Half-Yearly Operations Report

2nd half 2022

Version : 1.1

Date : 21/12/2023

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

Document Change record

Document version	Date	Author	Change description
0.1	03/01/2023	CH	First version used as template
1.0	23/02/2023	CH	Merge of all partner’s inputs
1.1	21/12/2023	CH	Update after the OSI SAF Operations Review in november 2023: • RID 008: if target accuracy requirements are exceeded, it is now highlighted in red in a consistent way • RID 003: captions for tables 1 and 2 corrected to “2nd half 2022” (not first) • RID 006: links updated in 5.1.X to direct to monthly maps and validation report • RID 004: "Land Contamination Ratio" replaced by "Land Contribution Ratio" • RID 010: link to the list of pyrgeometer stations updated • RID 016: caption corrected for table 9 • RID 017: text in section 6.1.1 corrected to “2nd half 2022” (not first) • RID 018: table 53 completed with product identifiers and names • RID 001: reference to CDOP 3 in the SeSp title has been removed, CDOP3 in the HYR identifier written on landscape pages has been corrected. • RID 011 and RID 030, links updated in the section about radiative fluxes and sea-ice quality assessement • RID 032: inconsistency about F17/F18 corrected for OSI-405-c • RID 033: Results for Nov and Dec corrected for OSI-403-d • RID 009: statements updated when target accuracy requirements are exceeded. • RID 012: AHL DLI mean diff margins corrected. • RID 002: section about the provision of sea-ice products within 5 hours removed from section 2. • RID 034: Emissivity (OSI-404-a) updated figure legend. • RID 029: comment updated about Metop-B NHL L3 SST/IST, to mention the requirement is not met in Nov. 2022. • RID 014: text updated in the section about wind products being compared to ECMWF model winds • RID 019: lines for ScatSat-1 wind vectors (OSI-112-a and OSI-112-b) removed from table 55 because these winds have been discontinued in 2021, they can't be retrieved from the KNMI FTP server any more (since it only contains a rolling archive of 3 days) and they are not available from PO.DAAC. • RID 024: Table 55 caption updated to include that KNMI FTP values provides an average and the PO.DAAC values reflects the absolute number of downloads.

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1. Introduction

1.1. Scope of the document

The present report covers from 1st of July to 31st of December 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 1.0, 30 May 2017

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-c, 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 1 are copied from table 2 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.

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	JUL 2022	AUG 2022	SEP 2022	OCT 2022	NOV 2022	DEC 2022
OSI-102-b	ASCAT-B 25 km wind	100.0	100.0	100.0	100.0	99.9	100.0
OSI-102-c	ASCAT-C 25 km wind	100.0	100.0	100.0	100.0	99.9	100.0
OSI-104-b	ASCAT-B Coastal wind	99.9	99.9	99.9	99.9	99.9	99.9
OSI-104-c	ASCAT-C Coastal wind	99.6	99.7	99.6	99.5	99.4	99.7
OSI-114-a	HY-2B 25 km wind vectors	97.2	98.3	97.8	99.3	98.5	96.9
OSI-114-b	HY-2B 50 km wind vectors	96.9	98.3	97.8	99.5	98.3	96.9
OSI-115-a	HY-2C 25 km wind vectors	96.9	99.5	99.3	99.3	99.3	99.5
OSI-115-b	HY-2C 50 km wind vectors	96.9	99.5	99.3	99.3	99.5	99.5
OSI-201-b	GBL SST	98.4	98.4	98.3	100	100	100
OSI-202-c	NAR SST	96.8	100	98.3	100	100	99.2
OSI-203-a	NHL SST/IST (L3)	100	100	100	100	96.7	100
OSI-203-b	NHL SST/IST (L3)	85.3	24.6	100	100	96.7	100
OSI-204-b	MGR SST (Metop-B)	98.0	99.9	100	100	99.6	99.6
OSI-204-c	MGR SST (Metop-C)	97.9	100	99.2	100	99.4	99.3
OSI-205-a	SST/IST (L2)	99.8	99.9	99.9	100	96.8	100
OSI-205-b	SST/IST (L2)	83.9	25.0	98.2	100	95.7	98.2
OSI-206-a	Meteosat SST	96.9	100	98.5	99.9	99.2	99.6
OSI-207-b	GOES-East SST	97.4	99.9	98.3	99.7	99.9	99.9
OSI-208-b	IASI SST	97.7	99.9	98.9	100	99.1	99.7
OSI-301-b OSI-302-b	AHL DLI + SSI	100	100	100	100	100	100
OSI-303-a	Meteosat DLI - hourly	97.2	100	98.9	100	99.0	99.6
	Meteosat DLI - daily	96.8	100	96.7	100	100	100
OSI-304-a	Meteosat SSI - hourly	97.2	100	98.9	100	99.0	99.6
	Meteosat SSI - daily	96.8	100	96.7	100	100	100
OSI-305-b	GOES-East DLI - hourly	97.4	100	98.8	100	99.2	99.7
	GOES-East DLI - daily	96.8	100	96.7	100	100	100
OSI-306-b	GOES-East SSI - hourly	97.4	100	98.8	100	99.2	99.7
	GOES-East SSI - daily	96.8	100	96.7	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	96.7	100
OSI-403-d	Global Sea Ice Type	100	100	100	100	96.7	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	96.7	100
OSI-407-a	Medium Res. Sea Ice Drift	100	100	99.2	100	99.1	98.3
OSI-408	Global Sea Ice Concentration (AMSR-2)	100	100	100	100	100	100
OSI-410	Level 2 PMW sea ice concentration	100	99.2	99.4	99.5	97	99.4
OSI-430-b	Global Reproc Sea Ice Conc Updates	96.8	100	100	100	96.7	100

Table 1: Percentage of OSI SAF products available on the OSI SAF FTP servers within the specified time over 2nd half 2022.

2.2. Availability via EUMETCast

Ref.	Product	JUL 2022	AUG 2022	SEP 2022	OCT 2022	NOV 2022	DEC 2022
OSI-102-b	ASCAT-B 25 km wind	100.0	100.0	100.0	100.0	99.9	100.0
OSI-102-c	ASCAT-C 25 km wind	100.0	100.0	100.0	100.0	99.9	100.0
OSI-104-b	ASCAT-B Coastal wind	99.9	99.9	99.9	99.9	99.9	99.9
OSI-104-c	ASCAT-C Coastal wind	99.6	99.7	99.6	99.5	99.4	99.7
OSI-114-a	HY-2B 25 km wind vectors	97.2	98.3	97.8	99.3	98.5	96.9
OSI-114-b	HY-2B 50 km wind vectors	96.9	98.3	97.8	99.5	98.3	96.9
OSI-115-a	HY-2C 25 km wind vectors	96.9	99.5	99.3	99.3	99.3	99.5
OSI-115-b	HY-2C 50 km wind vectors	96.9	99.5	99.3	99.3	99.5	99.5
OSI-201-b	GBL SST	100	100	100	100	100	100
OSI-202-c	NAR SST	99.2	100	99.2	100	100	99.2
OSI-203-a	NHL SST/IST (L3)	98.4	98.4	96.8	100	96.7	100
OSI-203-b	NHL SST/IST (L3)	84.0	25.0	98.3	100	96.7	100
OSI-204-b	MGR SST (Metop-B)	97.9	100	100	100	100	100
OSI-204-c	MGR SST (Metop-C)	Not distributed on EUMETCast					
OSI-205-a	SST/IST (L2)	99.9	100	99.5	100	97.6	100
OSI-205-b	SST/IST (L2)	83.0	24.1	95.3	98.9	96.5	96.3
OSI-206-a	Meteosat SST	100	100	100	100	100	100
OSI-207-b	GOES-East SST	99.9	100	99.7	100	100	99.9
OSI-208-b	IASI SST	100	100	100	100	100	100
OSI-301-b OSI-302-b	AHL DLI + SSI	100	96.8	96.7	100	100	100
OSI-303-a	Meteosat DLI - hourly	100	100	100	100	99.9	100
	Meteosat DLI - daily	100	100	100	100	100	100
OSI-304-a	Meteosat SSI - hourly	100	100	100	100	99.9	100
	Meteosat SSI - daily	100	100	100	100	100	100
OSI-305-b	GOES-East DLI - hourly	99.7	100	100	100	100	99.7
	GOES-East DLI - daily	100	100	100	100	100	100
OSI-306-b	GOES-East SSI - hourly	99.7	100	100	100	100	99.7
	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	94	97	100	88	100
OSI-403-d	Global Sea Ice Type	100	94	97	100	88	100
OSI-404-a	Global Sea Ice Emissivity	100	100	100	100	100	100
OSI-405-c	Low Res. Sea Ice Drift	100	94	97	100	91	100
OSI-407-a	Medium Res. Sea Ice Drift	100	100	99.2	100	100	98.3
OSI-408	Global Sea Ice Concentration (AMSR-2)	100	100	100	100	100	100
OSI-410	Level 2 PMW sea ice concentration	100	99.2	99.4	99.5	97	99.4

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

Comment:
The percentage below 95% are highlighted in red and explanations are provided in the next section.

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
19/20 July	All product	Outage of the FTP server at Ifremer due to an air-conditioning outage	Users have been informed
31 July/01 Sept.	All product	Degraded data due to missing auxiliary data	Users have been informed
29/30 Sept.	All product	Outage of the FTP server at Ifremer	Users have been informed
22 Nov.	All product	FTP server at Ifremer down for an upgrade operation	Users have been informed

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

Date	Impacted products or services	Anomaly	Corrective and preventive measures
Jul./Aug. 2023	OSI-203-b, OSI-205-b	VIIRS data from Suomi NPP missing due to satellite outage which lasted from 27.07 to 23.08. No OSI SAF products from this sensor were produced during this period.	Users were informed with several service messages during this long outage
8 Nov.	OSI-401-b, OSI-410 (SSMIS)	Mising SSMIS input data	Users were informed

3.3. At Wind subsystem (KNMI)

Date	Impacted products or services	Anomaly	Corrective and preventive measures
11 July	OSI-114-a OSI-114-b	The HY-2B winds have been unavailable between 8 July 23:45 and 11 July 8:45 UTC sensing time due to an instrument anomaly.	Users have been informed
6 Dec.	OSI-102-b OSI-104-b	The ASCAT-B winds have been unavailable on 6 December between 13:06 and 20:03 UTC sensing time due to a spacecraft anomaly.	Users have been informed

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)

NA

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

NA

4.3. At Wind subsystem (KNMI)

Date	Impacted products or services	Events and modifications, maintenance activities
04-10-2022	OSI-102-b OSI-102-c OSI-104-b OSI-104-c	Upgrade of wind processing chain in preparation of introduction of Land Contribution Ratio in ASCAT input data. AWDP version is 3_3_01.
22-11-2022	OSI-104-b OSI-104-c	Introduction of Land Contribution Ratio in ASCAT input data. The minimum distance of winds to the coast is reduced from approximately 20 km to 10 - 15 km in the new products.

4.4. Release of software and new data records & ICDR

OSI-450-a, OSI-455 and OSI-458 CDRs and OSI-430-a ICDR were released in November 2022.

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.

Robust statistics
In the following, for the LML SST products (OSI-206-a, OSI-207-b, OSI-IO-SST, OSI-202-c, 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 https://osi-saf.eumetsat.int/low-and-mid-latitudes-processing-center/charts-display?product=SST.

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

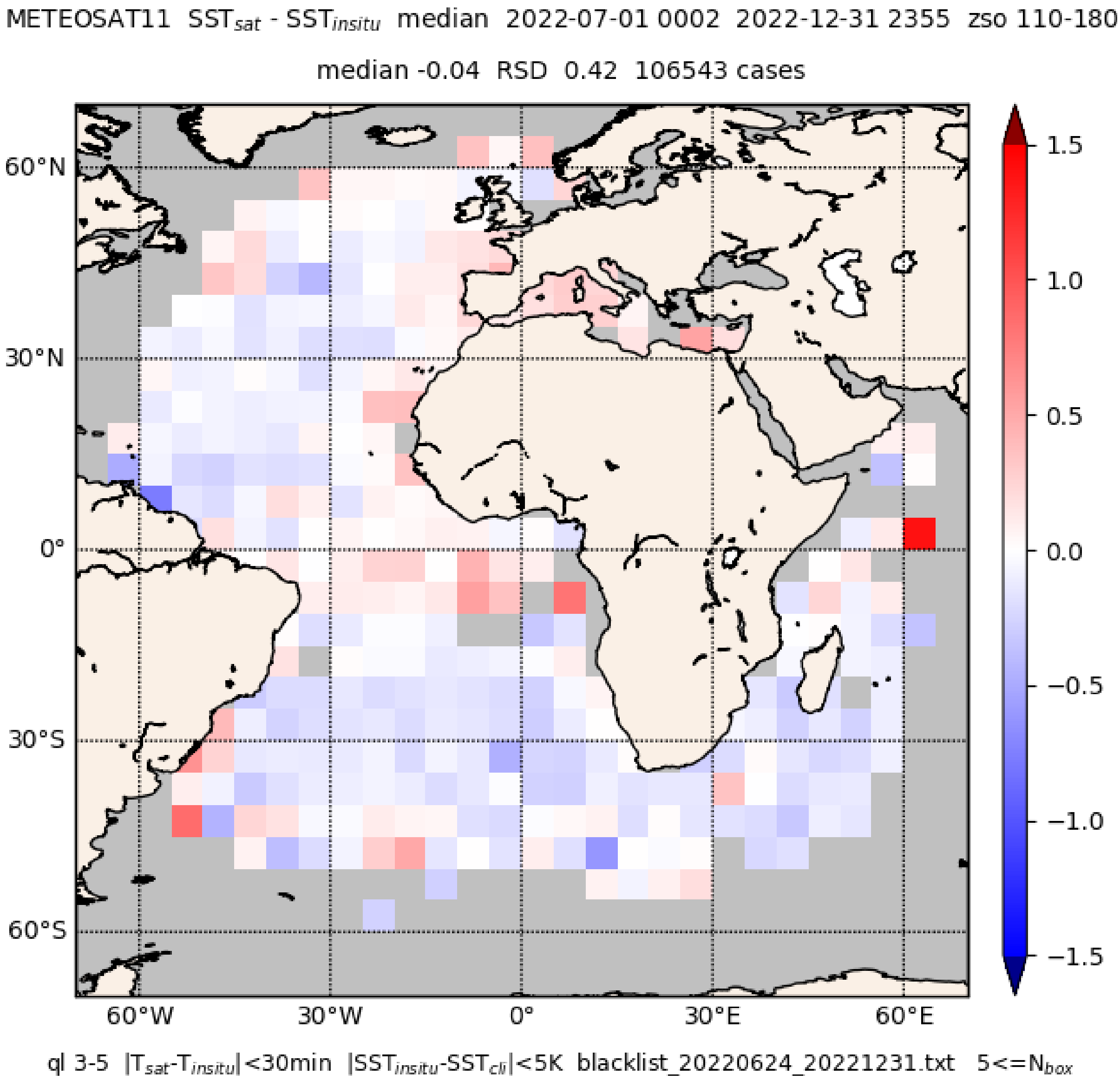

Figure 1: Meteosat night-time SST median difference with respect to buoys measurements for quality level 3,4,5

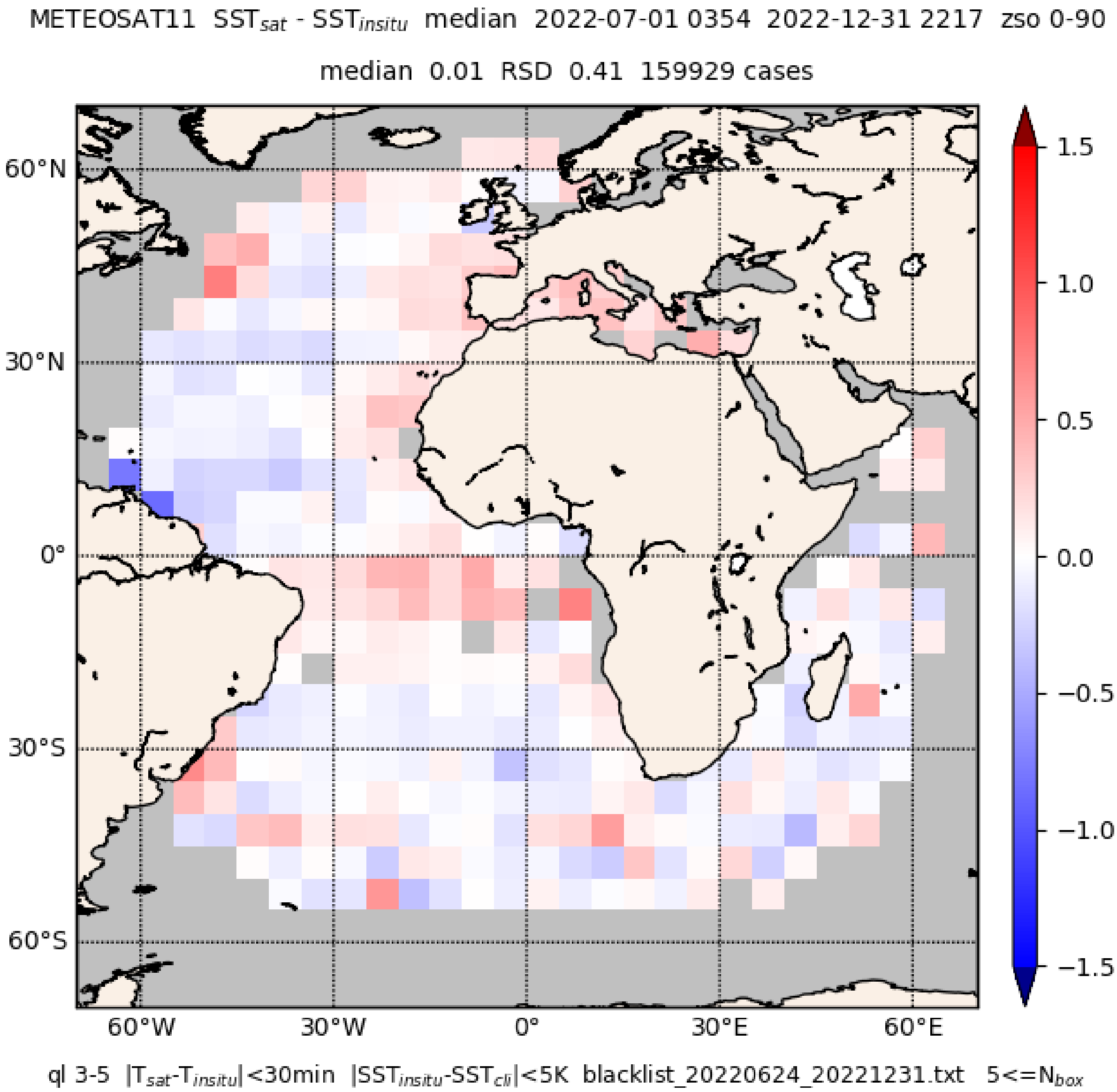

Figure 2: Meteosat day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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

Meteosat night-time SST quality results over 2nd 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
JUL 2022	15232	0.03	0.54	0.02	0.48
AUG 2022	19493	-0.01	0.50	0.00	0.45
SEP 2022	20214	-0.08	0.47	-0.06	0.42
OCT 2022	17819	-0.06	0.46	-0.04	0.42
NOV 2022	16697	-0.08	0.45	-0.07	0.41
DEC 2022	17088	-0.08	0.43	-0.06	0.39
Meteosat day-time SST quality results over 2nd half 2022					
JUL 2022	30030	0.06	0.56	0.07	0.49
AUG 2022	31921	0.03	0.51	0.05	0.45
SEP 2022	25486	-0.05	0.49	-0.01	0.42
OCT 2022	22685	-0.02	0.45	-0.01	0.39
NOV 2022	23903	-0.03	0.42	-0.02	0.35
DEC 2022	25904	-0.01	0.40	0.00	0.35

Table 3: Meteosat SST quality results over 2nd 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 https://osi-saf.eumetsat.int/low-and-mid-latitudes-processing-center/charts-display?product=SST.

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

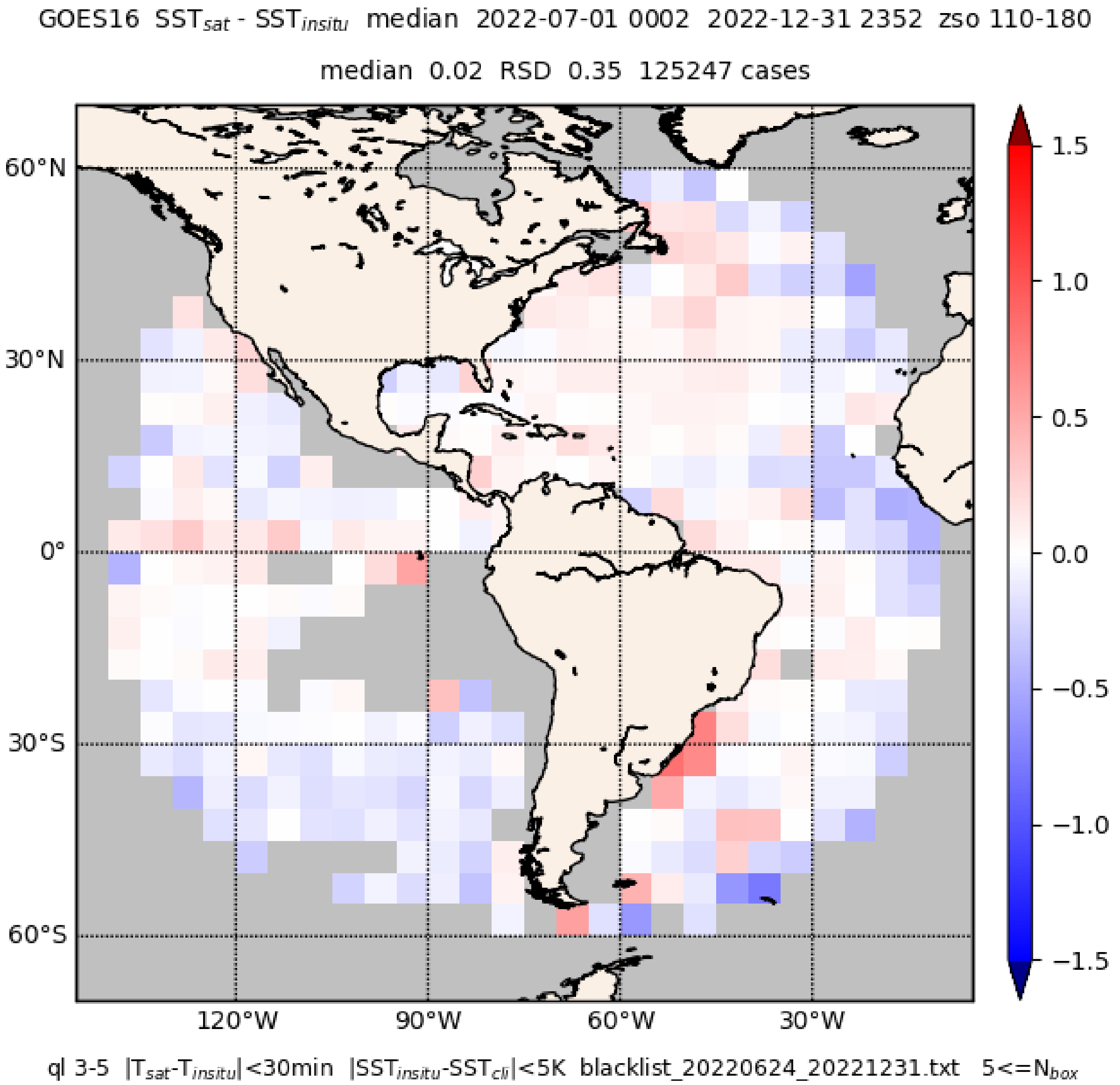

Figure 3: GOES-East night-time SST median difference with respect to buoys measurements for quality level 3,4,5

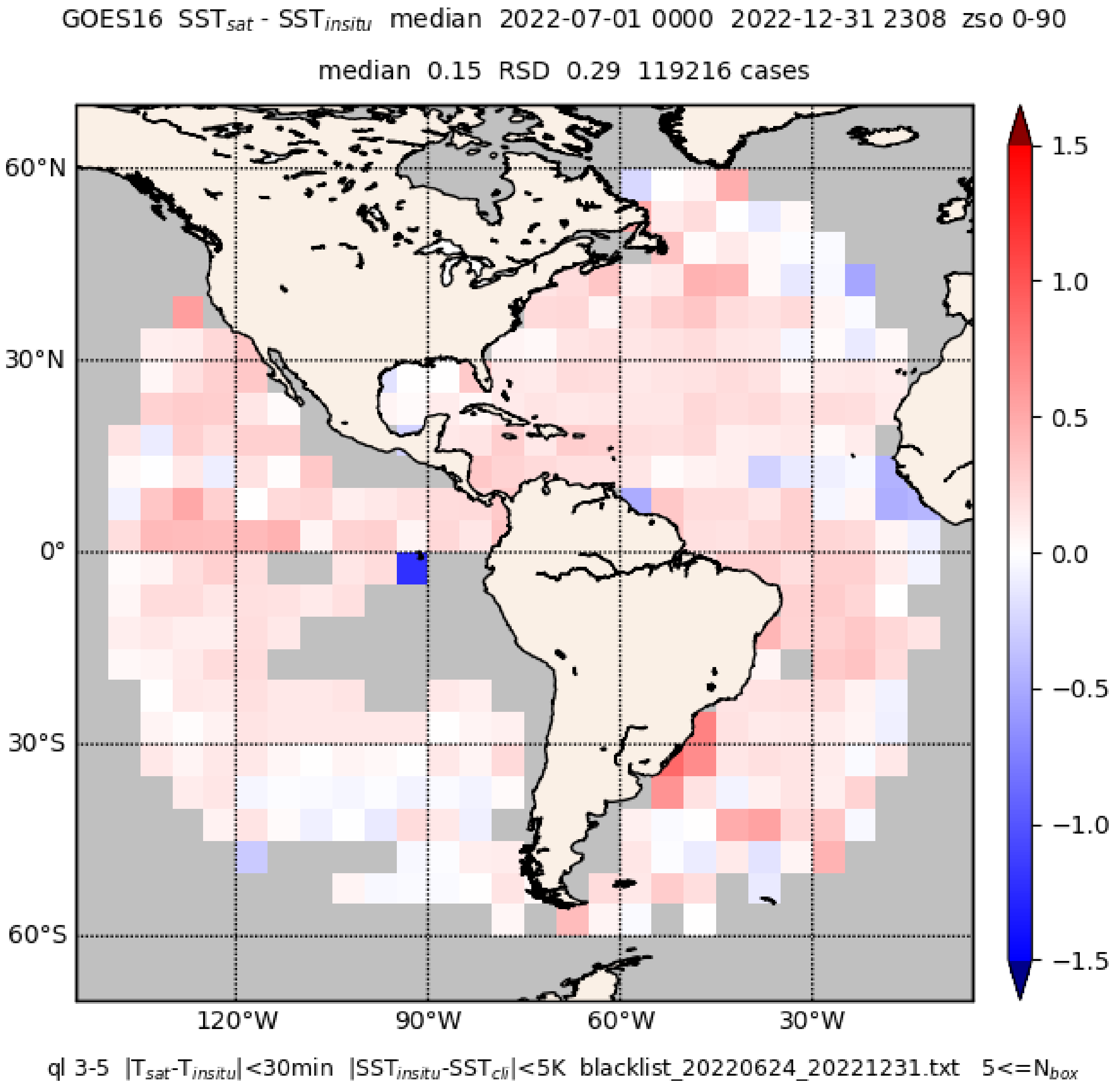

Figure 4: GOES-East day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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

GOES-East night-time SST quality results 2nd 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
JUL 2022	15799	-0.10	0.40	-0.05	0.34
AUG 2022	22074	-0.06	0.40	-0.02	0.33
SEP 2022	24878	-0.04	0.43	-0.01	0.36
OCT 2022	21586	0.03	0.38	0.06	0.33
NOV 2022	19684	0.05	0.39	0.08	0.33
DEC 2022	21226	0.02	0.43	0.07	0.35
GOES-East day-time SST quality results 2nd half 2022					
JUL 2022	17936	0.01	0.39	0.06	0.32
AUG 2022	21144	0.06	0.37	0.10	0.30
SEP 2022	22031	0.11	0.39	0.13	0.30
OCT 2022	20084	0.18	0.33	0.20	0.26
NOV 2022	18778	0.18	0.35	0.20	0.28
DEC 2022	19243	0.16	0.36	0.19	0.29

Table 4: GOES-East SST quality results over 2nd 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

On the 23 June 2022, Meteosat-9, in position 45.5° East, replaced Meteosat-8 (in position 41.5° East since 2016) for the Indian Ocean Data Coverage (IODC). Sea Surface Temperature is processed as a demonstration product since 2016.

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.

