



# Half-Yearly Operations Report

2nd half 2018

Version : 1.0

Date : 20/02/2019

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



Norwegian  
Meteorological  
Institute



Danish  
Meteorological  
Institute



Royal Netherlands  
Meteorological Institute  
*Ministry of Infrastructure and the  
Environment*

## Document Change record

Document version	Date	Author	Change description
0.1	13/12/2018	CH	Template to be filled by OSI SAF team
1.0	20/02/2018	CH	With all inputs except L2 HL SST/IST and MR SIDR

## Table of contents

1.Introduction.....	4
1.1.Scope of the document.....	4
1.2.Products characteristics.....	4
1.3.Applicable documents.....	4
1.4.Reference documents.....	4
1.5.Definitions, acronyms and abbreviations.....	6
2.OSI SAF products availability and timeliness.....	8
2.1.Availability on FTP servers.....	9
2.2.Availability via EUMETCast.....	10
3.Main anomalies, corrective and preventive measures.....	11
3.1.At Low and Mid-Latitudes subsystem (Météo-France and Ifremer).....	11
3.2.At High Latitudes subsystem (MET Norway and DMI).....	12
3.3.At Wind subsystem (KNMI).....	13
4.Main events and modifications, maintenance activities.....	13
4.1.At Low and Mid-Latitudes subsystem (Météo-France and Ifremer).....	13
4.2.At High Latitudes subsystem (MET Norway and DMI).....	14
4.3.At Wind subsystem (KNMI).....	14
4.4.Release of new data records and off-line products.....	14
5.OSI SAF products quality.....	15
5.1.SST quality.....	15
5.1.1.Meteosat SST (OSI-206-a) quality.....	15
5.1.2.GOES-East SST (OSI-207-a) quality.....	18
5.1.3.Meteosat Indian Ocean SST (OSI-IO-SST) quality.....	21
5.1.4.NAR SST (OSI-202-b) quality.....	24
5.1.4.1.NPP NAR SST quality.....	25
5.1.4.2.Metop NAR SST quality.....	26
5.1.5.GBL SST (OSI-201) and MGR SST (OSI-204) quality.....	28
5.1.6.AHL SST (OSI-203) and HL SST/IST (OSI-205-a) quality.....	30
5.1.7.IASI SST (OSI-208-b) quality.....	34
5.2.Radiative Fluxes quality.....	37
5.2.1.DLI quality.....	37
5.2.1.1.Meteosat DLI (OSI-303) and GOES-East DLI (OSI-305) quality.....	37
5.2.1.2.Meteosat Indian Ocean DLI (OSI-IO-DLI) quality.....	38
5.2.1.3.AHL DLI (OSI-301) quality.....	38
5.2.2.SSI quality.....	39
5.2.2.1.Meteosat SSI (OSI-304) and GOES-East SSI (OSI-306) quality.....	39
5.2.2.2.Meteosat Indian Ocean SSI (OSI-IO-SSI).....	40
5.2.2.3.AHL SSI (OSI-302) quality.....	41

5.3.Sea Ice quality.....	44
5.3.1.Global sea ice concentration (OSI-401-b) quality.....	44
5.3.2.Global sea ice concentration (OSI-408) quality.....	50
5.3.3.Global sea ice edge (OSI-402-c) quality.....	53
5.3.4.Global sea ice type (OSI-403-c) quality.....	56
5.3.5.Sea ice emissivity (OSI-404) quality.....	58
5.3.6.Low resolution sea ice drift (OSI-405-c) quality.....	60
5.3.7.Medium resolution sea ice drift (OSI-407) quality.....	63
5.4.Global Wind quality (OSI-102, OSI-102-b, OSI-104, OSI-104-b).....	65
5.4.1.Comparison with ECMWF model wind data.....	65
5.4.2.Comparison with buoys.....	67
6.Service and Product usage.....	69
6.1.Statistics on the web site and help desk.....	69
6.1.1.Statistics on the central OSI SAF web site and help desk.....	69
6.1.1.1.Statistics on the registered users.....	69
6.1.1.2.Statistics on the use of the OSI SAF central Web site.....	70
6.1.1.3.Status of User requests made via the OSI SAF and EUMETSAT Help desks.....	71
6.1.2.Statistics on the OSI SAF Sea Ice Web portal.....	71
6.1.3.Statistics on the OSI SAF KNMI scatterometer web page.....	71
6.2.Statistics on the OSI SAF FTP servers use.....	73
6.2.1.Downloads statistics from the OSI SAF LML subsystem and from PO.DAAC.....	73
6.2.2.Downloads statistics from the OSI SAF HL subsystem, and from CMEMS and C3S....	74
6.2.3.Downloads statistics from the OSI SAF WIND subsystem and from PO.DAAC.....	75
6.3.Statistics from EUMETSAT central facilities.....	76
6.3.1.Users from EUMETCast.....	76
6.3.2.Users and retrievals from EUMETSAT Data Center.....	77
7.Training.....	80

## 1. Introduction

### 1.1. Scope of the document

The present report covers from 1<sup>st</sup> July of 31 December to 2018.

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-103 (discontinued), OSI-104, OSI-104-b  
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] Atlantic High Latitude L3 Sea Surface Temperature Product User Manual  
OSI-203  
SAF/OSI/CDOP/met.no/TEC/MA/115
- [RD.10] Geostationary Sea Surface Temperature Product User Manual  
OSI-206-a, OSI-207-a, OSI-IO-SST  
SAF/OSI/CDOP3/MF/TEC/MA/181
- [RD.11] Atlantic High Latitude Radiative Fluxes Product User Manual  
OSI-301, OSI-302  
SAF/OSI/CDOP/met.no/TEC/MA/116
- [RD.12] 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.13] Product User Manual for OSI SAF Global Sea Ice Concentration  
OSI-401-b  
SAF/OSI/CDOP3/DMI\_MET/TEC/MA/204

- [RD.14]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.15]50 Ghz Sea Ice Emissivity Product User Manual  
OSI-404-a  
SAF/OSI/CDOP3/DMI/TEC/MA/191
- [RD.16]Low Resolution Sea Ice Drift Product User's Manual  
OSI-405-c  
SAF/OSI/CDOP/met.no/TEC/MA/128
- [RD.17]Medium Resolution Sea Ice Drift Product User Manual  
OSI-407-a  
SAF/OSI/CDOP/DMI/TEC/MA/137
- [RD.18]Global Sea Ice Concentration Reprocessing Product User Manual  
OSI-409, OSI-409-a, OSI-430  
SAF/OSI/CDOP3/MET-Norway/TEC/MA/138
- [RD.19]Global Sea Ice Concentration Climate Data Record Product User Manual  
OSI-450  
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
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	JUL. 2018	AUG. 2018	SEP. 2018	OCT. 2018	NOV. 2018	DEC. 2018
OSI-102	ASCAT-A 25 km Wind	99.9	99.9	99.8	100	99.6	100
OSI-102-b	ASCAT-B 25 km Wind	99.9	99.9	99.9	99.9	99.6	100
OSI-104	ASCAT-A Coastal Wind	99.7	99.7	99.7	99.7	99.5	100
OSI-104-b	ASCAT-B Coastal Wind	99.9	100	99.9	99.9	99.6	100
OSI-201-b	GBL SST	100	96.8	100	100	100	100
OSI-202-b	NAR SST	100	96.8	100	100	100	100
OSI-203	AHL SST/IST (L3)	100	100	100	100	100	100
OSI-204-b	MGR SST	100	100.2	100	100	97.6	98.3
OSI-205	SST/IST (L2)	99.9	99.9	100	NA	NA	NA
OSI-205-a		NA	NA	NA	99.9	100	98.5
OSI-206-a	Meteosat SST	100	99.9	99.8	100	98.5	99.8
OSI-207-a	GOES-East SST	100	98.9	99.7	100	98.5	99.9
OSI-208-b	IASI SST	99.9	100	100	100	99.7	99.8
OSI-301	AHL DLI	100	100	100	100	100	96.8
OSI-302	AHL SSI	100	100	100	100	100	96.8
OSI-303-a	Meteosat DLI - hourly	99.7	99.9	99.9	99.9	97.4	99.5
	Meteosat DLI - daily	100	100	100	100	93.3	100
OSI-304-a	Meteosat SSI - hourly	99.7	99.9	99.9	99.9	97.4	99.5
	Meteosat SSI - daily	100	100	100	100	93.3	100
OSI-305-a	GOES-East DLI - hourly	98.7	98.1	99.0	99.9	98.3	100
	GOES-East DLI - daily	100	100	100	100	96.7	100
OSI-306-a	GOES-East SSI - hourly	98.7	98.1	99.0	99.9	98.3	100
	GOES-East SSI - daily	100	100	100	100	96.7	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	96.8
OSI-403-c	Global Sea Ice Type	100	100	100	100	100	96.8
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	96.8
OSI-407/-a	Medium Res. Sea Ice Drift	66.6	91.2	90.0	67.4	47.9	49.1
OSI-408	Global Sea Ice Concentration (AMSR-2)	100	100	100	100	100	100
OSI-430	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 2nd half 2018.**

