# Half-Yearly Operations Report

1st half 2023

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

# Document Change record

| Document version | Date | Author | Change description |
|---|---|---|---|
| 0.1 | 22/06/2023 | CH | Template provided to OSI SAF partners |
| 1.0 | 30/08/2023 | CH | Missing Low resolution sea-ice drift (OSI-405-c) report |
| 1.1 | 21/12/2023 | CH | OSI-410 replaced by OSI-410-a everywhere<br>OSI-401-b replaced by OSI-401-d everywhere<br>OSI-408 replaced by OSI-408-a everywhere<br>Number of helpdesk requests at HL subsystem added<br><br>Update after the OSI SAF Operations Review in november 2023:<br>• RID 008: if target accuracy requirements are exceeded, it is now highlighted in red in a consistent way<br>• RID 006: links updated in 5.1.X to direct to monthly maps and validation report<br>• RID 010: link to the list of pyrgeometer stations updated<br>• RID 001: reference to CDOP 3 in the SeSp title has been removed<br>• RID 021: identifiers of old/new products added in the availability tables, when there was a switch during the 6 months. The date of the switches are already indicated in section 4.<br>• RID 011 and RID 030, links updated in the section about radiative fluxes and sea-ice quality assessement<br>• RID 032: inconsistency about F17/F18 corrected for OSI-405-c<br>• RID 012: AHL DLI mean diff margins corrected.<br>• RID 037: LR SIDR (OSI-405-c) results added<br>• RID 002: section about the provision of sea-ice products within 5 hours removed from section 2.<br>• RID 034: Emissivity (OSI-404-a) updated figure legend.<br>• RID 013: OSI-410-a section 5.3.1: All figures and comments have been corrected and updated, following operations review comments.<br>• RID 014: text updated in the section about wind products being compared to ECMWF model winds<br>• RID 019: lines for ScatSat-1 wind vectors (OSI-112-a and OSI-112-b) removed from table 53 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.<br>• RID 024: Table 53 caption updated to include that KNMI FTP values provides an average and the PO.DAAC values reflects the absolute number of downloads. |

## Table of contents

# 1. Introduction

## 1.1. Scope of the document

The present report covers from 1st of January to 30 June 2023.

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 2.03, 21 March 2023

## 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] ScatSat-1 wind Product User Manual
OSI-112-a, OSI-112-b (discontinued)
SAF/OSI/CDOP2/KNMI/TEC/MA/287

[RD.3] 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.4] ASCAT L2 winds Data Record Product User Manual
OSI-150-a, OSI-150-b
SAF/OSI/CDOP2/KNMI/TEC/MA/238

[RD.5] Product User Manual (PUM) for the Ku-band wind data records
SeaWinds, Oceansat-2, RapidScat (ISS)
OSI-151-c, OSI-151-d, OSI-153-c, OSI-153-d, OSI-159-a, OSI-159-b
SAF/OSI/CDOP3/KNMI/TEC/MA/414

[RD.6] ERS L2 winds Data Record Product User Manual
OSI-152
SAF/OSI/CDOP2/KNMI/TEC/MA/279

[RD.7] 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.8]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.9]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.10]Geostationary Sea Surface Temperature Product User Manual
OSI-206-a, OSI-207-b, OSI-IO-SST
SAF/OSI/CDOP3/MF/TEC/MA/181

[RD.11]MSG/SEVIRI Sea Surface Temperature data record Product User Manual
OSI-250
SAF/OSI/CDOP3/MF/TEC/MA/309

[RD.12]Product User Manual for Atlantic High Latitudes level 3 Radiative Flux products
OSI-301-c, OSI-302-c
SAF/OSI/CDOP3/MET-Norway/TEC/MA/373

[RD.13]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.14]Product User Manual for Global Sea Ice Concentration Level 2 and Level 3
OSI-410-a, OSI-401-d, OSI-408-a
OSISAF/DMI/PUM/421

[RD.15]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.16]50 Ghz Sea Ice Emissivity Product User Manual
OSI-404-a
SAF/OSI/CDOP3/DMI/TEC/MA/191

[RD.17]Low Resolution Sea Ice Drift Product User's Manual
OSI-405-c
SAF/OSI/CDOP/met.no/TEC/MA/128

[RD.18]Medium Resolution Sea Ice Drift Product User Manual
OSI-407-a
SAF/OSI/CDOP/DMI/TEC/MA/137

[RD.19]Product User Manual for the Sea Ice Index, version 2.2
OSI SAF SII (OSI-420)
SAF/OSI/CDOP3/MET-Norway/TEC/MA/387

[RD.20]Global Sea Ice Concentration Climate Data Records Product User Manual
OSI-450-a, OSI-430-a, OSI-458
SAF/OSI/CDOP3/MET/TEC/MA/288

[RD.21] Product User's Manual for the Global Sea Ice Drift Climate Data Record v1
OSI-455
SAF/OSI/CDOP3/MET/TEC/MA/418

## 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 | JAN 2023 | FEB 2023 | MAR 2023 | APR 2023 | MAY 2023 | JUN 2023 |
|---|---|---|---|---|---|---|---|
| OSI-102-b | ASCAT-B 25 km wind | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-102-c | ASCAT-C 25 km wind | 100 | 100 | 100 | 100 | 99.9 | 99.9 |
| OSI-104-b | ASCAT-B Coastal wind | 99.9 | 99.9 | 99.9 | 100 | 100 | 100 |
| OSI-104-c | ASCAT-C Coastal wind | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 |
| OSI-114-a | HY-2B 25 km wind vectors | 96.0 | 98.7 | 99.1 | 99.3 | 97.9 | 96.8 |
| OSI-114-b | HY-2B 50 km wind vectors | 96.2 | 98.7 | 99.1 | 99.3 | 97.9 | 96.8 |
| OSI-115-a | HY-2C 25 km wind vectors | 99.3 | 100 | 99.0 | 99.8 | 97.9 | 97.5 |
| OSI-115-b | HY-2C 50 km wind vectors | 99.3 | 99.7 | 99.0 | 99.8 | 98.1 | 97.5 |
| OSI-201-b | GBL SST | 100 | 98.2 | 95.2 | 100 | 100 | 98.3 |
| OSI-202-c | NAR SST | 100 | 99.1 | 94.4 | 100 | 100 | 98.3 |
| OSI-203-a | NHL SST/IST (L3) | 100 | 100 | 100 | 98.2 | 100 | 100 |
| OSI-203-b | NHL SST/IST (L3) | 100 | 100 | 100 | 98.2 | 100 | 100 |
| OSI-204-b | MGR SST (Metop-B) | 99.8 | 99.6 | 94.4 | 99.6 | 99.7 | 98.4 |
| OSI-204-c | MGR SST (Metop-C) | 99.5 | 99.5 | 94.4 | 99.6 | 99.8 | 98.7 |
| OSI-205-a | SST/IST (L2) | 100 | 100 | 100 | 98.7 | 98.3 | 100 |
| OSI-205-b | SST/IST (L2) | 100 | 98.5 | 100 | 100 | 99.1 | 100 |
| OSI-206-a | Meteosat SST | 99.6 | 99.1 | 93.8 | 99.4 | 99.7 | 98.1 |
| OSI-207-b | GOES-East SST | 99.5 | 99.4 | 94.4 | 99.6 | 99.6 | 98.5 |
| OSI-208-b | IASI SST | 99.4 | 99.4 | 94.1 | 99.5 | 99.9 | 98.1 |
| OSI-301-b/c<br>OSI-302-b/c | AHL DLI + SSI | 100 | 100 | 100 | 100 | 96.8 | 100 |
| OSI-303-a | Meteosat DLI - hourly | 100 | 99.6 | 94.2 | 99.7 | 99.9 | 98.3 |
| | Meteosat DLI - daily | 100 | 96.4 | 93.5 | 100 | 100 | 100 |
| OSI-304-a | Meteosat SSI - hourly | 100 | 99.6 | 94.2 | 99.7 | 99.9 | 98.3 |
| | Meteosat SSI - daily | 100 | 96.4 | 93.5 | 100 | 100 | 100 |
| OSI-305-b | GOES-East DLI - hourly | 100 | 99.6 | 94.4 | 99.6 | 100 | 98.3 |
| | GOES-East DLI - daily | 100 | 96.4 | 93.5 | 100 | 100 | 100 |
| OSI-306-b | GOES-East SSI - hourly | 100 | 99.6 | 94.4 | 99.6 | 100 | 98.3 |
| | GOES-East SSI - daily | 100 | 96.4 | 93.5 | 100 | 100 | 100 |
| OSI-401-b/d | Global Sea Ice Concentration (SSMIS) | 100 | 100 | 100 | 96.4 | 100 | 100 |
| OSI-402-d | Global Sea Ice Edge | 100 | 96.7 | 96.8 | 100 | 100 | 100 |
| OSI-403-d | Global Sea Ice Type | 100 | 96.7 | 96.8 | 100 | 100 | 100 |
| OSI-404-a | Global Sea Ice Emissivity | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-405-c | Low Res. Sea Ice Drift | 100 | 96.7 | 100 | 100 | 100 | 100 |
| OSI-407-a | Medium Res. Sea Ice Drift | 100 | 100 | 100 | 99.1 | 100 | 100 |
| OSI-408/-a | Global Sea Ice Concentration (AMSR-2) | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-410/-a | Level 2 PMW sea ice concentration | 98.7 | 99.2 | 99.3 | 97.4 | 98.9 | 99.1 |
| OSI-430-b | Global Reproc Sea Ice Conc Updates | 100 | 100 | 100 | 100 | 100 | 100 |

**Table 1: Percentage of OSI SAF products available on the OSI SAF FTP servers within the specified time over 1st half 2023.**

Comment: For the low availability of products on the LML FTP server in March, see section 4 below.

## 2.2. Availability via EUMETCast

| Ref. | Product | JAN 2023 | FEB 2023 | MAR 2023 | APR 2023 | MAY 2023 | JUN 2023 |
|---|---|---|---|---|---|---|---|
| OSI-102-b | ASCAT-B 25 km wind | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-102-c | ASCAT-C 25 km wind | 100 | 100 | 100 | 100 | 99.9 | 99.9 |
| OSI-104-b | ASCAT-B Coastal wind | 99.9 | 99.9 | 99.9 | 100 | 100 | 100 |
| OSI-104-c | ASCAT-C Coastal wind | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 | 99.9 |
| OSI-114-a | HY-2B 25 km wind vectors | 96.0 | 98.7 | 99.1 | 99.3 | 97.9 | 96.8 |
| OSI-114-b | HY-2B 50 km wind vectors | 96.2 | 98.7 | 99.1 | 99.3 | 97.9 | 96.8 |
| OSI-115-a | HY-2C 25 km wind vectors | 99.3 | 100 | 99.0 | 99.8 | 97.9 | 97.5 |
| OSI-115-b | HY-2C 50 km wind vectors | 99.3 | 99.7 | 99.0 | 99.8 | 98.1 | 97.5 |
| OSI-201-b | GBL SST | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-202-c | NAR SST | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-203-a | NHL SST/IST (L3) | 100 | 96.4 | 100 | 98.3 | 96.8 | 98.3 |
| OSI-203-b | NHL SST/IST (L3) | 100 | 96.4 | 100 | 100 | 96.8 | 96.7 |
| OSI-204-b | MGR SST (Metop-B) | 100 | 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 | 100 | 99.4 | 99.6 | 100 |
| OSI-205-b | SST/IST (L2) | 99.1 | 99.2 | 99.3 | 98.6 | 97.0 | 100 |
| OSI-206-a | Meteosat SST | 100 | 99.7 | 99.9 | 99.9 | 100 | 99.9 |
| OSI-207-b | GOES-East SST | 100 | 100 | 100 | 100 | 100 | 99.9 |
| OSI-208-b | IASI SST | 99.9 | 99.9 | 100 | 100 | 100 | 99.8 |
| OSI-301-b/c<br>OSI-302-b/c | AHL DLI + SSI | 100 | 100 | 100 | 100 | 96.8 | 100 |
| OSI-303-a | Meteosat DLI - hourly | 100 | 100 | 100 | 100 | 100 | 100 |
| | Meteosat DLI - daily | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-304-a | Meteosat SSI - hourly | 100 | 100 | 100 | 100 | 100 | 100 |
| | Meteosat SSI - daily | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-305-b | GOES-East DLI - hourly | 100 | 100 | 100 | 100 | 100 | 99.9 |
| | GOES-East DLI - daily | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-306-b | GOES-East SSI - hourly | 100 | 100 | 100 | 100 | 100 | 100 |
| | GOES-East SSI - daily | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-401-b/d | Global Sea Ice Concentration (SSMIS) | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-402-d | Global Sea Ice Edge | 100 | 96.4 | 96.8 | 100 | 96.8 | 100 |
| OSI-403-d | Global Sea Ice Type | 100 | 96.4 | 96.8 | 100 | 96.8 | 98.3 |
| OSI-404-a | Global Sea Ice Emissivity | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-405-c | Low Res. Sea Ice Drift | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-407-a | Medium Res. Sea Ice Drift | 100 | 96.4 | 96.8 | 100 | 96.8 | 100 |
| OSI-408/-a | Global Sea Ice Concentration (AMSR-2) | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-410/-a | Level 2 PMW sea ice concentration | 98.6 | 99.2 | 99.3 | 97.4 | 98.8 | 99.2 |

**Table 2: Percentage of OSI SAF products delivered via EUMETCast within the specified time over 1st half 2023.**

# 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 |
|---|---|---|---|
| 12 May | Ifremer receiving services unavailable | Ifremer ftp server were unstable from 6h10 to 8h50 preventing CMS to push new data. | A reboot of ftp server solved the issue |
| 1st June | Ifremer receiving services unavailable | Due to an error from a partner, the disk space was saturated preventing CMS to push new data from 3h00 to 9h00 UTC | Data transfer and reboot of services |
| 19 June | All product missing from 07 to 14 UTC | IFREMER FTP server update | Available late |

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

| Date | Impacted products or services | Anomaly | Corrective and preventive measures |
|---|---|---|---|
| 12 April | All sea ice products on FTP | MET Norway FTP server unavailable between 11 and 13 UTC due to internal network outage | Fixed network issue |
| 22 – 23 April | All DMI products and L3 AVHRR SST/IST | Due to an outage of the operational vmware system at DMI no products were produced between 22/4 15:16 UTC and 23/4 13:00 UTC. | Users were informed |

## 3.3. At Wind subsystem (KNMI)

Nothing to report here over the past half year.

# 4. Main events and modifications, maintenance activities

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

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

| Date | Impacted products or services | Events and modifications, maintenance activities |
|---|---|---|
| 21 march | OSI-206/303/304 series | Swap from Meteosat-11 to Meteosat-10 |
| 29-30 march | All LML products | Due to a maintenance on the IFREMER LML FTP server, all OSI SAF LML products have been unavailable from 2023-03-29T04:00Z to 2023-03-30T0755Z. |

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

| Date | Impacted products or services | Events and modifications, maintenance activities |
|---|---|---|
| 25 April | L2 and L3 SIC products (OSI-401, OSI-408, OSI-410 series) | Switch to new upgraded products. |
| 25 May | OSI-301/302 series | Switch from OSI-301/302-b to OSI-301/302-c |

## 4.3. At Wind subsystem (KNMI)

Nothing to report here over the past half year.

## 4.4. Release of software and new data records & ICDR

Version 4.0 of the OSI SAF Pencil beam scatterometer Wind Processor (PenWP) has been released on 16 February.

# 5. OSI SAF products quality

## 5.1. SST quality

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

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

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

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

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

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

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

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

<u>Robust statistics</u>
In the following, for the LML SST products (OSI-206-a, OSI-207-b, OSI-IO-SST, OSI-202-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.

On the 21 March 2023, Meteosat-10 replaced Meteosat-11 as prime operational satellite in Meteosat 0° position. The OSI SAF Meteosat SST product kept the same identifier but the switch implied some changes in the file names and metadata. The netCDF global attribute file_quality_level has been set to 0 (unknown quality) until the quality is assessed and validated by the OSI SAF team.
The following maps show the difference between the satellite SST and the insitu SST first on the periode from the 1$^{st}$ of January to the 21$^{st}$ of March with Meteosat-11, and below from the 22$^{nd}$ of March to the 30$^{th}$ of June with Meteosat-10.

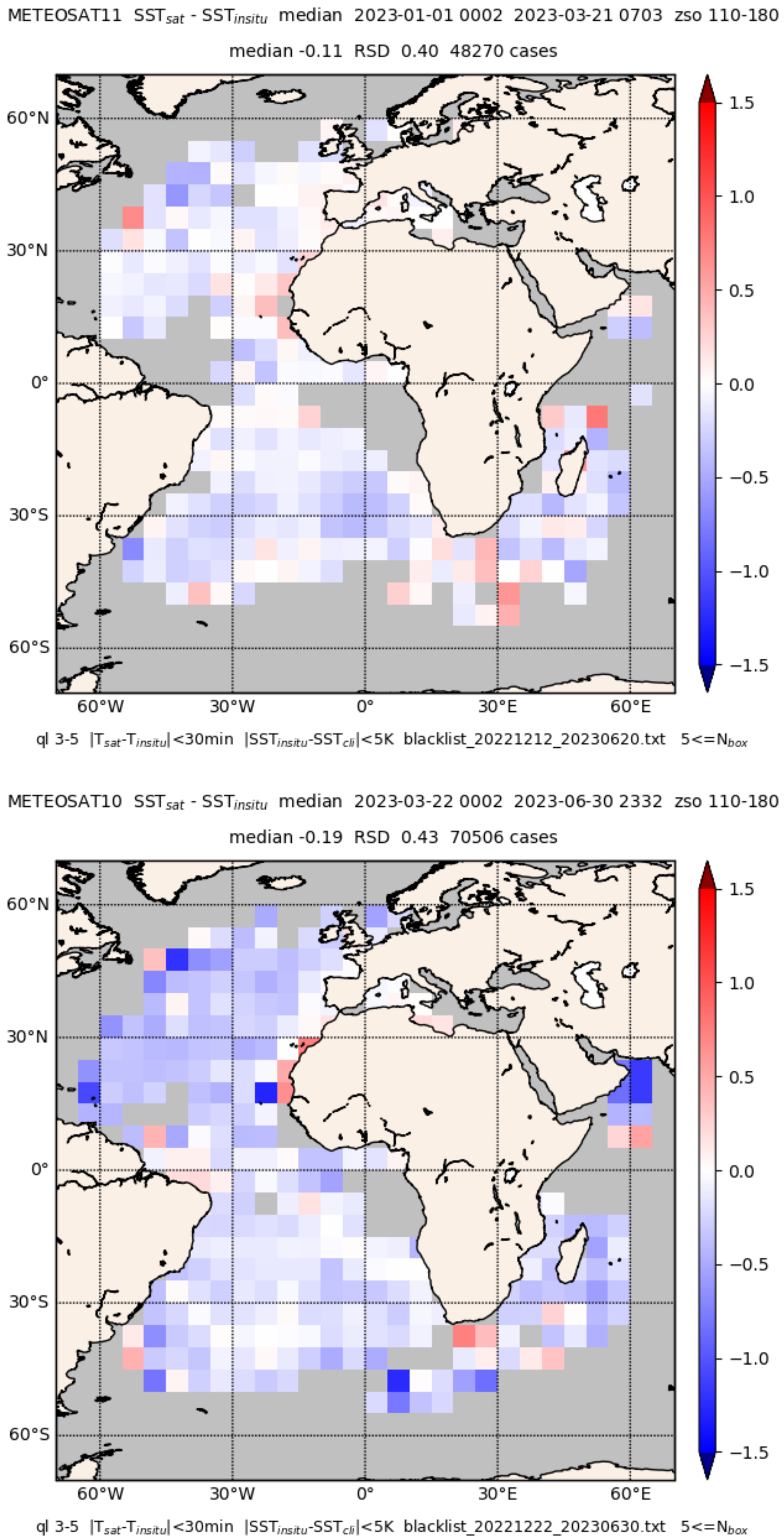


**Figure 1: Meteosat night-time SST median difference with respect to buoys measurements for quality level 3,4,5**

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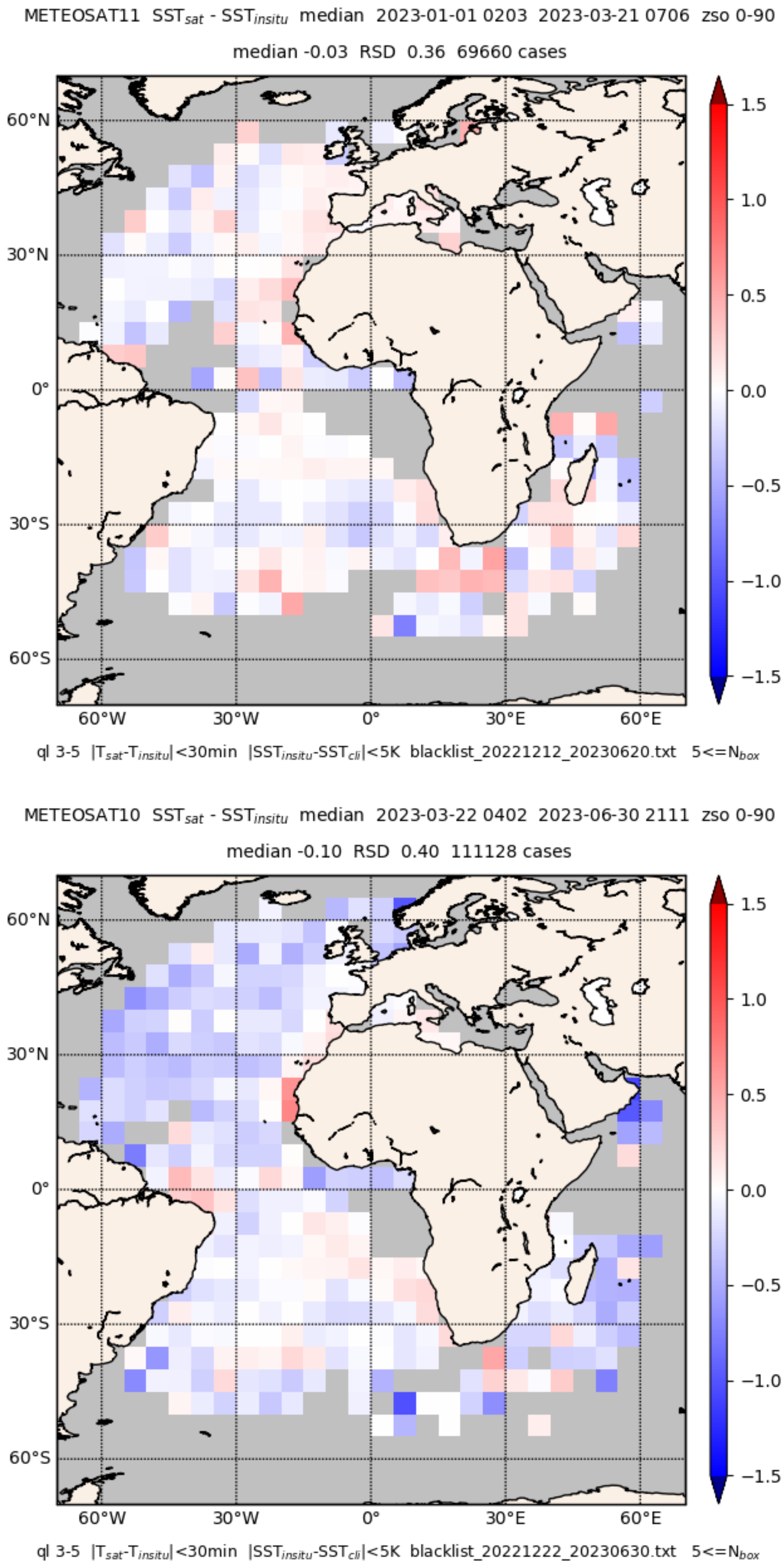


**Figure 2: Meteosat day-time SST median difference with respect to buoys measurements for quality level 3,4,5**

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

| Meteosat night-time SST quality results over 1st half 2023 | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 0.5 K) | SD in K (req.: 1 K) | Median in K | RSD in K |
| JAN 2023 | 17273 | -0.14 | 0.43 | -0.11 | 0.40 |
| FEB 2023 | 17469 | -0.14 | 0.43 | -0.11 | 0.39 |
| MAR 2023 | 13528 | -0.11 | 0.45 | -0.09 | 0.41 |
| APR 2023 | 21403 | -0.22 | 0.46 | -0.18 | 0.42 |
| MAY 2023 | 19924 | -0.23 | 0.47 | -0.19 | 0.43 |
| JUN 2023 | 21196 | -0.20 | 0.50 | -0.18 | 0.44 |
| Meteosat day-time SST quality results over 1st half 2023 | | | | | |
| JAN 2023 | 26012 | -0.07 | 0.41 | -0.04 | 0.36 |
| FEB 2023 | 25755 | -0.07 | 0.41 | -0.04 | 0.36 |
| MAR 2023 | 17893 | -0.02 | 0.42 | 0.01 | 0.36 |
| APR 2023 | 30986 | -0.15 | 0.45 | -0.09 | 0.39 |
| MAY 2023 | 34658 | -0.17 | 0.47 | -0.11 | 0.40 |
| JUN 2023 | 34604 | -0.14 | 0.52 | -0.11 | 0.43 |

**Table 3: Meteosat SST quality results over 1st half 2023, for 3, 4, 5 quality indexes.**

Comments:
The maps and table do not show exactly the same data: the cases from 22 to 31 March are in the map but not in the table.
The number of cases in the map for Meteosat-11 (1st of January to 21 March) is the same as the number of cases for January-February-March in the table.
But the number of cases in the map for Meteosat-10 (22 March to 31 June) is higher than the number of cases for April-May-June in the table.

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.