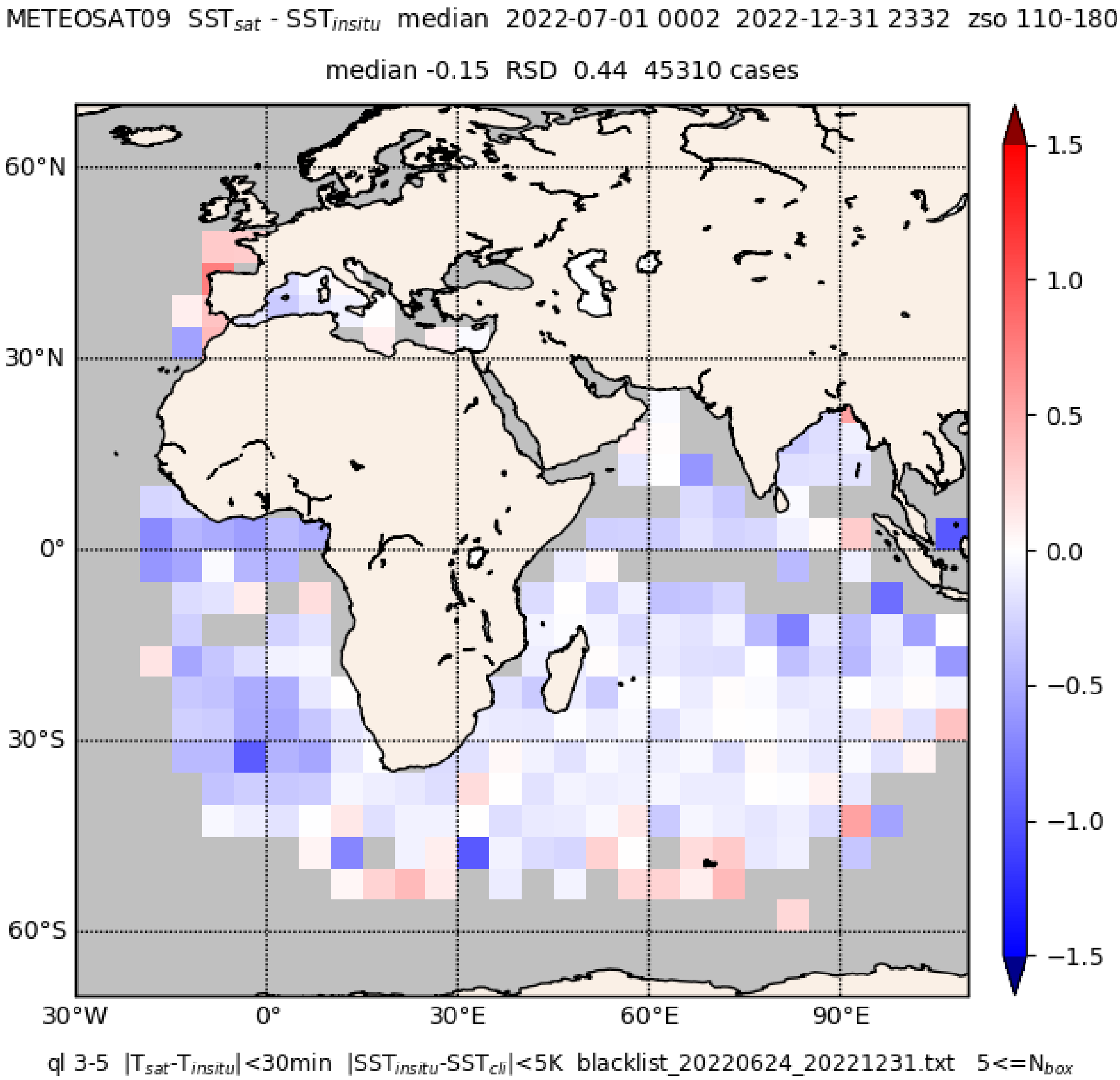

Figure 5: Meteosat Indian Ocean night-time SST median difference with respect to buoys measurements for quality level 3,4,5

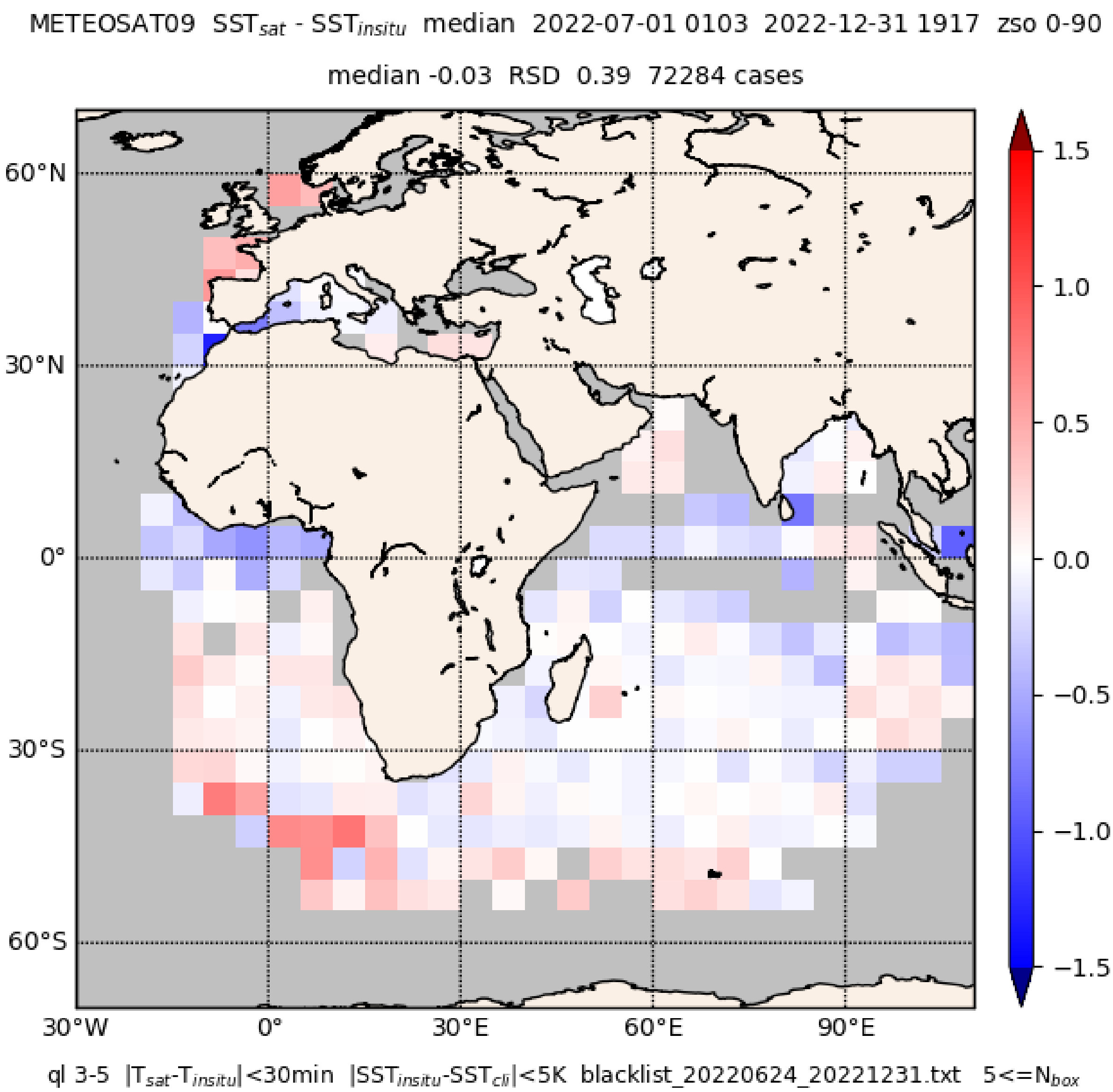

Figure 6: Meteosat Indian Ocean day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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 2nd 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
JUL 2022	8073	-0.18	0.52	-0.13	0.42
AUG 2022	8469	-0.17	0.56	-0.08	0.40
SEP 2022	6604	-0.13	0.60	-0.09	0.42
OCT 2022	6939	-0.21	0.57	-0.13	0.43
NOV 2022	7938	-0.23	0.52	-0.21	0.45
DEC 2022	7287	-0.31	0.53	-0.27	0.48
Meteosat Indian Ocean day-time SST quality results over 2nd half 2022					
JUL 2022	14969	-0.14	0.55	-0.08	0.44
AUG 2022	13316	-0.08	0.55	-0.02	0.37
SEP 2022	8486	-0.05	0.55	-0.02	0.38
OCT 2022	9231	-0.11	0.48	-0.06	0.33
NOV 2022	12388	-0.10	0.45	-0.08	0.37
DEC 2022	13894	0.02	0.53	0.06	0.42

Table 5: Meteosat Indian Ocean SST quality results over 2nd 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-c 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.

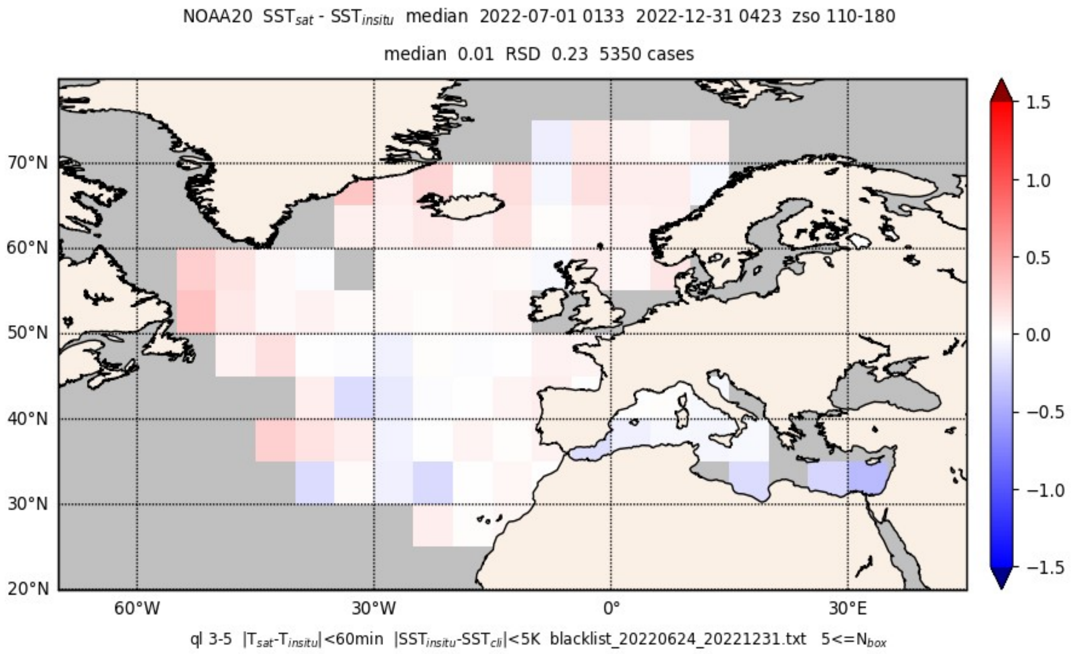

Figure 7: NOAA-20 NAR night-time SST median difference with respect to buoys measurements for quality level 3,4,5

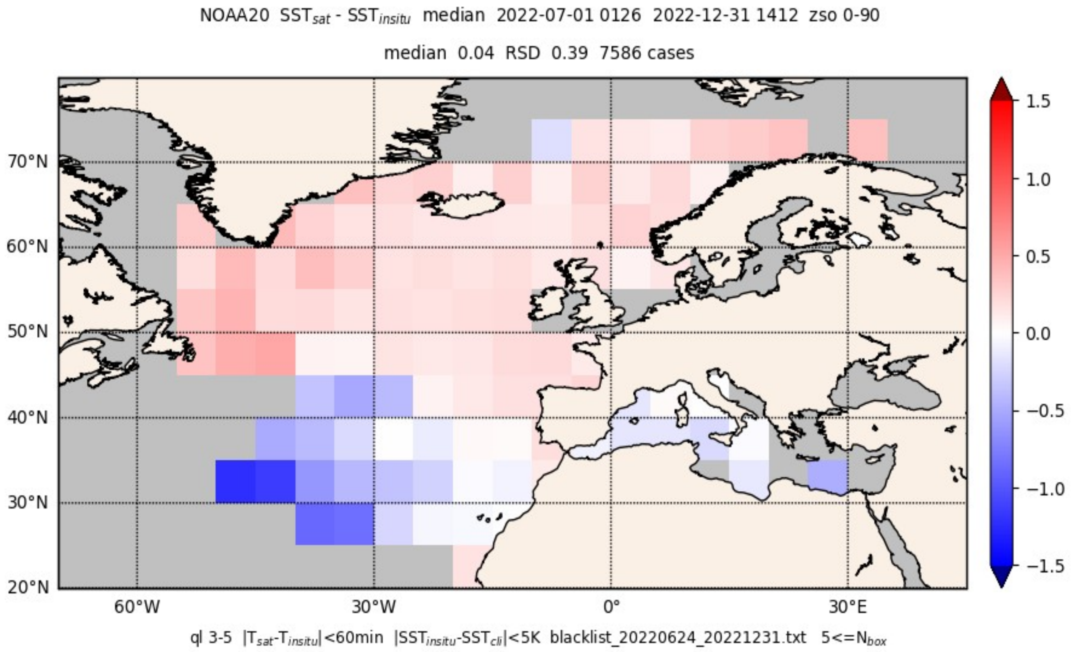

Figure 8: NOAA-20 NAR day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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

NOAA-20 NAR night-time SST quality results over 2nd 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
JUL 2022	898	-0.02	0.31	0.02	0.22
AUG 2022	1268	-0.05	0.33	-0.01	0.24
SEP 2022	1000	-0.03	0.32	0.01	0.24
OCT 2022	949	-0.05	0.33	0.01	0.24
NOV 2022	643	0.01	0.25	0.03	0.20
DEC 2022	592	-0.01	0.26	0.01	0.20
NOAA-20 NAR day-time SST quality results over 2nd half 2022					
JUL 2022	1715	0.01	0.55	0.10	0.39
AUG 2022	1988	-0.08	0.52	0.02	0.42
SEP 2022	1296	-0.15	0.57	-0.06	0.44
OCT 2022	1191	-0.08	0.46	0.01	0.33
NOV 2022	840	0.02	0.43	0.11	0.29
DEC 2022	556	0.01	0.41	0.07	0.26

Table 6: Quality results for NOAA-20 NAR SST over 2nd 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 https://osi-saf.eumetsat.int/low-and-mid-latitudes-processing-center/charts-display?product=SST.

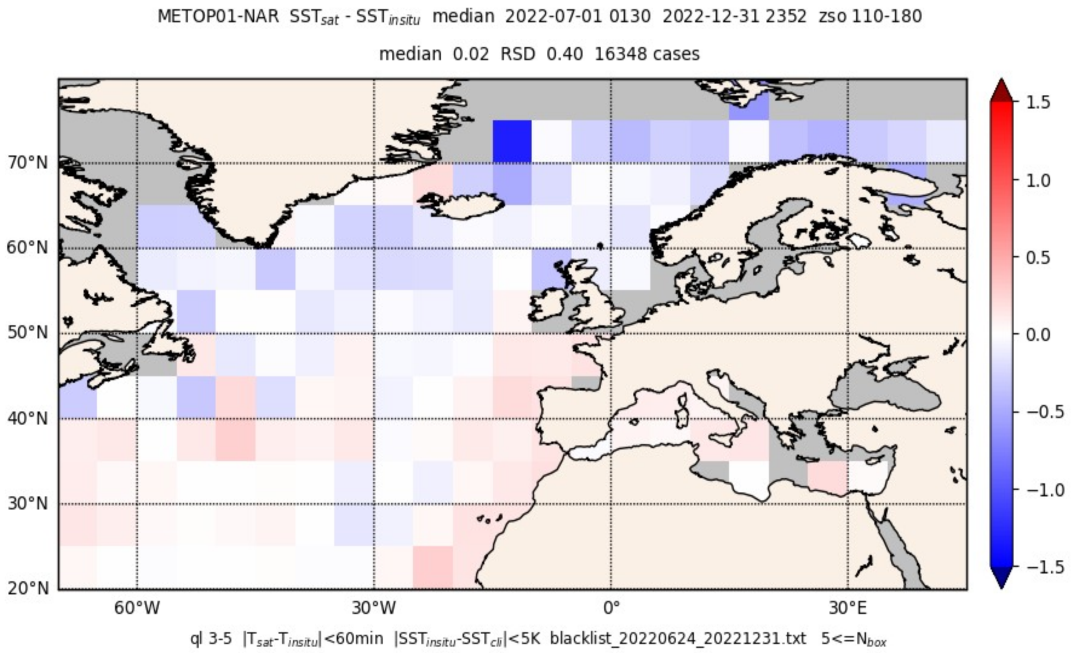

Figure 9: Metop-B NAR night-time SST median difference with respect to buoys measurements for quality level 3,4,5

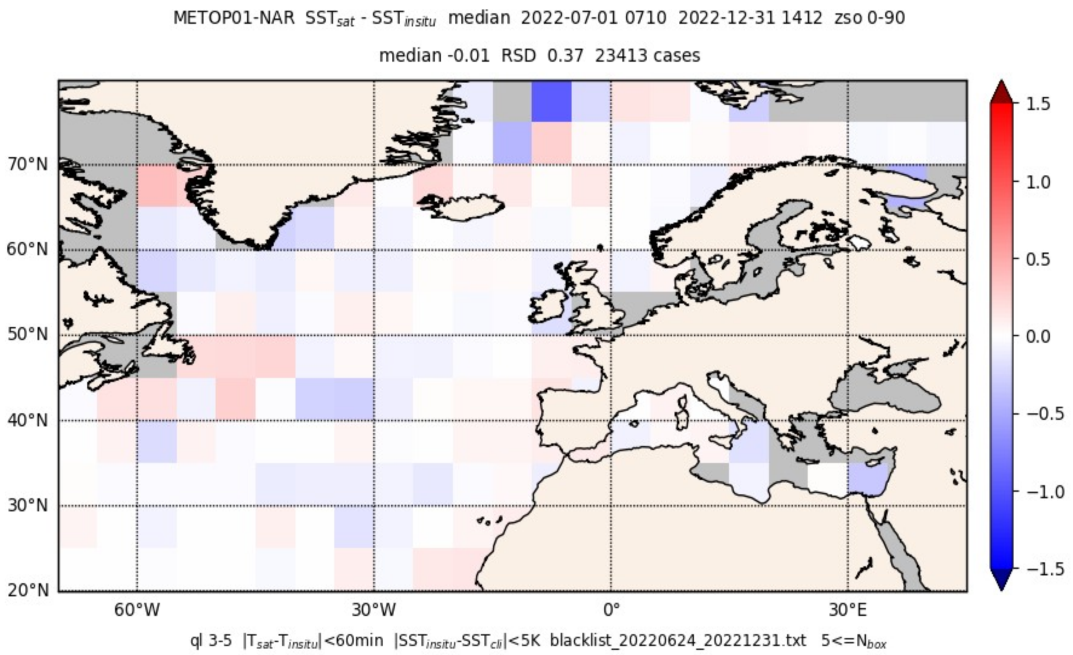

Figure 10: Metop-B NAR day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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

Metop-B NAR night-time SST quality results over 2nd 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
JUL 2022	1101	-0.09	0.35	-0.05	0.31
AUG 2022	2670	-0.06	0.51	0.00	0.37
SEP 2022	3455	-0.08	0.62	0.04	0.43
OCT 2022	3466	-0.06	0.53	0.04	0.40
NOV 2022	3042	-0.07	0.59	0.04	0.44
DEC 2022	2614	-0.06	0.50	0.01	0.38
Metop-B NAR day-time SST quality results over 2nd half 2022					
JUL 2022	4134	-0.09	0.62	-0.05	0.38
AUG 2022	5063	-0.08	0.53	-0.03	0.38
SEP 2022	4608	-0.06	0.54	0.01	0.39
OCT 2022	4094	-0.05	0.49	0.01	0.37
NOV 2022	3186	-0.02	0.46	0.04	0.38
DEC 2022	2328	-0.04	0.41	0.01	0.34

Table 7: Quality results for Metop-B NAR SST over 2nd half 2022, for 3, 4, 5 quality indexes

Comments:
Overall statistics are good and within the requirement.

5.1.5. GBL SST (OSI-201-b) and MGR SST (OSI-204-b) 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 https://osi-saf.eumetsat.int/low-and-mid-latitudes-processing-center/charts-display?product=SST.

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

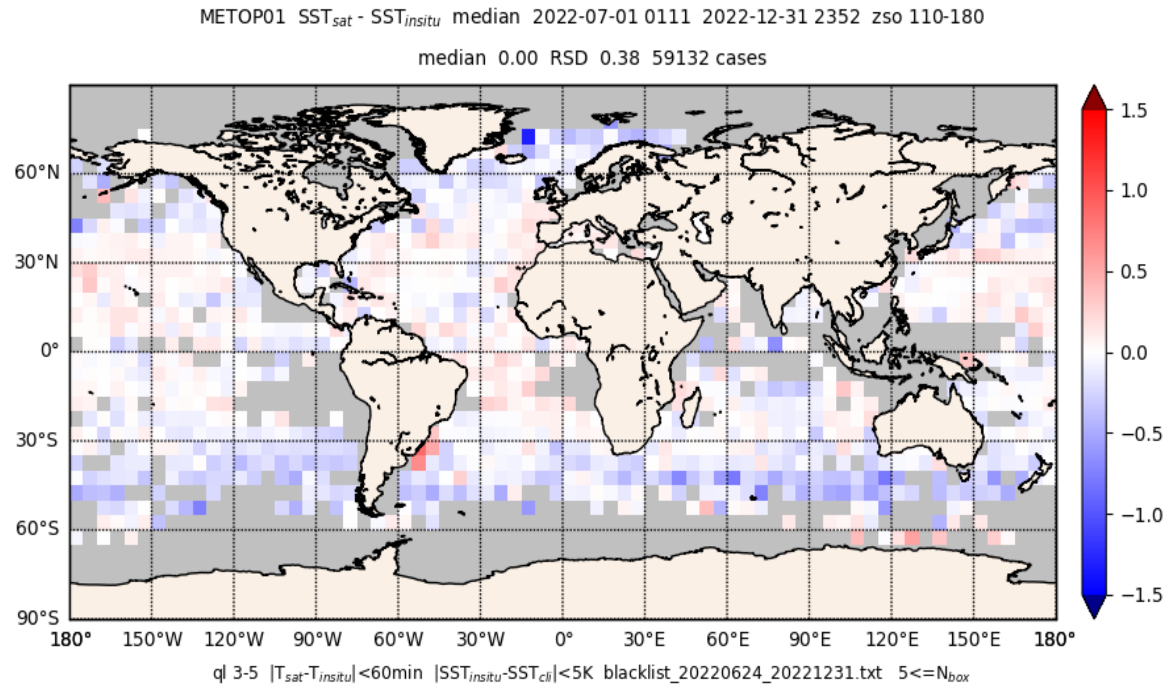

Figure 11: Metop-B night-time SST median difference with respect to buoys measurements for quality level 3,4,5

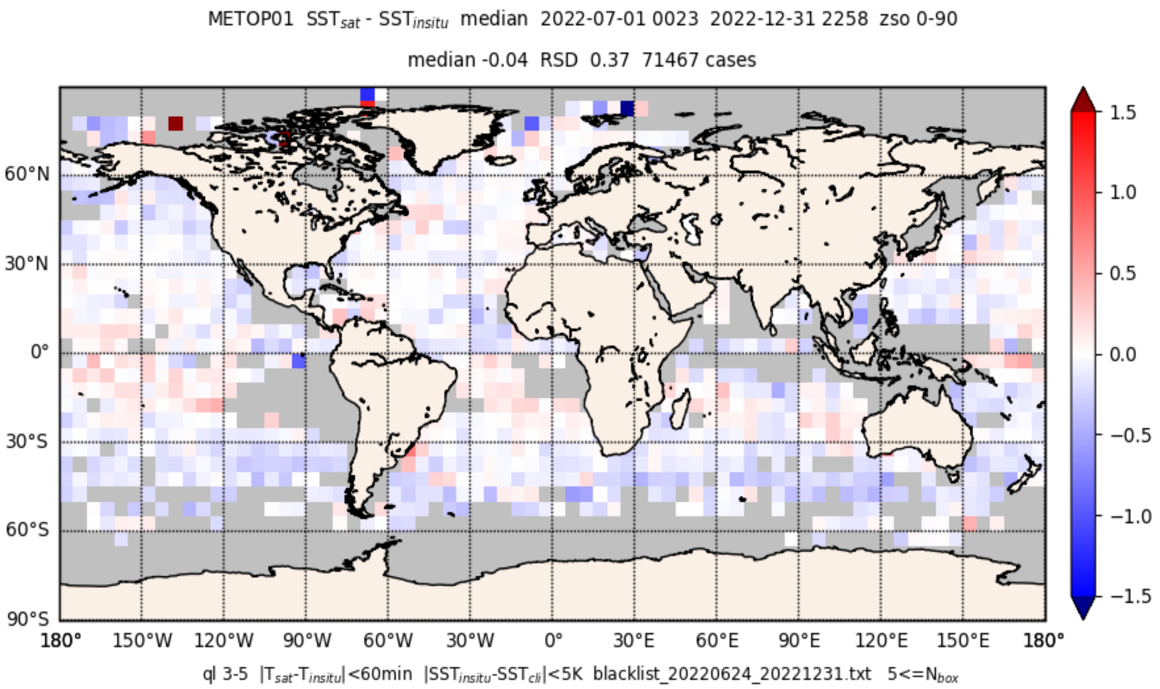

Figure 12: Metop-B day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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

Global Metop-B night-time SST quality results over 2nd 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
JUL 2022	6947	-0.13	0.48	-0.03	0.36
AUG 2022	9798	-0.11	0.53	-0.02	0.37
SEP 2022	11070	-0.11	0.55	0.00	0.39
OCT 2022	11349	-0.10	0.53	0.01	0.39
NOV 2022	10225	-0.09	0.55	0.02	0.40
DEC 2022	9743	-0.09	0.51	0.00	0.38
Global Metop-B day-time SST quality results over 2nd half 2022					
JUL 2022	11137	-0.12	0.58	-0.07	0.39
AUG 2022	13353	-0.10	0.52	-0.05	0.38
SEP 2022	13297	-0.10	0.49	-0.04	0.37
OCT 2022	12765	-0.07	0.45	-0.03	0.35
NOV 2022	11095	-0.04	0.43	-0.01	0.36
DEC 2022	9820	-0.06	0.44	-0.02	0.36

Table 8: Quality results for global METOP SST over 2nd 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 https://osi-saf.eumetsat.int/low-and-mid-latitudes-processing-center/charts-display?product=SST.

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

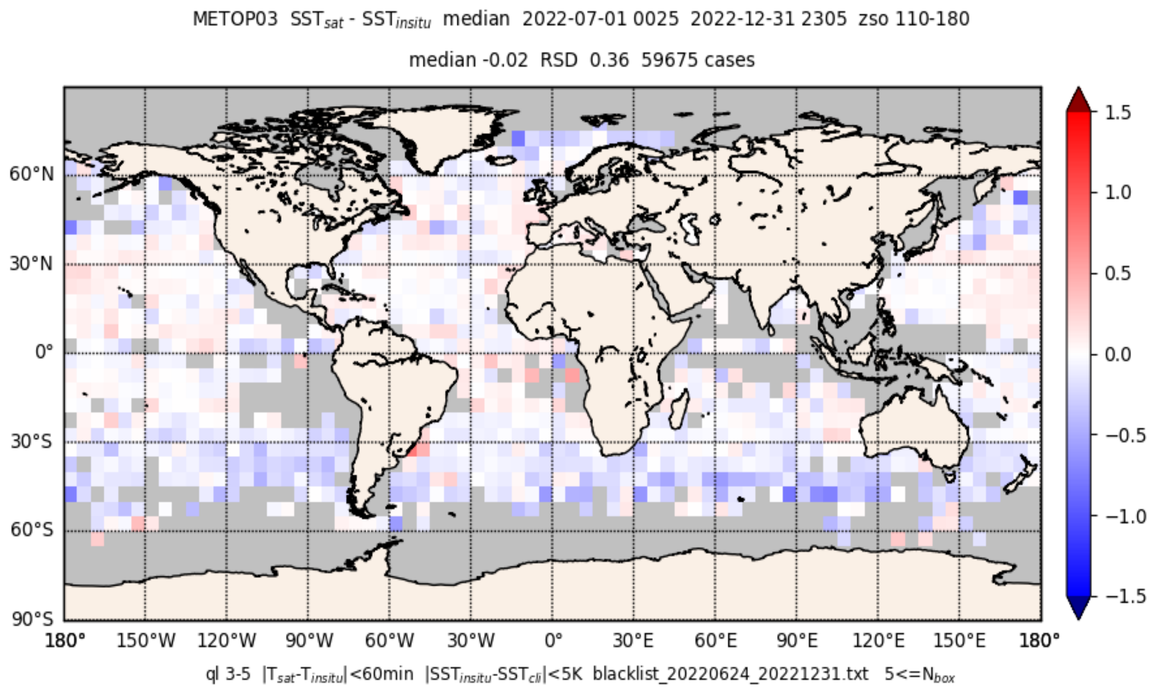

Figure 13: Metop-C night-time SST median difference with respect to buoys measurements for quality level 3,4,5

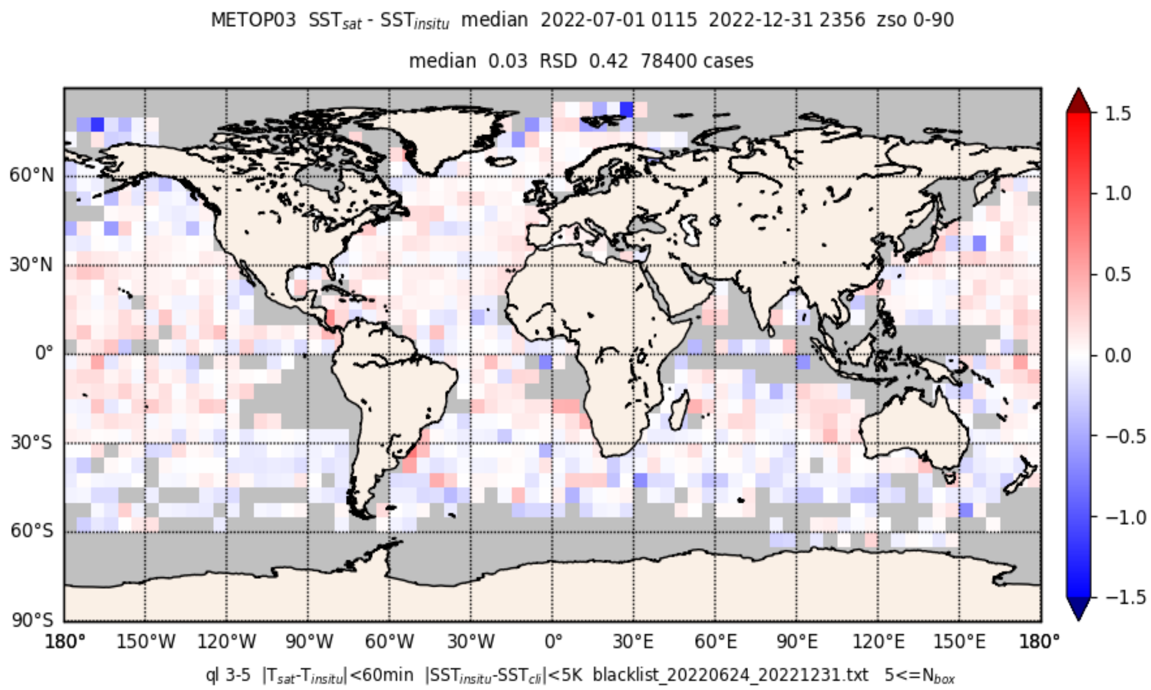

Figure 14: Metop-C day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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

Global Metop-C night-time SST quality results over 2nd 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
JUL 2022	7092	-0.16	0.53	-0.05	0.35
AUG 2022	9822	-0.14	0.56	-0.03	0.34
SEP 2022	11194	-0.12	0.57	-0.01	0.36
OCT 2022	11383	-0.14	0.59	-0.02	0.38
NOV 2022	10338	-0.11	0.55	0.00	0.37
DEC 2022	9846	-0.12	0.52	-0.01	0.36
Global Metop-C day-time SST quality results over 2nd half 2022					
JUL 2022	12217	-0.11	0.65	-0.03	0.43
AUG 2022	14517	-0.07	0.59	-0.01	0.42
SEP 2022	14792	-0.01	0.56	0.04	0.43
OCT 2022	13669	0.00	0.50	0.04	0.41
NOV 2022	12152	0.03	0.51	0.08	0.41
DEC 2022	11053	0.02	0.48	0.05	0.39

Table 9: Quality results for global Metop-C SST over 2nd 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. We anticipate to get near real time access to PROMICE surface temperatures soon, in order to cover the entire HYR period with PROMICE surface temperature data for future reportings.

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.

The following tables and figures provide, in order, the results for the SST, sea IST and inland IST, respectively. As for the SST validation, table 10 below contains a list of buoys that were disqualified from the validation data because they were supposedly stranded on a coastline or located in ice.

Buoy ID	Location	Buoy ID	Location
GL_TS_DB_1601701	Antarctic Peninsula	GL_TS_DB_4801686	Arctic ice pack
GL_TS_DB_4101842	Northern coast of Norway	GL_TS_DB_4801761	Arctic ice pack
GL_TS_DB_4600181	South of Alaska	GL_TS_DB_4801762	Arctic ice pack
GL_TS_DB_4600204	South of Alaska	GL_TS_DB_4801763	Arctic ice pack
GL_TS_DB_4600265	Eastern Bering Strait	GL_TS_DB_4801764	Arctic ice pack
GL_TS_DB_4601819	Arctic ice pack	GL_TS_DB_4802508	Canadian Archipelago
GL_TS_DB_4701737	Canadian Archipelago	GL_TS_DB_4802592	Arctic ice pack
GL_TS_DB_4801628	Arctic ice pack	GL_TS_DB_4802593	Arctic ice pack
GL_TS_DB_4801670	Arctic ice pack	GL_TS_DB_4802594	Arctic ice pack
GL_TS_DB_4801767	Arctic ice pack	GL_TS_DB_4802595	Arctic ice pack
GL_TS_DB_4801771	Arctic ice pack	GL_TS_DB_4802596	Arctic ice pack
GL_TS_DB_4801772	Arctic ice pack	GL_TS_DB_4802600	Arctic ice pack
GL_TS_DB_4802539	North of Alaska	GL_TS_DB_4802654	Arctic ice pack
GL_TS_DB_4802662	Arctic ice pack	GL_TS_DB_4802655	Arctic ice pack
GL_TS_DB_6401834	North of Iceland	GL_TS_DB_4802657	Arctic ice pack
GL_TS_DB_6402667	South of Iceland	GL_TS_DB_4802659	Arctic ice pack
GL_TS_DB_4601812	Arctic ice pack	GL_TS_DB_4802660	Arctic ice pack
GL_TS_DB_4801636	Arctic ice pack	GL_TS_DB_4802661	Arctic ice pack
GL_TS_DB_4801663	Arctic ice pack	GL_TS_DB_4802663	Arctic ice pack
GL_TS_DB_4801665	Arctic ice pack	GL_TS_DB_5401767	Coast of Chile
GL_TS_DB_4801668	Arctic ice pack	GL_TS_DB_6401589	Arctic ice pack

Table 10: List of buoy IDs and locations for the disqualified buoys in the SST validation.

