI-304	MSG2_OHDLISSI_OPE	50898	365
Hourly OSI-304	MSG2_OSIHSSI_OPE	60039	8781
OSI-206	MSG2_OSIHSSTN_OPE	59765	167
Daily OSI-303/OSI-304	MSG3_ODDLISSI_OPE	42353	445
Hourly OSI-303/OSI-304	MSG3_OHDLISSI_OPE	74045	7400
Daily OSI-304	MSG3_OSIDSSI_OPE	34	3
Hourly OSI-304	MSG3_OSIHSSI_OPE	1158	169
Daily OSI-303/OSI-304	MSG4_ODDLISSI_OPE	45132	3292
Hourly OSI-303/OSI-304	MSG4_OHDLISSI_OPE	208147	31894
OSI-206	MSG4_OSIHSSTN_OPE	102725	8617
OSI-202	N17_OSSTGASC_OPE	1973	2898
	N17_OSSTMNOR_OPE	1937	4876
	N17_OSSTMORI_OPE	2546	4857
	N18_OSSTGASC_OPE	1973	2909
	N18_OSSTMNOR_OPE	1937	2989
	N18_OSSTMORI_OPE	2546	2985
OSI-202	N20_OSSTNARN_OPE	13	1
OSI-205-b	NPP_OSSTIST2B_OPE	705	4
OSI-203-b	NPP_OSSTIST3B_OPE	1546	116
OSI-112-a	SCATSAT1_OSSW025_OPE	85287	21908
OSI-112-b	SCATSAT1_OSSW050_OPE	2412	402

Table 57: Volume of data downloaded (in MB) by products from EDC over 1st half 2022.

Ingestion Summary over the 1st half 2022

The next table lists the received percentage of OSI SAF products by month over the period. In red, there was clearly an outage of products as well under the OSI SAF monthly target performance of 95%.

There might be some differences between disseminated values over EUMETCast and the data ingested in the EDC. We assume it is due to how the availability is calculated in both cases. In the EUMETCast case, the statistics are calculated depending on the number of inputs received, while in UMARF the number of expected products is static (it is considered a theoretical number of expected products).

Product id.	Product name	JAN 2022	FEB 2022	MAR 2022	APR 2022	MAY 2022	JUN 2022
OSI-404	Global Sea Ice Emissivity (DMSP-F18)	100	100	93.5	100	100	100
OSI-305-b	Daily Downward Longwave Irradiance (GOES-16)	100	100	100	100	100	100
OSI-306-b	Daily Surface Solar Irradiance (GOES-16)						
OSI-305-b	Hourly Downward Longwave Irradiance (GOES-16)	100	99.8	99.0	99.8	100	99.3
OSI-306-b	Hourly Surface Solar Irradiance (GOES-16)						
OSI-207-b	Hourly Sea Surface Temperature (GOES-16)	100	100	99.0	99.8	100	99.3
OSI-408	Sea Ice Concentration (AMSR-2)	100	100	100	100	100	100
OSI-102-b	ASCAT 25km Wind (Metop-B)	100	100	100	100	100	99.7
OSI-104-b	ASCAT 12.5km Coastal Wind (Metop-B)	99.7	100	100	100	100	100
OSI-102-c	ASCAT 25 km Wind (Metop-C)	100	100	100	100	100	99.5
OSI-104-c	ASCAT 12.5 km Coastal Wind (Metop-C)	100	100	100	100	100	99.7
OSI-201-b	Global Sea Surface Temperature (Metop-B)	98.3	100	98.3	100	100	98.3
OSI-202-b	NAR Sea Surface Temperature (Metop-B)	98.3	100	100	100	100	98.3
OSI-202-c	NAR Sea Surface Temperature (NOAA-20)	0	0	93.5	0	100	98.3
OSI-407-a	Sea Ice Drift (Multi Mission)	100	99.1	98.4	100	99.1	100
OSI-205-a	SST/IST L2 (Metop-B)	100	100	100	100	100	100
OSI-205-b	SST/IST L2 (NPP)	99.7	90.3	100	100	100	100
OSI-203-a	SST/IST L3 (Metop-B)	100	91.2	100	100	100	100
OSI-203-b	SST/IST L3 (NPP)	100	100	100	100	100	100
OSI-401-b	Global Sea Ice Concentration (Multi Mission)	100	100	96.7	100	100	100
OSI-405-c	Global Low Resolution Sea Ice Drift	100	100	100	100	100	93.3
OSI-402-d	Global Sea Ice Edge (Multi Mission)	100	100	100	100	100	100
OSI-403-d	Global Sea Ice Type (Multi Mission)	98.3	100	100	100	100	100
OSI-301-b	Atlantic High Latitude Downward Longwave Irradiance	100	100	100	100	100	100
OSI-302-b	Atlantic High Latitude Surface Solar Irradiance						
OSI-303-a	Daily Downward Longwave Irradiance (MSG)	96.7	100	100	100	100	100
OSI-304-a	Daily Surface Solar Irradiance (MSG)						
OSI-303-a	Hourly Downward Longwave Irradiance (MSG)	99.3	99.8	99.0	100	100	99.3
OSI-304-a	Hourly Surface Solar Irradiance (MSG)						
OSI-206-a	Hourly Sea Surface Temperature (MSG)	54.7	99.7	99.1	100	100	99.4
OSI-410	Level 2 PMW sea ice concentration F-16	98.6	99.7	97.6	99.2	99.7	99.7
	Level 2 PMW sea ice concentration F-17	97.2	98.9	100	100	100	99.7

Product id.	Product name	JAN 2022	FEB 2022	MAR 2022	APR 2022	MAY 2022	JUN 2022
	Level 2 PMW sea ice concentration F-18	98.8	96.4	95.3	100	100	98.5
	Level 2 PMW sea ice concentration GW-1	100	96.0	91.5	100	100	100
OSI-114-a	HY-2B 25 km wind vectors						
OSI-114-b	HY-2B 50 km wind vectors						
OSI-115-a	HY-2C 25 km wind vectors						
OSI-115-b	HY-2C 50 km wind vectors						

Table 58: Percentage of received OSI SAF products in EDC in 1st half 2022

7. Training

Every year EUMETSAT runs a long-form course dedicated to the use of our Copernicus data in support of marine applications. Historically called "Using the Copernicus Marine data stream for ocean applications". This year, its going to be renamed this to the "EUMETSAT Supporting Marine applications course" reflecting a widening of the scope beyond just the use of Copernicus data to also include and support the OSI SAF catalogue.

The course itself will be held online from October 31st to November 25th. Usually the first three weeks of the course for supported self-paced learning, with content hosted on EUMETSAT Moodle instance. The final week is dedicated entirely to work on trainee-determined mini-projects, during which the trainers co-create final artefacts of relevance to the participants application of interest. Even though the course will be held online there is a dedicated collaboration with a university partner to enhance outreach. This year collaboration is set with the National and Kapodistrian University of Athens (UOA).

8. Recent publications

Xu, X. and A. Stoffelen, Support vector machine tropical wind speed retrieval in the presence of rain for Ku-band wind scatterometry
Atmos. Meas. Tech., 2021, 14, 7435-7451, doi:10.5194/amt-14-7435-2021.