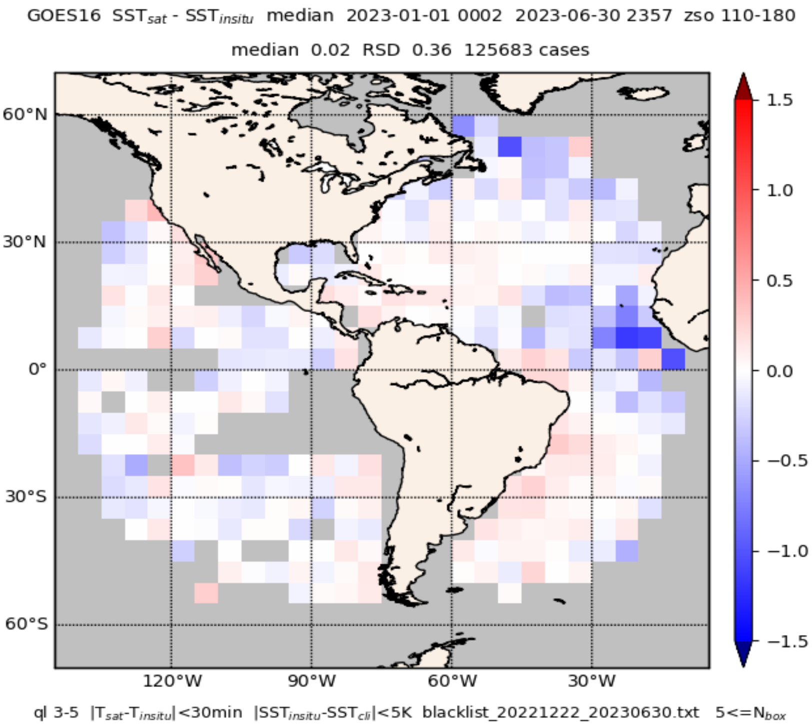


**Figure 3: GOES-East night-time SST median difference with respect to buoys measurements for quality level 3,4,5**

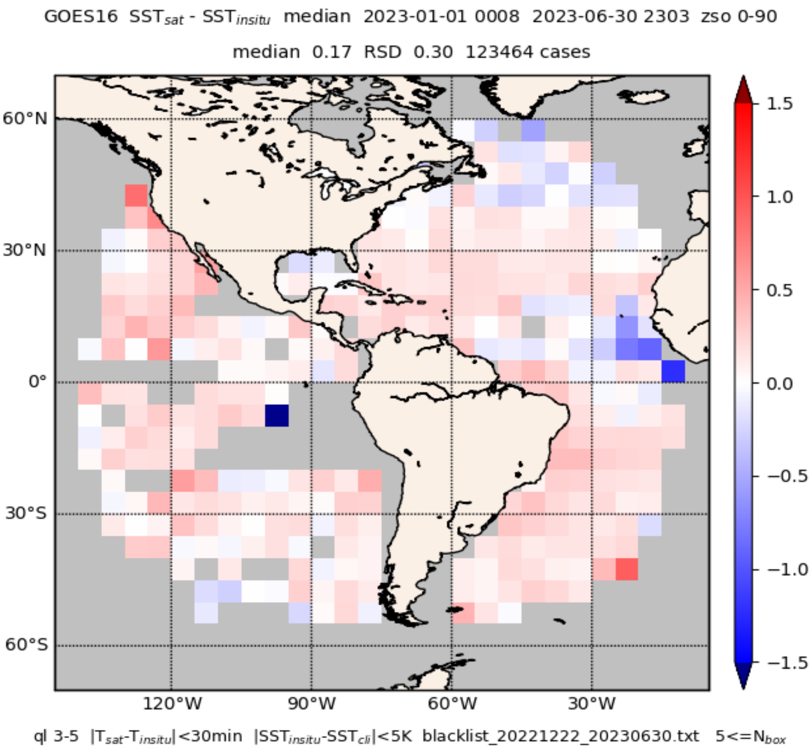


**Figure 4: GOES-East day-time SST median difference with respect to buoys measurements for quality level 3,4,5**

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

| Month | Number of cases | Mean diff. in K (req.: ± 0.5 K) | SD in K (req.: 1 K) | Median in K | RSD in K |
|---|---|---|---|---|---|
| GOES-East night-time SST quality results 1st half 2023 | | | | | |
| JAN 2023 | 23383 | -0.01 | 0.42 | 0.04 | 0.35 |
| FEB 2023 | 19095 | 0.01 | 0.39 | 0.05 | 0.33 |
| MAR 2023 | 24687 | -0.02 | 0.41 | 0.02 | 0.36 |
| APR 2023 | 19884 | -0.02 | 0.40 | 0.02 | 0.35 |
| MAY 2023 | 18547 | -0.06 | 0.43 | -0.02 | 0.38 |
| JUN 2023 | 20087 | -0.06 | 0.44 | 0.00 | 0.39 |
| GOES-East day-time SST quality results 1st half 2023 | | | | | |
| JAN 2023 | 20844 | 0.14 | 0.38 | 0.17 | 0.30 |
| FEB 2023 | 18303 | 0.17 | 0.34 | 0.19 | 0.27 |
| MAR 2023 | 24797 | 0.15 | 0.36 | 0.17 | 0.28 |
| APR 2023 | 18770 | 0.15 | 0.35 | 0.18 | 0.27 |
| MAY 2023 | 20506 | 0.08 | 0.42 | 0.12 | 0.34 |
| JUN 2023 | 20244 | 0.09 | 0.41 | 0.14 | 0.33 |

**Table 4: GOES-East SST quality results over 1st half 2023, 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.

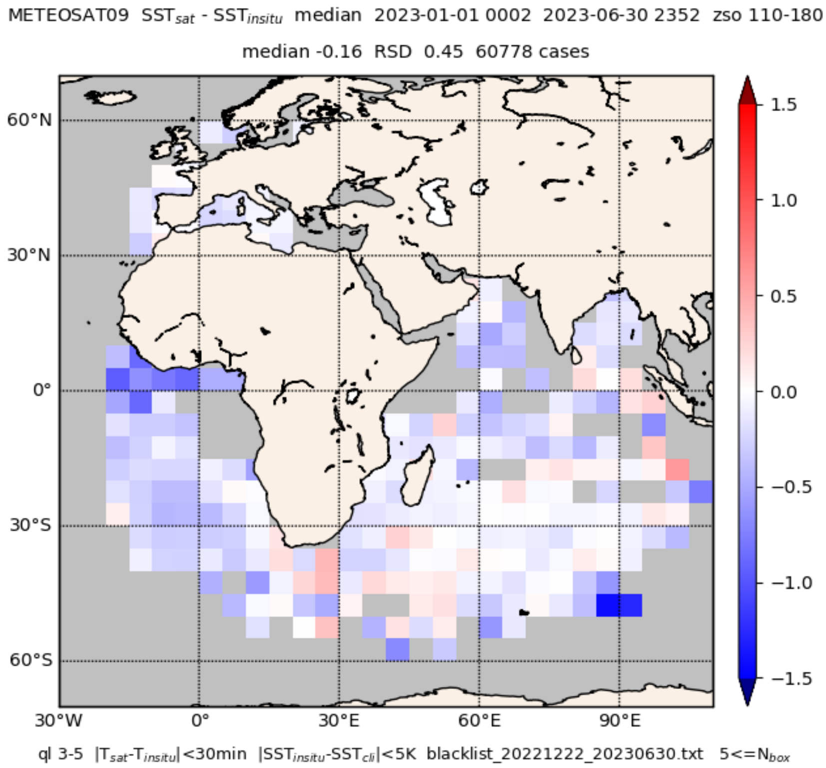


**Figure 5: Meteosat Indian Ocean night-time SST median difference with respect to buoys measurements for quality level 3,4,5**

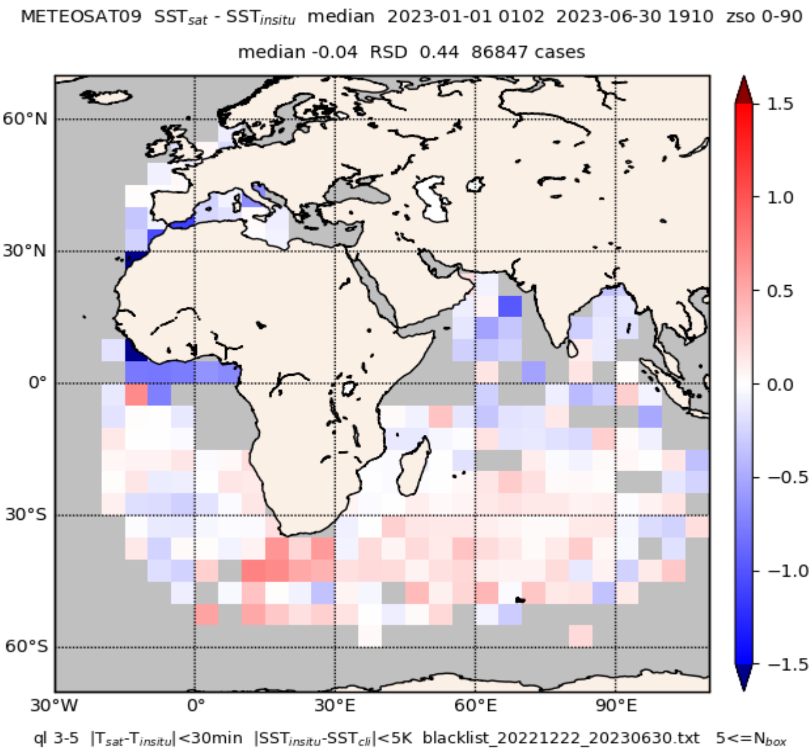


**Figure 6: Meteosat Indian Ocean day-time SST median difference with respect to buoys measurements for quality level 3,4,5**

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 1st half 2023 | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 0.5 K) | SD in K (req.: 1 K) | Median in K | RSD in K |
| JAN 2023 | 6852 | -0.30 | 0.53 | -0.26 | 0.51 |
| FEB 2023 | 8273 | -0.21 | 0.48 | -0.16 | 0.42 |
| MAR 2023 | 9471 | -0.21 | 0.49 | -0.17 | 0.45 |
| APR 2023 | 11958 | -0.20 | 0.47 | -0.15 | 0.43 |
| MAY 2023 | 12966 | -0.20 | 0.54 | -0.13 | 0.46 |
| JUN 2023 | 11258 | -0.20 | 0.50 | -0.13 | 0.43 |
| Meteosat Indian Ocean day-time SST quality results over 1st half 2023 | | | | | |
| JAN 2023 | 12867 | 0.09 | 0.57 | 0.13 | 0.47 |
| FEB 2023 | 13249 | -0.11 | 0.47 | -0.08 | 0.42 |
| MAR 2023 | 12206 | -0.07 | 0.45 | -0.03 | 0.39 |
| APR 2023 | 15020 | -0.08 | 0.44 | -0.05 | 0.39 |
| MAY 2023 | 19242 | -0.19 | 0.60 | -0.07 | 0.52 |
| JUN 2023 | 14263 | -0.14 | 0.50 | -0.08 | 0.43 |

**Table 5: Meteosat Indian Ocean SST quality results over 1st half 2023, 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.

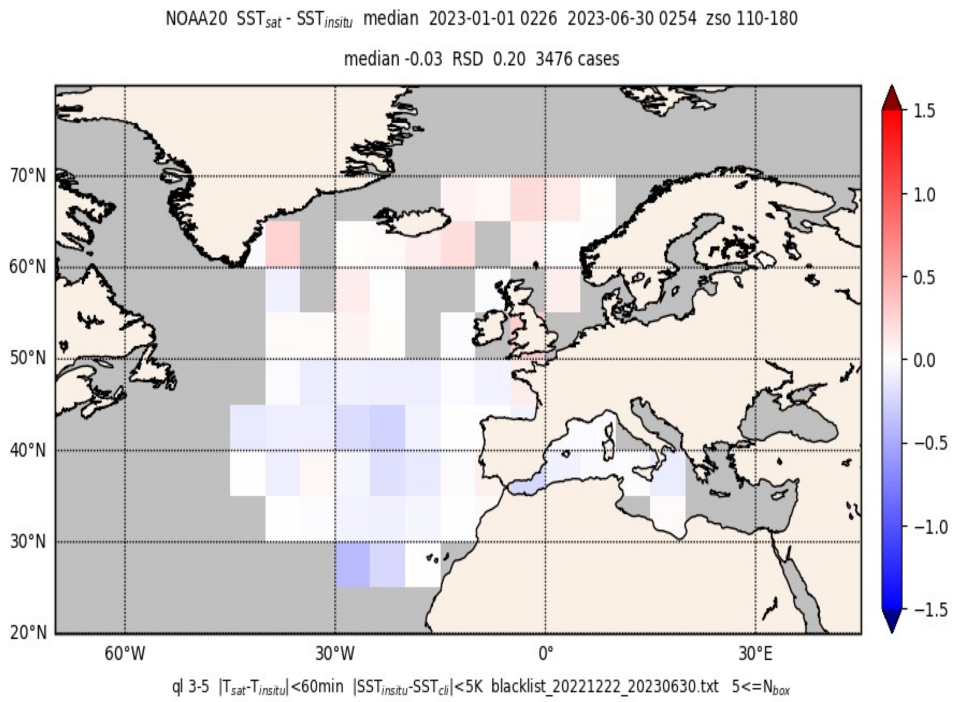


**Figure 7: NOAA-20 NAR night-time SST median difference with respect to buoys measurements for quality level 3,4,5**

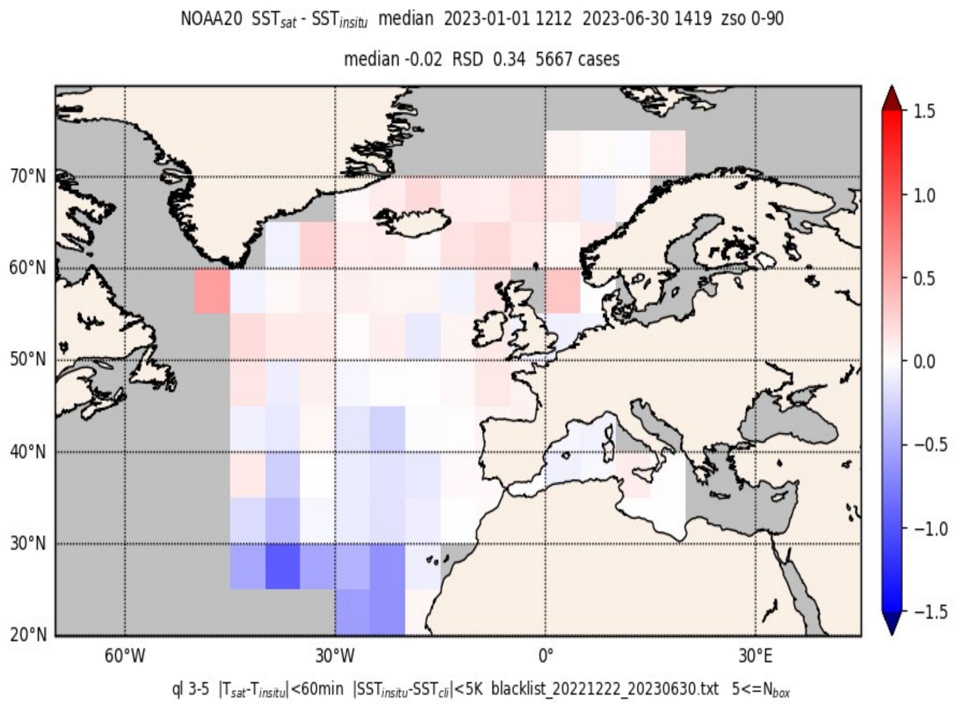


**Figure 8: NOAA-20 NAR day-time SST median difference with respect to buoys measurements for quality level 3,4,5**

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

| Month | Number of cases | Mean diff. in K (req.: ± 0.5 K) | SD in K (req.: 0.8 K) | Median in K | RSD in K |
|---|---|---|---|---|---|
| NOAA-20 NAR night-time SST quality results over 1st half 2023 | | | | | |
| JAN 2023 | 405 | -0.01 | 0.28 | 0.02 | 0.16 |
| FEB 2023 | 430 | -0.04 | 0.22 | -0.01 | 0.16 |
| MAR 2023 | 477 | -0.06 | 0.30 | -0.03 | 0.22 |
| APR 2023 | 711 | -0.07 | 0.25 | -0.03 | 0.19 |
| MAY 2023 | 784 | -0.15 | 0.27 | -0.09 | 0.20 |
| JUN 2023 | 669 | -0.06 | 0.33 | 0.00 | 0.24 |
| NOAA-20 NAR day-time SST quality results over 1st half 2023 | | | | | |
| JAN 2023 | 464 | 0.01 | 0.36 | 0.04 | 0.23 |
| FEB 2023 | 437 | 0.03 | 0.39 | 0.05 | 0.25 |
| MAR 2023 | 670 | -0.02 | 0.49 | 0.08 | 0.29 |
| APR 2023 | 1088 | -0.07 | 0.45 | 0.02 | 0.31 |
| MAY 2023 | 1507 | -0.18 | 0.51 | -0.10 | 0.33 |
| JUN 2023 | 1501 | -0.12 | 0.56 | -0.07 | 0.42 |

**Table 6: Quality results for NOAA-20 NAR SST over 1st half 2023, 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.

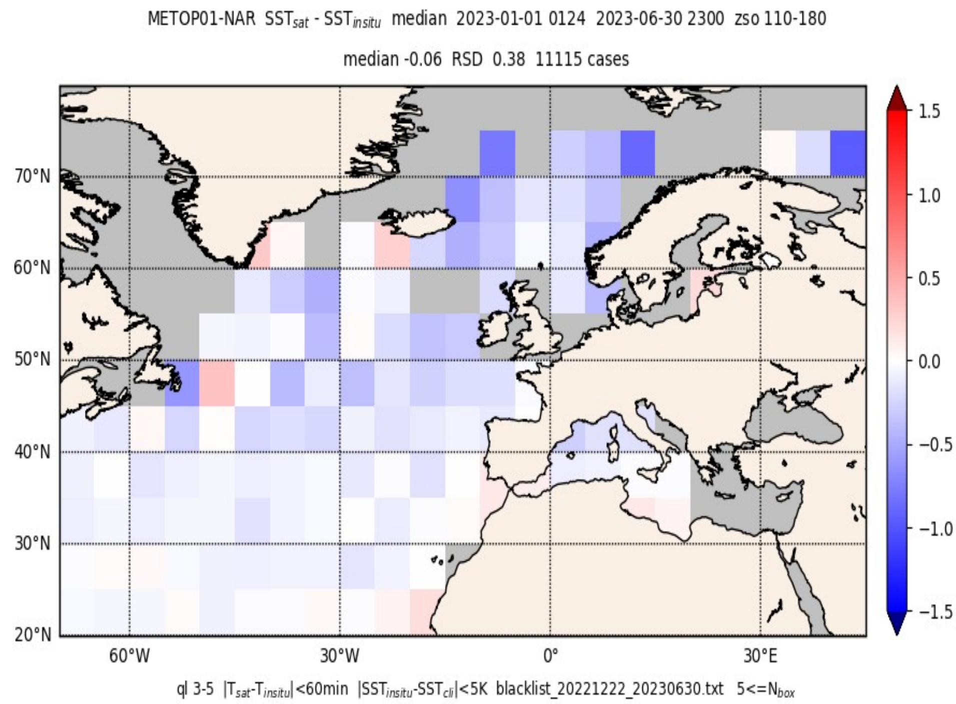


**Figure 9: Metop-B NAR night-time SST median difference with respect to buoys measurements for quality level 3,4,5**

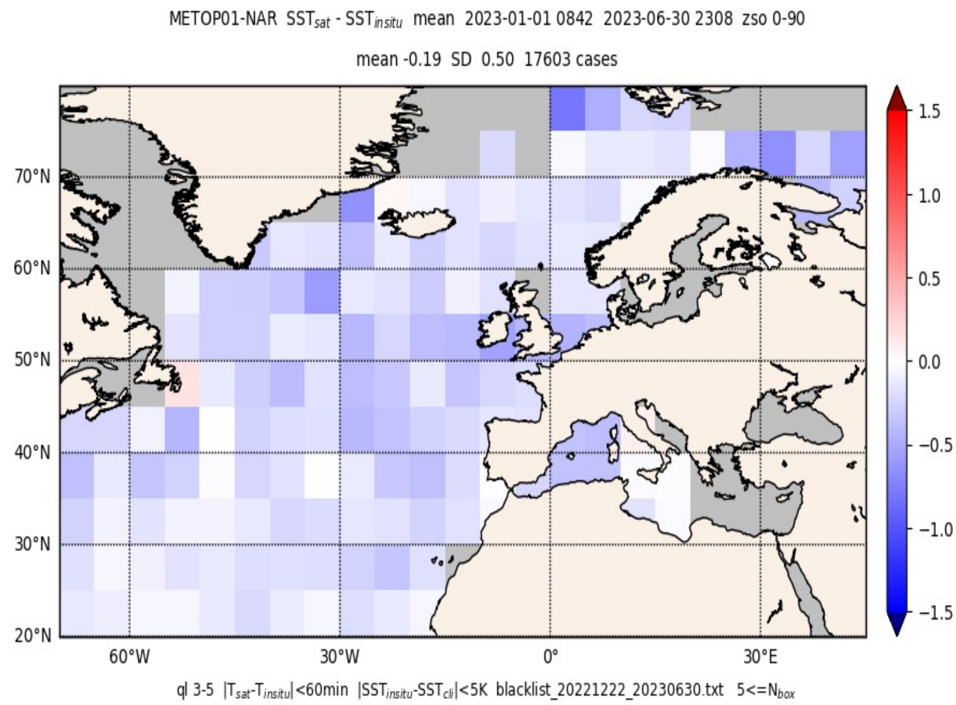


**Figure 10: Metop-B NAR day-time SST median difference with respect to buoys measurements for quality level 3,4,5**

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

| Metop-B NAR night-time SST quality results over 1st half 2023 | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 0.5 K) | SD in K (req.: 0.8 K) | Median in K | RSD in K |
| JAN 2023 | 2270 | -0.06 | 0.49 | 0.00 | 0.38 |
| FEB 2023 | 1951 | -0.14 | 0.45 | -0.08 | 0.37 |
| MAR 2023 | 2173 | -0.12 | 0.48 | -0.04 | 0.37 |
| APR 2023 | 1915 | -0.17 | 0.49 | -0.10 | 0.40 |
| MAY 2023 | 1576 | -0.20 | 0.50 | -0.10 | 0.42 |
| JUN 2023 | 1230 | -0.14 | 0.48 | -0.06 | 0.39 |
| Metop-B NAR day-time SST quality results over 1st half 2023 | | | | | |
| JAN 2023 | 2334 | -0.07 | 0.40 | -0.03 | 0.35 |
| FEB 2023 | 2074 | -0.11 | 0.43 | -0.07 | 0.32 |
| MAR 2023 | 2459 | -0.13 | 0.41 | -0.09 | 0.33 |
| APR 2023 | 3116 | -0.20 | 0.50 | -0.14 | 0.37 |
| MAY 2023 | 3473 | -0.27 | 0.50 | -0.19 | 0.42 |
| JUN 2023 | 4147 | -0.27 | 0.58 | -0.19 | 0.45 |

**Table 7: Quality results for Metop-B NAR SST over 1st half 2023, 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.

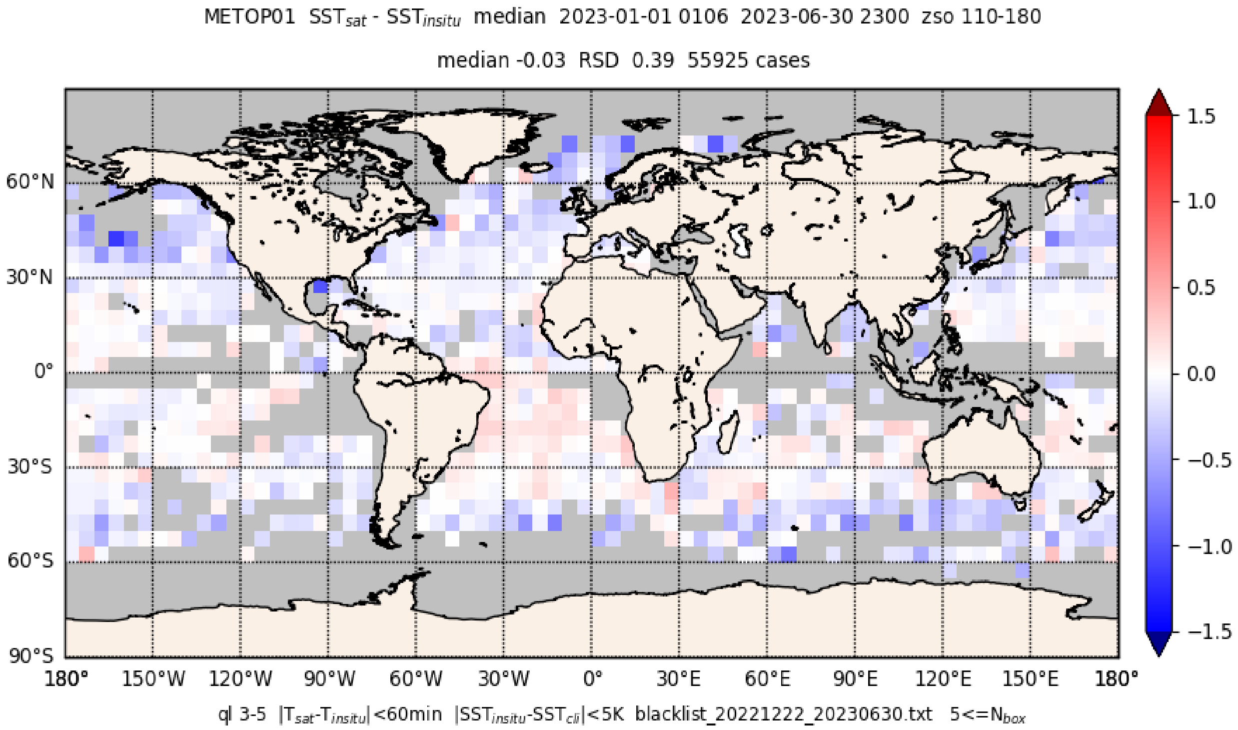


**Figure 11: Metop-B night-time SST median difference with respect to buoys measurements for quality level 3,4,5**

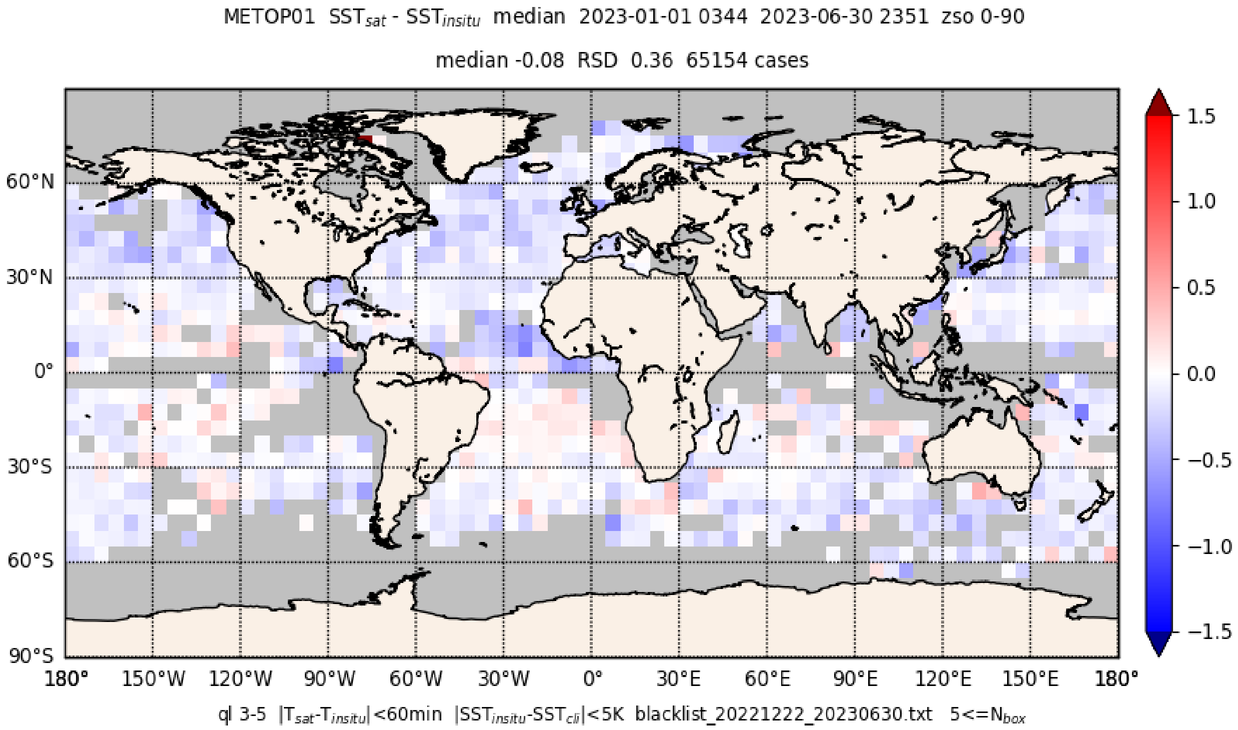


**Figure 12: Metop-B day-time SST median difference with respect to buoys measurements for quality level 3,4,5**

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

| Global Metop-B night-time SST quality results over 1st half 2023 | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 0.5 K) | SD in K (req.: 0.8 K) | Median in K | RSD in K |
| JAN 2023 | 9898 | -0.11 | 0.50 | -0.02 | 0.37 |
| FEB 2023 | 9116 | -0.14 | 0.54 | -0.04 | 0.39 |
| MAR 2023 | 10150 | -0.12 | 0.52 | -0.03 | 0.39 |
| APR 2023 | 9611 | -0.15 | 0.55 | -0.04 | 0.42 |
| MAY 2023 | 8936 | -0.15 | 0.52 | -0.05 | 0.40 |
| JUN 2023 | 8214 | -0.13 | 0.53 | -0.02 | 0.38 |
| Global Metop-B day-time SST quality results over 1st half 2023 | | | | | |
| JAN 2023 | 10481 | -0.09 | 0.42 | -0.05 | 0.35 |
| FEB 2023 | 9242 | -0.10 | 0.44 | -0.06 | 0.36 |
| MAR 2023 | 10598 | -0.10 | 0.43 | -0.07 | 0.35 |
| APR 2023 | 11101 | -0.15 | 0.47 | -0.09 | 0.36 |
| MAY 2023 | 11447 | -0.18 | 0.48 | -0.12 | 0.39 |
| JUN 2023 | 12285 | -0.17 | 0.52 | -0.09 | 0.39 |

**Table 8: Quality results for global METOP SST over 1st half 2023, 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.

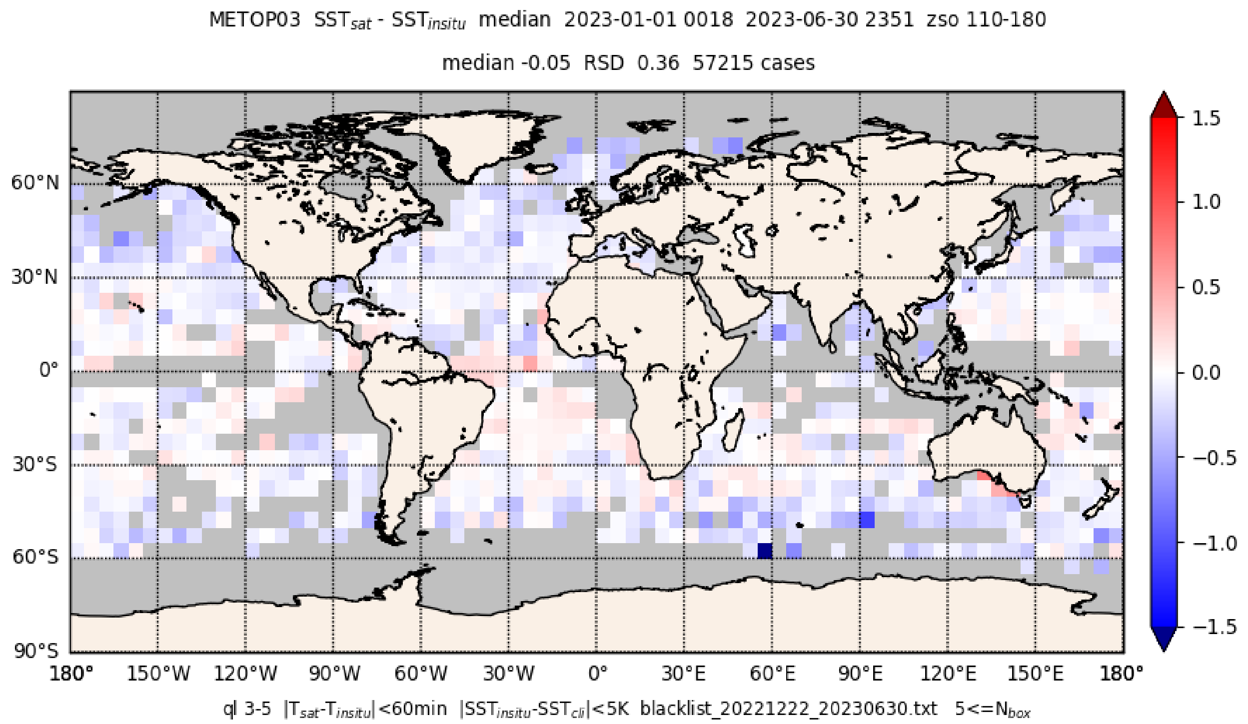


**Figure 13: Metop-C night-time SST median difference with respect to buoys measurements for quality level 3,4,5**

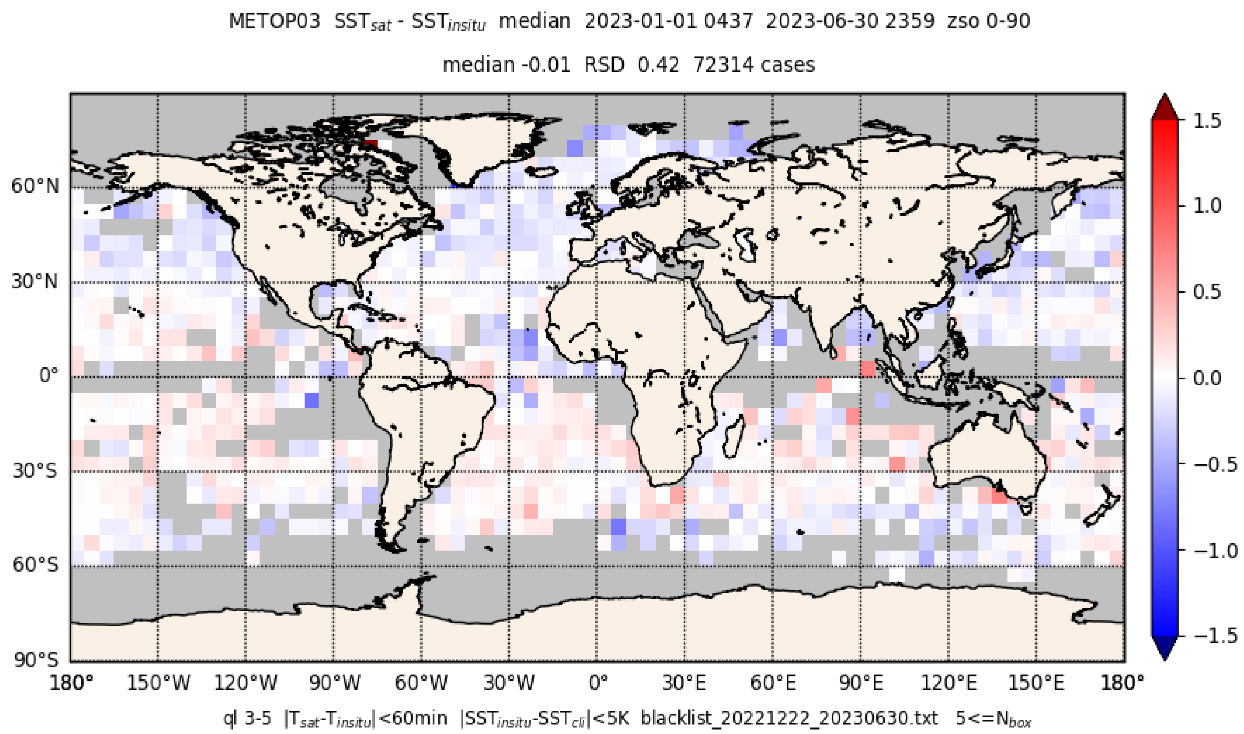


**Figure 14: Metop-C day-time SST median difference with respect to buoys measurements for quality level 3,4,5**

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

| 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 |
|---|---|---|---|---|---|
| Global Metop-C night-time SST quality results over 1st half 2023 | | | | | |
| JAN 2023 | 10147 | -0.16 | 0.51 | -0.05 | 0.36 |
| FEB 2023 | 9309 | -0.17 | 0.57 | -0.05 | 0.37 |
| MAR 2023 | 10354 | -0.16 | 0.55 | -0.05 | 0.36 |
| APR 2023 | 9888 | -0.16 | 0.54 | -0.05 | 0.39 |
| MAY 2023 | 9288 | -0.18 | 0.55 | -0.06 | 0.39 |
| JUN 2023 | 8229 | -0.15 | 0.53 | -0.03 | 0.36 |
| Global Metop-C day-time SST quality results over 1st half 2023 | | | | | |
| JAN 2023 | 11577 | 0.01 | 0.48 | 0.05 | 0.39 |
| FEB 2023 | 10499 | -0.01 | 0.48 | 0.02 | 0.39 |
| MAR 2023 | 11757 | -0.03 | 0.48 | 0.00 | 0.39 |
| APR 2023 | 12329 | -0.09 | 0.53 | -0.03 | 0.42 |
| MAY 2023 | 12830 | -0.12 | 0.54 | -0.06 | 0.43 |
| JUN 2023 | 13322 | -0.12 | 0.61 | -0.04 | 0.44 |

**Tableau 9: Quality results for global Metop-C SST over 1st half 2023, 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.