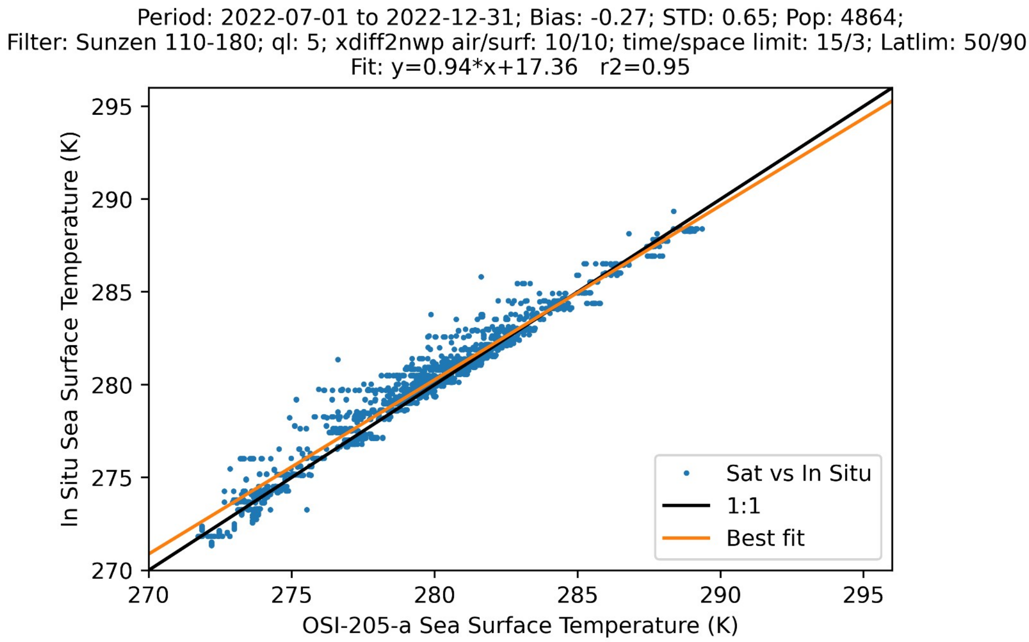

Figure 15: 2nd half 2022 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only nighttime data for the northern hemisphere are shown.

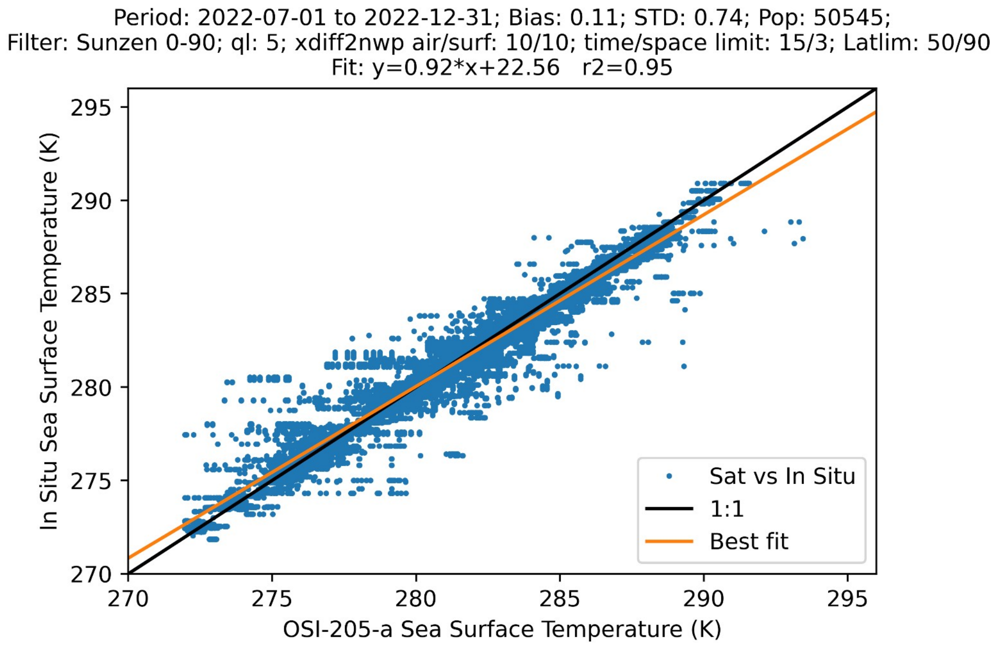

Figure 16: 2nd half 2022 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only daytime data for the northern hemisphere are shown.

OSI-205-a AVHRR SST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	1983	-0.71	-1.4	1.00	0
FEB 2022	922	-0.74	-5.7	0.81	19
MAR 2022	934	-0.78	-11.4	0.72	28
APR 2022	100	-0.33	52.9	0.84	16
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
JUL 2022	N/A	N/A	N/A	N/A	N/A
AUG 2022	1	-0.99	-41.43	0.00	100.00
SEP 2022	311	0.10	86.18	0.63	37.22
OCT 2022	981	-0.27	61.75	0.64	36.13
NOV 2022	2598	-0.25	63.79	0.56	43.82
DEC 2022	973	-0.46	34.91	0.83	17.18
2nd half 2022	4864	-0.27	60.78	0.65	34.5
OSI-205-a AVHRR SST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	563	-0.38	45.7	0.66	34
FEB 2022	717	-0.20	71.4	0.34	66
MAR 2022	3315	-0.22	68.6	0.53	47
APR 2022	3313	-0.13	81.4	0.56	44
MAY 2022	4834	0.03	95.7	0.60	40
JUN 2022	6524	-0.03	95.7	0.90	10
1st half 2022	19266	-0.08	88.6	0.71	29.0
JUL 2022	23770	0.15	78.37	0.83	17.31
AUG 2022	14952	0.08	88.3	0.63	37.44
SEP 2022	9120	0.00	99.73	0.70	29.54
OCT 2022	2589	0.20	71.52	0.65	35.31
NOV 2022	114	0.08	88.75	0.25	74.86
DEC 2022	N/A	N/A	N/A	N/A	N/A
2nd half 2022	50545	0.11	84.93	0.74	25.69
(*) 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 11: Quality results for OSI-205-a AVHRR SST against Copernicus In situ DB buoys, for the Northern Hemisphere, over JAN 2022 to DEC 2022, for quality level 5,4,3 by night and by day

Comments:
For the validation against measured SST of Copernicus In Situ DB buoys in the Northern Hemisphere, the target requirements for the mean difference (± 0.7 K) and standard deviation (± 1.0 K) are all satisfied.

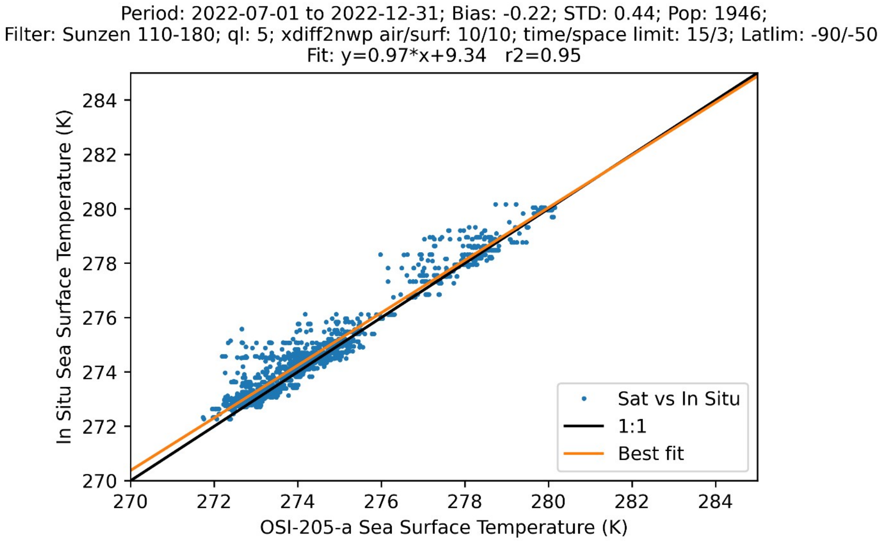

Figure 17: 2nd half 2022 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only night-time data for the southern hemisphere are shown.

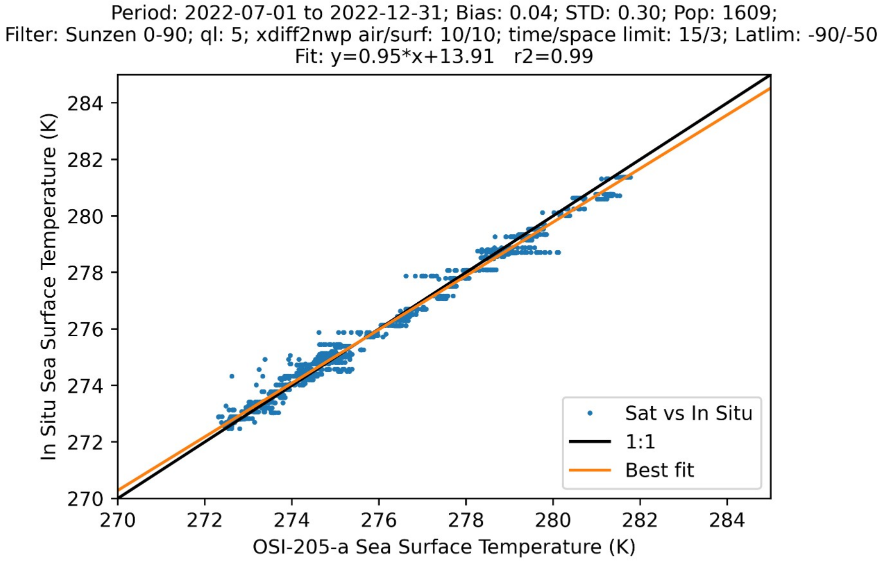

Figure 18: 2nd half 2022 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only daytime data for the southern hemisphere are shown.

OSI-205-a AVHRR SST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	N/A	N/A	N/A	N/A	N/A
FEB 2022	68	-0.79	-12.9	1.35	-35
MAR 2022	1195	-0.38	45.7	1.08	-8
APR 2022	1095	-0.58	17.1	1.08	-8
MAY 2022	1050	-1.06	-51.4	1.26	-26
JUN 2022	1411	-0.77	-10.0	1.09	-9
1st half 2022	4819	-0.69	1.4	1.15	-15.0
JUL 2022	685	-0.27	60.96	0.44	55.63
AUG 2022	332	-0.33	52.31	0.45	55.24
SEP 2022	461	-0.20	71.85	0.49	51.32
OCT 2022	463	-0.09	87.8	0.32	68.33
NOV 2022	5	-0.91	-30.29	0.48	52.32
DEC 2022	N/A	N/A	N/A	N/A	N/A
2nd half 2022	1946	-0.22	68.21	0.44	56.08
OSI-205-a AVHRR SST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	724	0.01	98.6	0.65	35
FEB 2022	568	-0.01	98.6	0.38	62
MAR 2022	999	-0.05	92.9	0.42	58
APR 2022	723	-0.14	80.0	0.53	47
MAY 2022	589	-0.17	75.7	0.67	33
JUN 2022	492	-0.58	17.1	1.06	-6
1st half 2022	4095	-0.13	81.4	0.64	36.0
JUL 2022	N/A	N/A	N/A	N/A	N/A
AUG 2022	64	0.07	90.62	0.32	67.79
SEP 2022	270	-0.11	84.13	0.31	69.46
OCT 2022	312	-0.01	97.93	0,28	71.70
NOV 2022	550	0.11	84.22	0.29	70,68
DEC 2022	401	0.07	89.38	0,28	72.00
2nd half 2022	1609	0.04	94.98	0.30	69.72
(*) 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 AVHRR SST, for the Southern Hemisphere, over JAN 2022 to DEC 2022, for quality level 5,4,3 by night and by day

Comments:
For the validation against measured SST of Copernicus In Situ DB buoys in the Southern Hemisphere, the target requirements for the mean difference (± 0.7 K) and standard deviation (± 1.0 K) are all satisfied.

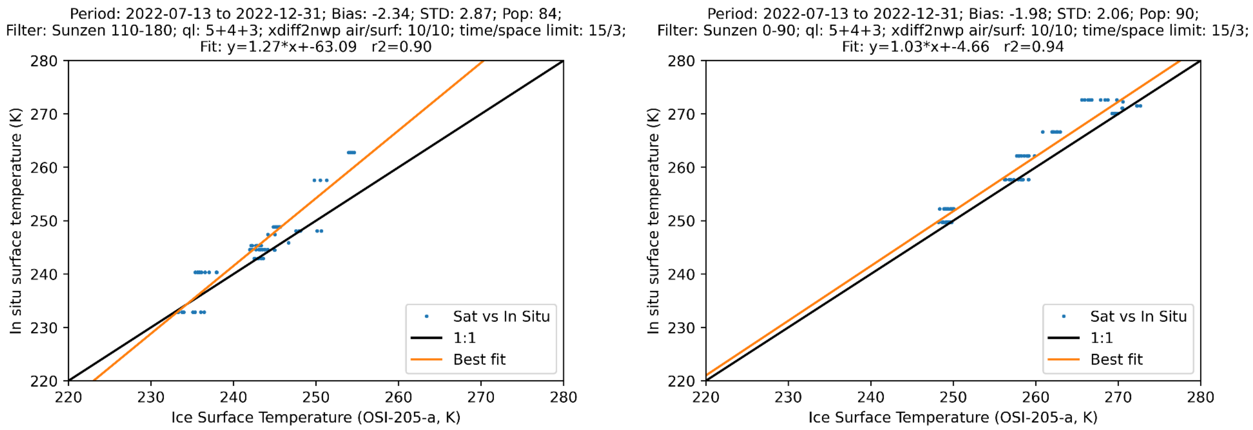

Figure 19: 2nd half 2022 OSI-205-a monthly mean IST mean difference and bias with respect to conventional buoys measurements from the SIMB3 buoys (air temperature). Data with quality level 3, 4, 5 are shown. The graph on the left shows night-time data, while the plot on the right only shows day-time observations.

OSI-205-a IST quality results over 2nd 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 (**)
JUL 2022	N/A	N/A	N/A	N/A	N/A
AUG 2022	N/A	N/A	N/A	N/A	N/A
SEP 2022	N/A	N/A	N/A	N/A	N/A
OCT 2022	5	0.78	77.60	1.25	58.24
NOV 2022	41	-3.87	-10.63	2.75	8.46
DEC 2022	38	-1.10	68.62	2.12	29.21
OSI-205-a IST quality results over 2nd 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 (**)
JUL 2022	1	-1.71	51.14	0.00	100
AUG 2022	22	-2.29	34.51	2.71	9.74
SEP 2022	N/A	N/A	N/A	N/A	N/A
OCT 2022	67	-1.88	46.4	1.80	40.01
NOV 2022	N/A	N/A	N/A	N/A	N/A
DEC 2022	N/A	N/A	N/A	N/A	N/A
(*) 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 13: Quality results for OSI-205-a Metop AVHRR IST against SIMB3 for the Northen Hemisphere, over 2nd 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 November as indicated by the negative margin values in the margin column. But it still satisfies the threshold requirement of ± 4.0 K. The target requirements for the standard deviation are all satisfied.

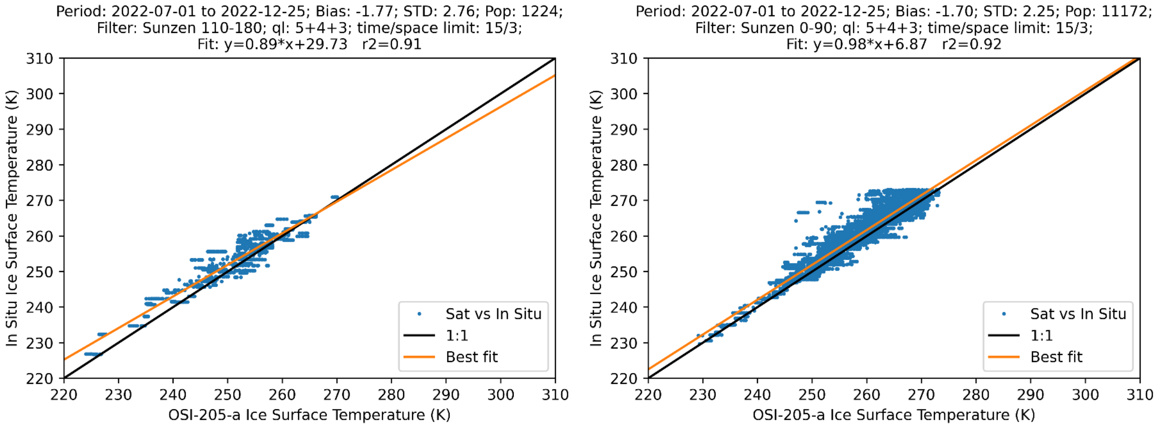

Figure 20: IST PROMICE air: 2nd half 2022 OSI-205-a monthly mean IST with respect to air measurements from PROMICE. The graph on the left shows night-time data with quality flags 5, 4 & 3, while the plot on the right only shows day-time observations

OSI-205-a IST quality results over 2nd **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 (**)
JUL 2022	N/A	N/A	N/A	N/A	N/A
AUG 2022	N/A	N/A	N/A	N/A	N/A
SEP 2022	N/A	N/A	N/A	N/A	N/A
OCT 2022	346	-1.01	71.09	2.14	28.52
NOV 2022	471	-2.18	37.62	3.39	-12.91
DEC 2022	407	-1.93	44.94	2.23	25.69
OSI-205-a IST quality results over 2nd **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 (**)
JUL 2022	1124	-2.45	30.12	2.08	30.52
AUG 2022	3534	-1.75	49.89	2.12	29.19
SEP 2022	3214	-2.07	40.87	2.44	18.77
OCT 2022	2902	-1.01	71.14	1.91	36.23
NOV 2022	152	-2.60	25.72	4.18	-39.25
DEC 2022	246	-0.14	96.12	1.19	60.25
(*) 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 2nd half 2022, for quality levels 3, 4 and 5, by night and by day. Compared to PROMICE measured air temperature

Comments:
For the validation against measured surface temperatures of PROMICE stations in the Northern Hemisphere, the target requirements for the mean difference are all satisfied. The target requirements for the standard deviation are also satisfied, except for observations in November as indicated by the negative margin values in the margin column. It still satisfies the threshold requirement of ± 4.0 K during night-time, but it is exceeded during day-time. However, there is a relatively small amount of day-time data in November, which affects the result. We have not identified the reason for the poor November performance, but it is anticipated that 1 or a few outliers have passed out quality filters and contribute to poor validation.

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 JAN 2022 to DEC 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 (**)
JAN 2022	790	-0,38	45,5	0,91	8,7
FEB 2022	567	-0,36	48,5	0,88	12,3
MAR 2022	646	-0,3	56,6	0,87	13,3
APR 2022	412	-0,48	31,1	0,96	4,4
MAY 2022	186	-0,54	22,6	0,93	7,2
JUN 2022	157	-0,29	59,1	0,94	5,6
JUL 2022	177	-0,65	7,6	1,22	-22,2
AUG 2022	241	-0,62	12,1	0,93	6,7
SEP 2022	1124	-0,4	43,6	1,03	-2,6
OCT 2022	1367	-0,48	31,7	1,01	-1,1
NOV 2022	1034	-0,4	43,6	1,06	-6,3
DEC 2022	609	-0,36	48	0,97	2,7
OSI-205-b NHL VIIRS SST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	311	-0,29	58,7	0,7	30,5
FEB 2022	464	-0,4	43	0,7	30,1
MAR 2022	745	-0,34	51,3	0,65	34,7
APR 2022	695	-0,28	60,4	0,74	26,4
MAY 2022	504	-0,26	62,2	0,71	29,3
JUN 2022	889	-0,09	86,9	0,78	22,1
JUL 2022	1552	-0,11	84,3	0,95	4,7
AUG 2022	404	-0,26	62,3	0,81	18,9
SEP 2022	1788	-0,14	80	0,8	20,4
OCT 2022	1402	-0,31	56,5	0,8	19,7
NOV 2022	531	-0,39	44,9	0,72	28,2
DEC 2022	210	-0,38	45,2	0,65	34,7
(*) 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 JAN 2022 to DEC 2022, for 3,4,5 quality indexes, by night and by day. Comparison with drifting buoys.

OSI-205-b NHL VIIRS IST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	-	-	-	-	-
FEB 2022	-	-	-	-	-
MAR 2022	-	-	-	-	-
APR 2022	82	-1,98	43,6	2,25	25,2
MAY 2022	27	-3,18	9,3	1,77	41
JUN 2022	28	-2,52	28,1	1,44	51,9
JUL 2022	10	-2,17	38,1	1,24	58,6
AUG 2022	32	-2,52	28,1	2,22	26
SEP 2022	111	-2,33	33,5	1,94	35,4
OCT 2022	291	-2,52	27,9	2,22	26,2
NOV 2022	12	-2,26	35,5	1,03	65,5
DEC 2022	6	-1,98	43,4	1,03	65,5
OSI-205-b NHL VIIRS IST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	-	-	-	-	-
FEB 2022	-	-	-	-	-
MAR 2022	-	-	-	-	-
APR 2022	476	-2,43	30,5	1,85	38,2
MAY 2022	849	-1,66	52,5	2,06	31,4
JUN 2022	392	-1,8	48,7	2,26	24,6
JUL 2022	108	-1,88	46,3	2,55	14,9
AUG 2022	101	-2,17	37,9	2,11	29,6
SEP 2022	210	-2,37	32,4	1,81	39,5
OCT 2022	179	-2,45	30,1	1,76	41,2
NOV 2022	17	-2,63	24,8	1,5	50
DEC 2022	12	-2,77	20,9	1,27	57,8
(*) 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 16: Quality results for OSI-205-b NPP VIIRS IST over April 2022 to Dec 2022, for quality levels 3, 4 and 5, by night and by day. Compared to PROMICE measured air temperature on the Greenland ice sheet.

Comments:
For the last half year, the SST part of the OSI-205-b product is within target requirement for bias for all months. For standard deviation it is within requirement for all months for daytime, while for night time it is around the target requirement for all months, with four of six months slightly outside.
The IST part of the OSI-205-b product is within target requirement for both bias and standard deviation for all months, both daytime and night time.

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 JAN 2022 to DEC 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 (**)
JAN 2022	10557	-0,75	-6,4	-6,4	15.0
FEB 2022	6712	-0,71	-2	-2	27.5
MAR 2022	6324	-0,69	1,6	1,6	19.2
APR 2022	4358	-0,57	19,1	19,1	12.1
MAY 2022	2210	-0,56	20,4	20,4	0.7
JUN 2022	1480	-0,39	43,9	43,9	-17.7
JUL 2022	1309	-0,66	6	1,2	-20
AUG 2022	3410	-0,44	37,9	1,06	-6,1
SEP 2022	5784	-0,57	18,2	1,03	-3,3
OCT 2022	8182	-0,56	19,5	0,85	15,5
NOV 2022	7430	-0,88	-25,6	0,92	8,1
DEC 2022	6008	-0,56	20,2	0,83	16,8
OSI-203-a NHL AVHRR SST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	3350	-0,31	55.8	0,84	16.0
FEB 2022	6771	-0,45	36.4	0,55	44.9
MAR 2022	10838	-0,29	58.7	0,65	35.0
APR 2022	10020	-0,25	64.0	0,66	34.5
MAY 2022	9983	-0,22	68.3	0,66	34.5
JUN 2022	12545	-0,05	92.3	0,8	20.4
JUL 2022	14163	-0,17	76,3	0,92	8,2
AUG 2022	13280	-0,24	65,4	0,75	24,6
SEP 2022	10611	-0,27	61,7	0,83	17,3
OCT 2022	8418	-0,14	80	0,71	29,1
NOV 2022	3262	-0,21	69,9	0,64	36,2
DEC 2022	1350	-0,26	62,6	0,56	44,2
(*) 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 JAN 2022 to DEC 2022, for 3,4,5 quality indexes, by night and by day. Comparison with drifting buoys.

OSI-203-a NHL AVHRR IST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	-	-	-	-	-
FEB 2022	-	-	-	-	-
MAR 2022	-	-	-	-	-
APR 2022	19	-3,26	6,8	3,11	-3,6
MAY 2022	8	-4,71	34,4	2,21	26,4
JUN 2022	-	-	-	-	-
JUL 2022	-	-	-	-	-
AUG 2022	17	-4,16	-18,8	1,6	46,6
SEP 2022	55	-4,14	-18,4	2,52	16,1
OCT 2022	146	-3,79	-8,2	2,61	13
NOV 2022	144	-3,85	-10	3,05	-1,6
DEC 2022	130	-4	-14,2	3,05	-1,8
OSI-203-a NHL AVHRR IST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	-				
FEB 2022	-				
MAR 2022	-				
APR 2022	178	-0,64	81,9	2,67	11
MAY 2022	313	-0,15	95,7	2,92	2,7
JUN 2022	202	-1,29	63,3	3,12	-3,9
JUL 2022	73	-0,96	72,7	2,45	18,2
AUG 2022	179	-1,75	50,1	3,3	-9,9
SEP 2022	150	-2,56	26,8	2,52	15,9
OCT 2022	124	-2,84	19	2,53	15,6
NOV 2022	9	-3,77	-7,7	1,72	42,7
DEC 2022	17	-4,61	-31,6	1,71	43
(*) 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 JAN 2022 to DEC 2022, for 3,4,5 quality indexes, by night and by day, compared to PROMICE measured air temperature on the Greenland ice sheet, averaged over 12 hours.

Comments:
For the last half year, the SST part of the OSI-203-a product is within target requirement for bias for all months, except November. For standard deviation it is within requirement for all months for daytime, while for night time it is around the target requirement for all months, with three of six months slightly outside.
The IST part of the OSI-203-a product is within target requirement for bias at daytime for most of the months, but slightly outside target requirement at night time. For standard deviation it is within or close to the target requirement for most of the months, both daytime and night time.

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 JAN 2022 to DEC 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 (**)
JAN 2022	74	-0,11	84,9	0,9	9,9
FEB 2022	16173	-0,33	53,2	0,73	27,4
MAR 2022	11306	-0,24	65,5	0,9	10,3
APR 2022	11803	-0,25	63,7	0,9	10
MAY 2022	8317	-0,56	20,2	0,91	9
JUN 2022	3082	-0,65	7,2	1,08	-7,7
JUL 2022	2070	-0,46	34,5	1,23	-23,3
AUG 2022	1214	-0,84	20,6	1,03	-3,3
SEP 2022	1917	-0,67	4	1,02	-2,3
OCT 2022	7790	-0,59	15,7	0,91	9
NOV 2022	9488	-0,47	32,8	1,01	-0,6
DEC 2022	8779	-0,61	12,9	1,19	-19,2
OSI-203-b NHL VIIRS SST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	5412	-0,43	38,8	0,75	25,3
FEB 2022	8290	-0,45	36	0,67	33,4
MAR 2022	10591	-0,39	44,5	0,68	32,3
APR 2022	9182	-0,47	33,2	0,75	25
MAY 2022	9119	-0,36	49	0,63	37,1
JUN 2022	10978	-0,17	76,4	0,68	31,8
JUL 2022	9624	-0,29	59,1	0,84	16,5
AUG 2022	4218	-0,42	40,6	0,74	26
SEP 2022	8331	-0,27	60,9	0,74	25,9
OCT 2022	7740	-0,3	57,6	0,73	27
NOV 2022	2783	-0,36	48,7	0,65	34,7
DEC 2022	1097	-0,41	41,1	0,63	37,1
(*) 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 19: Quality results for OSI-203-b NHL VIIRS SST over JAN 2022 to DEC 2022, for 3,4,5 quality indexes, by night and by day. Comparison with drifting buoys.

OSI-203-b NHL VIIRS IST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	-	-	-	-	-
FEB 2022	-	-	-	-	-
MAR 2022	-	-	-	-	-
APR 2022	35	-4,35	24,3	2,14	28.7
MAY 2022	-	-	-	-	-
JUN 2022	-	-	-	-	-
JUL 2022	-	-	-	-	-
AUG 2022	14	-5,45	-55,6	3,54	-17,8
SEP 2022	66	-4,71	-34,5	2,31	22,9
OCT 2022	133	-3,22	8,1	2,63	12,3
NOV 2022	85	-3,62	-3,4	3,47	-15,5
DEC 2022	91	-4,14	-18,2	3,68	-22,5
OSI-203-b NHL VIIRS IST quality results over JAN 2022 to DEC 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 (**)
JAN 2022	-	-	-	-	-
FEB 2022	-	-	-	-	-
MAR 2022	-	-	-	-	-
APR 2022	126	-1,99	43,3	2,41	19,6
MAY 2022	205	-2,45	30,1	2,65	11,7
JUN 2022	120	-3,35	4,3	2,84	5,4
JUL 2022	33	-3,27	6,5	2,98	0,6
AUG 2022	40	-2,39	31,8	2,14	28,5
SEP 2022	95	-2,65	24,4	1,78	40,5
OCT 2022	78	-3,05	12,8	2,07	31
NOV 2022	11	-4,14	-18,3	2,03	32,4
DEC 2022	10	-3,69	-5,5	1,58	47,4
(*) 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 20: Quality results for OSI-203-b NHL VIIRS IST over JAN 2022 to DEC 2022, for 3,4,5 quality indexes, by night and by day, compared to PROMICE measured air temperature on the Greenland ice sheet.

Comments:
For the last half year, the SST part of the OSI-203-a product is within target requirement for bias for all months, except August. For standard deviation it is within requirement for all months for daytime, while for night time it is around the target requirement for all months, with five of six months slightly outside.
The IST part of the OSI-203-a product is within target requirement for bias at daytime for most of the months, but at night time it is slightly outside target requirement in November and December and in August it is outside threshold requirement. For standard deviation it is within the target requirement for all of the months at daytime, while at night time it is inside in September and October and outside in August, November and December. It is always within threshold requirement.

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.

