Half-Yearly Operations Report

1st half 2020

Version : 1.1

Date : 10/11/2020

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

Document Change record

Document version	Date	Author	Change description
1.0	28/09/2020	CH	First version
1.1	10/11/2020	CH	Updated after Operation Review in October

Table of contents

1. Introduction

1.1. Scope of the document

The present report covers from January to June 2020.

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
CDOP 3 Service Specification (SeSp)
SAF/OSI/CDOP3/MF/MGT/PL/003, version 1.0, 30 May 2017

1.4. Reference documents

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

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

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

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

[RD.5] Reprocessed SeaWinds L2 winds Product User Manual
OSI-151-a, OSI-151-b
SAF/OSI/CDOP2/KNMI/TEC/MA/220

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

[RD.7] Oceansat-2 L2 winds Data Record Product User Manual
OSI-153-a, OSI-153-b
SAF/OSI/CDOP3/KNMI/TEC/MA/297

[RD.8] Low Earth Orbiter Sea Surface Temperature Product User Manual
OSI-201-b, OSI-202-b, OSI-204-b, OSI-208-b
SAF/OSI/CDOP3/MF/TEC/MA/127

[RD.9] 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.10]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.11]Geostationary Sea Surface Temperature Product User Manual
OSI-206-a, OSI-207-a, OSI-IO-SST
SAF/OSI/CDOP3/MF/TEC/MA/181

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

[RD.13]MSG/SEVIRI Sea Surface Temperature data record Product User Manual
OSI-250
SAF/OSI/CDOP3/MF/TEC/MA/309

[RD.14]Geostationary Radiative Flux Product User Manual
OSI-303-a, OSI-304-a, OSI-305-a, OSI-306-a, OSI-IO-DLI, OSI-IO-SSI
SAF/OSI/CDOP3/MF/TEC/MA/182

[RD.15]Product User Manual for OSI SAF Global Sea Ice Concentration
OSI-401-b
SAF/OSI/CDOP3/DMI_MET/TEC/MA/204

[RD.16]Global Sea Ice Edge and Type Product User's Manual
OSI-402-c, OSI-403-c
SAF/OSI/CDOP2/MET-Norway/TEC/MA/205

[RD.17]50 Ghz Sea Ice Emissivity Product User Manual
OSI-404-a
SAF/OSI/CDOP3/DMI/TEC/MA/191

[RD.18]Low Resolution Sea Ice Drift Product User's Manual
OSI-405-c
SAF/OSI/CDOP/met.no/TEC/MA/128

[RD.19]Medium Resolution Sea Ice Drift Product User Manual
OSI-407-a
SAF/OSI/CDOP/DMI/TEC/MA/137

[RD.20]Global Sea Ice Concentration Reprocessing Product User Manual
OSI-409, OSI-409-a, OSI-430
SAF/OSI/CDOP3/MET-Norway/TEC/MA/138

[RD.21]Global Sea Ice Concentration Climate Data Record Product User Manual
OSI-450, OSI-430-b
SAF/OSI/CDOP2/MET/TEC/MA/288

1.5. Definitions, acronyms and abbreviations

AHL	Atlantic High Latitude
ASCAT	Advanced SCATterometer
AVHRR	Advanced Very High Resolution Radiometer
BUFR	Binary Universal Format Representation
CDOP	Continuous Development and Operations Phase
CMEMS	Copernicus Marine Environment Monitoring Service
CMS	Centre de Météorologie Spatiale (Météo-France)
DLI	Downward Long wave Irradiance
DMI	Danish Meteorological Institute
DMSP	Defense Meteorological Satellite Program
ECMWF	European Centre for Medium range Weather Forecasts
EDC	EUMETSAT Data Centre
EPS	European Polar System
FTP	File Transfer Protocol
GBL	Global oceans
GOES	Geostationary Operational Environmental Satellite

GOES-E	GOES-East, nominal GOES at 75°W
GRIB	GRIdded Binary format
GTS	Global Transmission System
HIRLAM	High Resolution Limited Area Model
HL	High Latitude
HRIT	High Rate Information Transmission
Ifremer	Institut Français de Recherche pour l'Exploitation de la MER
KNMI	Koninklijk Nederlands Meteorologisch Instituut
LEO	Low Earth Orbiter
LML	Low and Mid Latitude
MAP	Merged Atlantic Product
MET	Nominal Meteosat at 0° longitude
MET Norway or MET	Norwegian Meteorological Institute
Metop	METeorological OPerational Satellite
MF	Météo-France
MGR	Meta-GRanule
MSG	Meteosat Second Generation
NAR	Northern Atlantic and Regional
NESDIS	National Environmental Satellite, Data and Information Service
NetCDF	Network Common Data Form
NMS	National Meteorological Service
NOAA	National Oceanic and Atmospheric Administration
NPP	NPOESS Preparatory Project
NPOESS	National Polar-orbiting Operational Environmental Satellite System
NRT	Near Real-Time
NWP	Numerical Weather Prediction
NIC	National Ice Center (USA)
OSI SAF	Ocean and Sea Ice SAF
R&D	Research and Development
RMDCN	Regional Meteorological Data Communication Network
RMS	Root-Mean-Squared
RSD	Robust Standard Deviation
SAF	Satellite Application Facility
SD	Standard Deviation
SEVIRI	Spinning Enhanced Visible and Infra-Red Imager
SSI	Surface Short wave Irradiance
SSMI	Special Sensor Microwave Imager
SSMIS	Special Sensor Microwave Imager and Sounder
SST/IST	Sea Surface Temperature/ sea Ice Surface Temperature
SST	Sea Surface Temperature
TBC	To Be Confirmed
TBD	To Be Defined
WMO	World Meteorological Organisation

2. OSI SAF products availability and timeliness

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

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

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

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

2.1. Availability on FTP servers

Ref.	Product	JAN. 2020	FEB. 2020	MAR. 2020	APR. 2020	MAY 2020	JUN. 2020
OSI-102	ASCAT-A 25 km wind	100	99.9	100	100	100	99.9
OSI-102-b	ASCAT-B 25 km wind	100	99.9	100	100	100	99.9
OSI-102-c	ASCAT-C 25 km wind	100	100	100	100	100	99.8
OSI-104	ASCAT-A Coastal wind	99.7	99.5	99.7	99.9	99.8	99.9
OSI-104-b	ASCAT-B Coastal wind	100	100	99.9	100	100	99.9
OSI-104-c	ASCAT-C Coastal wind	100	99.9	99.9	100	100	99.7
OSI-112-a	ScatSat-1 25 km wind vectors	82.9	69.3	78.4	39.0	89.7	71.0
OSI-112-b	ScatSat-1 50 km wind vectors	82.8	69.3	78.5	39.1	89.8	71.3
OSI-201-b	GBL SST	100	100	100	100	100	95.0
OSI-202-b	NAR SST	100	100	99.2	100	100	94.2
OSI-203-a	NHL SST/IST (L3)	100	100	100	100	98.4	100
OSI-203-b	NHL SST/IST (L3)	96.8	100	100	100	98.4	100
OSI-204-b	MGR SST	99.7	99.7	99.7	100	99.8	93.7
OSI-205-a	SST/IST (L2)	99.9	100	100	100	99.2	99.3
OSI-205-b	SST/IST (L2)	88.7	99.8	98.2	100	97.1	100
OSI-206-a	Meteosat SST	100	99.9	99.9	100	100	94.0
OSI-207-a	GOES-East SST	100	99.9	99.6	100	100	94.0
OSI-208-b	IASI SST	99.8	99.9	99.2	100	99.7	94.3
OSI-301	AHL DLI	100	100	100	100	96.8	100
OSI-302	AHL SSI	96.8	100	100	100	96.8	100
OSI-303-a	Meteosat DLI - hourly	100	99.7	99.9	100	100	93.9
	Meteosat DLI - daily	100	96.6	100	100	100	93.3
OSI-304-a	Meteosat SSI - hourly	100	99.7	99.9	100	100	93.9
	Meteosat SSI - daily	100	96.6	100	100	100	93.3
OSI-305-a	GOES-East DLI - hourly	100	99.7	99.9	100	100	93.9
	GOES-East DLI - daily	100	96.6	100	100	100	93.3
OSI-306-a	GOES-East SSI - hourly	100	99.7	99.9	100	100	93.9
	GOES-East SSI - daily	100	96.6	100	100	100	93.3
OSI-401-b	Global Sea Ice Concentration (SSMIS)	100	100	100	100	96.8	96.7
OSI-402-c	Global Sea Ice Edge	100	100	100	100	96.8	96.7
OSI-403-c	Global Sea Ice Type	100	100	100	100	96.8	96.7
OSI-404/-a	Global Sea Ice Emissivity	100	100	100	100	96.8	96.7

Ref.	Product	JAN. 2020	FEB. 2020	MAR. 2020	APR. 2020	MAY 2020	JUN. 2020
OSI-405-c	Low Res. Sea Ice Drift	100	100	100	100	96.8	96.7
OSI-407/-a	Medium Res. Sea Ice Drift	75.0	100	100	100	100	99.2
OSI-408	Global Sea Ice Concentration (AMSR-2)	100	100	100	100	96.8	96.7
OSI-430-a	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 2020.

2.2. Availability via EUMETCast

Ref.	Product	JAN. 2020	FEB. 2020	MAR. 2020	APR. 2020	MAY 2020	JUN. 2020
OSI-102	ASCAT-A 25 km wind	100	99.9	100	100	100	99.9
OSI-102-b	ASCAT-B 25 km wind	100	99.9	100	100	100	99.9
OSI-102-c	ASCAT-C 25 km wind	100	100	100	100	100	99.8
OSI-104	ASCAT-A Coastal wind	99.7	99.5	99.7	99.9	99.8	99.9
OSI-104-b	ASCAT-B Coastal wind	100	100	99.9	100	100	99.9
OSI-104-c	ASCAT-C Coastal wind	100	99.9	99.9	100	100	99.7
OSI-112-a	ScatSat-1 25 km wind vectors	82.9	69.3	78.4	39.0	89.7	71.0
OSI-112-b	ScatSat-1 50 km wind vectors	82.8	69.3	78.5	39.1	89.8	71.3
OSI-201-b	GBL SST	100	100	100	100	100	100
OSI-202-b	NAR SST	100	100	99.2	100	100	100
OSI-203-a	NHL SST/IST (L3)	100	100	100	100	93.3	100
OSI-203-b	NHL SST/IST (L3)	96.8	100	100	100	98.4	100
OSI-204-b	MGR SST	99.7	99.7	99.8	100	99.7	99.5
OSI-205-a	SST/IST (L2)	96.8	100	100	100	100	100
OSI-205-b	SST/IST (L2)	96.8	100	100	100	100	100
OSI-206-a	Meteosat SST	100	100	100	100	100	100
OSI-207-a	GOES-East SST	100	99.9	99.9	100	100	100
OSI-208-b	IASI SST	99.8	99.9	99.3	100	99.7	100
OSI-301	AHL DLI	96.8	100	100	100	100	100
OSI-302	AHL SSI	96.8	100	100	100	100	100
OSI-303-a	Meteosat DLI - hourly	100	100	100	100	100	99.9
	Meteosat DLI - daily	100	100	100	100	100	100
OSI-304-a	Meteosat SSI - hourly	100	100	100	100	100	99.9
	Meteosat SSI - daily	100	100	100	100	100	100

Ref.	Product	JAN. 2020	FEB. 2020	MAR. 2020	APR. 2020	MAY 2020	JUN. 2020
OSI-305-a	GOES-East DLI - hourly	100	100	100	100	100	100
	GOES-East DLI - daily	100	100	100	100	100	100
OSI-306-a	GOES-East SSI - hourly	100	100	100	100	100	100
	GOES-East SSI - daily	100	100	100	100	100	100
OSI-401-b	Global Sea Ice Concentration (SSMIS)	100	100	100	100	100	100
OSI-402-c	Global Sea Ice Edge	100	100	100	100	100	96.7
OSI-403-c	Global Sea Ice Type	100	100	98.4	100	100	96.7
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	96.7
OSI-407/-a	Medium Res. Sea Ice Drift	99.2	100	99.2	100	100	99.2
OSI-408	Global Sea Ice Concentration (AMSR-2)	100	100	100	100	100	100

Table 2: Percentage of OSI SAF products delivered via EUMETCast within the specified time over 1st half 2020.

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
From 2 june at 12:00Z to 4 june at 08:00Z	All LML products	LML FTP Ifremer under maintenance. This explains the availability under 95 % in June. All the products have been available on the FTP server but not within timeliness.	User were informed in advance

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

Date	Impacted products or services	Anomaly	Corrective and preventive measures
02-01-2020	OSI-205-b	Missing products due to problem with generation of cloud mask	Users were informed
13-01-2020 and 18-02-2020	OSI-205-b, OSI-203-b	Missing products due to missing VIIRS data from NOAA.	Users were informed
20-01-2020 and 22-01-2020	All HL products	Outage of FTP server due to internal network issue	Users were informed
30-05-2020	OSI-401-b, OSI-402/3-c, OSI-404-a, OSI-405-c, OSI-407-a, OSI-408, OSI-430-b	Products delayed on FTP due to internal network problem.	Users were informed

3.3. At Wind subsystem (KNMI)

Date	Impacted products or services	Anomaly	Corrective and preventive measures
1st half 2020	ScatSat-1 winds OSI-112-a OSI-112-b	Frequent outages and delays occur in the provision of ScatSat-1 input data by the Indian Space Research Organisation (ISRO). This leads to lower availabilities for the OSI-112-a and OSI-112-b wind products in the tables in section 2. In particular in April 2020 the availability was very low.	Although we did not get an explanation for this from ISRO we suspect that it had to do with the Covid-19 lock-down in India causing delays in solving technical issues.

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
5 june at 22:00Z	SST products validation	Update of the SST operational validation for LML products, including the building of the buoy blacklist: The software has been revisited: intermediate ASCII files have been replaced by NetCDF files, new satellites can be added more easily, the validation and blacklist processing are more consistent. The validation principles are unchanged, but some tests and thresholds have been changed and robust statistics have been added.
First half 2020	All products on EUMETCast	The products data flow from Météo-France to EUMETSAT was switched from the Operations Internet Server to the Internet Data Services (IDS). This includes the use of secure ftp (sftp) instead of the ftp protocol.

Due to Covid-19 crisis, activities have been firstly stopped then started again progressively. No significant activities during this period, except the update of the SST operational validation.

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

Date	Impacted products or services	Events and modifications, maintenance activities
04-06-2020	OSI-301, OSI-302, OSI-301-b, OSI-302-b	OSI-301/2 were replaced with OSI-301/2-b
First half 2020	All products on EUMETCast	The products data flow from MET and DMI to EUMETSAT was switched from the Operations Internet Server to the Internet Data Services (IDS). This includes the use of secure ftp (sftp) instead of the ftp protocol.

4.3. At Wind subsystem (KNMI)

Date	Impacted products or services	Events and modifications, maintenance activities
7 Jan 2020	OSI-112-a and b: ScatSat-1 winds	ISRO has moved to data processing software version 1.1.4. for ScatSat-1 level 1 processing This results in a change of 0.35 dB in the HH and VV backscatter values. The effects for the winds calibration are fully compensated in the OSI SAF processing and hence the wind characteristics are not changed.
26 May 2020	All wind products on EUMETCast	The wind products data flow from KNMI to EUMETSAT was switched from the Operations Internet Server to the Internet Data Services (IDS). This includes the use of secure ftp (sftp) instead of the ftp protocol.

4.4. Release of new data records and off-line products

NA

5. OSI SAF products quality

5.1. SST quality

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

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

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

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

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

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

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

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

Robust statistics

In the following, for the LML SST products (OSI-206-a, OSI-207-a, OSI-IO-SST, OSI-202-b, OSI-201-b, OSI-204-b), 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.

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

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

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

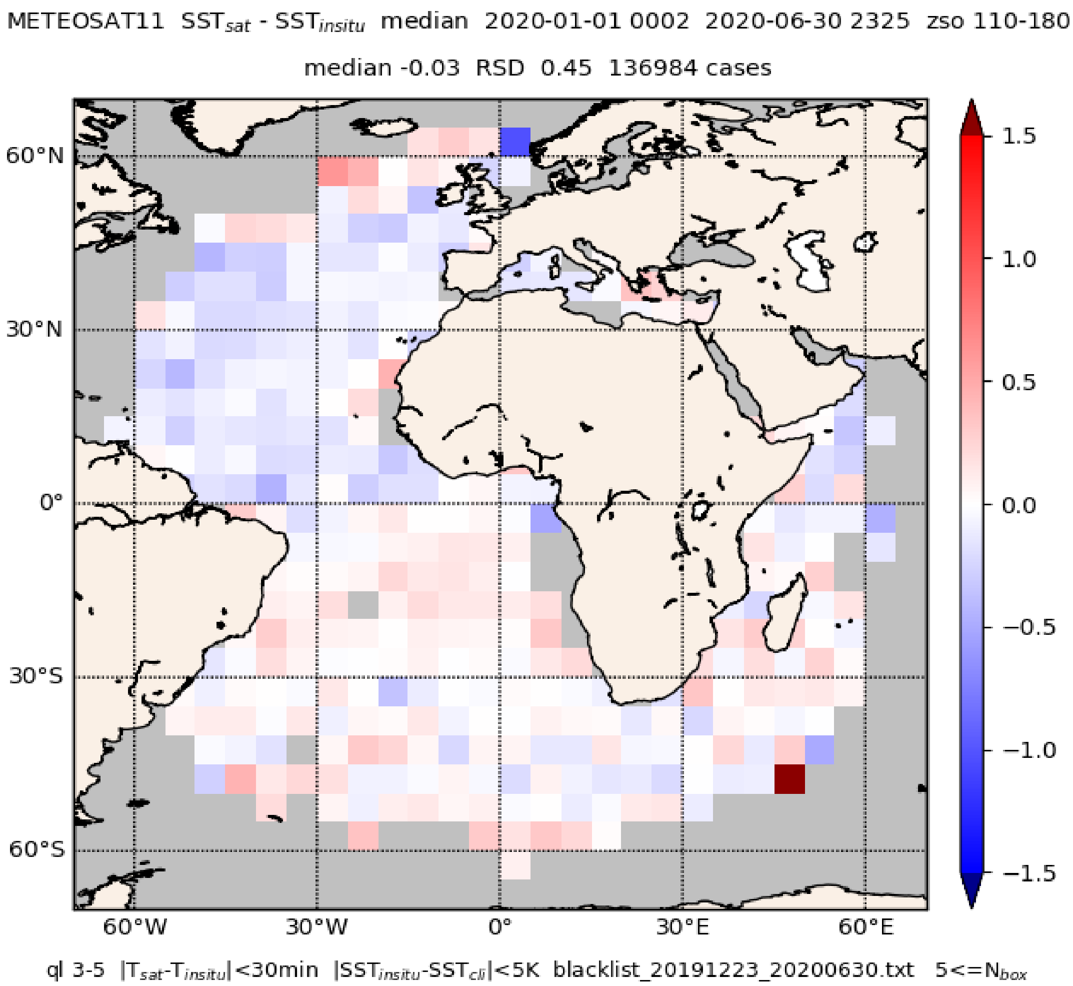


Figure 1: Meteosat night-time SST median difference with respect to buoys measurements for quality level 3,4,5

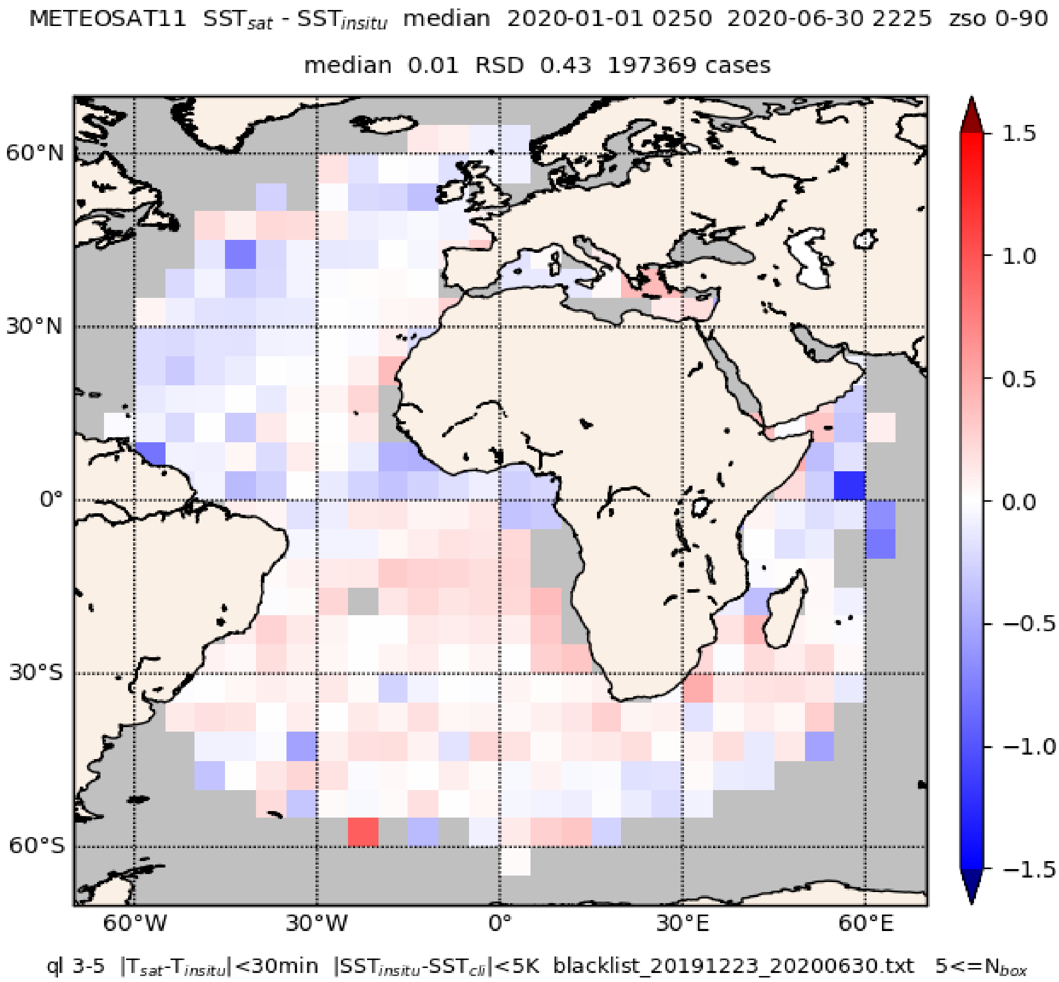


Figure 2: Meteosat day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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

Meteosat night-time SST quality results over 1st half 2020					
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. 2020	12695	-0.07	0.49	-0.04	0.43
FEB. 2020	24232	-0.12	0.51	-0.08	0.46
MAR. 2020	26629	-0.07	0.49	-0.04	0.42
APR. 2020	27505	-0.06	0.50	-0.02	0.42
MAY 2020	27513	-0.07	0.53	-0.03	0.45
JUN. 2020	18410	-0.01	0.51	0.03	0.44
Meteosat day-time SST quality results over 1st half 2020					
JAN. 2020	17957	-0.07	0.52	-0.03	0.44
FEB. 2020	34555	-0.07	0.53	-0.02	0.45
MAR. 2020	35683	-0.03	0.50	0.01	0.42
APR. 2020	39474	-0.04	0.49	0.01	0.39
MAY 2020	40988	-0.05	0.53	0.00	0.45
JUN. 2020	28712	0.02	0.53	0.06	0.45

Table 3: Meteosat SST quality results over 1st half 2020, for 3, 4, 5 quality indexes.

Comments:
Overall statistics are good and within the requirement.

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

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

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

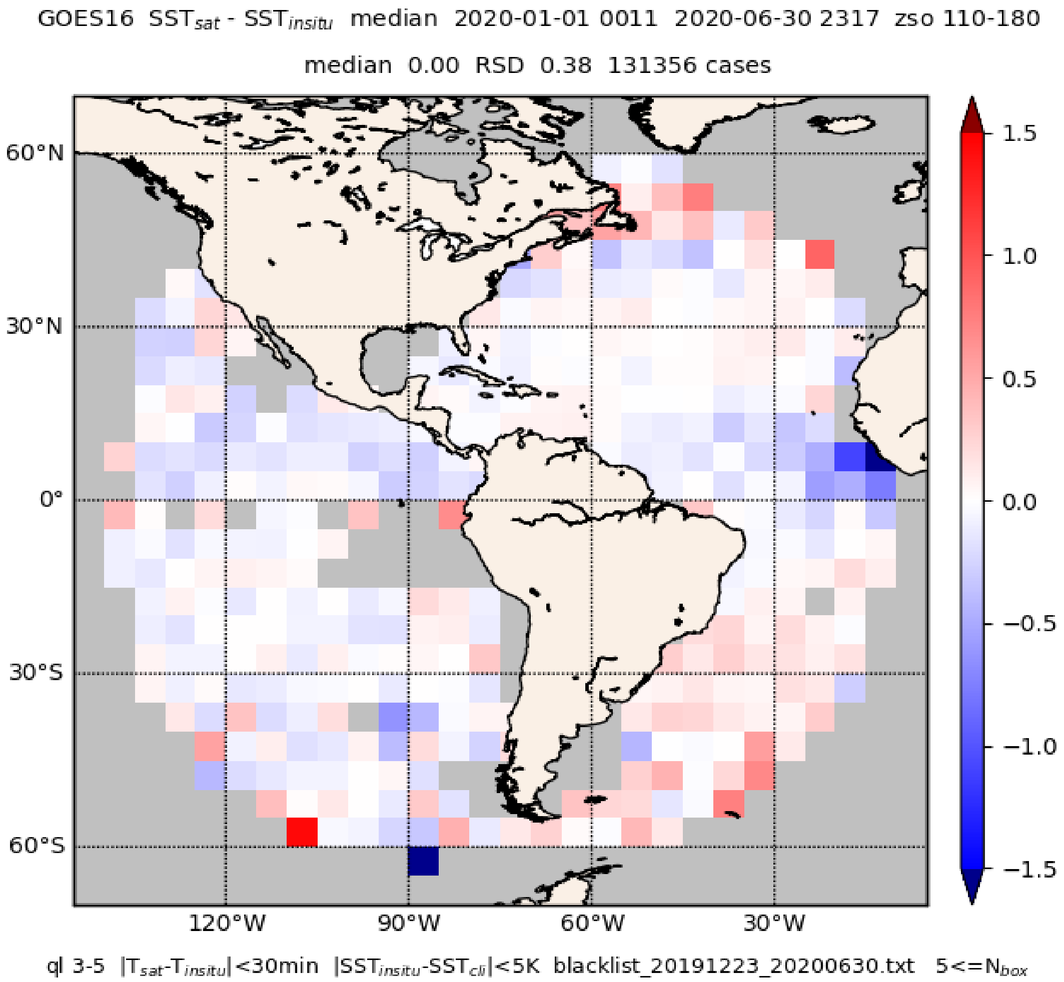


Figure 3: GOES-East night-time SST median difference with respect to buoys measurements for quality level 3,4,5

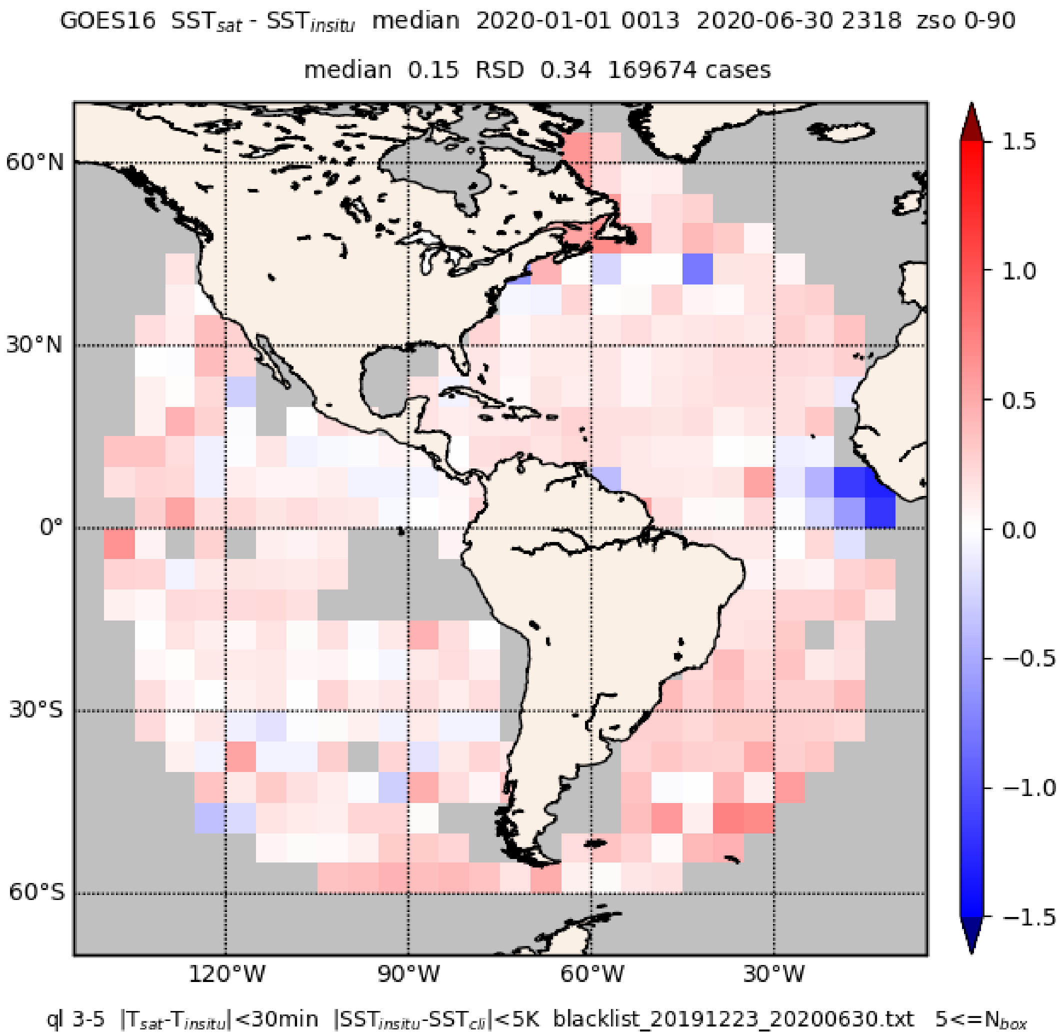


Figure 4: GOES-East day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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

GOES-East <u>night</u>-time SST quality results 1st half 2020					
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. 2020	22998	-0.04	0.49	0.01	0.42
FEB. 2020	24397	-0.09	0.50	-0.01	0.39
MAR. 2020	23840	-0.02	0.43	0.02	0.34
APR. 2020	23447	-0.05	0.44	0.00	0.35
MAY 2020	21459	-0.09	0.51	-0.02	0.42
JUN. 2020	15215	-0.09	0.57	0.01	0.42
GOES-East <u>day</u>-time SST quality results 1st half 2020					
JAN. 2020	27922	0.09	0.47	0.13	0.39
FEB. 2020	29461	0.07	0.49	0.14	0.34
MAR. 2020	28221	0.14	0.43	0.18	0.30
APR. 2020	30725	0.12	0.41	0.15	0.29
MAY 2020	31096	0.06	0.48	0.13	0.36
JUN. 2020	22249	0.09	0.54	0.15	0.37

Table 4: GOES-East SST quality results over 1st half 2020, for 3, 4, 5 quality indexes

Comments:
Overall statistics are good and within the requirement.