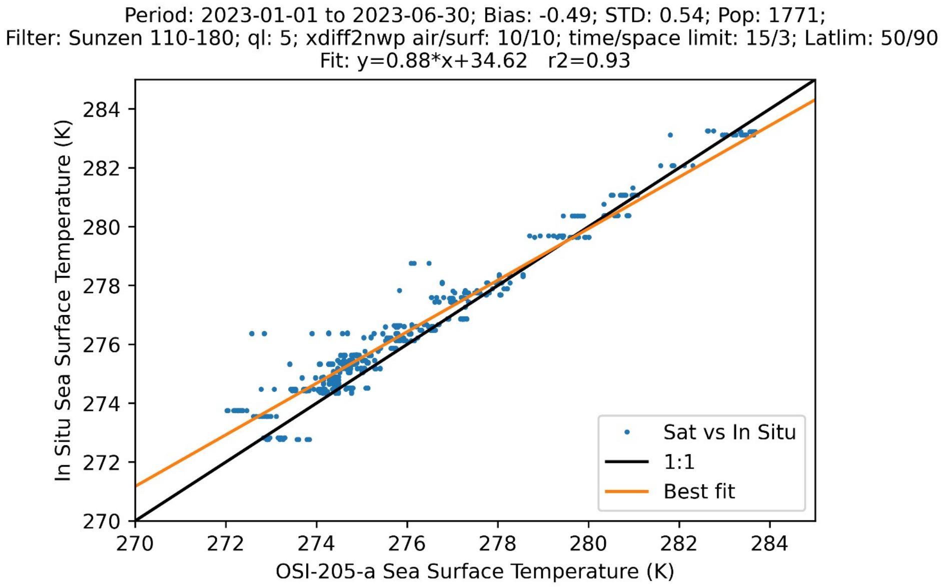


**Figure 15: 1st half 2023 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only night-time data for the northern hemisphere are shown.**

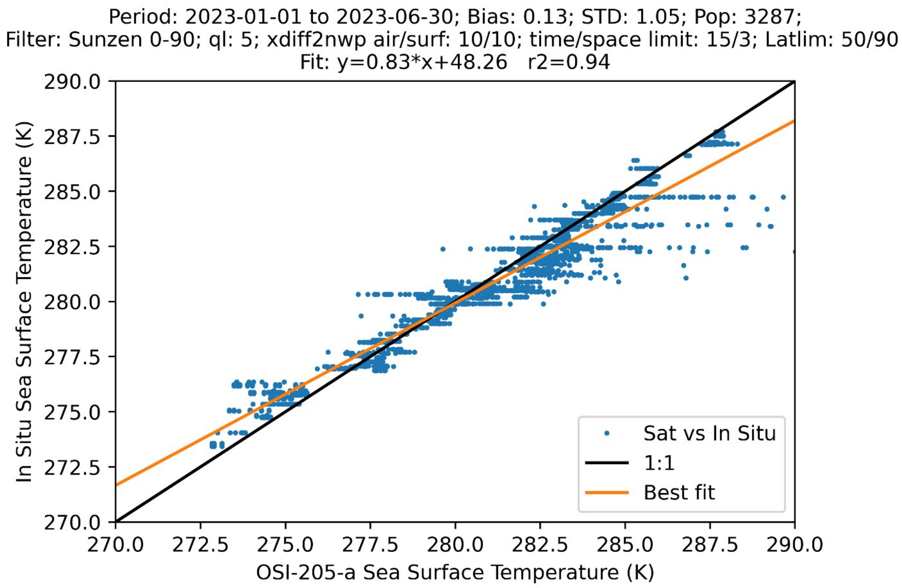


**Figure 16: 1st half 2023 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only daytime data for the northern hemisphere are shown.**

As for the SST validation, no buoys were disqualified from the validation data. Geographical plots of drifting patterns showed no signs of buoys being stranded on coastlines nor located in ice.

| OSI-205-a AVHRR SST quality results over JUL 2022 to JUN 2023, night-time, NH | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 0.7 K) | Mean diff. margin (*) | SD in K (req.: 1.0 K) | SD margin (**) |
| JUL 2022 | - | - | - | - | - |
| 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 | 34.60 |
| JAN 2023 | 870 | -0.56 | 19.65 | 0.57 | 42.66 |
| FEB 2023 | 792 | -0.41 | 41.80 | 0.52 | 48.47 |
| MAR 2023 | 109 | -0.46 | 34.59 | 0.25 | 74.72 |
| APR 2023 | - | - | - | - | - |
| MAY 2023 | - | - | - | - | - |
| JUN 2023 | - | - | - | - | - |
| *1st half 2023* | 1771 | -0.49 | 30.48 | 0.54 | 46.16 |
| OSI-205-a AVHRR SST quality results over JUL 2022 to JUN 2023, day-time, NH | | | | | |
| Month | Number of cases | Mean diff. in K (req.: ± 0.7 K) | Mean diff. margin (*) | SD in K (req.: 1.0 K) | SD margin (**) |
| JUL 2022 | 23770 | 0.15 | 78.37 | 0.83 | 17.31 |
| AUG 2022 | 14952 | 0.08 | 88.30 | 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 | - | - | - | - | - |
| *2nd half 2022* | 50545 | 0.11 | 84.93 | 0.74 | 25.69 |
| JAN 2023 | - | - | - | - | - |
| FEB 2023 | 474 | 0.05 | 92.81 | 0.32 | 67.61 |
| MAR 2023 | 318 | -0.60 | 14.5 | 0.65 | 35.13 |
| APR 2023 | 2523 | -0.19 | 72.17 | 0.50 | 50.19 |
| MAY 2023 | 4065 | -0.18 | 73.94 | 0.45 | 55.00 |
| JUN 2023 | 3287 | 0.13 | 82.11 | 1.05 | -4.86 |
| *1st half 2023* | 10667 | -0.09 | 86.77 | 0.72 | 27.85 |
| (*) Mean diff. margin = 100 * (1 - ( \|mean diff. / mean diff. req.\| ))<br>(**) SD margin = 100 * (1 - (SD / SD req.))<br>100 refers then to a perfect product, 0 to a quality just as required. without margin.<br>A negative result indicates that the product quality does not fulfil the target requirement. | | | | | |

**Table 10: Quality results for OSI-205-a AVHRR SST against Copernicus in situ DB buoys, for the Northern Hemisphere, over JUL 2022 to JUN 2023, for quality level 5 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 with one exception. For the day-time validation in June, the standard deviation is slightly above the target requirement but still way below the threshold requirement (±1.5).

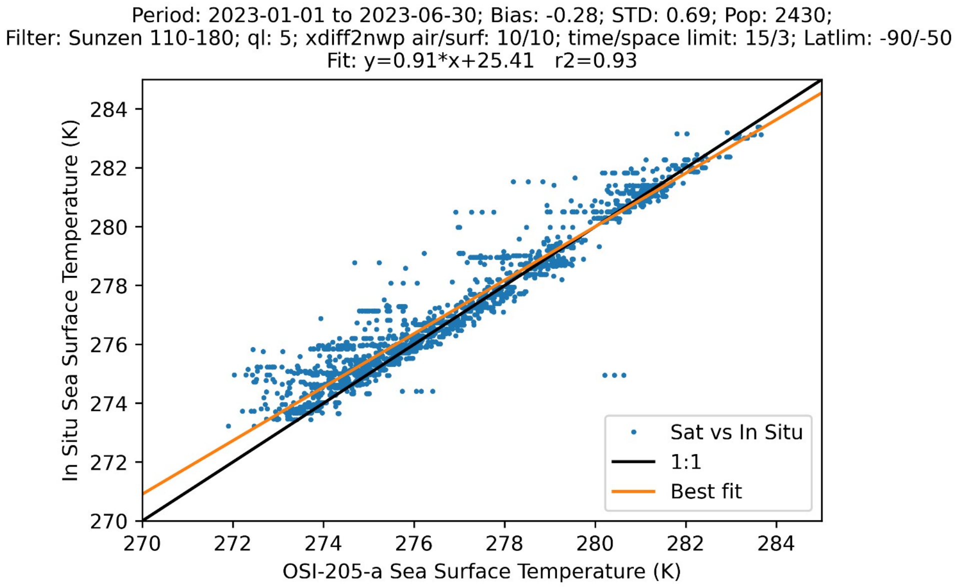


**Figure 17: 1st half 2023 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only night-time data for the southern hemisphere are shown.**

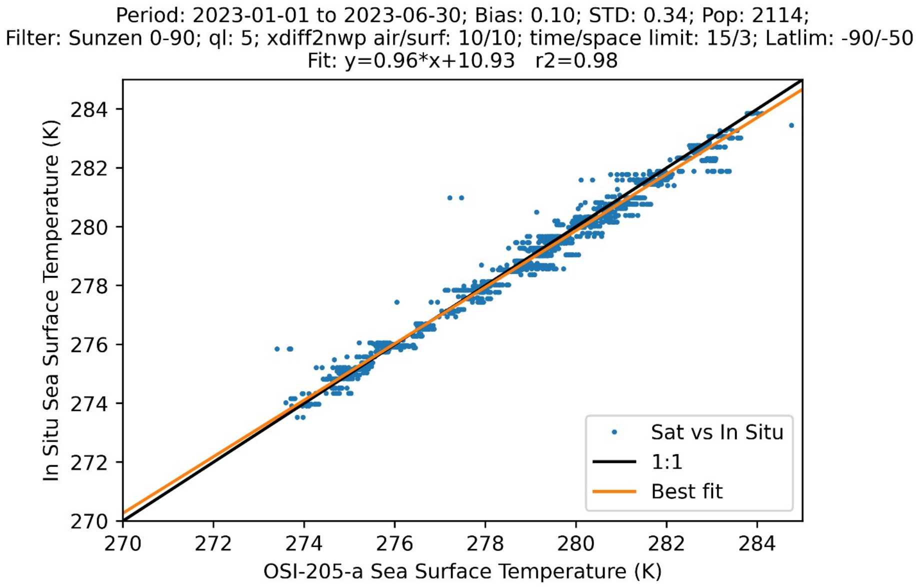


**Figure 18: 1st half 2023 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only daytime data for the southern hemisphere are shown.**

| OSI-205-a AVHRR SST quality results over JUL 2022 to JUN 2023, 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 (**) |
| DEC 2022 | 685 | -0.27 | 60.96 | 0.44 | 55.63 |
| NOV 2022 | 332 | -0.33 | 52.31 | 0.45 | 55.24 |
| OCT 2022 | 461 | -0.20 | 71.85 | 0.49 | 51.32 |
| SEP 2022 | 463 | -0.09 | 87.80 | 0.32 | 68.33 |
| AUG 2022 | 5 | -0.91 | -30.29 | 0.48 | 52.32 |
| JUL 2022 | - | - | - | - | - |
| *2nd half 2022* | 1946 | -0.22 | 68.21 | 0.44 | 56.08 |
| JAN 2023 | - | - | - | - | - |
| FEB 2023 | 104 | 0.03 | 95.82 | 0.33 | 66.74 |
| MAR 2023 | 501 | -0.13 | 81.13 | 0.83 | 16.68 |
| APR 2023 | 500 | -0.13 | 80.97 | 0.54 | 46.31 |
| MAY 2023 | 653 | -0.22 | 68.53 | 0.48 | 51.95 |
| JUN 2023 | 672 | -0.62 | 11.32 | 0.75 | 25.26 |
| *1st half 2023* | 2430 | -0.28 | 59.39 | 0.69 | 31.46 |
| OSI-205-a AVHRR SST quality results over JUL 2022 to JUN 2023, 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 (**) |
| DEC 2022 | - | - | - | - | - |
| NOV 2022 | 64 | 0.07 | 90.62 | 0.32 | 67.79 |
| OCT 2022 | 270 | -0.11 | 84.13 | 0.31 | 69.46 |
| SEP 2022 | 312 | -0.01 | 97.93 | 0.28 | 71.70 |
| AUG 2022 | 550 | 0.11 | 84.22 | 0.29 | 70.68 |
| JUL 2022 | 401 | 0.07 | 89.38 | 0.28 | 72.00 |
| *2nd half 2022* | 1609 | 0.04 | 94.98 | 0.30 | 69.72 |
| JAN 2023 | 666 | 0.11 | 84.93 | 0.29 | 70.9 |
| FEB 2023 | 586 | 0.09 | 87.58 | 0.28 | 71.97 |
| MAR 2023 | 542 | 0.15 | 78.80 | 0.35 | 64.91 |
| APR 2023 | 286 | 0.01 | 99.20 | 0.36 | 64.33 |
| MAY 2023 | 34 | -0.03 | 95.63 | 0.94 | 5.57 |
| JUN 2023 | - | - | - | - | - |
| *1st half 2023* | 2114 | 0.10 | 86.34 | 0.34 | 66.28 |
| (*) Mean diff. margin = 100 * (1 - ( \|mean diff. / mean diff. req.\| ))<br>(**) SD margin = 100 * (1 - (SD / SD req.))<br>100 refers then to a perfect product, 0 to a quality just as required. without margin.<br>A negative result indicates that the product quality does not fulfil the requirement. | | | | | |

**Table 11: Quality results for OSI-205-a AVHRR SST, for the Southern Hemisphere, over JUL 2022 to JUN 2023, 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.

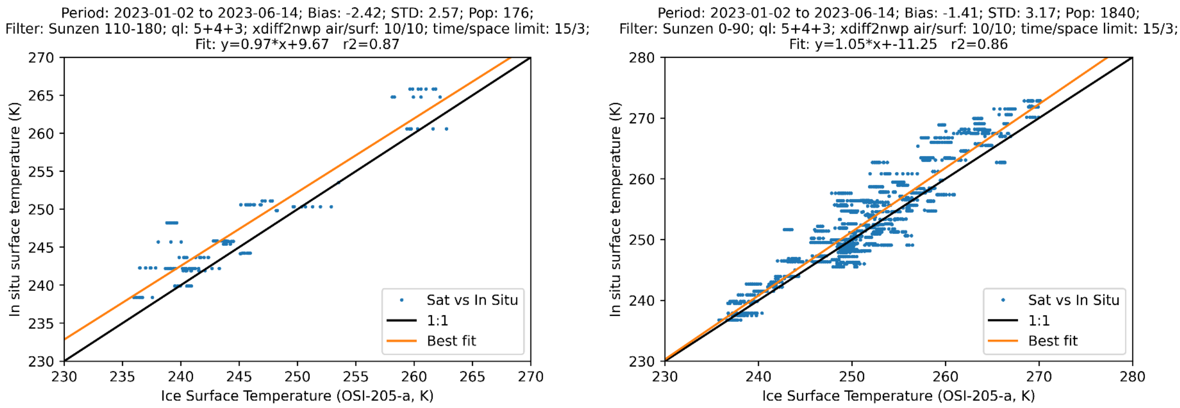


**Figure 19: 1st half 2023 OSI-205-a IST with respect to conventional buoys measurements from the SIMB3 buoys (air temperature). The graph on the left shows night-time data, while the plot on the right only shows day-time observations.**

| OSI-205-a IST quality results over 1st half 2023, night-time, air temperature, SIMB3 | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 3.5 K) | Mean diff. margin (*) | SD in K (req.: 3.0 K) | SD margin (**) |
| JAN 2023 | 129 | -2.37 | 32.30 | 2.79 | 7.10 |
| FEB 2023 | 47 | -2.54 | 27.39 | 1.85 | 38.49 |
| MAR 2023 | - | - | - | - | - |
| APR 2023 | - | - | - | - | - |
| MAY 2023 | - | - | - | - | - |
| JUN 2023 | - | - | - | - | - |
| OSI-205-a IST quality results over 1st half 2023, day-time, air temperature, SIMB3 | | | | | |
| Month | Number of cases | Mean diff. in K (req.: ± 3.5 K) | Mean diff. margin (*) | SD in K (req.: 3.0 K) | SD margin (**) |
| JAN 2023 | - | - | - | - | - |
| FEB 2023 | 105 | -1.06 | 69.70 | 1.14 | 61.85 |
| MAR 2023 | 497 | -0.41 | 88.24 | 1.83 | 38.96 |
| APR 2023 | 889 | -0.96 | 72.55 | 3.48 | -16.12 |
| MAY 2023 | 281 | -4.30 | -22.85 | 2.99 | 0.25 |
| JUN 2023 | 68 | -3.22 | 8.14 | 1.25 | 58.41 |
| (*) Mean diff. margin = 100 * (1 - ( \|mean diff. / mean diff. req.\| ))<br>(**) SD margin = 100 * (1 - (SD / SD req.))<br>100 refers then to a perfect product, 0 to a quality just as required. without margin.<br>A negative result indicates that the product quality does not fulfil the requirement. | | | | | |

**Table 12: Quality results for OSI-205-a Metop AVHRR IST against SIMB3 for the Northen Hemisphere, over 1st half 2023, 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 are all satisfied with two exceptions. During day-time, the mean difference in May and standard deviation in April are above the target requirements of ±3.5 K and ±3.0 K, respectively. But they still satisfy their respective threshold requirements of ±4.5 K and ±4.0 K.

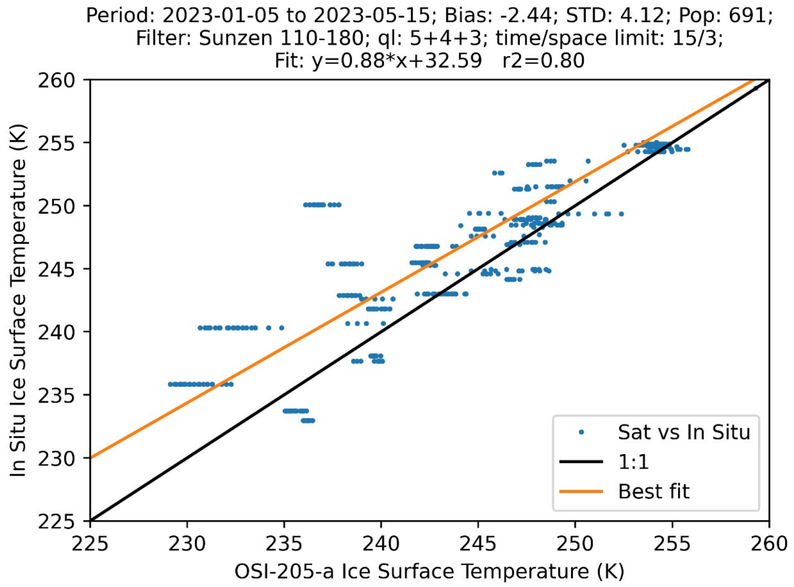


**Figure 20: 1st half 2023 OSI-205-a IST with respect to air measurements from PROMICE. Only night-time data is shown.**

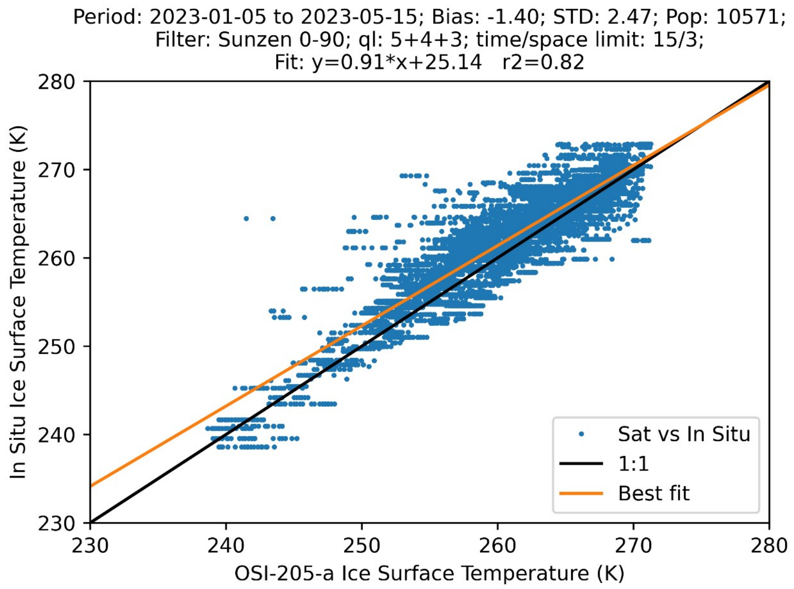


**Figure 21: 1st half 2023 OSI-205-a IST with respect to air measurements from PROMICE. Only day-time data is shown.**

| OSI-205-a IST quality results over 1st half 2023, night-time, air temperature, PROMICE | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (target: ±3.5 K) | Mean diff. margin (*) | SD in K (target: 3.0 K) | SD margin (**) |
| JAN 2023 | 456 | -2.41 | 31.02 | 2.79 | 6.84 |
| FEB 2023 | 201 | -2.77 | 20.78 | 6.07 | -102.32 |
| MAR 2023 | 34 | -0.76 | 78.29 | 4.29 | -42.92 |
| APR 2023 | - | - | - | - | - |
| MAY 2023 | - | - | - | - | - |
| JUN 2023 | - | - | - | - | - |
| OSI-205-a IST quality results over 1st half 2023, day-time, air temperature, PROMICE | | | | | |
| Month | Number of cases | Mean diff. in K (target: ±3.5 K) | Mean diff. margin (*) | SD in K (target: 3.0 K) | SD margin (**) |
| JAN 2023 | 208 | -0.65 | 81.42 | 2.34 | 22.06 |
| FEB 2023 | 121 | 0.89 | 74.47 | 2.17 | 27.68 |
| MAR 2023 | 403 | -0.39 | 88.82 | 1.90 | 36.68 |
| APR 2023 | 5252 | -1.32 | 62.28 | 2.26 | 24.67 |
| MAY 2023 | 4587 | -1.67 | 52.19 | 2.69 | 10.33 |
| JUN 2023 | - | - | - | - | - |
| (*) Mean diff. margin = 100 * (1 - ( \|mean diff. / mean diff. target\| ))<br>(**) SD margin = 100 * (1 - (SD / SD target))<br>100 refers then to a perfect product, 0 to a quality just as targeted. without margin.<br>A negative result indicates that the product quality does not fulfil the target requirement. | | | | | |

**Table 13: Quality results for OSI-205-a Metop AVHRR IST over 1st half 2023, 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 are all satisfied with two exceptions. The night-time standard deviation for February and March both exceed the target requirement of ± 3.0 K. The exact cause for this is not identified at the moment, but it seems to be caused by extreme weather events at the weather stations “NUK_U” and “KAN_U” behind Nuuk and Kangerlussuaq, respectively. The events take place from end-February to start-March, and they are correlated with temperature rises measured at local weather stations, especially in Nuuk. Furthermore, there is generally a low amount of data in this period, which makes it visible in the standard deviation despite there only being a few abnormal measurements (41 in February and 4 in March). By excluding only those measurements, the standard deviations become 2.79 K and 1.84 K, respectively.

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

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

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

| OSI-205-b NHL VIIRS SST quality results over JUL 2022 to JUN 2023, night-time | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 0.7 K) | Mean diff. margin (*) | SD in K (req.: 1.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 367 | -0.404 | 42.3 | 0.929 | 7.1 |
| FEB 2023 | 300 | -0.295 | 57.8 | 0.895 | 10.5 |
| MAR 2023 | 199 | -0.333 | 52.4 | 0.807 | 19.3 |
| APR 2023 | 267 | -0.376 | 46.3 | 0.833 | 16.7 |
| MAY 2023 | 178 | -0.511 | 27.0 | 0.906 | 9.4 |
| JUN 2023 | 42 | -0.328 | 53.2 | 0.699 | 30.1 |
| OSI-205-b NHL VIIRS SST quality results over JUL 2022 to JUN 2023, day-time | | | | | |
| Month | Number of cases | Mean diff. in K (req.: ± 0.7 K) | Mean diff. margin (*) | SD in K (req.: 1.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 109 | -0.479 | 31.6 | 0.735 | 26.5 |
| FEB 2023 | 225 | -0.41 | 41.4 | 0.692 | 30.8 |
| MAR 2023 | 253 | -0.51 | 27.1 | 0.748 | 25.2 |
| APR 2023 | 484 | -0.248 | 64.6 | 0.605 | 39.5 |
| MAY 2023 | 449 | -0.228 | 67.4 | 0.71 | 29.0 |
| JUN 2023 | 624 | -0.018 | 97.4 | 0.916 | 8.4 |
| (*) Mean diff. margin = 100 * (1 - ( \|mean diff. / mean diff. req.\| ))<br>(**) SD margin = 100 * (1 - (SD / SD req.))<br>100 refers then to a perfect product, 0 to a quality just as required. without margin.<br>A negative result indicates that the product quality does not fulfil the requirement. | | | | | |

**Table 14: Quality results for OSI-205-b NHL VIIRS SST, over Northern Atlantic and Arctic Ocean, over JUL 2022 to JUN 2023, for 3,4,5 quality indexes, by night and by day. Comparison with drifting buoys.**

| OSI-205-b NHL VIIRS IST quality results over JUL 2022 to JUN 2023, night-time | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 3.5 K) | Mean diff. margin (*) | SD in K (req.: 3.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 18 | -4.69 | -34.0 | 2.02 | 32.6 |
| FEB 2023 | 6 | -4.36 | -24.7 | 2.51 | 16.2 |
| MAR 2023 | 37 | -2.44 | 30.1 | 1.46 | 51.2 |
| APR 2023 | 124 | -2.94 | 15.9 | 2.13 | 28.7 |
| MAY 2023 | 20 | -2.97 | 14.9 | 2.33 | 22.2 |
| JUN 2023 | - | - | - | - | - |
| OSI-205-b NHL VIIRS IST quality results over JUL 2022 to JUN 2023, day-time | | | | | |
| Month | Number of cases | Mean diff. in K (req.: ± 3.5 K) | Mean diff. margin (*) | SD in K (req.: 3.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 7 | -3.43 | 1.8 | 0.96 | 67.8 |
| FEB 2023 | 14 | -2.72 | 22.2 | 1.50 | 49.7 |
| MAR 2023 | 57 | -2.92 | 16.4 | 2.09 | 30.3 |
| APR 2023 | 542 | -2.36 | 32.5 | 2.00 | 33.1 |
| MAY 2023 | 378 | -1.82 | 47.9 | 1.89 | 36.9 |
| JUN 2023 | - | - | - | - | - |
| (*) Mean diff. margin = 100 * (1 - ( \|mean diff. / mean diff. req.\| ))<br>(**) SD margin = 100 * (1 - (SD / SD req.))<br>100 refers then to a perfect product, 0 to a quality just as required. without margin.<br>A negative result indicates that the product quality does not fulfil the requirement. | | | | | |

**Table 15: Quality results for OSI-205-b NHL NPP VIIRS IST, over Northern Atlantic and Arctic Ocean, over JUL 2022 to JUN 2023, 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-205-b product is within target requirement for mean difference and standard deviation for all months, both day-time and night-time.
The IST part of the OSI-205-b product is within target requirement for both mean difference and standard deviation for all months, both daytime and night time, expect that it is outside the mean difference requirement in January and February at night-time (still within threshold requirement).