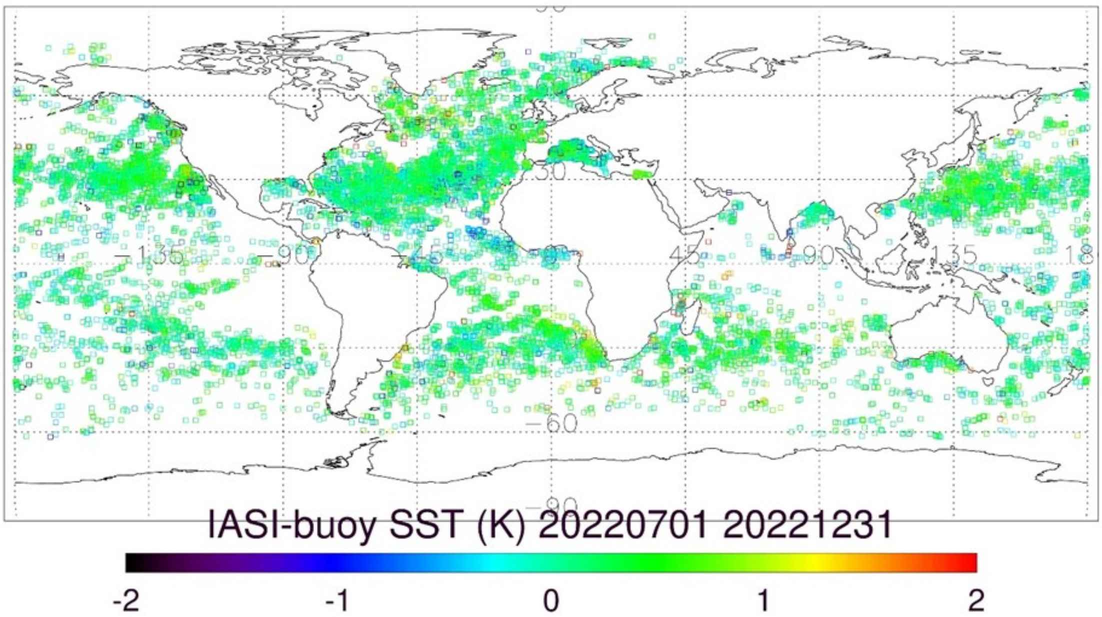

Figure 21: Mean Metop-B IASI night-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JUL 2022 to DEC 2022

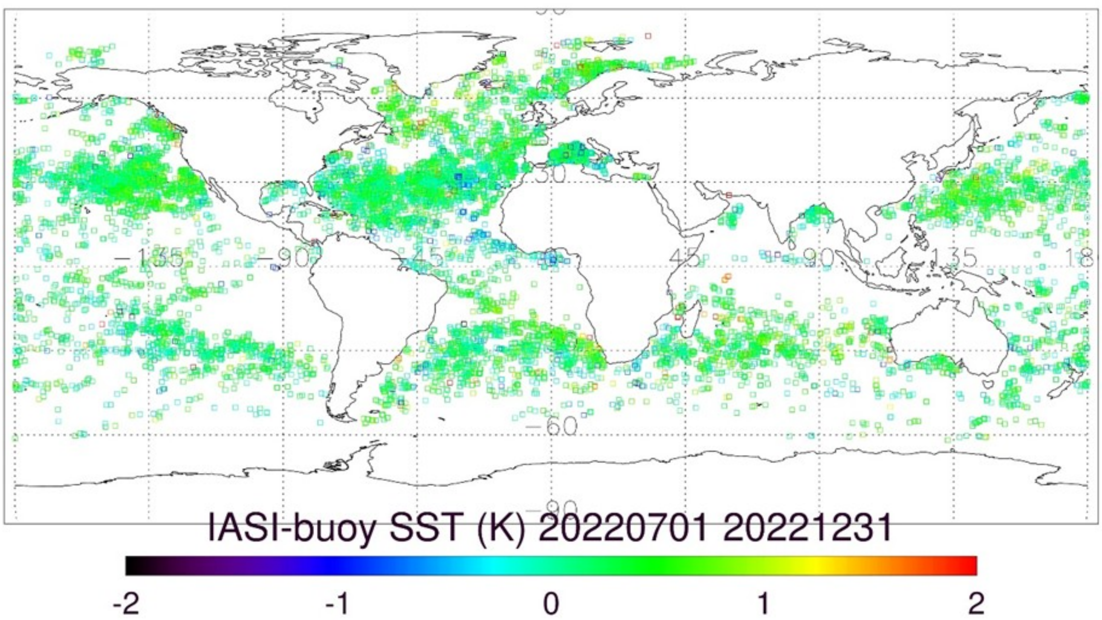

Figure 22: Mean Metop-B IASI day-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JUL 2022 to DEC 2022

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 2nd 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 (**)
JUL 2022	2520	0.20	60	0.51	36
AUG 2022	3235	0.17	66	0.52	35
SEP 2022	2409	0.22	56	0.49	39
OCT 2022	2218	0.23	54	0.45	44
NOV 2022	1919	0.23	54	0.47	41
DEC 2022	2342	0.14	72	0.51	36
Global Metop-B IASI day-time SST quality results over 2nd half 2022					
JUL 2022	1844	0.24	52	0.47	41
AUG 2022	2221	0.26	48	0.45	44
SEP 2022	3120	0.16	68	0.53	34
OCT 2022	2702	0.16	68	0.47	41
NOV 2022	2368	0.15	70	0.48	40
DEC 2022	1768	0.20	60	0.47	41
(*) 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

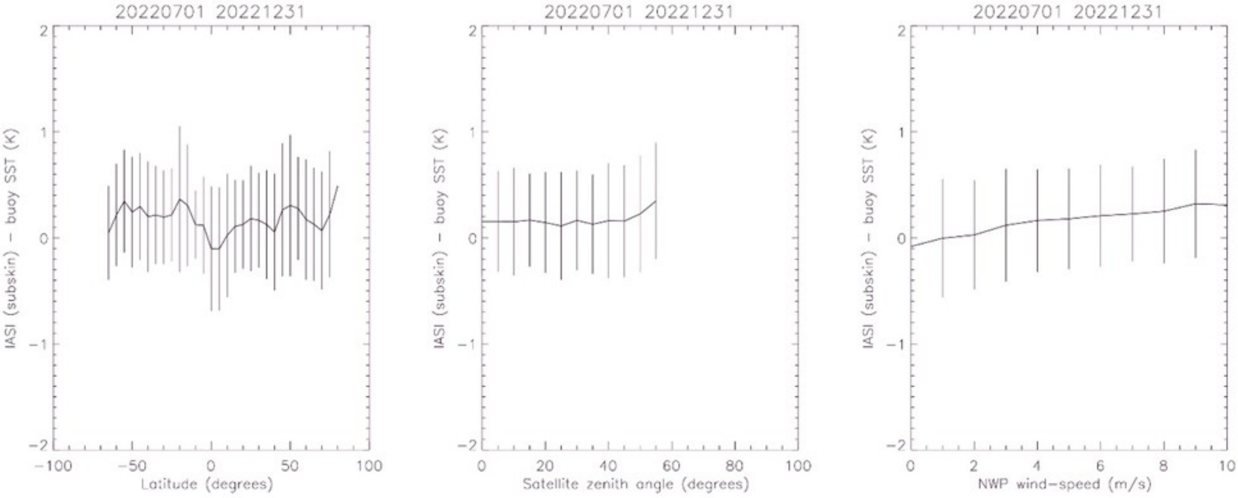

Figure 23: Mean Metop-B IASI night-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JAN 2022 to DEC 2022

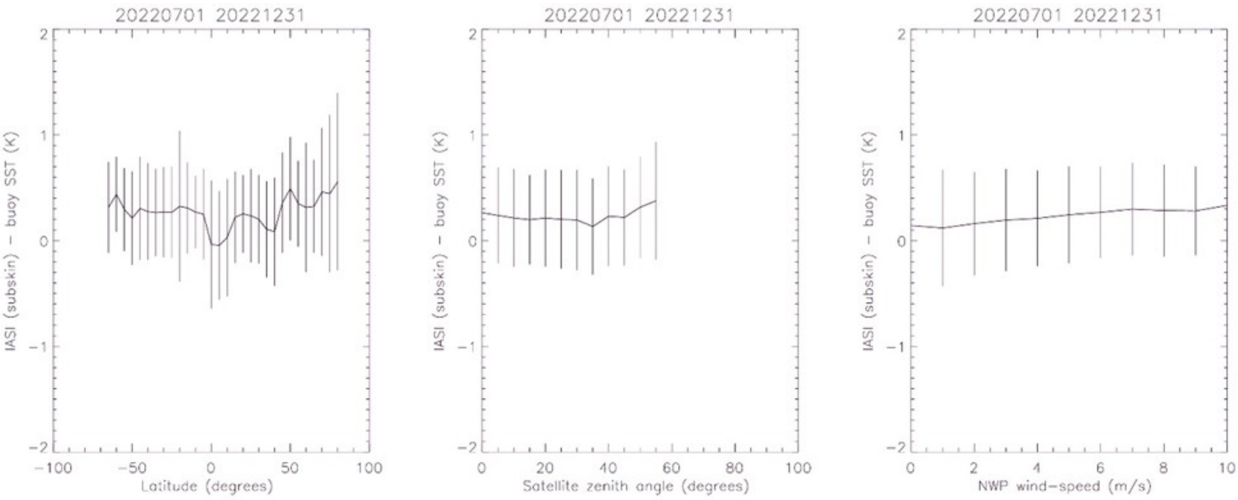

Figure 24: Mean Metop-B IASI day-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JAN 2022 to DEC 2022

Comments:
Over the six month reporting period the night-time mean IASI bias (for quality levels 3 and above) against drifting buoy SSTs is 0.16K with a standard deviation of 0.51K (n=16287); and the day-time mean bias is 0.23K, standard deviation 0.47K (n=12379). The monthly mean on whole time period results is within the target accuracy.

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:
https://osi-saf.eumetsat.int/files/lml/doc_lml/osisaf_cdop3_ss1_dlissival_user_doc.pdf

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

GOES-East hourly DLI quality results from JAN 2022 to DEC 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
JAN 2022	2954	244.27	-5.13	**58.00**	19.71	**19.31**	-5.00	15.04
FEB 2022	2631	253.28	-7.20	**43.15**	18.35	**27.55**	-6.11	16.15
MAR 2022	2963	280.83	-4.98	**64.53**	15.19	**45.91**	-4.20	13.94
APR 2022	2861	302.43	-2.80	**81.48**	15.01	**50.37**	-2.20	14.44
MAY 2022	2967	346.19	0.08	**99.54**	14.90	**56.96**	0.33	13.98
JUN 2022	2867	367.83	2.93	**84.07**	14.48	**60.63**	3.08	12.92
JUL 2022	2963	389.17	3.34	**82.84**	13.98	**64.08**	2.39	12.30
AUG 2022	2972	382.43	1.21	**93.67**	14.24	**62.76**	0.47	12.22
SEP 2022	2880	352.44	2.70	**84.68**	15.05	**57.30**	2.98	12.65
OCT 2022	2945	306.41	0.71	**95.37**	13.97	**54.41**	1.51	12.05
NOV 2022	2880	280.96	-3.73	**73.45**	17.50	**37.71**	-2.54	13.64
DEC 2022	2638	259.76	-10.60	**18.39**	22.29	**14.19**	-7.16	17.79

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

Table 22: GOES-East hourly DLI quality results from JAN 2022 to DEC 2022.

GOES-East daily DLI quality results from JAN 2022 to DEC 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
JAN 2022	121	243.84	-5.17	**57.60**	11.42	**53.17**	-5.34	9.56
FEB 2022	107	253.89	-7.38	**41.86**	10.16	**59.98**	-7.75	10.87
MAR 2022	123	280.94	-5.02	**64.26**	8.40	**70.10**	-4.82	8.37
APR 2022	119	302.49	-2.84	**81.22**	7.86	**74.02**	-2.24	6.97
MAY 2022	124	346.41	0.12	**99.31**	8.40	**75.75**	0.10	9.41
JUN 2022	119	367.74	2.93	**84.06**	7.64	**79.22**	3.02	7.16
JUL 2022	123	389.32	3.38	**82.64**	6.76	**82.64**	2.31	5.62
AUG 2022	124	382.37	1.15	**93.98**	7.55	**80.25**	1.16	6.80
SEP 2022	120	352.43	2.73	**84.51**	9.00	**74.46**	3.29	7.54
OCT 2022	122	306.34	0.73	**95.23**	8.36	**72.71**	2.13	6.89
NOV 2022	120	280.90	-3.72	**73.51**	9.55	**66.00**	-2.91	8.40
DEC 2022	110	259.67	-10.62	**18.20**	13.37	**48.51**	-9.94	12.69

(*) 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 in % = 100*SD/Mean DLI
with SD req. in % = 10%
Same comment as for Mean diff. Margin

Table 23: GOES-East daily DLI quality results from JAN 2022 to DEC 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.

Meteosat 0° hourly DLI quality results from JAN 2022 to DEC 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
JAN 2022	373	286.62	-9.48	**33.85**	16.86	**41.18**	-10.91	16.42
FEB 2022	670	290.55	-4.72	**67.51**	17.34	**40.32**	-2.98	15.68
MAR 2022	744	294.47	1.13	**92.33**	17.80	**39.55**	0.45	16.37
APR 2022	720	304.50	2.70	**82.27**	14.71	**51.69**	2.31	13.07
MAY 2022	719	330.79	3.30	**80.05**	11.88	**64.09**	3.55	11.32
JUN 2022	720	351.09	4.78	**72.77**	13.10	**62.69**	4.88	12.88
JUL 2022	741	354.62	3.29	**81.44**	13.75	**61.23**	4.51	12.96
AUG 2022	744	360.44	5.52	**69.37**	12.54	**65.21**	5.52	12.70
SEP 2022	720	341.45	3.69	**78.39**	12.79	**62.54**	3.25	12.40
OCT 2022	719	340.43	3.08	**81.91**	16.06	**52.82**	3.50	15.37
NOV 2022	720	312.03	-3.07	**80.32**	16.77	**46.26**	-0.69	15.52
DEC 2022	744	297.12	-8.47	**42.99**	20.49	**31.04**	-8.40	18.09

(*) 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 in % = 100*SD/Mean DLI
with SD req. in % = 10%
Same comment as for Mean diff. Margin

Table 24: Meteosat 0° hourly DLI quality results from JAN 2022 to DEC 2022.

Meteosat 0° daily DLI quality results from JAN 2022 to DEC 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
JAN 2022	16	286.52	-9.65	**32.64**	8.06	**71.87**	-11.36	8.60
FEB 2022	28	290.45	-4.73	**67.43**	10.65	**63.33**	-4.20	9.93
MAR 2022	31	294.46	1.15	**92.19**	11.18	**62.03**	1.80	9.27
APR 2022	30	304.50	2.68	**82.40**	8.32	**72.68**	2.52	7.55
MAY 2022	30	330.83	3.25	**80.35**	4.10	**87.61**	3.08	4.35
JUN 2022	30	351.10	4.79	**72.71**	5.54	**84.22**	4.39	5.37
JUL 2022	31	354.76	3.29	**81.45**	8.98	**74.69**	6.72	6.26
AUG 2022	31	360.45	5.55	**69.21**	5.05	**85.99**	6.21	4.62
SEP 2022	30	341.44	3.67	**78.50**	4.66	**86.35**	4.16	5.38
OCT 2022	30	340.39	3.13	**81.61**	8.48	**75.09**	4.45	8.40
NOV 2022	30	311.98	-3.07	**80.32**	7.63	**75.54**	-3.23	6.70
DEC 2022	31	297.18	-8.47	**43.00**	11.76	**60.43**	-7.87	11.96

(*) 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 in % = 100*SD/Mean DLI
with SD req. in % = 10%
Same comment as for Mean diff. Margin

Table 25: Meteosat 0° daily DLI quality results from JAN 2022 to DEC 2022.

Comments:
Overall statistics are good and within the requirement.

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

On the 23 June 2022, Meteosat-9, in position 45.5° East, replaced Meteosat-8 (in position 41.5° East since 2016) for the Indian Ocean Data Coverage (IODC). Downward Long wave Irradiance is processed as a demonstration product since 2016.

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

Meteosat Indian Ocean hourly DLI quality results from JAN 2022 to DEC 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
JAN 2022	717	290.96	-10.07	**30.78**	18.24	**37.31**	-9.61	15.30
FEB 2022	670	292.83	-2.44	**83.34**	22.01	**24.84**	-1.47	19.42
MAR 2022	744	297.23	3.89	**73.82**	20.48	**31.10**	2.99	19.43
APR 2022	720	306.70	4.91	**67.98**	15.94	**48.03**	4.40	14.06
MAY 2022	719	335.69	8.20	**51.15**	16.66	**50.37**	6.61	13.33
JUN 2022	712	354.36	8.53	**51.86**	14.41	**59.34**	8.61	13.96
JUL 2022	741	357.58	6.25	**65.04**	14.12	**60.51**	7.45	12.45
AUG 2022	744	363.53	8.60	**52.69**	14.00	**61.49**	9.36	13.36
SEP 2022	720	343.06	5.30	**69.10**	14.77	**56.95**	4.87	14.10
OCT 2022	719	341.48	4.13	**75.81**	18.70	**45.24**	4.71	17.21
NOV 2022	720	313.73	-1.37	**91.27**	19.80	**36.89**	-1.12	19.26
DEC 2022	744	298.78	-6.81	**54.41**	21.43	**28.27**	-9.14	19.58

(*) 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 in % = 100*SD/Mean DLI
with SD req. in % = 10%
Same comment as for Mean diff. Margin

Table 26: Meteosat Indian Ocean hourly DLI quality results from JAN 2022 to DEC 2022.

Meteosat Indian Ocean daily DLI quality results from JAN 2022 to DEC 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
JAN 2022	30	290.98	-10.02	**31.13**	10.08	**65.36**	-9.70	9.99
FEB 2022	28	292.72	-2.46	**83.19**	13.51	**53.85**	-0.69	14.84
MAR 2022	31	297.25	3.94	**73.49**	13.43	**54.82**	4.48	16.42
APR 2022	30	306.70	4.87	**68.24**	8.78	**71.37**	5.04	10.52
MAY 2022	30	335.72	8.14	**51.51**	6.29	**81.26**	8.14	8.08
JUN 2022	30	354.28	7.97	**55.01**	6.05	**82.92**	7.66	5.54
JUL 2022	31	357.73	6.26	**65.00**	9.33	**73.92**	8.53	6.90
AUG 2022	31	363.53	8.62	**52.58**	6.20	**82.95**	8.94	5.34
SEP 2022	30	343.06	5.29	**69.16**	4.77	**86.10**	5.53	3.59
OCT 2022	30	341.45	4.19	**75.46**	10.33	**69.75**	5.84	11.62
NOV 2022	30	313.68	-1.38	**91.20**	8.86	**71.75**	0.79	7.24
DEC 2022	31	298.84	-6.82	**54.36**	12.25	**59.01**	-7.04	12.96

(*) 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 in % = 100*SD/Mean DLI
with SD req. in % = 10%
Same comment as for Mean diff. Margin

Table 27: Meteosat Indian Ocean daily DLI quality results from JAN 2022 to DEC 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 in the scientific validation report (SVR) available at https://osi-saf.eumetsat.int/products/osi-301-c. 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 JAN 2022 to DEC 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 % (**)
JAN 2022	134	262.43	-2.22	83.08	17.81	32.69
FEB 2022	135	265.48	0.89	93.30	15.39	41.83
MAR 2022	147	267.10	2.20	83.53	15.00	43.36
APR 2022	148	276.48	3.21	76.78	16.67	38.99
MAY 2022	153	301.08	3.84	74.49	17.76	40.24
JUN 2022	148	328.89	3.04	95.62	18.29	43.87
JUL 2022	153	344.11	0.72	95.82	17.93	47.78
AUG 2022	153	340.47	-0.26	98.47	18.42	45.93
SEP 2022	148	314.40	-3.83	75.64	15.42	51.54
OCT 2022	153	302.12	-3.72	75.37	14.86	51.41
NOV 2022	148	284.05	-18.01	-26.81	14.40	52.32
DEC 2022	153	266.90	-8.33	37.58	18.86	31.46

(*) 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 in % = 100*SD/Mean DLI
with SD req. in % = 10%
Same comment as for Mean diff. Margin

Table 28: AHL DLI quality results from JAN 2022 to DEC 2022.

Comments:
For this half year period the AHL DLI product is within bias target requirement for all months except November and December. The standard deviation is always within target requirement.

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 JAN 2022 to DEC 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
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	3543	498.60	-3.08	**93.82**	81.16	**45.74**	-8.52	54.80
JUL 2022	3708	482.97	-0.92	**98.10**	83.43	**42.42**	-8.74	51.84
AUG 2022	3401	489.07	3.08	**93.70**	81.59	**44.39**	-10.25	55.53
SEP 2022	3034	475.02	5.13	**89.20**	70.47	**50.55**	-3.90	47.36
OCT 2022	1388	378.37	-5.09	**86.55**	43.57	**61.62**	-5.62	20.09
NOV 2022	1098	263.68	-17.78	**32.57**	61.49	**22.27**	-3.80	32.53
DEC 2022	2175	313.11	-10.79	**65.54**	78.68	**16.24**	-7.54	51.42

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

Table 29: GOES-East hourly SSI quality results from JAN 2022 to DEC 2022.

GOES-East daily SSI quality results from JAN 2022 to DEC 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
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
JUL 2022	154	229.92	1.38	**94.00**	23.00	**66.66**	0.75	20.09
AUG 2022	160	228.54	4.03	**82.37**	21.10	**69.22**	3.14	17.29
SEP 2022	204	217.99	1.97	**90.96**	17.60	**73.09**	-0.32	14.27
OCT 2022	111	145.39	-1.75	**87.96**	6.83	**84.34**	-2.03	5.26
NOV 2022	139	86.34	-5.77	**33.17**	14.36	**44.56**	-0.61	8.12
DEC 2022	259	107.50	-3.91	**63.63**	16.97	**47.38**	-1.75	13.60

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

Table 30: GOES-East daily SSI quality results from JAN 2022 to DEC 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 JAN 2022 to DEC 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
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	4127	498.62	-5.25	**89.47**	65.21	**56.41**	-6.67	45.08
JUN 2022	4376	477.29	-7.98	**83.28**	63.20	**55.86**	-6.72	46.03
JUL 2022	4490	526.49	-10.88	**79.33**	54.04	**65.79**	-9.76	35.27
AUG 2022	4243	485.54	-17.20	**64.58**	57.71	**60.38**	-17.19	36.47
SEP 2022	3439	413.27	-12.36	**70.09**	58.90	**52.49**	-10.66	41.07
OCT 2022	2831	367.23	3.61	**90.17**	62.00	**43.72**	2.97	37.36
NOV 2022	2296	322.95	4.61	**85.73**	67.58	**30.25**	3.82	33.41
DEC 2022	1756	226.96	11.93	**47.44**	72.91	**-7.08**	6.21	31.33

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

Table 31: Meteosat 0° hourly SSI quality results from JAN 2022 to DEC 2022.

Meteosat 0° daily SSI quality results from JAN 2022 to DEC 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
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	340	255.62	-3.65	**85.72**	16.82	**78.07**	-2.76	15.13
JUN 2022	359	245.75	-4.77	**80.59**	14.69	**80.07**	-4.09	13.49
JUL 2022	372	268.78	-6.43	**76.08**	14.73	**81.73**	-5.40	12.35
AUG 2022	369	235.39	-9.61	**59.17**	14.10	**80.03**	-9.01	11.81
SEP 2022	327	182.81	-6.82	**62.69**	13.49	**75.40**	-5.94	9.54
OCT 2022	309	142.86	0.23	**98.39**	13.36	**68.83**	0.47	9.15
NOV 2022	298	106.93	0.48	**95.51**	12.21	**61.94**	-0.20	6.57
DEC 2022	269	63.99	2.92	**54.37**	17.78	**7.38**	0.92	6.29

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

Table 32: Meteosat 0° daily SSI quality results from JAN 2022 to DEC 2022.

Comments:
The SD margin is negative in December 2022 for the SSI hourly result: there are few measurements and in winter it is classic that the result is worse.
The other statistics are good and within the requirement.

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

On the 23 June 2022, Meteosat-9, in position 45.5° East, replaced Meteosat-8 (in position 41.5° East since 2016) for the Indian Ocean Data Coverage (IODC). 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.

Meteosat Indian Ocean hourly SSI quality results from JAN 2022 to DEC 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
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	4130	498.44	-5.15	**89.67**	66.59	**55.47**	-5.11	45.42
JUN 2022	4359	480.97	-4.34	**90.98**	67.7	**53.08**	-3.77	46.54
JUL 2022	4491	529.45	-7.86	**85.15**	54.36	**65.78**	-8.00	35.63
AUG 2022	4260	486.69	-14.36	**70.49**	66.75	**54.28**	-15.46	40.28
SEP 2022	3449	416.86	-7.70	**81.53**	65.93	**47.28**	-7.27	45.77
OCT 2022	2840	369.66	6.98	**81.12**	66.08	**40.41**	7.73	39.81
NOV 2022	2297	331.04	12.91	**61.00**	62.13	**37.44**	9.17	36.72
DEC 2022	1760	230.95	16.21	**29.81**	73.46	**-6.03**	8.64	38.37

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

Table 33: Meteosat Indian Ocean hourly SSI quality results from JAN 2022 to DEC 2022.

Meteosat Indian Ocean daily SSI quality results from JAN 2022 to DEC 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
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	340	255.76	-3.52	**86.24**	17.23	**77.54**	-1.13	15.75
JUN 2022	359	247.81	-2.71	**89.06**	16.13	**78.3**	-1.09	13.89
JUL 2022	372	270.26	-4.94	**81.72**	14.85	**81.68**	-3.88	13.92
AUG 2022	369	236.81	-8.19	**65.42**	17.56	**75.28**	-8.28	15.60
SEP 2022	327	185.08	-4.55	**75.42**	16.48	**70.32**	-5.53	13.97
OCT 2022	309	144.41	1.78	**87.67**	15.13	**65.08**	1.35	10.04
NOV 2022	298	109.92	3.46	**68.52**	13.79	**58.18**	1.67	8.46
DEC 2022	269	65.23	4.16	**36.23**	19.19	**1.94**	1.59	9.21

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

Table 34: Meteosat Indian Ocean daily SSI quality results from JAN 2022 to DEC 2022.

Comments:
The SD margin is negative in December 2022 for the SSI hourly result: there are few measurements and in winter it is classic that the result is worse.
The other 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.
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: https://osisaf-hl.met.no/other-docs.

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

AHL SSI quality results from JAN 2022 to DEC 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 % (**)
JAN 2022	51	15.94	-5.04	-216.19	7.43	-55.37
FEB 2022	135	30.13	-8.08	-168.17	16.10	-78.12
MAR 2022	240	75.21	-9.11	-21.13	29.72	-31.72
APR 2022	238	141.14	-11.02	21.92	33.16	21.39
MAY 2022	246	173.85	-13.67	21.37	41.72	20.01
JUN 2022	238	209.88	2.92	86.09	51.38	18.40
JUL 2022	246	174.77	-3.85	77.97	36.21	30.94
AUG 2022	246	143.38	-0.58	95.95	35.36	17.79
SEP 2022	238	83.82	-3.43	59.08	22.24	11.56
OCT 2022	195	39.72	-3.00	24.47	13.76	-15.47
NOV 2022	99	14.29	-3.01	-110,64	7.91	-84.51
DEC 2022	25	9.55	-5.20	-444,50	6.28	-119.20

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

Table 36: AHL SSI quality results from JAN 2022 to DEC 2022.

Comments:
For this half year period the AHL SSI products is close to the bias target requirement and always within threshold requirement. For the standard deviation it is within the target requirement for July to September and outside in October to December.

5.3. Sea Ice quality

5.3.1. L2 PMW sea ice concentration (OSI-410) quality

The OSI-410 sea ice concentration L2 product on satellite swath for SSMIS and AMSR-2 instruments is delivered with separate product files for the SSMIS (F16, F17 and F18) and AMSR-2 sensors. The product also includes uncertainty estimates and product quality flags.

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 division at the National Ice Center (NIC). The NIC ice charts are primarily based on SAR (RCM, Radarsat-2 and Sentinel-1) data, together with AVHRR and MODIS data in several cases.

The quality assessment results are shown separately for the four different sensor products; SSMIs F16, - F17, - F18 and AMSR2.

The requirements on the accuracy of the OSI-410 ice concentration product are as follows: a *threshold* accuracy of 20%; a *target* accuracy of 10% and 15% for the Northern and Southern hemisphere, respectively; an *optimal* accuracy of 5%. For the quality assessment this means that the product is required to have as minimum an annual mean difference and standard deviation less than 10% ice concentration on the Northern hemisphere and less than 15% ice concentration on the Southern hemisphere.

For each ice chart concentration level the deviation between ice chart concentration and OSI SAF ice concentration is calculated. Afterwards the mean difference (bias) 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.

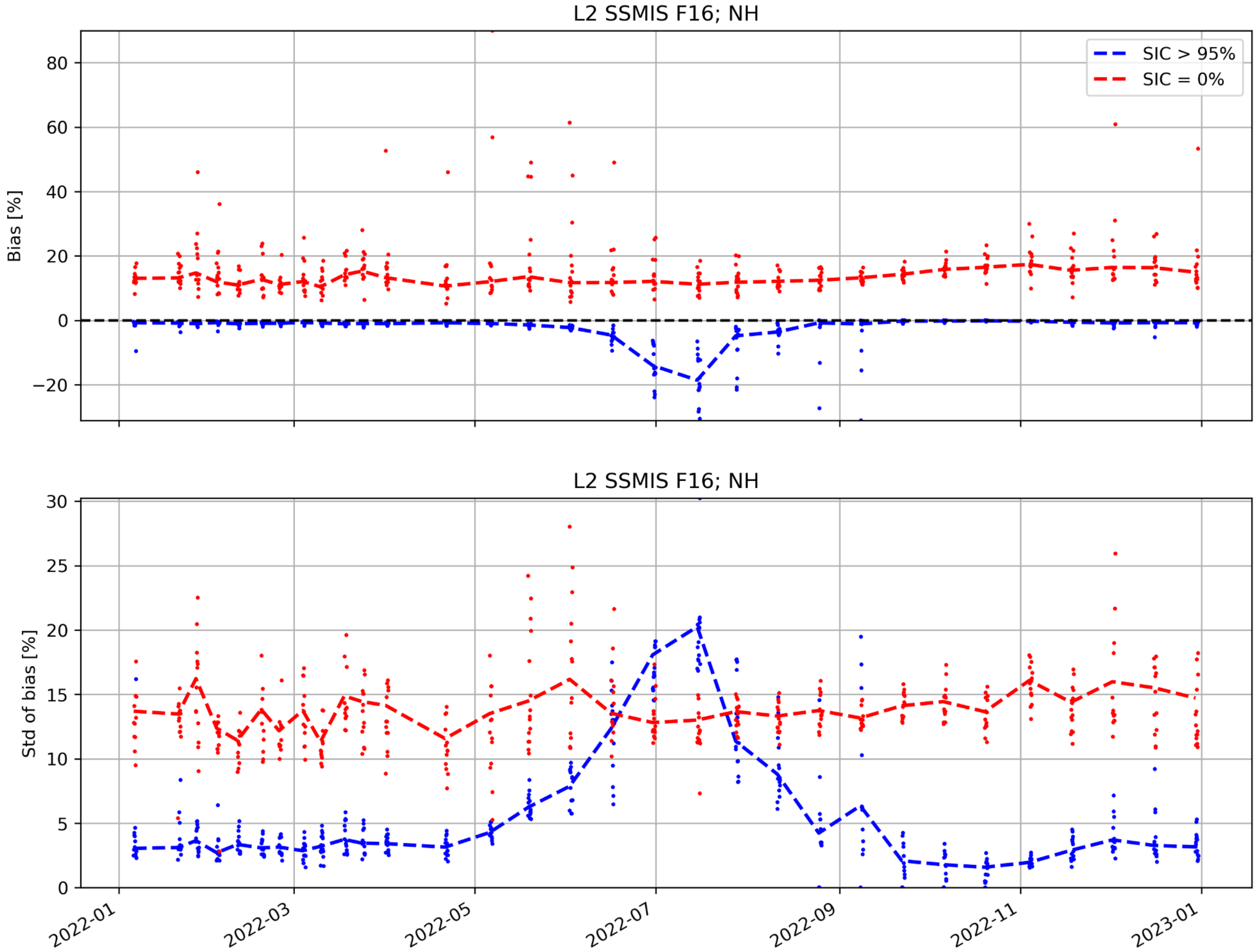

Figure 25: For OSI-410 SSMIS F16 in the Northern hemisphere:

Top plot: 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.

Bottom plot: Standard deviation of the difference in ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice.

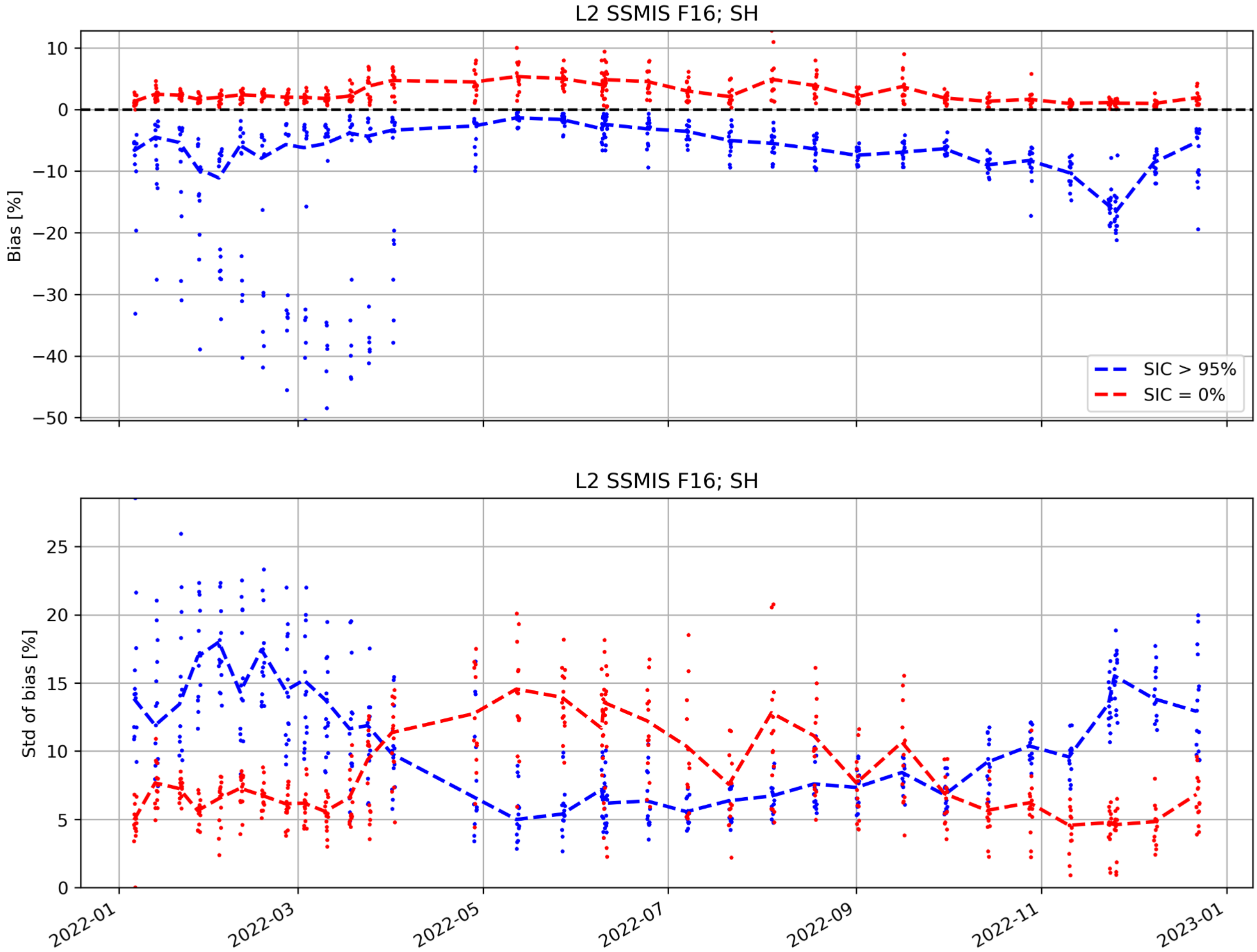

Figure 26: For OSI-410 SSMIS F16 in the Southern hemisphere:

Top plot: 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.