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

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

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

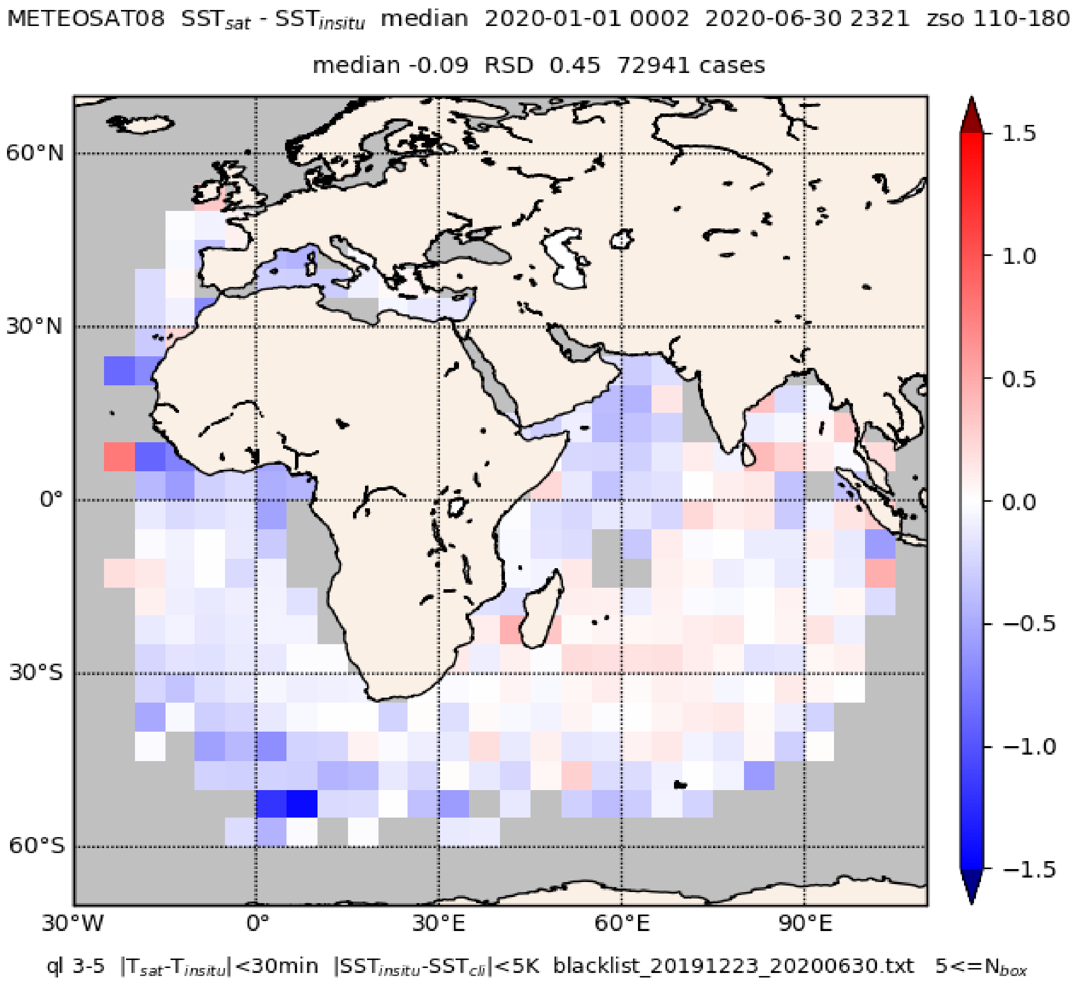


Figure 5: Meteosat Indian Ocean night-time SST median difference with respect to buoys measurements for quality level 3,4,5

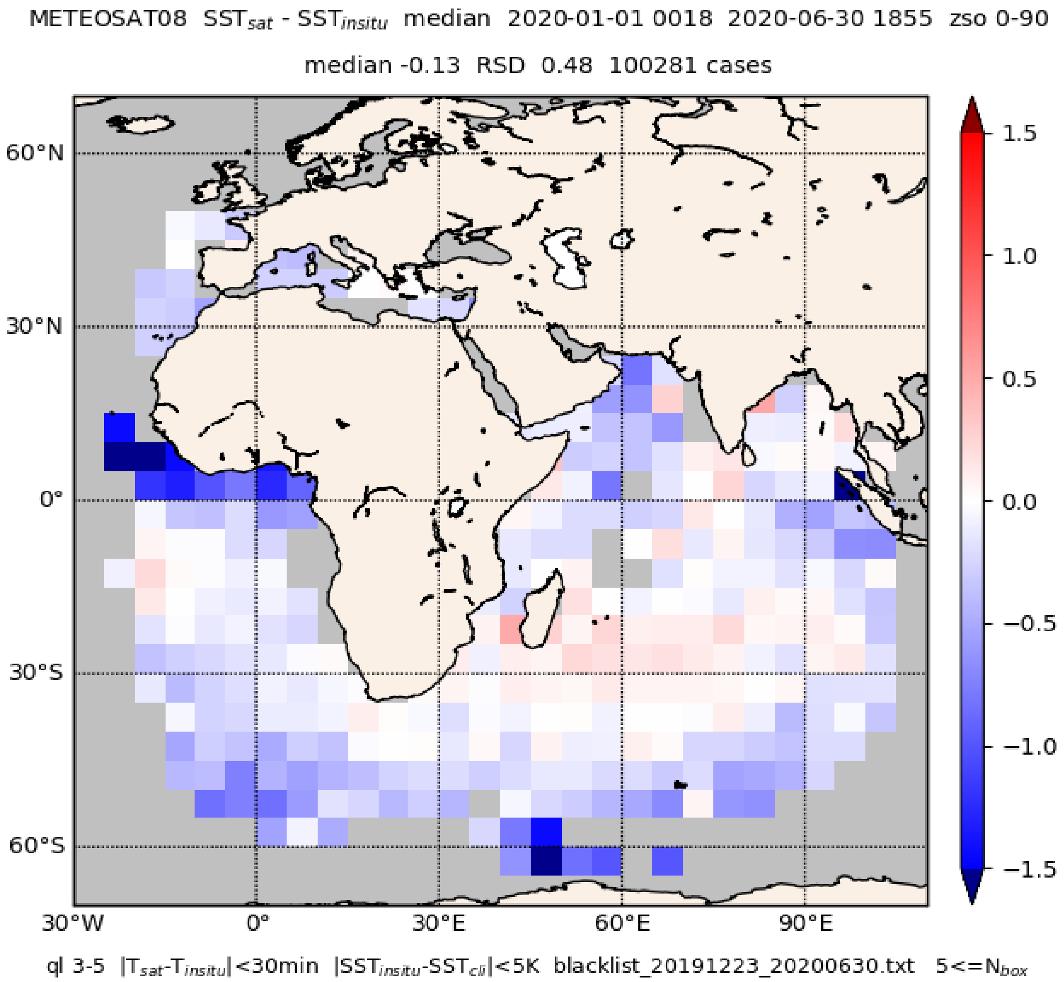


Figure 6: Meteosat Indian Ocean day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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 2020					
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. 2020	11924	-0.15	0.56	-0.09	0.46
FEB. 2020	11643	-0.22	0.54	-0.18	0.44
MAR. 2020	13250	-0.12	0.52	-0.11	0.44
APR. 2020	13822	-0.11	0.52	-0.09	0.46
MAY 2020	13822	-0.10	0.53	-0.07	0.47
JUN. 2020	8480	0.00	0.54	0.02	0.44
Meteosat Indian Ocean day-time SST quality results over 1st half 2020					
JAN. 2020	18572	-0.23	0.64	-0.14	0.50
FEB. 2020	17737	-0.30	0.62	-0.21	0.46
MAR. 2020	18802	-0.17	0.57	-0.12	0.47
APR. 2020	17525	-0.18	0.60	-0.10	0.47
MAY 2020	16981	-0.18	0.62	-0.11	0.50
JUN. 2020	10664	-0.11	0.63	-0.05	0.51

Table 5: Meteosat Indian Ocean SST quality results over 1st half 2020, for 3, 4, 5 quality indexes.

Comments:
Overall statistics are good and within the requirement.

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

The operational NAR SST is processed with AVHRR and VIIRS data, separately. Currently Metop-B and S-NPP 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 S-NPP satellite. It is considered that if the accuracy requirements are met for both AVHRR and VIIRS separately, the accuracy requirements for OSI-202-b are fully met.

5.1.4.1. NPP NAR SST quality

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

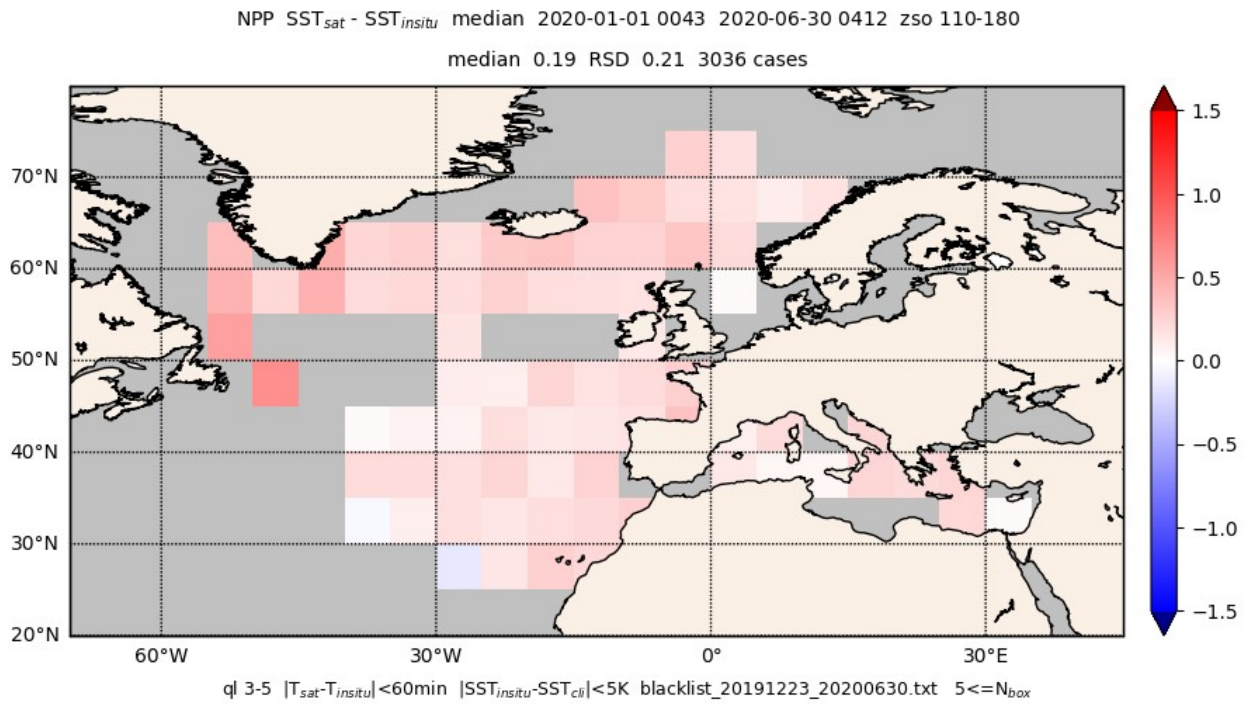


Figure 7: NPP NAR night-time SST median difference with respect to buoys measurements for quality level 3,4,5

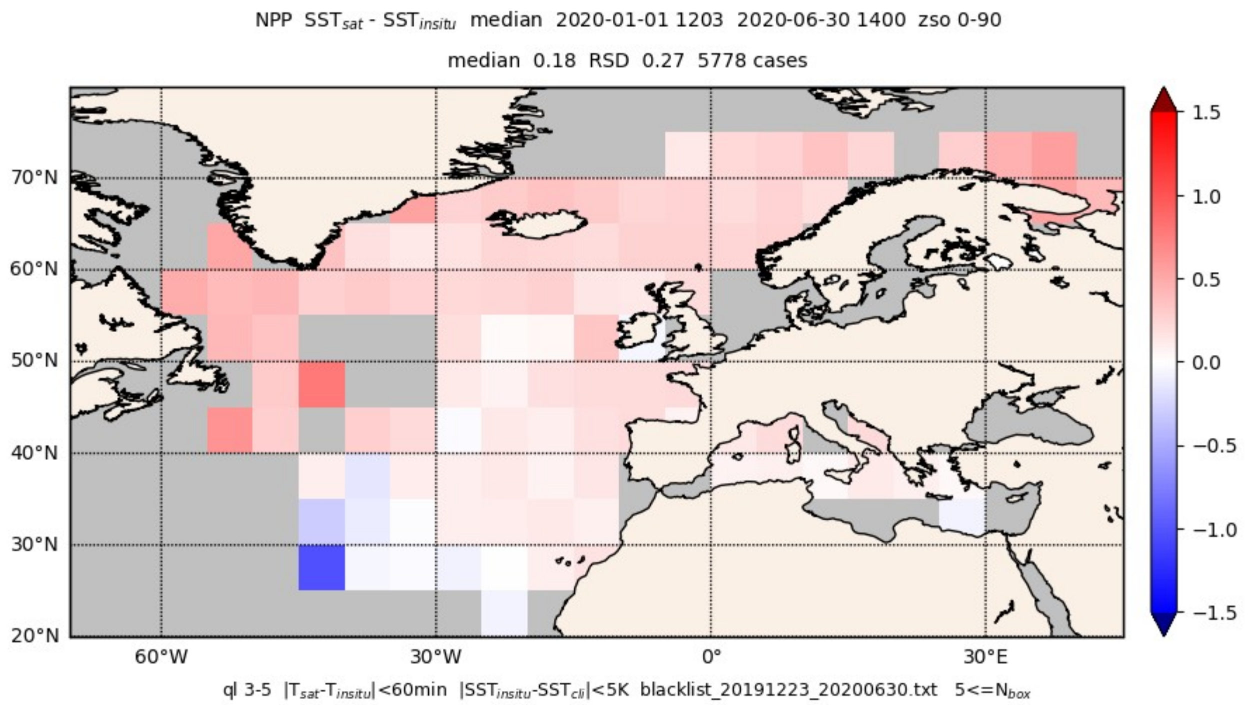


Figure 8: NPP NAR day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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

NPP NAR night-time SST quality results over 1st half 2020					
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. 2020	644	0.17	0.25	0.19	0.18
FEB. 2020	625	0.16	0.28	0.19	0.22
MAR. 2020	626	0.18	0.25	0.20	0.19
APR. 2020	463	0.16	0.29	0.17	0.22
MAY 2020	429	0.19	0.35	0.21	0.24
JUN. 2020	249	0.15	0.30	0.20	0.20
NPP NAR day-time SST quality results over 1st half 2020					
JAN. 2020	609	0.07	0.34	0.11	0.24
FEB. 2020	635	0.07	0.43	0.12	0.28
MAR. 2020	966	0.11	0.39	0.14	0.24
APR. 2020	1040	0.20	0.41	0.22	0.27
MAY 2020	1363	0.15	0.45	0.21	0.27
JUN. 2020	1165	0.19	0.43	0.24	0.27

Table 6: Quality results for NPP NAR SST over 1st half 2020, 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 mean night-time and day-time SST mean difference with respect to buoys measurements for quality level 3,4,5 over the reporting period. Monthly maps are available on http://osi-saf.eumetsat.int/lml/#qua_SST%Metop%20NAR%20SST_monthly%20map_monthly_Night%20time.

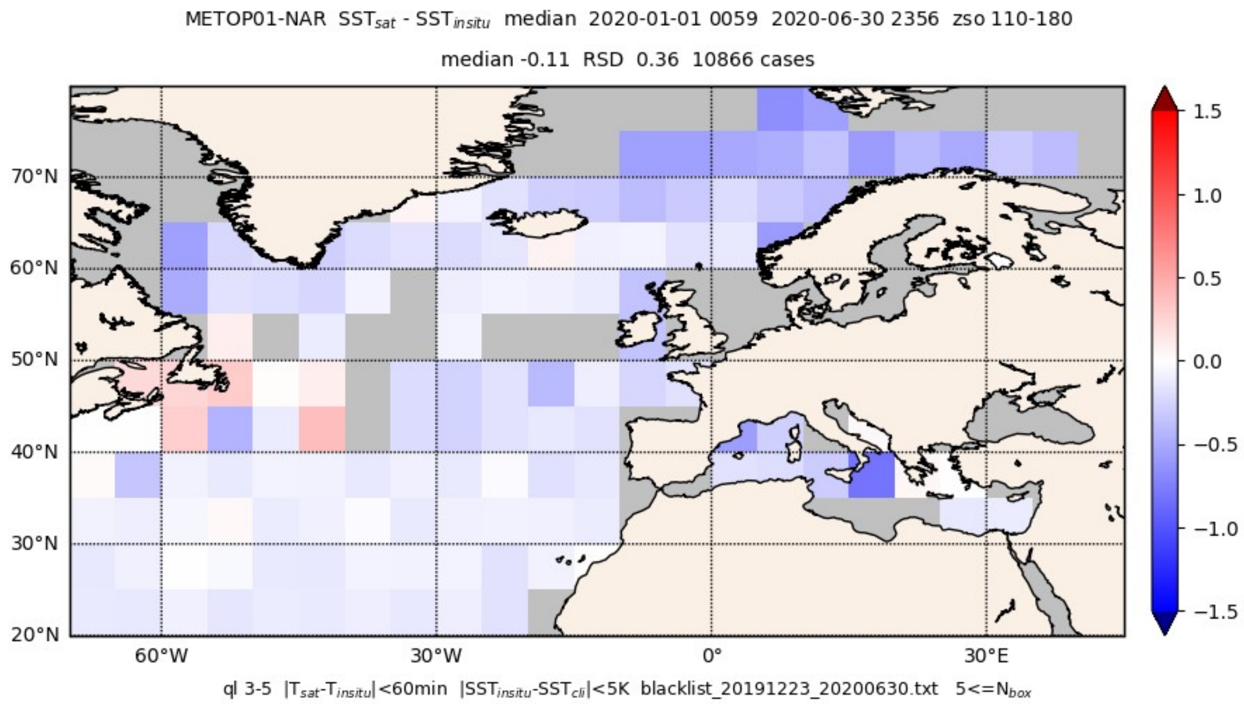


Figure 9: Metop-B NAR night-time SST median difference with respect to buoys measurements for quality level 3,4,5

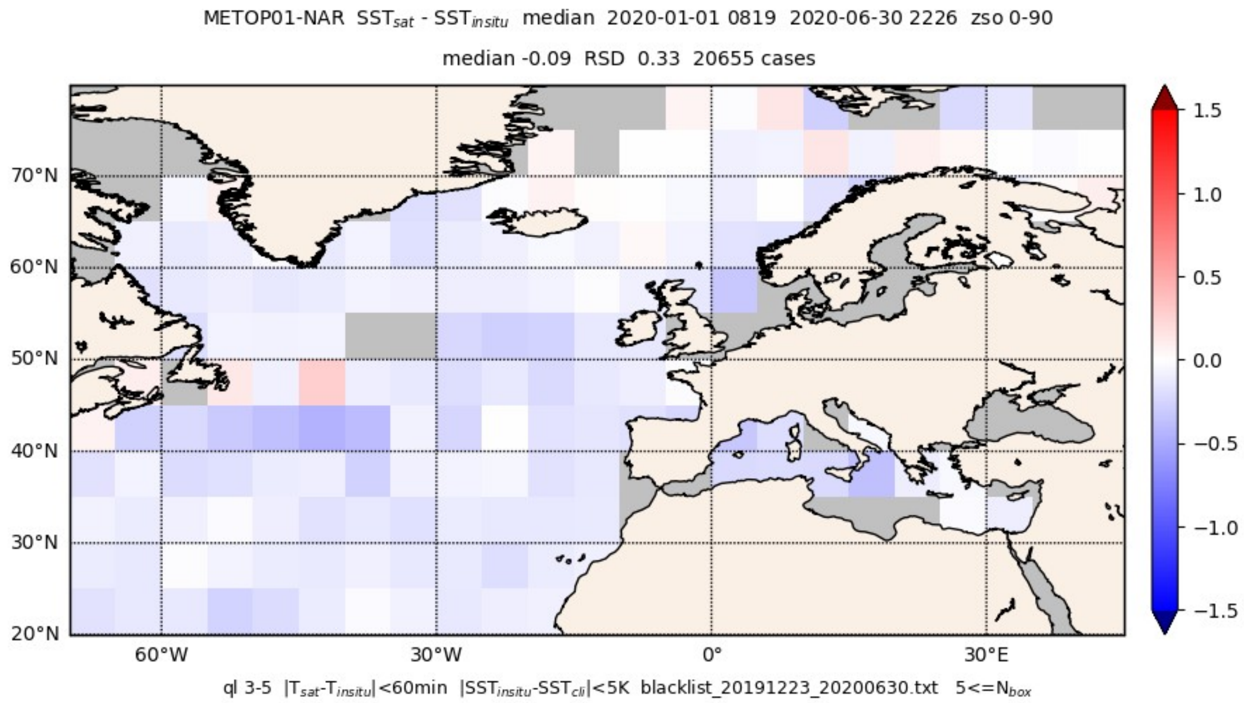


Figure 10: Metop-B NAR day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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

Metop-B NAR night-time SST quality results over 1st half 2020					
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. 2020	2410	-0.13	0.43	-0.07	0.35
FEB. 2020	2092	-0.18	0.45	-0.11	0.38
MAR. 2020	2076	-0.18	0.42	-0.10	0.34
APR. 2020	1845	-0.24	0.46	-0.15	0.37
MAY 2020	1509	-0.22	0.46	-0.14	0.37
JUN. 2020	934	-0.24	0.39	-0.18	0.33
Metop-B NAR day-time SST quality results over 1st half 2020					
JAN. 2020	2019	-0.08	0.37	-0.03	0.29
FEB. 2020	2266	-0.14	0.41	-0.09	0.33
MAR. 2020	2997	-0.13	0.42	-0.08	0.31
APR. 2020	4376	-0.14	0.42	-0.09	0.31
MAY 2020	4723	-0.20	0.50	-0.12	0.34
JUN. 2020	4274	-0.19	0.59	-0.11	0.36

Table 7: Quality results for Metop-B NAR SST over 1st half 2020, for 3, 4, 5 quality indexes

Comments:
Overall statistics are good and within the requirement.