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

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

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

| OSI-203-a NHL AVHRR SST quality results over JUL 2022 to JUN 2023, night-time | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 0.7 K) | Mean diff. margin (*) | SD in K (req.: 1.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 4864 | -0.89 | -28.2 | 0.81 | 19.0 |
| FEB 2023 | 3890 | -0.83 | -18.7 | 0.67 | 32.1 |
| MAR 2023 | 1503 | -0.78 | -11.4 | 0.69 | 31.0 |
| APR 2023 | 1456 | -0.47 | 32.4 | 0.76 | 23.2 |
| MAY 2023 | 919 | -0.37 | 46.0 | 0.85 | 15.0 |
| JUN 2023 | 483 | -0.28 | 59.3 | 0.98 | 1.3 |
| OSI-203-a NHL AVHRR SST quality results over JUL 2022 to JUN 2023, day-time | | | | | |
| Month | Number of cases | Mean diff. in K (req.: ± 0.7 K) | Mean diff. margin (*) | SD in K (req.: 1.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 888 | -0.39 | 44.0 | 0.71 | 28.5 |
| FEB 2023 | 1497 | -0.40 | 42.7 | 0.55 | 44.4 |
| MAR 2023 | 2599 | -0.66 | 4.7 | 0.74 | 25.7 |
| APR 2023 | 3091 | -0.38 | 44.7 | 0.59 | 40.5 |
| MAY 2023 | 3291 | -0.42 | 39.0 | 0.71 | 28.4 |
| JUN 2023 | 3383 | -0.26 | 61.9 | 0.93 | 7.0 |
| (*) Mean diff. margin = 100 * (1 - ( \|mean diff. / mean diff. req.\| ))<br>(**) SD margin = 100 * (1 - (SD / SD req.))<br>100 refers then to a perfect product, 0 to a quality just as required. without margin.<br>A negative result indicates that the product quality does not fulfil the requirement. | | | | | |

**Table 16: Quality results for OSI-203-a NHL AVHRR SST over JUL 2022 to JUN 2023, for 3,4,5 quality indexes, by night and by day. Comparison with drifting buoys.**

| OSI-203-a NHL AVHRR IST quality results over JUL 2022 to JUN 2023, night-time | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 3.5 K) | Mean diff. margin (*) | SD in K (req.: 3.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 139 | -3.85 | -10.2 | 3.48 | -16.1 |
| FEB 2023 | 112 | -3.04 | 13.1 | 3.77 | -25.8 |
| MAR 2023 | 136 | -4.15 | -18.6 | 2.82 | 5.7 |
| APR 2023 | 38 | -4.03 | -15.3 | 3.46 | -15.6 |
| MAY 2023 | - | - | - | - | - |
| JUN 2023 | - | - | - | - | - |
| OSI-203-a NHL AVHRR IST quality results over JUL 2022 to JUN 2023, day-time | | | | | |
| Month | Number of cases | Mean diff. in K (req.: ± 3.5 K) | Mean diff. margin (*) | SD in K (req.: 3.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 10 | -5.47 | -56.4 | 1.76 | 41.1 |
| FEB 2023 | 7 | -4.64 | -32.6 | 0.642 | 78.6 |
| MAR 2023 | 52 | -1.90 | 45.7 | 1.66 | 44.4 |
| APR 2023 | 257 | -0.77 | 77.9 | 2.87 | 4.3 |
| MAY 2023 | 159 | 0.11 | 96.8 | 2.70 | 10.0 |
| JUN 2023 | - | - | - | - | - |
| (*) Mean diff. margin = 100 * (1 - ( \|mean diff. / mean diff. req.\| ))<br>(**) SD margin = 100 * (1 - (SD / SD req.))<br>100 refers then to a perfect product, 0 to a quality just as required. without margin.<br>A negative result indicates that the product quality does not fulfil the requirement. | | | | | |

**Table 17: Quality results for OSI-203-a NHL AVHRR IST over JUL 2022 to JUN 2023, 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 standard deviation for all months, both daytime and night-time. For mean difference it is within requirement for all months for daytime, while for night time it is outside target requirement in January to March (still within threshold requirement).
The IST part of the OSI-203-a product is within target requirement for mean difference and standard deviation at daytime for March to May, but outside in January and February (with few observations). At night-time it is outside target requirements for most of the months, but within threshold requirement.

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

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

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

| OSI-203-b NHL VIIRS SST quality results over JUL 2022 to JUN 2023, night-time | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 0.7 K) | Mean diff. margin (*) | SD in K (req.: 1.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 6518 | -0.26 | 62.8 | 0.80 | 19.1 |
| FEB 2023 | 4407 | -0.31 | 54.4 | 0.77 | 22.7 |
| MAR 2023 | 1958 | -0.19 | 71.7 | 1.04 | -4.7 |
| APR 2023 | 1740 | -0.46 | 33.7 | 0.82 | 17.3 |
| MAY 2023 | 809 | -0.59 | 14.9 | 1.01 | -1.2 |
| JUN 2023 | 494 | -0.67 | 3.1 | 0.92 | 7.7 |
| OSI-203-b NHL VIIRS SST quality results over JUL 2022 to JUN 2023, day-time | | | | | |
| Month | Number of cases | Mean diff. in K (req.: ± 0.7 K) | Mean diff. margin (*) | SD in K (req.: 1.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 917 | -0.49 | 29.1 | 0.62 | 37.5 |
| FEB 2023 | 1373 | -0.40 | 42.3 | 0.66 | 33.4 |
| MAR 2023 | 2515 | -0.67 | 3.6 | 0.62 | 37.2 |
| APR 2023 | 2268 | -0.53 | 23.0 | 0.67 | 32.9 |
| MAY 2023 | 2477 | -0.40 | 42.7 | 0.69 | 30.8 |
| JUN 2023 | 2258 | -0.32 | 53.6 | 0.81 | 18.6 |
| (*) Mean diff. margin = 100 * (1 - ( \|mean diff. / mean diff. req.\| ))<br>(**) SD margin = 100 * (1 - (SD / SD req.))<br>100 refers then to a perfect product, 0 to a quality just as required. without margin.<br>A negative result indicates that the product quality does not fulfil the requirement. | | | | | |

**Table 18: Quality results for OSI-203-b NHL VIIRS SST over JUL 2022 to JUN 2023, for 3,4,5 quality indexes, by night and by day. Comparison with drifting buoys.**

| OSI-203-b NHL VIIRS IST quality results over JUL 2022 to JUN 2023, night-time | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req.: ± 3.5 K) | Mean diff. margin (*) | SD in K (req.: 3.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 75 | -3.69 | -5.7 | 3.46 | -15.4 |
| FEB 2023 | 69 | -3.49 | 0.2 | 3.80 | -26.8 |
| MAR 2023 | 89 | -4.47 | -27.8 | 3.03 | -1.3 |
| APR 2023 | 72 | -4.50 | -28.8 | 3.07 | -2.5 |
| MAY 2023 | - | - | - | - | - |
| JUN 2023 | - | - | - | - | - |
| OSI-203-b NHL VIIRS IST quality results over JUL 2022 to JUN 2023, day-time | | | | | |
| Month | Number of cases | Mean diff. in K (req.: ± 3.5 K) | Mean diff. margin (*) | SD in K (req.: 3.0 K) | SD margin (**) |
| JUL 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 |
| JAN 2023 | 7 | -4.83 | -38.2 | 0.55 | 81.4 |
| FEB 2023 | 6 | -3.51 | -0.3 | 2.39 | 20.3 |
| MAR 2023 | 27 | -0.41 | 88.2 | 1.76 | 41.2 |
| APR 2023 | 156 | -1.94 | 44.5 | 2.86 | 4.6 |
| MAY 2023 | 124 | -2.50 | 28.4 | 2.63 | 12.1 |
| JUN 2023 | - | - | - | - | - |
| (*) Mean diff. margin = 100 * (1 - ( \|mean diff. / mean diff. req.\| ))<br>(**) SD margin = 100 * (1 - (SD / SD req.))<br>100 refers then to a perfect product, 0 to a quality just as required. without margin.<br>A negative result indicates that the product quality does not fulfil the requirement. | | | | | |

**Table 19: Quality results for OSI-203-b NHL NPP VIIRS IST over JUL 2022 to JUN 2023, 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 mean difference and standard deviation for all months, except slightly outside for standard deviation at night-time in March and May.
The IST part of the OSI-203-a product is within target requirement for mean difference and standard deviation at daytime for all months, except for mean difference in January (with few observations). At night-time it is outside target requirements for most of the months, but 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.

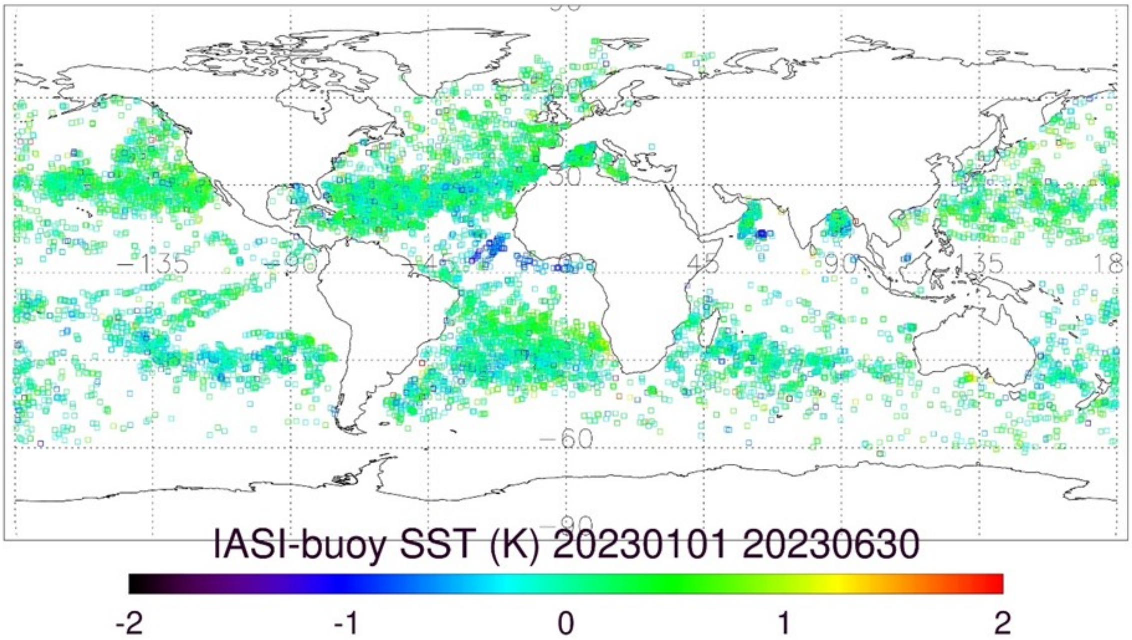


**Figure 22: Mean Metop-B IASI night-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JAN 2023 to JUN 2023**

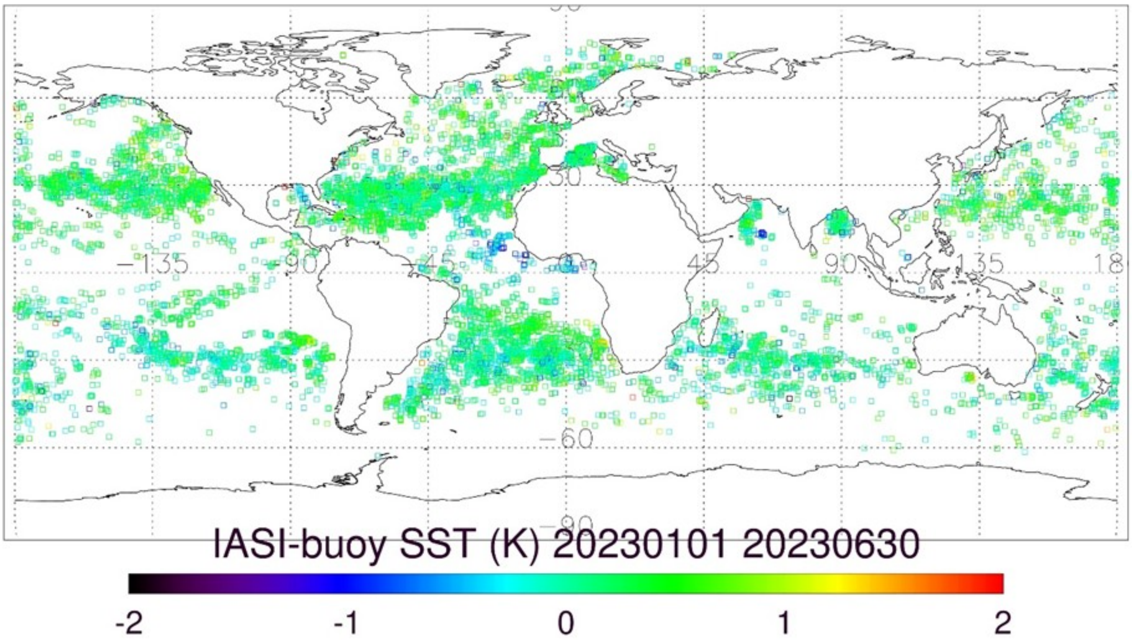


**Figure 23: Mean Metop-B IASI day-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JAN 2023 to JUN 2023**

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

| Global Metop-B IASI night-time SST quality results over 1st half 2023 | | | | | |
|---|---|---|---|---|---|
| Month | Number of cases | Mean diff. in K (req. : ± 0.5 K) | Mean diff. margin (*) | SD in K (req.: 0.8 K) | SD margin (**) |
| JAN 2023 | 2380 | 0.09 | 82 | 0.49 | 39 |
| FEB 2023 | 2224 | 0.13 | 74 | 0.49 | 39 |
| MAR 2023 | 2390 | 0.09 | 82 | 0.49 | 39 |
| APR 2023 | 2624 | 0.06 | 88 | 0.51 | 36 |
| MAY 2023 | 2299 | 0.05 | 90 | 0.49 | 39 |
| JUN 2023 | 2461 | 0.06 | 88 | 0.48 | 40 |
| Global Metop-B IASI day-time SST quality results over 1st half 2023 | | | | | |
| JAN 2023 | 1806 | 0.20 | 60 | 0.44 | 45 |
| FEB 2023 | 1747 | 0.23 | 54 | 0.45 | 44 |
| MAR 2023 | 1806 | 0.20 | 60 | 0.44 | 45 |
| APR 2023 | 1956 | 0.09 | 82 | 0.45 | 44 |
| MAY 2023 | 1744 | 0.13 | 74 | 0.46 | 43 |
| JUN 2023 | 1893 | 0.17 | 66 | 0.47 | 41 |
| (*) Mean diff. margin = 100 * (1 - ( \|mean diff. / mean diff. req.\| ))<br>(**) SD margin = 100 * (1 - (SD / SD req.))<br>100 refers then to a perfect product, 0 to a quality just as required. without margin.<br>A negative result indicates that the product quality does not fulfil the requirement. | | | | | |

**Table 20: Quality results for global Metop-B IASI SST over 1st half 2023, for Quality Levels 3, 4 and 5**

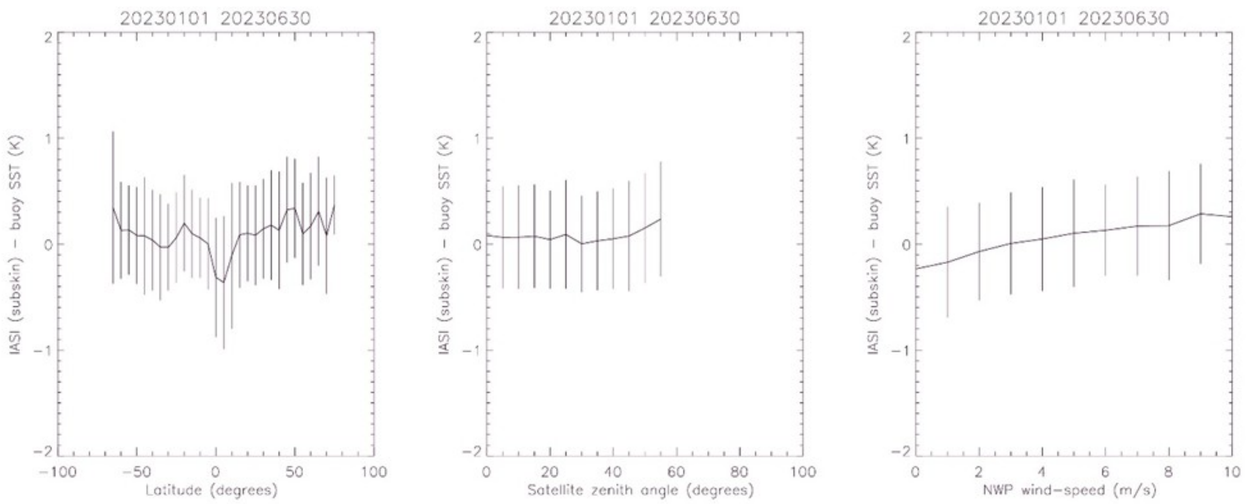


**Figure 24: Mean Metop-B IASI night-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JUL 2022 to JUN 2023**

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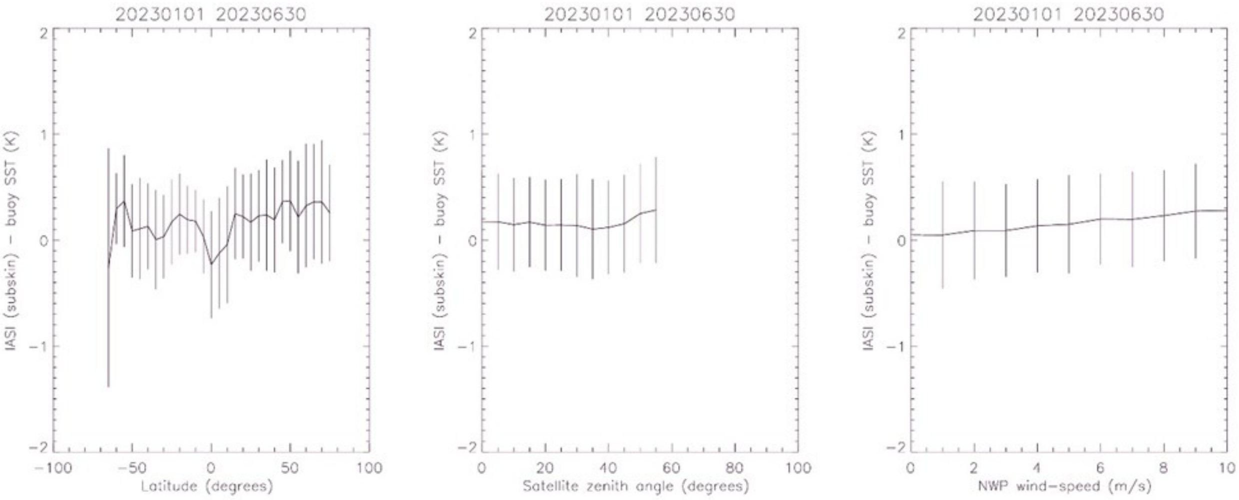


**Figure 25: Mean Metop-B IASI day-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JUL 2022 to JUN 2023**

Comments:
The monthly validation results are within the specified requirements.
The night-time results from 1st January 2023 to 30th June 2023 have an overall mean difference of 0.08 K and standard deviation of 0.49 K for 14409 collocations.
The day-time results from 1st January 2023 to 30th June 2023 have an overall mean difference of 0.16 K and standard deviation of 0.46 K for 11147 collocations.

## 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 JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean DLI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 |
| JAN 2023 | 2953 | 278.56 | -8.76 | 37.11 | 17.99 | 35.42 | -6.93 | 14.84 |
| FEB 2023 | 2688 | 269,23 | -3,82 | 71,62 | 17,81 | 33,85 | -2,53 | 14,58 |
| MAR 2023 | 2970 | 275.34 | -5.10 | 62.95 | 17.96 | 34.77 | -4.05 | 15.66 |
| APR 2023 | 2880 | 305.08 | -2.55 | 83.28 | 15.62 | 48.80 | -1.99 | 14.34 |
| MAY 2023 | 2866 | 337.02 | 0.44 | 97.39 | 15.50 | 54.01 | 0.05 | 13.57 |
| JUN 2023 | 2755 | 365.06 | 1.87 | 89.76 | 14.39 | 60.58 | 0.89 | 12.47 |

**(*) 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 21: GOES-East hourly DLI quality results from JUL 2022 to JUN 2023.**

| GOES-East daily DLI quality results from JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean DLI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 |
| JAN 2023 | 122 | 278.53 | -8.83 | 36.60 | 10.27 | 63.13 | -8.45 | 9.65 |
| FEB 2023 | 112 | 269,27 | -3,8 | 71,78 | 9,25 | 65,65 | -1,81 | 7,97 |
| MAR 2023 | 123 | 274.93 | -5.21 | 62.10 | 9.97 | 63.74 | -4.81 | 10.87 |
| APR 2023 | 120 | 305.07 | -2.55 | 83.28 | 8.38 | 72.53 | -2.59 | 8.57 |
| MAY 2023 | 121 | 336.94 | 0.50 | 97.03 | 8.67 | 74.27 | -0.07 | 6.62 |
| JUN 2023 | 114 | 365.42 | 1.83 | 89.98 | 7.32 | 79.97 | 2.21 | 6.62 |

**(*) 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 daily DLI quality results from JUL 2022 to JUN 2023.**

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.

On the 21 March 2023, Meteosat-10 replaced Meteosat-11 as prime operational satellite in Meteosat 0° position. The OSI SAF Meteosat DLI and SSI products kept the same identifiers but the switch implied some changes in the file names and metadata.

| Meteosat 0° hourly DLI quality results from JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean DLI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 |
| JAN 2023 | 744 | 301.28 | -9.69 | 35.67 | 18.83 | 37.50 | -8.70 | 14.72 |
| FEB 2023 | 672 | 281.26 | -6.32 | 55.06 | 17.43 | 38.03 | -4.99 | 15.48 |
| MAR 2023 | 728 | 307.51 | -4.56 | 70.34 | 16.20 | 47.32 | -3.20 | 13.56 |
| APR 2023 | 720 | 307.74 | 0.43 | 97.21 | 14.87 | 51.68 | 0.97 | 15.05 |
| MAY 2023 | 744 | 325.45 | 4.08 | 74.93 | 11.87 | 63.53 | 3.98 | 12.51 |
| JUN 2023 | 720 | 354.45 | 6.22 | 64.90 | 12.00 | 66.14 | 5.90 | 12.37 |

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

**(**) SD margin = 100 * (1 - (SD 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: Meteosat 0° hourly DLI quality results from JUL 2022 to JUN 2023.**

| Meteosat 0° daily DLI quality results from JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean DLI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 |
| JAN 2023 | 31 | 301.27 | -9.70 | 35.61 | 10.74 | 64.35 | -8.97 | 11.30 |
| FEB 2023 | 28 | 281.18 | -6.32 | 55.05 | 10.75 | 61.77 | -4.71 | 10.67 |
| MAR 2023 | 30 | 307.48 | -4.49 | 70.79 | 7.58 | 75.35 | -3.53 | 4.66 |
| APR 2023 | 30 | 307.71 | 0.44 | 97.14 | 6.89 | 77.61 | 2.39 | 8.84 |
| MAY 2023 | 31 | 325.49 | 4.10 | 74.81 | 5.73 | 82.40 | 4.96 | 6.96 |
| JUN 2023 | 30 | 354.49 | 6.21 | 64.96 | 4.44 | 87.47 | 5.81 | 4.45 |

**(*) 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° daily DLI quality results from JUL 2022 to JUN 2023.**

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 JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean DLI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 |
| JAN 2023 | 744 | 300.65 | -10.33 | 31.28 | 20.46 | 31.95 | -10.38 | 18.57 |
| FEB 2023 | 672 | 280.69 | -6.89 | 50.91 | 22.21 | 20.87 | -4.46 | 20.59 |
| MAR 2023 | 744 | 308.88 | -3.31 | 78.57 | 18.10 | 41.40 | -2.92 | 16.10 |
| APR 2023 | 720 | 309.88 | 2.58 | 83.35 | 18.52 | 40.23 | 3.34 | 17.35 |
| MAY 2023 | 744 | 327.36 | 5.99 | 63.40 | 16.87 | 48.47 | 7.08 | 15.81 |
| JUN 2023 | 720 | 359.07 | 10.85 | 39.57 | 15.53 | 56.75 | 11.42 | 12.69 |
| **(*) Mean diff. margin = 100 * (1 - ( \|mean diff. in %/ mean diff. req. in %\| ))**<br>with mean diff. in % = 100*Mean diff/Mean DLI<br>and mean diff. req. = 5 %<br>100 refers then to a perfect product, 0 to a quality just as required, without margin.<br>A negative result indicates that the product quality does not fulfil the requirement.<br><br>**(**) SD margin = 100 * (1 - (SD in %/ SD req. in %))**<br>with SD in % = 100*SD/Mean DLI<br>with SD req. in % = 10%<br>Same comment as for Mean diff. Margin. | | | | | | | | |

**Table 25: Meteosat Indian Ocean hourly DLI quality results from JUL 2022 to JUN 2023.**

| Meteosat Indian Ocean daily DLI quality results from JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean DLI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 |
| JAN 2023 | 31 | 300.63 | -10.34 | 31.21 | 12.53 | 58.32 | -11.86 | 16.31 |
| FEB 2023 | 28 | 280.61 | -6.89 | 50.89 | 13.95 | 50.29 | -2.54 | 14.63 |
| MAR 2023 | 31 | 308.96 | -3.31 | 78.57 | 9.18 | 70.29 | -2.95 | 9.50 |
| APR 2023 | 30 | 309.86 | 2.59 | 83.28 | 8.99 | 70.99 | 3.98 | 11.29 |
| MAY 2023 | 31 | 327.38 | 6.00 | 63.35 | 8.43 | 74.25 | 7.28 | 10.03 |
| JUN 2023 | 30 | 359.08 | 10.81 | 39.79 | 6.77 | 81.15 | 10.64 | 7.75 |
| **(*) Mean diff. margin = 100 * (1 - ( \|mean diff. in %/ mean diff. req. in %\| ))**<br>with mean diff. in % = 100*Mean diff/Mean DLI<br>and mean diff. req. = 5 %<br>100 refers then to a perfect product, 0 to a quality just as required, without margin.<br>A negative result indicates that the product quality does not fulfil the requirement.<br><br>**(**) SD margin = 100 * (1 - (SD in %/ SD req. in %))**<br>with SD in % = 100*SD/Mean DLI<br>with SD req. in % = 10%<br>Same comment as for Mean diff. Margin. | | | | | | | | |

**Table 26: Meteosat Indian Ocean daily DLI quality results from JUL 2022 to JUN 2023.**

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 JUL 2022 to JUN 2023 | | | | | | |
|---|---|---|---|---|---|---|
| Month | Number of cases | Mean DLI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) |
| JUL 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 |
| JAN 2023 | 92 | 273.73 | -7.68 | 42.35 | 13.13 | 53.33 |
| FEB 2023 | 110 | 264.03 | 0.53 | 95.99 | 16.18 | 38.61 |
| MAR 2023 | 122 | 251.01 | 4.07 | 67.57 | 14.51 | 41.24 |
| APR 2023 | 118 | 271.23 | -3.49 | 74.27 | 19.38 | 29.45 |
| MAY 2023 | 110 | 294.89 | -2.12 | 85.62 | 19.3 | 35.02 |
| JUN 2023 | 118 | 315.45 | -1.59 | 89.92 | 19.16 | 39.55 |

**(*) 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: AHL DLI quality results from JUL 2022 to JUN 2023.**

Comments:
For this half year period the AHL DLI product is within mean difference target requirement for all months except January. The standard deviation is always within target requirement. The AHL flux products were upgraded on 23 May 2023.

### *5.2.2. SSI quality*

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

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

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

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

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

| GOES-East hourly SSI quality results from JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean SSI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 |
| JAN 2023 | 1024 | 180.46 | -25.36 | -40.53 | 74.94 | -38.42 | -4.91 | 54.43 |
| FEB 2023 | 2246 | 366.56 | -15.36 | 58.10 | 89.22 | 18.87 | -7.07 | 57.34 |
| MAR 2023 | 3112 | 433.75 | -10.27 | 76.32 | 102.24 | 21.43 | 1.28 | 55.51 |
| APR 2023 | 2894 | 469.97 | -7.23 | 84.62 | 88.16 | 37.47 | -3.57 | 55.23 |
| MAY 2023 | 3529 | 482.58 | -4.33 | 91.03 | 77.09 | 46.75 | -8.54 | 53.30 |
| JUN 2023 | 3104 | 503.18 | 0.75 | 98.51 | 85.26 | 43.52 | -4.36 | 62.54 |

**(*) 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 28: GOES-East hourly SSI quality results from JUL 2022 to JUN 2023.**

| GOES-East daily SSI quality results from JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean SSI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 |
| JAN 2023 | 120 | 58.14 | -4.67 | 19.68 | 16.10 | 7.69 | 0.53 | 12.41 |
| FEB 2023 | 190 | 152.27 | -1.21 | 92.05 | 17.88 | 60.86 | 0.50 | 14.64 |
| MAR 2023 | 215 | 194.80 | 2.06 | 89.43 | 18.90 | 67.66 | 3.99 | 13.56 |
| APR 2023 | 148 | 214.50 | -0.46 | 97.86 | 23.38 | 63.67 | -1.33 | 18.95 |
| MAY 2023 | 153 | 226.70 | -2.43 | 89.28 | 18.80 | 72.36 | -1.09 | 15.04 |
| JUN 2023 | 116 | 232.05 | -1.11 | 95.22 | 19.42 | 72.10 | -0.36 | 21.78 |

**(*) 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 daily SSI quality results from JUL 2022 to JUN 2023.**

Comments:
Daily statistics are good and within the requirements.
For SSI hourly statistics, statistics are good and within the requirements, except for January 2023.
In January 2023 the mean difference margin and the SD margin are negative, which means that the quality do not fulfil the requirements: there are few measurements and in winter it is classic that the quality is worse.