Bottom plot: Standard deviation of the difference in ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice.

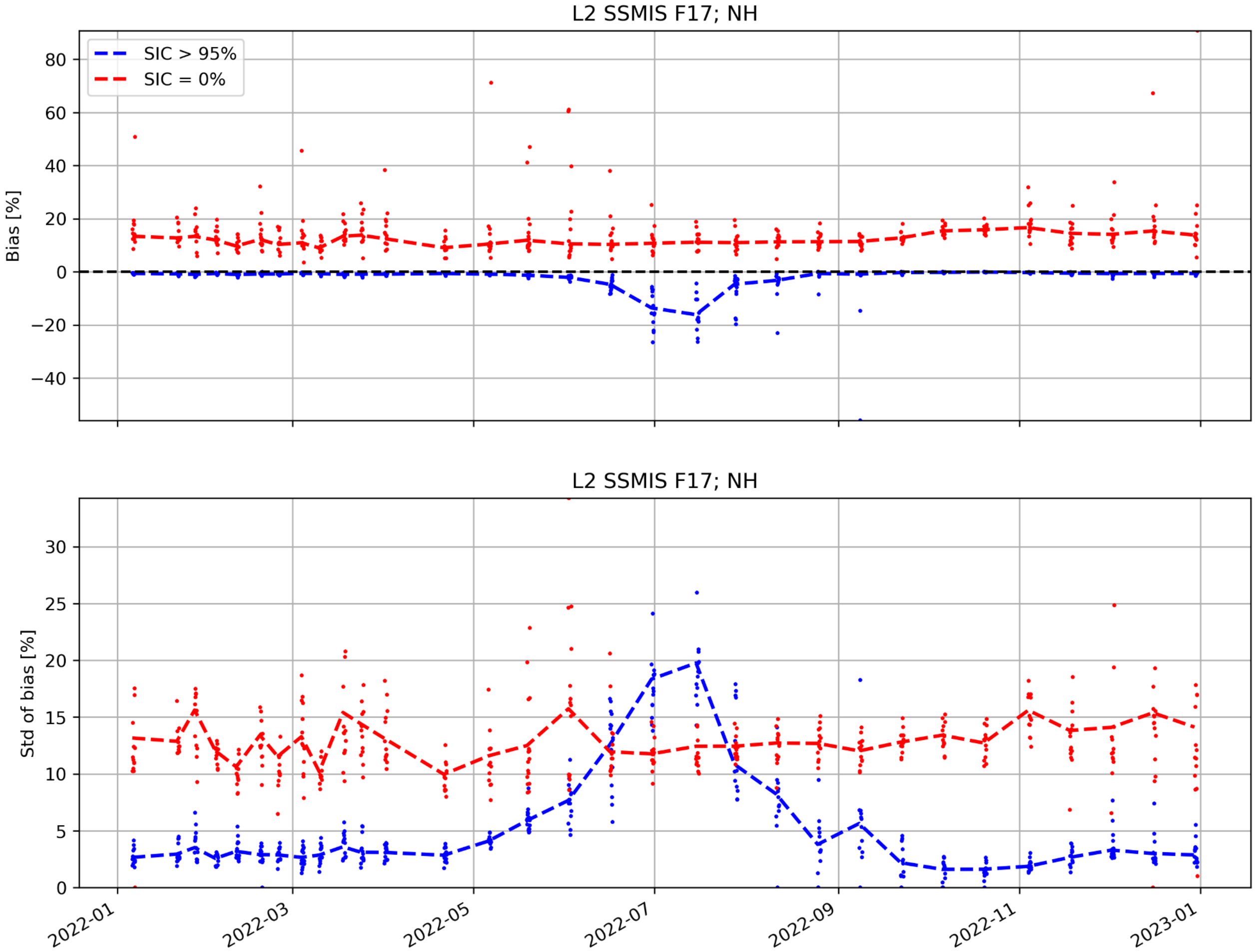

Figure 27: For OSI-410 SSMIS F17 in the Northern hemisphere:

Top plot: 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.

Bottom plot: Standard deviation of the difference in ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice.

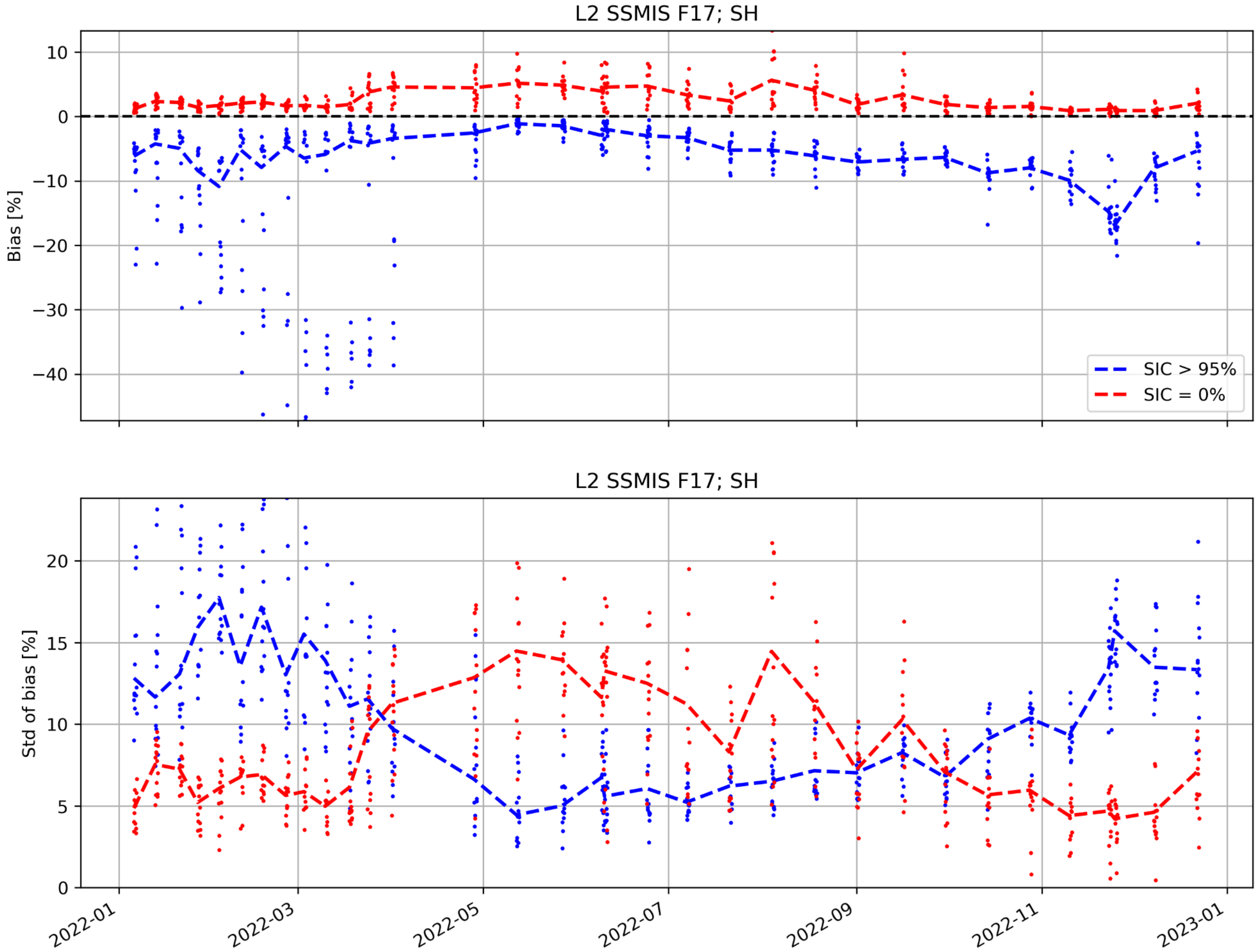

Figure 28: For OSI-410 SSMIS F17 in the Southern hemisphere:

Top plot: 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.

Bottom plot: Standard deviation of the difference in ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice.

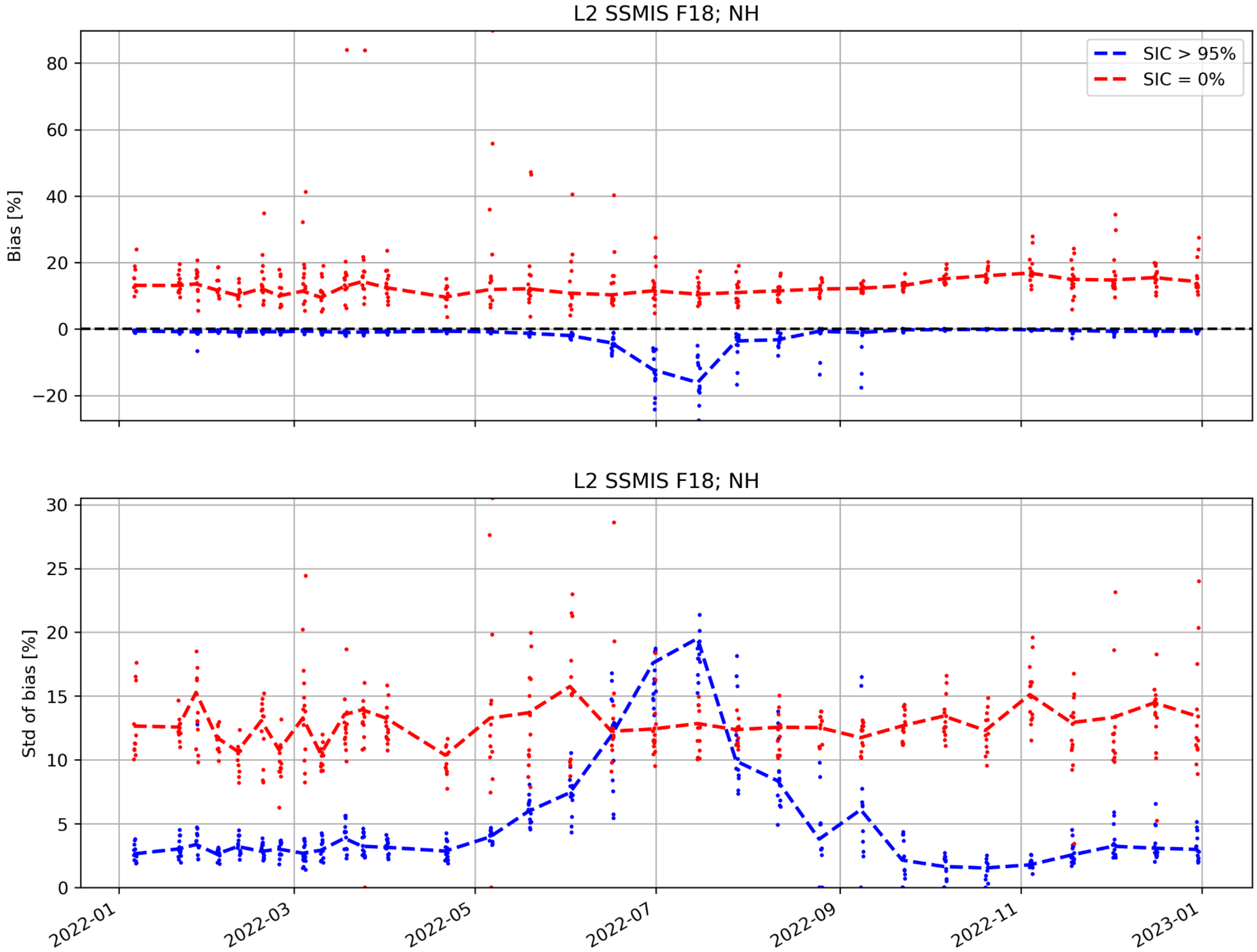

Figure 29: For OSI-410 SSMIS F18 in the Northern hemisphere:

Top plot: 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.

Bottom plot: Standard deviation of the difference in ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice.

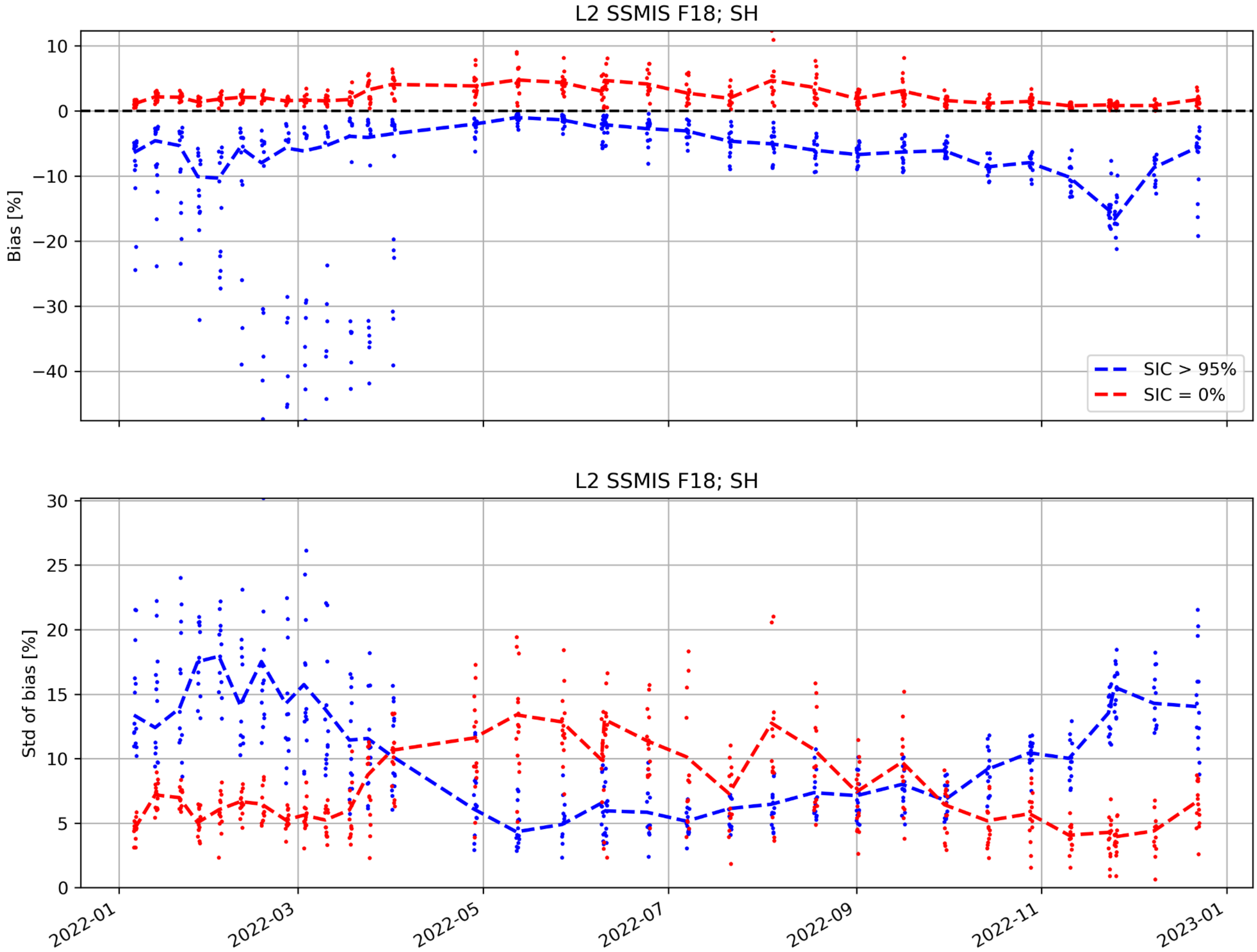

Figure 30: For OSI-410 SSMIS F18 in the Southern hemisphere:

Top plot: 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.

Bottom plot: Standard deviation of the difference in ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice.

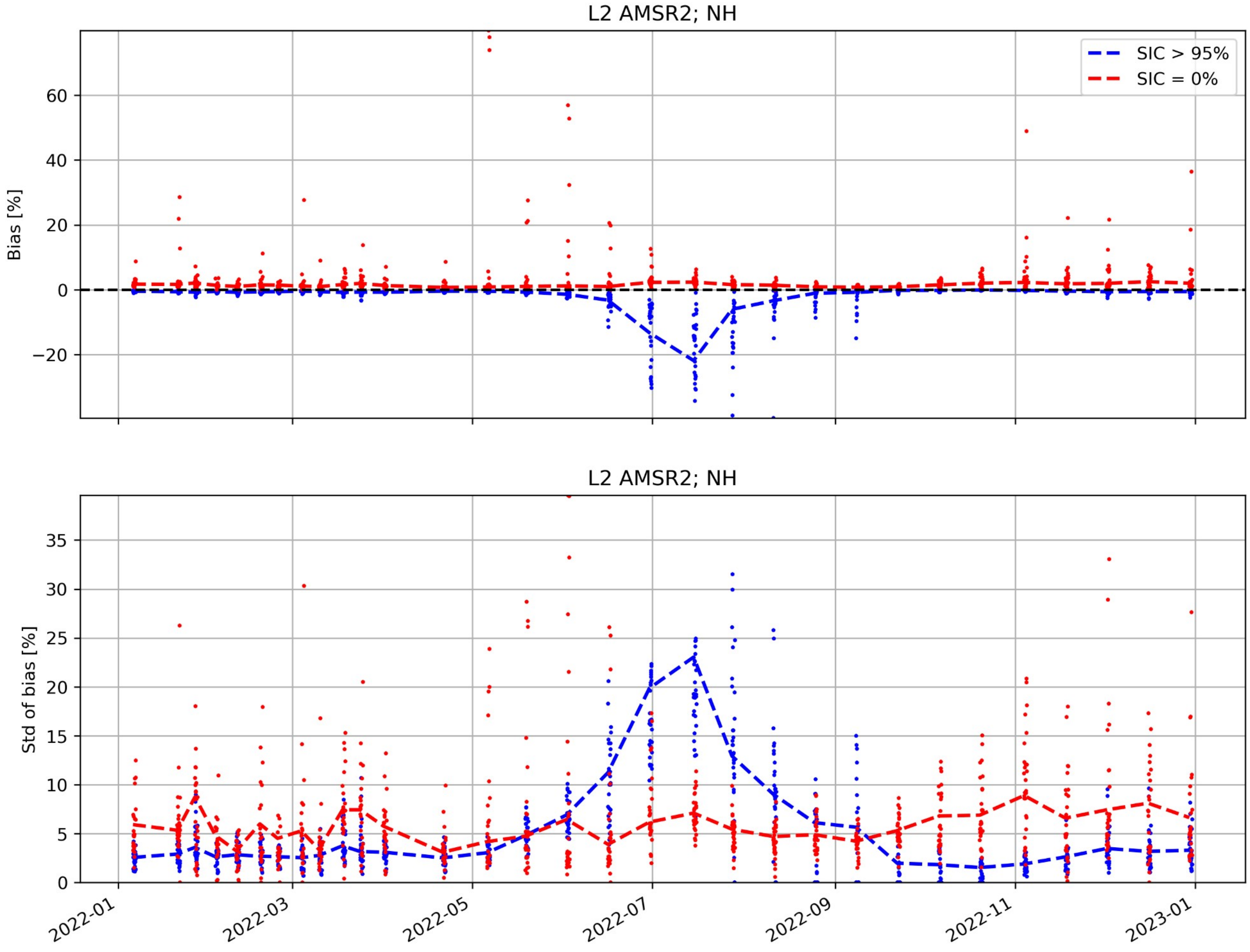

Figure 31: For OSI-410 AMSR2, in the Northern hemisphere:

Top plot: 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.

Bottom plot: Standard deviation of the difference in ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice.

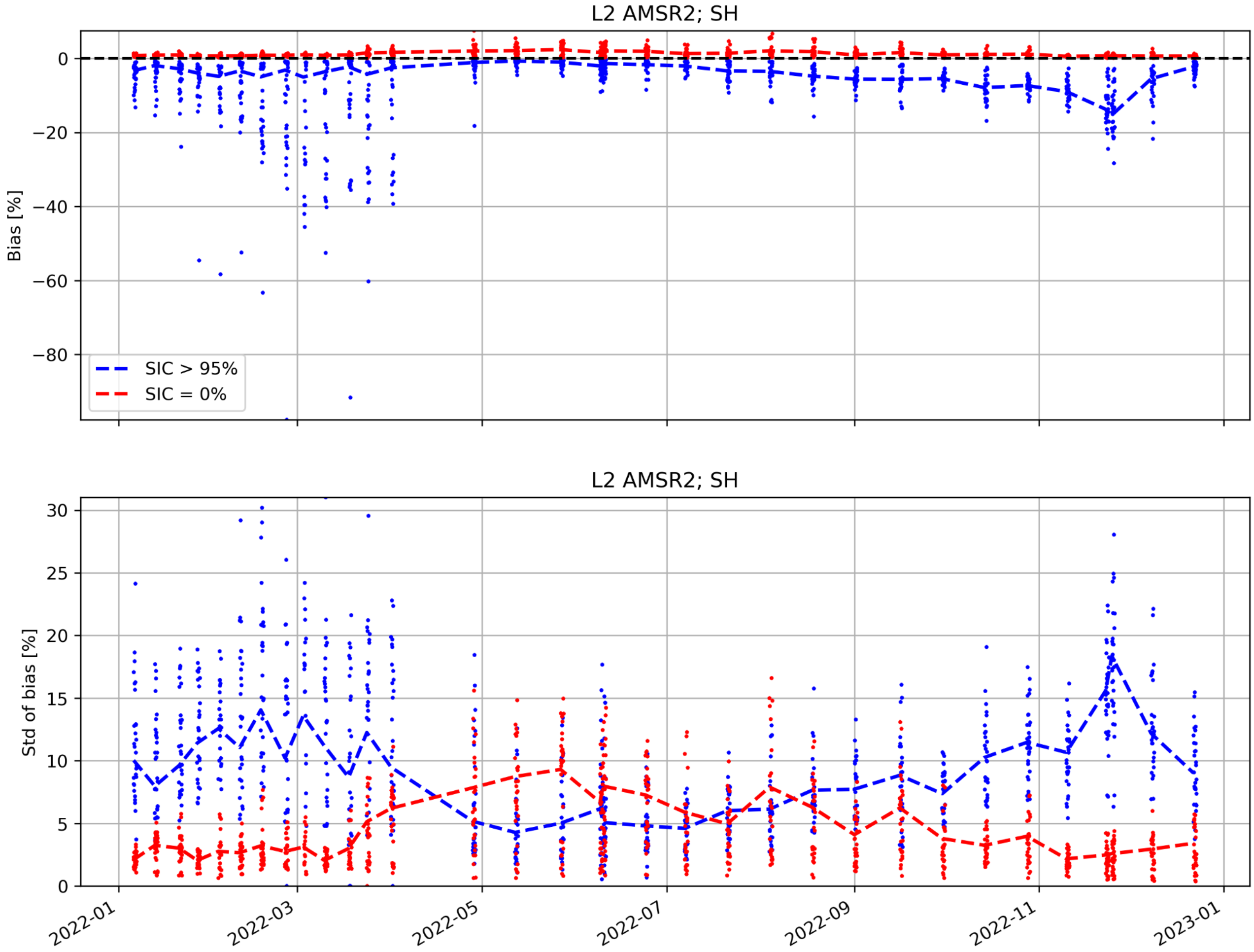

Figure 32: For OSI-410 AMSR2, in the Southern hemisphere:

Top plot: 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.

Bottom plot: Standard deviation of the difference in ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice.

Average yearly bias and standard deviation on bias in 2022								
OSI-410	Northern hemisphere				Southern hemisphere			
Category	Ice		Water		Ice		Water	
Metric (%)	Bias	STD	Bias	STD	Bias	STD	Bias	STD
SSMIS F16	-5,3	6,8	15,6	13,5	-12,5	11,8	2,7	7,8
SSMIS F17	-4,5	6,5	14,4	12,6	-11,8	11,5	2,6	7,8
SSMIS F18	-4,3	6,5	14,6	12,6	-12,0	11,6	2,4	7,3
AMSR2	-4,5	6,6	2,7	6,1	-9,5	11,2	1,2	4,0

Comments:
This is the first time that an assessment of the product has been conducted for the Half-Yearly operations Report. Assessment results are delivered for the full year of 2022. Prior assessment results covering the year 2018 was delivered with the product Scientific Validation Report from 2020 (Document reference: SAF/OSI/CDOP3/DMI/SCI/MA/378).
All sensor products perform good over ice in the Northern hemisphere (NH) where the bias and STD values are well below the requirement of 10% ice concentration on annual average. The same applies for the water category in the Southern hemisphere, where the bias and STD values are well below the requirement of 15% ice concentration on annual average.
All the three SSMIS sensor products show larger bias and STD over ice in the SH, where values are just below the target requirement of 15%. Also, all three SSMIS sensor products show large bias and STD over ocean in the NH, where the values exceed the target requirement of 10%. We are not immediately able to explain these deviations. The equivalent quality assessment conducted for the validation of the upgraded OSI-410-a products for the full year of 2021, do not show such large bias and STD values ("Validation Report for Global Sea Ice Concentration Level 2 and Level 3 Products, OSI-401-d, OSI-408-a,OSI-410-a", document available at https://osisaf-hl.met.no/sites/osisaf-hl/files/validation_reports/osisaf_svr_ice-conc_l2-3_v1p0.pdf, last access February 2023).

5.3.2. 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 https://www.dmi.dk/gronland/is/.

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.

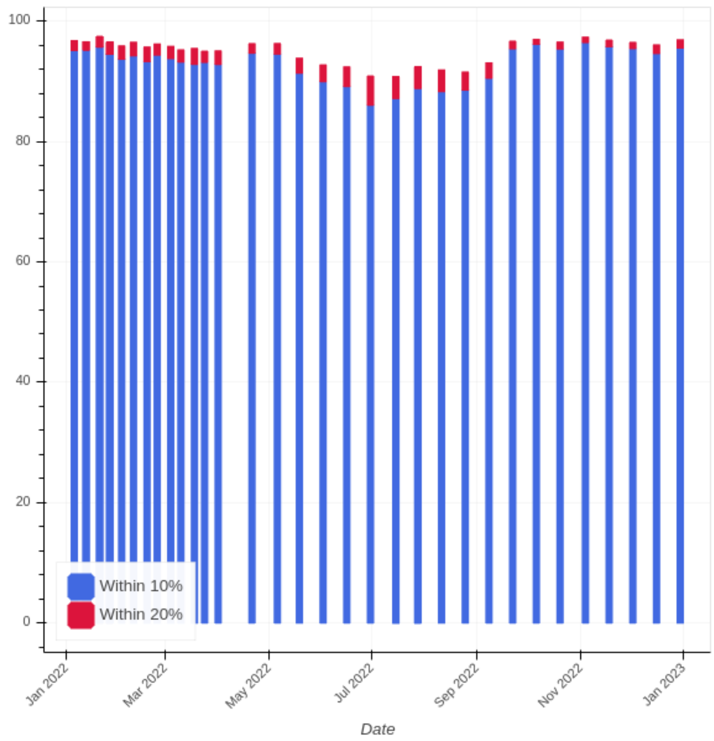

Figure 33: Comparison of ice concentrations from NIC ice analysis and the OSI SAF concentration product. Northern hemisphere. ‘Match +/- 10%’ corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%.

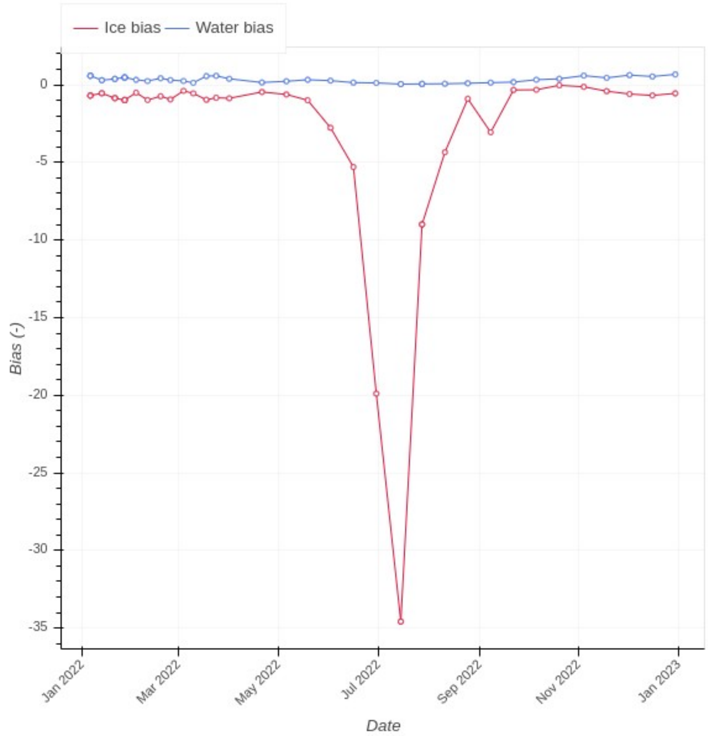

Figure 34: Difference between ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Northern hemisphere.

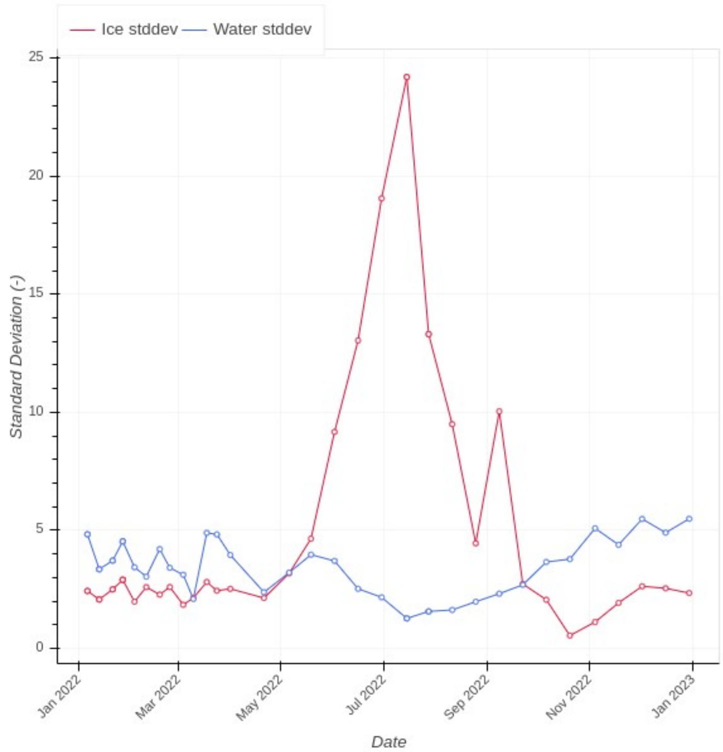

Figure 35: Standard deviation of the difference in ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice. Northern hemisphere.