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

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

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

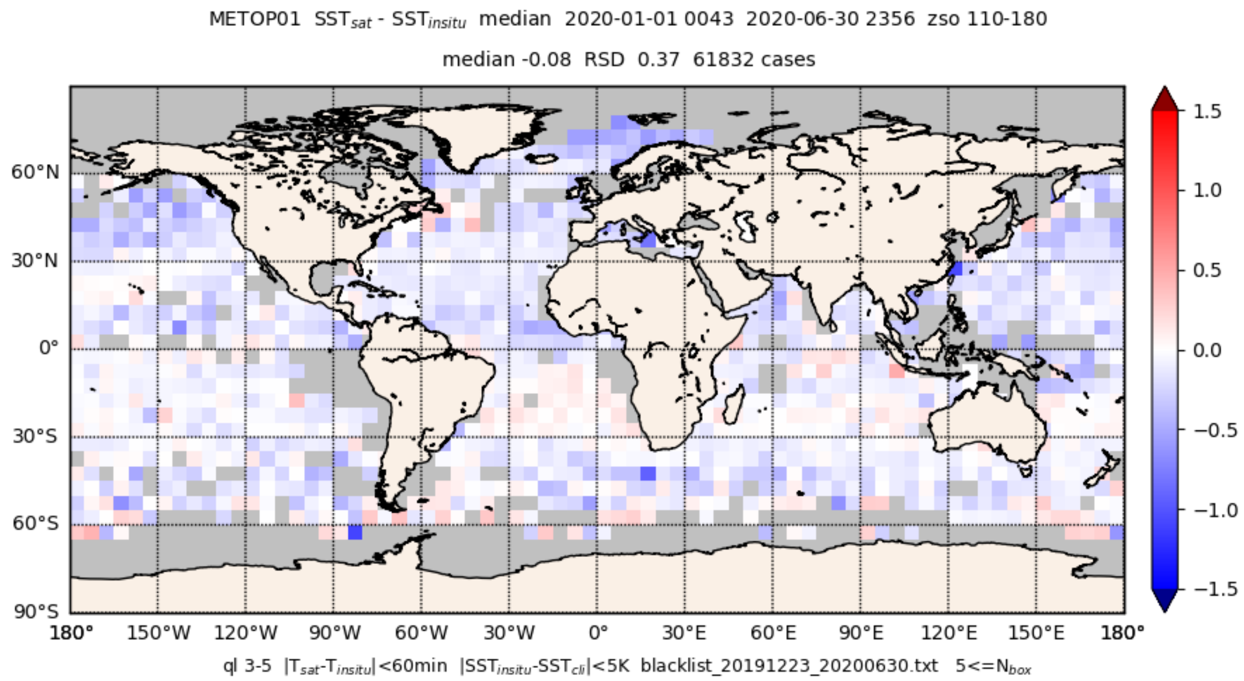


Figure 11: Metop-B night-time SST median difference with respect to buoys measurements for quality level 3,4,5

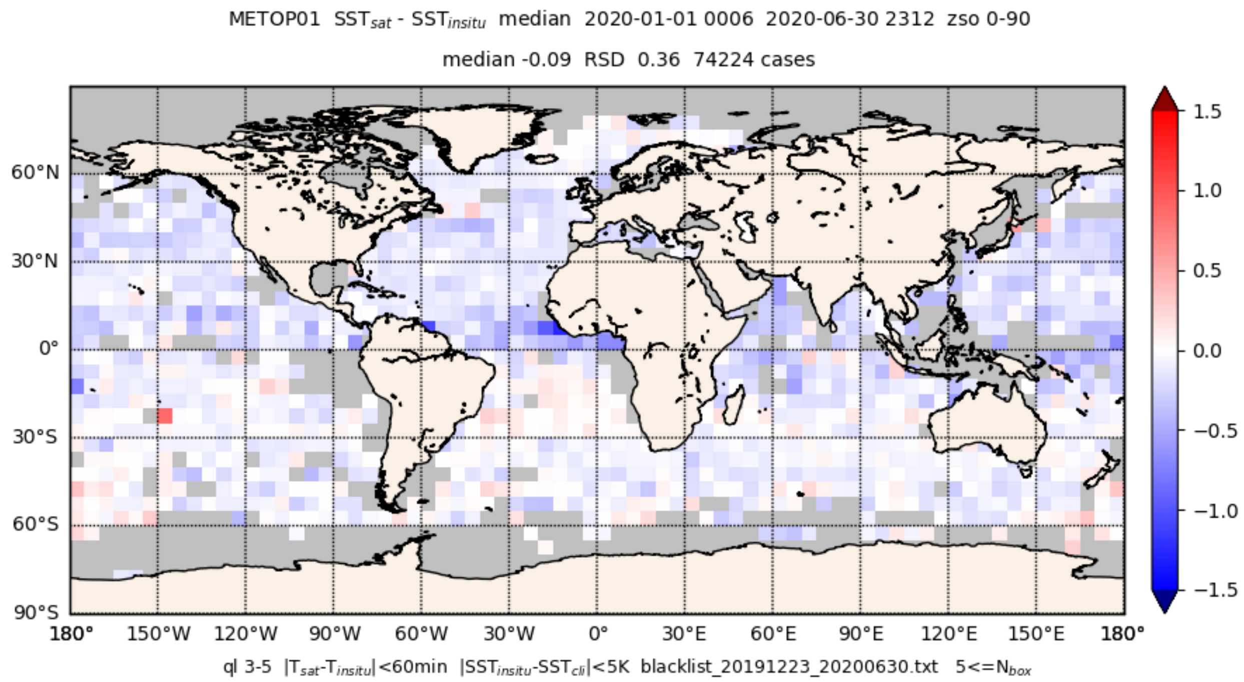


Figure 12: Metop-B day-time SST median difference with respect to buoys measurements for quality level 3,4,5

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

Global Metop-B night-time SST quality results over 1st half 2020					
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. 2020	10420	-0.17	0.48	-0.09	0.37
FEB. 2020	10402	-0.18	0.49	-0.11	0.37
MAR. 2020	11494	-0.18	0.51	-0.08	0.37
APR. 2020	11317	-0.18	0.50	-0.08	0.38
MAY 2020	10732	-0.14	0.51	-0.04	0.39
JUN. 2020	7467	-0.14	0.49	-0.04	0.36
Global Metop-B day-time SST quality results over 1st half 2020					
JAN. 2020	10905	-0.14	0.45	-0.09	0.36
FEB. 2020	10847	-0.14	0.43	-0.10	0.35
MAR. 2020	12358	-0.13	0.44	-0.09	0.34
APR. 2020	13973	-0.14	0.45	-0.09	0.36
MAY 2020	14571	-0.16	0.50	-0.10	0.37
JUN. 2020	11570	-0.14	0.55	-0.07	0.37
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 8: Quality results for global METOP SST over 1st half 2020, for 3,4,5 quality indexes

Comments:
Overall statistics are good and within the requirement.

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

5.1.6.1. 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 OSI-205-a is a high latitude SST and global ice surface temperature (IST) and marginal ice zone surface temperature product.

Conventional measures as Standard Deviation of mean differences (SD) and mean differences are calculated for monthly averages for day-time and night-time. Only best quality data (ql 5) are used for the SST validation, while data with quality levels 3, 4 and 5 are used for the 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 110 degrees. In-situ observations and the centre of the OSI-205-a level-2 pixel must be within 3 km of each other and observation times must be within 15 minutes.
Buoy data used for the SST validation is from the Copernicus Marine Environment Monitoring Service (In Situ TAC). CRREL buoy data have been used for the IST validation.

The IST accuracy requirements are split into two on the Product Requirement Document: Namely, for in-situ IR radiometers, and for traditional in situ buoy data. The reason for this is the higher certainty in IR radiometers, measuring the ice surface skin temperature, compared to the conventional buoy temperature measurements (also discussed in the ATBD for OSI-205-a). Only validation results for OSI-205 vs. traditional buoy data (air temperatures) are subject to the quality assessment requirements.

At the moment there are not sufficient valid observational data available from the southern hemisphere to conduct a quality assessment.

The following tables provide the monthly mean quality results over the reporting period and figures show graphs of comparison results for the half-year reporting periods.

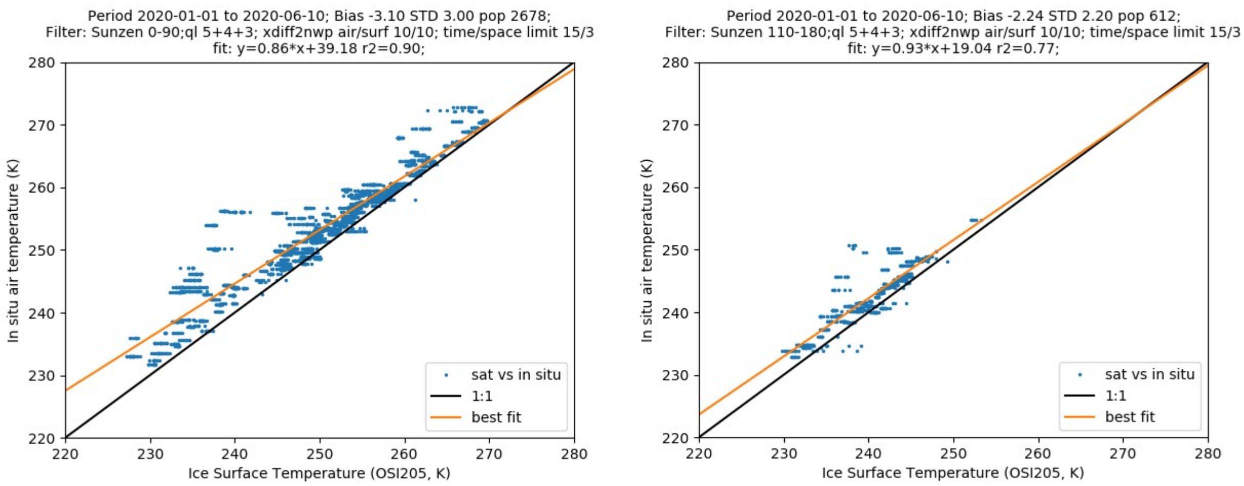


Figure 13: JAN. to JUN. 2020 OSI-205-a monthly mean IST mean difference and bias with respect to conventional buoys measurements from the CRREL buoys (air temperature). Data with quality level 3, 4, 5 are shown. The graph on the left shows day-time data, while the plot on the right only shows night-time observations.

OSI-205-a IST quality results over 1st half 2020, night-time, air temperature, CRREL					
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. 2020	515	-2.25	35.7	2.17	27.7
FEB. 2020	97	-2.17	38.0	2.36	21.3
MAR. 2020	NA	NA	NA	NA	NA
APR. 2020	NA	NA	NA	NA	NA
MAY 2020	NA	NA	NA	NA	NA
JUN. 2020	NA	NA	NA	NA	NA
OSI-205-a IST quality results over 1st half 2020, day-time, air temperature, CRREL					
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. 2020	NA	NA	NA	NA	NA
FEB. 2020	136	-3.53	-0.9	2.03	32.3
MAR. 2020	736	-4.81	-37.4	4.46	-48.7
APR. 2020	1268	-2.42	30.9	1.72	42.7
MAY 2020	538	-2.24	36.0	1.93	35.7
JUN. 2020	NA	NA	NA	NA	NA
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 9: Quality results for OSI-205-a Metop AVHRR IST over 1st half 2020, for quality levels 3, 4 and 5, by night and by day.

Comments:
For the validation against measured air temperature the requirements of ±3.5K for the mean difference and ±3.0K for the standard deviation. are mostly satisfied, except for March during day-time.

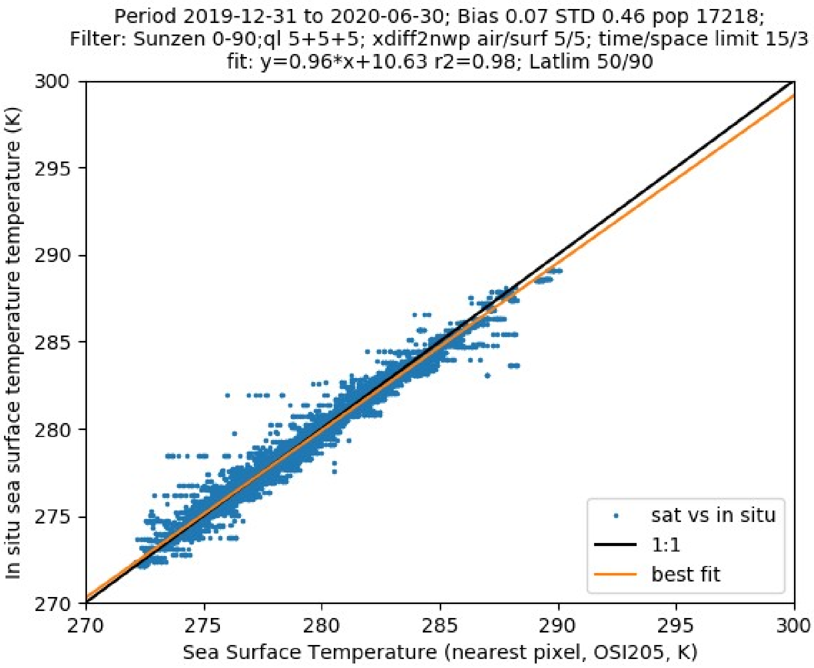


Figure 14: 1st half 2020 OSI-205-a SST mean difference and bias with respect to conventional buoys measurements from the Copernicus In Situ DB. Only daytime data with quality level 5 are shown.

The Level 2 Sea Surface Temperature (SST, OSI-205-a) is derived from polar satellites data, currently AVHRR on board Metop-B.

The following table provides the OSI-205-a SST quality results over the reporting period.

OSI-205-a AVHRR SST quality results over JUL. 2019 to JUN. 2020, 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. 2019	NA	NA	NA	NA	NA
AUG. 2019	9	0.22	68.6	0.26	74.0
SEP. 2019	346	-0.18	74.3	0.66	34.0
OCT. 2019	1272	-0.18	74.3	0.51	49.0
NOV. 2019	2294	-0.30	57.1	0.64	36.0
DEC. 2019	2630	-0.10	85.7	0.51	49.0
2nd half 2019	*6551*	*-0.19*	*72.9*	*0.58*	*42.0*
JAN. 2020	1705	-0.24	65.7	0.49	51.0
FEB. 2020	645	-0.33	52.9	0.63	37.0
MAR. 2020	384	-0.33	52.9	0.34	66.0
APR. 2020	NA	NA	NA	NA	NA
MAY 2020	NA	NA	NA	NA	NA
JUN. 2020	NA	NA	NA	NA	NA
1st half 2020	*2734*	*-0.27*	*61.4*	*0.51*	*49.0*
OSI-205-a AVHRR SST quality results over JUL. 2019 to JUN. 2020 , 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. 2019	3384	0.16	77.1	0.53	47.0
AUG. 2019	3083	-0.13	81.4	0.36	64.0
SEP. 2019	3026	-0.04	94.3	0.33	67.0
OCT. 2019	2664	-0.12	82.9	0.34	66.0
NOV. 2019	492	-0.02	97.1	0.28	72.0
DEC. 2019	148	-0.02	97.1	0.25	75.0
2nd half 2019	*12797*	*-0.02*	*97.1*	*0.41*	*59.0*
JAN. 2020	182	-0.08	88.6	0.37	63.0
FEB. 2020	364	-0.23	67.1	0.30	70.0
MAR. 2020	1449	-0.08	88.6	0.30	70.0
APR. 2020	3591	0.06	91.4	0.33	67.0
MAY 2020	5428	0.05	92.9	0.49	51.0
JUN. 2020	6204	0.15	78.6	0.51	49.0
1st half 2020	*17218*	*0.07*	*90.0*	*0.46*	*54.0*
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 10: Quality results for OSI-205-a AVHRR SST, both Northern and Southern Hemispheres, over JUL. 2019 to JUN. 2020, for quality level 5, by night and by day

Comments:
Since the last report, data for December 2019 has become available. The statistics for December 2019 and the 2nd half of 2019 have therefore been updated.

A visual inspection of extreme outliers has been carried out for the reporting period.
For the validation period of December 2019-June 2020 13 buoys were disqualified from the validation data, since they are supposedly grounded at coast lines:

- GL_TS_DB_2101624 at the coast of Kamchatka Peninsula, at the Sea of Okhotsk.
- GL_TS_DB_2601625 at the coast of Spitzbergen.
- GL_TS_DB_4401568 at the west coast of Norway.
- GL_TS_DB_4402553 at the south-west coast of Greenland.
- GL_TS_DB_4402557 at the south-west coast of Greenland.
- GL_TS_DB_4402590 at the south-west coast of Greenland.
- GL_TS_DB_4601685 at the coast of Canada, at the Pacific Ocean.
- GL_TS_DB_4801674 at the north coast of Alaska, at the Beaufort Sea.
- GL_TS_DB_4801675 at the north coast of Alaska, at the Beaufort Sea.
- GL_TS_DB_6202680 at the west coast of Norway.
- GL_TS_DB_6301682 at the north coast of Norway.
- GL_TS_DB_6401570 at the north coast of Norway.
- GL_TS_DB_6501538 at the south-west coast of Greenland.

Validation values for the first half year of 2020 are fully satisfactory and fulfil the requirements on mean error and standard deviation error.

5.1.6.2. 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. The validation of this IST product is based the drifting buoys on the sea ice. These buoys do not provide a good estimate of the sea ice skin surface temperature, but is the only available data source for routine validation on sea ice in the Arctic Ocean. The problem with these buoys is that they sometimes are burried in snow and hence measure temperatures different to the surface skin temperature.

OSI-205-b NHL VIIRS SST quality results over JUL. 2019 to JUN. 2020, 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. 2019	325	-0.610	12.9	0.938	6.2
AUG. 2019	667	-0.680	2.8	0.793	20.7
SEP. 2019	1742	-0.495	29.2	0.934	6.5
OCT. 2019	3306	-0.507	27.6	0.900	10.0
NOV. 2019	3030	-0.545	21.6	0.928	7.2
DEC. 2019	2630	-0.440	37.2	0.959	4.1
JAN. 2020	1927	-0.393	43.9	0.877	12.3
FEB. 2020	1105	-0.435	37.9	0.905	9.5
MAR. 2020	1840	-0.281	59.8	0.798	20.2
APR. 2020	2021	-0.165	76.4	0.751	24.9
MAY 2020	654	-0.402	42.6	0.908	9.2
JUN. 2020	321	-0.206	70.5	1.043	-4.3
OSI-205-b NHL VIIRS SST quality results over JUL. 2019 to JUN. 2020, 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. 2019	2609	-0.233	66.7	0.770	23.0
AUG. 2019	1862	-0.581	17.0	0.734	26.6
SEP. 2019	2354	-0.353	49.5	0.668	33.2
OCT. 2019	2967	-0.404	42.3	0.648	35.2
NOV. 2019	1157	-0.442	36.9	0.610	39.0
DEC. 2019	532	-0.320	54.3	0.638	36.2
JAN. 2020	612	-0.575	17.9	0.739	26.1
FEB. 2020	982	-0.557	20.5	0.738	26.2
MAR. 2020	2280	-0.368	47.5	0.671	32.9
APR. 2020	3257	-0.144	79.5	0.579	42.1
MAY 2020	3237	-0.174	75.1	0.680	32.0
JUN. 2020	3034	-0.128	81.7	0.775	22.5
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 11: Quality results for OSI-205-b NHL VIIRS SST, over Northern Atlantic and Arctic Ocean, over JUL. 2019 to JUN. 2020, 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. 2019 to JUN. 2020, 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. 2019	0	-	-	-	-
AUG. 2019	0	-	-	-	-
SEP. 2019	15	-0.94	73.2	2.91	2.9
OCT. 2019	171	-2.48	29.1	2.96	1.43
NOV. 2019	217	-5.03	-43.8	3.64	-21.4
DEC. 2019	339	-2.53	27.6	4.39	-46.3
JAN. 2020	424	0.45	87.2	4.85	-61.8
FEB. 2020	330	-0.23	93.5	5.33	-77.7
MAR. 2020	84	2.26	35.4	4.56	-52.1
APR. 2020	0	-	-	-	-
MAY 2020	0	-	-	-	-
JUN. 2020	0	-	-	-	-
OSI-205-b NHL VIIRS IST quality results over JUL. 2019 to JUN. 2020, 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. 2019	0	-	-	-	-
AUG. 2019	23	-3.65	-4.3	2.09	30.3
SEP. 2019	30	-1.94	44.4	3.11	-3.9
OCT. 2019	0	-	-	-	-
NOV. 2019	0	-	-	-	-
DEC. 2019	0	-	-	-	-
JAN. 2020	0	-	-	-	-
FEB. 2020	3	-	-	-	-
MAR. 2020	40	4.208	-20.2	6.132	-104.4
APR. 2020	291	-4.929	-40.8	3.276	-9.2
MAY 2020	107	-3.153	9.9	3.521	-17.4
JUN. 2020	1	-	-	-	-
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 12: Quality results for OSI-205-b NHL VIIRS IST, over Northern Atlantic and Arctic Ocean, over JUL. 2019 to JUN. 2020, for 3,4,5 quality indexes, by night and by day. Comparison with air temperature from buoys.

Comments:
SST meets the target requirement for mean difference and standard deviation for all months both daytime and night-time of the reporting period, except a slightly too high standard deviation in June at night-time.
IST has few matchups for the reporting period. The target requirement for mean difference is met for all months except in March and April at daytime. The target requirement for standard deviation is not met for daytime or night-time.

5.1.6.3. 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. The validation of this IST product is based the drifting buoys on the sea ice. These buoys do not provide a good estimate of the sea ice skin surface temperature, but is the only available data source for routine validation on sea ice in the Arctic Ocean. The problem with these buoys is that they sometimes are burried in snow and hence measure temperatures different to the surface skin temperature.

OSI-203-a NHL AVHRR SST quality results over JUL. 2019 to JUN. 2020, 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. 2019	140	-0.456	34.8	0.948	5.2
AUG. 2019	166	-0.581	17.0	0.949	5.1
SEP. 2019	446	-0.596	14.9	0.882	11.8
OCT. 2019	2089	-0.700	0.0	0.812	18.8
NOV. 2019	2602	-0.712	-1.6	0.845	15.4
DEC. 2019	2583	-0.615	12.1	0.784	21.6
JAN. 2020	1578	-0.752	-7.5	0.722	27.7
FEB. 2020	970	-0.764	-9.2	0.706	29.3
MAR. 2020	1146	-0.744	-6.3	0.602	39.7
APR. 2020	1750	-0.447	36.1	0.675	32.4
MAY 2020	404	-0.376	46.2	0.957	4.2
JUN. 2020	150	-0.069	90.0	1.007	-0.7
OSI-203-a NHL AVHRR SST quality results over JUL. 2019 to JUN. 2020, 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. 2019	4483	-0.298	57.4	0.850	15.0
AUG. 2019	1681	-0.406	42.0	0.764	23.6
SEP. 2019	2119	-0.281	59.9	0.638	36.2
OCT. 2019	2985	-0.331	52.8	0.577	42.3
NOV. 2019	1710	-0.238	66.0	0.482	51.8
DEC. 2019	748	-0.187	73.3	0.545	45.5
JAN. 2020	779	-0.402	42.5	0.598	40.1
FEB. 2020	1441	-0.535	23.5	0.572	42.7
MAR. 2020	3272	-0.414	40.8	0.589	41.0
APR. 2020	3818	-0.229	67.1	0.581	41.8
MAY 2020	2973	-0.095	86.3	0.580	41.9
JUN. 2020	3445	-0.043	93.8	0.705	29.4
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 13: Quality results for OSI-203-a NHL AVHRR SST over JUL. 2019 to JUN. 2020, 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. 2019 to JUN. 2020, 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. 2019	0	-	-	-	-
AUG. 2019	0	-	-	-	-
SEP. 2019	0	-	-	-	-
OCT. 2019	120	-2.51	28.4	2.73	9.1
NOV. 2019	215	-5.39	-54.0	3.12	-4.0
DEC. 2019	324	-2.69	23.2	4.12	-37.2
JAN. 2020	296	0.258	92.6	5.473	-82.4
FEB. 2020	201	-2.000	42.9	4.739	-58.0
MAR. 2020	40	2.089	40.3	5.584	-86.1
APR. 2020	0	-	-	-	-
MAY 2020	0	-	-	-	-
JUN. 2020	0	-	-	-	-
OSI-203-a NHL AVHRR IST quality results over JUL. 2019 to JUN. 2020, 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. 2019	0	-	-	-	-
AUG. 2019	16	-4.75	-35.8	1.86	37.9
SEP. 2019	53	-0.92	73.7	3.26	-8.7
OCT. 2019	5	-	-	-	-
NOV. 2019	0	-	-	-	-
DEC. 2019	0	-	-	-	-
JAN. 2020	0	-	-	-	-
FEB. 2020	9	-	-	-	-
MAR. 2020	32	2.231	36.2	5.684	-89.5
APR. 2020	122	-4.960	-41.7	3.143	-4.8
MAY 2020	60	-3.114	11.0	3.854	-28.5
JUN. 2020	0	-	-	-	-
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 14: Quality results for OSI-203-a NHL AVHRR IST over JUL. 2019 to JUN. 2020, for 3,4,5 quality indexes, by night and by day. Comparison with air temperature from buoys.

Comments:
SST meets the target requirement for mean difference for all months except at night-time in January, February and March when the mean difference is a bit too negative. For standard deviation the target accuracy is met for all months both daytime and night-time of the reporting period, except a slightly too high standard deviation in June at night-time.

IST has few matchups for the reporting period. The target requirement for mean difference is met for all months except in April at daytime. The target requirement for standard deviation is not met for daytime or night-time.

5.1.6.4. 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. The validation of this IST product is based the drifting buoys on the sea ice. These buoys do not provide a good estimate of the sea ice skin surface temperature, but is the only available data source for routine validation on sea ice in the Arctic Ocean. The problem with these buoys is that they sometimes are burried in snow and hence measure temperatures different to the surface skin temperature.

OSI-203-b NHL VIIRS SST quality results over JUL. 2019 to JUN. 2020, 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. 2019	610	-0.866	-23.8	1.050	-5.0
AUG. 2019	1131	-0.719	-2.8	0.814	18.6
SEP. 2019	2401	-0.747	-6.7	0.940	6.0
OCT. 2019	5835	-0.514	26.5	0.808	19.2
NOV. 2019	5230	-0.497	29.0	0.836	16.4
DEC. 2019	4882	-0.428	38.9	0.840	16.0
JAN. 2020	3365	-0.373	46.7	0.806	19.4
FEB. 2020	2390	-0.395	43.6	0.784	21.6
MAR. 2020	3710	-0.291	58.4	0.733	26.7
APR. 2020	3023	-0.297	57.6	0.820	18.0
MAY 2020	1356	-0.593	15.3	0.916	8.4
JUN. 2020	809	-0.372	46.9	1.111	-11.1
OSI-203-b NHL VIIRS SST quality results over JUL. 2019 to JUN. 2020, 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. 2019	2257	-0.334	52.2	0.690	31.0
AUG. 2019	1744	-0.492	29.7	0.631	36.9
SEP. 2019	2126	-0.372	46.9	0.603	39.7
OCT. 2019	3529	-0.395	43.6	0.574	42.6
NOV. 2019	2233	-0.460	34.2	0.553	44.7
DEC. 2019	1389	-0.534	23.7	0.620	38.0
JAN. 2020	1882	-0.807	-15.2	0.752	24.8
FEB. 2020	2129	-0.757	-8.2	0.736	26.4
MAR. 2020	3995	-0.443	36.8	0.604	39.6
APR. 2020	4056	-0.236	66.4	0.562	43.8
MAY 2020	3290	-0.226	67.7	0.608	39.2
JUN. 2020	3590	-0.104	85.1	0.683	31.7
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 15: Quality results for OSI-203-b NHL VIIRS SST over JUL. 2019 to JUN. 2020, 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. 2019 to JUN. 2020, 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. 2019	0	-	-	-	-
AUG. 2019	0	-	-	-	-
SEP. 2019	10	-4.95	-41.5	1.43	52.4
OCT. 2019	177	-2.34	33.2	3.35	-11.6
NOV. 2019	210	-3.92	-12.1	3.20	-6.6
DEC. 2019	306	-2.77	20.8	4.21	-40.3
JAN. 2020	158	0.58	83.4	5.74	-91.6
FEB. 2020	153	0.36	89.5	6.20	-106.9
MAR. 2020	55	3.67	-5.1	5.40	-80.0
APR. 2020	0	-	-	-	-
MAY 2020	0	-	-	-	-
JUN. 2020	0	-	-	-	-
OSI-203-b NHL VIIRS IST quality results over JUL. 2019 to JUN. 2020, 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. 2019	1	-	-	-	-
AUG. 2019	25	-4.76	-36.0	2.40	20.1
SEP. 2019	41	-2.49	29.0	3.10	-3.5
OCT. 2019	0	-	-	-	-
NOV. 2019	0	-	-	-	-
DEC. 2019	0	-	-	-	-
JAN. 2020	0	-	-	-	-
FEB. 2020	0	-	-	-	-
MAR. 2020	6	-	-	-	-
APR. 2020	128	-4.132	-18.0	3.531	-17.7
MAY 2020	72	-4.735	-35.3	2.964	1.2
JUN. 2020	1	-	-	-	-
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 16: Quality results for OSI-203-b NHL VIIRS IST over JUL. 2019 to JUN. 2020, for 3,4,5 quality indexes, by night and by day

Comments:
SST meets the target requirement for mean difference for all months except at day time in January and February when the mean difference is a bit too negative. For standard deviation the target accuracy is met for all months both daytime and night-time of the reporting period, except a slightly too high standard deviation in June at night-time.