## 2.2. Availability via EUMETCast

Ref.	Product	JUL. 2018	AUG. 2018	SEP. 2018	OCT. 2018	NOV. 2018	DEC. 2018
OSI-102	ASCAT-A 25 km Wind	99.9	99.9	99.8	100	99.6	100
OSI-102-b	ASCAT-B 25 km Wind	99.9	99.9	99.9	99.9	99.6	100
OSI-104	ASCAT-A Coastal Wind	99.7	99.7	99.7	99.7	99.5	100
OSI-104-b	ASCAT-B Coastal Wind	99.9	100	99.9	99.9	99.6	100
OSI-201-b	GBL SST	100	100	100	100	100	100
OSI-202-b	NAR SST	100	100	100	100	98.3	99.2
OSI-203	AHL SST/IST (L3)	100	100	100	100	100	100
OSI-204-b	MGR SST	100	100	100	100	98.0	98.2
OSI-205	SST/IST (L2)	100	100	100	NA	NA	NA
OSI-205-a		NA	NA	NA	100	100	100
OSI-206-a	Meteosat SST	99.7	100	99.9	99.9	98.9	99.7
OSI-207-a	GOES-East SST	100	98.8	99.9	100	98.9	99.9
OSI-208-b	IASI SST	100	99.9	100	100	99.8	100
OSI-301	AHL DLI	100	90.3	100	100	100	96.8
OSI-302	AHL SSI	93.5	93.5	100	100	100	100
OSI-303-a	Meteosat DLI - hourly	100	100	100	99.6	97.5	99.6
	Meteosat DLI - daily	100	100	100	100	100	100
OSI-304-a	Meteosat SSI - hourly	100	100	100	99.6	97.5	99.6
	Meteosat SSI - daily	100	100	100	100	100	100
OSI-305-a	GOES-East DLI - hourly	99.1	99.7	100	99.9	97.9	99.6
	GOES-East DLI - daily	100	100	100	100	100	100
OSI-306-a	GOES-East SSI - hourly	99.1	99.7	100	99.9	97.9	99.6
	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	96.8
OSI-403-c	Global Sea Ice Type	100	100	100	100	100	96.8
OSI-404/-a	Global Sea Ice Emissivity	100	100	100	100	100	100
OSI-405-c	Low Res. Sea Ice Drift	100	100	96.7	100	100	96.8
OSI-407/-a	Medium Res. Sea Ice Drift	96.8	98.3	96.7	74.8	61.7	56.2
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 2nd half 2018.**

### 3. Main anomalies, corrective and preventive measures

In case of anomaly (outage, degraded products...), correspondent 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
10 July 2330Z to 11 July 0300Z	Meteosat 0° products OSI-206-a OSI-303-a OSI-304-a	Meteosat-11 instrument anomaly	Switch to Meteosat-9
24 August to 7 Sept.	Meteosat 0° SST OSI-206-a	12 UTC product sometimes missing due to cloud mask lack	Correction of the cloud mask processing
27 July	Metop/AVHRR SST products OSI-201-b OSI-202-b OSI-204-b	Incorrect gridded feature in the Metop SST retrieval	Correction of the incorrect gridded feature in the Metop SST retrieval (see service message #1643)
22 Sept. 1500Z to 23 Sept. 1900Z	Meteosat IO products OSI-IO-SST OSI-IO-DLI OSI-IO-SSI	Outage on Meteosat-8	
05 Nov. 1800Z to 0600Z	Meteosat 0° et GOES-East products OSI-206-a OSI-207-a OSI-303-a OSI-304-a OSI-305-a OSI-306-a	Problem on the processing chain	Switch on the backup chain
13 Nov., 16 Nov.	Metop SST (L2) OSI-204-b	Cloud mask maia4 incomplete	Evolution of cloud mask (MAIA 4)
27-28 Nov.	IASI SST (L2) OSI-208-b	Missing input IASI L2Pcore SST	Documentation in JOP/OICD
25 Dec. 1600Z to 26 Dec. 0000Z	Metop SST products OSI-201-b OSI-202-b OSI-204-b	Problem with cloud mask computing related to missing NWP input	

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

Date	Impacted products or services	Anomaly	Corrective and preventive measures
13 August	AMSR-2 SICO OSI-408	Missing data in the AMSR-2 Sea Ice Concentration. Only one product was affected.	Users were informed. Service message #1650
20 Sept.	Global Sea ice conc. updates OSI-430	Missing data in products, caused by dynamical tiepoint calculations problems. Users were informed (#1660).	Corrected tiepoints and recalculated and redistributed products on FTP
18 Oct.	All products on HL FTP	Outage of FTP server due to internal network outage. Users were informed (#1678).	Fixed network issue.
24 Oct.	All products on HL FTP	Outage of FTP server due to network gateway problem. Users were informed (#1684).	Fixed network issue.
08 Dec.	MR Ice Drift OSI-407-a	One product were not delivered.	Users were informed. Service message #1713
09 Dec.	All products on HL FTP	Outage of FTP server due to network problem. Users were informed (#1714).	Fixed network issue.
12 Dec.	All products made at MET Norway OSI-203 OSI-301, 302 OSI-402-c, 403-c, 405-c	Generic failure of crontab at MET Norway HPC system, which caused outage of distribution to FTP. Users were informed (#1717).	Fixed problem with crontab. Improved system monitoring.
17 Dec.	AMSR-2 SICO OSI-408	Missing data in one AMSR-2 SICO product due to missing input data.	Users were informed. Service message #1720

There has been some problems with the internal network at MET Norway during the autumn 2018, which caused some problems for the availability of the OSI SAF HL FTP server. The issues causing these problems have now been fixed and the FTP service is stable again.

The MR Ice Drift (OSI-407-a) problem with reaching timeliness is mainly due to a very long processing time for the uncertainties. Before the upgrade to OSI-407-a in October it was tested if timeliness could be reached and it was concluded that it was just doable. Unfortunately the tests were done on data from the summer months and hence there were not as many areas to calculate as in the winter months. We are currently working on optimising the production time in order to reach the timeliness.

### 3.3. At Wind subsystem (KNMI)

Date	Impacted products or services	Anomaly	Corrective and preventive measures
27-28 Nov.	ASCAT wind products	Products were missing and delayed due to an anomaly in the KNMI EUMETCast reception station.	The reception station servers have been renewed now.

## 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
17 July	Metop SST products OSI-201-b OSI-202-b (AVHRR) OSI-204-b OSI-208-b	Cloud mask upgrade (MAIA4) and improvement in the GLB SST algorithm for OSI-201-b and OSI-204-b. Upgrade of the NetCDF library used to generate the netCDF4 products → Additional global attribute _NCProperties (see service message #1637)
31 July	NPP SST product OSI-202-b (VIIRS)	Additional global attribute _NCProperties in NAR SST based on VIIRS data (see service message #1643)
31 July	Metop/AVHRR SST products OSI-201-b OSI-202-b OSI-204-b	Correction of an incorrect gridded feature in the Metop SST retrieval (see service message #1643)
13 Nov.	Meteosat 0° et GOES-East DLI/SSI products OSI-303-a OSI-304-a OSI-305-a OSI-306-a	Scientific Validation Report available, Global attribute file_quality_level, in the NetCDF files, set to 3 (excellent : no known problems) Radiative fluxes based on GOES-16 became operational.
18 Dec.	Meteosat 0° et GOES-East DLI/SSI products OSI-206-a OSI-207-a	Scientific Validation Report available, Global attribute file_quality_level, in the NetCDF files, set to 3 (excellent : no known problems) Sensor Specific Error Statistic (SSES) updated in the variables sse_bias and sses_standard_deviation. SST based on GOES-16 became operational.

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

Date	Impacted products or services	Events and modifications, maintenance activities
09 August	Emissivity OSI-404/	Upgrade of product from OSI-404 to OSI-404-a including uncertainties, effective temperature and update of the emissivity algorithm coefficients
11 October	MR Ice Drift OSI-407	Upgrade of product from OSI-407 to OSI-407-a using Metop-B instead of Metop-A and including uncertainties. The product was also upgraded from 2 products per day to 4.
11 October	SST/IST L2 OSI-205	Upgrade of product from OSI-205 to OSI-205-a using Metop-B instead of Metop-A and including uncertainties.

## 4.3. At Wind subsystem (KNMI)

Date	Impacted products or services	Events and modifications, maintenance activities
25 Sept.	ASCAT wind products	The CMOD7 Geophysical Model Function replaces CMOD5n for wind retrieval; stress-equivalent ECMWF model background winds are used instead of real 10m winds.

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

Three new wind processing software packages have been released and were announced on 21 August: AWDP3.2, PenWP2.2, and CWDP0.9.

## 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 accuracy when compared to **night time** buoy measurements (see Service Specification Document [AD-1]):

- monthly mean difference (mean difference req. in following tables) less than 0.5 K,
- monthly difference standard deviation (SD req. in following tables) less than 1 K for the geostationary products (Meteosat and GOES-East SST), and 0.8 K for the polar ones (GBL, NAR, AHL, MGR and IASI SST).

Daytime statistics are also provided for information.

According to GHRSSST-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.