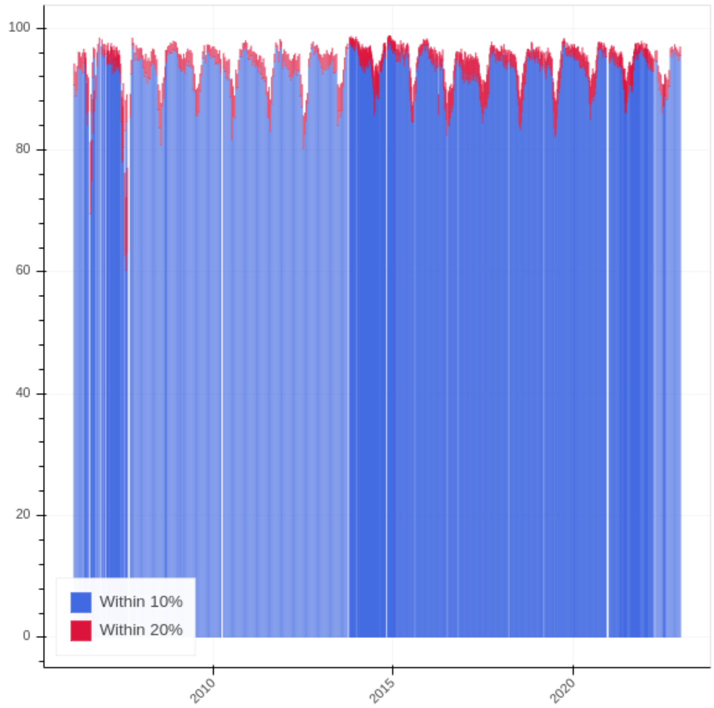

Figure 36: Multiyear variability. Comparison between ice concentrations from NIC ice analysis and the OSI SAF concentration product. ‘Match +/- 10%’ corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Northern hemisphere.

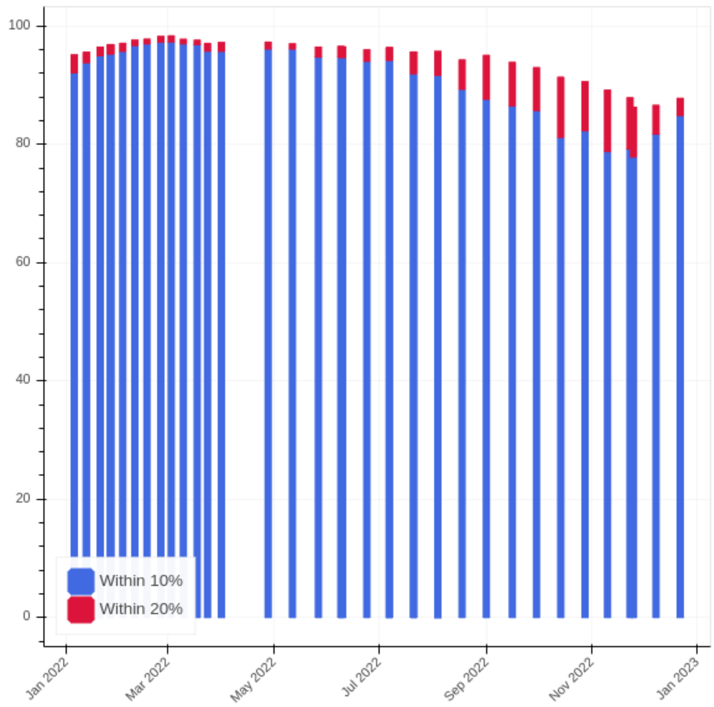

Figure 37: Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/-10%, and likewise for +/-20%. Southern hemisphere.

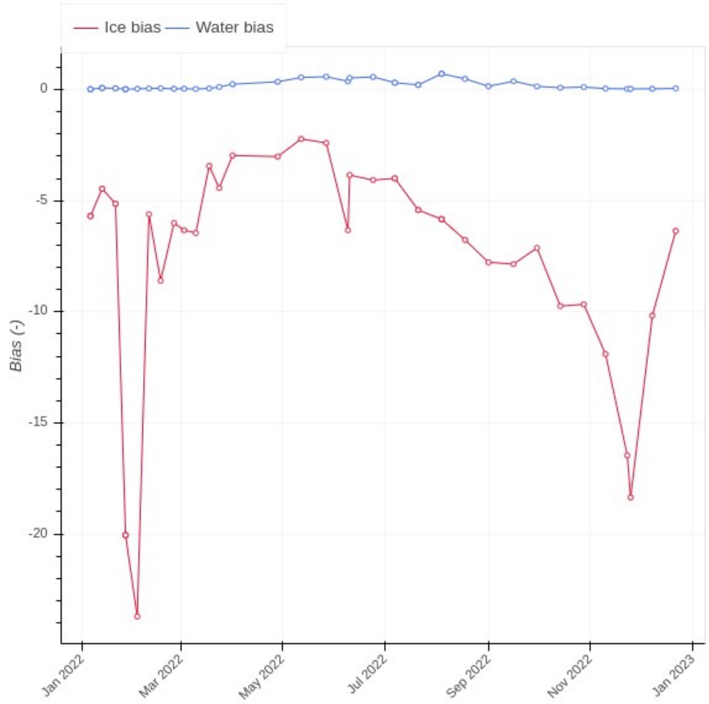

Figure 38: Difference between the ice concentrations from the NIC ice analysis and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Southern hemisphere.

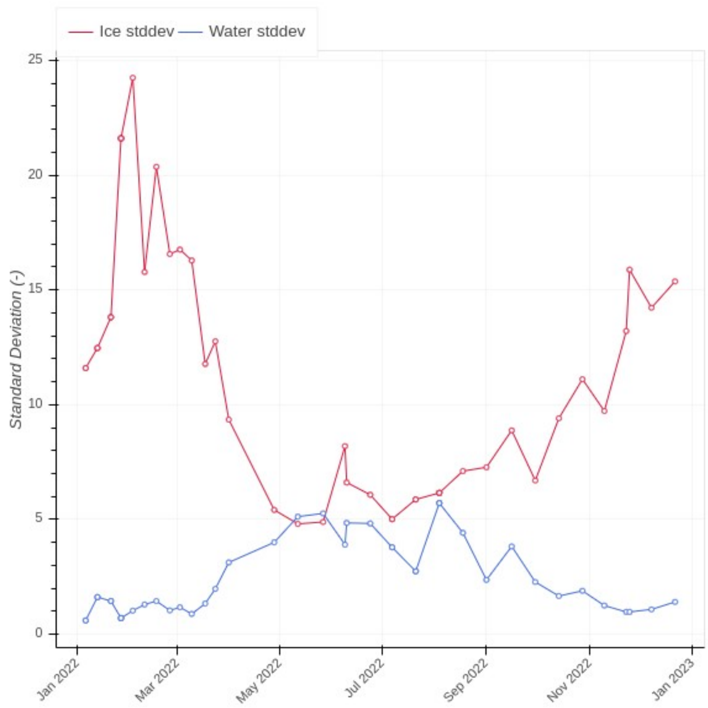

Figure 39: Standard deviation of the difference in ice concentrations from the NIC ice analysis and OSI SAF concentration product for two categories: water and ice. Southern hemisphere.

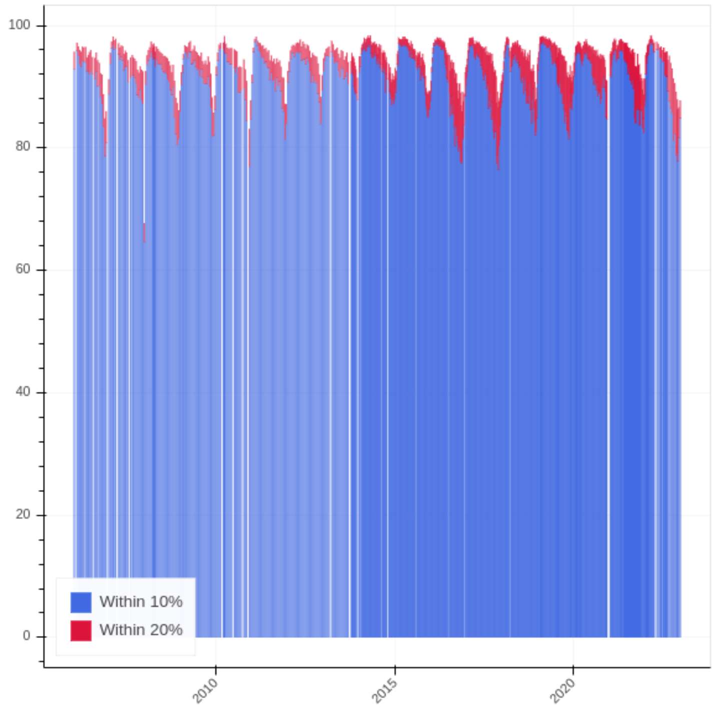

Figure 40: Multiyear variability. Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Southern hemisphere.

Concentration product					
Month	+/- 10% [%]	+/- 20% [%]	Mean difference [%]	SD [%]	Number of obs.
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
JUL 2022	95.29	96.27	-2.05	7.75	310132
AUG 2022	98.13	98.54	-0.92	5.19	378149
SEP 2022	97.28	97.86	-1.12	5.88	346587
OCT 2022	98.83	99.22	-0.46	3.19	355895
NOV 2022	98.47	99.05	-0.61	4.08	298877
DEC 2022	96.68	97.63	-1.23	5.28	250428

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 JAN 2022 to DEC 2022. First two columns shows how often there is agreement within 10 and 20% concentration.

Concentration product					
Month	+/- 10% [%]	+/- 20% [%]	Mean difference [%]	SD [%]	Number of obs.
JAN 2022	93.59	96.96	-3.87	8.98	153157
FEB 2022	98.42	99.07	-2.48	5.42	163964
MAR 2022	98.38	99.35	-1.76	4.66	158456
APR 2022	99.24	99.54	-1.44	4.17	145624
MAY 2022	-	-	-	-	-
JUN 2022	-	-	-	-	-
JUL 2022	-	-	-	-	-
AUG 2022	-	-	-	-	-
SEP 2022	-	-	-	-	-
OCT 2022	95.34	97.48	-3.49	9.15	129049
NOV 2022	93.12	97.25	-3.83	9.77	47449
DEC 2022	84.41	94.62	-5.47	11.14	53884

Table 39: Monthly quality assessment results from comparing the OSI SAF sea ice concentration product to MET Norway ice service analysis for the Weddell Sea area. From JAN 2022 to DEC 2022. First two columns shows how often there is agreement within 10 and 20% concentration. Ice charts are not drawn during the period May to September.

Comments:
Figure 35 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.
Since March 2022 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	5.38	3.47
Southern Hemishpere	11.42	2.45

5.3.3. 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.

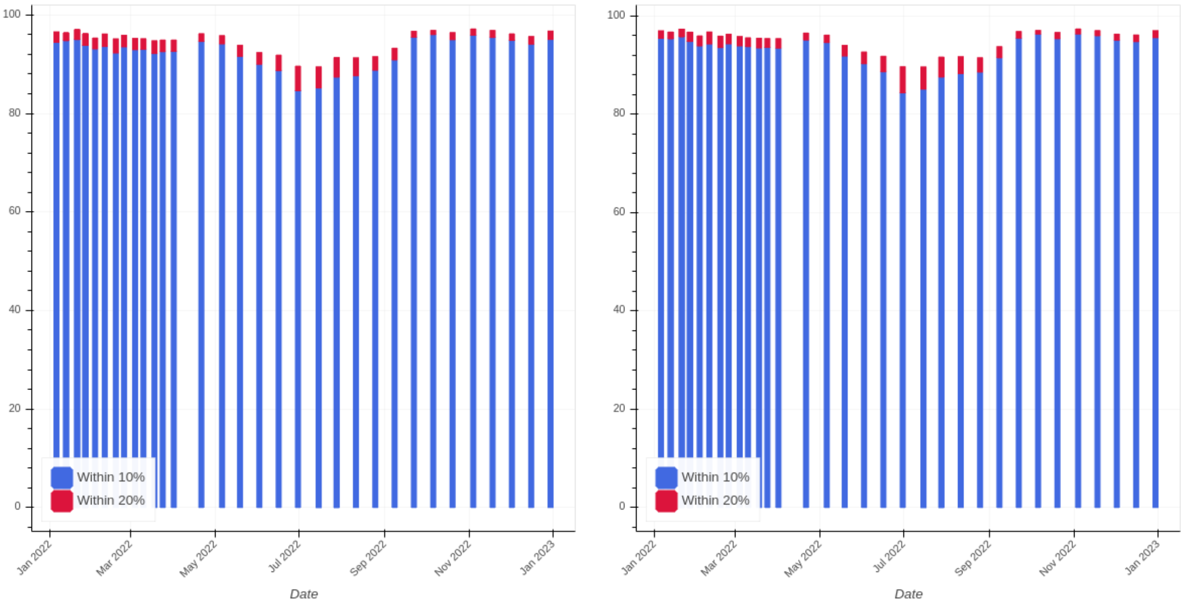

Figure 41: Comparison of ice concentrations from the NIC ice analysis and the OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%

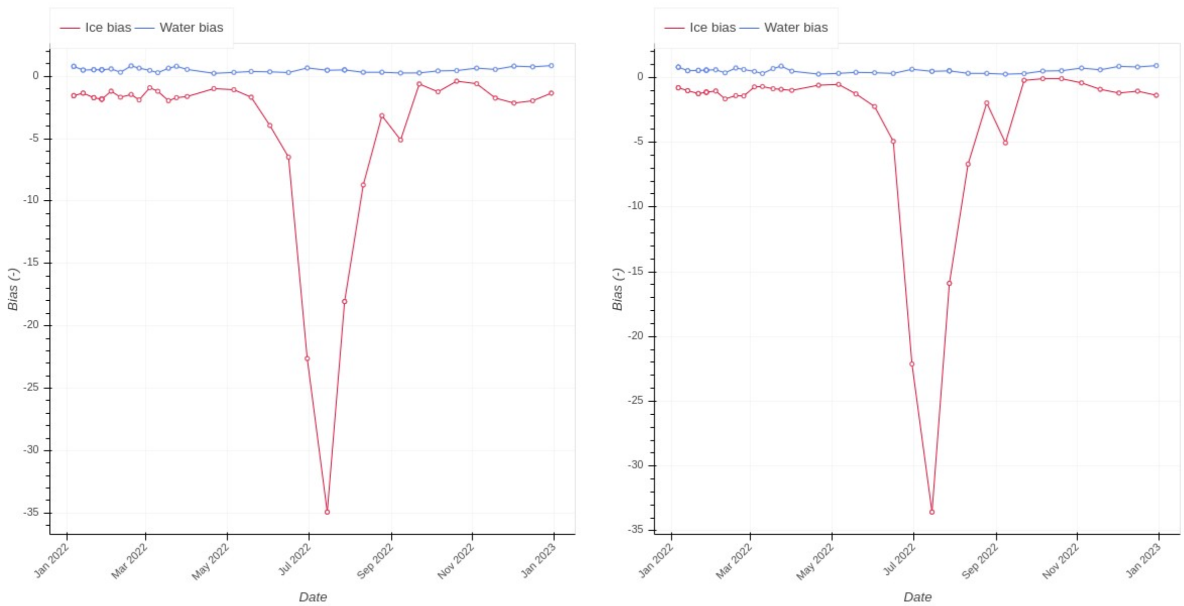

Figure 42: Difference between ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern Hemisphere

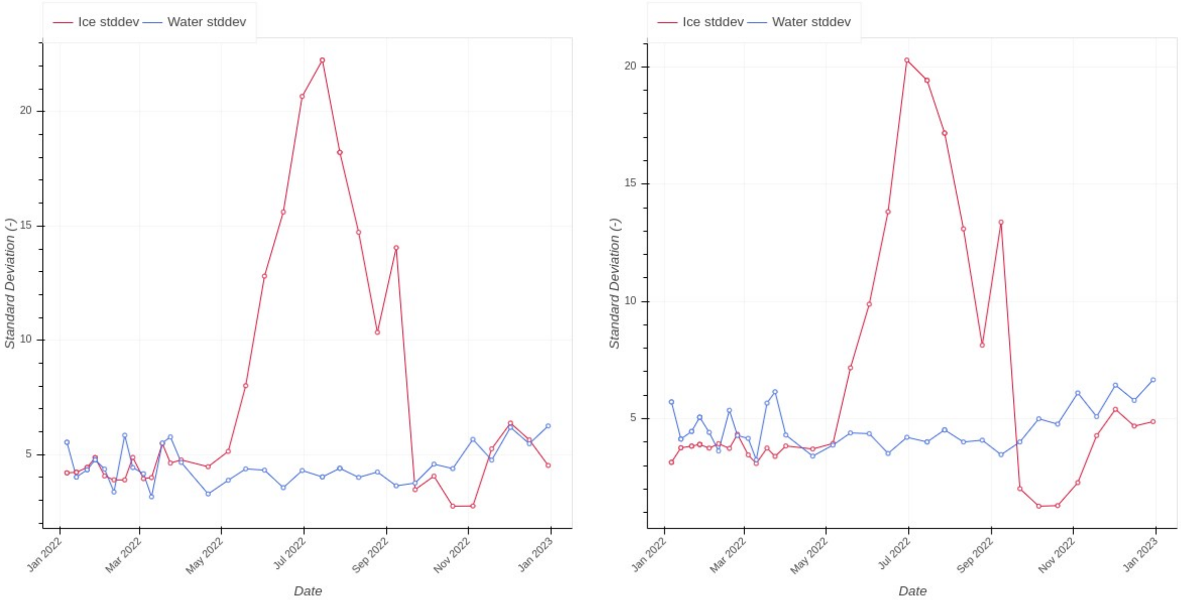

Figure 43: Standard deviation of the difference in ice concentrations from the Greenland overview charts made by DMI and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern hemisphere.

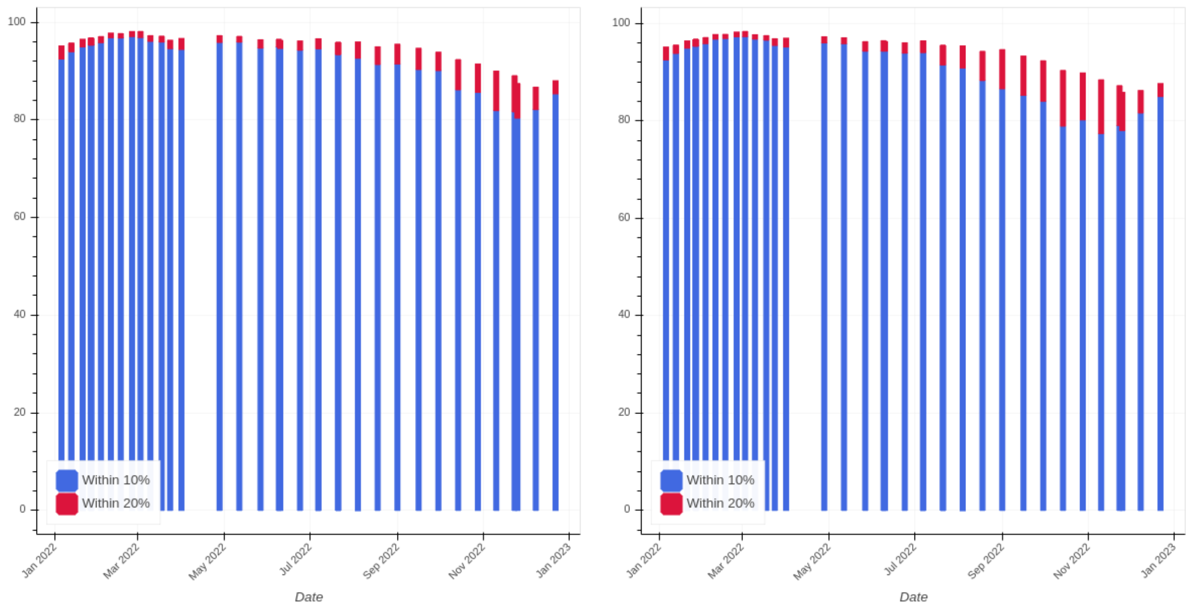

Figure 44: Comparison of ice concentrations from the NIC ice analysis and the OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right. Southern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%

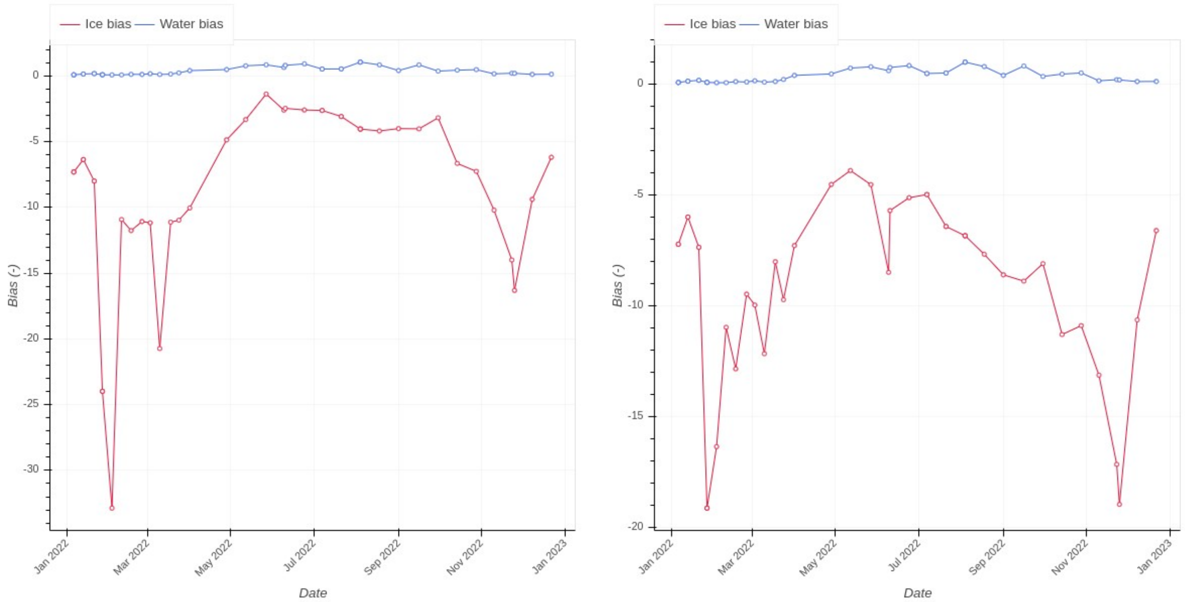

Figure 45: Difference between ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Southern Hemisphere

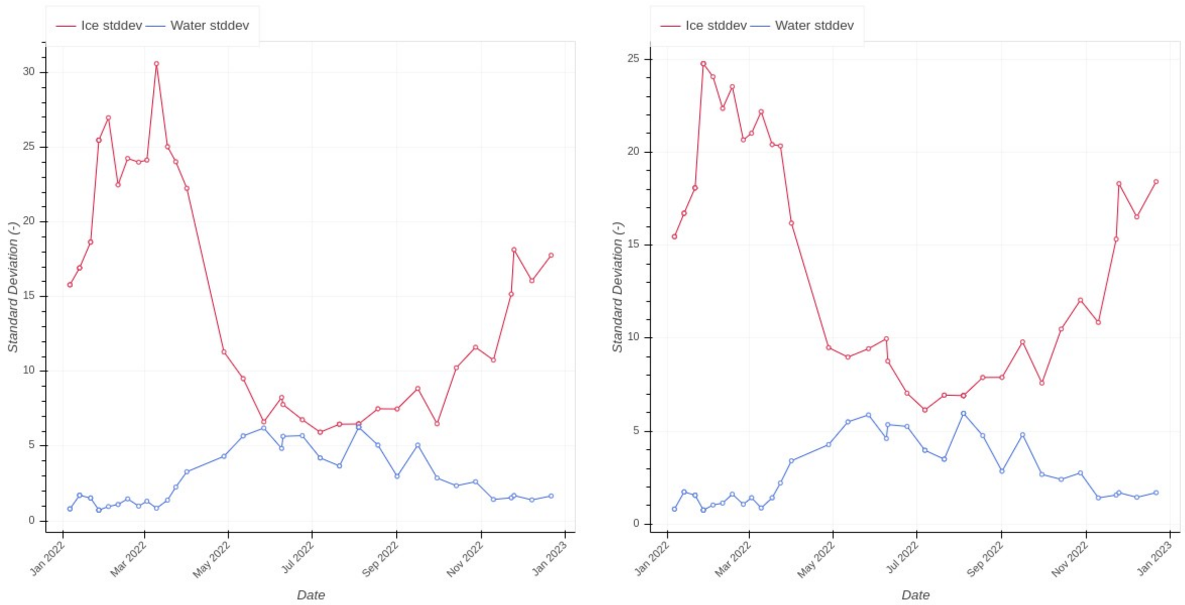

Figure 46: Standard deviation of the difference in ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and, ice. Southern hemisphere.

Comments:

Figure 43 and Figure 46 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. Since March 2022 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
OSHD algorithm	NH	7.73	4.54
	SH	14.32	2.78
TUD algorithm	NH	6.64	4.65
	SH	14.95	2.85

5.3.4. 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.

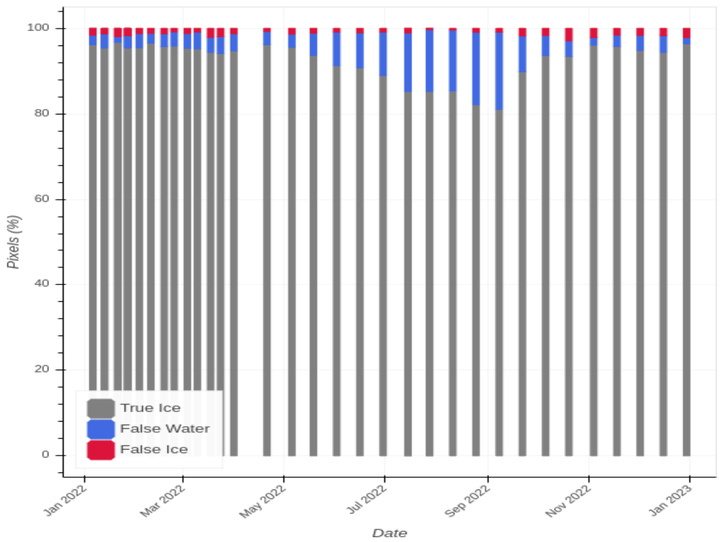

Figure 47: Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Northern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the DMI ice analysis indicated ice and vice versa for the 'False Ice' category.

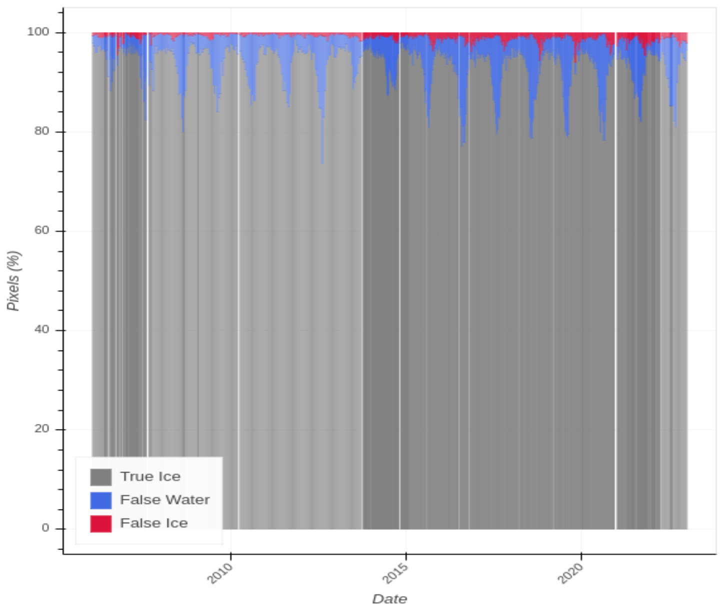

Figure 48: Multiyear variability. Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Northern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the DMI ice analysis indicated ice and vice versa for the 'False Ice' category.

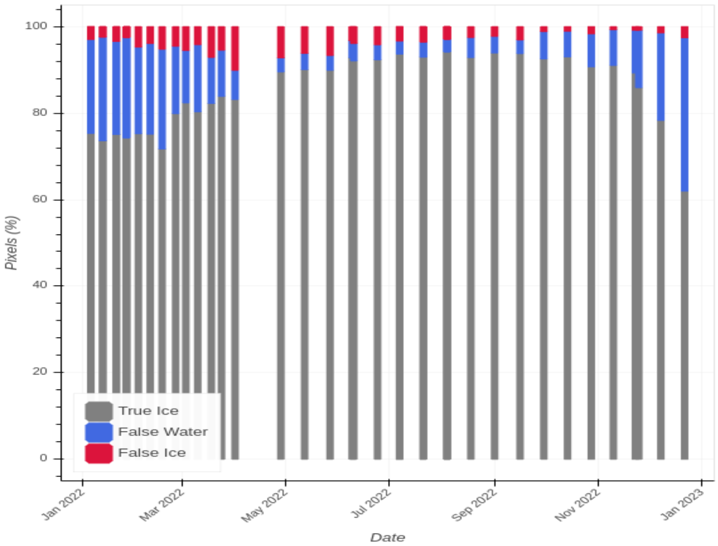

Figure 49: Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'False Ice' category.

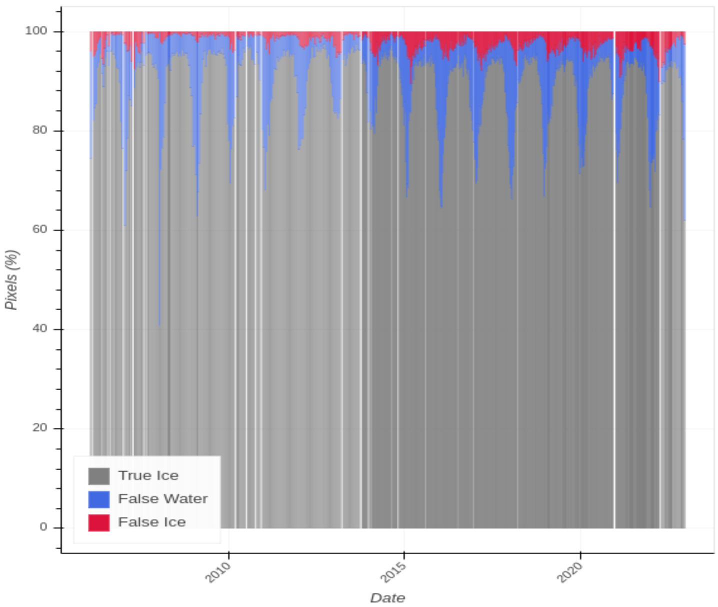

Figure 50: Multiyear variability. Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'False Ice' category.

Month	Correct [%]	SAF lower [%]	SAF higher [%]	Mean edge diff [km]	Number of obs.
JAN 2022	97.18	1.53	1.3	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
JUL 2022	97.67	1.87	0.46	19.39	394909
AUG 2022	98.62	1.03	0.35	12.45	457407
SEP 2022	98.51	1.02	0.47	15.32	421000
OCT 2022	99.20	0.3	0.49	8.60	446359
NOV 2022	98.64	0.43	0.93	7.71	444725
DEC 2022	97.97	0.92	1.11	12.65	413109

Table 40: Monthly quality assessment results from comparing OSI SAF sea ice products to MET Norway ice service analysis for the Svalbard area, from JAN 2022 to DEC 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	96.42	2.86	0.73	49.42	462845
FEB 2022	98.71	0.74	0.56	16.88	370314
MAR 2022	98.95	0.62	0.42	20.17	370976
APR 2022	98.99	0.38	0.63	14.24	277743
MAY 2022	-	-	-	-	-
JUN 2022	-	-	-	-	-
JUL 2022	-	-	-	-	-
AUG 2022	-	-	-	-	-
SEP 2022	-	-	-	-	-
OCT 2022	98.10	1.73	0.17	38.19	369732
NOV 2022	97.08	2.54	0.38	47.05	369732
DEC 2022	92.15	6.72	1.13	77.34	277356

Table 41: Monthly quality assessment results from comparing OSI SAF sea ice products to MET Norway ice service analysis for the Weddell Sea area, from JAN 2022 to DEC 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 40, 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 12 months in 2022 is 13.9 km and the target accuracy requirement of 20 km edge difference per year is therefore met. The monthly differences are well below the yearly requirement all months except the summer month of June when melting of snow and ice can make the product quality worse.

In Table 41, the Southern Hemisphere OSI SAF sea-ice edge product is compared with navigational ice charts from the Weddell Sea region (MET Norway ice service). Values for 2021 are included here since these were missing in the previous HYR due to software problems. The yearly averaged edge difference for the seven months with available ice charts in the period of July 2021 to June 2022 is 30.9 km, and for January to December 2022 is 37.6 km, and the target accuracy requirement of 45 km edge difference per year is met for both periods. The monthly differences are well below the yearly requirement in all months except the summer months of December 2021, January and November-December 2022 when melting of snow and ice makes the product quality worse.