IST has few matchups for the reporting period. The target requirement for mean difference is met in January and February, but not March at night time, and not in April and May at daytime. The target requirement for standard deviation is met in May at daytime, but not the other months with available validation data.

5.1.7. 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.

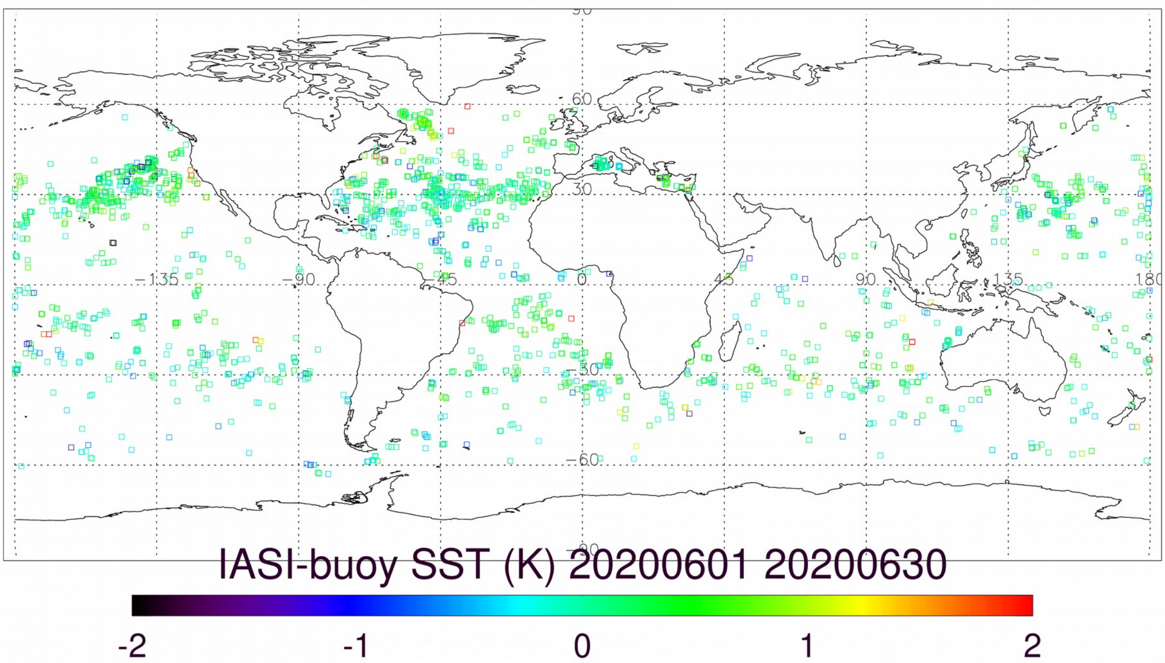


Figure 15: Mean Metop-B IASI night-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JAN. to JUN. 2020

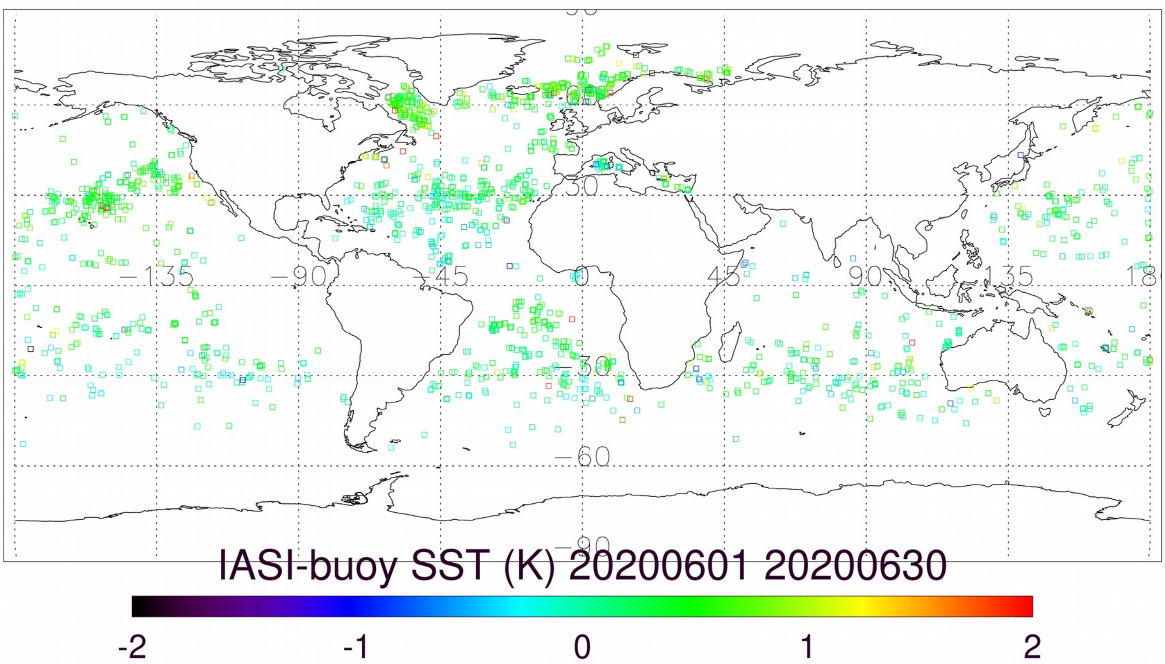


Figure 16: Mean Metop-B IASI day-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JAN. to JUN. 2020

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 2020					
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. 2020	1845	0.10	80	0.53	34
FEB. 2020	2291	0.12	76	0.50	38
MAR. 2020	2959	0.07	86	0.48	40
APR. 2020	3094	0.11	78	0.52	35
MAY 2020	2865	0.11	78	0.48	40
JUN. 2020	1987	0.13	74	0.51	36
Global Metop-B IASI day-time SST quality results over 1st half 2020					
JAN. 2020	1373	0.18	64	0.49	39
FEB. 2020	1786	0.20	60	0.44	45
MAR. 2020	2416	0.16	68	0.45	44
APR. 2020	2344	0.17	66	0.41	49
MAY 2020	2520	0.22	56	0.47	41
JUN. 2020	1796	0.30	40	0.47	41
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.					

Table 17: Quality results for global Metop-B IASI SST over 1st half 2020, for Quality Levels 3, 4 and 5

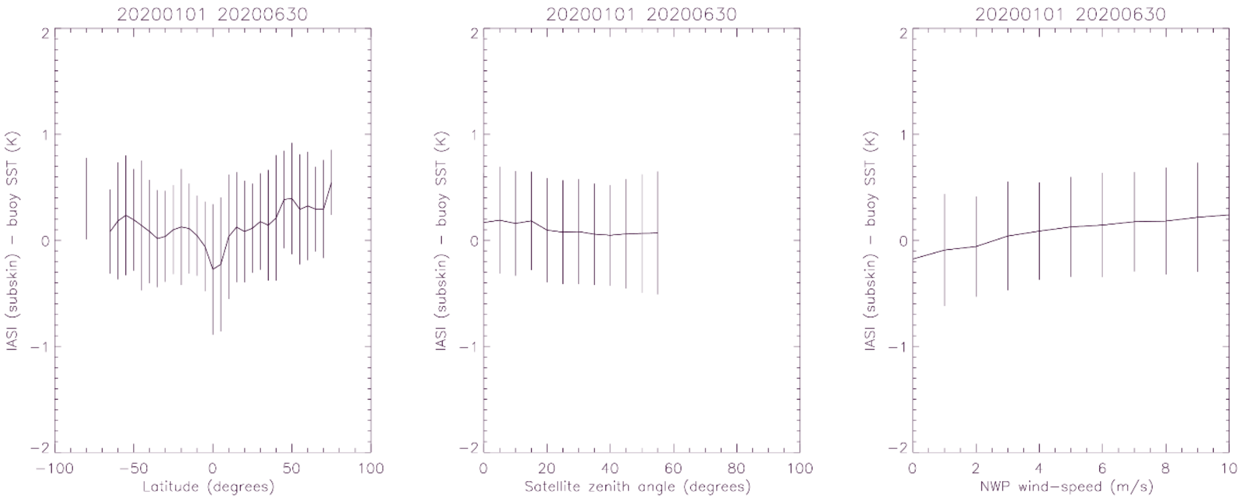


Figure 17: Mean Metop-B IASI night-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JUL. 2019 to JUN. 2020

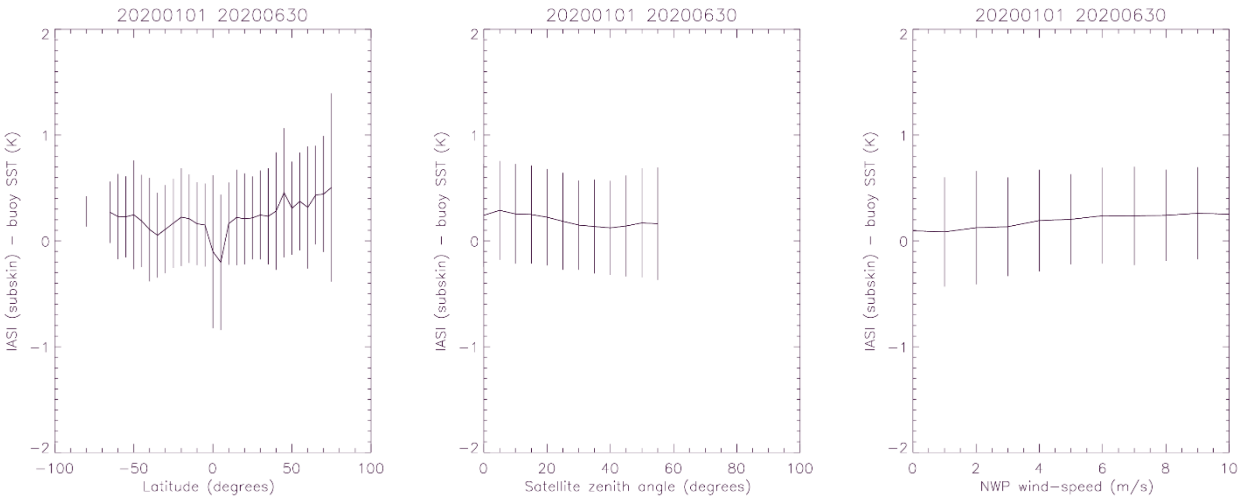


Figure 18: Mean Metop-B IASI day-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JUL. 2019 to JUN. 2020

Comments:
Over the six month reporting period the night-time mean IASI bias (for quality levels 3 and above) against drifting buoy SSTs is 0.11K with a standard deviation of 0.50K (n=15041). The monthly mean and whole time period results and within the target accuracy.

5.2. Radiative Fluxes quality

5.2.1. DLI quality

DLI products are constituted of the geostationary products (Meteosat DLI and GOES-East DLI) and the polar ones (AHL DLI). 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. Meteosat DLI (OSI-303) and GOES-East DLI (OSI-305) quality

The list of pyrgeometer stations used for validating the geostationary DLI products is available on the OSI SAF Web Site from the following page:
http://osi-saf.eumetsat.int/lml/img/flx_map_stations.gif
The list of stations has been updated on the 8 October 2018 : some stations have been removed because they had not provided data for more than one year, some stations have been added after assessment of their quality.

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

Geostationary Meteosat & GOES-East DLI quality results over JUL. 2019 to JUN. 2020								
Month	Number of cases	Mean DLI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. in % (req.: ± 5 %)	Mean diff. margin(*) in %	SD in Wm^{-2}	SD in % (req. : ± 10%)	SD margin(**) in %
JUL. 2019	5948	370.58	-1.41	-0.38	92.39	19.99	5.39	46.06
AUG. 2019	5812	366.56	-1.55	-0.42	91.54	19.43	5.30	46.99
SEP. 2019	4737	352.71	-1.51	-0.43	91.44	16.64	4.72	52.82
OCT. 2019	4951	317.51	-2.72	-0.86	82.87	15.28	4.81	51.88
NOV. 2019	5009	289.09	-6.61	-2.29	54.27	16.92	5.85	41.47
DEC. 2019	4431	280.50	-3.97	-1.42	71.69	19.09	6.81	31.94
JAN. 2020	4345	279.51	-5.54	-1.98	60.36	17.52	6.27	37.32
FEB. 2020	4076	279.12	-3.83	-1.37	72.56	16.55	5.93	40.71
MAR. 2020	4431	299.69	-2.63	-0.88	82.45	14.92	4.98	50.22
APR. 2020	4210	307.43	-3.20	-1.04	79.18	18.49	6.01	39.86
MAY 2020	4371	337.06	-6.16	-1.83	63.45	21.82	6.47	35.26
JUN. 2020	4098	364.32	-4.16	-1.14	77.16	25.08	6.88	31.16
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.								

Table 18: Geostationary DLI quality results over 1st half 2020.

Comments:
Overall statistics are good and within the requirement.

5.2.1.2. Meteosat Indian Ocean DLI (OSI-IO-DLI) quality

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

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

Geostationary Meteosat Indian Ocean DLI quality results over JUL. 2019 to JUN. 2020								
Month	Number of cases	Mean DLI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. in % (req.: ± 5 %)	Mean diff. margin in %(*)	SD in Wm^{-2}	SD in % (req.: ± 10 %)	SD margin (**) in %
JUL. 2019	1348	342.45	10.21	2.98	40.37	15.58	4.55	54.50
AUG. 2019	1463	344.95	11.00	3.19	36.22	19.48	5.65	43.53
SEP. 2019	1267	322.13	6.78	2.10	57.91	17.59	5.46	45.39
OCT. 2019	1425	327.76	-1.98	-0.60	87.92	20.03	6.11	38.89
NOV. 2019	1409	313.82	-13.01	-4.15	17.09	20.68	6.59	34.10
DEC. 2019	711	301.93	-6.01	-1.99	60.19	21.53	7.13	28.69
JAN. 2020	741	301.90	-10.00	-3.31	33.75	21.60	7.15	28.45
FEB. 2020	596	312.18	-4.12	-1.32	73.60	18.50	5.93	40.74
MAR. 2020	688	294.72	0.61	0.21	95.86	17.33	5.88	41.20
APR. 2020	647	312.64	4.60	1.47	70.57	13.44	4.30	57.01
MAY 2020	719	316.25	6.63	2.10	58.07	12.31	3.89	61.08
JUN. 2020	629	343.80	6.91	2.01	59.80	12.27	3.57	64.31
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.								

Table 19: Meteosat Indian Ocean DLI quality results over 1st half 2020.

Comments:
Overall statistics are good and within the requirement.

5.2.1.3. AHL DLI (OSI-301/OSI-301-b) quality

The pyrgeometer stations used for quality assessment of the AHL DLI product are briefly described athttp://nowcasting.met.no/validering/flukser/. More information on the stations is provided in 5.2.2.3.

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

AHL DLI quality results over JUL. 2019 to JUN. 2020								
Month	Number of cases	Mean DLI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. in % (req.: ± 5 %)	Mean diff. margin in %(*)	SD in Wm^{-2}	SD in % (req.: ± 10 %)	SD margin (**) in %
JUL. 2019	307	335.88	-4.48		73,4	11.32	0	66,3
AUG. 2019	288	333.82	-6.52		61,0	11.55	0	65,4
SEP. 2019	237	319.98	-2.80		82,4	13.43	0	58,0
OCT. 2019	245	299.59	-0.41		97,2	14.17	0	52,7
NOV. 2019	220	289.80	7.30		49,6	14.34	0	50,5
DEC. 2019	237	288.85	8.09		44,0	18.62	0	35,5
JAN. 2020	63	274.03	-2.64	-0.95	80,9	16.47	5.95	40,5
FEB. 2020	64	261.76	3.16	1.22	75,6	19.41	7.51	24,9
MAR. 2020	74	257.19	0.39	0.15	97,0	19.10	7.44	25,6
APR. 2020	60	270.37	9.71	3.73	25,5	14.56	5.59	44,2
MAY 2020	56	287.86	-1.75	-0.61	87,9	19.43	6.71	32,9
JUN. 2020	56	316.99	-3.26	-1.02	79,6	21.05	6.57	34,3
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.								

Table 20: AHL DLI quality results over JUL. 2019 to JUN. 2020.

Comments:
The validation results for Jul 2019-Dec 2019 is for OSI-301, while Jan 2020-Jun 2020 is for OSI-301-b. The difference in number of cases is due to a different way of calculating number of cases, as the validation now only uses cases where in situ data are available for all hours through the day. Requirements are met for all months. There is a slight bias for April that is being investigated as it is related to a similar bias in SSI. The reason for this is not known yet.

5.2.2. SSI quality

SSI products are constituted of the geostationary products (Meteosat SSI and GOES-East SSI) and polar ones (AHL SSI). 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. Meteosat SSI (OSI-304) and GOES-East SSI (OSI-306) quality

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

Geostationary Meteosat & GOES-East SSI quality results JUL. 2019 to JUN. 2020								
Month	Number of cases	Mean SSI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. in % (req.: ± 10 %)	Mean diff. margin(*) in %	SD in Wm^{-2}	SD in % (req.: ± 30 %)	SD margin (**) in %
JUL. 2019	8651	490.32	-2.80	-0.57	94.29	71.23	14.53	51.58
AUG. 2019	8342	473.08	-6.97	-6.89	31.10	72.65	15.36	48.81
SEP. 2019	6930	457.26	0.46	0.10	98.99	69.09	15.11	49.63
OCT. 2019	6593	387.05	2.35	0.61	93.93	71.16	18.39	38.72
NOV. 2019	5583	346.29	5.61	1.62	83.80	76.72	22.15	26.15
DEC. 2019	5081	331.00	-0.54	-0.16	98.37	72.27	21.83	27.22
JAN. 2020	5125	309.27	5.49	1.78	82.25	70.11	22.67	24.43
FEB. 2020	4557	336.47	5.92	1.76	82.41	77.35	22.99	23.37
MAR. 2020	6518	399.57	5.03	1.26	87.41	74.95	18.76	37.47
APR. 2020	6898	463.37	1.13	0.24	97.56	76.91	16.60	44.67
MAY 2020	7684	476.34	-11.59	-2.43	75.67	68.74	14.43	51.90
JUN. 2020	7034	464.31	-9.51	-2.05	79.52	76.58	16.49	45.02
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.								

Table 21: Geostationary SSI quality results over 1st half 2020.

Comments:
Overall statistics are good and within the requirement.

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

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

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

Meteosat Indian Ocean SSI quality results over JUL. 2019 to JUN. 2020								
Month	Number of cases	Mean SSI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. in % (req. : ± 10 %)	Mean diff. margin(*) in %	SD in Wm^{-2}	SD in % (req.: ± 30 %)	SD margin(**) in %
JUL. 2019	4461	506.02	-6.19	-1.22	87.77	60.40	11.94	60.21
AUG. 2019	4649	463.49	-9.89	-2.13	78.66	64.51	13.92	53.61
SEP. 2019	3887	444.77	-4.33	-0.97	90.26	61.38	13.80	54.00
OCT. 2019	3696	361.85	5.75	1.59	84.11	65.44	18.08	39.72
NOV. 2019	3050	329.68	15.50	4.70	52.98	68.34	20.73	30.90
DEC. 2019	2787	341.46	7.53	2.21	77.95	65.76	19.26	35.81
JAN. 2020	2656	292.06	15.01	5.14	48.61	66.03	22.61	24.64
FEB. 2020	2184	288.11	12.14	4.21	57.86	54.62	18.96	36.81
MAR. 2020	3260	397.51	8.03	2.02	79.80	67.72	17.04	43.21
APR. 2020	3657	465.34	4.02	0.86	91.36	60.25	12.95	56.84
MAY 2020	4050	493.65	-8.87	-1.80	82.03	57.83	11.71	60.95
JUN. 2020	3565	452.42	-11.68	-2.58	74.18	68.53	15.15	49.51

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

Table 22: Meteosat Indian Ocean SSI quality results over 1st half 2020.

Comments:
Overall statistics are good and within the requirement.

5.2.2.3. AHL SSI (OSI-302/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
Ekofisk	76920	56.50°N	3.2°E	SSI, DLI	The station was closed due to change platforms in the position. Instrumentation is recovered and work in progress to remount equipment.
Holt	90400	69.67°N	18.93°E	SSI	In use
Bjørnøya	99710	74.52°N	19.02°E	SSI, DLI	In use, Arctic station with snow on ground much of the year.
Hopen	99720	76.51°N	25.01°E	SSI, DLI	In use, 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 23: Validation stations that are currently used for AHL radiative fluxes quality assessment.

The stations used in this validation 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 station at Ekofisk was closed in July 2015, instruments are recovered and work in progress to remount equipment on a new platform. This is however pending financial support. As this was the only pure maritime station available, this is a serious drawback for evaluation of the performance of the flux products.

The pyranometer stations used for validation of the AHL SSI product are the stations listed in table 23. There are some differences in the stations used for SSI validation compared to DLI. The reason for this is partly the observation programme at stations, but also that SSI validation is more sensitive to station characteristics than DLI.

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

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

AHL SSI quality results over JUL. 2019 to JUN. 2020								
Month	Number of cases	Mean SSI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. in % (req.: ± 10%)	Mean diff. margin in %(*)	SD in Wm^{-2}	SD in % (req.: ± 30 %)	SD margin(**) in %
JUL. 2019	462	198.62	43.22		-117,6	32.56	16,39	45,4
AUG. 2019	448	150.96	37.51		-148,5	35.02	23,2	22,7
SEP. 2019	416	88.06	20.86		-136,9	19.99	22,7	24,3
OCT. 2019	402	40.08	12.18		-203,9	16.38	40,87	-36,2
NOV. 2019	386	11.17	6.12		-447,9	10.62	95,08	-216,9
DEC. 2019	420	6.14	9.52		-1450,5	9.27	150,98	-403,3
JAN. 2020	24	12.20	-3.23	-20.93	-109,3	6.22	40.34	-34,5
FEB. 2020	51	26.13	-4.04	-13.40	-34,0	11.37	37.67	-25,6
MAR. 2020	98	70.93	-6.92	-8.89	11,1	24.62	31.62	-5,4
APR. 2020	87	126.12	-20.52	-13.99	-39,9	23.98	16.35	45,5
MAY 2020	89	184.91	-12.40	-6.28	37,2	55.56	28.16	6,1
JUN. 2020	88	234.66	-2.08	-0.88	91,2	31.83	13.44	55,2
(*) Mean diff. margin = 100 * (1 - (|mean diff. / mean diff. req.|)) (**) SD margin = 100 * (1 - (SD / SD req.)) 100 refers then to a perfect product, 0 to a quality just as required. without margin. A negative result indicates that the product quality does not fulfil the requirement.								

Table 24: AHL SSI quality results over JUL. 2019 to JUN. 2020

Comments:
The validation results for Jul 2019-Dec 2019 is for OSI-302, while Jan 2020-Jun 2020 is for OSI-302-b. The difference in number of cases is due to a different way of calculating number of cases, as the validation now only uses cases where in situ data are available for all hours through the day. The requirement on bias using the new product was not met in January, February and April. Given latitudes being evaluated, January and February are difficult to properly evaluate since signal is within signal to noise ratio at high latitudes which dominates the validation basis for this product. The reason for the deviation April is being investigated. On a general basis the new product is performing better than the old product.

5.3. Sea Ice quality

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

The OSI SAF sea ice concentration product is validated against navigational ice charts, as these are believed to be the best independent source of reference data currently available. These navigational ice charts originates from the operational ice charting divisions at DMI, MET Norway and National Ice Center (NIC). The ice charts are primarily based on SAR (Radarsat and Sentinel-1) data, together with AVHRR and MODIS data in several cases. The quality assessment results are shown separately for the three different sets of ice charts.
For the quality assessment at the Northern Hemisphere, performed twice a week, the concentration product is required to have a mean difference and standard deviation less than 10% ice concentration on an annual basis. For the weekly quality assessment at the Southern Hemisphere the concentration product is required to have a mean difference and standard deviation less than 15% ice concentration on an annual basis.
For each ice chart concentration level the deviation between ice chart concentration and OSI SAF ice concentration is calculated. Afterwards deviations are grouped into categories, i.e. ±10% and ±20%. Furthermore the mean difference and standard deviation are calculated and reported for ice (100% ice concentration) and for water (0% ice concentration). We use conventional mean difference and standard deviations for all calculations.
In addition, statistics from manual evaluation (on the confidence level of the products) are shown as additional information. There is no requirement on these statistics. The error codes for the manual evaluation are shown below.

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

Table 25: Error codes for the manual registration

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

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

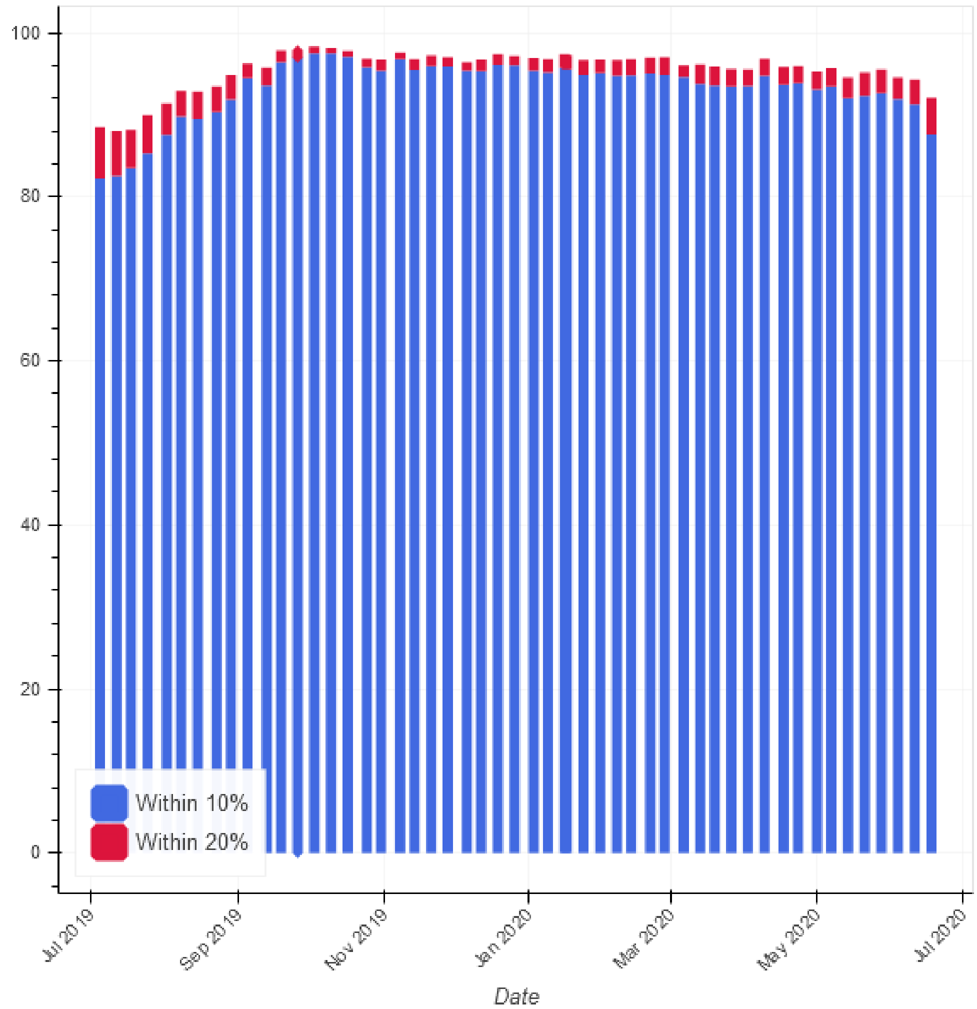


Figure 19: Comparison of ice concentrations from the Greenland overview charts made by DMI and the OSI SAF concentration product. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%.