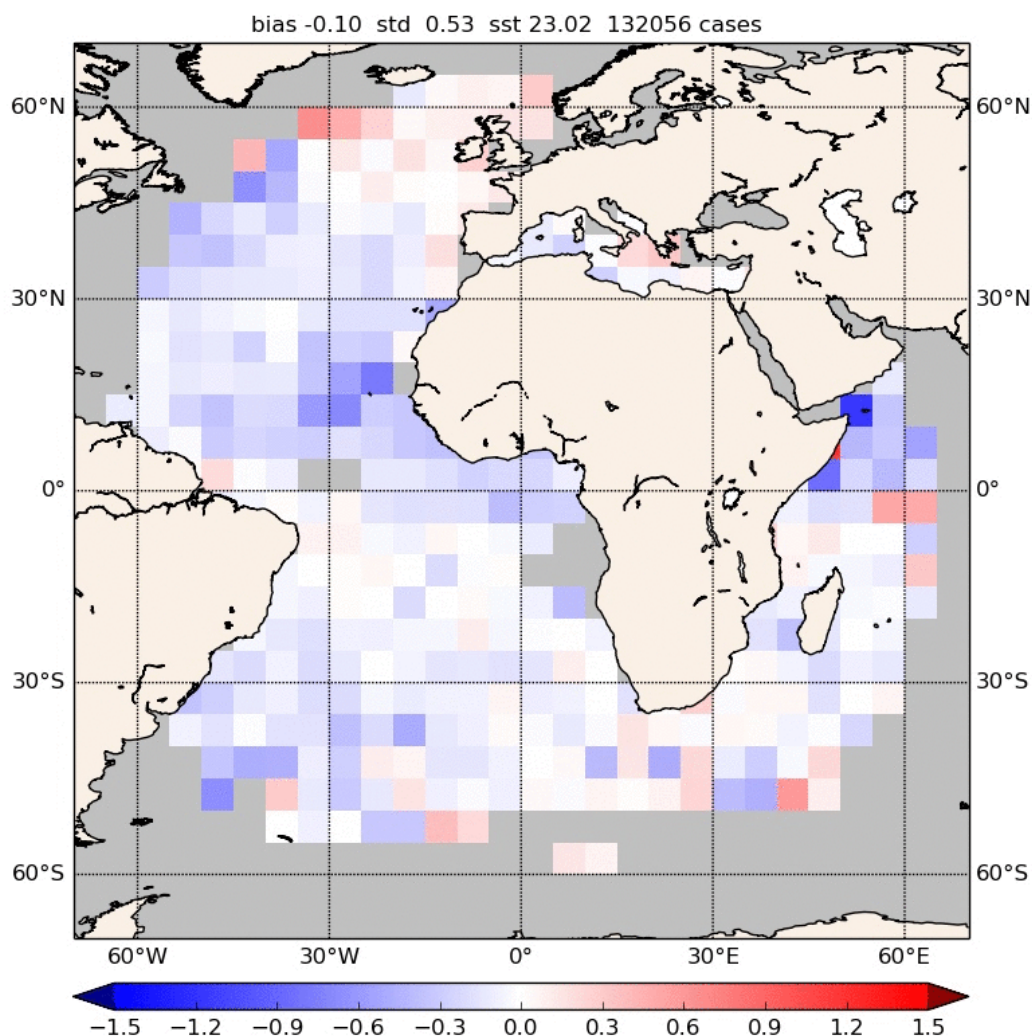
#### **5.1.1. Meteosat SST (OSI-206-a) quality**

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%20Metop%20GBL%20SST\\_monthly%20map\\_monthly\\_Night%20time](http://osi-saf.eumetsat.int/lml/#qua_SST%20Metop%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](http://osi-saf.eumetsat.int/lml/#doc_SST)) gives further details about the regional bias observed.



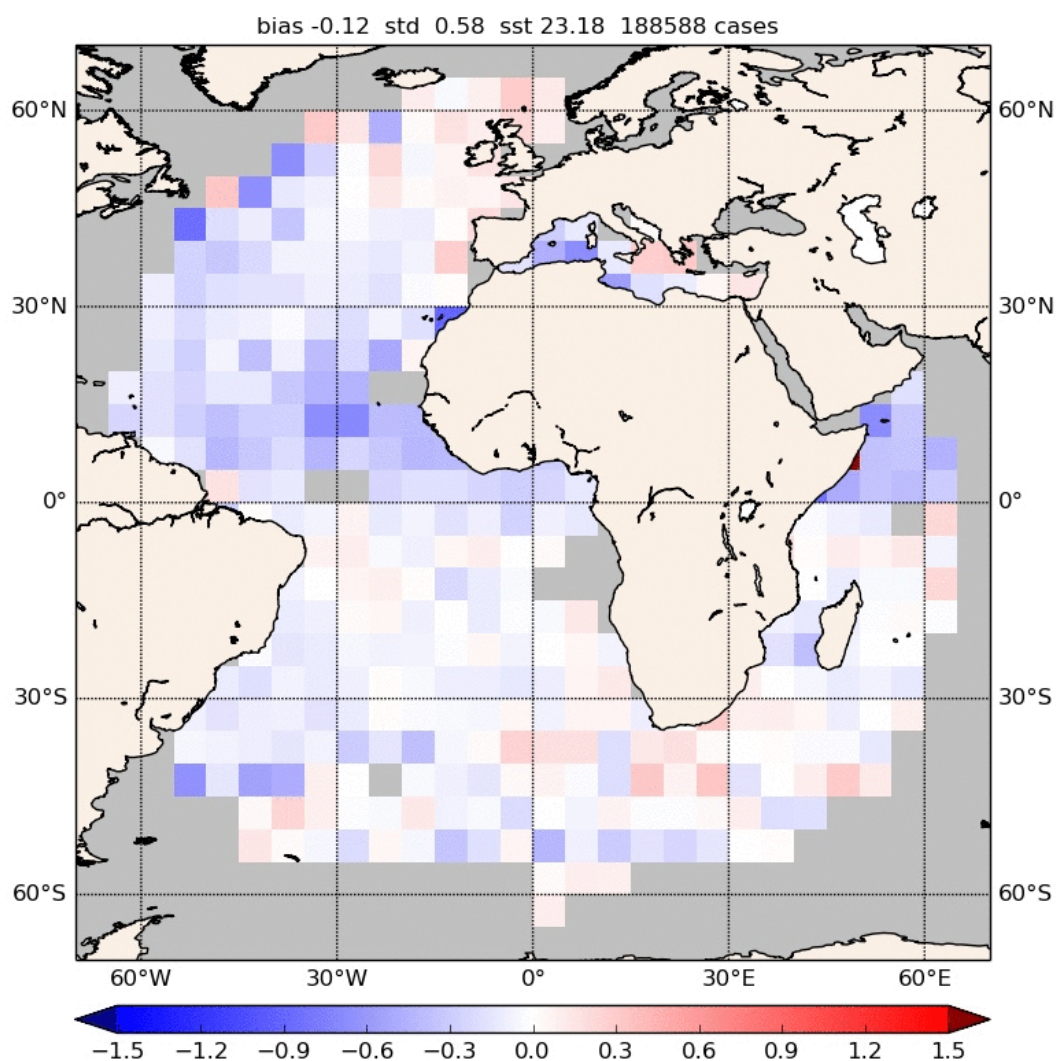
METEOSAT11 SST diff 2018-07-01 0000 2018-12-31 2326 zso 110-180 ql 3-5 n>5 (safos)



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



METEOSAT11 SST diff 2018-07-01 0250 2018-12-31 2203 zso 0- 90 ql 3-5 n>5 (safos)



**Figure 2: Mean Meteosat day-time SST mean 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 <u>night</u> -time SST quality results over 2nd half 2018					
Month	Number of cases	Mean diff. in K (req.: 0.5 K)	Mean diff. margin (*)	SD in K (req.: 1 K)	SD margin (**)
JUL. 2018	20609	-0.08	84	0.57	43
AUG. 2018	21150	-0.17	66	0.56	44
SEP. 2018	25187	-0.10	80	0.53	47
OCT. 2018	24800	-0.08	84	0.53	47
NOV. 2018	18133	-0.05	90	0.51	49
DEC. 2018	22224	-0.10	80	0.48	52
Meteosat <u>day</u> -time SST quality results over 2nd half 2018					
JUL. 2018	36145	-0.20	60	0.74	26
AUG. 2018	30114	-0.19	62	0.58	42
SEP. 2018	32627	-0.09	82	0.55	45
OCT. 2018	29444	-0.06	88	0.52	48
NOV. 2018	25201	-0.06	88	0.51	49
DEC. 2018	32303	-0.09	82	0.47	53
(*) Mean diff. margin = $100 * (1 - (  \text{mean diff.} / \text{mean diff. req.}  ))$					
(**) SD margin = $100 * (1 - (SD / SD \text{ req.}))$					
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 3: Meteosat SST quality results over 2nd half 2018, for 3, 4, 5 quality indexes.**