#### 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.

On the 21 March 2023, Meteosat-10 replaced Meteosat-11 as prime operational satellite in Meteosat 0° position. The OSI SAF Meteosat DLI and SSI products kept the same identifiers but the switch implied some changes in the file names and metadata.

| Meteosat 0° hourly SSI quality results from JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean SSI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 | 2416 | 330.94 | 3.90 | 88.22 | 66.84 | 32.68 | 3.00 | 34.12 |
| DEC 2022 | 2077 | 262.61 | 7.36 | 71.97 | 68.78 | 12.70 | 1.19 | 31.88 |
| JAN 2023 | 2282 | 271.77 | 4.74 | 82.56 | 59.98 | 26.43 | 8.79 | 34.92 |
| FEB 2023 | 2060 | 323.52 | 8.23 | 74.56 | 51.93 | 46.49 | 8.62 | 28.12 |
| MAR 2023 | 580 | 401.00 | -6.03 | 84.96 | 73.42 | 38.97 | -0.75 | 53.46 |
| APR 2023 | 3043 | 408.25 | 6.92 | 83.05 | 65.19 | 46.77 | 6.24 | 45.90 |
| MAY 2023 | 3751 | 461.55 | -2.34 | 94.93 | 60.18 | 56.54 | -1.16 | 39.06 |
| JUN 2023 | 3352 | 505,68 | 5,42 | 89,28 | 65,22 | 57,01 | 5,56 | 42,39 |
| **(*) Mean diff. margin = 100 * (1 - ( \|mean diff. in %/ mean diff. req. in %\| ))**<br>with mean diff. in % = 100*Mean diff/Mean SSI<br>and mean diff. req. = 10 %<br>100 refers then to a perfect product, 0 to a quality just as required, without margin.<br>A negative result indicates that the product quality does not fulfil the requirement.<br><br>**(**) SD margin = 100 * (1 - (SD in %/ SD req. in %))**<br>with SD in % = 100*SD/Mean SSI<br>with SD req. in % = 30%<br>Same comment as for Mean diff. Margin. | | | | | | | | |

**Table 30: Meteosat 0° hourly SSI quality results from JUL 2022 to JUN 2023.**

| Meteosat 0° daily SSI quality results from JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean SSI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 | 310 | 110.59 | 0.28 | 97.47 | 12.18 | 63.29 | -0.23 | 6.84 |
| DEC 2022 | 306 | 76.62 | 1.68 | 78.07 | 17.09 | 25.65 | 0.10 | 7.09 |
| JAN 2023 | 307 | 86.69 | 0.93 | 89.27 | 10.76 | 58.63 | 1.92 | 6.63 |
| FEB 2023 | 244 | 117.21 | 2.07 | 82.34 | 11.72 | 66.67 | 2.77 | 6.63 |
| MAR 2023 | 58 | 169.93 | -3.37 | 80.17 | 16.25 | 68.12 | 0.11 | 14.55 |
| APR 2023 | 269 | 195.40 | 2.39 | 87.77 | 16.05 | 72.62 | 2.86 | 12.84 |
| MAY 2023 | 308 | 237.61 | -2.10 | 91.16 | 15.57 | 78.16 | -1.75 | 12.94 |
| JUN 2023 | 262 | 273,92 | 2,19 | 92 | 18,59 | 77,38 | 2,15 | 15,56 |

**(*) 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° daily SSI quality results from JUL 2022 to JUN 2023.**

Comments:
Overall 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 JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean SSI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 | 2417 | 337.83 | 11.00 | 67.44 | 62.14 | 38.69 | 7.55 | 37.60 |
| DEC 2022 | 2082 | 265.17 | 10.31 | 61.12 | 69.90 | 12.13 | 2.36 | 38.22 |
| JAN 2023 | 2283 | 278.89 | 11.87 | 57.44 | 67.65 | 19.14 | 9.84 | 45.52 |
| FEB 2023 | 2076 | 339.04 | 23.10 | 31.87 | 65.23 | 35.87 | 17.17 | 44.20 |
| MAR 2023 | 1134 | 510.03 | 17.73 | 65.24 | 85.77 | 43.94 | 13.41 | 58.48 |
| APR 2023 | 3054 | 405.24 | 5.02 | 87.61 | 70.16 | 42.29 | 6.01 | 50.23 |
| MAY 2023 | 3755 | 456.35 | -7.15 | 84.33 | 68.38 | 50.05 | -1.69 | 42.92 |
| JUN 2023 | 3366 | 499.81 | 1.36 | 97.28 | 72.07 | 51.94 | 3.84 | 41.65 |

**(*) 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 Indian Ocean hourly SSI quality results from JUL 2022 to JUN 2023.**

| Meteosat Indian Ocean daily SSI quality results from JUL 2022 to JUN 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | Number of cases | Mean SSI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) | Median | RSD |
| JUL 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 | 310 | 113.20 | 2.89 | 74.47 | 13.85 | 59.22 | 1.20 | 8.50 |
| DEC 2022 | 306 | 77.52 | 2.57 | 66.85 | 18.61 | 19.98 | 0.12 | 9.53 |
| JAN 2023 | 307 | 89.03 | 3.27 | 63.27 | 13.71 | 48.67 | 2.27 | 10.34 |
| FEB 2023 | 245 | 123.32 | 7.64 | 38.05 | 15.44 | 58.27 | 5.39 | 13.26 |
| MAR 2023 | 102 | 209.29 | 5.74 | 72.57 | 17.28 | 72.48 | 6.37 | 15.10 |
| APR 2023 | 269 | 194.79 | 1.78 | 90.86 | 18.03 | 69.15 | 1.36 | 14.53 |
| MAY 2023 | 308 | 235.29 | -4.42 | 81.21 | 17.74 | 74.87 | -1.97 | 14.66 |
| JUN 2023 | 262 | 271.85 | 0.11 | 99.60 | 21.97 | 73.06 | 2.57 | 16.44 |

**(*) 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 daily SSI quality results from JUL 2022 to JUN 2023.**

Comments:
Overall statistics are good and within the requirement.

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

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

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

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

**Table 34: Validation stations that may be used for AHL radiative fluxes quality assessment.**

The stations listed in table 34 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 34. 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](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 JUL 2022 to JUN 2023 | | | | | | |
|---|---|---|---|---|---|---|
| Month | Number of cases | Mean SSI in $Wm^{-2}$ | Mean diff. in $Wm^{-2}$ | Mean diff. margin in % (*) | SD in $Wm^{-2}$ | SD margin in % (**) |
| JUL 2022 | 246 | 174.77 | -3.85 | 61.54 | 36.21 | 32.42 |
| AUG 2022 | 246 | 143.38 | -0.58 | 94.17 | 35.36 | 18.14 |
| SEP 2022 | 238 | 83.82 | -3.43 | 65.73 | 22.24 | 15.02 |
| OCT 2022 | 195 | 39.72 | -3.00 | 70.01 | 13.76 | -7.33 |
| NOV 2022 | 99 | 14.29 | -3.01 | 69.93 | 7.91 | -52.45 |
| DEC 2022 | 25 | 9.55 | -5.20 | 48.00 | 6.28 | -41.94 |
| JAN 2023 | 31 | 11.35 | -6.38 | 36.22 | 8.41 | -58.12 |
| FEB 2023 | 120 | 27.36 | -6.65 | 33.47 | 18.14 | -77.83 |
| MAR 2023 | 209 | 61.71 | -11.17 | -11.67 | 25.06 | -14.65 |
| APR 2023 | 208 | 129.17 | -8.2 | 17.98 | 37.13 | 9.92 |
| MAY 2023 | 194 | 172.21 | 0.58 | 94.17 | 40.53 | 21.28 |
| JUN 2023 | 208 | 241.87 | 10.89 | -8.89 | 45.27 | 34.67 |

**(*) 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 35: AHL SSI quality results from JUL 2022 to JUN 2023.**

Comments:
For this half year period the AHL SSI products is within the mean difference target requirement for all month except slightly outside in March and June, and always within threshold requirement. For the standard deviation it is within the target requirement for April to June and outside in January to March. The AHL flux products were upgraded on 23 May 2023.

## 5.3. Sea Ice quality

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

The OSI-410-a 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-a 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.

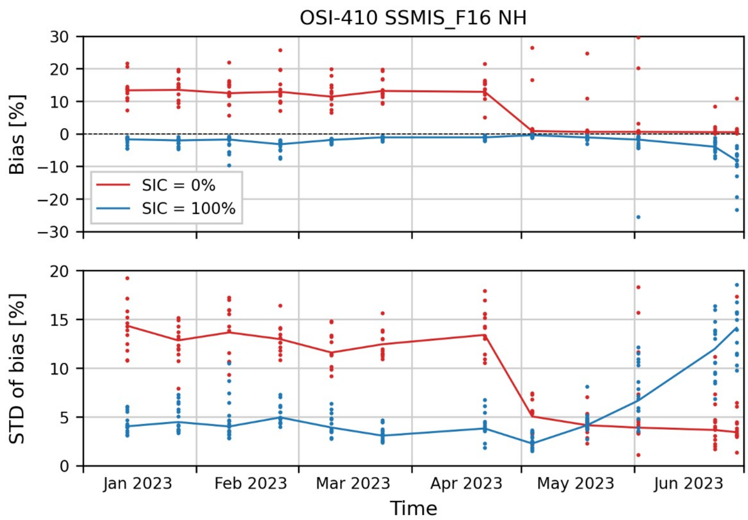


**Figure 26: For OSI-410-a SSMIS F16 in the Northern hemisphere:**

**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.**

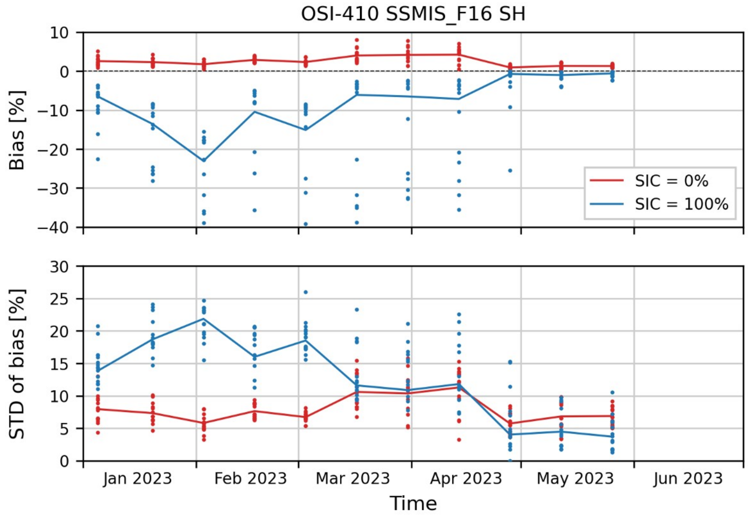


**Figure 27: For OSI-410-a SSMIS F16 in the Southern hemisphere:**

**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.**

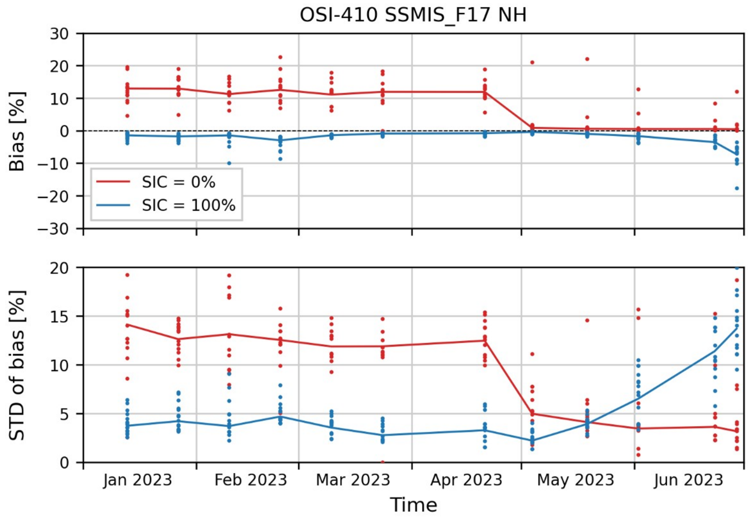


**Figure 28: For OSI-410-a SSMIS F17 in the Northern hemisphere:**

**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.**

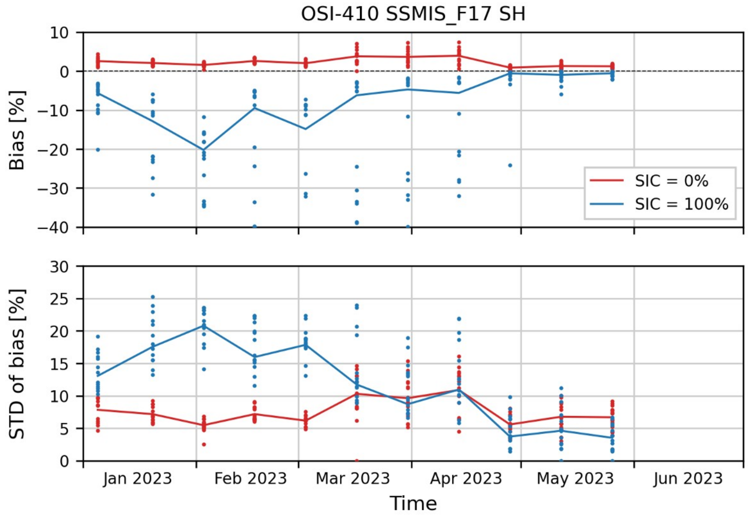


**Figure 29: For OSI-410-a SSMIS F17 in the Southern hemisphere:**

**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.**

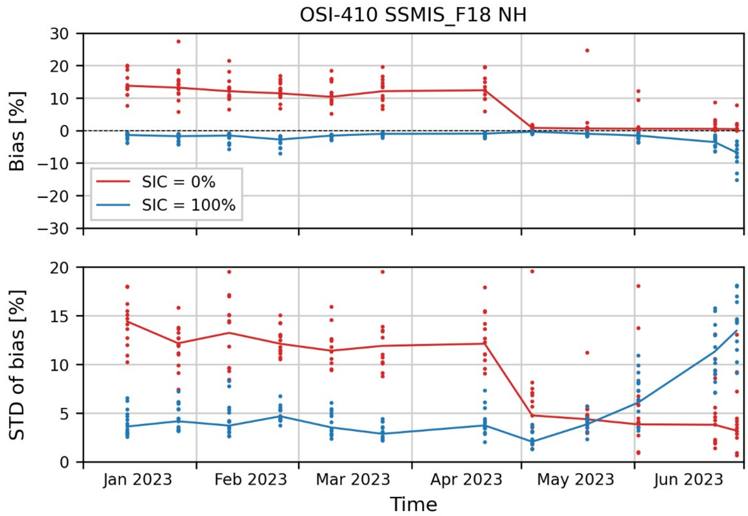


**Figure 30: For OSI-410-a SSMIS F18 in the Northern hemisphere:**

**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.**

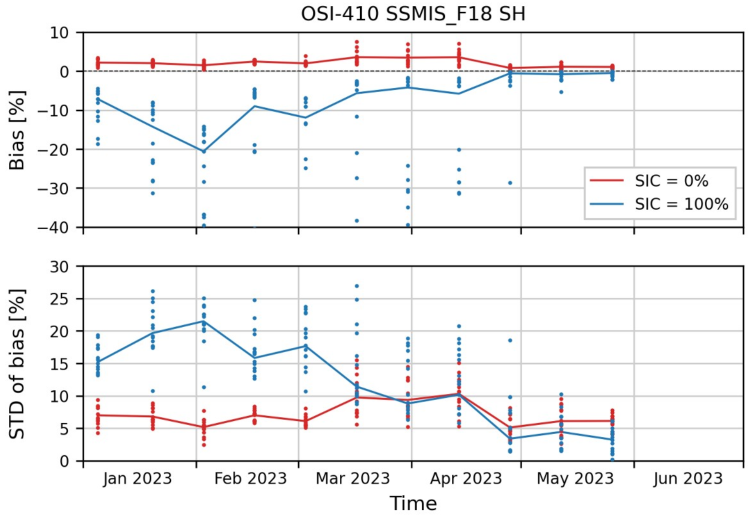


**Figure 31: For OSI-410-a SSMIS F18 in the Southern hemisphere:Top plot: Difference between ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the 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.**

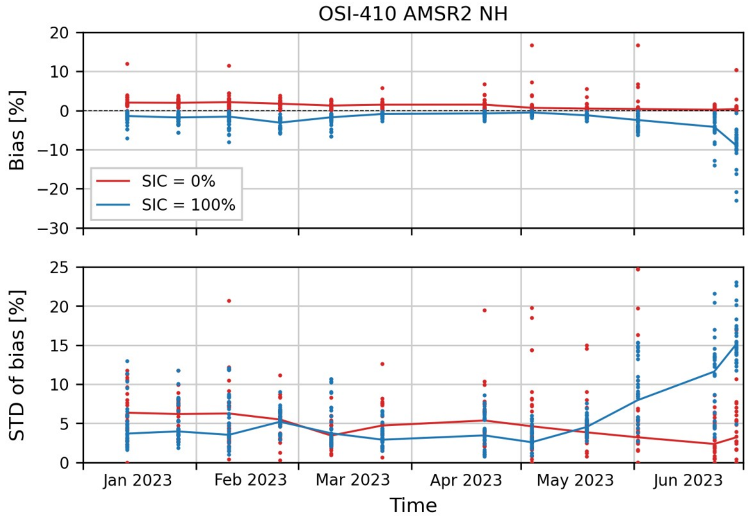


**Figure 32: For OSI-410-a AMSR2, in the Northern hemisphere:**

**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.**

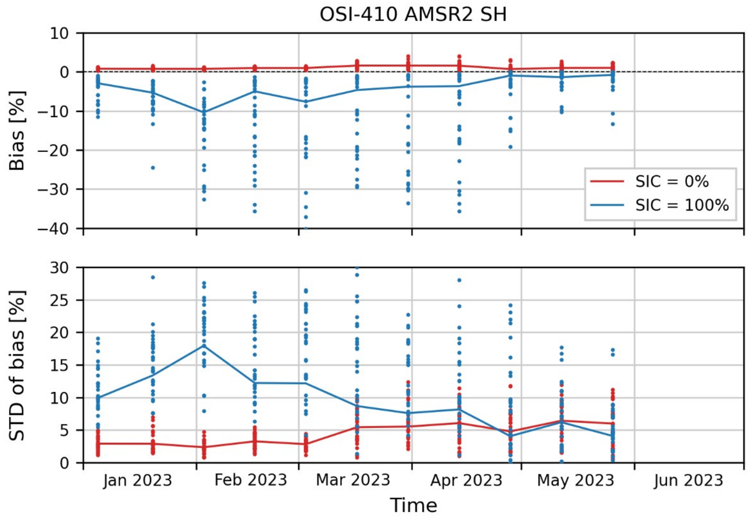


**Figure 33: For OSI-410-a AMSR2, in the Southern hemisphere:**

**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 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OSI-410-a | Northern hemisphere | | | | Southern hemisphere | | | |
| Category | Ice | | Water | | Ice | | Water | |
| Metric (%) | Bias | STD | Bias | STD | Bias | STD | Bias | STD |
| SSMIS F16 | -2.36 | 5.61 | 7.73 | 9.28 | -8.25 | 12.31 | 2.53 | 7.92 |
| SSMIS F17 | -2.04 | 5.30 | 7.30 | 8.99 | -7.42 | 11.68 | 2.33 | 7.61 |
| SSMIS F18 | -2.01 | 5.25 | 7.37 | 8.94 | -7.32 | 11.94 | 2.16 | 7.17 |
| AMSR2 | -2.38 | 5.70 | 1.18 | 4.60 | -4.32 | 9.49 | 1.06 | 4.40 |

Comments:
All sensor products perform well in the Northern hemisphere, where all bias and STD values are below the target accuracy of 10 %. In the Southern hemisphere, all sensor products performs worse over ice, but still within the target accuracy of 15 %.

### *5.3.2. Global sea ice concentration (OSI-401-d) 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.

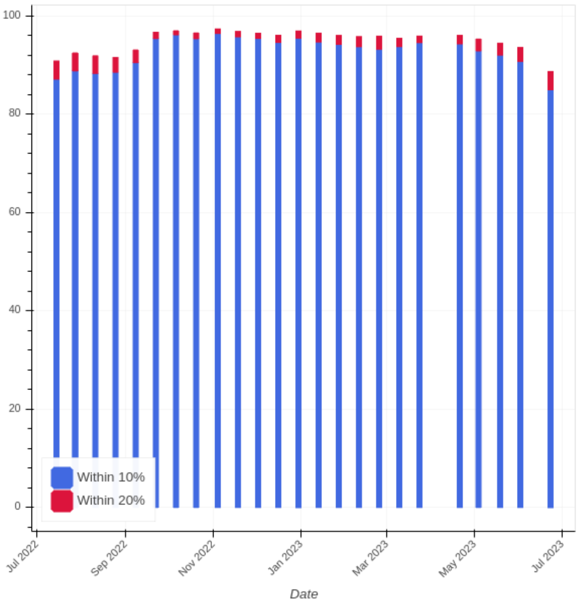


**Figure 34: Comparison of ice concentrations from NIC ice analysis and the OSI SAF concentration product. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%.**

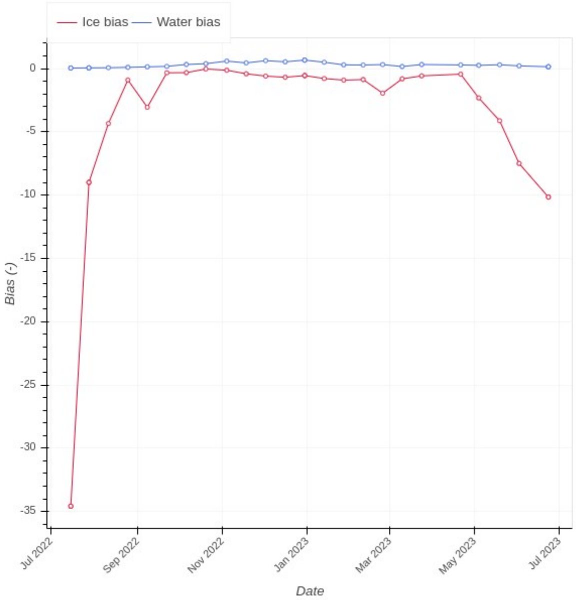


**Figure 35: Difference between ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Northern hemisphere.**

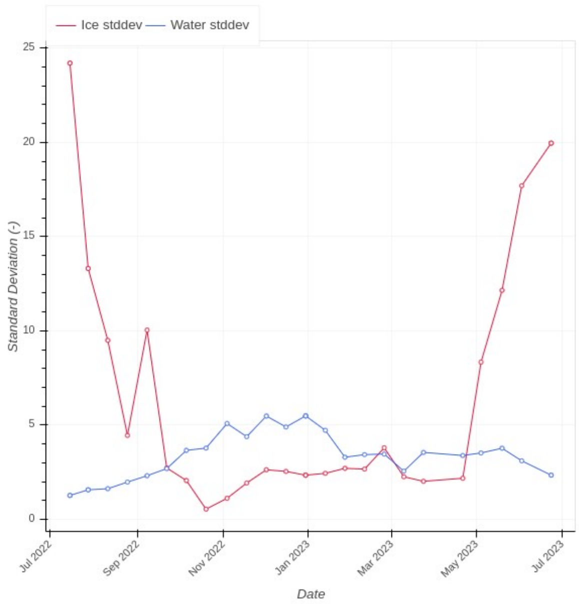


**Figure 36: Standard deviation of the difference in ice concentrations from NIC ice analysis and OSI SAF concentration product for two categories: water and ice. Northern hemisphere.**

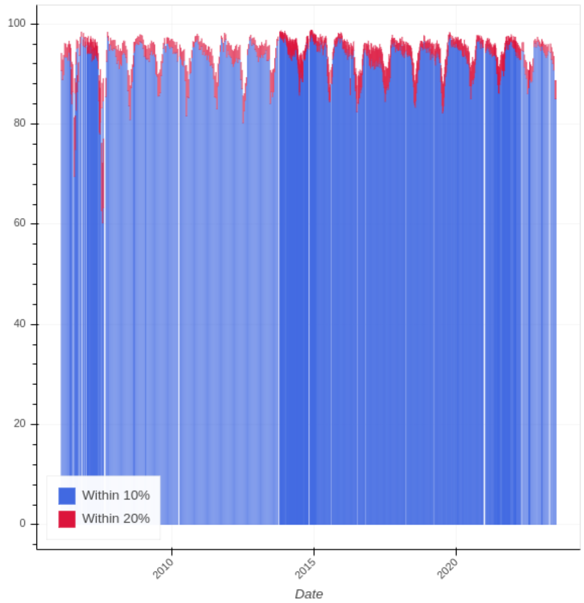


**Figure 37: Multiyear variability. Comparison between ice concentrations from NIC ice analysis and the OSI SAF concentration product. ‘Match +/- 10%’ corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Northern hemisphere.**

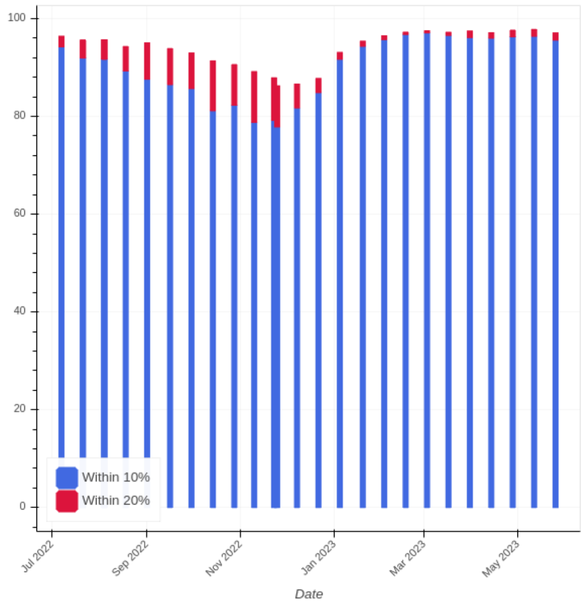


**Figure 38: Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/-10%, and likewise for +/-20%. Southern hemisphere.**

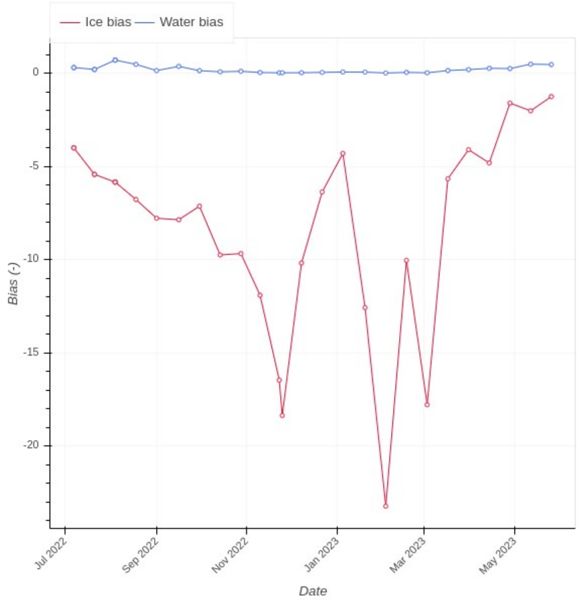


**Figure 39: Difference between the ice concentrations from the NIC ice analysis and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Southern hemisphere.**

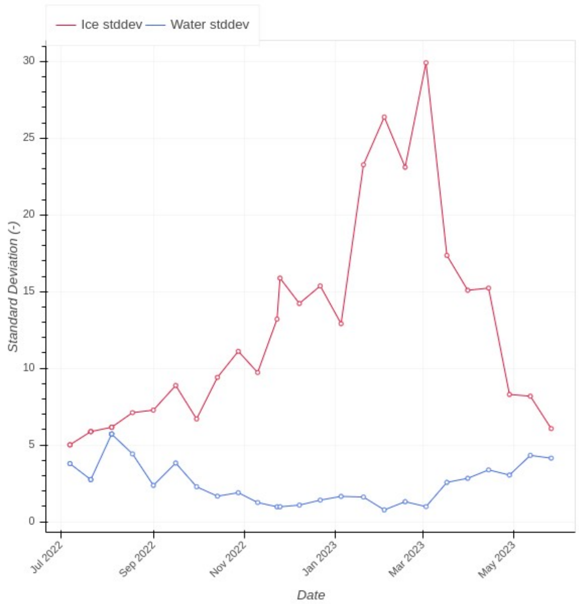


**Figure 40: Standard deviation of the difference in ice concentrations from the NIC ice analysis and OSI SAF concentration product for two categories: water and ice. Southern hemisphere.**

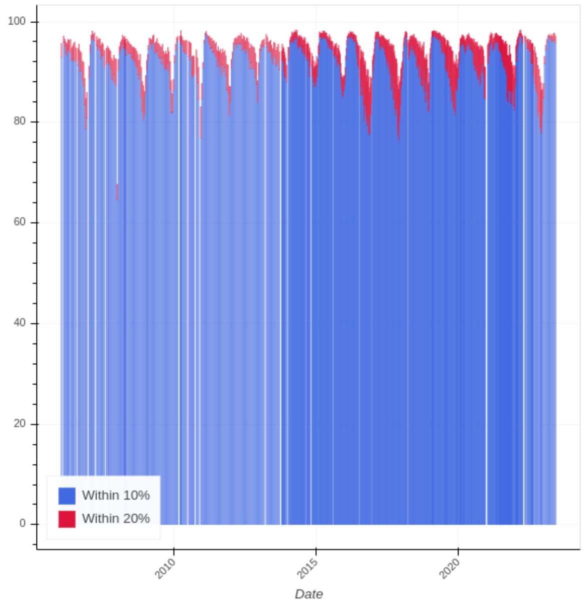


**Figure 41: Multiyear variability. Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Southern hemisphere.**

| Concentration product | | | | | |
|---|---|---|---|---|---|
| Month | +/- 10% [%] | +/- 20% [%] | Mean difference [%] | SD [%] | Number of obs. |
| JUL 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 |
| JAN 2023 | 95.58 | 96.82 | -1.64 | 6.31 | 252974 |
| FEB 2023 | 94.90 | 96.19 | -1.95 | 7.45 | 227202 |
| MAR 2023 | 93.35 | 94.92 | -2.50 | 8.14 | 207770 |
| APR 2023 | 95.04 | 96.30 | -2.11 | 8.20 | 161172 |
| MAY 2023 | 95.77 | 96.92 | -1.71 | 7.15 | 172317 |
| JUN 2023 | 93.64 | 95.25 | -2.29 | 7.68 | 243491 |

**Table 36: Monthly quality assessment results from comparing the OSI SAF sea ice concentration product to MET Norway ice service analysis for the Svalbard area, from JUL 2022 to JUN 2023. 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. |
| JUL 2022 | - | - | - | - | - |
| AUG 2022 | - | - | - | - | - |
| SEP 2022 | - | - | - | - | - |
| OCT 2022 | - | - | - | - | - |
| NOV 2022 | 93.76 | 96.78 | -3.77 | 10.20 | 181137 |
| DEC 2022 | 82.06 | 94.58 | -6.07 | 11.81 | 166194 |
| JAN 2023 | 92.39 | 97.70 | -3.95 | 8.39 | 397242 |
| FEB 2023 | 95.80 | 98.53 | -3.52 | 6.72 | 331369 |
| MAR 2023 | 97.28 | 98.92 | -3.18 | 6.20 | 327463 |
| APR 2023 | 98.25 | 99.36 | -2.80 | 4.97 | 79744 |
| MAY 2023 | - | - | - | - | - |
| JUN 2023 | - | - | - | - | - |

**Table 37: 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 JUL 2022 to JUN 2023. 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 36 and Figure 40 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. However the requirement is on the yearly (and not half-yearly) average std. dev. of the difference.
The NIC ice analysis is only available every second week. 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 last year (July 2022 to June 2023) can be seen in the table just below. The product are within 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 | 8.83 | 3.22 |
| Southern Hemishpere | 11.70 | 2.77 |

### *5.3.3. Global sea ice concentration (OSI-408-a) quality*

The OSI-408-a 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-d) 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.