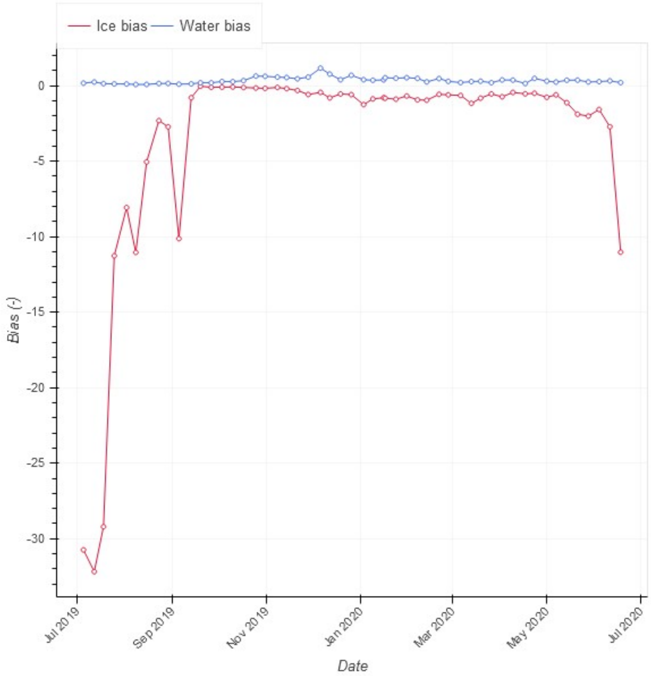


Figure 20: Difference between ice concentrations from the Greenland overview charts made by DMI and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Northern hemisphere.

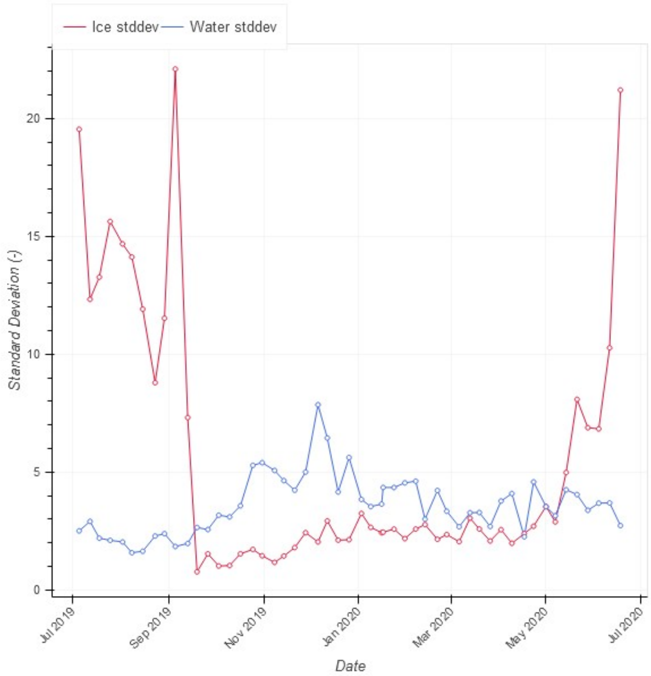


Figure 21: Standard deviation of the difference in ice concentrations from the Greenland overview charts made by DMI and OSI SAF concentration product for two categories: water and ice. Northern hemisphere.

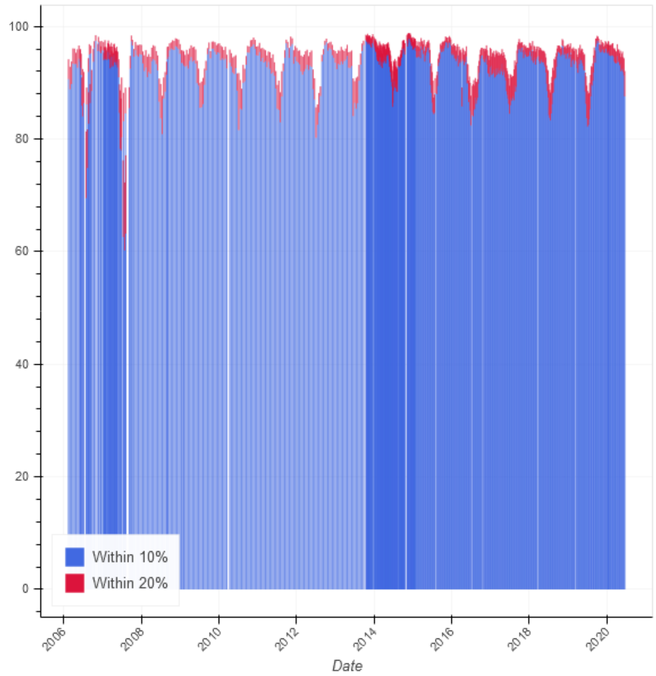


Figure 22: Multiyear variability. Comparison between ice concentrations from the Greenland overview charts made by DMI and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Northern hemisphere.

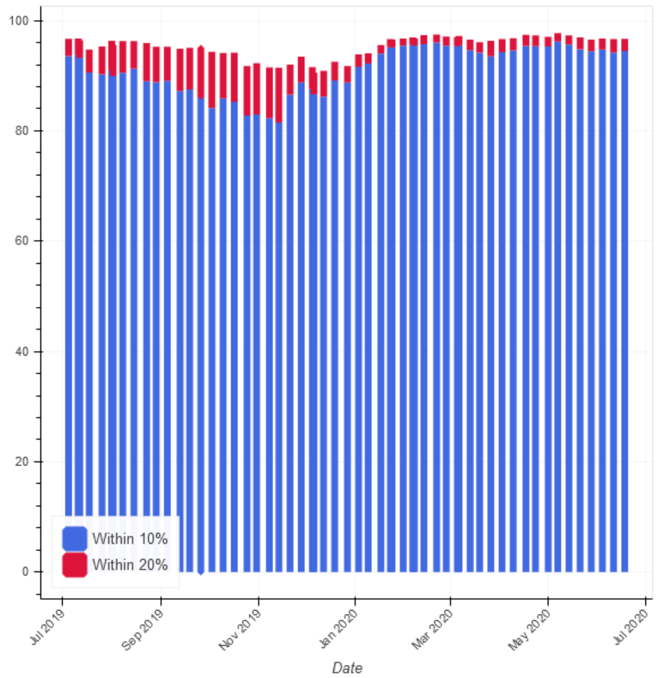


Figure 23: Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/-10%, and likewise for +/-20%. Southern hemisphere.

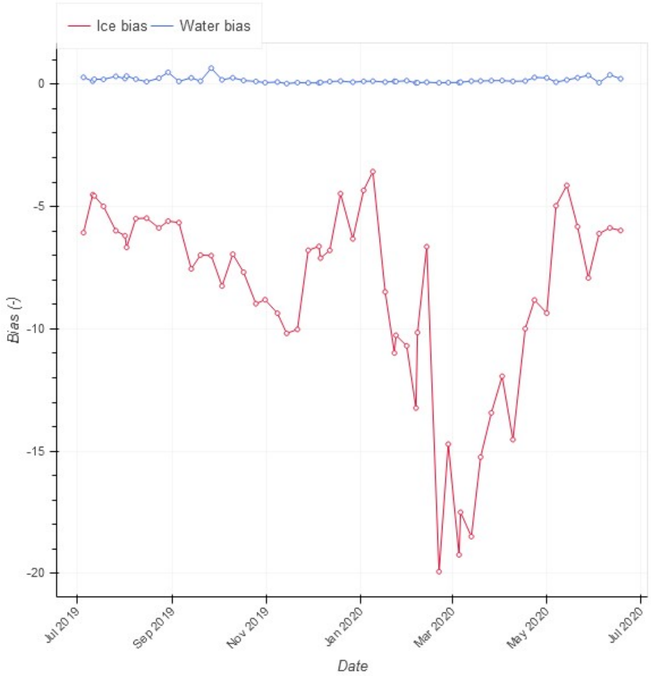


Figure 24: Difference between the ice concentrations from the NIC ice analysis and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Southern hemisphere.

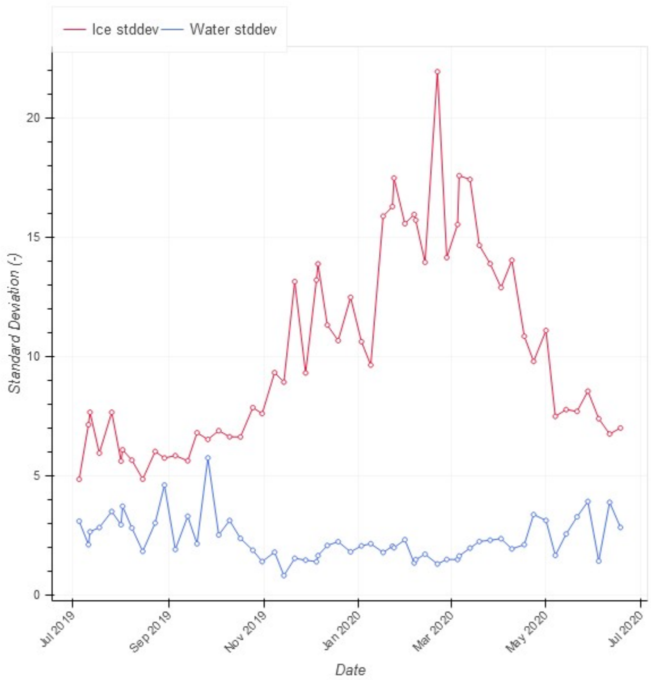


Figure 25: Standard deviation of the difference in ice concentrations from the NIC ice analysis and OSI SAF concentration product for two categories: water and ice. Southern hemisphere.

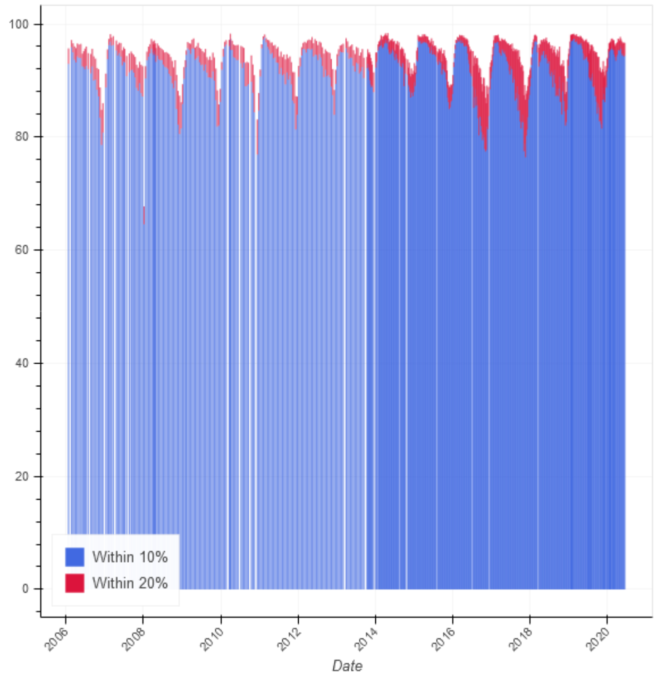


Figure 26: Multiyear variability. Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Southern hemisphere.

Concentration product					
Month	+/- 10% [%]	+/- 20% [%]	Mean difference [%]	SD [%]	Number of obs.
JUL. 2019	95.67	96.73	-1.55	6.55	444495
AUG. 2019	96.57	97.48	-1.32	6.05	513778
SEP. 2019	97.30	97.90	-0.97	5.25	533137
OCT. 2019	98.25	98.80	-0.64	4.11	554373
NOV. 2019	97.81	98.55	-0.90	4.76	410550
DEC. 2019	97.18	98.07	-1.14	5.61	321765
JAN. 2020	96.41	97.51	-1.38	6.03	322624
FEB. 2020	95.27	96.64	-1.81	6.90	321729
MAR. 2020	94.62	95.98	-1.88	6.80	321588
APR. 2020	92.23	93.80	-2.70	8.50	281872
MAY 2020	89.96	91.51	-3.50	9.75	273674
JUN. 2020	91.98	93.59	-2.93	9.09	389360

Table 26: 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. 2019 to JUN. 2020. First two columns shows how often there is agreement within 10 and 20% concentration.

Based on the quality flags in the sea ice products, monthly statistics for the confidence levels are derived for each product type as Code 0-5: 0 -> not processed, no input data; 1 -> computation failed; 2 -> processed but to be used with care; 3 -> nominal processing, acceptable quality; 4 -> nominal processing, good quality; 5 -> nominal processing, excellent quality'. Code 1-5 is given as fraction of total processed data (code 5+4+3+2+1 = 100%). 'Unprocessed' is given as fraction of total data (total data = processed data + unprocessed data).

Month	Code=5	code=4	code=3	code=2	code=1	Unprocessed
JAN. 2020	75.97	24.03	0.00	0.00	0.00	0.00
FEB. 2020	76.28	23.72	0.00	0.00	0.00	0.00
MAR. 2020	77.51	22.49	0.00	0.00	0.00	0.00
APR. 2020	80.83	19.17	0.00	0.00	0.00	0.00
MAY 2020	79.16	20.84	0.00	0.00	0.00	0.00
JUN. 2020	77.74	22.26	0.00	0.00	0.00	0.00

Table 27: Statistics for sea ice concentration confidence levels, Code 0-5, Northern Hemisphere.

Month	Code=5	code=4	code=3	code=2	code=1	Unprocessed
JAN. 2020	89.21	10.79	0.00	0.00	0.00	0.00
FEB. 2020	92.06	7.94	0.00	0.00	0.00	0.00
MAR. 2020	90.15	9.85	0.00	0.00	0.00	0.00
APR. 2020	85.62	14.38	0.00	0.00	0.00	0.00
MAY 2020	80.89	19.11	0.00	0.00	0.00	0.00
JUN. 2020	76.70	23.30	0.00	0.00	0.00	0.00

Table 28: Statistics for sea ice concentration confidence levels, Code 0-5, Southern Hemisphere.

Comments:
Figure 22 and Figure 26 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 DMI ice analysis for NH and NIC ice analysis for SH, respectively.
Average yearly SD for the period can be seen in the table just below. The product are with target accuracy of 10 % and 15 % for the NH and SH products, respectively.

Average yearly standard deviation		
	Average SD Ice	Average SD Water
Northern Hemisphere	5.49	3.59
Southern Hemishpere	10.31	2.36

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

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

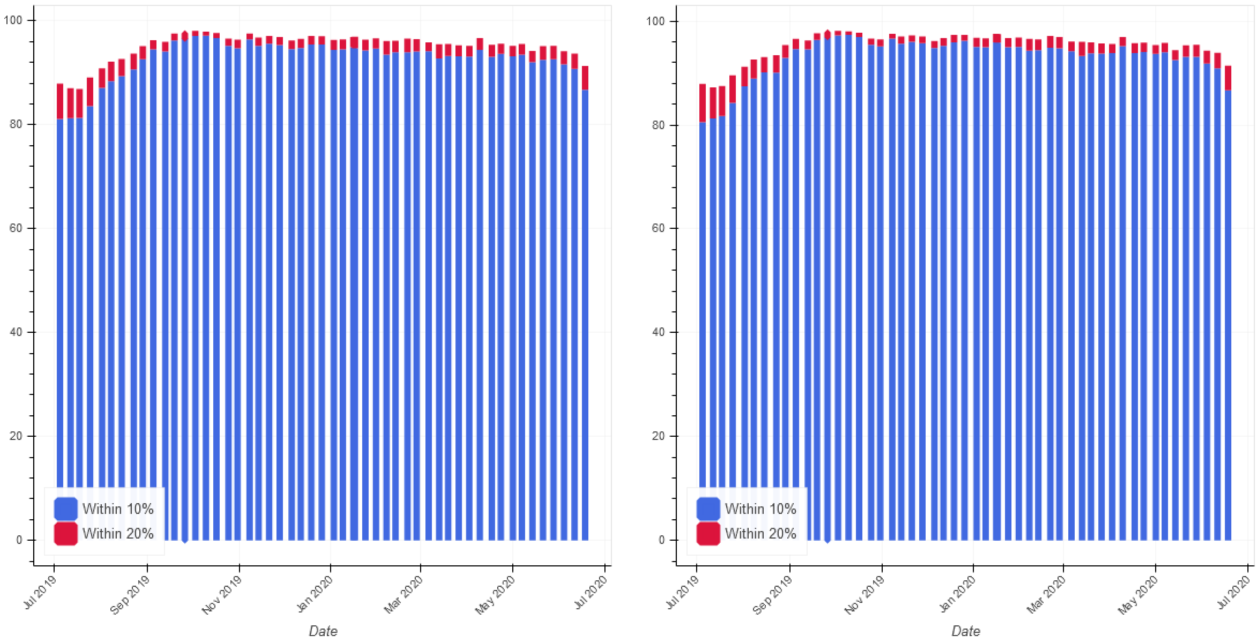


Figure 27: Comparison of ice concentrations from the Greenland overview charts made by DMI and the OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%

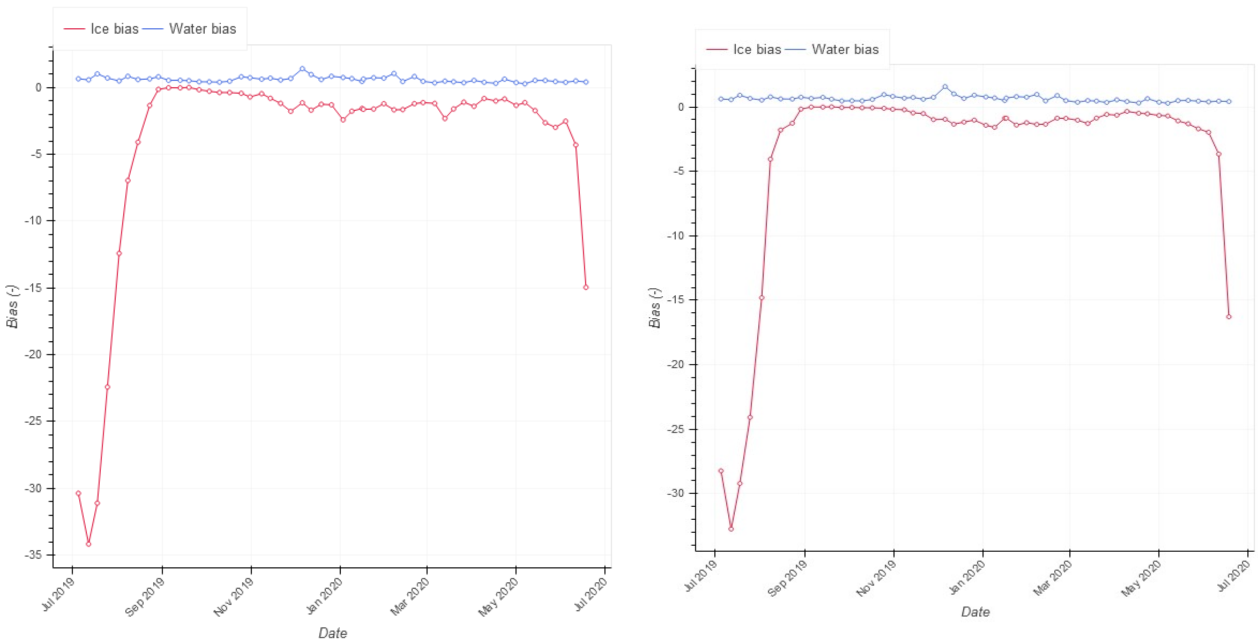


Figure 28: Difference between ice concentrations from the Greenland overview charts made by DMI and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern Hemisphere

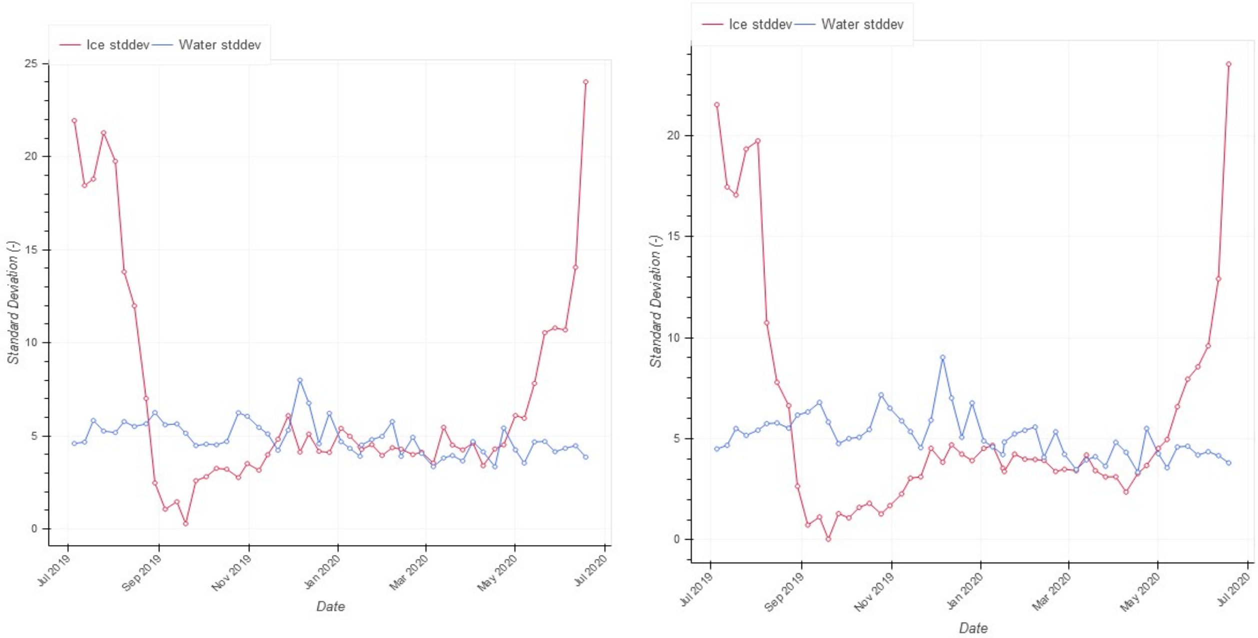


Figure 29: Standard deviation of the difference in ice concentrations from the Greenland overview charts made by DMI and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern hemisphere.

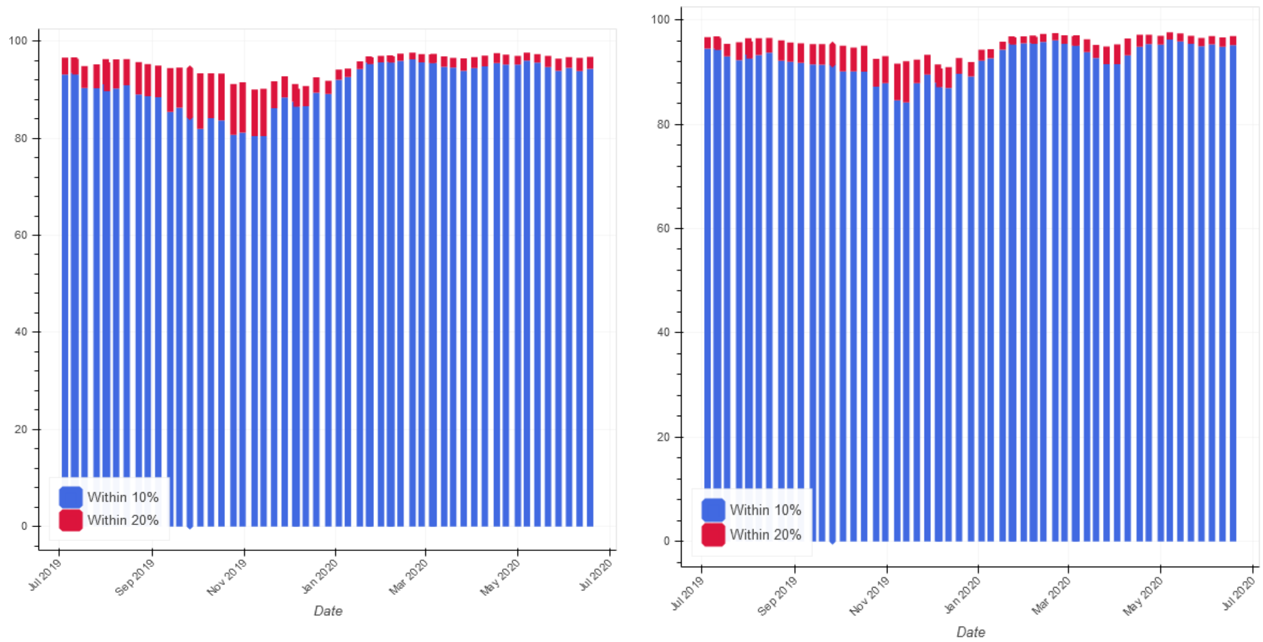


Figure 30: Comparison of ice concentrations from the NIC ice analysis and the OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right. Southern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%

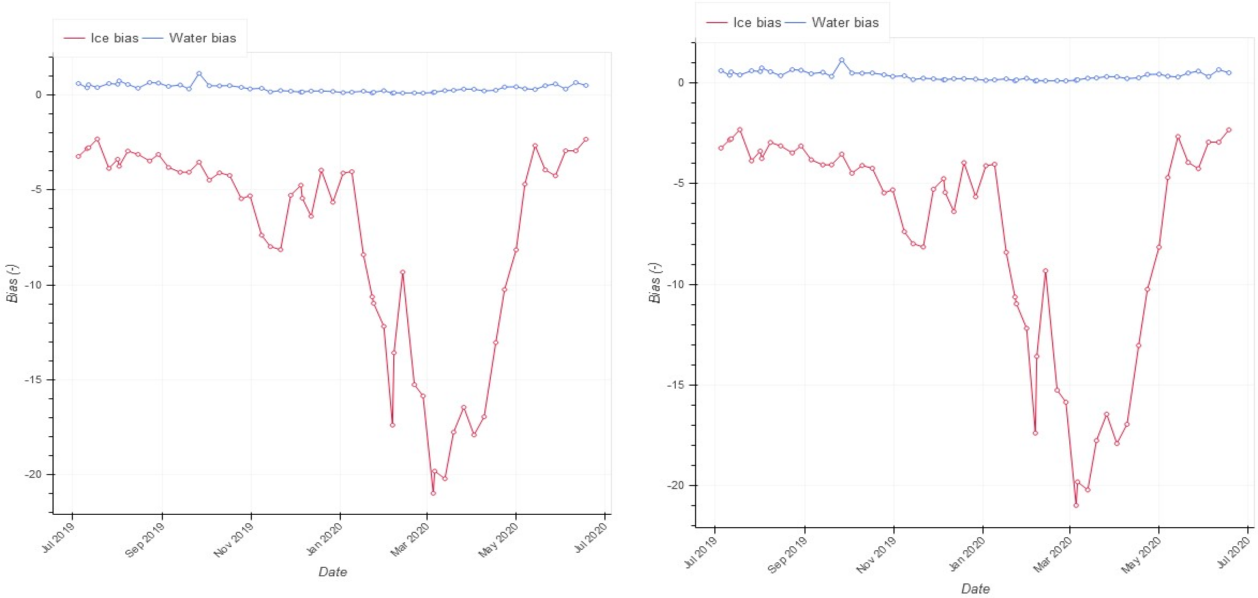


Figure 31: Difference between ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Southern Hemisphere

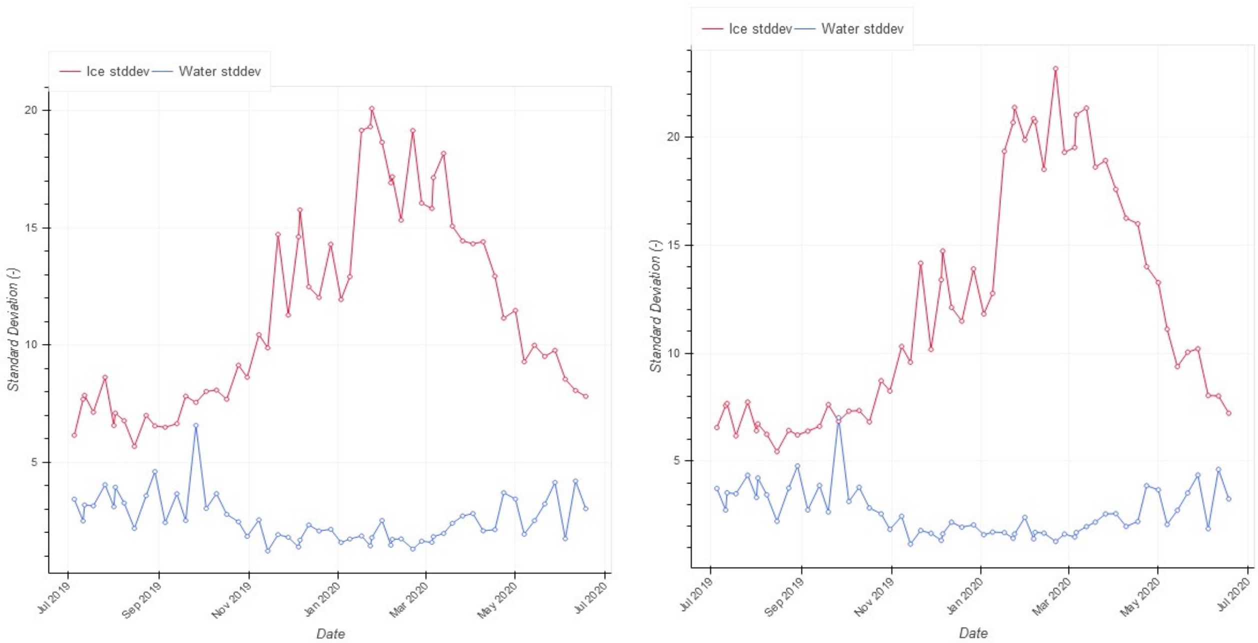


Figure 32: Standard deviation of the difference in ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and, ice. Southern hemisphere.