5.3.5. 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]
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	-	-
JUL 2022	-	-
AUG 2022	-	-
SEP 2022	-	-
OCT 2022	103,385	2,345,921
NOV 2022	91,532	2,413,182
DEC 2022	145,009	1,989,644

Table 42: Monitoring of NH sea ice type quality by comparing the multi year coverage with the 11-days running mean, from JAN 2022 to DEC 2022.

Month	SD wrt running mean [km²]	Mean MYI coverage [km²]
JAN 2022	-	-
FEB 2022	-	-
MAR 2022	24,765	552,022
APR 2022	33,701	453,573
MAY 2022	68,824	564,932
JUN 2022	82,632	702,576
JUL 2022	68,689	773,090
AUG 2022	65,629	816,753
SEP 2022	-	-
OCT 2022	-	-
NOV 2022	-	-
DEC 2022	-	-

Table 43: Monitoring of SH sea ice type quality by comparing the multi year coverage with the 11-days running mean, from JAN 2022 to DEC 2022.

Comments:
Table 42 shows the sea-ice type monitoring for NH. The mid-column represents the monthly standard deviations of the daily MYI coverage variability. Most months have values well below the requirement of 100.000 km^2, except March and October 2022 which have values just above the requirement, and December 2022 which has a high value above the requirement. As commented in previous HYR, the high number in March is caused by a large warm-air intrusion in mid-March, starting 13^{th} of March in the Fram Strait and for the following five days this affected the MYI classification across the Arctic Ocean. December 2022 had a series of warm air intrusions which largely affected the ice type product during almost the entire month, causing large temporary gaps of multiyear ice (misinterpreted as first-year ice).
Table 43 shows the monitoring of the sea-ice type product for SH. All months have values well below the requirement of 100.000 km^2.

5.3.6. Sea ice emissivity (OSI-404-a) 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 51 is the difference between the hemispheric OSI SAF product and the validation product.

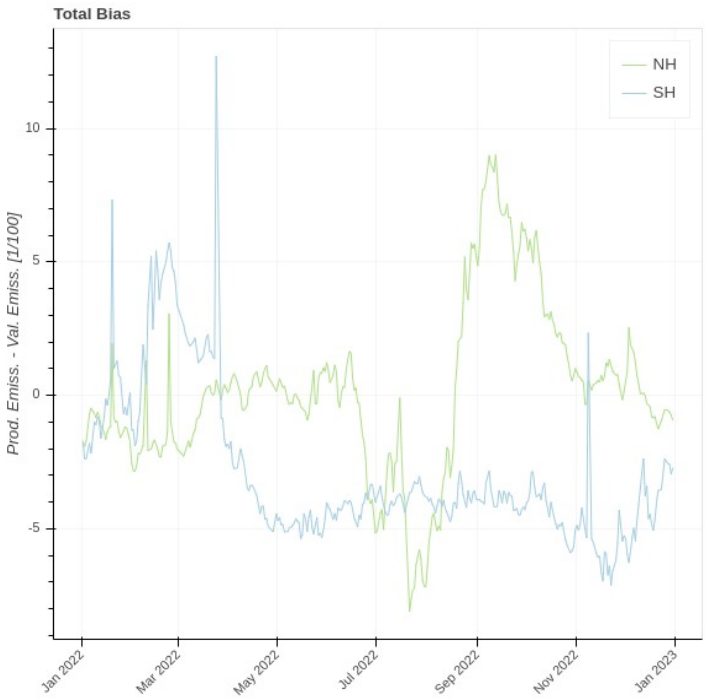

Figure 51: The mean hemispheric difference between the OSI SAF operational product and the validation product derived from NWP and SSMIS data.

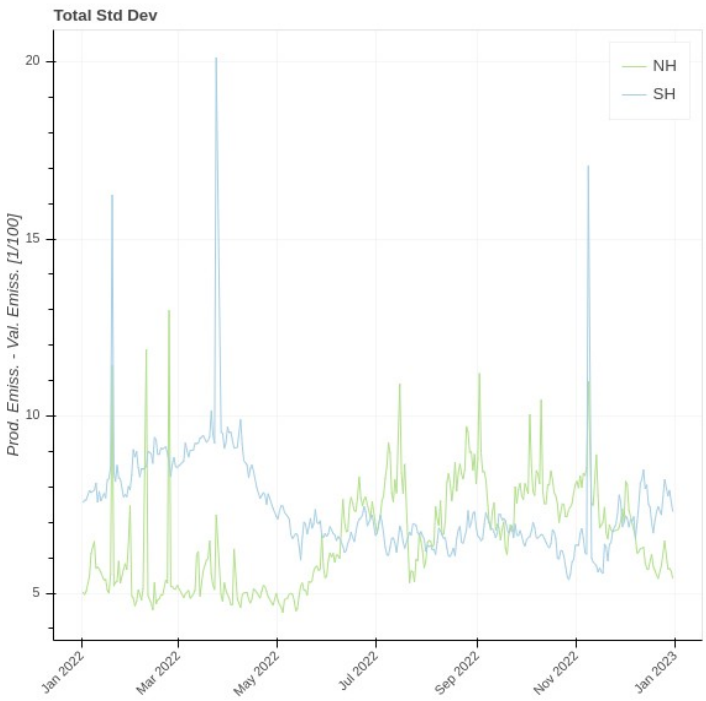

Figure 52: The standard deviation of the difference between the OSI SAF operational product and the validation product for the northern and southern hemispheres.

Comments:

The mean annual difference on the Northern Hemisphere is 0.003 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	0.003	0.07	± 0.05	± 0.15
SH	-0.03	0.07	± 0.05	± 0.15

5.3.7. 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-F18) 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.

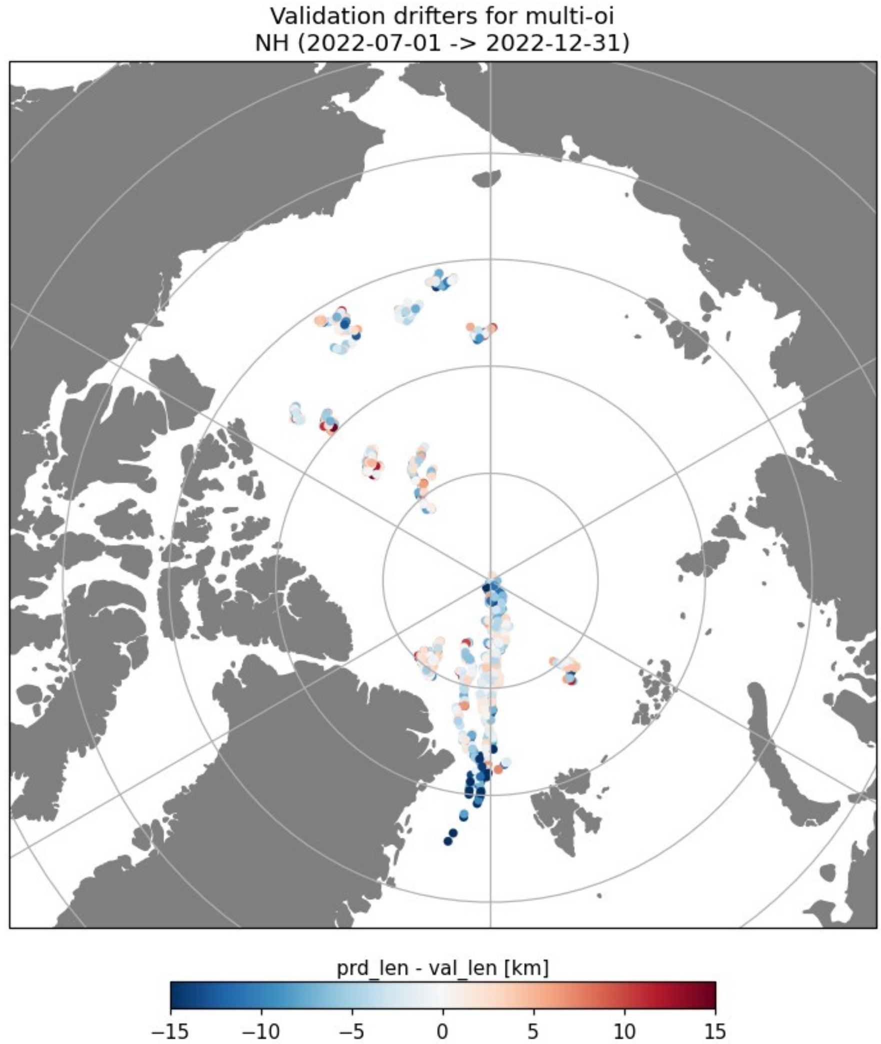

Figure 53: Location of GPS drifters for the quality assessment period (JUL 2022 to DEC 2022) in NH. The shade of each symbol represents the mean difference (prod-ref) in drift length (km over 2 days) for the multi-oi product.

Month	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
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
JUL 2022	0,21	-0,25	5,92	5,77	0,8	0,09	0,85	350
AUG 2022	-2,05	-1,17	5,65	6,32	0,8	-0,37	0,83	275
SEP 2022	-1,78	-1,15	6,79	7,98	0,8	-0,61	0,85	172
OCT 2022	-0,11	-0,19	2,49	2,24	0,93	0,3	0,96	166
NOV 2022	-0,51	0,1	2,3	1,69	0,92	0,11	0,96	123
DEC 2022	-1,89	-3,07	5,43	8,69	0,73	2,81	0,89	113
Last 12 months	-0,31	-0,46	3,96	4,33	0,9	-0,05	0,93	3093

Table 44: Quality assessment results for the LRSID (multi-oi) product (NH) for JAN 2022 to DEC 2022.

Month	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
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
JUL 2022	--	--	--	--	--	--	--	0
AUG 2022	--	--	--	--	--	--	--	0
SEP 2022	--	--	--	--	--	--	--	0
OCT 2022	-0,17	-0,13	4,21	5,11	0,92	0,34	0,88	145
NOV 2022	0,09	-0,13	3,22	4,55	0,94	0,17	0,86	93
DEC 2022	-2,92	-3,54	5,91	9,48	0,7	2,51	0,85	104
Last 12 months	-0,13	-0,33	3,37	4,38	0,93	-0,05	0,95	1568

Table 45: Quality assessment results for the LRSID (SSMIS-F18) product (NH) for JAN 2022 to DEC 2022.

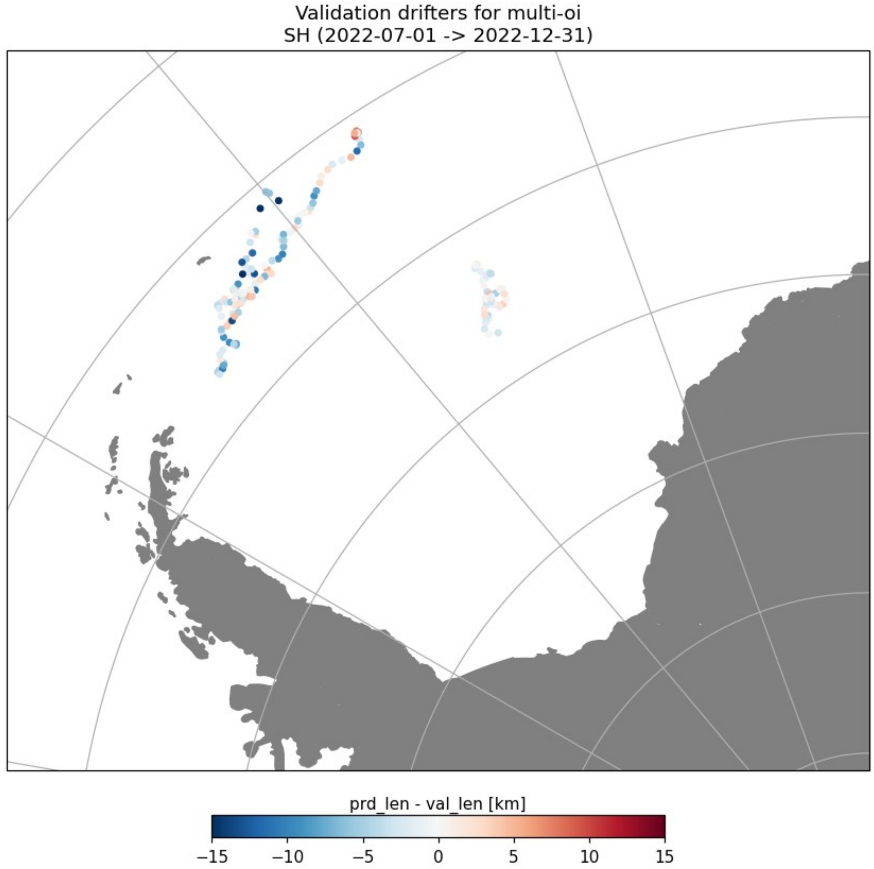

Figure 54: Location of GPS drifters for the quality assessment period (JAN 2022 to DEC 2022) in SH. The shade of each symbol represents the mean difference (prod-ref) in drift length (km over 2 days) for the multi-oi product.

Products	**b(X) [km]**	**b(Y) [km]**	**σ(X) [km]**	**σ(Y) [km]**	**α**	**β[km]**	**ρ**	**N**
multi-oi	-0,43	0,46	6,13	5,4	0,87	-0,76	0,95	514
ssmis-f18	1,08	0,87	7,29	6,44	0,93	0,41	0,93	322
amsr2-gw1	-0,03	0,69	5,48	5,18	0,91	-0,26	0,96	354

Table 46: Quality assessment results for selected OSI-405-c products (SH) for the last 12 months (JAN 2022 to DEC 2022).

Comments:
The OSI-405-c product behaved nominally over the last 6 months. Validation against buoy data exhibits worse statistics at the very end of the period (Dec 2022) with RMSEs as high as 9.5 km and a negative bias of up until -3.5 km. This is attributed to the prominent sampling in the Fram Strait (many buoys drifting there in Dec. 2022). Fram Strait is a difficult region for the product because of the pronounced longitudinal gradient of the drift, that is not adequately captured from a coarse resolution product such as OSI-405-c. The validation statistics in the SH are also higher than in previous, this time associated with a prominent sampling of buoys in the marginal ice zone.

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

Quality assessment dataset
The ice drift quality assessment is performed by collocation of the satellite based drift vectors with the trajectories of in situ drifters. The ice drift reference data set consists of all drifters from the "positive list" used to produce the analysis fields for the global deterministic NWP model at ECMWF and for the local area model running at DMI. The data are stored at DMI.

A nearest-neighbor approach is implemented for the collocation and any collocation pair whose distance between the satellite 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 pairs of satellite ice drift 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 47 below, show selected mean difference statistics against drifting buoys. Mean differences (x-mean, y-mean) and standard deviation of mean differences (x-SD, y-SD) 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 correlation coefficient (r). N, indicate the number of data pairs that are applied in the mean difference statistics.
A plot of the locations of the used buoys is shown in Figure 55, and it is seen that only buoys from the central Arctic have been used for the validation. The colorbar shows the drift deviations of OSI-407.

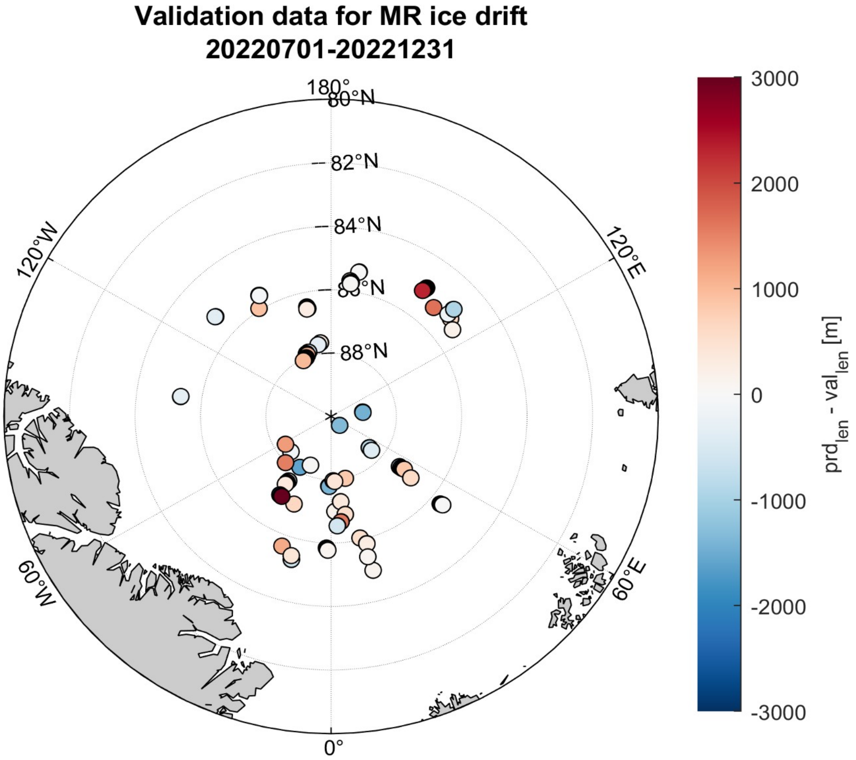

Figure 55: Location of GPS drifters for the quality assessment period (2nd half 2022). The shade of each symbol represents the difference (prod-def) in drift length in meters

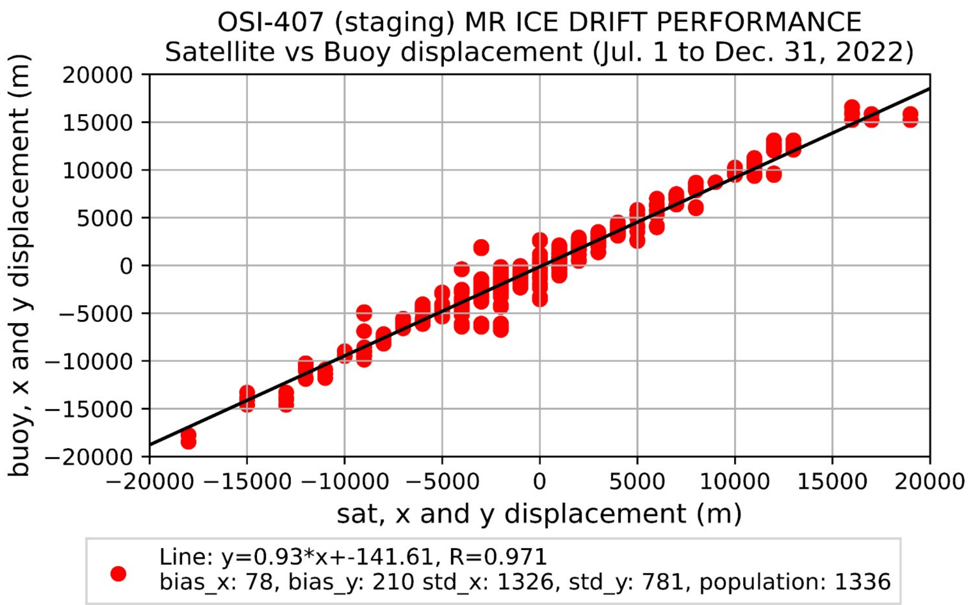

Figure 56: Correlation scatter plot showing the MR sea ice drift product (OSI-407) performance, Jul. 2022 to Dec. 2022.

Month	b(X) [m]	b(Y) [m]	σ(X) [m]	σ(Y) [m]	α	β [m]	ρ	N
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
JUL 2022	97	302	524	524	0.96	-121.64	0.972	306
AUG 2022	-557	-85	2025	921	0.87	-248.75	0.935	248
SEP 2022	-726	-770	227	122	1.00	760.72	0.999	8
OCT 2022	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NOV 2022	512	350	763	573	0.92	-405.22	0.976	132
DEC 2022	236	263	1263	829	0.97	-221.06	0.973	642
Last 12 months	49	155	1003	1093	0.91	-56.47	0.959	7462

Table 47: MR sea ice drift product (OSI-407-a) performance, JAN 2022 to DEC 2022

Comments:
The product requirement target accuracy of 2 km standard deviation is met in all cases, except for August 2022 where it is exceeded by 25 m. However, this is still far within the threshold accuracy of 5 km.
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. A total of 19 different buoys are used, which is 8 more than in the previous half year period. The WMO ID's of the buoys are as given below.
2601510, 2601516, 2601713, 2601716, 4601785, 4601786, 4601793, 4601812, 4601817, 4601818, 4801628, 4801663, 4801668, 4802602, 4802603, 6401582, 6401584, 6401586, 6401590

5.4. Global Wind quality (OSI-102-b, OSI-102-c, OSI-104-b, OSI-104-c, OSI-114-a, OSI-114-b, OSI-115-a, OSI-115-b)

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 January 2021 to December 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 ECMWF model winds. Note that local smaller scale wind variations, which are resolved by the scatterometer but not by the model, 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/.

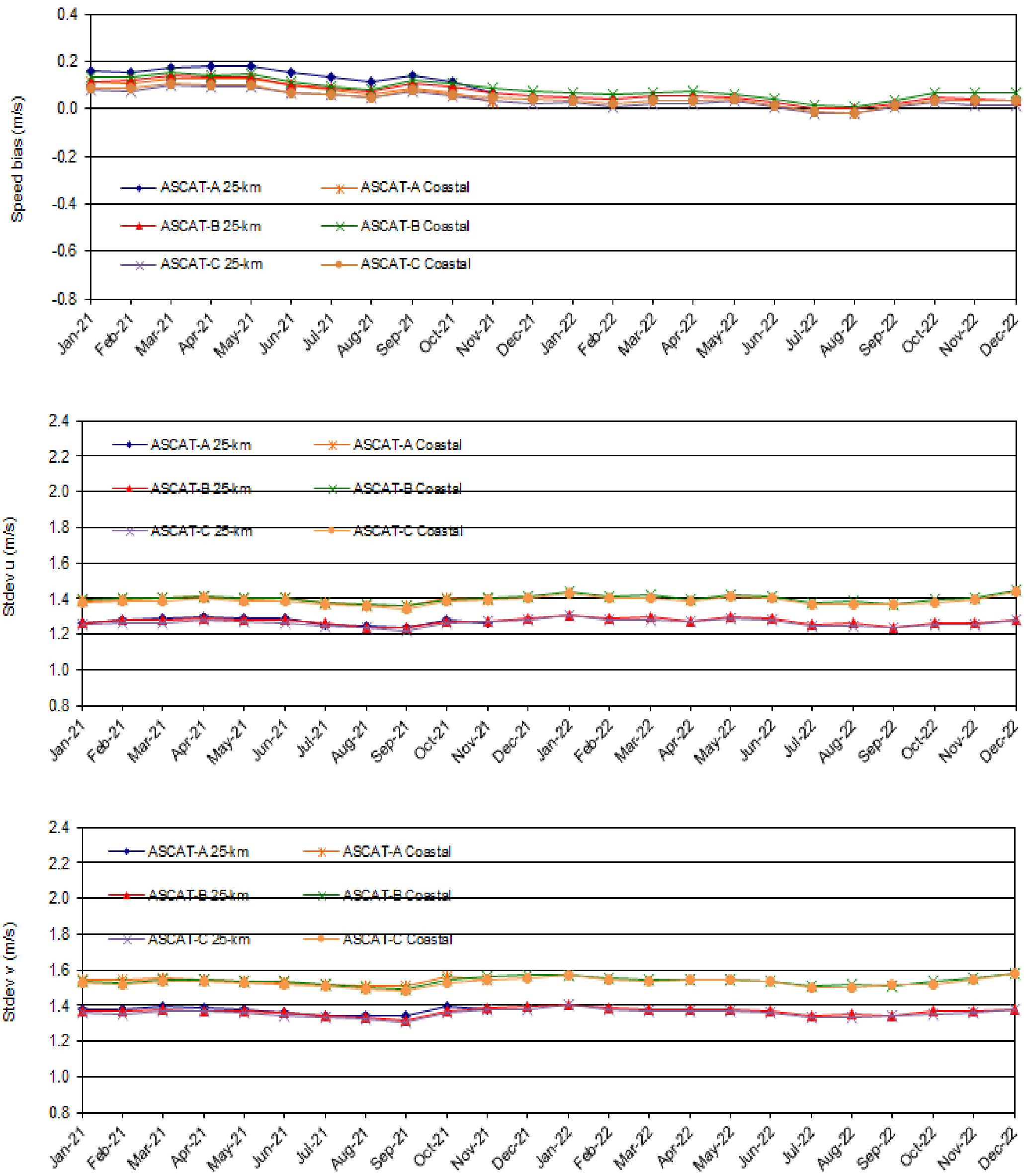

Figure 57: Comparison of ASCAT scatterometer winds against ECMWF NWP forecast winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus ECMWF, top), wind u component standard deviation (middle) and wind v component standard deviation (bottom) are shown.

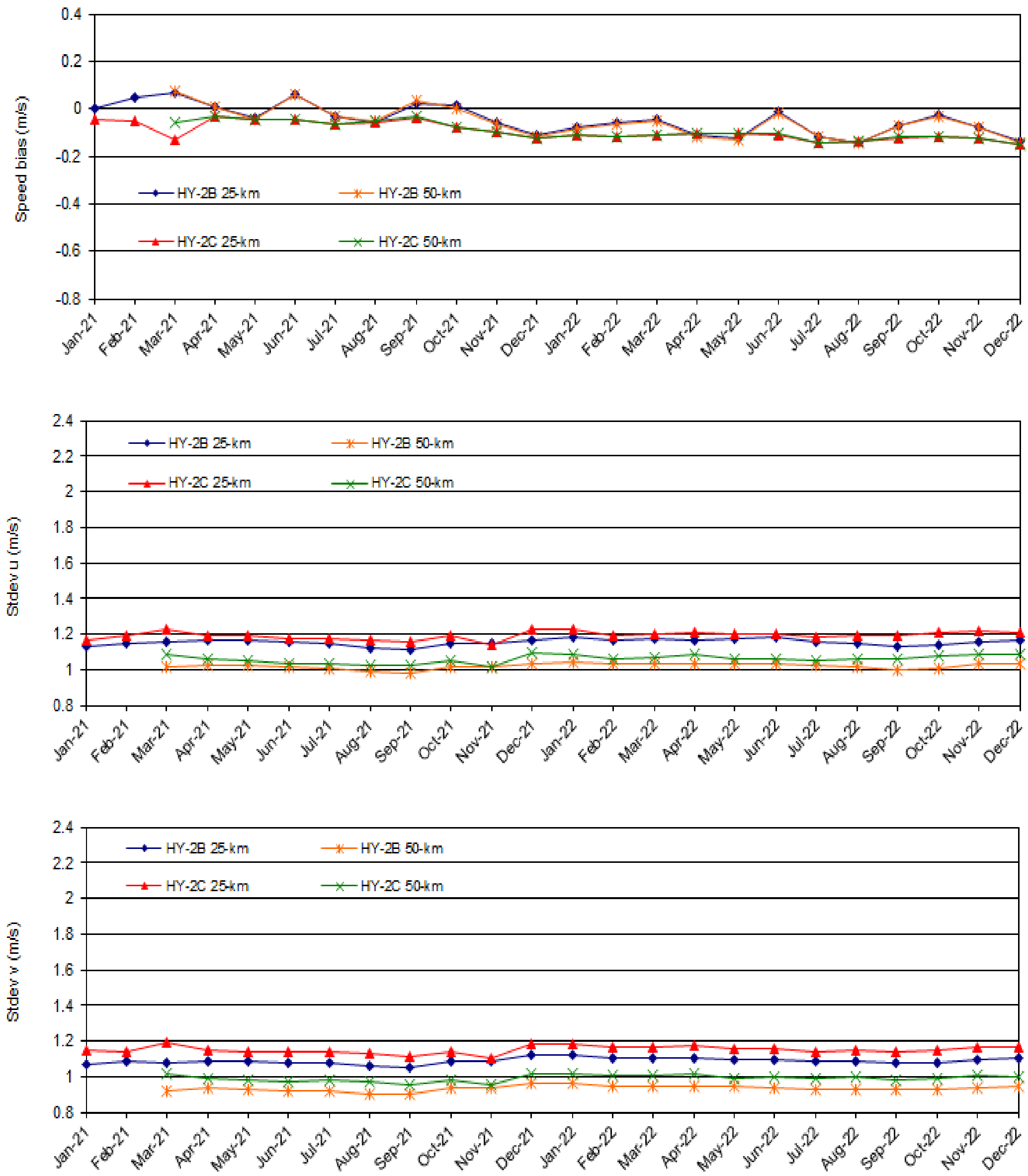

Figure 58: Comparison of HY-2B and HY-2C scatterometer winds against ECMWF NWP forecast winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus ECMWF, top), wind u component standard deviation (middle) and wind v component standard deviation (bottom) are shown.

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 January 2021 to December 2022.

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.

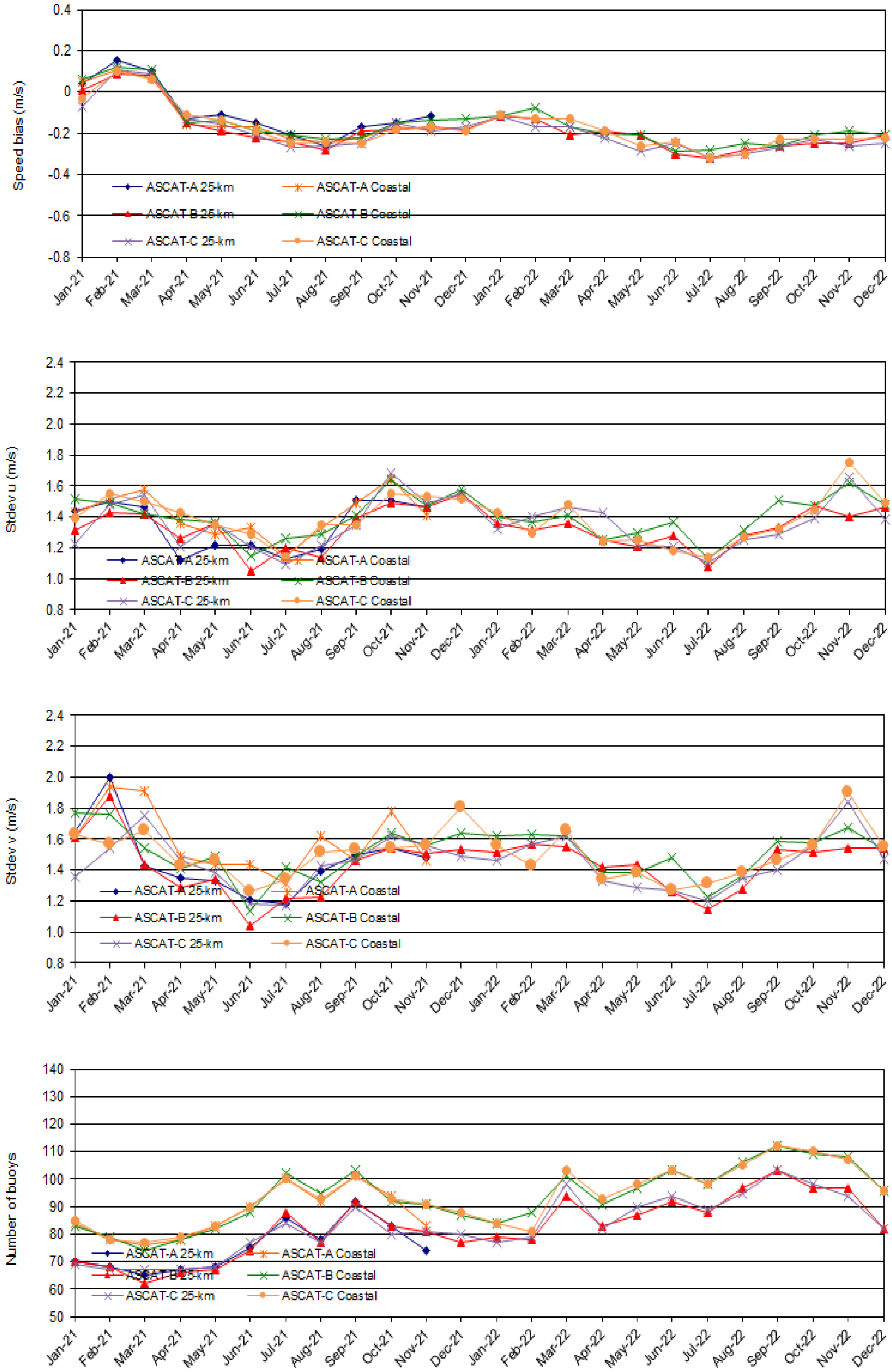

Figure 59: Comparison of ASCAT scatterometer winds against buoy winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus buoy, top), wind u component standard deviation (2nd plot) and wind v component standard deviation (3rd plot) are shown. Also the number of buoys available for the comparisons is shown (bottom).