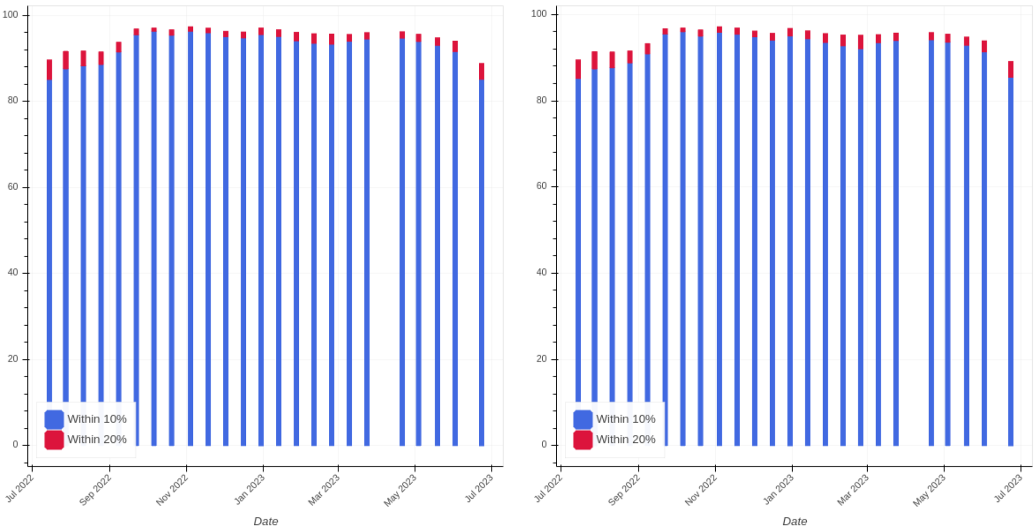


**Figure 42: Comparison of ice concentrations from the NIC ice analysis and the OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%**

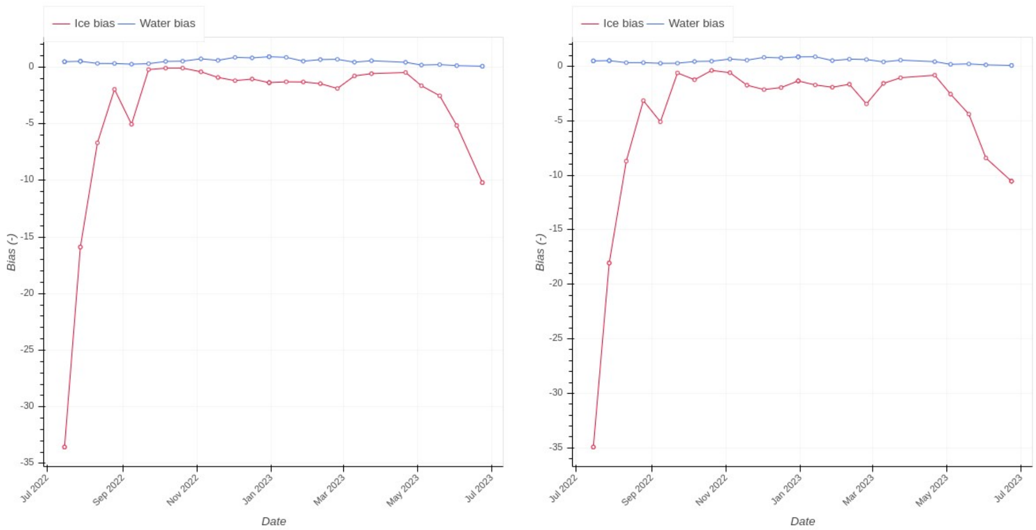


**Figure 43: Difference between ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern Hemisphere**

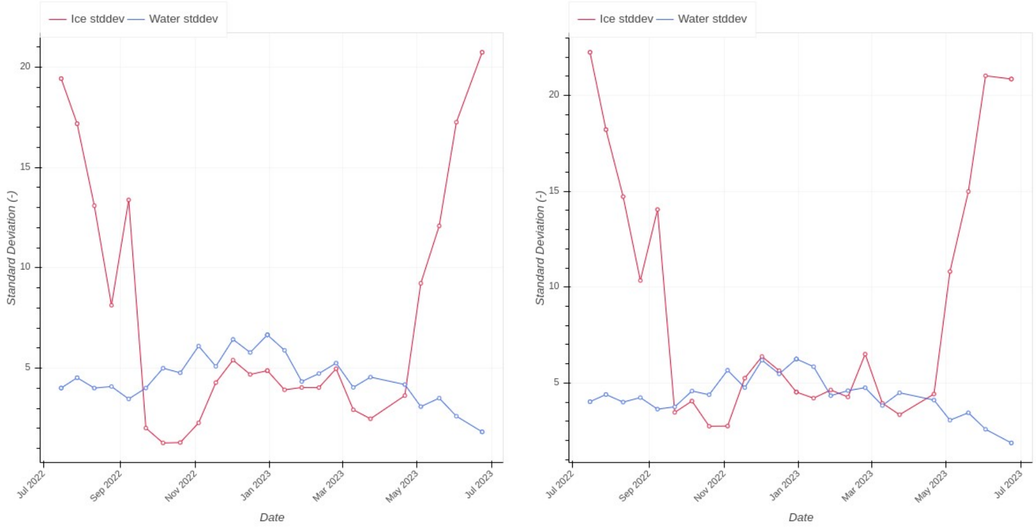


**Figure 44: Standard deviation of the difference in ice concentrations from the Greenland overview charts made by DMI and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern hemisphere.**

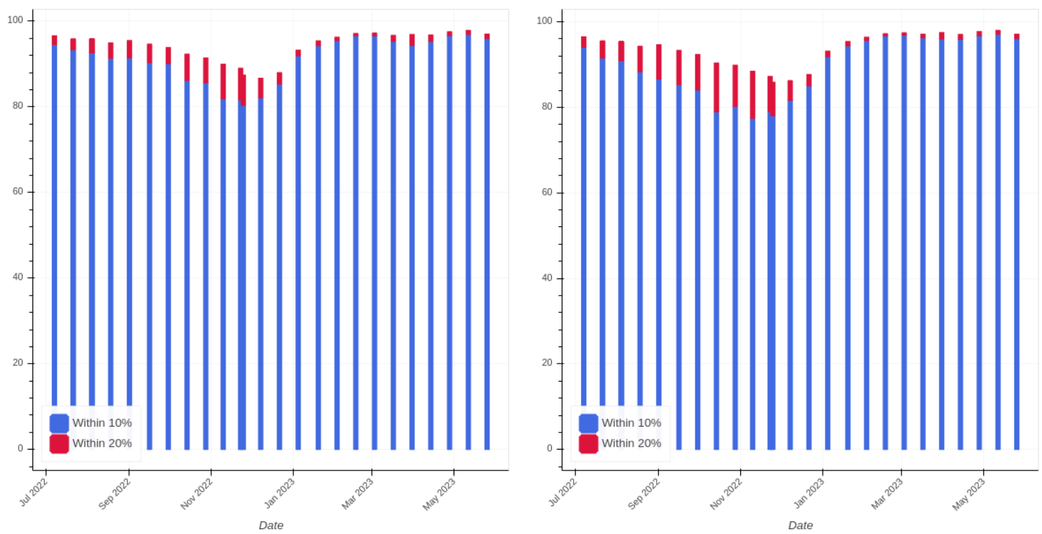


**Figure 45: Comparison of ice concentrations from the NIC ice analysis and the OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right. Southern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%**

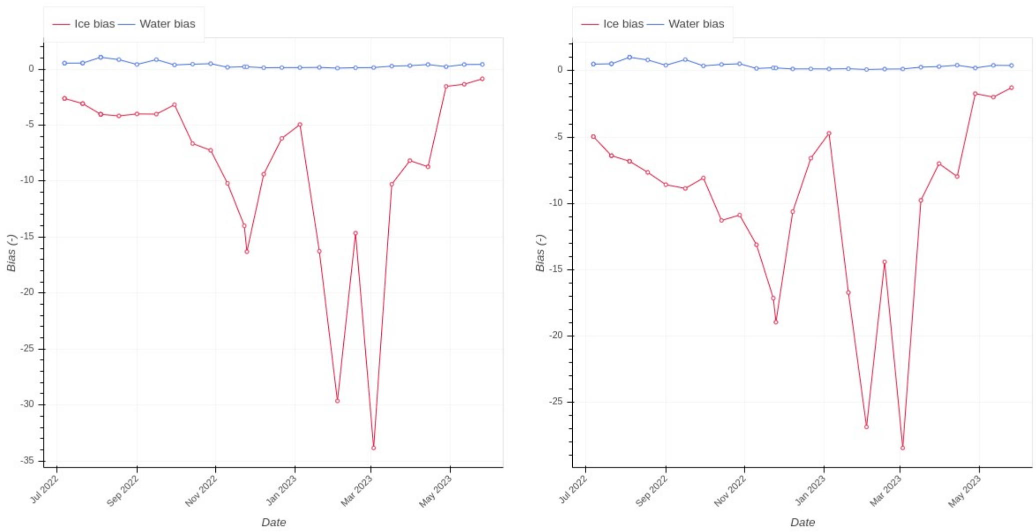


**Figure 46: Difference between ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Southern Hemisphere**

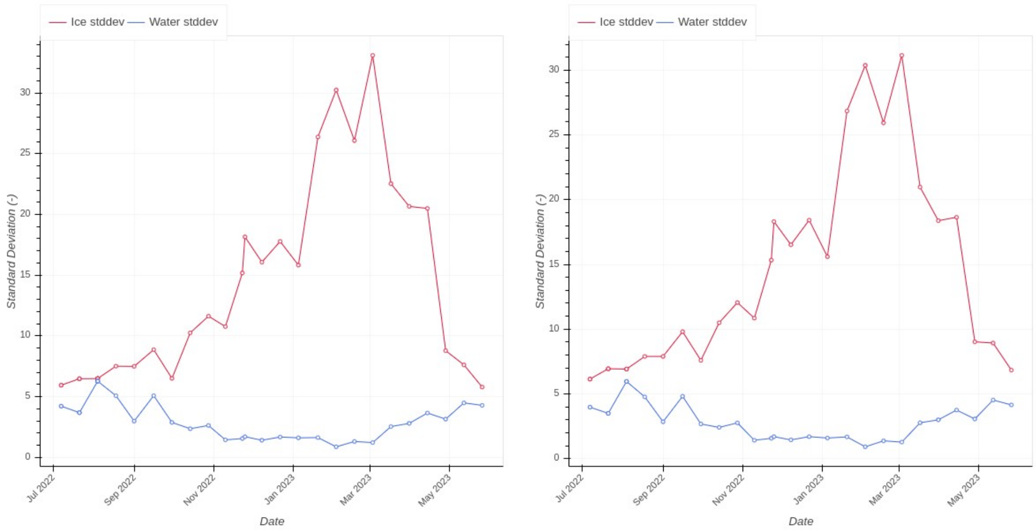


**Figure 47: Standard deviation of the difference in ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and, ice. Southern hemisphere.**

Comments:

Figure 44 and Figure 47 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. However the requirement is on the yearly (and not half-yearly) average std. dev. of the difference.

The NIC ice analysis is only available every second week. 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 TUD algorithm product are within target accuracy of 10 % and 15 % for the NH and SH products, respectively. This is also the case for the OSHD algorithm product for Southern Hemisphere, however, for the NH hemisphere the product is a little above the target for this period, but within threshold accuracy.

| Average yearly standard deviation | | | |
|---|---|---|---|
| | | Average SD Ice | Average SD Water |
| OSHD algorithm | NH | 11.15 | 4.11 |
| | SH | 13.38 | 3.11 |
| TUD algorithm | NH | 9.91 | 4.24 |
| | SH | 13.26 | 3.17 |

### *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.

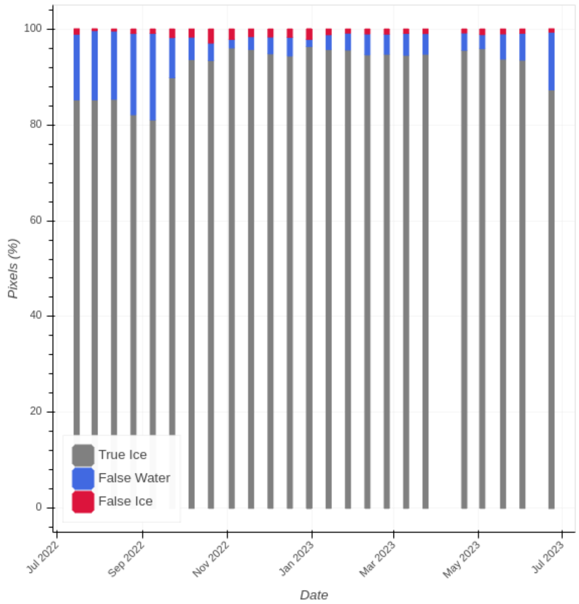


**Figure 48: Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Northern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the DMI ice analysis indicated ice and vice versa for the 'False Ice' category.**

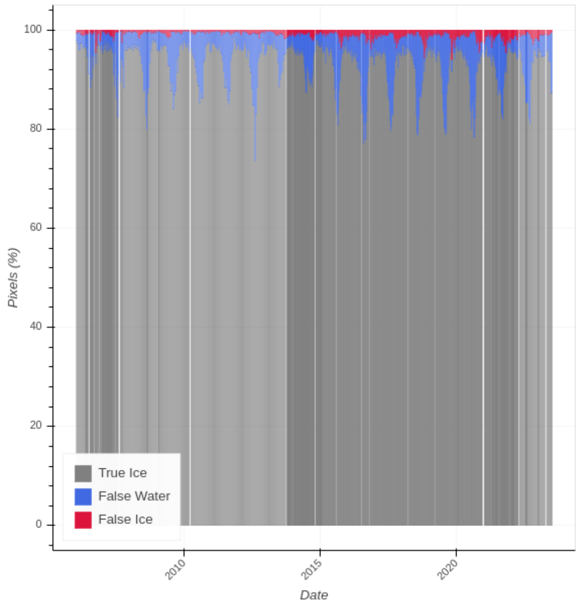


**Figure 49: Multiyear variability. Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Northern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the DMI ice analysis indicated ice and vice versa for the 'False Ice' category.**

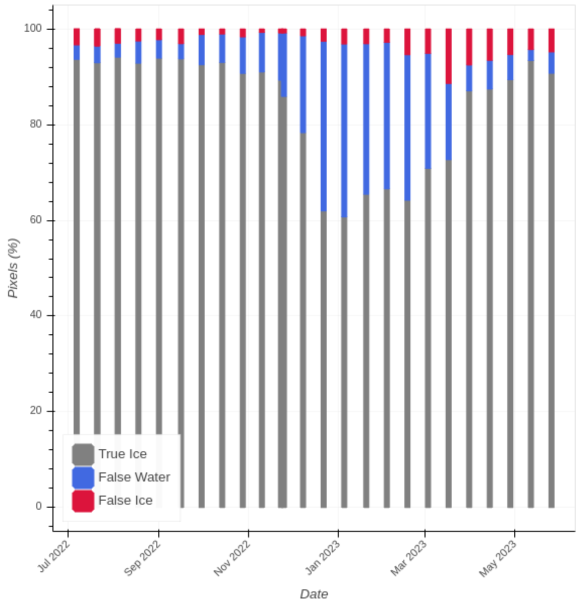


**Figure 50: Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'False Ice' category.**

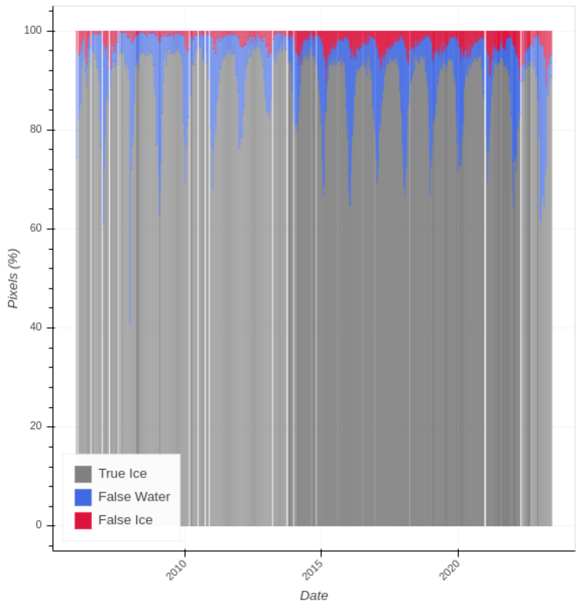


**Figure 51: Multiyear variability. Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'False Ice' category.**

| Month | Correct [%] | SAF lower [%] | SAF higher [%] | Mean edge diff [km] | Number of obs. |
|---|---|---|---|---|---|
| JUL 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 | 0.30 | 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 |
| JAN 2023 | 97.26 | 1.15 | 1.58 | 14.09 | 427361 |
| FEB 2023 | 97.51 | 1.44 | 1.05 | 14.28 | 356260 |
| MAR 2023 | 97.36 | 1.57 | 1.06 | 15.57 | 456234 |
| APR 2023 | 97.73 | 1.36 | 0.92 | 15.28 | 360615 |
| MAY 2023 | 97.79 | 1.07 | 1.14 | 15.66 | 331547 |
| JUN 2023 | 96.26 | 2.82 | 0.92 | 27.86 | 394679 |

**Table 38: Monthly quality assessment results from comparing OSI SAF sea ice products to MET Norway ice service analysis for the Svalbard area, from JUL 2022 to JUN 2023. 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 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 |
| JAN 2023 | 97.39 | 2.13 | 0.48 | 70.35 | 462845 |
| FEB 2023 | 98.47 | 0.99 | 0.54 | 45.57 | 370664 |
| MAR 2023 | 98.70 | 0.89 | 0.40 | 40.75 | 370976 |
| APR 2023 | 99.21 | 0.54 | 0.25 | 28.36 | 92581 |
| MAY 2023 | - | - | - | - | - |
| JUN 2023 | - | - | - | - | - |

**Table 39: Monthly quality assessment results from comparing OSI SAF sea ice products to MET Norway ice service analysis for the Weddell Sea area, from JUL 2022 to JUN 2023. 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 38, the Northern Hemisphere OSI SAF sea-ice edge product is compared with navigational ice charts from the Svalbard region (MET Norway ice service). The yearly averaged edge difference for the recent 12 months in 2021/2022 is 14.9 km and the target accuracy requirement of 20 km edge difference per year is therefore met. As previous years, the monthly differences are well below the yearly requirement all months except the summer month of June when melting of snow and ice makes the product quality worse.

In Table 39, the Southern Hemisphere OSI SAF sea-ice edge product is compared with navigational ice charts from the Weddell Sea region (MET Norway ice service). These ice charts are only provided during the Antarctic summer months October to early April. The yearly averaged edge difference for the seven months with available ice charts in the period of July 2022 to June 2023 is 49.7 km, which is a little above the target accuracy requirement of 45 km edge difference per year. The requirement is therefore not met. The monthly differences are above the requirement in the mid-summer months, November to February, 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 (STD) in the difference from the running mean of the multi-year ice (MYI) area coverage shall be below 100.000km$^2$ to meet the target accuracy requirement.

| Month | STD wrt running mean [km²] | Mean MYI coverage [km²] |
|---|---|---|
| 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 |
| JAN 2023 | 100,005 | 2,020,350 |
| FEB 2023 | 96,378 | 2,171,813 |
| MAR 2023 | 106,597 | 1,869,166 |
| APR 2023 | 66,222 | 1,486,910 |
| MAY 2023 | - | - |
| JUN 2023 | - | - |

**Table 40: Monitoring of NH sea ice type quality by comparing the multiyear ice coverage with the 11-days running mean, from JUL 2022 to JUN 2023.**

| Month | STD wrt running mean [km²] | Mean MYI coverage [km²] |
|---|---|---|
| JUL 2022 | 68,689 | 773,090 |
| AUG 2022 | 65,629 | 816,753 |
| SEP 2022 | - | - |
| OCT 2022 | - | - |
| NOV 2022 | - | - |
| DEC 2022 | - | - |
| JAN 2023 | - | - |
| FEB 2023 | - | - |
| MAR 2023 | 44,182 | 412,731 |
| APR 2023 | 44,792 | 438,192 |
| MAY 2023 | 77,089 | 444,044 |
| JUN 2023 | 49,115 | 462,294 |

**Table 41: Monitoring of SH sea ice type quality by comparing the multiyear ice coverage with the 11-days running mean, from JUL 2022 to JUN 2023.**

Comments:
Table 40 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 high values close to the requirement of 100.000 km$^2$, with October 2022, January and March 2023 being slightly above the requirement, and December 2022 being largely above the requirement. As commented in previous HYR, the extra high number in December 2022 was due to 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 41 shows the corresponding 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 52 is the difference between the hemispheric OSI SAF product and the validation product.

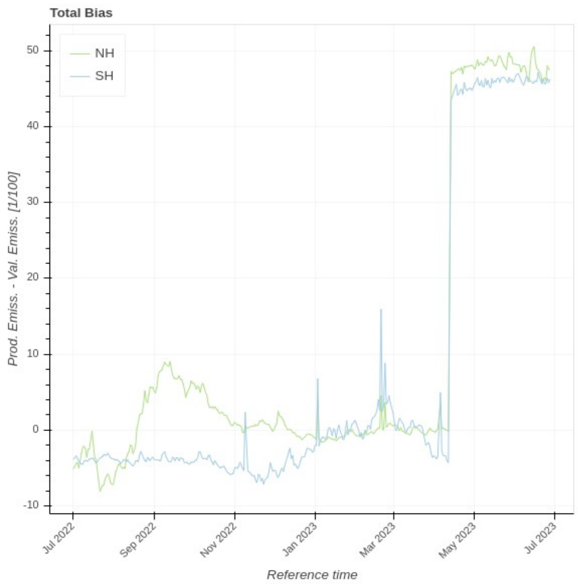


**Figure 52: The mean hemispheric difference between the OSI SAF operational product and the validation product derived from NWP and SSMIS data.**

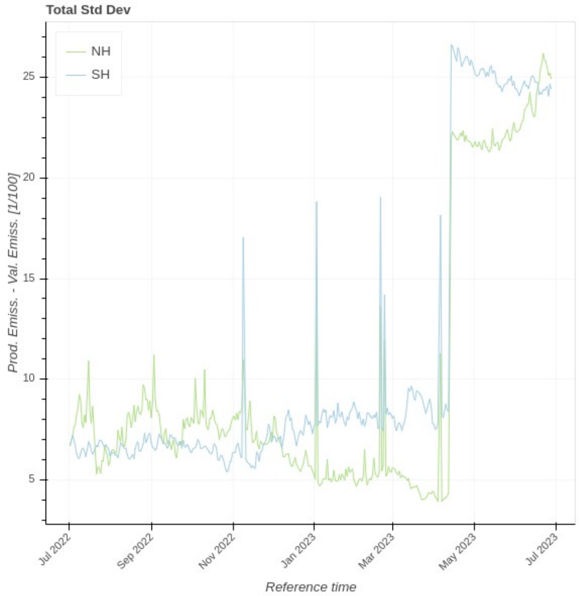


**Figure 53: The standard deviation of the difference between the OSI SAF operational product and the validation product for the northern and southern hemispheres.**

Comments:
The standard deviation of the Emissivity product is above the target accuracy on a yearly basis, but below the threshold accuracy as can be seen in the table below.
In Figure 52 and 53 a large jump can be seen in the bias and standard deviation, respectively. It has been confirmed that the 50 and 52 GHz brightness temperature from F18 SSMIS have been corrupted since April 12 2023. This affects the effective temperature of the product and the validation product and is hence visible in the validation plots.

We are with the coming update of the emissivity product looking into the brightness temperature at 50 and 52 GHz from F17 SSMIS in order to hopefully be able to use this instead.

| | Mean difference | SD | Target accuracy | Threshold accuracy |
|---|---|---|---|---|
| NH | 0.1 | 0.1 | ± 0.05 | ± 0.15 |
| SH | 0.07 | 0.1 | ± 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.

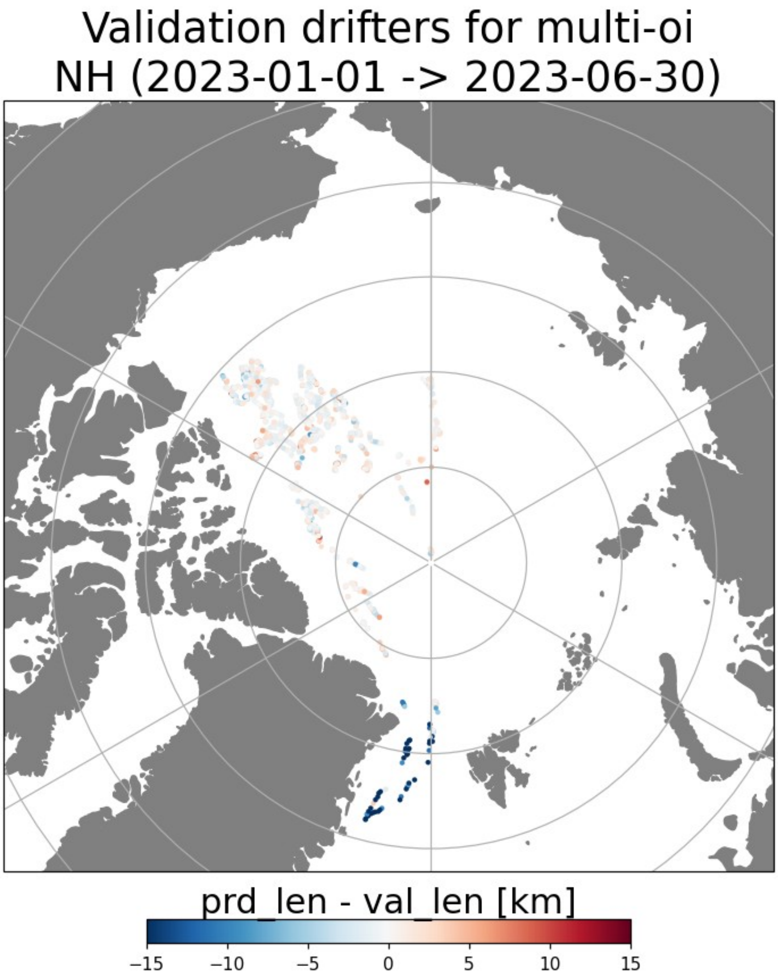


**Figure 54: Location of GPS drifters for the quality assessment period (JAN 2023 to JUN 2023) in NH. The shade of each symbol represents the mean difference (prod-ref) in drift length (km over 2 days) for the multi-oi product.**

| Month | b(X) [km] | b(Y) [km] | σ(X) [km] | σ(Y) [km] | α | β[km] | ρ | N |
|---|---|---|---|---|---|---|---|---|
| JUL 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 |
| JAN 2023 | -0.89 | -2.18 | 4.98 | 7.78 | 0.69 | -1.58 | 0.91 | 418 |
| FEB 2023 | -0.1 | -0.57 | 2.63 | 4.14 | 0.81 | -0.68 | 0.94 | 227 |
| MAR 2023 | -0.16 | 0.33 | 2.13 | 1.76 | 0.99 | 0.13 | 0.98 | 242 |
| APR 2023 | -0.26 | -0.04 | 1.57 | 1.48 | 0.97 | -0.16 | 0.98 | 285 |
| MAY 2023 | -0.03 | 0.29 | 2.21 | 2.24 | 0.98 | 0.21 | 0.95 | 222 |
| JUN 2023 | 0.31 | 0.53 | 3.38 | 3.92 | 0.91 | 0.54 | 0.85 | 247 |
| Last 12 months | -0.54 | -0.62 | 4.33 | 5.35 | 0.82 | -0.04 | 0.91 | 2840 |

**Table 42: Quality assessment results for the LRSID (multi-oi) product (NH) for JUL 2022 to JUN 2023.**

| Month | b(X) [km] | b(Y) [km] | σ(X) [km] | σ(Y) [km] | α | β[km] | ρ | N |
|---|---|---|---|---|---|---|---|---|
| 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 |
| JAN 2023 | -0.41 | -0.78 | 4.79 | 5.46 | 0.82 | -0.98 | 0.91 | 372 |
| FEB 2023 | 0.34 | -0.34 | 3.45 | 3.04 | 0.98 | -0.08 | 0.92 | 217 |
| MAR 2023 | -0.02 | 0.22 | 3.66 | 4.67 | 0.98 | 0.24 | 0.93 | 227 |
| APR 2023 | -0.16 | -0.09 | 2.55 | 2.46 | 0.96 | -0.14 | 0.95 | 276 |
| MAY 2023 | -- | -- | -- | -- | -- | -- | -- | 0 |
| JUN 2023 | -- | -- | -- | -- | -- | -- | -- | 0 |
| Last 12 months | -0.31 | -0.52 | 4.08 | 4.99 | 0.88 | -0.14 | 0.92 | 1434 |

**Table 43: Quality assessment results for the LRSID (SSMIS-F18) product (NH) for JUL 2022 to JUN 2023.**

**NOT PRODUCED: Not enough SH drifters.**

**Figure 55: Location of GPS drifters for the quality assessment period (JAN 2023 to JUN 2023) 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 |
| ssmis-f18 | -- | -- | -- | -- | -- | -- | -- | 0 |
| amsr2-gw1 | -- | -- | -- | -- | -- | -- | -- | 0 |

**Table 44: Quality assessment results for selected OSI-405-c products (SH) for the last 12 months (JUL 2022 to JUN 2023).**

Comments:
The validation statistics for OSI-405 in H1 2023 are nominal but perturbed by the lack of available drifters. In the Arctic (NH) Jan 2023 stands out as a month with large RMSE and bias, which is when a couple of drifters travelled south in the Fram Strait and along the east coast of Greenland. This area is known to be challenging for OSI-405 (and other similar low resolution sea-ice drift products). By February these buoys had exited the sea-ice cover and no longer perturbed the validation statistics. Validation statistics for Feb – June 2023 where nominal. In H1 2023 it was not possible to compute validation statistics for the Southern Ocean because of the lack of drifter data.