Comments:
Figure 29 and Figure 32 provide the essential information on the compliance of the sea ice concentration product accuracy, showing the std. dev. of the difference in ice concentration between the OSI SAF product and the DMI ice analysis for NH and NIC ice analysis for SH,

respectively. Average yearly SD for the period can be seen in the table just below. The product are with target accuracy of 10 % and 15 % for the NH and SH products, respectively.

Average yearly standard deviation		
	Average SD Ice	Average SD Water
OSHD algorithm NH	7.31	4.86
TUD algorithm NH	6.29	5.63
OSHD algorithm SH	11.48	2.63
TUD algorithm SH	12.15	2.70

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

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

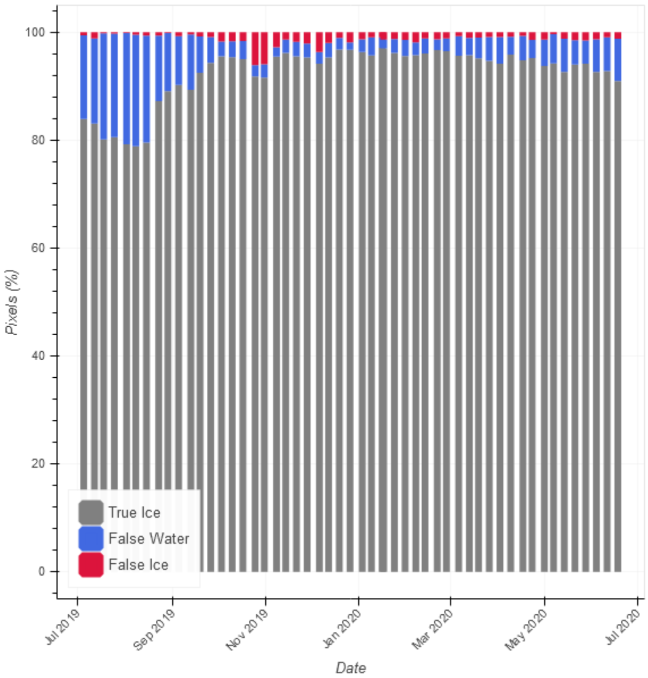


Figure 33: Comparison between the Greenland overview charts made by DMI and the OSI SAF sea ice edge product. Northern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the DMI ice analysis indicated ice and vice versa for the 'False Ice' category.

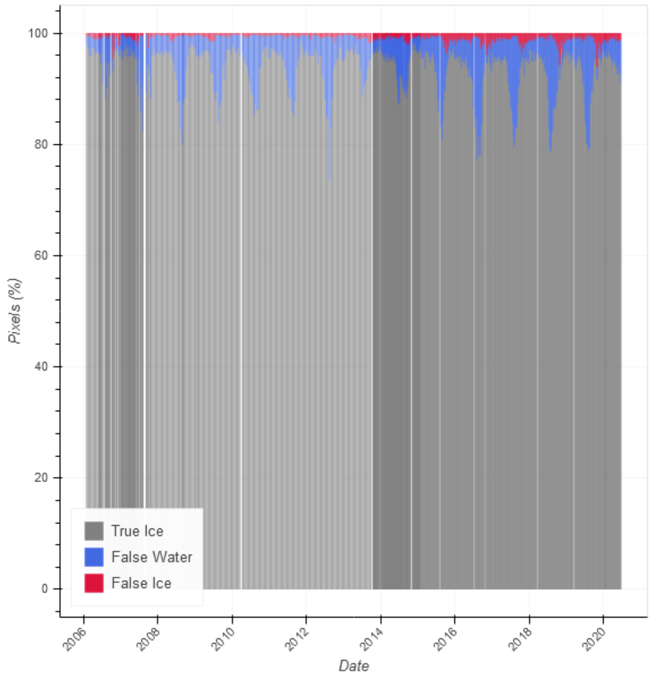


Figure 34: Multiyear variability. Comparison between the Greenland overview charts made by DMI and the OSI SAF sea ice edge product. Northern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the DMI ice analysis indicated ice and vice versa for the 'False Ice' category.

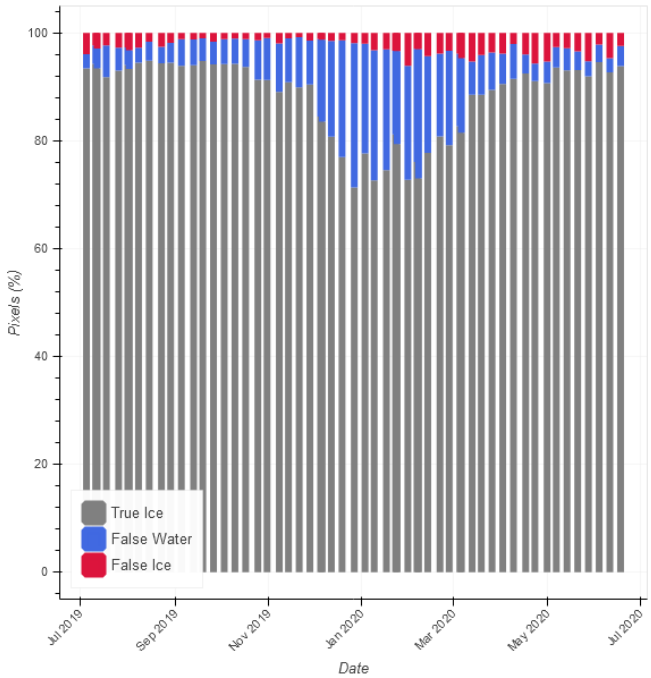


Figure 35: Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'False Ice' category.

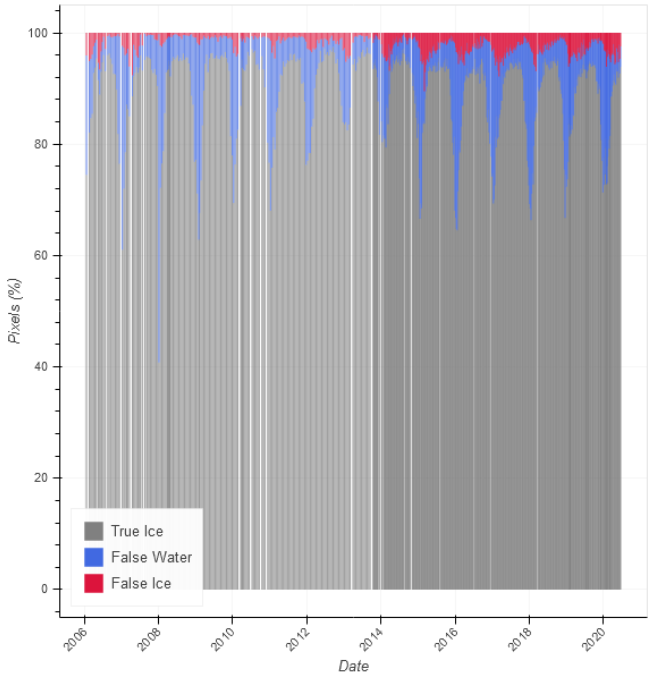


Figure 36: Multiyear variability. Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'False Ice' category.

Month	Correct [%]	SAF lower [%]	SAF higher [%]	Mean edge diff [km]	Number of obs.
JUL. 2019	97.32	2.07	0.61	17.10	637662
AUG. 2019	98.09	1.34	0.57	16.50	680310
SEP. 2019	98.87	0.67	0.46	19.02	664994
OCT. 2019	98.96	0.37	0.67	10.09	725620
NOV. 2019	98.32	0.68	1.00	9.53	660968
DEC. 2019	98.48	0.78	0.74	10.61	573464
JAN. 2020	98.14	1.05	0.81	12.19	630529
FEB. 2020	97.18	1.65	1.17	15.46	638393
MAR. 2020	97.97	1.28	0.74	19.97	689888
APR. 2020	97.51	1.70	0.79	23.33	622101
MAY 2020	96.40	2.65	0.94	27.83	539034
JUN. 2020	96.92	2.44	0.64	25.39	632059

Table 29: Monthly quality assessment results from comparing OSI SAF sea ice products to MET Norway ice service analysis for the Svalbard area, from JUL. 2019 to JUN. 2020. 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. 2018	-	-	-	-	-
AUG. 2018	-	-	-	-	-
SEP. 2018	-	-	-	-	-
OCT. 2018	98.44	1.36	0.20	32.38	184086
NOV. 2018	98.23	1.55	0.22	23.73	368172
DEC. 2018	94.05	5.56	0.38	57.27	460310
JAN. 2019	98.21	1.28	0.51	35.24	368716
FEB. 2019	98.63	0.66	0.71	16.94	276859
MAR. 2019	99.34	0.25	0.41	13.61	461770
APR. 2019	99.02	0.45	0.54	20.68	276573
MAY 2019	-	-	-	-	-
JUN. 2019	-	-	-	-	-

Table 30: Monthly quality assessment results from comparing OSI SAF sea ice products to MET Norway ice service analysis for the Weddell Sea area, from JUL. 2019 to JUN. 2020. 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	Code=5	code=4	code=3	code=2	code=1	Unprocessed
JAN. 2020	78.67	4.66	12.34	3.60	0.73	53.82
FEB. 2020	76.04	5.13	13.44	4.50	0.88	53.85
MAR. 2020	74.34	4.84	15.19	4.75	0.88	53.82
APR. 2020	76.28	5.46	13.61	3.83	0.82	53.64
MAY 2020	78.04	6.13	10.97	3.94	0.92	53.06
JUN. 2020	80.32	4.03	8.96	5.56	1.14	51.99

Table 31: Statistics for sea ice edge confidence levels, Code 0-5, Northern Hemisphere.

Month	Code=5	code=4	code=3	code=2	code=1	Unprocessed
JAN. 2020	92.47	1.50	2.19	2.46	1.39	22.38
FEB. 2020	95.45	0.64	1.36	1.59	0.97	22.37
MAR. 2020	94.21	0.58	2.04	2.38	0.80	22.36
APR. 2020	89.16	1.93	4.82	3.47	0.63	22.38
MAY 2020	83.55	4.82	6.75	4.14	0.74	22.40
JUN. 2020	76.77	7.78	10.05	4.62	0.78	22.41

Table 32: Statistics for sea ice edge confidence levels, Code 0-5, Southern Hemisphere.

Comments:
In Table 29 the Northern Hemisphere OSI SAF 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 2019/2020 is 17.3 km and the target accuracy requirement of 20 km edge difference is therefore met. As previous years, the monthly differences are well below the yearly requirement all months except the spring/summer months of April-June, when melting of snow and ice makes the product quality worse.
In Table 30 the Southern Hemisphere OSI SAF ice edge product is compared with weekly navigational ice charts from the Weddel Sea region (MET Norway ice service) covering SH

summer period October-April. The yearly averaged edge difference for the 7 months containing ice charts within the recent 12 months is 28.6 km and the target accuracy requirement of 45 km edge difference is therefore met. The monthly differences are well below the yearly requirement all months except the SH mid-summer month of December, when melting of snow and ice makes the product quality worse.

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

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

Month	SD wrt running mean [km²]	Mean MYI coverage [km²]
JUL. 2019	-	-
AUG. 2019	-	-
SEP. 2019	-	-
OCT. 2019	106933	2297619
NOV. 2019	69843	2313436
DEC. 2019	49513	2333853
JAN. 2020	39107	2289414
FEB. 2020	39644	1960795
MAR. 2020	49796	1712688
APR. 2020	55622	1320193
MAY 2020	-	-
JUN. 2020	-	-

Table 33: Monitoring of NH sea ice type quality by comparing the multi year coverage with the 11-days running mean

Month	Code=5	code=4	code=3	code=2	code=1	Unprocessed
JAN. 2020	91.96	0.59	6.81	0.51	0.13	53.82
FEB. 2020	89.60	0.70	9.01	0.54	0.16	53.85
MAR. 2020	88.91	1.04	9.19	0.71	0.15	53.82
APR. 2020	91.50	1.05	6.56	0.74	0.15	53.64
MAY 2020	83.63	0.79	2.77	12.66	0.16	53.06
JUN. 2020	78.73	0.33	0.34	20.39	0.21	51.99

Table 34: Statistics for sea ice type confidence levels, Northern Hemisphere.

Month	Code=5	code=4	code=3	code=2	code=1	Unprocessed
JAN. 2020	91.94	0.29	0.33	7.19	0.25	22.38
FEB. 2020	94.88	0.20	0.23	4.53	0.17	22.37
MAR. 2020	93.07	0.14	0.18	6.48	0.13	22.36
APR. 2020	88.16	0.13	0.19	11.42	0.10	22.38
MAY 2020	81.65	0.15	0.22	17.85	0.12	22.40
JUN. 2020	74.66	0.20	0.28	24.74	0.12	22.41

Table 35: Statistics for sea ice type confidence levels, Southern Hemisphere.

Comments:
In Table 33, the mid-column represents the monthly standard deviations of the daily MYI coverage variability. All months have values well below the requirement of 100.000 km2, except October 2019 where the variability is just above the requirement. Generally there is a higher variability in October which is in the beginning of the freezing period with very little training data for first-year ice. But also a warm air intrusion over the ice north of Svalbard around the 8 October caused a temporary drop in the multiyear ice coverage which was restored after a couple of days. This resulted in the higher variability for October.

5.3.5. Sea ice emissivity (OSI-404) quality

The near 50 GHz sea ice emissivity product is compared to the 50.3 GHz and 52.8 GHz vertical polarized surface emissivity (which is the same at these two frequencies) at an incidence angle at 50 degrees. The product emissivity covers all incidence angles from nadir to 60 degrees but the validation product is derived from measurements at 50 degrees. The validation emissivity product is derived from NWP data and SSMIS satellite data. Both the OSI SAF product and the validation products cover the entire northern and southern hemisphere sea ice cover, including all ice types and seasons. The total mean difference plot in figure 58 is the difference between the hemispheric OSI SAF product and the validation product. The OSI SAF operational emissivity is higher than the validation product on the southern hemisphere giving a positive bias. The northern hemisphere has a negative bias. The mean annual difference on the northern hemisphere is -0.006 and on the southern hemisphere it is -0.03. There is no clear seasonal cycle neither on the northern nor southern hemisphere.

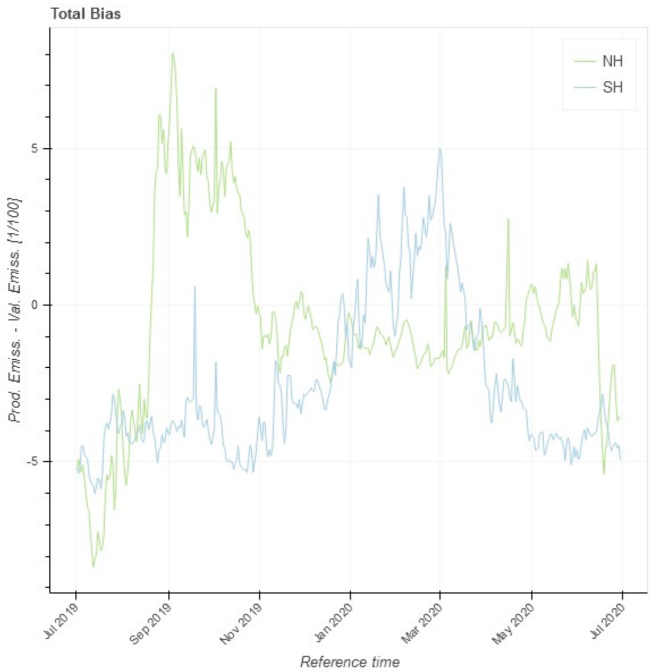


Figure 37: The mean hemispheric difference between the OSI SAF operational product and the validation product derived from NWP and SSMIS data. The y-axis unit is in hundreds (1/100)

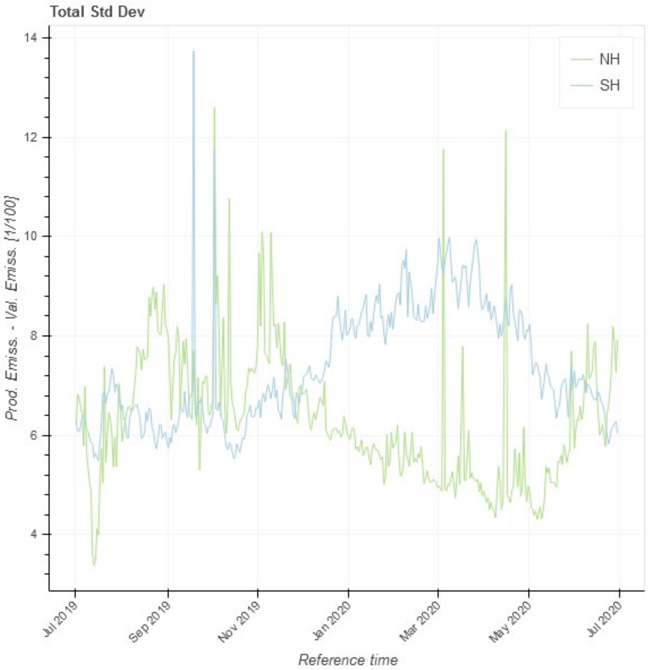


Figure 38: The standard deviation of the difference between the OSI SAF operational product and the validation product for the northern and southern hemispheres. The y-axis unit is in hundreds (1/100)

Comments:
From Figure 39 it can be seen that the Emissivity is below the threshold accuracy. The average standard deviation over a year can be seen in the table below. The accuracy is closed to the target accuracy and well below the threshold accuracy.

	Mean difference	SD	Target accuracy	Threshold accuracy
NH	-0.006	0.06	± 0.05	± 0.15
SH	-0.03	0.07	± 0.05	± 0.15

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

Quality assessment dataset

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

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

Reported statistics

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

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

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

Quality assessment statistics

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

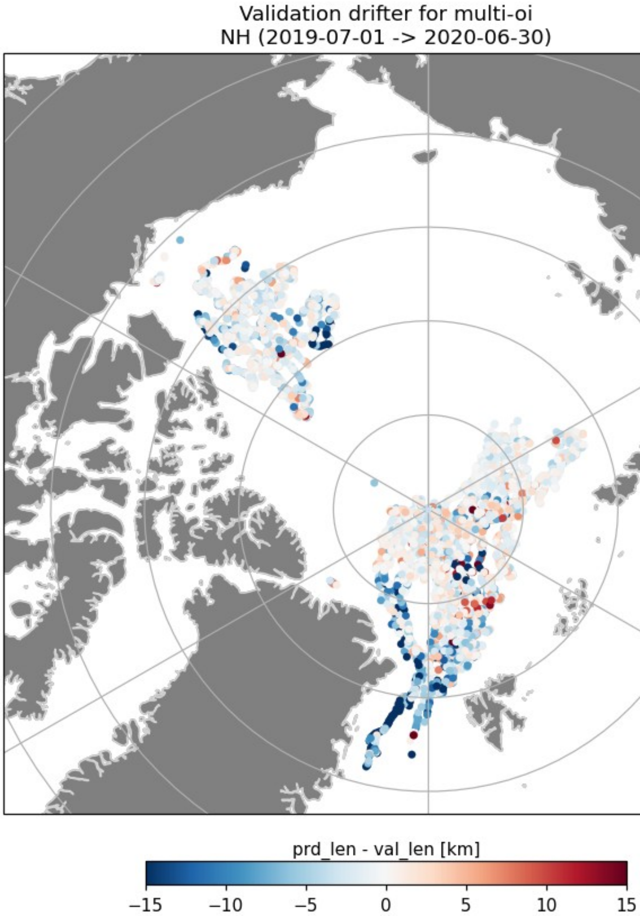


Figure 39: Location of GPS drifters for the quality assessment period (JAN. 2020 to JUN. 2020) in NH. The shade of each symbol represents the mean difference (prod-ref) in drift length (km over 2 days) for the multi-oi product.

Month	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
JUL. 2019	-0.19	-0.31	4.62	4.48	0.75	0.02	0.88	342
AUG. 2019	+0.33	+0.90	6.20	5.89	0.78	0.63	0.89	280
SEP. 2019	+0.41	-0.80	4.33	4.36	0.92	-0.24	0.96	317
OCT. 2019	+0.15	-0.22	2.36	2.55	0.96	0.06	0.98	659
NOV. 2019	-0.09	-0.04	2.41	2.12	0.95	-0.02	0.99	752
DEC. 2019	+0.02	-0.22	1.92	1.78	0.97	-0.13	0.99	811
JAN. 2020	-0,09	-0,04	2,24	2,56	0,95	0,15	0,97	890
FEB. 2020	-0,24	0,15	3,43	4,5	0,92	0,5	0,95	790
MAR. 2020	-0,73	0,5	4,71	5,29	0,88	1,35	0,93	811
APR. 2020	-0,26	0,06	4,77	3,88	0,9	0,35	0,94	755
MAY 2020	-0,28	-1,34	4,31	5,65	0,87	-0,45	0,93	718
JUN. 2020	-0,26	-1,77	6,34	6,59	0,75	-0,02	0,81	648
Last 12 months	-0,16	-0,26	3,99	4,29	0,91	0,12	0,95	7773

Table 36: Quality assessment results for the LRSID (multi-oi) product (NH) for JUL. 2019 to JUN. 2020.

Month	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
JUL. 2019	--	--	--	--	--	--	--	0
AUG. 2019	--	--	--	--	--	--	--	0
SEP. 2019	--	--	--	--	--	--	--	0
OCT. 2019	+0.14	-0.20	4.31	4.18	0.98	0.03	0.94	546
NOV. 2019	-0.16	+0.12	3.83	4.06	0.97	0.03	0.96	683
DEC. 2019	-0.19	-0.33	3.85	3.24	0.99	-0.27	0.96	776
JAN. 2020	0,08	-0,07	3,71	4,08	0,95	0,22	0,92	867
FEB. 2020	-0,06	0,27	5,06	5,66	0,91	0,7	0,91	769
MAR. 2020	-0,75	0,63	5,58	6,34	0,89	1,17	0,9	773
APR. 2020	0,1	0	6,15	6,04	0,89	0,52	0,87	671
MAY 2020	--	--	--	--	--	--	--	0
JUN. 2020	--	--	--	--	--	--	--	0
Last 12 months	-0,13	0,07	4,72	4,94	0,94	0,21	0,93	5085

Table 37: Quality assessment results for the LRSID (SSMIS-F18) product (NH) for JUL. 2019 to JUN. 2020.

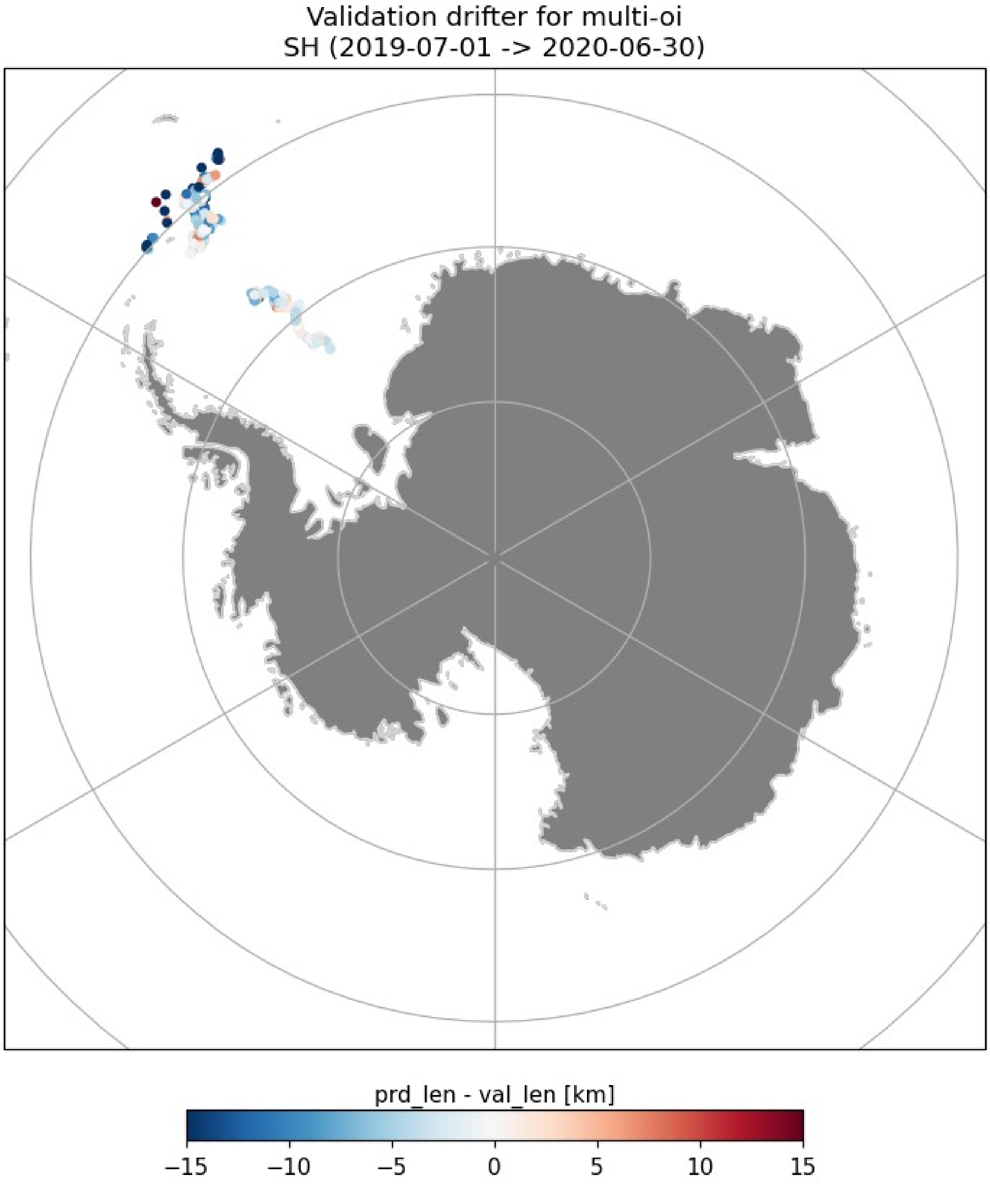


Figure 40: Location of GPS drifters for the quality assessment period (JUL. 2019 to JUN. 2020) in SH. The shade of each symbol represents the mean difference (prod-ref) in drift length (km over 2 days) for the multi-oi product.