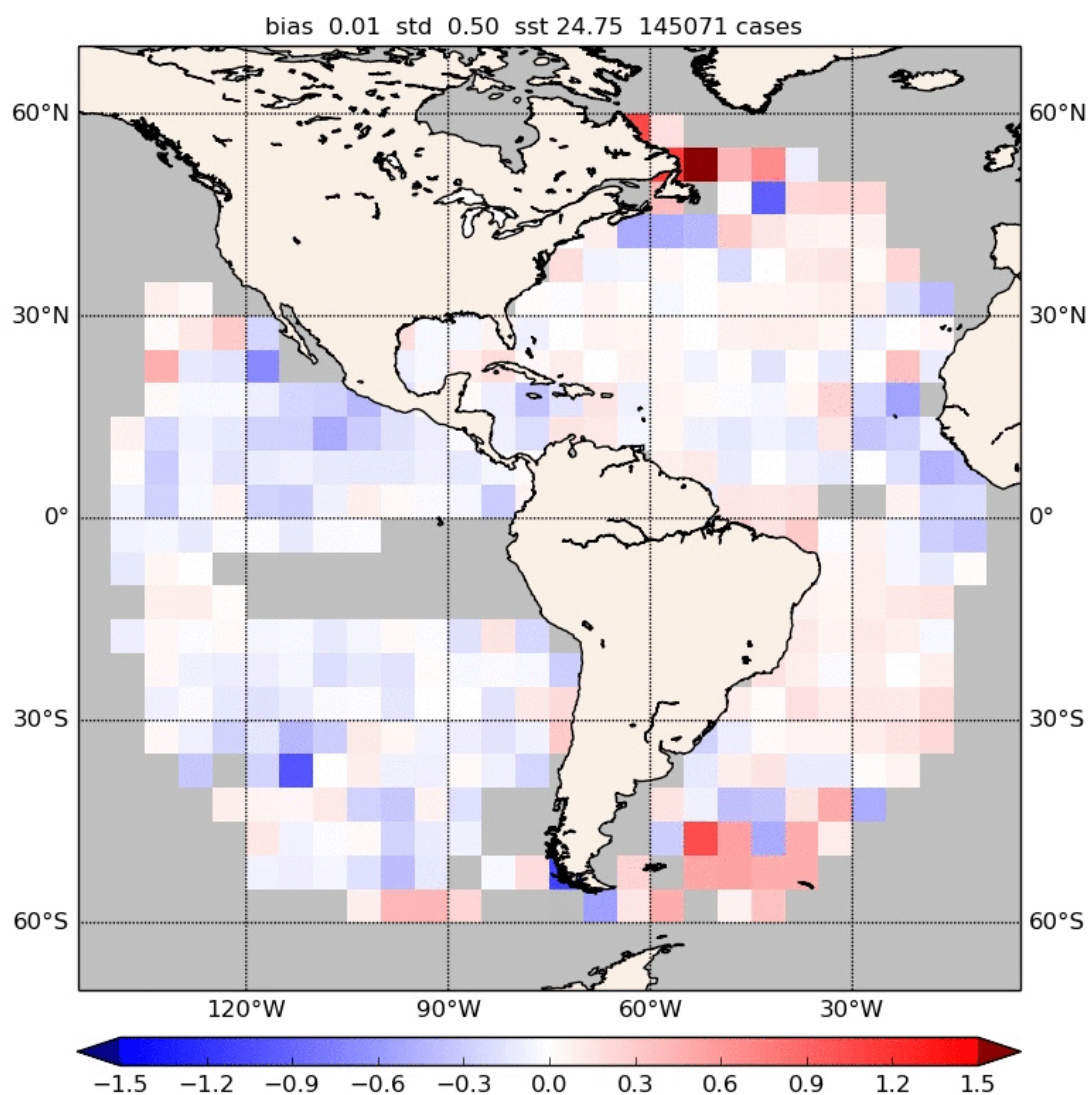
Comments:  
Overall statistics are good and within the requirement.

### 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](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](http://osi-saf.eumetsat.int/lml/#doc_SST)) gives further details about the regional bias observed.

GOES16 SST diff 2018-07-01 0017 2018-12-31 2324 zso 110-180 ql 3-5 n>5 (goesr)

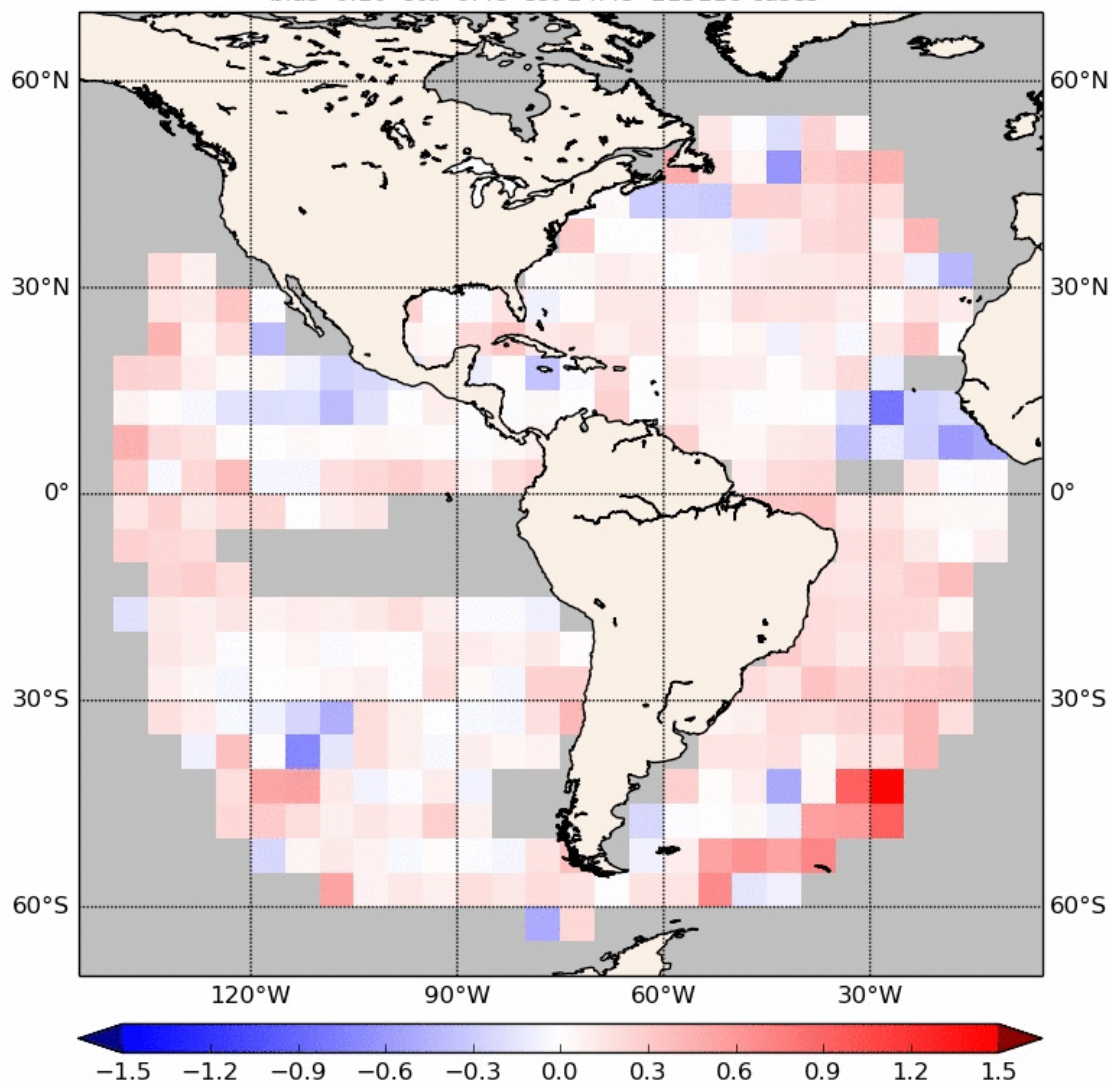


**Figure 3: Mean GOES-East night-time SST mean difference with respect to buoys measurements for quality level 3,4,5**



GOES16 SST diff 2018-07-01 0018 2018-12-31 2324 zso 0- 90 ql 3-5 n>5 (goesr)

bias 0.10 std 0.48 sst 24.45 213118 cases



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

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

GOES-East night-time SST quality results 2nd half 2018					
Month	Number of cases	Mean diff. in K (req.: 0.5 K)	Mean diff. margin (*)	SD in K (req.: 1 K)	SD margin (**)
JUL. 2018	21997	-0.05	90	0.54	46
AUG. 2018	23436	-0.04	92	0.52	48
SEP. 2018	25536	-0.01	98	0.52	48
OCT. 2018	24800	0.08	84	0.46	54
NOV. 2018	20702	0.05	90	0.46	54
DEC. 2018	26801	-0.02	96	0.47	53
GOES-East day-time SST quality results 2nd half 2018					
JUL. 2018	36314	0.05	90	0.53	47
AUG. 2018	35046	0.03	94	0.51	49
SEP. 2018	34936	0.12	76	0.49	51
OCT. 2018	34037	0.20	60	0.45	55
NOV. 2018	30586	0.16	68	0.44	56
DEC. 2018	39455	0.07	86	0.45	55
(*) 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 4: GOES-East SST quality results over 2nd half 2018, for 3, 4, 5 quality indexes**

Comments:

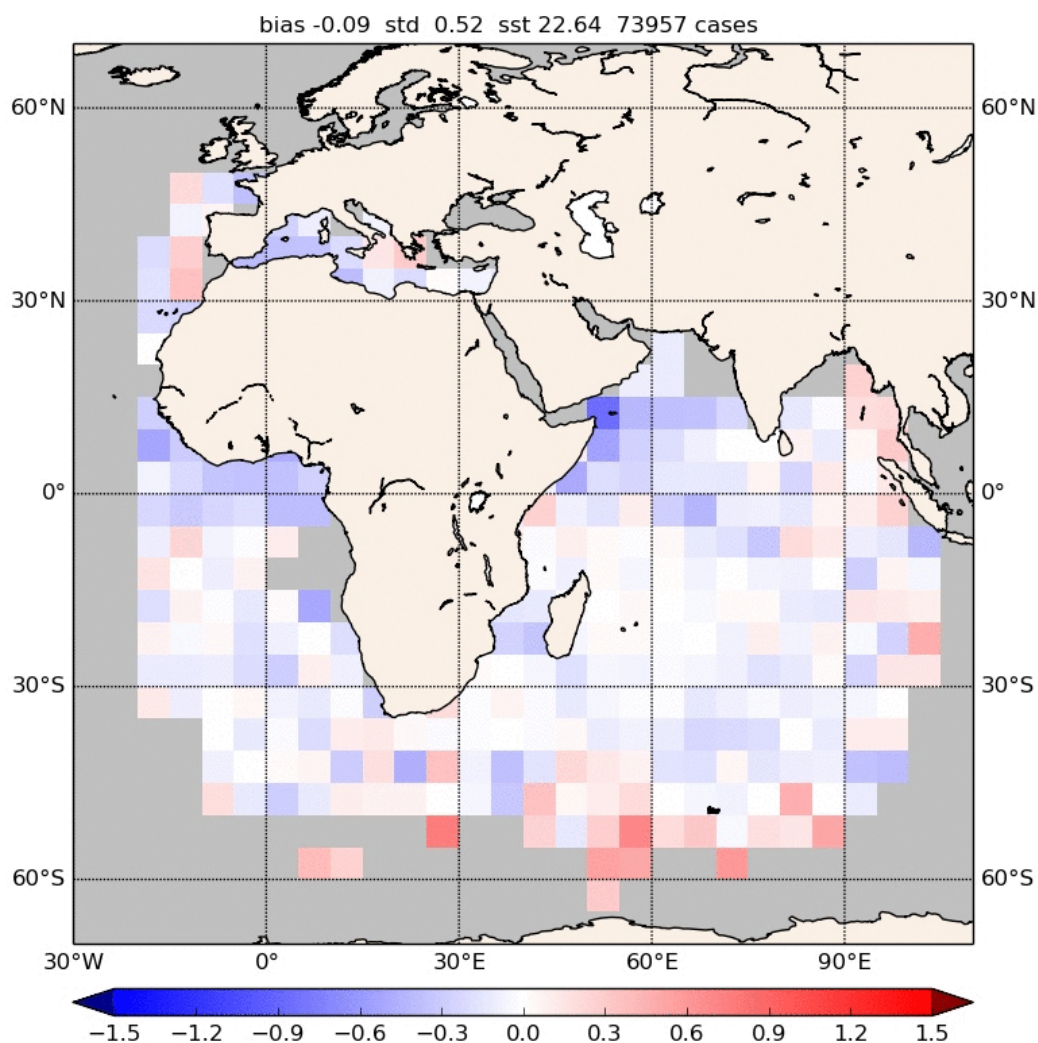
Overall statistics are good and within the requirement.

### 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.

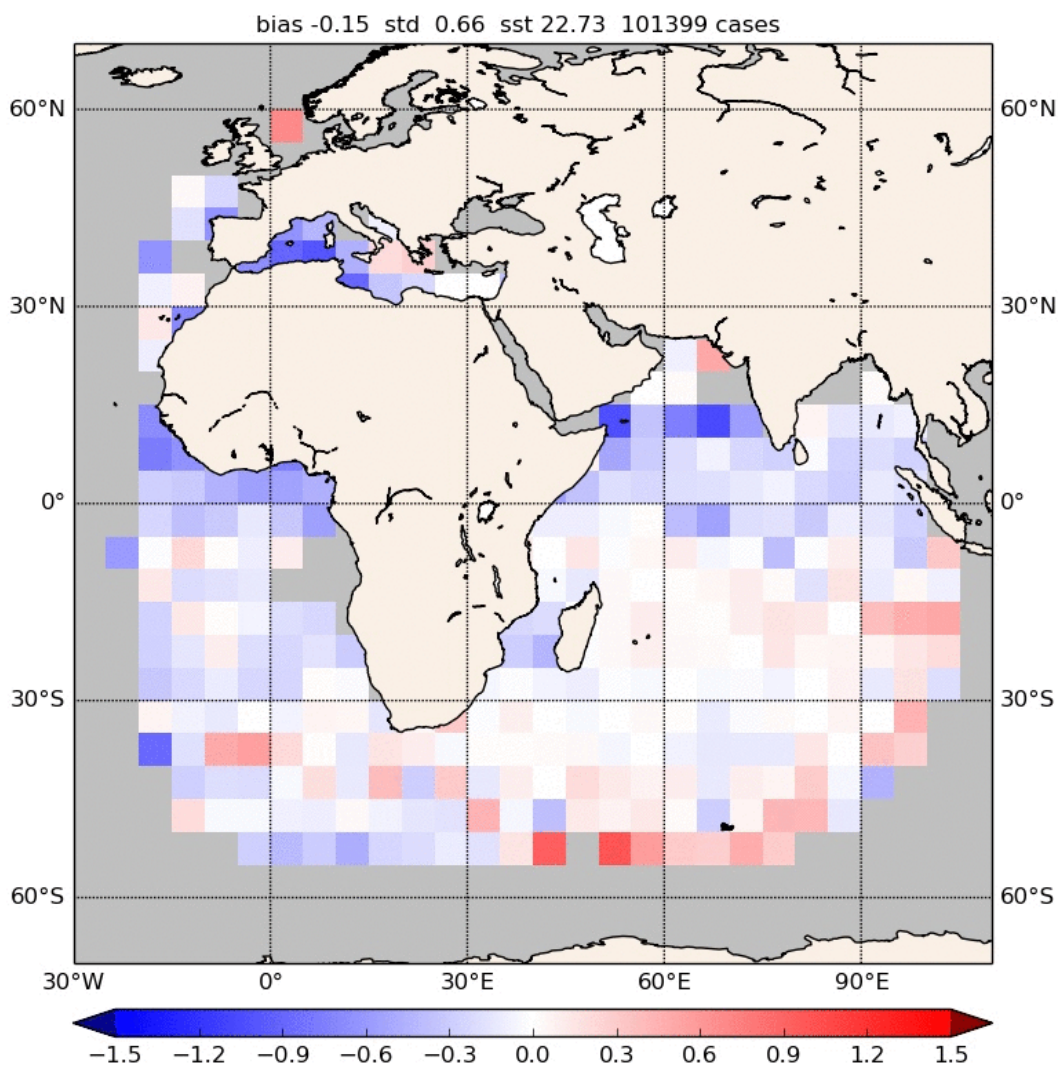
METEOSAT08 SST diff 2018-07-01 0001 2018-12-31 2325 zso 110-180 ql 3-5 n>5 (safoi)



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



METEOSAT08 SST diff 2018-07-01 0120 2018-12-31 1933 zso 0- 90 ql 3-5 n>5 (safoi)



**Figure 6: Mean Meteosat Indian Ocean day-time SST mean 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 <u>night</u> -time SST quality results over 2nd half 2018					
Month	Number of cases	Mean diff. in K (req.: 0.5 K)	Mean diff. margin (*)	SD in K (req.: 1 K)	SD margin (**)
JUL. 2018	14442	-0.04	92	0.58	42
AUG. 2018	12806	-0.07	86	0.50	50
SEP. 2018	12588	-0.08	84	0.52	48
OCT. 2018	12080	-0.11	78	0.50	50
NOV. 2018	10331	-0.10	80	0.49	51
DEC. 2018	10574	-0.17	66	0.51	49
Meteosat Indian Ocean <u>day</u> -time SST quality results over 2nd half 2018					
JUL. 2018	18615	-0.34	32	1.00	0
AUG. 2018	15270	-0.11	78	0.61	39
SEP. 2018	15602	-0.07	86	0.55	45
OCT. 2018	15784	-0.08	84	0.50	50
NOV. 2018	16371	-0.10	80	0.49	51
DEC. 2018	18587	-0.18	64	0.51	49
(*) Mean diff. margin = $100 * (1 - (  \text{mean diff.} / \text{mean diff. req.}  ))$					
(**) SD margin = $100 * (1 - (SD / SD \text{ req.}))$					
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 5: Meteosat Indian Ocean SST quality results over 2nd half 2018, for 3, 4, 5 quality indexes.**

#### Comments:

Overall statistics are within the requirement.

However in July day time statistics display a SD of 1K which is the requirement limit. We can only emit hypothesis as to why this happened: the cold bias is concentrated in West Africa, the Mediterranean Sea and the Arabian Sea. In all this areas fewer data are available either because of a permanent lake of in-situ measurements or because of cloud cover (due to monsoon for instance). This is combined with the fact that in this season the dust aerosol load of the atmosphere is generally very high. The methodology applied to correct dust aerosol contamination is much more efficient at night (during day-time we use some interpolations). This would explain why statistics are better during night-time.

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

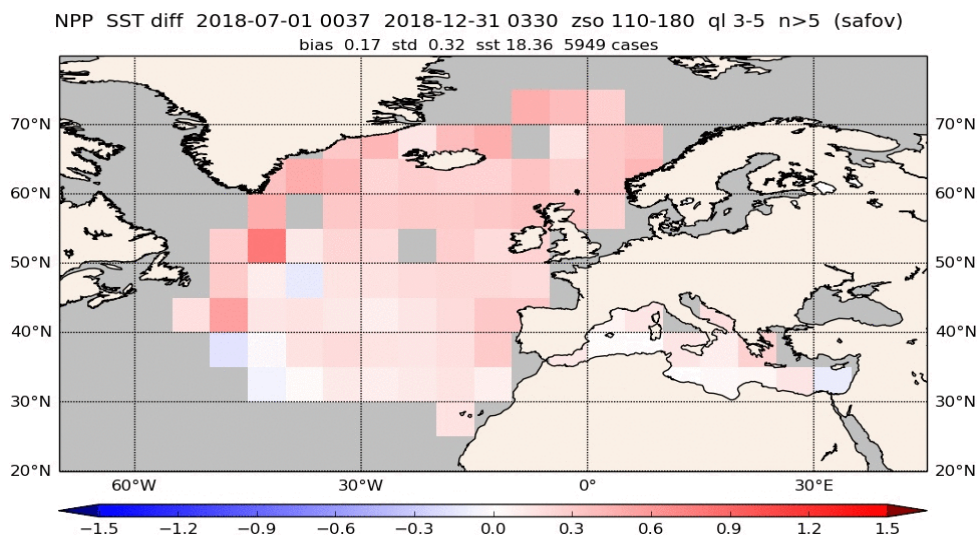
The operational NAR SST is processed with AVHRR and VIIRS data, separately. Currently Metop-B and S-NPP are used.