### *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-neighbour 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 45 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 56, 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.

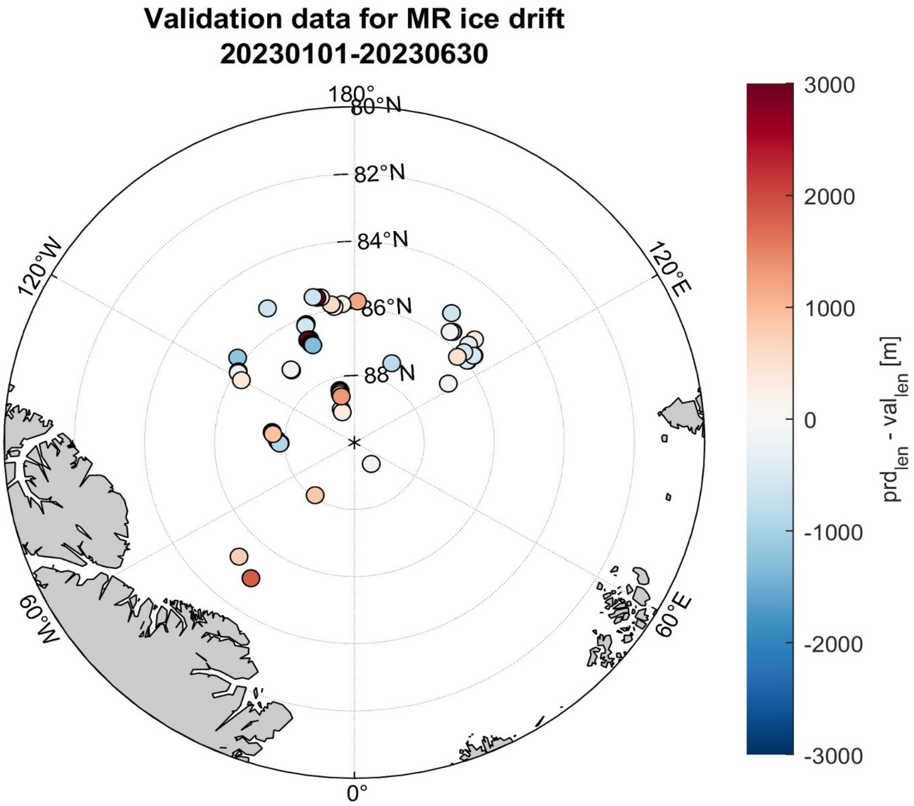


**Figure 56: Location of GPS drifters for the quality assessment period (1st half 2023). The shade of each symbol represents the difference (prod-def) in drift length in meters**

**Figure 57: Scatter plot for all the observations of the buoys shown in the previous figure (1st half 2023).**

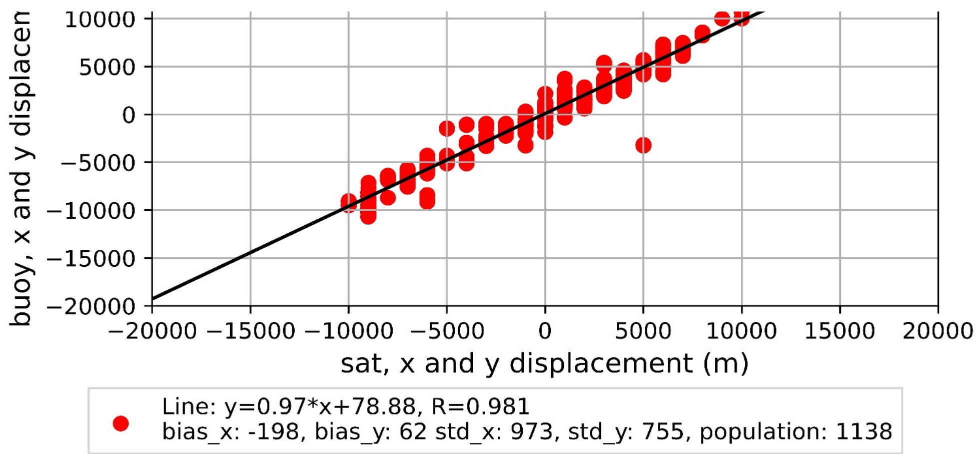


**Figure 57: Correlation scatter plot showing the MR sea ice drift product (OSI-407) performance (1st half 2023).**

| Month | b(X) [m] | b(Y) [m] | σ(X) [m] | σ(Y) [m] | α | β [m] | ρ | N |
|---|---|---|---|---|---|---|---|---|
| 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 | 112 | 1.00 | 760.72 | 0.999 | 8 |
| OCT 2022 | - | - | - | - | - | - | - | - |
| 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 |
| JAN 2023 | -129 | -128 | 1047 | 778 | 0.97 | 187.60 | 0.979 | 392 |
| FEB 2023 | 342 | 480 | 528 | 668 | 1.02 | -503.13 | 0.994 | 68 |
| MAR 2023 | -309 | -5 | 1017 | 708 | 0.99 | 144.63 | 0.967 | 520 |
| APR 2023 | -445 | 629 | 482 | 621 | 0.89 | -193.74 | 0.994 | 92 |
| MAY 2023 | 198 | 518 | 602 | 407 | 0.93 | -446.44 | 0.994 | 56 |
| JUN 2023 | -705 | 415 | 582 | 718 | 0.93 | 18.40 | 0.972 | 10 |
| Last 12 months | -49 | 142 | 1185 | 773 | 0.95 | -37.52 | 0.975 | 2474 |

**Table 45: MR sea ice drift product (OSI-407-a) performance, JUL 2022 to JUN 2023**

Comments:
The optimal accuracy of 1 km standard deviation is met in all months in the first half of 2023, except for January and March where the standard deviation in one direction exceeds it with a few meters. Still, these values are well within the target accuracy of 2 km. The same can be said for the yearly standard deviation, so the product requirements are met.

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. A total of 8 different buoys are used, and the ID's of the buoys are as given below.

2601510, 260156, 2601713, 2601716, 4601812, 4601818, 4802592, 4802603.

The outlier shown in the correlation scatter plot (Figure 57) is from 20 January 2023 at a time where the sea ice changed direction rapidly according to both the buoy (4802603) and the product.

## 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 July 2021 to June 2023.

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/](https://nwp-saf.eumetsat.int/site/monitoring/winds-quality-evaluation/scatterometer-mon/).

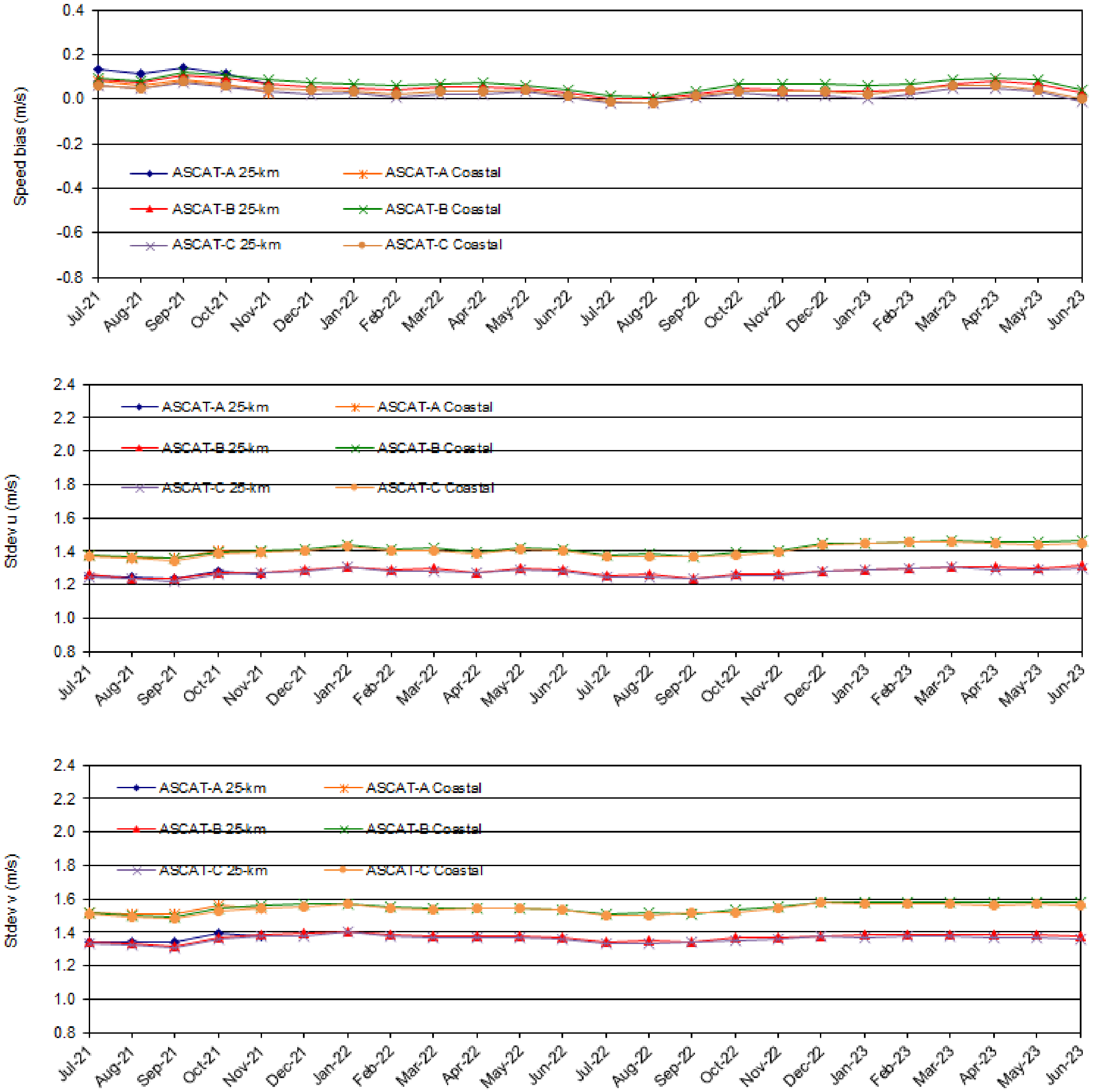


**Figure 58: Comparison of ASCAT scatterometer winds against ECMWF NWP forecast winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus ECMWF, top), wind u component standard deviation (middle) and wind v component standard deviation (bottom) are shown.**

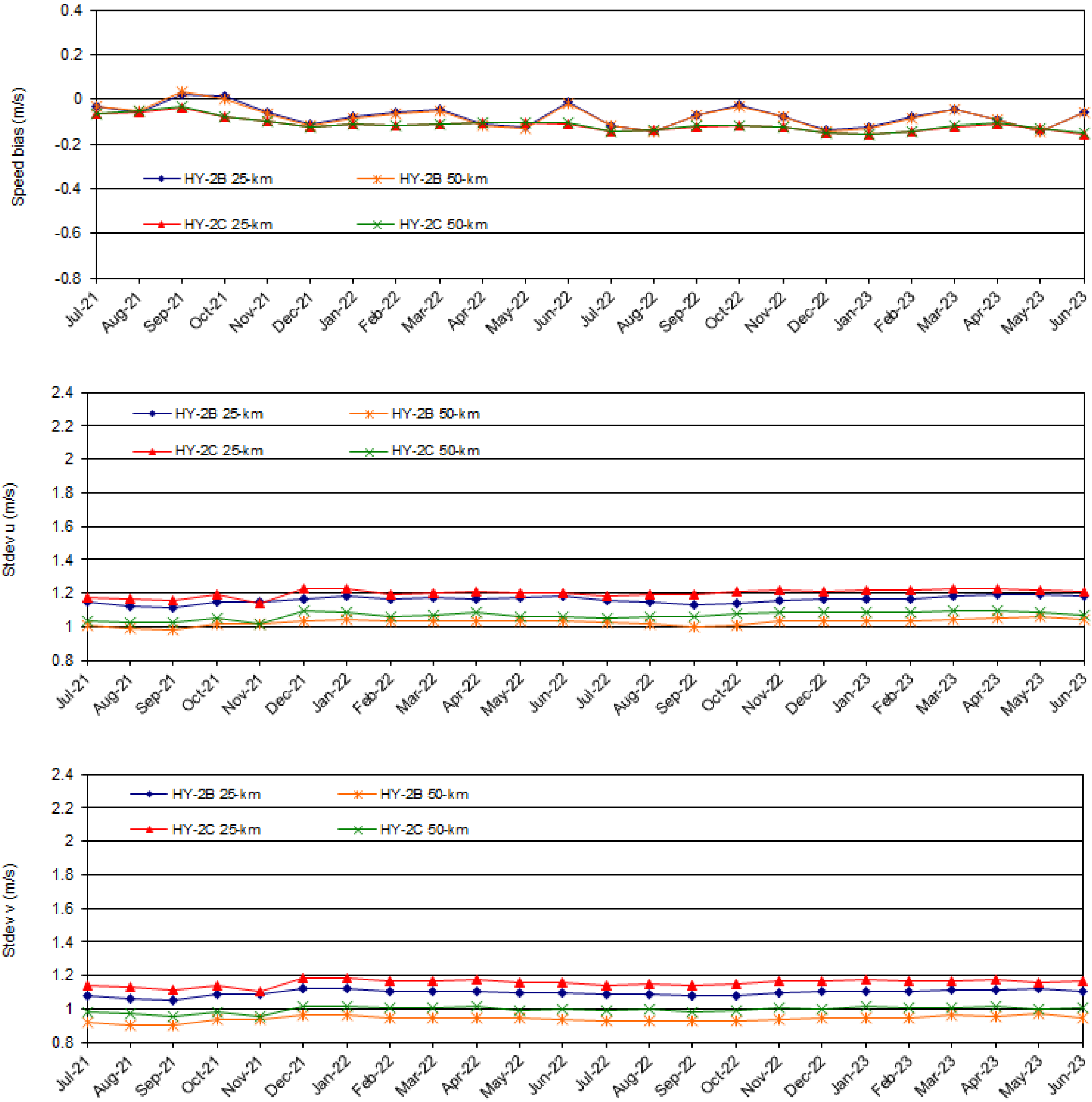


**Figure 59: Comparison of HY-2B and HY-2C scatterometer winds against ECMWF NWP forecast winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus ECMWF, top), wind u component standard deviation (middle) and wind v component standard deviation (bottom) are shown.**

### *5.4.2. Comparison with buoys*

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

The figure below shows the monthly results of July 2021 to April 2023. The last two months of the reporting period could not be covered since the blacklists from ECMWF were not available yet. These months will be included in the next Operations Report.

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.

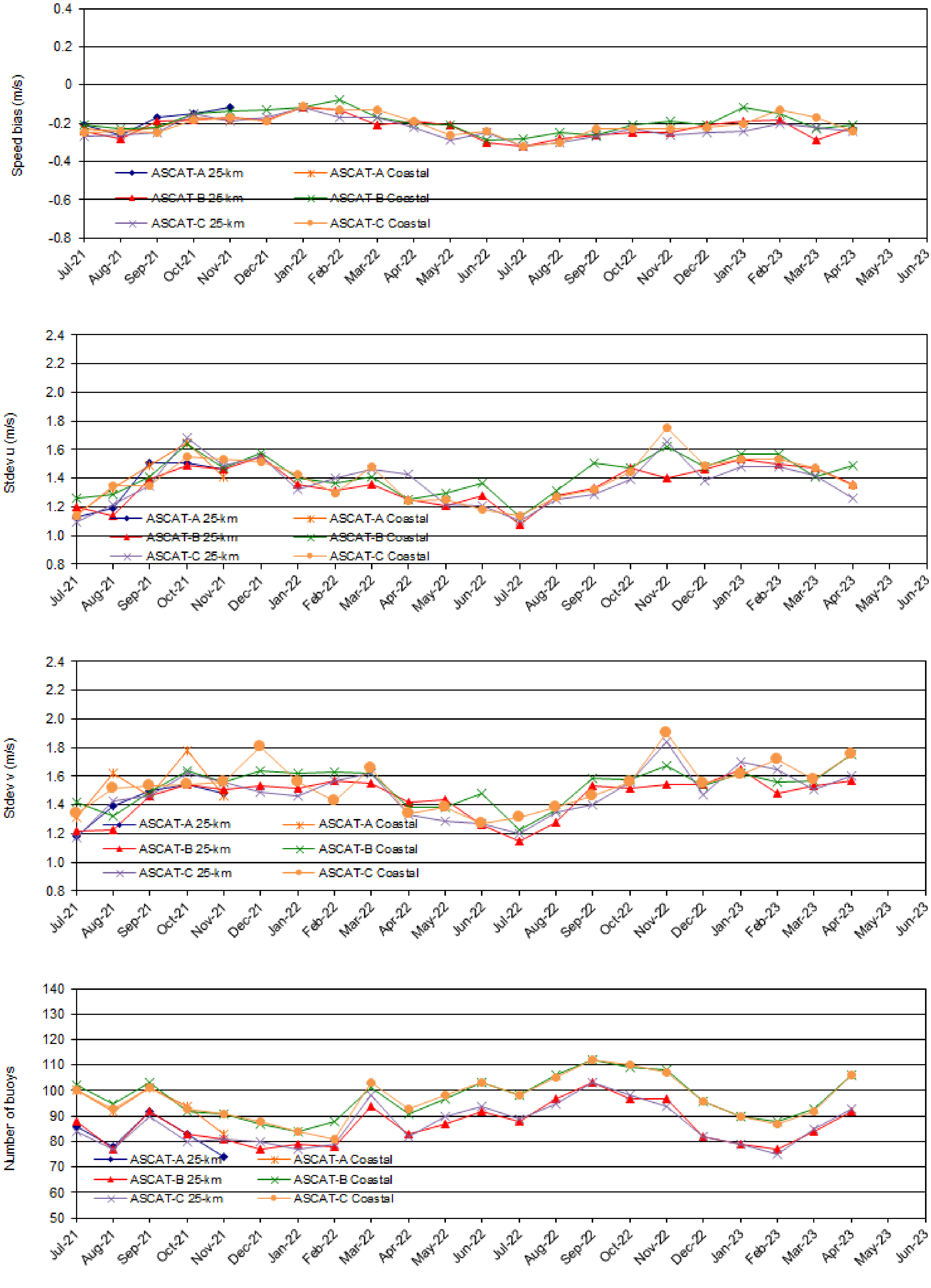


**Figure 60: Comparison of ASCAT scatterometer winds against buoy winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus buoy, top), wind u component standard deviation (2nd plot) and wind v component standard deviation (3rd plot) are shown. Also the number of buoys available for the comparisons is shown (bottom).**

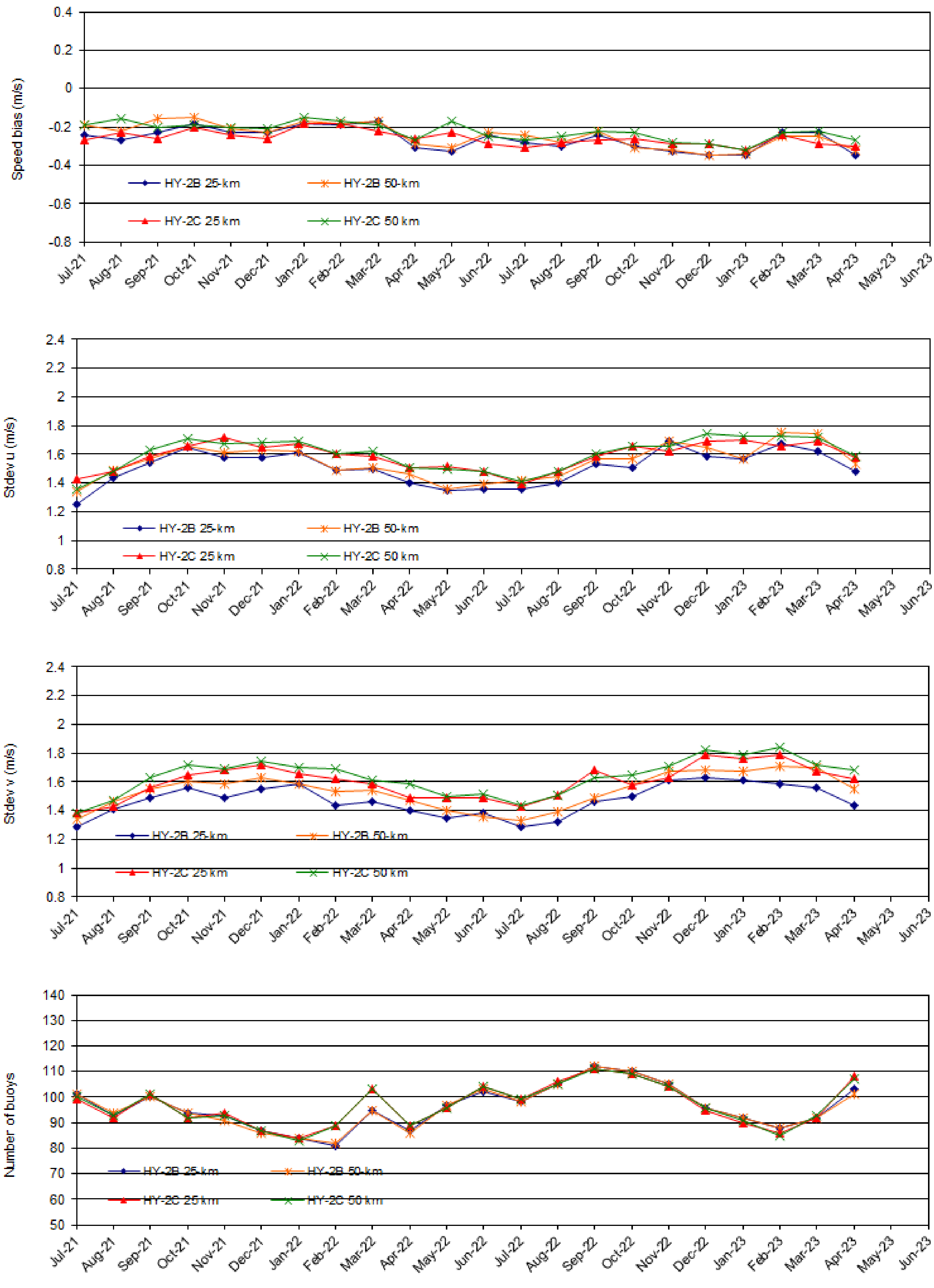


**Figure 61: Comparison of HY-2B and HY-2C scatterometer winds against buoy winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus buoy, top), wind u component standard deviation (2nd plot) and wind v component standard deviation (3rd plot) are shown. Also the 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, https://osi-saf.eumetsat.int, managed by MF/CMS,
- a web site for LML, https://osi-saf.eumetsat.int/lml/, managed by MF/CMS,
- a web site for HL, https://osisaf-hl.met.no/, managed by MET Norway,
- a web site for WIND, https://scatterometer.knmi.nl/osisaf/ managed by KNMI.

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

### *6.1.1. Statistics on the registered users*

| Statistics on the central Web site use | | |
|---|---|---|
| Month | Registered users | Pages |
| JAN 2023 | 2200 | 5358 |
| FEB 2023 | 2211 | 5216 |
| MAR 2023 | 2217 | 5356 |
| APR 2023 | 2220 | 4434 |
| MAY 2023 | 2227 | 5619 |
| JUN 2023 | 2236 | 5375 |

**Table 46: Statistics on central OSI SAF web site use over 1st half 2023.**

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

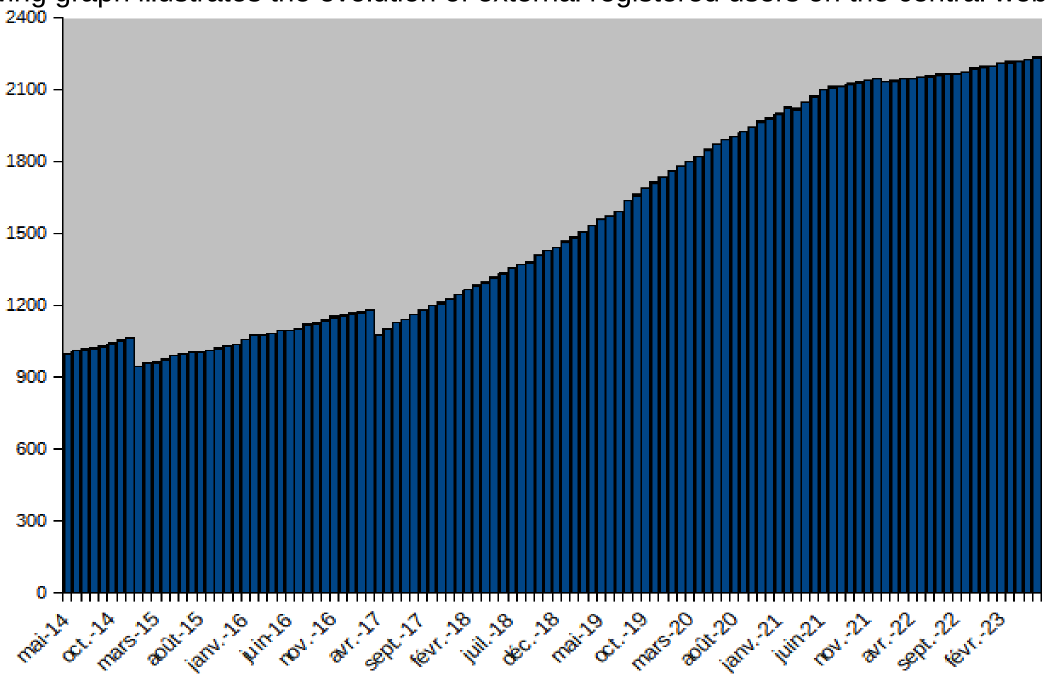


**Figure 62: Evolution of external registered users on the central Web Site from April 2014 to JUN 2023.**

Comments:
Nothing special to report on the period.

The following table lists the institutions or companies the new registered users (over 1st half 2023) are from.

| Country | Institution, establishment or company |
|---|---|
| Bulgaria | National Institut of Meteorology and Hydrology |
| China | Beijing Information Science Technology University |
| China | Ocean University of China |
| China | Ocean University of China |
| France | Institut français de recherche pour l'exploitation de la mer |
| France | Institut Technique de la Betterave |
| France | Météo-France |
| France | Météo-France |
| France | Météo-France |
| France | Service Hydrographique et Océanographique de la Marine |
| Germany | Alfred Wegener Institute for Polar and Marine Research |
| Germany | Bundesanstalt für Gewässerkunde (Germany) |
| Germany | European Organisation for the Exploitation of Meteorological Satellites |
| India | National Centre for Polar and Ocean Research |
| India | national Centre for Polar and Ocean Research, Goa, India |
| Indonesia | Fisika Udayana |
| Israel | Solargik Ltd. |
| Italy | European Space Agency - European Space Research Institute |
| Japan | Fisheries Research Institute |
| Korea (South) | Korea Meteorological Administration |
| Latvia | Latvian Environment, Geology & Meteorology centre |
| Mexico | Universidad Autonoma de Baja California |
| Norway | Norwegian Meteorological Institute |
| Spain | Institut Royal Météorologique de Belgique |
| Spain | MeteoGalicia |
| Sweden | Swedish Meteorological and Hydrological Institute |
| United Kingdom | Met Office |
| United Kingdom | Plymouth Marine Laboratory |
| United Kingdom | University College London |
| United States of America | University of Texas at Austin |

**Table 47: List of institutes of the newly registered users over 1st half 2023 on the central Web Site**

Moreover 14 new individual users, i.e. persons independent from any institute, establishment or company, registered on the period.