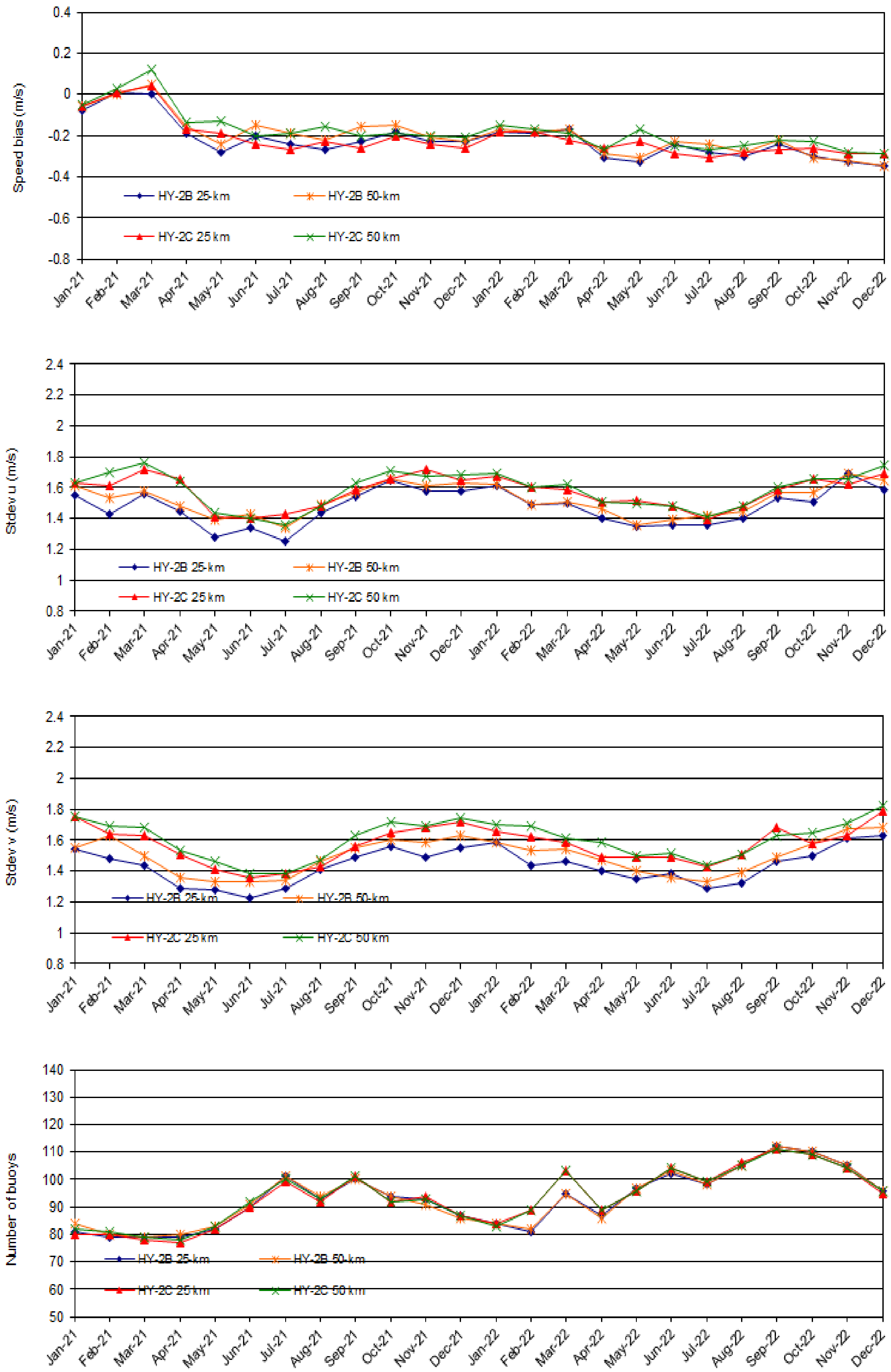

Figure 60: Comparison of HY-2B and HY-2C scatterometer winds against buoy winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus buoy, top), wind u component standard deviation (2nd plot) and wind v component standard deviation (3rd plot) are shown. Also the number 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
JUL 2022	2163	2329
AUG 2022	2166	2857
SEP 2022	2169	2888
OCT 2022	2175	4384
NOV 2022	2191	5914
DEC 2022	2196	3972

Table 48: Statistics on central OSI SAF web site use over 2nd half 2022.

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

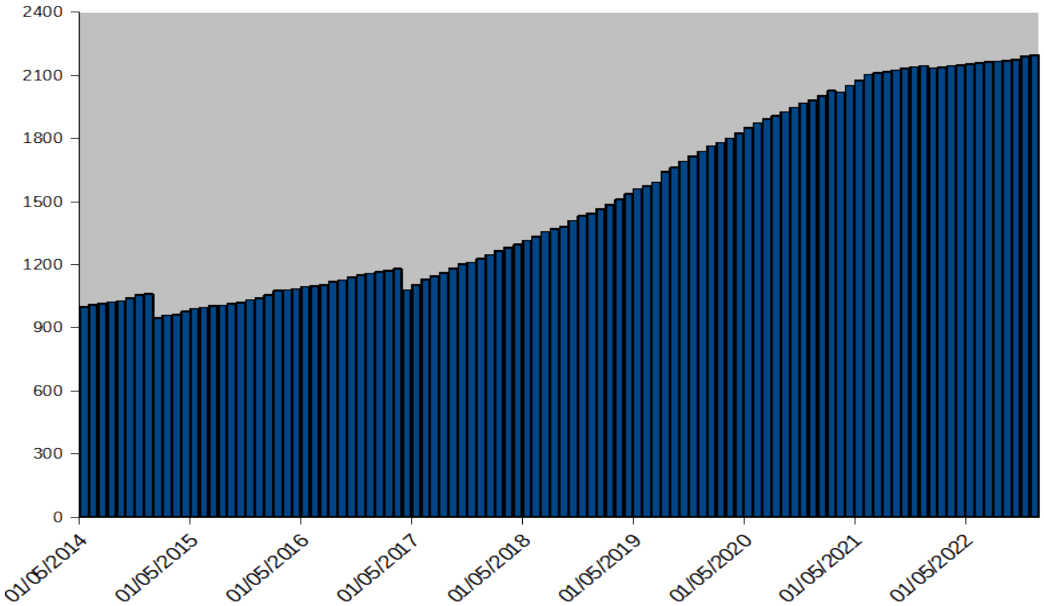

Figure 61: Evolution of external registered users on the central Web Site from May 2014 to DEC 2022.

Comments:
Nothing special to report on the period.

The following table lists the institutions or companies the new registered users (over 2nd half 2022) are from.

Country	Institution, establishment or company
Australia	Bureau of Meteorology (Australia)
Brazil	Meteorological Research Institute
Brazil	Universidade de são paulo
Canada	University of Toronto
China	Institute of Tropical and Marine Meteorology
Cyprus	Department of Fisheries and Marine Research, Cyprus
France	Centre National d'Etudes Spatiales
France	Météo-France
Germany	European Organisation for the Exploitation of Meteorological Satellites
Iran, Islamic Republic of	Iranian National Institute for Oceanography and Atmospheric Science
Italy	Institute of Marine Sciences (CNR-ISMAR)
Italy	Institute of Marine Science - CNR
Japan	Fisheries Research Institute
Japan	Hokkaido University
Korea (South)	Yonsei University
Lao PDR	Department of Meteorology
Lithuania	Lithuanian hydrometeorological service
Macao, SAR China	University of Saint Joseph (Macao)
Madagascar	DIRECTION GENERALE DE LA METEOROLOGIE
Norway	Seaweed Solutions
Norway	Norwegian Meteorological Institute
Portugal	Universidade do Algarve
Spain	University of Cadiz
United Kingdom	University College London
United States of America	University of California, Los Angeles
United States of America	University of Michigan
United States of America	University of Washington
United States of America	United States Navy
United States of America	Stony Brook University

Table 49: List of institutes of the newly registered users over 2nd 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	Acronym
China	Macau Meteorology and Astronomy	
Germany	EUMETSAT	
India	Indian Space Research Organisation	ISRO
-	4 private users	

Table 50: 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	7	7	7	0	0	0
HL subsystem						
WIND subsystem	26	26	18	7	0	1

Table 51: Helpdesk inquires over 2nd 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).

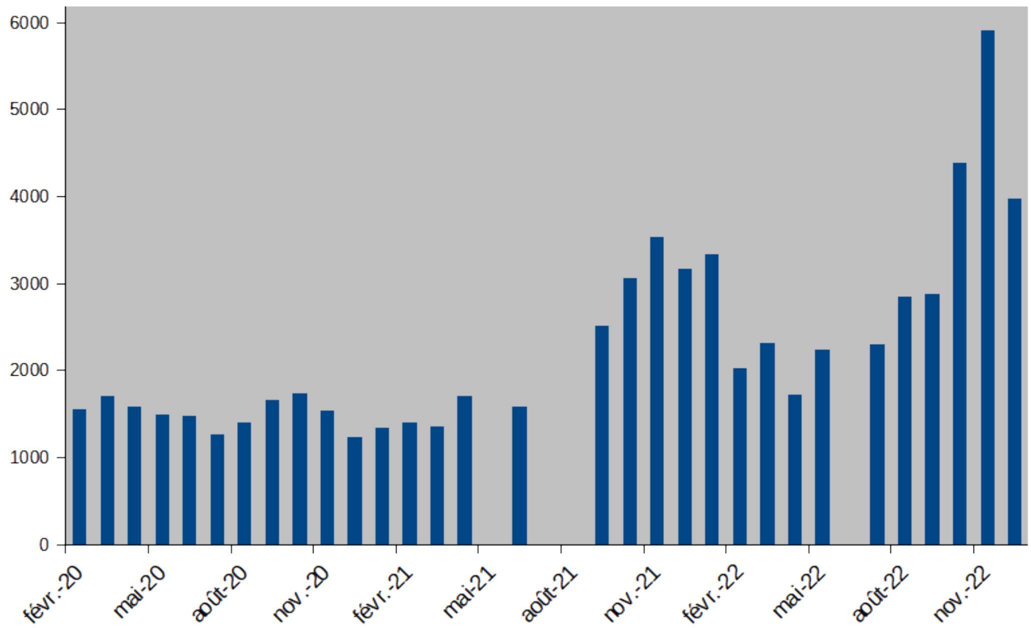

Figure 62: Evolution of page views on the central OSI SAF web site over the past 2 years

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

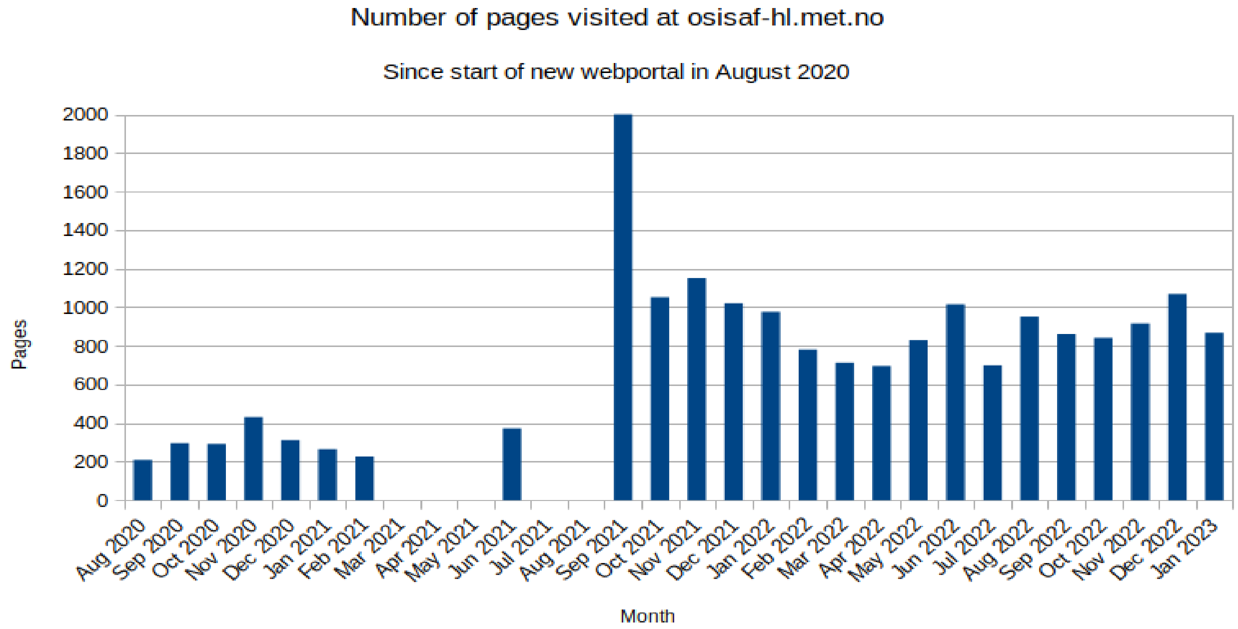

Figure 63: Evolution of page views on the HL OSI SAF Sea Ice portal over the past 2 years (the bar is stopped at 2000 pages, to show more details)

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.

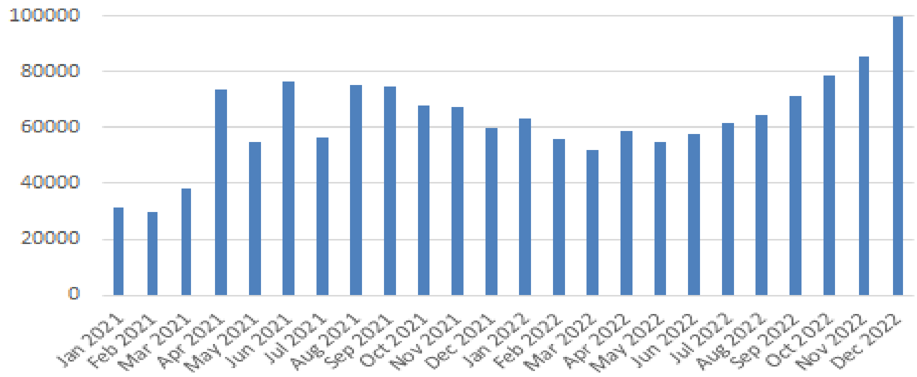

Figure 64: Evolution of page views on KNMI scatterometer website over the past 2 years

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.

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.

		JUL 2022		AUG 2022		SEP 2022		OCT 2022		NOV 2022		DEC 2022	
		Ifremer FTP/ HTTP/ OpenDap WCS WMS	PO. DAAC	Ifremer FTP/ HTTP/ OpenDap WCS WMS	PO. DAAC	Ifremer FTP/ HTTP/ OpenDap WCS WMS	PO. DAAC	Ifremer FTP/ HTTP/ OpenDap WCS WMS	PO. DAAC	Ifremer FTP/ HTTP/ OpenDap WCS WMS	PO. DAAC	Ifremer FTP/ HTTP/ OpenDap WCS WMS	PO. DAAC
SST MAP +LML			x		x		x		x		x		x
SSI MAP +LML			x		x		x		x		x		x
DLI MAP +LML		0	x	0	x	1	x	0	x	0	x	0	x
OSI-201 series	GBL SST	135 / 436 / 153	62	206 / 143 / 143	71	450 / 126 / 126	75	1145 / 137 / 135	68	598 / 156 / 156	65	707 / 174 / 173	74
OSI-202 series	NAR SST	1805 / 1	0	1467	9	2025	3	1258	13	1278	8	822	1
OSI-204 series	MGR SST	206045 / 105	78359	368358 / 281	34862	294033 / 421 / 0 / 0 / 1	33948	312034 / 563	37511	185396 / 649	33898	258043 / 1463 / 0 / 451 / 159	35080
OSI-206 series	Meteosat SST	15545 / 414	1687	15328 / 562	4107	9249 / 483	2363	3767 / 723	9188	14010 / 647	5243	34680 / 823 / 1 / 1 / 1	1880
OSI-207 series	GOES-East SST	1818	875	2229	872	2137	974	1578	872	1444	913	1882	867
OSI-IO-SST	Meteosat-8 SST	1	147	18118 / 2	141	8363	135	30723	169	0	152	39170	160
OSI-208 series	IASI SST	23782	139	28356	69	24567 / 4	58	21655	66	42084	62	44480	62
OSI-250	Meteosat SST Data record	0	4829	0	4950	0	58	0 / 2 / 0 / 1	62	0	63	0	62
OSI-303 series	Meteosat DLI	71521 / 86	x	90406	x	87341	x	119581	x	89002 / 1 / 1	x	93950 / 401	x

OSI-304 series	Meteosat SSI	71521 / 86	x	90406	x	87341	x	119581	x	89002 / 1 / 1	x	93950 / 401	x
OSI-305 series	GOES-East DLI	38290 / 2	x	36567	x	30103	x	62762	x	30327	x	31947	x
OSI-306 series	GOES-East SSI	38290 / 2	x	36567	x	30103	x	62762	x	30327	x	31947	x
OSI-IO-DLI	Meteosat-8 DLI	0	x	11050 / 177	x	7459 / 23	x	40	x	0	x	0	x
OSI-IO-SSI	Meteosat-8 SSI	0	x	11050 / 177	x	7459 / 23	x	40	x	0	x	0	x

Table 52: Number of OSI SAF products downloaded from Ifremer FTP server and PO.DAAC server over 2nd half 2022.

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		JUL 2022	AUG 2022	SEP 2022	OCT 2022	NOV 2022	DEC 2022
OSI-401 series	Global Sea Ice Concentration (SSMIS)	68351	105613	70657	76550	163478	67293
OSI-402 series	Global Sea Ice Edge	9845	6698	6058	60945	22946	16967
OSI-403 series	Global Sea Ice Type	12201	33392	15111	32414	4524	36466
OSI-404 series	Global Sea Ice Emissivity	0	0	93	124	147	64
OSI-405 series	Low resolution Sea Ice Drift	23742	37707	27183	26391	32041	58067
OSI-407 series	Medium resolution Sea Ice Drift	2744	1125	9345	948	5610	372
OSI-408 series	Global Sea Ice Concentration (AMSR-2)	3894	6335	5076	3272	9487	3094
OSI-410	Level 2 PMW sea ice concentration	3276	3361	2901	2542	4227	4188
OSI-409	Ice Concentration Data Record v1.2		46456		2020		
OSI-430	Ice Concentration ICDR v1.2		9895		5545		
OSI-430-b	Ice Concentration ICDR v2.0	30172	20722	22947	13630	20802	2377
OSI-430-a	Ice Concentration ICDR v3.0					5171	4963
OSI-450	Ice Concentration CDR v2.0	126382	52909	65705	63114	58067	62803
OSI-450-a	Ice Concentration CDR v3.0	-	-	-	-	90631	75370
OSI-458	LR Ice Drift CDR v1.0	-	-	-	-	12462	45256
OSI-203 series	AHL SST	827	348	1759	252	1303	129
OSI-205 series	L2 SST/IST	24935	64137	23062	20141	7347	0
OSI-301/2 series	AHL DLI-SSI	496	494	480	494	488	488

Table 53: Number of OSI SAF products downloaded from OSI SAF HL FTP server over 2nd half 2022

Redistribution by CMEMS and C3S		JUL 2022		AUG 2022		SEP 2022		OCT 2022		NOV 2022		DEC 2022	
		CMEMS	C3S	CMEMS	C3S	CMEMS	C3S	CMEMS	C3S	CMEMS	C3S	CMEMS	C3S
OSI-401 series	Global Sea Ice Concentration (SSMIS)	24506		21432		17940		15401		21142		25992	
OSI-402 series	Global Sea Ice Edge	20676		17229		14020		11105		14779		18858	
OSI-403 series	Global Sea Ice Type	20367		17044		13840		10903		14526		18605	
OSI-405 series	Low resolution Sea Ice Drift	21107		15851		12749		9779		13312		17438	
OSI-409	Ice Concentration Data Record v1.2		67		28						66		47681
OSI-430	Ice Concentration ICDR v1.2		11		6						12		6881
OSI-430-b	Ice Concentration ICDR v2.0	2374	23578	3	29372	4	28864	20	14701	15	18811	9	20220
OSI-450	Ice Concentration Data Record v2.0	14	52103	1	88801	0	72209	0	149595	8	81306	16	52863

Table 54: Number of OSI SAF products redistributed by CMEMS (downloads/product/day) and C3S (number of files) over 2nd 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.

		JUL 2022		AUG 2022		SEP 2022		OCT 2022		NOV 2022		DEC 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	ASCAT-A 25 km												
OSI-102-b	ASCAT-B 25 km	19 per file (BUFR), 38 per file (NetCDF)	377857	19 per file (BUFR), 38 per file (NetCDF)	640614	19 per file (BUFR), 38 per file (NetCDF)	749971	19 per file (BUFR), 36 per file (NetCDF)	705604	19 per file (BUFR), 36 per file (NetCDF)	602187	19 per file (BUFR), 36 per file (NetCDF)	636393
OSI-102-c	ASCAT-C 25 km	20 per file (BUFR), 24 per file (NetCDF)	340224	20 per file (BUFR), 24 per file (NetCDF)	602821	20 per file (BUFR), 24 per file (NetCDF)	721524	20 per file (BUFR), 25 per file (NetCDF)	645525	20 per file (BUFR), 25 per file (NetCDF)	550924	20 per file (BUFR), 25 per file (NetCDF)	590171
OSI-104	ASCAT-A Coastal												
OSI-114-a	HY-2B 25 km wind vectors	8 per file (BUFR), 15 per file (NetCDF)		8 per file (BUFR), 15 per file (NetCDF)		8 per file (BUFR), 15 per file (NetCDF)		6 per file (BUFR), 15 per file (NetCDF)		6 per file (BUFR), 15 per file (NetCDF)		6 per file (BUFR), 15 per file (NetCDF)	
OSI-114-b	HY-2B 50 km wind vectors	5 per file (BUFR), 15 per file (NetCDF)		5 per file (BUFR), 15 per file (NetCDF)		5 per file (BUFR), 15 per file (NetCDF)		3 per file (BUFR), 15 per file (NetCDF)		3 per file (BUFR), 15 per file (NetCDF)		3 per file (BUFR), 15 per file (NetCDF)	
OSI-115-a	HY-2C 25 km wind vectors	7 per file (BUFR), 16 per file (NetCDF)		7 per file (BUFR), 16 per file (NetCDF)		7 per file (BUFR), 16 per file (NetCDF)		6 per file (BUFR), 15 per file (NetCDF)		6 per file (BUFR), 15 per file (NetCDF)		6 per file (BUFR), 15 per file (NetCDF)	
OSI-115-b	HY-2C 50 km wind vectors	4 per file (BUFR), 16 per file (NetCDF)		4 per file (BUFR), 16 per file (NetCDF)		4 per file (BUFR), 16 per file (NetCDF)		2 per file (BUFR), 15 per file (NetCDF)		2 per file (BUFR), 15 per file (NetCDF)		2 per file (BUFR), 15 per file (NetCDF)	
OSI-104-b	ASCAT-B Coastal	9 per file (BUFR), 38 per file (NetCDF)	6540	9 per file (BUFR), 38 per file (NetCDF)	32945	9 per file (BUFR), 38 per file (NetCDF)	1981	9 per file (BUFR), 36 per file (NetCDF)	53244	9 per file (BUFR), 36 per file (NetCDF)	10190	9 per file (BUFR), 36 per file (NetCDF)	1502
OSI-104-c	ASCAT-C Coastal	11 per file (BUFR), 24 per file (NetCDF)	910	11 per file (BUFR), 24 per file (NetCDF)	11067	11 per file (BUFR), 24 per file (NetCDF)	1976	11 per file (BUFR), 25 per file (NetCDF)	10117	11 per file (BUFR), 25 per file (NetCDF)	40380	11 per file (BUFR), 25 per file (NetCDF)	1446

Table 55: Number of OSI SAF products downloaded from KNMI FTP server (average number) and PO.DAAC server (absolute number).

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 2nd 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 2nd half 2022.

Series	Item	Volume in MB	Number of files
OSI-410	F-16_OSICOL2_TST	4	2
OSI-401	F-17_OSICOGB_OPE	1	2
OSI-410	F-17_OSICOL2_TST	4	2
OSI-410	F-18_OSICOL2_TST	4	2
OSI-404	F-18_OSIEMGB_OPE	550	28
Daily OSI-305/OSI-306	GOES-13_ODDLISSI_OPE		88
Hourly OSI-305/OSI-306	GOES-13_OHDLISSI_OPE	59772	2093
OSI-306	GOES-13_OSIHSSI_OPE	167	24
Daily OSI-305/OSI-306	GOES-16_ODDLISSI_OPE	26	1709
Hourly OSI-305/OSI-306	GOES-16_OHDLISSI_OPE	136584	13753
OSI-207	GOES-16_OSIHSSTN_OPE	4240	382
OSI-408	GW-1_OSICOAMSRGB_OPE	33510	3140
OSI-102-b	M01_OAS025_OPE	53439	9326
OSI-104-b	M01_OASWC12_OPE	262997	33772
OSI-407	M01_OMRSIDRN_OPE	2	1
OSI-201	M01_OSSTGLB_OPE	154602	1294
OSI-201	M01_OSSTGLBN_OPE	216	6
OSI-205	M01_OSSTIST2_OPE	465542	42851
OSI-203	M01_OSSTIST3A_OPE	963	68
OSI-202	M01_OSSTNARN_OPE	2571	114

Series	Item	Volume in MB	Number of files
OSI-104-a	M02_OAS012_OPE	418	133
OSI-102-a	M02_OAS025_OPE	52466	8826
OSI-104-a	M02_OASW012_OPE	27	9
OSI-102-a	M02_OASW025_OPE	4	2
OSI-104-a	M02_OASWC12_OPE	227588	33428
OSI-201	M02_OSSTGLB_OPE	239046	10576
OSI-102-c	M03_OAS025_OPE	52834	5343
OSI-104-c	M03_OASWC12_OPE	75401	7857
OSI-401	MML_OSICOGBN_OPE	141661	8142
OSI-405	MML_OSIDRGB_OPE	183	266
OSI-402	MML_OSIEDGBN_OPE	1838	858
OSI-403	MML_OSITYGBN_OPE	17792	3792
OSI-206	MSG1_OSIHSST_OPE	127811	564
Daily OSI-303/OSI-304	MSG2_ODDLISSI_OPE		14
Hourly OSI-303/OSI-304	MSG2_OHDLISSI_OPE	50036	359
Hourly OSI-304	MSG2_OSIHSSI_OPE	4953	711
OSI-206	MSG2_OSIHSST_OPE	128207	703
OSI-206	MSG2_OSIHSSTN_OPE	119530	334
Daily OSI-303/OSI-304	MSG3_OHDLISSI_OPE	59761	3700
Daily OSI-304	MSG3_OSIDSSI_OPE	12	1
Houry OSI-304	MSG3_OSIHSSI_OPE	100	9
OSI-206	MSG3_OSIHSST_OPE	172688	33942
OSI-206	MSG3_OSIHSSTN_OPE	158090	9989
Daily OSI-303/OSI-304	MSG4_ODDLISSI_OPE	559	761
Hourly OSI-303/OSI-304	MSG4_OHDLISSI_OPE	145539	12885
OSI-206	MSG4_OSIHSSTN_OPE	370310	31990
OSI-202	N17_OSSTMORI_OPE	3339	9714
	N18_OSSTMORI_OPE	3339	5970
	N20_OSSTNARN_OPE	1295	72
	NPP_OSSTIST2B_OPE	75156	438
	NPP_OSSTNARN_OPE	802	44
OSI-112-a	SCATSAT1_OSSW025_OPE	87544	25222
OSI-112-b	SCATSAT1_OSSW050_OPE	2412	402

Table 57: Volume of data downloaded (in MB) by products from EDC over 2nd half 2022.

Ingestion Summary over the 2nd 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	JUL 2022	AUG 2022	SEP 2022	OCT 2022	NOV 2022	DEC 2022
OSI-410	Level 2 PMW sea ice concentration (DMSP-F16)	99.3	100	100	100	95.0	99.7
OSI-410	Level 2 PMW sea ice concentration (DMSP-F17)	98.6	99.5	98.8	100	94.0	98.1
OSI-410	Level 2 PMW sea ice concentration (DMSP-F18)	98.1	96.5	97.8	100	92.6	99.0
OSI-404	Global Sea Ice Emissivity (DMSP-F18)	100	100	100	100	96.6	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	100	100	100	99.8
OSI-306-b	Hourly Surface Solar Irradiance (GOES-16)						
OSI-207-b	Hourly Sea Surface Temperature (GOES-16)	100	99.8	99.7	100	100	99.8
OSI-408	Sea Ice Concentration (AMSR-2)	100	100	100	100	100	100
OSI-410	Level 2 PMW sea ice concentration (AMSR-2)	100	100	100	100	100	100
OSI-102-b	ASCAT 25km Wind (Metop-B)	100	100	100	100	100	100
OSI-104-b	ASCAT 12.5km Coastal Wind (Metop-B)	100	100	100	100	100	100
OSI-407-a	Sea Ice Drift (Metop-B)	100	99.1	100	100	99.1	97.6
OSI-201-b	Global Sea Surface Temperature (Metop-B)	100	100	100	100	100	100
OSI-205-a	SST/IST L2 (Metop-B)	100	100	100	100	100	100
OSI-203-a	SST/IST L3 (Metop-B)	100	100	100	100	98.3	100
OSI-202-c	NAR Sea Surface Temperature (Metop-B)	100	100	100	100	100	100
OSI-102-c	ASCAT 25 km Wind (Metop-C)	100	100	100	100	100	100
OSI-104-c	ASCAT 12.5 km Coastal Wind (Metop-C)	100	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-401-b	Global Sea Ice Concentration (Multi Mission)	100	100	100	100	96.6	100
OSI-405-c	Global Low Resolution Sea Ice Drift	100	100	100	100	100	96.7
OSI-402-d	Global Sea Ice Edge (Multi Mission)	100	100	100	100	100	100
OSI-403-d	Global Sea Ice Type (Multi Mission)	100	100	100	100	100	100
OSI-206-a	Hourly Sea Surface Temperature (MSG)	99.8	100	100	100	100	100
OSI-303-a	Daily Downward Longwave Irradiance (MSG)	100	100	100	100	100	100
OSI-304-a	Daily Surface Solar Irradiance (MSG)						
OSI-303-a	Hourly Downward Longwave Irradiance (MSG)	100	100	100	100	100	100
OSI-304-a	Hourly Surface Solar Irradiance (MSG)						

Product id.	Product name	JUL 2022	AUG 2022	SEP 2022	OCT 2022	NOV 2022	DEC 2022
OSI-202-c	NAR Sea Surface Temperature (NOAA-20)	0	100	100	0	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						
OSI-205-b	SST/IST L2 (NPP)	84.5	23.9	100	100	100	100
OSI-203-b	SST/IST L3 (NPP)	82.2	27.4	100	100	100	100

Table 58: Percentage of received OSI SAF products in EDC in 2nd half 2022

Comments:
See section 3 for the explanations of low percentages.

7. Recent publications

Grieco, G., A. Stoffelen, A. Verhoef, J. Vogelzang and M. Portabella, Analysis of Data-Derived SeaWinds Normalized Radar Cross-Section Noise
Remote Sens., 2022, **14**, 21, 5444, doi:10.3390/rs14215444.

Vogelzang, J. and A. Stoffelen, On the Accuracy and Consistency of Quintuple Collocation Analysis of In Situ, Scatterometer, and NWP Winds
Remote Sens., 2022, **14**, 18, 4552, doi:10.3390/rs14184552.

Vogelzang, J., A. Stoffelen and A. Verhoef, The Effect of Error Non-Orthogonality on Triple Collocation Analyses
Remote Sens., 2022, **14**, 17, 4268, doi:10.3390/rs14174268.

Li, Z., A. Stoffelen and A. Verhoef, Bayesian Sea Ice Detection Algorithm for CFOSAT
Remote Sens., 2022, **14**, 15, 3569, doi:10.3390/rs14153569.