Products	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
multi-oi	-0,23	0,98	6,08	6,4	0,85	-0,44	0,95	329
ssmis-f18	-0,22	0,8	5,47	4,79	0,93	-0,17	0,96	223
amsr2-gw1	0,27	0,72	4,55	3,79	0,92	-0,04	0,97	246

Table 38: Quality assessment results for selected OSI-405-c products (SH) for the last 12 months (JUL. 2019 to JUN. 2020).

Comments:
Performance of OSI-405-c was nominal in NH. The statistics (bias and stddev) get worse towards the end of the period because a large cluster of buoys (those from MOSAiC) enter the Fram Strait and further drift along the East Greenland Region. This region has very dynamic sea-ice with significant gradients in space and time, and it is known that the coarse resolution OSI-405-c does not perform optimally there (see blue shades on Fig 39).

Performance of OSI-405-c in SH are more difficult to assess because of a sudden drop in number of available buoys from Jan-Feb 2020 (no new buoys deployed in SH after that). This drop has two explanations : 1) the buoys we access are managed by AWI, that was focused on MOSAiC at that time; 2) the COVID-19 outbreak cancelled many field trips to the Antarctic Ocean.

We note that validation of OSI-405-c might be a challenge in the coming semesters when the last MOSAiC buoys exit the Arctic Basin, and COVID-19 does not allow deploying new drifters (typically in late summer each year).

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

Quality assessment dataset
Quality assessment is performed by collocation of the drift vectors with the trajectories of in situ drifters. Those drifting objects are buoys (e.g. the Ice Tethered Profilers) or ice camps (e.g. the Russian manned stations) that report their position at typically hourly to 3 hourly intervals. They are made available in near-real-time via the GTS network at DMI. Argos data in the DMI GTP data have no quality flags and accuracy can be greater than 1500 m. It has been shown that the MR ice drift mean difference statistics improves significantly when validation is performed against high accuracy GPS drifters only (OSI-407 validation report and Phil Hwang, 2013. DOI: 10.1080/01431161.2013.848309). The CDOP3 WP22910 'HL temperature and sea ice drift in-situ validation database' includes work to archive and improve quality control of drifter data to be used in the MR ice drift validation.

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

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

Reported statistics
The Medium Resolution Sea Ice Drift product comprises two production modes, a summer mode from May to August, and a winter mode from September to April. These modes are using Visible

(AVHRR channel 2) and Thermal Infra-Red (AVHRR channel 4), respectively.

Quality assessment statistics

Table 39 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 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.

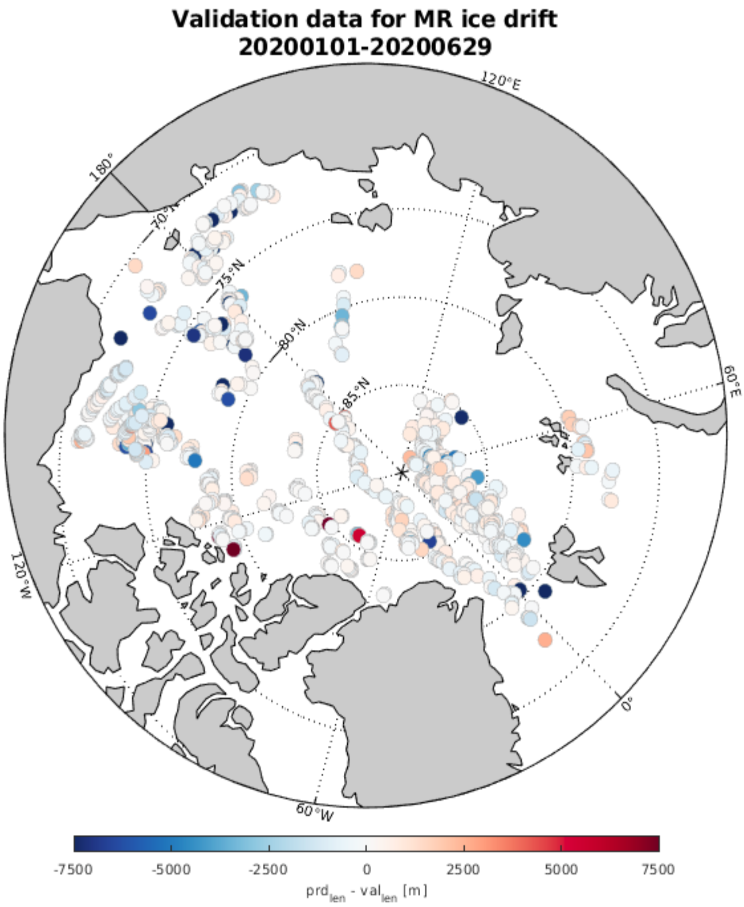


Figure 41: Location of GPS drifters for the quality assessment period (JAN. 2020 to JUN. 2020). The shade of each symbol represents the difference (prod-def) in drift length in meters

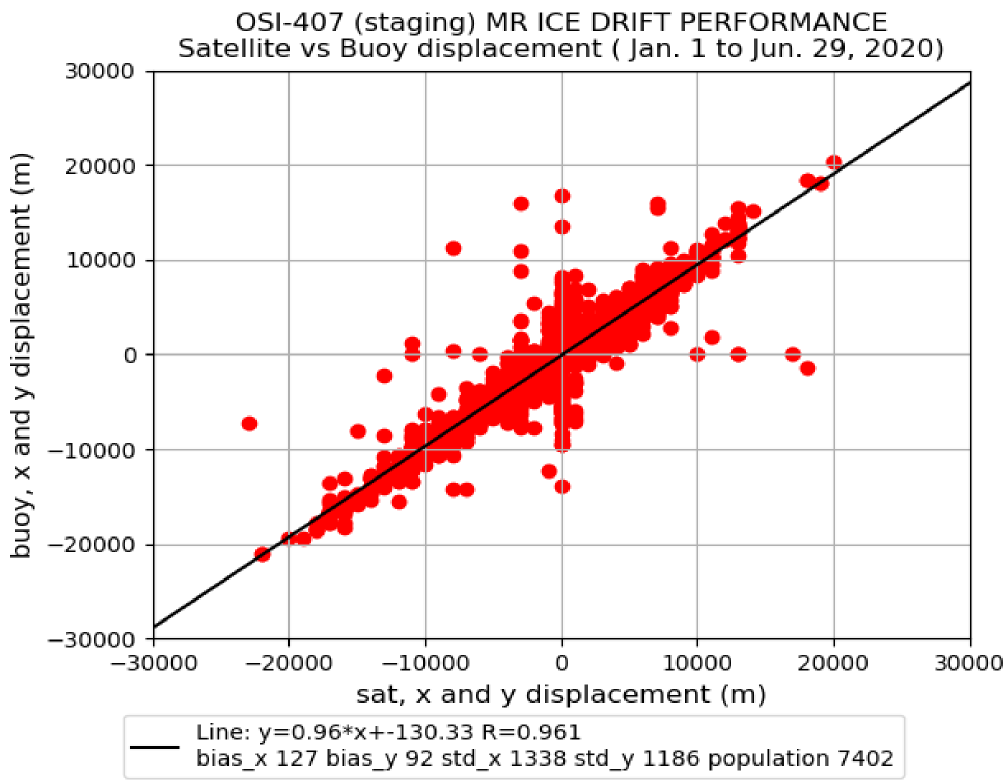


Figure 42: Scatter plot for all the observations of the buoys shown in the previous figure (JAN. 2020 to JUN. 2020).

Month	b(X) [m]	b(Y) [m]	σ(X) [m]	σ(Y) [m]	α	β [m]	ρ	N
JUL. 2019	326	-679	776	1200	1.06	194.8	0.963	2440
AUG. 2019	-37	-411	952	1126	0.92	-6.5	0.948	72
SEP. 2019	279	-270	786	406	0.96	-37.7	0.980	236
OCT. 2019	-688	730	2259	3199	0.82	-294.3	0.740	1094
NOV. 2019	39	-117	1024	1140	0.98	43.8	0.977	2722
DEC. 2019	-87	171	1159	1032	0.95	40.8	0.982	5282
JAN. 2020	463	122	2143	1601	0.92	-232	0.894	1110
FEB. 2020	16	109	1149	1186	0.93	10	0.961	1446
MAR. 2020	31	86	1325	1282	0.95	-84	0.941	2498
APR. 2020	-46	162	833	801	0.95	-55	0.980	1180
MAY 2020	221	-91	714	697	0.97	-192	0.992	742
JUN. 2020	501	113	953	819	1.05	-186	0.979	426
Last 12 months	36	16	1277	1375	0.96	-20	0.964	19248

Table 39: MR sea ice drift product (OSI-407) performance, JUL. 2019 to JUN. 2020

Comments:
The product requirement target accuracy of 2 km standard deviation is met.
Semi-automatic quality control (based on threshold on maximum buoy drift, 20+km difference

between observation and product, visual inspection on drift scatter plots (buoy vs. satellite), and inspection of extreme outliers) has been carried out for the first half year of 2020.
Match-ups were found with 253 individual buoys during this period, after carrying out the automated nearest-neighbour approach.
After further quality control 149 buoys were disqualified, and the remaining 104 were used for the statistics shown in the table above.
The following buoys were disqualified because they are supposedly grounded or located too far to the south to be drifting in ice (based on visual inspection of the buoy locations):
2501542, 2501667, 2601625, 4101610, 4101622, 4101623, 4101627, 4101655, 4101658, 4101659, 4101661, 4101663, 4101664, 4101765, 4401558, 4401565, 4401568, 4401569, 4401574, 4401756, 4401825, 4401895, 4401896, 4401897, 4401898, 4401899, 4402553, 4402556, 4402558, 4402562, 4402564, 4402565, 4402566, 4402589, 4402593, 4402594, 4402597, 4402598, 4402600, 4402602, 4601550, 4701658, 4701659, 4800642, 4800769, 4801632, 4801639, 4801671, 4801674, 4801675, 4801676, 4802539, 5301764, 6202661, 6202667, 6202668, 6202669, 6202675, 6202676, 6202683, 6203549, 6203564, 6203569, 6203582, 6203585, 6203587, 6203588, 6203710, 6203718, 6301535, 6301536, 6301564, 6401561, 6401568, 6401569, 6401811, 6401814, 6401820, 6401822, 6401823, 6401824, 6402505, 6402506, 6402508, 6402509, 6402510, 6402511, 6402512, 6402513, 6402514, 6402515, 6402516, 6402517, 6402518, 6402519, 6402522, 6402524, 6402525, 6402526, 6402527, 6402528, 6402529, 6402530, 6402531, 6402532, 6402533, 6402536, 6402537, 6402538, 6402539, 6402540, 6402541, 6402542, 6501500, 6501501, 6501538, 6501542, 6501543, 6501544, 2601623, 4101662, 4101771, 4401750, 4602501, 4602502, 4602503, 4602504, 6202666, 6203550, 6203551, 6203555, 6203556, 6203562, 6203563, 6203586, 6203715, 6203719, 6301537, 6301538, 6301542, 6301681, 6301682, 6301683, 6401502, 6401547, 6401570, 6401784, 6401804, 6501556

5.4. Global Wind quality (OSI-102, OSI-104, OSI-112 series)

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

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

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

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

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

5.4.1. Comparison with ECMWF model wind data

The figure below shows the monthly results of July 2018 to June 2020. Before computing the statistics, 0.2 m/s is added to the ECMWF winds in order to convert the real model winds into neutral winds. As of 25 September 2018, the products contain stress-equivalent ECMWF model background winds instead of real 10m winds and the 0.2 m/s correction is not applied any more. The scatterometer winds are also stress-equivalent winds.

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

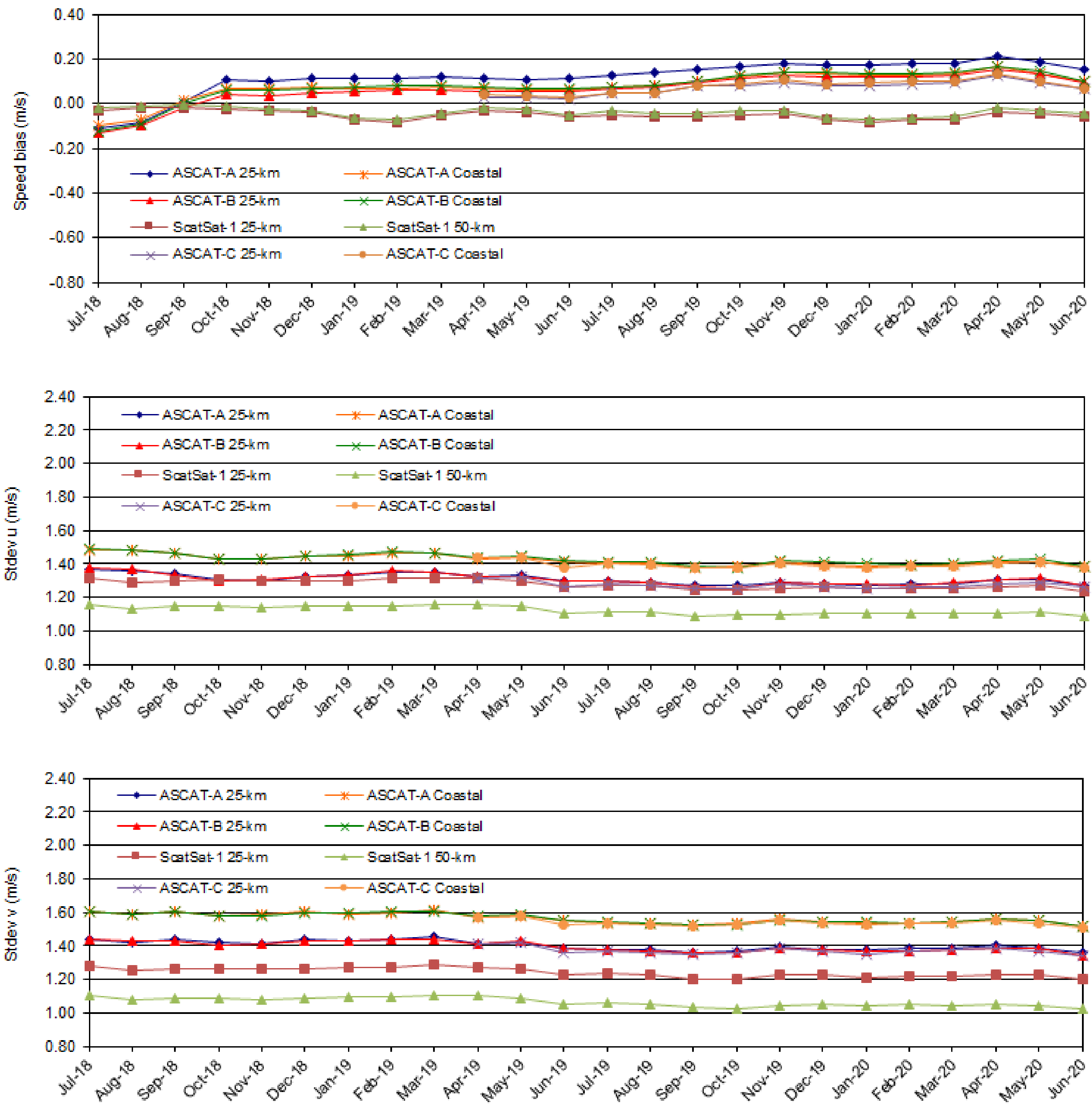


Figure 43: Comparison of scatterometer winds against ECMWF NWP forecast winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus ECMWF, top), wind u component standard deviation (middle) and wind v component standard deviation (bottom) are shown.

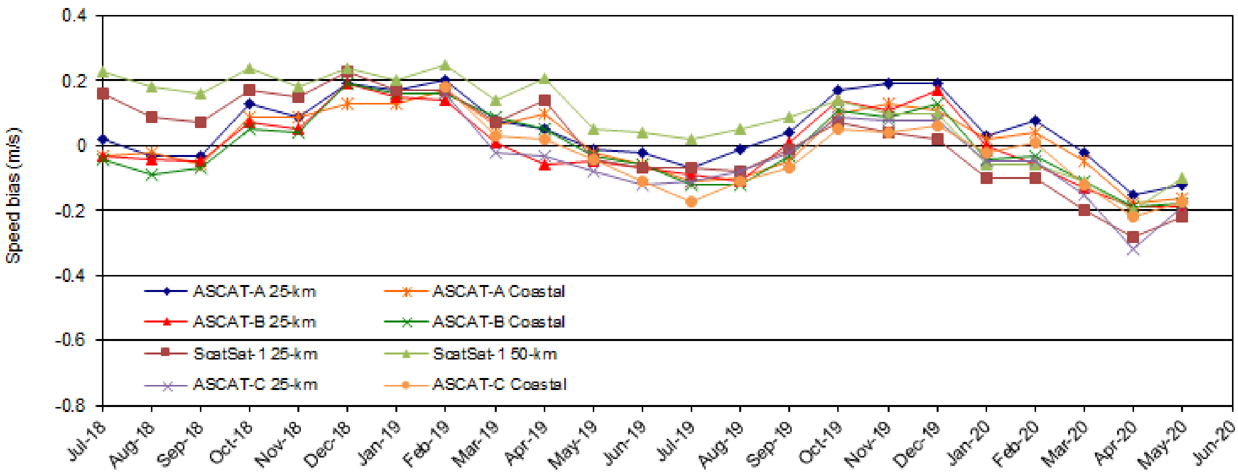
5.4.2. Comparison with buoys

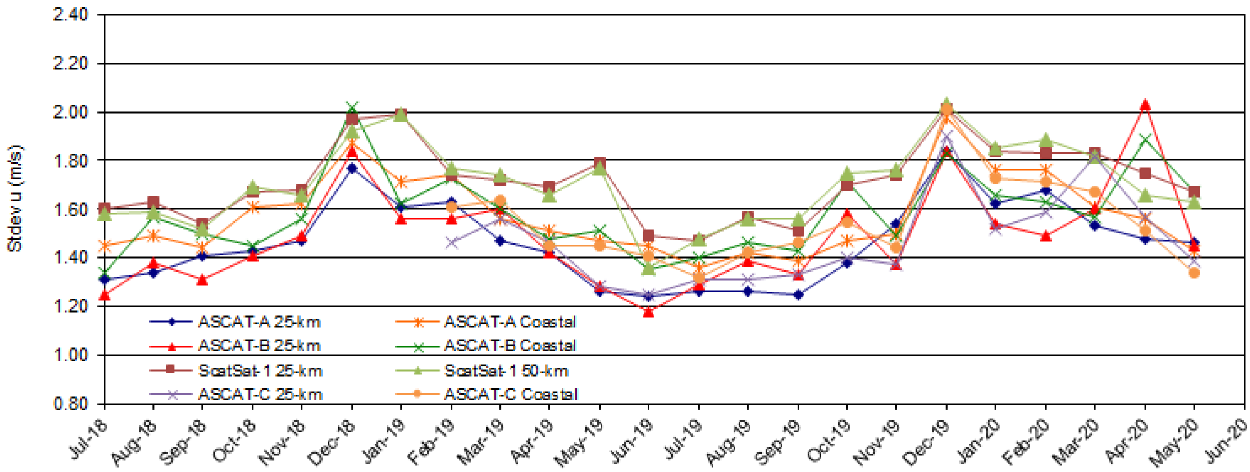
We compare the scatterometer winds with wind data from moored buoys on a monthly basis. The buoy data of approximately 150 buoys spread over the oceans (most of them in the tropical oceans and near Europe and North America) are retrieved from the ECMWF MARS archive and collocated with scatterometer winds. 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.

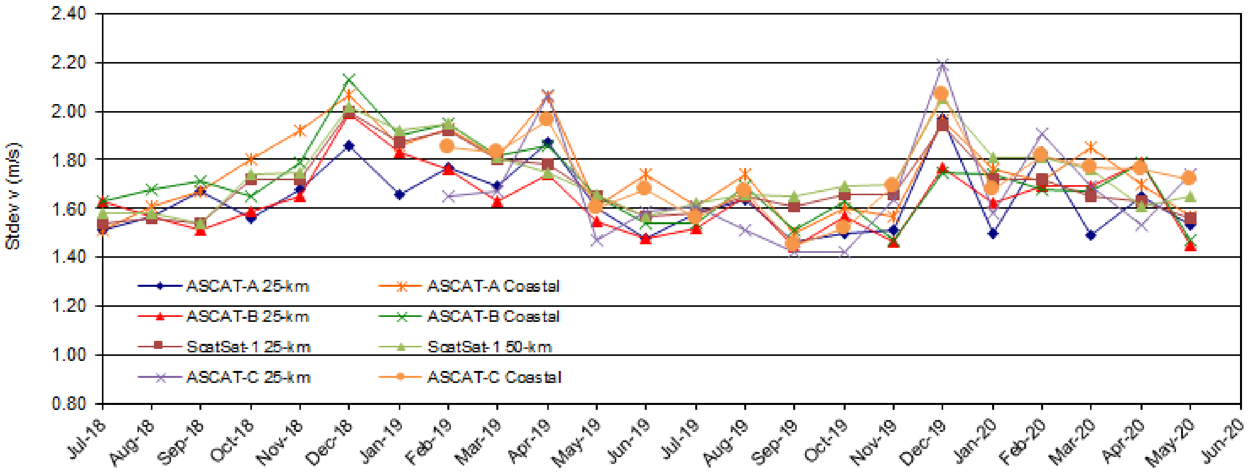
The figure below shows the monthly results of July 2018 to May 2020. The last month of the reporting period could not be covered since the blacklists from ECMWF were not available yet. These months will be included in the next Operations Report.

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.







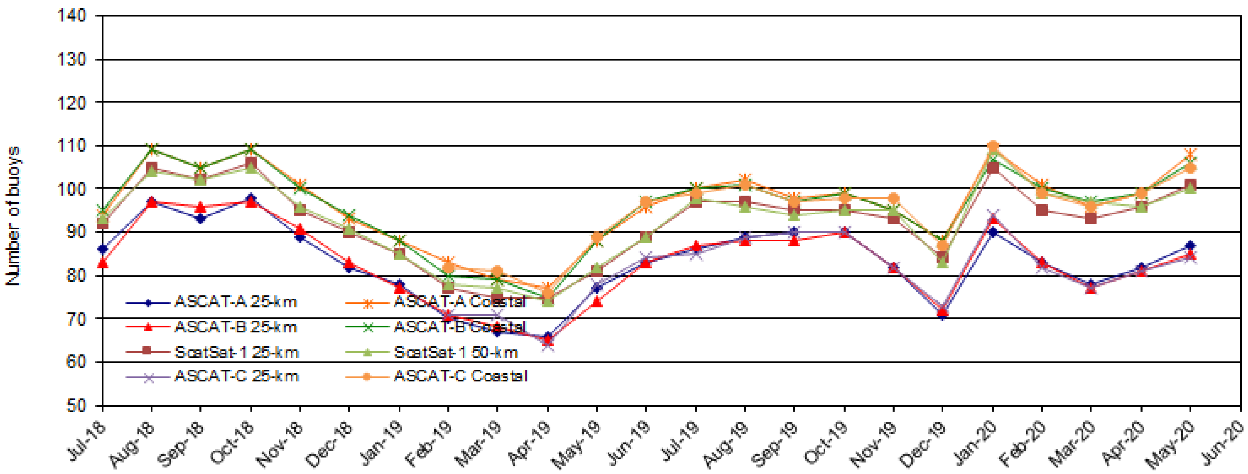


Figure 44: Comparison of scatterometer winds against buoy winds (monthly averages). For each product, the wind speed mean difference (scatterometer minus buoy, top), wind u component standard deviation (2nd plot) and wind v component standard deviation (3rd plot) are shown. Also the number of buoys available for the comparisons is shown (bottom).

6. Service and Product usage

6.1. Statistics on the web site and help desk

The OSI SAF offers to the users

- a central web site, http://osi-saf.eumetsat.int, managed by MF/CMS,
- a web site for SS1, http://osi-saf.eumetsat.int/lml/, managed by MF/CMS,
- a web site for SS2, http://osisaf.met.no/, managed by MET Norway,
- a web site for SS3, http://www.knmi.nl/scatterometer/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 central OSI SAF web site and help desk

6.1.1.1. Statistics on the registered users

Statistics on the central Web site use		
Month	Registered users	Pages
JAN. 2020	1763	1517
FEB. 2020	1780	1563
MAR. 2020	1801	1708
APR. 2020	1823	1582
MAY 2020	1850	1492
JUN. 2020	1873	1486

Table 40: Statistics on central OSI SAF web site use over 1st half 2020.

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

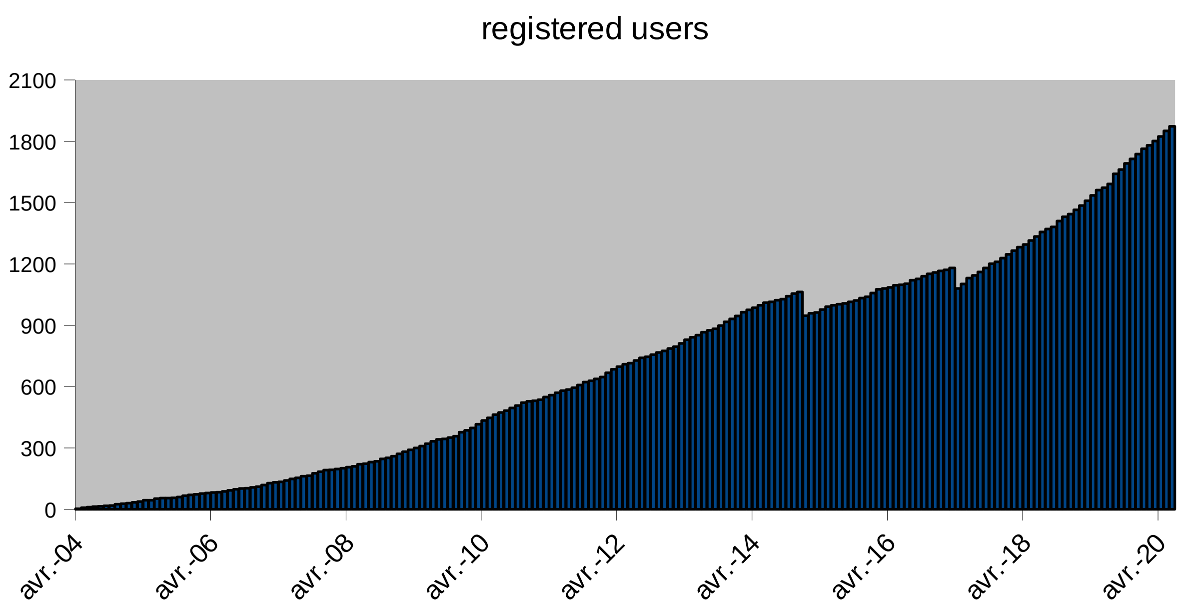


Figure 45: Evolution of external registered users on the central Web Site from April 2004 to JUN. 2020.

The following table lists the institutions or companies the new registered users (over 1st half 2020) are from.