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.

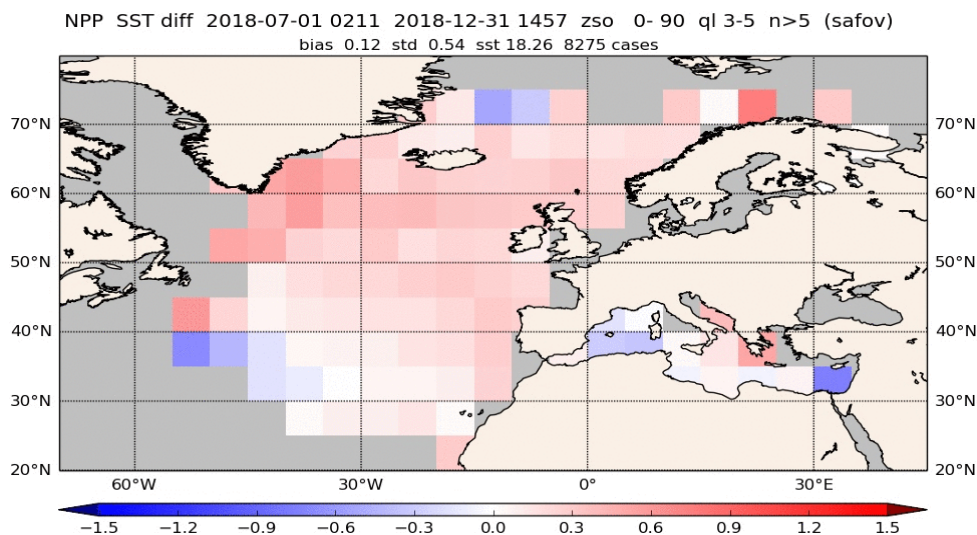


#### 5.1.4.1. NPP NAR SST quality

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/lm/#qua\\_SST%SNPP%20NAR%20SST\\_monthly%20map\\_monthly\\_Night%20time](http://osi-saf.eumetsat.int/lm/#qua_SST%SNPP%20NAR%20SST_monthly%20map_monthly_Night%20time).



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



**Figure 8: Mean NPP NAR day-time SST mean 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 <u>night-time</u> SST quality results over 2nd half 2018					
Month	Number of cases	Mean diff. in K (req.: 0.5 K)	Mean diff. margin (*)	SD in K (req.: 0.8 K)	SD margin (**)
JUL. 2018	834	0.03	94	0.40	50
AUG. 2018	796	0.09	82	0.40	50
SEP. 2018	1059	0.16	68	0.28	65
OCT. 2018	1095	0.21	58	0.25	69
NOV. 2018	1109	0.28	44	0.26	68
DEC. 2018	965	0.22	56	0.23	71
NPP NAR <u>day-time</u> SST quality results over 2nd half 2018					
JUL. 2018	1657	-0.10	80	0.81	-1
AUG. 2018	1408	0.10	80	0.50	38
SEP. 2018	1667	0.13	74	0.45	44
OCT. 2018	1334	0.21	58	0.38	53
NOV. 2018	1010	0.27	46	0.34	58
DEC. 2018	969	0.21	58	0.34	58
(*) 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 6: Quality results for NPP NAR SST over 2nd half 2018, for 3, 4, 5 quality indexes**

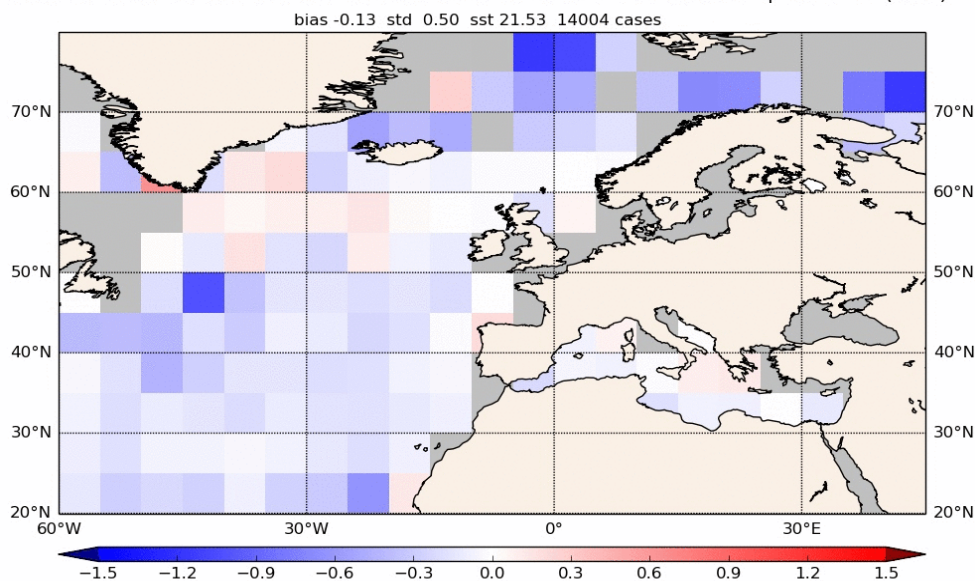
Comments:

Overall statistics are good and within the requirement except for July daytime statistics. NPP (and Metop) processing rely on Saharan Dust Index (SDI) based on Meteosat-11 during that period. Meteosat-11 SDI was not well calibrated since the beginning of its operational processing because we did not have enough matchups with in-situ under Saharan Dust contaminated conditions. On the 19<sup>th</sup> of July we made an adjustment to the SDI algorithm and this had repercussions on Metop and NPP processing. This localized (mainly over Mediterranean sea) problem lead to overall statistics being under requirements. Also as explained above, SDI correction is much more efficient during night-time which explain why the problem is only noticeable on day-time statistics.

#### **5.1.4.2. Metop NAR SST quality**

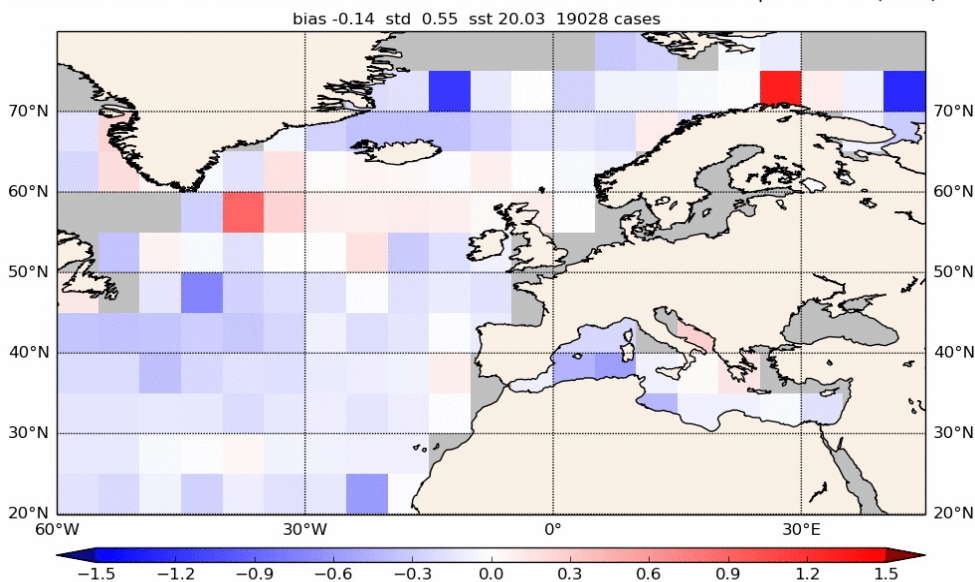
The following maps indicate the mean night-time and day-time SST mean difference with respect to buoys measurements for quality level 3,4,5 over the reporting period. Monthly maps are available on [http://osi-saf.eumetsat.int/lml/#qua\\_SST%Metop%20NAR%20SST\\_monthly%20map\\_monthly\\_Night%20time](http://osi-saf.eumetsat.int/lml/#qua_SST%Metop%20NAR%20SST_mont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

NAR METOP01 SST diff 2018-07-01 0016 2018-12-31 2241 zso 110-180 ql 3-5 n>5 (safol)



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

NAR METOP01 SST diff 2018-07-01 0736 2018-12-31 1435 zso 0- 90 ql 3-5 n>5 (safol)



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

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

Metop-B NAR night-time SST quality results over 2nd half 2018					
Month	Number of cases	Mean diff. in K (req.:0.5 K)	Mean diff. margin (*)	SD in K (req.:0.8 K)	SD margin (**)
JUL. 2018	1355	-0.27	46	0.41	49
AUG. 2018	2077	-0.29	42	0.50	38
SEP. 2018	2731	-0.12	76	0.55	31
OCT. 2018	2691	-0.05	90	0.51	36
NOV. 2018	2490	-0.06	88	0.50	38
DEC. 2018	2455	-0.11	78	0.44	45
Metop-B NAR day-time SST quality results over 2nd half 2018					
JUL. 2018	4419	-0.28	44	0.66	18
AUG. 2018	3773	-0.23	54	0.61	24
SEP. 2018	3612	-0.09	82	0.52	35
OCT. 2018	2752	-0.01	98	0.43	46
NOV. 2018	2157	-0.01	98	0.42	48
DEC. 2018	1956	-0.04	92	0.39	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 7: Quality results for Metop-B NAR SST over 2nd half 2018, 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