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

| Country | Institution, establishment or company |
|---|---|
| China | Harbin Institute of Technology |
| United Arab Erimates | Cobblestone Energy |
| - | One private user |

**Table 48: 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** | 13 | 13 | 11 | 0 | 2 | 0 |
| **HL subsystem** | 24 | 23 | 19 | 0 | 4 | 1 |
| **WIND subsystem** | 14 | 14 | 13 | 1 | 0 | 0 |

**Table 49: Helpdesk inquires over 1st half 2023**

### *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).

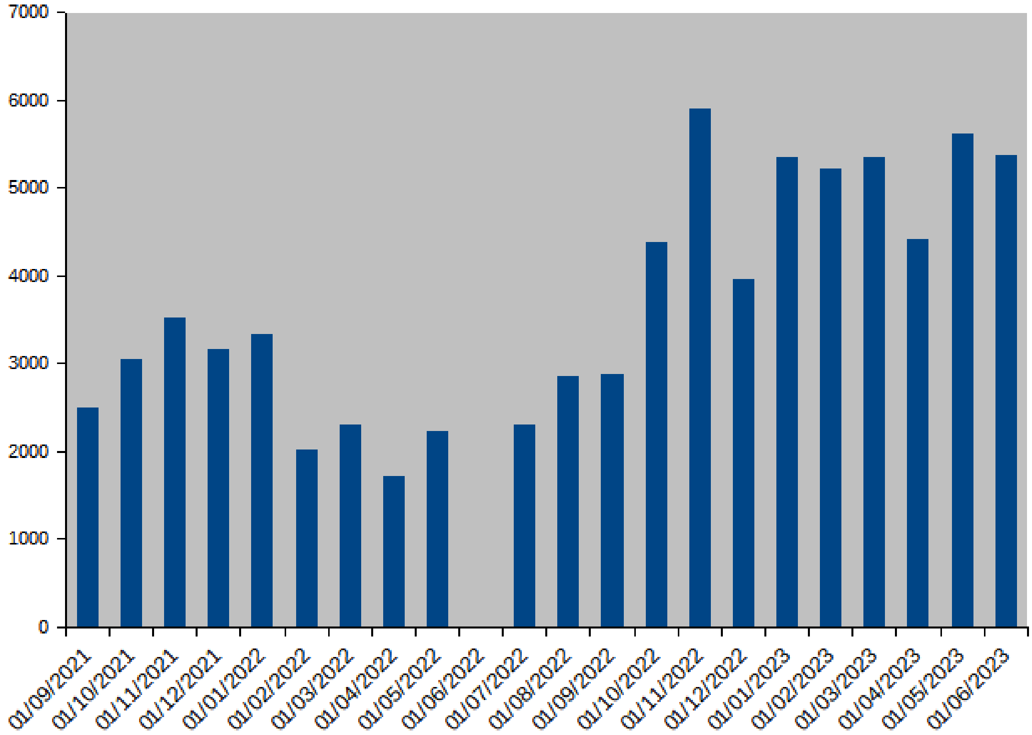


**Figure 63: Evolution of page views on the central OSI SAF web site over the past 2 years**

The following graph illustrates the evolution of number of unique visitors on the OSI SAF High Latitude portal ([http://osisaf-hl.met.no](http://osisaf-hl.met.no)).

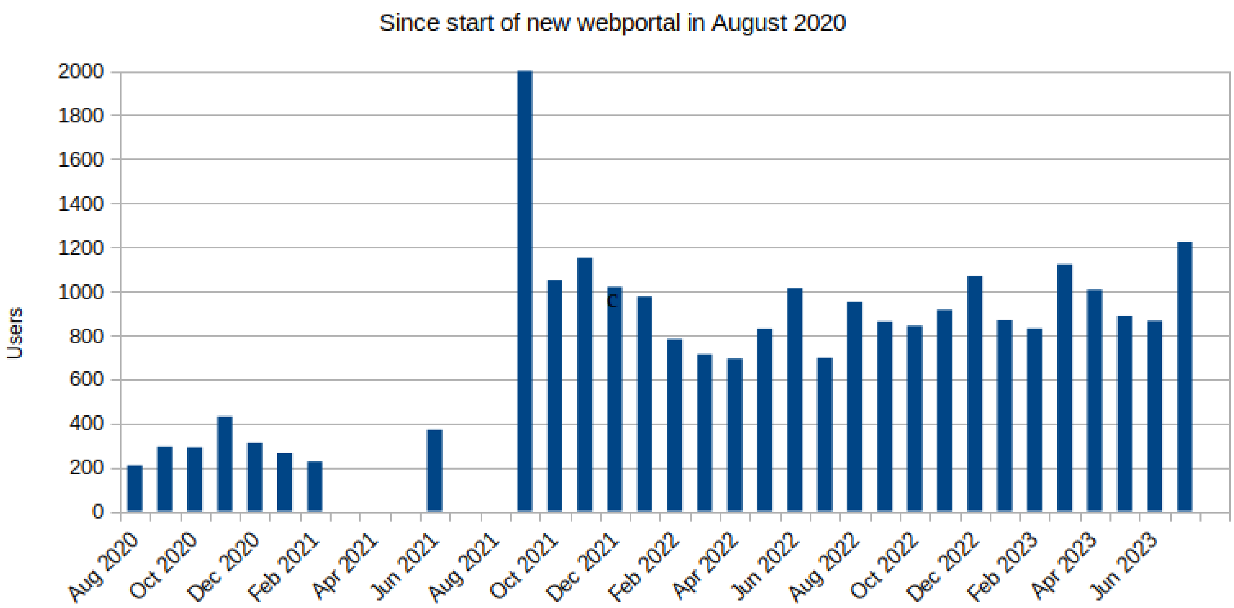


**Figure 64: Evolution of page views on the HL OSI SAF Sea Ice portal over the past 2 years**

The following graph illustrates the evolution of page views on the KNMI scatterometer web pages (https://scatterometer.knmi.nl/home/), which are partly devoted to the OSI SAF wind products.

Note: each click in a product viewer (to zoom in on a specific region) results in a new page view, That’s why there are so many page views.

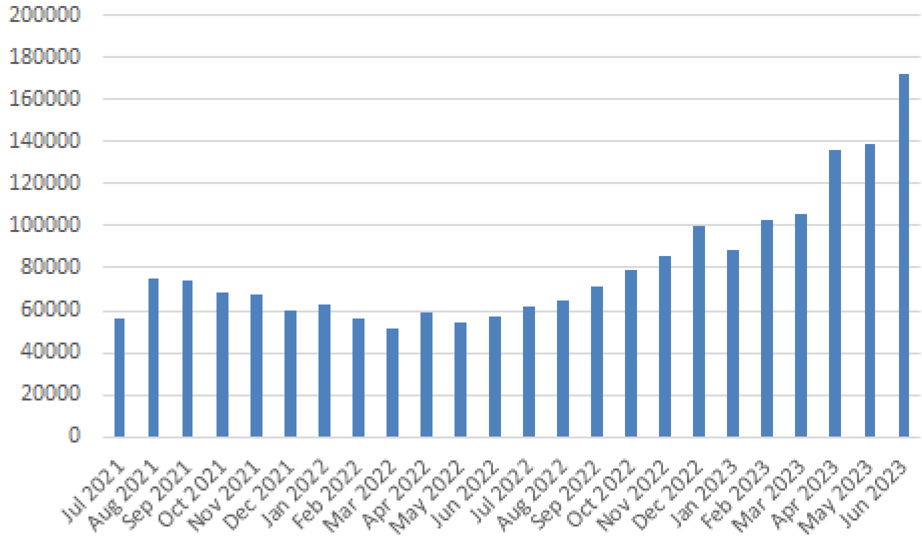


**Figure 65: Evolution of page views on KNMI scatterometer website over the past 2 years**

## 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.

| | | JAN 2023 | | FEB 2023 | | MAR 2023 | | APR 2023 | | MAY 2023 | | JUN 2023 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 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 | | | x | | x | | x | | x | | x | | x |
| OSI-201 series | GBL SST | 565/138/138 | 56 | 589/243/243/ | 54 | 796/349/348 | 34 | 6271/347/324 | 8 | 386/1940/1644/0/210 | | 1428/1167/1029/12 | |
| OSI-202 series | NAR SST | 527 | 1 | 648 | 0 | 6287 | 3 | 5808 | 0 | 424 | | 1396/129/0/0/3 | |
| OSI-204 series | MGR SST | 220492/539 | 34045 | 200346/1234 | 30565 | 486875/996 | 19165 | 401402/414 | 4888 | 138130/909 | | 368738/216 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OSI-206 series | Meteosat SST | 8048/532 | 3815 | 7727/921 | 6318 | 15691/1638 | 3273 | 3105/529 | 671 | 15755/52 | | 5721/18 | |
| OSI-207 series | GOES-East SST | 1892 | 850 | 1730 | 733 | 2146 | 493 | 1962 | 112 | 1293 | | 4516 | |
| OSI-IO-SST | Meteosat-8 SST | 39143 | 0 | 4163 | 18429 | 84 | 1479 | 11 | 0 | 0 | | 0 | |
| OSI-208 series | IASI SST | 36602 | 59 | 34310/3/0/0/6 | 55 | 46622 | 33 | 43248/1 | 0 | 26984/10 | | 78112 | |
| OSI-250 | Meteosat SST Data record | 0 | 59 | 0 | 55 | 2/3 | 33 | 0 | 7 | 0 | | 8/243/507 | |
| OSI-303 series | Meteosat 0° DLI | 77130/1 | x | 71121/8880 | x | 92009/31/0/1 | x | 40 | x | 0/1020/0/5 | x | 0 | x |
| OSI-304 series | Meteosat 0° SSI | 77130/1 | x | 71121/8880 | x | 92009/31/0/1 | x | 40 | x | 0/1020/0/5 | x | 0 | x |
| OSI-305 series | GOES-East DLI | 26138/2 | x | 24133/8879 | x | 29189/1 | x | 27195/1499/2/31 | x | 472830/18146 | x | 60410/13227 | x |
| OSI-306 series | GOES-East SSI | 26138/2 | x | 24133/8879 | x | 29189/1 | x | 27195/1499/2/31 | x | 472830/18146 | x | 60410/13227 | x |
| OSI-IO-DLI | Meteosat IO DLI | 0 | x | 3226 | x | 21683/22 | x | 0 | x | 1626/42 | x | 30 | x |
| OSI-IO-SSI | Meteosat IO SSI | 0 | x | 3226 | x | 21683/22 | x | 0 | x | 1626/42 | x | 30 | x |

**Table 50: Number of OSI SAF products downloaded from Ifremer FTP server and PO.DAAC server over 1st half 2023.**

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

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

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

| **OSI SAF HL FTP server** | | JAN 2023 | FEB 2023 | MAR 2023 | APR 2023 | MAY 2023 | JUN 2023 |
|---|---|---|---|---|---|---|---|
| OSI-401 series | Global Sea Ice Concentration (SSMIS) | 15709 | 75844 | 115487 | 82458 | 114471 | 36870 |
| OSI-402 series | Global Sea Ice Edge | 7307 | 8070 | 60436 | 8023 | 6347 | 7519 |
| OSI-403 series | Global Sea Ice Type | 2626 | 35269 | 23865 | 35156 | 11735 | 3892 |
| OSI-404 series | Global Sea Ice Emissivity | 62 | 62 | 63 | 1500 | 6368 | 9 |
| OSI-405 series | Low resolution Sea Ice Drift | 30557 | 13946 | 28904 | 20336 | 31267 | 30114 |
| OSI-407 series | Medium resolution Sea Ice Drift | 11078 | 3 | 165 | 118 | 125 | 129 |
| OSI-408 series | Global Sea Ice Concentration (AMSR-2) | 7637 | 3394 | 13474 | 3806 | 5204 | 15152 |
| OSI-410 series | Level 2 PMW sea ice concentration | 4180 | 4016 | 4120 | 4265 | 56531 | 3578 |
| OSI-409 | Ice Concentration Data Record v1.2 | 0 | 0 | 4972 | 2 | 1 | 5861 |
| OSI-430 | Ice Concentration ICDR v1.2 | 16 | 0 | 1248 | 0 | 0 | 730 |
| OSI-430-b | Ice Concentration ICDR v2.0 | 12620 | 6212 | 16243 | 4257 | 10223 | 12248 |
| OSI-430-a | Ice Concentration ICDR v3.0 | 3465 | 4795 | 9110 | 6399 | 11560 | 5970 |
| OSI-450 | Ice Concentration Data Record v2.0 | 33414 | 28577 | 56484 | 33284 | 53499 | 24439 |
| OSI-450-a | Ice Concentration Data Record v3.0 | 100760 | 45940 | 183365 | 36240 | 90290 | 44352 |
| OSI-455 | Ice Drift Data Record v1.0 | 62598 | 5952 | 271609 | 22520 | 63547 | 25204 |
| OSI-458 | AMSR Ice Concentration CDR v3.0 | 0 | 1 | 35 | 10 | 8259 | 5107 |
| OSI-203 series | AHL SST | 124 | 375 | 124 | 614 | 193 | 191 |
| OSI-205 series | L2 SST/IST | 3654 | 532 | 0 | 395 | 0 | 365 |
| OSI-301/2 series | AHL DLI-SSI | 500 | 455 | 25570 | 1132 | 20228 | 490 |

**Table 51: Number of OSI SAF products downloaded from OSI SAF HL FTP server over 1st half 2023**

| **Redistribution by CMEMS and C3S** | | JAN 2023 | | FEB 2023 | | MAR 2023 | | APR 2023 | | MAY 2023 | | JUN 2023 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CMEMS | C3S | CMEMS | C3S | CMEMS | C3S | CMEMS | C3S | CMEMS | C3S | CMEMS | C3S |
| OSI-401 series | Global Sea Ice Concentration (SSMIS) | 25018 | | 18077 | | 18694 | | 18932 | | 12320 | | 11214 | |
| OSI-402 series | Global Sea Ice Edge | 18087 | | 12016 | | 11251 | | 12246 | | 5330 | | 4785 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OSI-403 series | Global Sea Ice Type | 17879 | | 11795 | | 11208 | | 11851 | | 4821 | | 4249 | |
| OSI-405 series | Low resolution Sea Ice Drift | 16812 | | 10621 | | 9946 | | 11196 | | 4076 | | 3523 | |
| OSI-409 | Ice Concentration Data Record v1.2 | 4432 | | 4081 | | 4441 | | 3875 | | 3641 | | 3100 | |
| OSI-430 | Ice Concentration ICDR v1.2 | | 8553 | | 29892 | | 25717 | | 17395 | | 29592 | | 32618 |
| OSI-430-b | Ice Concentration ICDR v2.0 | 6 | 255 | 10 | 0 | 13 | 6888 | 61 | 129 | 1 | 0 | 16 | 0 |
| OSI-430-a | Ice Concentration ICDR v3.0 | | 43767 | | 86723 | | 168956 | | 74541 | | 111072 | | 130516 |
| OSI-450 | Ice Concentration Data Record v2.0 | 9 | 1602 | 6 | 472 | 6 | 46344 | 23 | 959 | 3 | 8 | 10 | 11 |
| OSI-450-a | Ice Concentration Data Record v3.0 | | | | | | | | | | | | |

**Table 52: Number of OSI SAF products redistributed by CMEMS (downloads/product/day) and C3S (number of files) over 1st half 2023. The number of users downloading OSI SAF products through CMEMS are up to between 12 and 19 for NRT products and between 2 and 6 for climate products (per month).**

### *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.

Unfortunately, PO.DAAC did not provide ASCAT download statistics for all months, this is due to some internal issues in their infrastructure. They are aware of the situation and working on a solution.

| | | JAN 2023 | | FEB 2023 | | MAR 2023 | | APR 2023 | | MAY 2023 | | JUN 2023 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 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 | 18 per file (BUFR), 50 per file (NetCDF) | N/A | 18 per file (BUFR), 50 per file (NetCDF) | 22302 | 18 per file (BUFR), 50 per file (NetCDF) | 10352 | 18 per file (BUFR), 43 per file (NetCDF) | 2159 | 18 per file (BUFR), 43 per file (NetCDF) | N/A | 18 per file (BUFR), 43 per file (NetCDF) | N/A |
| OSI-102-c | ASCAT-C 25 km | 19 per file (BUFR), 30 per file (NetCDF) | N/A | 19 per file (BUFR), 30 per file (NetCDF) | 8014 | 19 per file (BUFR), 30 per file (NetCDF) | 6916 | 19 per file (BUFR), 18 per file (NetCDF) | 134 | 19 per file (BUFR), 18 per file (NetCDF) | N/A | 19 per file (BUFR), 18 per file (NetCDF) | N/A |
| OSI-104 | ASCAT-A Coastal | | | | | | | | | | | | |
| OSI-114-a | HY-2B 25 km wind vectors | 11 per file (BUFR), 19 per file (NetCDF) | | 11 per file (BUFR), 19 per file (NetCDF) | | 11 per file (BUFR), 19 per file (NetCDF) | | 12 per file (BUFR), 18 per file (NetCDF) | | 12 per file (BUFR), 18 per file (NetCDF) | | 12 per file (BUFR), 18 per file (NetCDF) | |
| OSI-114-b | HY-2B 50 km wind vectors | 3 per file (BUFR), 18 per file (NetCDF) | | 3 per file (BUFR), 18 per file (NetCDF) | | 3 per file (BUFR), 18 per file (NetCDF) | | 3 per file (BUFR), 18 per file (NetCDF) | | 3 per file (BUFR), 18 per file (NetCDF) | | 3 per file (BUFR), 18 per file (NetCDF) | |
| OSI-115-a | HY-2C 25 km wind vectors | 11 per file (BUFR), 20 per file (NetCDF) | | 11 per file (BUFR), 20 per file (NetCDF) | | 11 per file (BUFR), 20 per file (NetCDF) | | 11 per file (BUFR), 17 per file (NetCDF) | | 11 per file (BUFR), 17 per file (NetCDF) | | 11 per file (BUFR), 17 per file (NetCDF) | |
| OSI-115-b | HY-2C 50 km wind vectors | 3 per file (BUFR), 20 per file (NetCDF) | | 3 per file (BUFR), 20 per file (NetCDF) | | 3 per file (BUFR), 20 per file (NetCDF) | | 2 per file (BUFR), 16 per file (NetCDF) | | 2 per file (BUFR), 16 per file (NetCDF) | | 2 per file (BUFR), 16 per file (NetCDF) | |
| OSI-104-b | ASCAT-B Coastal | 9 per file (BUFR), 50 per file (NetCDF) | N/A | 9 per file (BUFR), 50 per file (NetCDF) | 1440 | 9 per file (BUFR), 50 per file (NetCDF) | 6301 | 9 per file (BUFR), 43 per file (NetCDF) | 762 | 9 per file (BUFR), 43 per file (NetCDF) | N/A | 9 per file (BUFR), 43 per file (NetCDF) | N/A |
| OSI-104-c | ASCAT-C Coastal | 12 per file (BUFR), 30 per file (NetCDF) | N/A | 12 per file (BUFR), 30 per file (NetCDF) | 1420 | 12 per file (BUFR), 30 per file (NetCDF) | 6296 | 12 per file (BUFR), 18 per file (NetCDF) | 682 | 12 per file (BUFR), 18 per file (NetCDF) | N/A | 12 per file (BUFR), 18 per file (NetCDF) | N/A |

**Table 53: 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 16 JAN 2023.

| | | | | | |
|---|---|---|---|---|---|
| Albania | 6 | Ghana | 10 | Palestinian Territory, Occupied | 1 |
| Algeria | 9 | Greece | 21 | Paraguay | 1 |
| Angola | 3 | Guinea | 2 | Poland | 16 |
| Austria | 22 | Guinea-Bissau | 3 | Portugal | 7 |
| Azerbaijan | 3 | Hong Kong | 1 | Qatar | 3 |
| Bahrain | 1 | Hungary | 10 | Reunion | 2 |
| Belgium | 12 | Iceland | 2 | Romania | 11 |
| Benin | 4 | India | 3 | Russian Federation | 7 |
| Bosnia And Herzegovina | 1 | Iran, Islamic Republic Of | 35 | Rwanda | 6 |
| Botswana | 6 | Iraq | 1 | San Marino | 1 |
| Brazil | 5 | Ireland | 9 | Sao Tome And Principe | 2 |
| Bulgaria | 6 | Israel | 7 | Saudi Arabia | 3 |
| Burkina Faso | 4 | Italy | 303 | Senegal | 9 |
| Burundi | 2 | Jordan | 2 | Serbia | 2 |
| Cameroon | 6 | Kazakhstan | 5 | Seychelles | 3 |
| Canada | 1 | Kenya | 13 | Sierra Leone | 2 |
| Cape Verde | 3 | Korea, Republic Of | 1 | Slovakia | 9 |
| Central African Republic | 2 | Kuwait | 3 | Slovenia | 1 |
| Chad | 4 | Kyrgyzstan | 1 | Somalia | 2 |
| China | 4 | Latvia | 3 | South Africa | 23 |
| Comoros | 2 | Lebanon | 3 | South Sudan | 1 |
| Congo | 3 | Lesotho | 4 | Spain | 55 |
| Congo, The Democratic Republic Of The | 5 | Liberia | 3 | Sudan | 4 |
| Cote d'Ivoire | 6 | Libyan Arab Jamahiriya | 1 | Sweden | 6 |
| Country | 1 | Lithuania | 3 | Switzerland | 17 |
| Croatia | 2 | Luxembourg | 2 | Syrian Arab Republic | 1 |
| Cyprus | 1 | Madagascar | 6 | Tajikistan | 1 |
| Czech Republic | 22 | Malawi | 4 | Tanzania, United Republic Of | 6 |
| Denmark | 8 | Mali | 3 | Togo | 4 |
| Djibouti | 2 | Malta | 2 | Tunisia | 5 |
| Egypt | 6 | Mauritania | 5 | Turkey | 7 |
| Equatorial Guinea | 2 | Mauritius | 8 | Turkmenistan | 1 |
| Eritrea | 2 | Morocco | 10 | Uganda | 5 |
| Estonia | 4 | Mozambique | 6 | Ukraine | 3 |
| Eswatini | 4 | Namibia | 6 | United Arab Emirates | 6 |
| Ethiopia | 9 | Netherlands | 30 | United Kingdom | 145 |
| Finland | 5 | Niger | 8 | United States | 7 |
| France | 72 | Nigeria | 8 | Uzbekistan | 1 |
| Gabon | 4 | North Macedonia | 1 | Viet Nam | 1 |
| Gambia | 3 | Norway | 5 | Yemen | 1 |
| Georgia | 1 | Oman | 4 | Zambia | 4 |
| Germany | 133 | Pakistan | 3 | Zimbabwe | 4 |

**Table 54: Overall number of EUMETCast users by country on the 16/01/2023.**

### 6.3.2. *Users and retrievals from EUMETSAT Data Center*

**Orders Summary over the 1st half 2023**

The table below lists the products downloaded from the EUMETSAT Data Center (EDC), the volume of the downloaded data in megabytes (MB) and the number of files over the 1st half 2023.

| OSI SAF product | Item | Volume in MB | Number of files |
|---|---|---|---|
| OSI-401 series | F-15_OSICOGB_OPE | 1 | 2 |
| OSI-403 series | F-15_OSITYGB_OPE | 1 | 10 |
| OSI-404 series | F-18_OSIEMGB_OPE | 288 | 12 |
| Daily OSI-305/OSI-306 series | GOES-13_ODDLISSI_OPE | 44317 | 176 |
| Daily OSI-305/OSI-306 series | GOES-16_ODDLISSI_OPE | 48959 | 3794 |
| Hourly OSI-305/OSI-306 serie | GOES-16_OHDLISSI_OPE | 208 | 24 |
| OSI-207 series | GOES-16_OSIHSSTN_OPE | 741 | 72 |
| OSI-408 series | GW-1_OSICOAMSRGB_OPE | 107891 | 6122 |
| OSI-102-b | M01_OAS025_OPE | 28162 | 3091 |
| OSI-104-b | M01_OASWC12_OPE | 55375 | 6713 |
| OSI-407 series | M01_OMRSIDRN_OPE | 1209 | 158 |
| OSI-201 series | M01_OSSTGLBN_OPE | 114511 | 3090 |
| OSI-205 series | M01_OSSTIST2_OPE | 481471 | 42212 |
| OSI-203 series | M01_OSSTIST3A_OPE | 1665 | 118 |
| OSI-202 series | M01_OSSTNARN_OPE | 68793 | 2924 |
| OSI-102-a | M02_OAS025_OPE | 27550 | 2599 |
| OSI-104-a | M02_OASWC12_OPE | 34534 | 4346 |
| OSI-201 series | M02_OSSTGLB_OPE | 1530 | 84 |
| OSI-102-c | M03_OAS025_OPE | 28459 | 3451 |
| OSI-104-c | M03_OASWC12_OPE | 32153 | 2646 |
| OSI-401 series | MML_OSICOGB_OPE | 16 | 4 |
| OSI-401 series | MML_OSICOGBN_OPE | 65782 | 3298 |
| OSI-405 series | MML_OSIDRGB_OPE | 2162 | 4492 |
| OSI-402 series | MML_OSIEDGBN_OPE | 1694 | 206 |
| OSI-403 series | MML_OSITYGBN_OPE | 2636 | 266 |
| Daily OSI-303/OSI-304 series | MSG2_ODDLISSI_OPE | 10876 | 40 |
| Hourly OSI-303/OSI-304 series | MSG2_OHDLISSI_OPE | 218414 | 1605 |
| Daily OSI-303/OSI-304 series | MSG3_ODDLISSI_OPE | 2142 | 154 |

| OSI SAF product | Item | Volume in MB | Number of files |
|---|---|---|---|
| Hourly OSI-303/OSI-304 series | MSG3_OHDLISSI_OPE | 68809 | 1258 |
| OSI-206 series | MSG3_OSIHSST_OPE | 6329 | 1224 |
| Daily OSI-303/OSI-304 series | MSG4_ODDLISSI_OPE | 13018 | 1259 |
| Hourly OSI-303/OSI-304 series | MSG4_OHDLISSI_OPE | 411503 | 43545 |
| OSI-206 series | MSG4_OSIHSSTN_OPE | 72046 | 5978 |
| OSI-202 series | N20_OSSTNARN_OPE | 54784 | 2295 |
| OSI-205-b | NPP_OSSTIST2B_OPE | 435660 | 2538 |
| OSI-203-b | NPP_OSSTIST3B_OPE | 1611 | 118 |
| OSI-202 series | NPP_OSSTNARN_OPE | 27518 | 609 |
| OSI-112-a | SCATSAT1_OSSW025_OPE | 38717 | 6672 |
| OSI-112-b | SCATSAT1_OSSW050_OPE | 296 | 201 |

**Table 55: Volume of data downloaded (in MB) by products from EDC over 1st half 2023.**

**Ingestion Summary over the 1st half 2023**

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).

| OSI SAF product | Product id in EDC | JAN 2023 | FEB 2023 | MAR 2023 | APR 2023 | MAY 2023 | JUN 2023 |
|---|---|---|---|---|---|---|---|
| OSI-410 series | F-16_OSICOL2 | 98.2 | 98.7 | 94.9 | 98.1 | 100 | 100 |
| | F-17_OSICOL2 | 99.1 | 98.0 | 97.0 | 97.1 | 95.8 | 98.3 |
| | F-18_OSICOL2 | 98.4 | 98.5 | 96.3 | 96.9 | 97.5 | 96.9 |
| OSI-404 series | F-18_OSIEMGB | 100 | 100 | 100 | 100 | 100 | 100 |
| Daily OSI-305/OSI-306 series | GOES-16_ODDLISSI | 100 | 100 | 100 | 100 | 100 | 100 |
| Hourly OSI-305/OSI-306 series | GOES-16_OHDLISSI | 100 | 100 | 100 | 100 | 100 | 99.9 |
| OSI-207 series | GOES-16_OSIHSSTN | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-408 series | GW-1_OSICOAMSRGB | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-410 series | GW-1_OSICOL2 | 100 | 100 | 100 | 100 | 99.2 | 100 |
| OSI-102-b | M01_OAS025 | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-104-b | M01_OASWC12 | 100 | 100 | 100 | 100 | 100 | 100 |

| OSI SAF product | Product id in EDC | JAN 2023 | FEB 2023 | MAR 2023 | APR 2023 | MAY 2023 | JUN 2023 |
|---|---|---|---|---|---|---|---|
| OSI-407 series | M01_OMRSIDRN | 99.2 | 100 | 98.4 | 96.7 | 100 | 99.2 |
| OSI-201 series | M01_OSSTGLBN | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-205 series | M01_OSSTIST2 | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-203 series | M01_OSSTIST3A | 100 | 90.3 | 100 | 98.3 | 98.4 | 98.3 |
| OSI-202 series | M01_OSSTNARN | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-102-c | M03_OAS025 | 100 | 100 | 100 | 99.8 | 99.8 | 100 |
| OSI-104-c | M03_OASWC12 | 100 | 100 | 100 | 100 | 99.8 | 100 |
| OSI-301/OSI-302 series | MML_ODLISSIAHL | 100 | 100 | 100 | 100 | 96.8 | 100 |
| OSI-401 series | MML_OSICOGBN | 100 | 100 | 100 | 93.3 | 100 | 100 |
| OSI-405 series | MML_OSIDRGB | 100 | 100 | 100 | 100 | 100 | 95.0 |
| OSI-402 series | MML_OSIEDGBN | 100 | 100 | 100 | 100 | 100 | 95.0 |
| OSI-403 series | MML_OSITYGBN | 100 | 100 | 100 | 100 | 100 | 98.3 |
| OSI-206 series | MSG4_OSIHSSTN | 100 | 100 | 99.6 | 99.9 | 100 | 99.7 |
| Daily OSI-303/OSI-304 series | MSGx_ODDLISSI (MSG2&MSG4) | 100 | 100 | 100 | 100 | 100 | 100 |
| Hourly OSI-303/OSI-304 series | MSGx_OHDLISSI (MSG2&MSG4) | 100 | 100 | 99.9 | 100 | 100 | 100 |
| OSI-202 series | N20_OSSTNARN | 100 | 100 | 100 | 100 | 100 | 100 |
| OSI-205 series | NPP_OSSTIST2B | 100 | 94.6 | 100 | 94.5 | 100 | 96.6 |
| OSI-203 series | NPP_OSSTIST3B | 100 | 100 | 100 | 100 | 98.4 | 96.7 |

**Table 56: Percentage of received OSI SAF products in EDC in 1st half 2023**

Comments:
The rather low rate of ingestion of the OSI-205-b (NPP_OSSTIST2B) in February and April might be caused by the outage of the master production system at MET Norway and the need to switch to the backup system, or by an ingestion issue (the rate on the EUMETCast reception are better than 94.5 %).

## 7. Recent publications

See https://osi-saf.eumetsat.int/documentation/publications-documentation