Country	Institution, establishment or company
Armenia	Zanjan University
Benin	Agence pour la sécurité de la navigation aérienne en Afrique
Brazil	Instituto Nacional de Pesquisas Espaciais
Brazil	Universidade Federal de Alagoas
Canada	Memorial University of Newfoundland
China	ATMOSPHERE
China	Chang'an University
China	China University of Geo-science
China	China University of Mining and Technology
China	Chinese Academy of Meteorological Sciences
China	Chinese Academy of Sciences
China	Guangdong Ocean University
China	Nanjing University of Information Science & Technology
China	National Space Science Center,CAS
China	Ocean University of China
China	Shandong University of Science and Technology
China	Shanghai Ocean University
China	Tsinghua University
China	Wuhan university
China	Xiamen University
China	Zhejiang University
Denmark	Danish Meteorological Institute
Finland	Hurricane Unwinder
France	Institut de Recherche pour le Développement
France	Météo-France
Germany	European Organisation for the Exploitation of Meteorological Satellites
Greece	Hellenic National Meteorological Service
India	ANNA UNIVERSITY, CHENNAI
India	Central University Of Jharkhand, Brambe Ranchi
India	India Meteeorological Department
India	Indian Navy
India	Indian Space Research Organisation
India	Nagaland university
India	national Centre for Polar and Ocean Research, Goa
India	Teri School of Advanced Studies
Indonesia	The National Institute of Aeronautics and Space of Indonesia
Iran	Iranian National Institute for Oceanography and Atmospheric Science
Iran	Meteologica
Italy	Istituto di BioMeteorologia - Consiglio Nazionale delle
Italy	NATO Undersea Research Centre
Italy	University of Napoli Parthenope
Japan	University of Tokyo
Kenya	Kirinyaga University
Korea	Korea Institute of Ocean Science and Technology
Korea	Korea Meteorological Administration

Country	Institution, establishment or company
Korea	National Institute of Meteorological Sciences
Korea	Pukyong National University
Korea	University of South Korea, Yonsei Univ
Netherlands	Royal Netherlands Meteorological Institute
Netherlands	University of Twente
Netherlands	Wageningen University, WUR
Nigeria	Nigeria Institute for Oceanography and Marine Research Victoria Island Lagos
Norway	NA
Norway	Norwegian Defence Research Establishment
Norway	University of Bergen
Norway	Yttersia AS
Portugal	Instituto Dom Luiz
Russian Federation	AEROCOSMOS
Russian Federation	Saint Petersburg State University
Russian Federation	Shirshov Institute of Oceanology RAS
Spain	Universitat Politècnica de Catalunya
Sweden	Chalmers University of Technology
Switzerland	ETH Zürich
Taiwan	National Central University
Turkey	Türkish State Meteorological Services
United Kingdom	Bangor University, School of Ocean Sciences
United Kingdom	Met Office
United Kingdom	University College London
United Kingdom	University of Strathclyde
United States	Exprodat
United States	Florida State University
United States	Isocero.com
United States	Joint Typhoon Warning Center
United States	National Aquatic Resources Research and Development Agency
United States	Oregon State University
United States	Remote Sensing Systems
United States	Starpath School of Navigation
United States	Surfline/Wavetrak
United States	University Corporation for Atmospheric Research
United States	University of Maryland, College Park
United States	University of Massachusetts
United States	University of Wisconsin–Madison
United States	Washington State University
United States	Woods Hole Oceanographic Institution

Table 41: List of institutes of the new registered users over 1st half 2020 on the central Web Site

Moreover 38 new individual users, i.e. persons independent from any institute, establishment or company, registered on the period.

6.1.1.2. Statistics on the use of the OSI SAF central Web site

Usage of the OSI SAF central Web Site by country (top 10) over 1st half 2020 (pages views)						
Countries	JAN. 2020	FEB. 2020	MAR. 2020	APR. 2020	MAY 2020	JUN. 2020
United States	469	444	538	498	528	623
China	379	362	321	293	223	256
France	142	108	130	148	100	128
United Kingdom	98	87	59	99	123	100
Senegal	116	82	88	69	17	3
Kenya	5	38	69	72	13	0
Spain	28	29	23	36	52	28
Russian Federation	35	22	29	53	35	21
Germany	27	42	16	17	33	25
India	34	31	36	33	17	5
Others/Commercial	65	39	35	28	51	63

Table 42: Usage of the OSI SAF central Web Site by country (top 10) over 1st half 2020

6.1.1.3. Status of User requests made via the OSI SAF and EUMETSAT Help desks

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

The total number of OSI SAF helpdesk inquiries at the LML subsystem in this half year was 13. 12 requests were acknowledged or answered within three working days. 9 were categorized as ‘info’, 1 as ‘archive’, 4 as ‘unavailable’ and 1 as ‘anomaly’.

The total number of OSI SAF helpdesk inquiries at the HL subsystem in this half year was 15. All requests were acknowledged or answered within three working days. 7 were categorized as ‘info’, 2 as ‘archive’, 0 as ‘unavailable’ and 6 as ‘anomaly’.

The total number of OSI SAF helpdesk inquiries at scat@knmi in this half year was 19. All requests were acknowledged or answered within three working days. 16 were categorized as ‘info’, 1 as ‘archive’ and 2 as ‘unavailable’ (all referring to ScatSat-1 outages).

6.1.2. Statistics on the OSI SAF Sea Ice Web portal

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

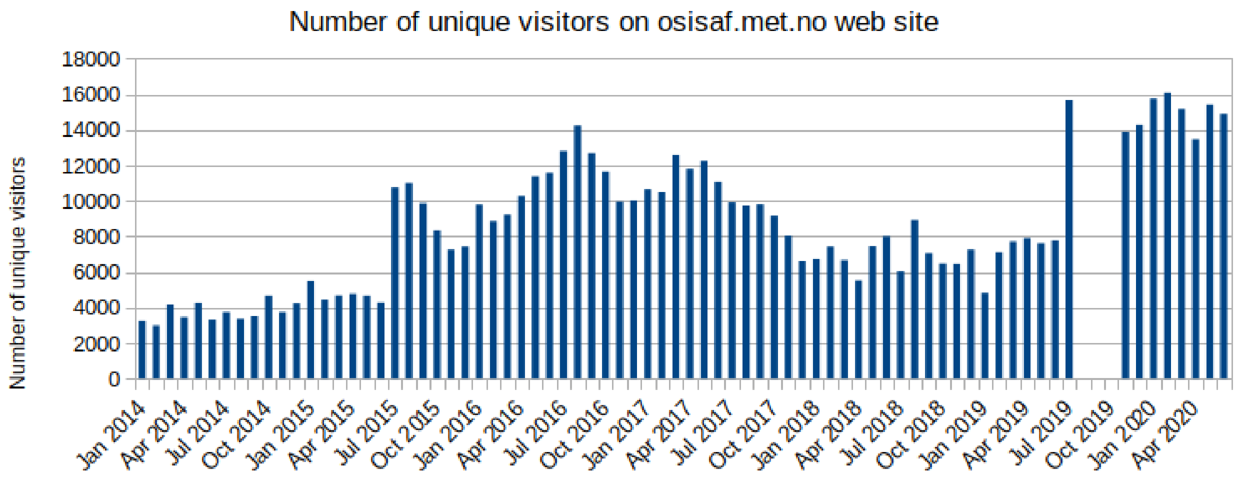


Figure 46: Evolution of unique visitors on the HL OSI SAF Sea Ice portal from January 2014 to JUN. 2020 (http://osisaf.met.no)

6.1.3. Statistics on the OSI SAF KNMI scatterometer web page

The following graph illustrates the evolution of page views on the KNMI scatterometer web pages, which are partly devoted to the OSI SAF wind products, from August 2005 to June 2020. Only external sessions (from outside KNMI) are counted.

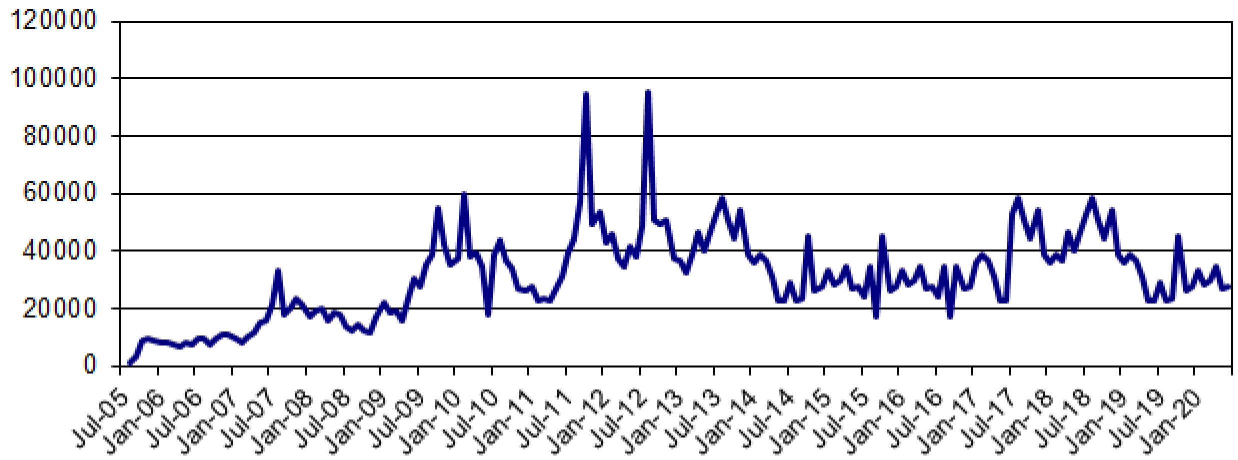


Figure 47: Number of page views on KNMI scatterometer website per month

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

Entity	**Shortened name**	**Country**
Chinese Academy of Sciences		China
Private user		The Netherlands
Private user		?
Jiangsu Climate Center		China
Laboratorio de Oceanografica Fisca e Meteorologica	LABOFIS	Brasil

Table 43: List of newly registered wind users at KNMI

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 on Ifremer FTP server. 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. 2020		FEB. 2020		MAR. 2020		APR. 2020		MAY 2020		JUN. 2020	
		Ifremer FTP/ HTTP/ OpenDap	PO.DAAC	Ifremer FTP/ HTTP/ OpenDap	PO.DAAC	Ifremer FTP/ HTTP/ OpenDap	PO.DAAC	Ifremer FTP/ HTTP/ OpenDap	PO.DAAC	Ifremer FTP/ HTTP/ OpenDap	PO.DAAC	Ifremer FTP/ HTTP/ OpenDap	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	640 / 2439	489	699 / 2336	161	777 / 5656 / 1	40	914 / 5337	2384	676 / 4204	1519	505 / 4671	239
OSI-202 series	NAR SST	1270	279	601	614	558	334	559	359	562	374	2528	40138
OSI-204 series	MGR SST	219522	35153	200038	33141	209587	35491	209489	38173	227341	1203511	227080	33419
OSI-206 series	Meteosat SST	6941	1386	9432	1558	35778 / 3	1225	11100 / 472 / 157	1305	16026	6782	11612	7852
OSI-207 series	GOES-East SST	19231	1	1391	0	1488	994	1440	2	1489	1	1409	2
OSI-IO-SST	Meteosat-8 SST	19729	775	18372	1432	20337	15	19977	1692	37706	744	22173	788
OSI-208 series	IASI SST	36235	13	30467	7	31941	19	34682	5232	45798	974	40871	1269
OSI-250	Meteosat SST Data record	1		0		0		0		0		0	
OSI-303 series	Meteosat DLI	91423	x	90776	x	162477	x	145790	x	92037	x	201151	x
OSI-304 series	Meteosat SSI	91423	x	90776	x	162477	x	145790	x	92037	x	201151	x
OSI-305 series	GOES-East DLI	76975	x	22834	x	87699	x	71693	x	3600	x	135233	x
OSI-306 series	GOES-East SSI	76975	x	22834	x	87699	x	71693	x	3600	x	135233	x
OSI-IO-DLI	Meteosat-8 DLI	26814	x	2749	x	3464	x	3136	x	2734	x	4807	x
OSI-IO-SSI	Meteosat-8 SSI	26814	x	2749	x	3464	x	3136	x	2734	x	4807	x

Table 44: Number of OSI SAF products downloaded from Ifremer FTP server and PO.DAAC server over 1st half 2020.

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 2020	FEB 2020	MAR 2020	APR 2020	MAY 2020	JUN 2020
OSI-401 series	Global Sea Ice Concentration (SSMIS)	150758	77269	49463	71132	125585	124232
OSI-402 series	Global Sea Ice Edge	7612	9781	6488	6399	7061	11624
OSI-403 series	Global Sea Ice Type	5198	12113	10118	49440	14399	5993
OSI-404 series	Global Sea Ice Emissivity	254	1223	65	60	62	61
OSI-405 series	Low resolution Sea Ice Drift	21363	31999	10669	30067	39585	24009
OSI-407 series	Medium resolution Sea Ice Drift	11273	10922	202	1658	7168	11381
OSI-408 series	Global Sea Ice Concentration (AMSR-2)	12778	3865	16436	6667	1118	8896
OSI-409	Ice Concentration Data Record v1.2	268	18494	15395	4992	94145	5361
OSI-430	Ice Concentration ICDR v1.2	62	3950	2216	9884	7209	293
OSI-430-b	Ice Concentration ICDR v2.0	16806	17614	15011	12146	17243	9480
OSI-450	Ice Concentration Data Record v2.0	128243	144452	103982	96792	159136	140912
OSI-203 series	AHL SST	464	2287	384	1244	808	248
OSI-205 series	L2 SST/IST	17032	23355	15888	67491	1788	112335
OSI-301 series	AHL DLI	394	503	157	150	155	160
OSI-302 series	AHL SSI	390	151	157	150	156	157

Table 45: Number of OSI SAF products downloaded from OSI SAF HL FTP server over 1st half 2020

Redistribution by CMEMS and C3S		JAN. 2020		FEB. 2020		MAR. 2020		APR. 2020		MAY 2020		JUN. 2020	
		CMEMS	C3S	CMEMS	C3S	CMEMS	C3S	CMEMS	C3S	CMEMS	C3S	CMEMS	C3S
OSI-401 series	Global Sea Ice Concentration (SSMIS)	31854	-	32057	-	34143	-	28396	-	35553	-	35909	-
OSI-402 series	Global Sea Ice Edge	30153	-	29563	-	31698	-	25077	-	31120	-	32597	-
OSI-403 series	Global Sea Ice Type	29788	-	29313	-	31534	-	25211	-	31759	-	31720	-
OSI-405 series	Low resolution Sea Ice Drift	28017	-	26356	-	28588	-	22509	-	29127	-	27882	-
OSI-409	Ice Concentration Data Record v1.2	2	124386	103	37675	8	3537	-	24071	-	32432	-	67699
OSI-430	Ice Concentration ICDR v1.2	30159	23273	4017	7528	46	4244	-	8993	-	13339	-	21152
OSI-430-b	Ice Concentration ICDR v2.0	-	-	-	-	-	-	14	-	351	-	415	-
OSI-450	Ice Concentration Data Record v2.0	-	-	-	-	-	-	19	-	198	-	0	-

Table 46: Number of OSI SAF products redistributed by CMEMS (downloads/product/day) and C3S (number of files) over 1st half 2020

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

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

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

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

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

		JAN. 2020		FEB. 2020		MAR. 2020		APR. 2020		MAY 2020		JUN. 2020	
		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	11 per file (BUFR), 86 per file (NetCDF)	188298	11 per file (BUFR), 86 per file (NetCDF)	50231	11 per file (BUFR), 86 per file (NetCDF)	448370	11 per file (BUFR), 85 per file (NetCDF)	287151	11 per file (BUFR), 85 per file (NetCDF)	80565	11 per file (BUFR), 85 per file (NetCDF)	86486
OSI-102-b	ASCAT-B 25 km	45 per file (BUFR), 93 per file (NetCDF)	63600	45 per file (BUFR), 93 per file (NetCDF)	55848	45 per file (BUFR), 93 per file (NetCDF)	151977	50 per file (BUFR), 93 per file (NetCDF)	190913	50 per file (BUFR), 93 per file (NetCDF)	69506	50 per file (BUFR), 93 per file (NetCDF)	67228
OSI-102-c	ASCAT-C 25 km	13 per file (BUFR), 66 per file (NetCDF)	2458	13 per file (BUFR), 66 per file (NetCDF)	1205	13 per file (BUFR), 66 per file (NetCDF)	8593	15 per file (BUFR), 65 per file (NetCDF)	3209	15 per file (BUFR), 65 per file (NetCDF)	9228	15 per file (BUFR), 65 per file (NetCDF)	30600
OSI-104	ASCAT-A Coastal	42 per file (BUFR), 86 per file (NetCDF)	5117	42 per file (BUFR), 86 per file (NetCDF)	8654	42 per file (BUFR), 86 per file (NetCDF)	130630	44 per file (BUFR), 85 per file (NetCDF)	46744	44 per file (BUFR), 85 per file (NetCDF)	52794	44 per file (BUFR), 85 per file (NetCDF)	11186
OSI-104-b	ASCAT-B Coastal	45 per file (BUFR), 93 per file (NetCDF)	3837	45 per file (BUFR), 93 per file (NetCDF)	6274	45 per file (BUFR), 93 per file (NetCDF)	55805	46 per file (BUFR), 93 per file (NetCDF)	121081	46 per file (BUFR), 93 per file (NetCDF)	30561	46 per file (BUFR), 93 per file (NetCDF)	7467
OSI-104-c	ASCAT-C Coastal	13 per file (BUFR), 66 per file (NetCDF)	175	13 per file (BUFR), 66 per file (NetCDF)	941	13 per file (BUFR), 66 per file (NetCDF)	3570	11 per file (BUFR), 65 per file (NetCDF)	1925	11 per file (BUFR), 65 per file (NetCDF)	4596	11 per file (BUFR), 65 per file (NetCDF)	5613
OSI-112-a	ScatSat-1 25 km wind vectors	67 per file (BUFR), 20 per file (NetCDF)	N/A	67 per file (BUFR), 20 per file (NetCDF)	N/A	67 per file (BUFR), 20 per file (NetCDF)	N/A	59 per file (BUFR), 17 per file (NetCDF)	N/A	59 per file (BUFR), 17 per file (NetCDF)	N/A	59 per file (BUFR), 17 per file (NetCDF)	N/A
OSI-112-b	ScatSat-1 50 km wind vectors	67 per file (BUFR), 20 per file (NetCDF)	N/A	67 per file (BUFR), 20 per file (NetCDF)	N/A	67 per file (BUFR), 20 per file (NetCDF)	N/A	55 per file (BUFR), 17 per file (NetCDF)	N/A	55 per file (BUFR), 17 per file (NetCDF)	N/A	55 per file (BUFR), 17 per file (NetCDF)	N/A

Table 47: Number of OSI SAF products downloaded from KNMI FTP server and PO.DAAC server over 1st half 2020

6.3. Statistics from EUMETSAT central facilities

6.3.1. Users from EUMETCast

Here below the list of the OSI SAF users identified by EUMETSAT for the distribution by EUMETCast. The table below shows the overall number of OSI SAF users by country on the 4 September 2019.

Albania	5	Greece	14	Pakistan	1
Algeria	8	Guinea	2	Poland	14
Angola	3	Guinea-Bissau	3	Portugal	5
Armenia	1	Hungary	9	Qatar	4
Austria	23	Iceland	1	Romania	8
Azerbaijan	3	India	3	Russian Federation	8
Bahrain	1	Iran, Islamic Republic Of	32	Rwanda	5
Belgium	9	Iraq	1	San Marino	1
Benin	4	Ireland	7	Sao Tome And Principe	2
Bosnia And Herzegovina	1	Isle Of Man	1	Saudi Arabia	3
Botswana	6	Israel	7	Senegal	8
Brazil	6	Italy	287	Serbia	2
Bulgaria	5	Jordan	2	Seychelles	2
Burkina Faso	4	Kazakhstan	5	Sierra Leone	2
Burundi	2	Kenya	13	Slovakia	3
Cameroon	4	Korea, Republic Of	1	Slovenia	1
Canada	2	Kuwait	3	Somalia	1
Cape Verde	2	Kyrgyzstan	1	South Africa	18
Central African Republic	2	Latvia	1	South Sudan	1
Chad	3	Lebanon	3	Spain	48
China	3	Lesotho	4	Sudan	4
Comoros	2	Liberia	2	Swaziland	3
Congo	3	Libyan Arab Jamahiriya	1	Sweden	3
Congo, The Democratic Republic Of The	5	Lithuania	2	Switzerland	14
Cote D'Ivoire	6	Luxembourg	1	Syrian Arab Republic	1
Croatia	2	Macedonia, The Former Yugoslav Republic Of	3	Tajikistan	1
Cyprus	1	Madagascar	6	Tanzania, United Republic Of	5
Czech Republic	20	Malawi	4	Togo	4
Denmark	7	Mali	3	Tunisia	4
Djibouti	2	Malta	2	Turkey	7
Egypt	5	Mauritania	4	Turkmenistan	1
Equatorial Guinea	2	Mauritius	7	Uganda	4
Eritrea	2	Moldova, Republic Of	1	Ukraine	2
Estonia	3	Morocco	7	United Arab Emirates	5
Ethiopia	8	Mozambique	5	United Kingdom	133
Finland	6	Namibia	6	United States	4
France	64	Netherlands	28	Uzbekistan	1
Gabon	2	Niger	7	Viet Nam	1
Gambia	3	Nigeria	6	Yemen	2
Georgia	1	Norway	4	Zambia	4
Germany	101	Oman	4	Zimbabwe	4
Ghana	9				

Table 48: Overall number of EUMETCast users by country on the 4 September 2019

6.3.2. Users and retrievals from EUMETSAT Data Center

Orders Summary over the 1st half 2020

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 2020**.

	Item	Volume in MB	Number of files
OSI-207 series	GOES-13_OSIHSST_OPE	623	732
OSI-305-a / OSI-306-a	GOES-16_ODDLISSI_OPE	4373	363
OSI-207-a	GOES-16_OSIHSSTN_OPE	3008	269
OSI-103 (with soil moisture)	M01_OAS025_OPE	15380	13749
OSI-104-b	M01_OASWC12_OPE	71156	13170
OSI-201-b	M01_OSSTGLBN_OPE	22281	609
OSI-205-a	M01_OSSTIST2_OPE	90	8
OSI-203-a	M01_OSSTIST3A_OPE	15	1
OSI-103 (with soil moisture)	M02_OAS012_OPE	5202	1652
	M02_OAS025_OPE	13176	12384
OSI-103	M02_OASW012_OPE	84	28
OSI-104	M02_OASWC12_OPE	71619	13546
OSI-150-a	M02_OR1ASW025_OPE	31205	37380
OSI-150-b	M02_OR1ASWC12_OPE	116070	37305
OSI-201	M02_OSSTGLB_OPE	94	6
OSI-104-c	M03_OASWC12_OPE	45	14
OSI-405 series	MML_OSIDRGB_OPE	1266	11782
OSI-403 series (NetCDF)	MML_OSITYGBN_OPE	3027	362
OSI-203	MML_OSSTAHL_OPE	2804	6102
OSI-250	MSG1_OR1HSST_OPE	37734	3903
OSI-303 / OSI-304	MSG2_ODDLISSI_OPE	718	28
	MSG2_OHDLISSI_OPE	12655	25
	MSG3_OHDLISSI_OPE	11127	440
OSI-304	MSG3_OSIHSSI_OPE	330	47
OSI-303-a / OSI-304-a	MSG4_ODDLISSI_OPE	803	41
	MSG4_OHDLISSI_OPE	74909	8218
OSI-206-a (NetCDF)	MSG4_OSIHSSTN_OPE	577	48
OSI-205-b	NPP_OSSTIST2B_OPE	93	1
OSI-203-b	NPP_OSSTIST3B_OPE	13	1
OSI-112-a	SCATSAT1_OSSW025_OPE	218	92

Table 49: Volume of data downloaded (in MB) by products from EDC over 1st half 2020

Ingestion Summary over the 1st half 2020

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

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

Product id.	Product name	JAN. 2020	FEB. 2020	MAR. 2020	APR. 2020	MAY 2020	JUN. 2020
OSI-404	Global Sea Ice Emissivity (DMSP-F18)	100	100	100	100	100	100
OSI-305-a OSI-306-a	Daily Downward Longwave Irradiance (GOES-16) Daily Surface Solar Irradiance (GOES-16)	100	100	100	100	100	100
OSI-305-a OSI-306-a	Hourly Downward Longwave Irradiance (GOES-16) Hourly Surface Solar Irradiance (GOES-16)	100	100	100	100	100	100
OSI-207-a	Hourly Sea Surface Temperature (GOES-16)	100	100	99.8	100	100	100
OSI-408	Sea Ice Concentration (AMSR-2)	100	100	100	98.3	100	100
OSI-102-b	ASCAT 25 km Wind (Metop-B)	100	100	100	99.7	99.5	99.7
OSI-104-b	ASCAT 12.5 km Coastal Wind (Metop-B)	99.7	99.5	100	100	99.5	100
OSI-102	ASCAT 25 km Wind (Metop-A)	100	99.5	100	100	99.0	100
OSI-104	ASCAT 12.5 km Coastal Wind (Metop-A)	99.5	99.7	100	99.5	99.3	100
OSI-102-c	ASCAT 25 km Wind (Metop-C)	100	100	100	100	100	100
OSI-104-c	ASCAT 12.5 km Coastal Wind (Metop-C)	100	100	100	100	100	100
OSI-201-b	Global Sea Surface Temperature (Metop-B)	100	100	100	100	100	100
OSI-202-b	NAR Sea Surface Temperature (Metop-B)	100	100	100	100	100	100
OSI-202-b	NAR Sea Surface Temperature (NPP)	91.9	100	100	100	100	100
OSI-407-a	Sea Ice Drift (Multi Mission)	98.3	100	96.7	100	99.1	100
OSI-205-a	SST/IST L2 (Metop-B)	100	100	100	100	100	99.6
OSI-205-b	SST/IST L2 (NPP)	100	100	100	100	100	100
OSI-203-a	SST/IST L3 (Metop-B)	100	100	100	100	100	100
OSI-203-b	SST/IST L3 (NPP)	100	100	100	100	100	100
OSI-301	AHL Downward Longwave Irradiance (Multi Mission)	100	100	100	100	100	NA
OSI-401-b	Global Sea Ice Concentration (Multi Mission)	100	100	100	100	100	100
OSI-405-c	Global Low Resolution Sea Ice Drift	100	98.2	100	100	100	100
OSI-402-c	Global Sea Ice Edge (Multi Mission)	100	100	100	100	100	100
OSI-403-c	Global Sea Ice Type (Multi Mission)	100	100	100	100	100	100
OSI-302	AHL Surface Solar Irradiance (Multi Mission)	100	100	100	96.6	100	NA
OSI-301-b OSI-302-b	AHL Downward Longwave Irradiance (Multi Mission) + AHL Surface Solar Irradiance (Multi Mission)	NA	NA	NA	100	100	100
OSI-303-a OSI-304-a	Daily Downward Longwave Irradiance (MSG) Daily Surface Solar Irradiance (MSG)	100	100	100	100	100	100

Product id.	Product name	JAN. 2020	FEB. 2020	MAR. 2020	APR. 2020	MAY 2020	JUN. 2020
OSI-303-a OSI-304-a	Hourly Downward Longwave Irradiance (MSG) Hourly Surface Solar Irradiance (MSG)	98.9	100	100	100	100	100
OSI-206-a	Hourly Sea Surface Temperature (MSG)	99.0	100	100	100	100	100
OSI-112-a	ScatSat-1 25 km wind vectors	100	100	100	100	100	100
OSI-112-b	ScatSat-1 50 km Wind vectors	100	100	100	100	100	100

Table 50: Percentage of received OSI SAF products in EDC in 1st half 2020

The OSI-301-b and OSI-302-b were declared operational in April 2020. They superseded the OSI-301 and OSI-302 which were discontinued in June 2020.