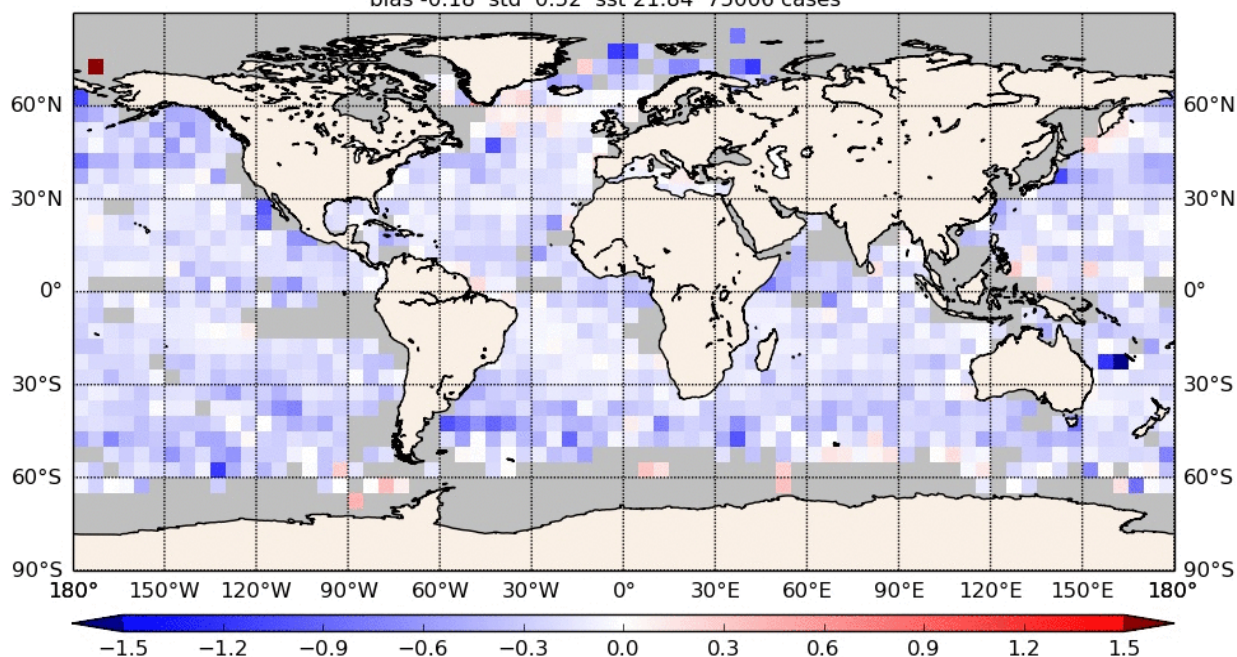
The OSI SAF SST products on global coverage (GBL SST and MGR SST) are based on Metop/AVHRR data, currently Metop-B.

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](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.

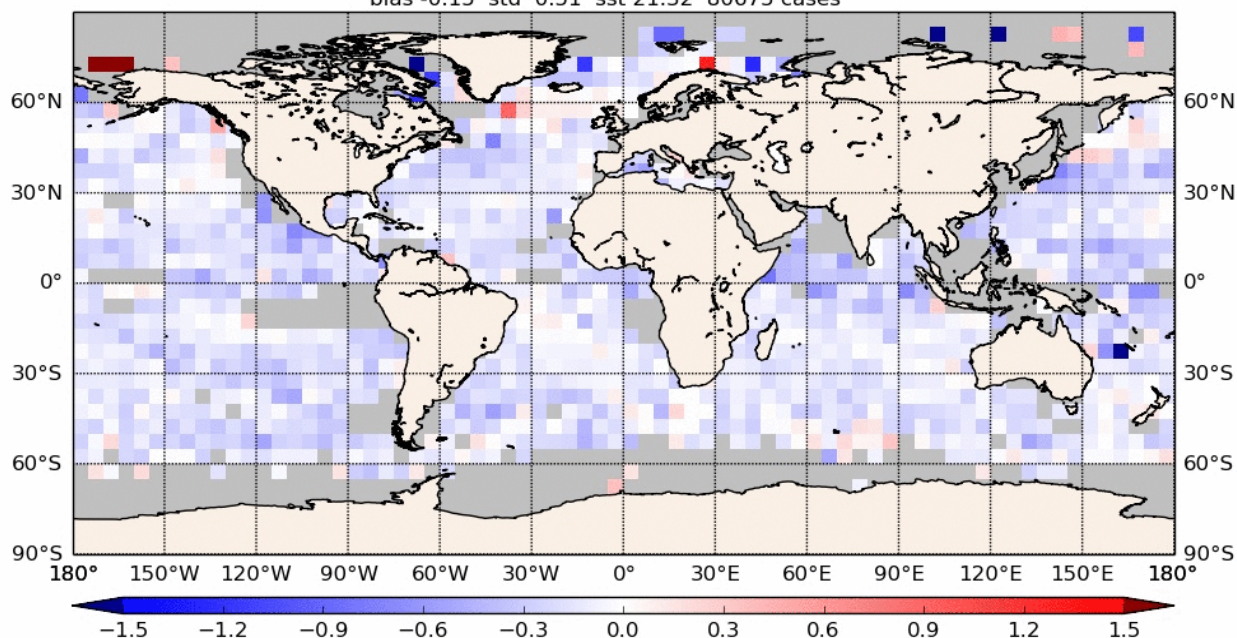


METOP01 SST diff 2018-07-01 0001 2018-12-31 2359 zso 110-180 ql 3-5 n>5 (safol)  
bias -0.18 std 0.52 sst 21.84 75006 cases



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

METOP01 SST diff 2018-07-01 0028 2018-12-31 2342 zso 0- 90 ql 3-5 n>5 (safol)  
bias -0.15 std 0.51 sst 21.32 80675 cases



**Figure 12: Mean Metop-B day-time SST mean 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 <u>night</u> -time SST quality results over 2nd half 2018					
Month	Number of cases	Mean diff. in K (req.:0.5 K)	Mean diff. margin (*)	SD in K (req.: 0.8 K)	SD margin (**)
JUL. 2018	10287	-0.17	66	0.49	39
AUG. 2018	11013	-0.21	58	0.51	36
SEP. 2018	13464	-0.19	62	0.55	31
OCT. 2018	14573	-0.16	68	0.53	34
NOV. 2018	12509	-0.18	64	0.52	35
DEC. 2018	12473	-0.20	60	0.50	38
Global Metop-B <u>day</u> -time SST quality results over 2nd half 2018					
JUL. 2018	14052	-0.18	64	0.60	25
AUG. 2018	12696	-0.17	66	0.54	33
SEP. 2018	14071	-0.14	72	0.51	36
OCT. 2018	14214	-0.10	80	0.49	39
NOV. 2018	12192	-0.13	74	0.44	45
DEC. 2018	12506	-0.16	68	0.45	44
(*) 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 2nd half 2018, for 3,4,5 quality indexes**

Comments:

Overall statistics are good and within the requirement.

#### **5.1.6. AHL SST (OSI-203) and HL SST/IST (OSI-205-a) quality**

##### **Level 2 High Latitude Sea and Sea Ice Surface Temperature (STT/IST, OSI-205/OSI-205-a)**

The Level 2 HL SST/IST (OSI-205/OSI-205-a) is derived from polar satellites data. OSI-205, derived from Metop-A was operational until 11 October 2018; OSI-205-a, derived from Metop-B, is operational since 11 October 2018. The OSI-205/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 (SST and IST) and night-time (SST only). Only best quality data (ql 5) are used. 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/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). Buoy data used for the IST validation is from the DMI GTS.

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/OSI-205-a). Only validation results for OSI-205-a vs. traditional buoy data (air temperatures) are subject to the quality assessment requirements. An example of validation results for OSI-205-a IST vs. in-situ IR radiometer data is shown for reference (see Comments).

**Level 2 High Latitude Sea and Sea Ice Surface Temperature validation results are not yet available. This section will be updated in a next version of this report.**

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: JUL. 2018 to DEC. 2018 OSI-205/OSI-205-a monthly mean IST mean difference and bias with respect to conventional buoys measurements from the DMI GTS. Only data with for quality level 5 are shown**

OSI-205/OSI-205-a IST quality results over 2nd half 2018, 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. 2018					
AUG. 2018					
SEP. 2018					
OCT. 2018					
NOV. 2018					
DEC. 2018					
OSI-205/OSI-205-a IST quality results over 2nd half 2018, 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. 2018					
AUG. 2018					
SEP. 2018					
OCT. 2018					
NOV. 2018					
DEC. 2018					
(*) 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/OSI-205-a Metop AVHRR IST over JUL. 2018 to DEC. 2018, for quality levels 4 and 5 (acceptable and best qualities), by night and by day.**

Comments:

**Figure 14: OSI-205/OSI-205-a validation (ql 4+5) against a single WMO buoy, showing mean difference of -2.72 K and a standard mean difference of 2.07 K.**

### Level 3 Atlantic High Latitude Sea Surface Temperature (AHL SST, OSI-203)

The Level 3 Atlantic High Latitude Sea Surface Temperature (AHL SST, OSI-203) is derived from polar satellites data, currently AVHRR on NOAA-18, NOAA-19 and Metop-A.

The following table provides the OSI-203 SST quality results over the reporting period.

OSI-203 AHL AVHRR SST quality results over year 2018, night-time					
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. 2018	213	-0.29	41.5	0.68	15.2
FEB. 2018	219	-0.15	71.0	0.75	5.9
MAR. 2018	244	-0.24	52.6	0.78	2.4
APR. 2018	303	-0.29	42.2	0.66	18.0
MAY 2018	428	-0.21	58.3	0.75	6.4
JUN. 2018	486	0.01	99.1	0.77	3.9
JUL. 2018	931	0.14	70.9	0.94	-18.0
AUG. 2018	811	-0.37	26.3	0.82	-3.4
SEP. 2018	1536	-0.26	48.6	0.72	10.0
OCT. 2018	1577	-0.23	53.1	0.79	1.5
NOV. 2018	1819	-0.19	61.9	0.69	14.2
DEC. 2018	1403	-0.29	42.7	0.65	19.3
OSI-203 AHL AVHRR SST quality results over year 2018, day-time					
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. 2018	967	-0.38	23.6	0.76	4.5
FEB. 2018	758	-0.24	52.1	0.78	2.2
MAR. 2018	664	-0.25	49.7	0.82	-2.7
APR. 2018	613	-0.27	46.9	0.61	24.9
MAY 2018	768	-0.15	69.3	0.67	16.2
JUN. 2018	801	0.09	81.1	0.62	22.1
JUL. 2018	1250	0.22	55.9	0.83	-3.6
AUG. 2018	1620	-0.21	58.6	0.77	4.3
SEP. 2018	2303	-0.13	72.4	0.64	20.4
OCT. 2018	2633	-0.15	68.2	0.71	11.8
NOV. 2018	2291	-0.19	61.0	0.78	2.0
DEC. 2018	2266	-0.32	36.2	0.68	14.4
(*) 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 10: Quality results for OSI-203AHL AVHRR SST over JAN. to DEC. 2018, for 3,4,5 quality indexes, by night and by day.**

#### Comments:

For this period, the validation results are normal, and all results are within target accuracy requirement, except standard deviation in July and August, which are slightly above target requirement.

In addition to the regular validation of the OSI-203 product, we have extended the validation to the last three years to look for any seasonal trends in the validation results. Plots for the mean difference for daytime and night-time are shown in Figure 17 and Figure 18. There is a common trend for all years plotted that the mean difference increase from start of the year with negative



difference towards slightly positive maximum at summer and decrease towards largest negative difference at end of the year. Usually the change from month to month is smooth, but some changes between months are more distinct, like September to October 2017 and July to August 2018. No clear reason for these sudden changes have been found, but they could be caused by the distribution of validation data, changes in weather regimes or other.

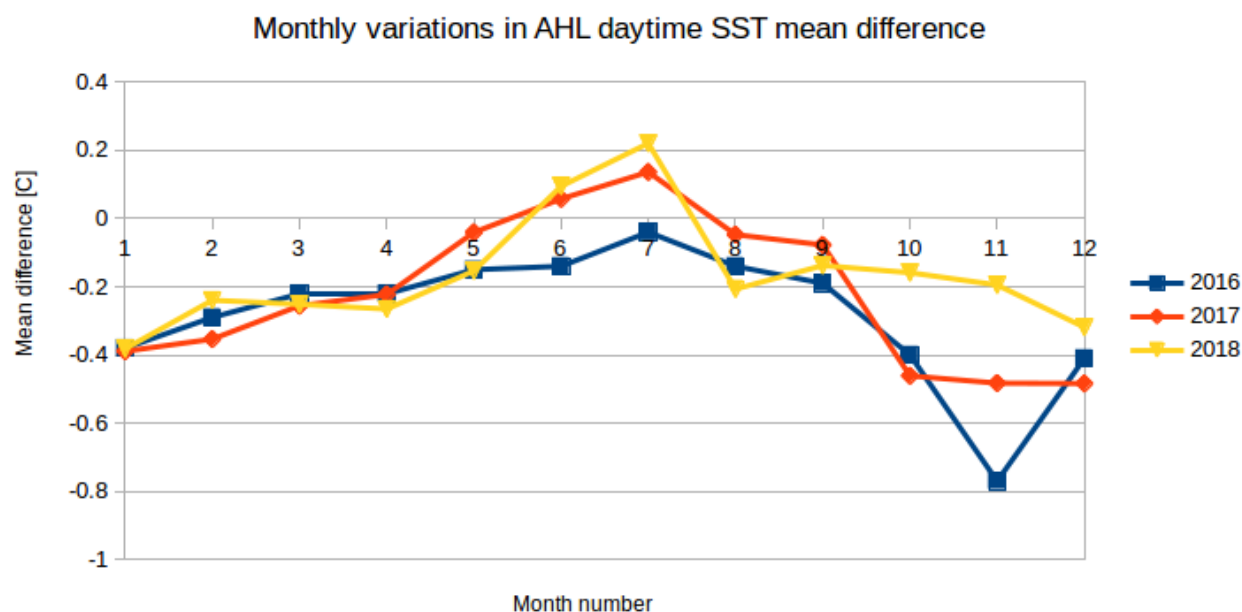


Figure 15: Monthly variations in mean difference for daytime (centred on 12:00) AHL SST product.

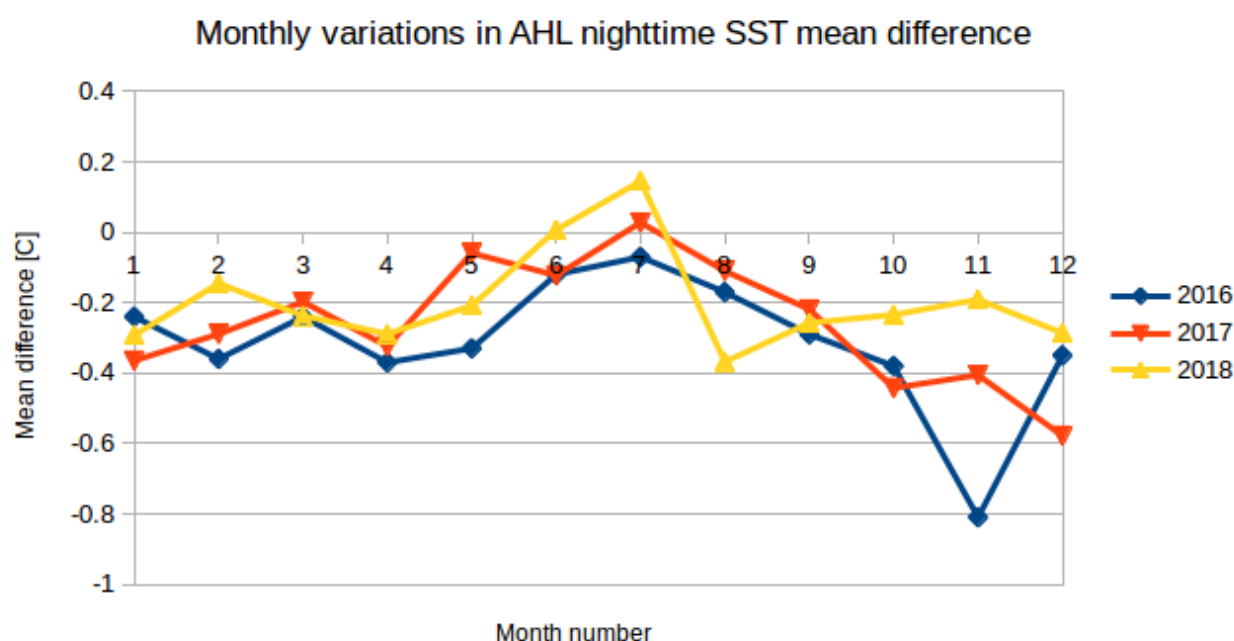
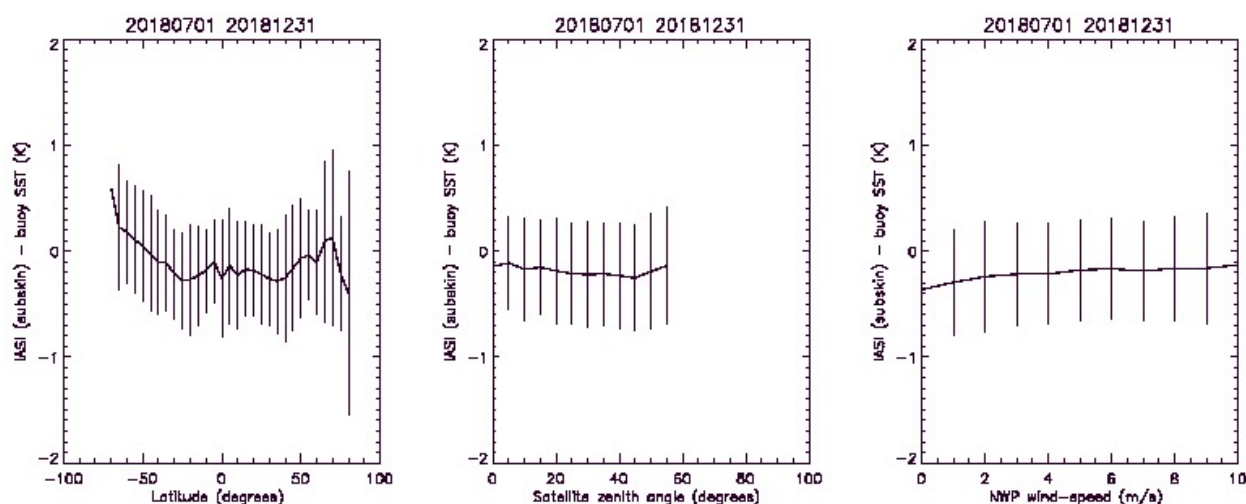


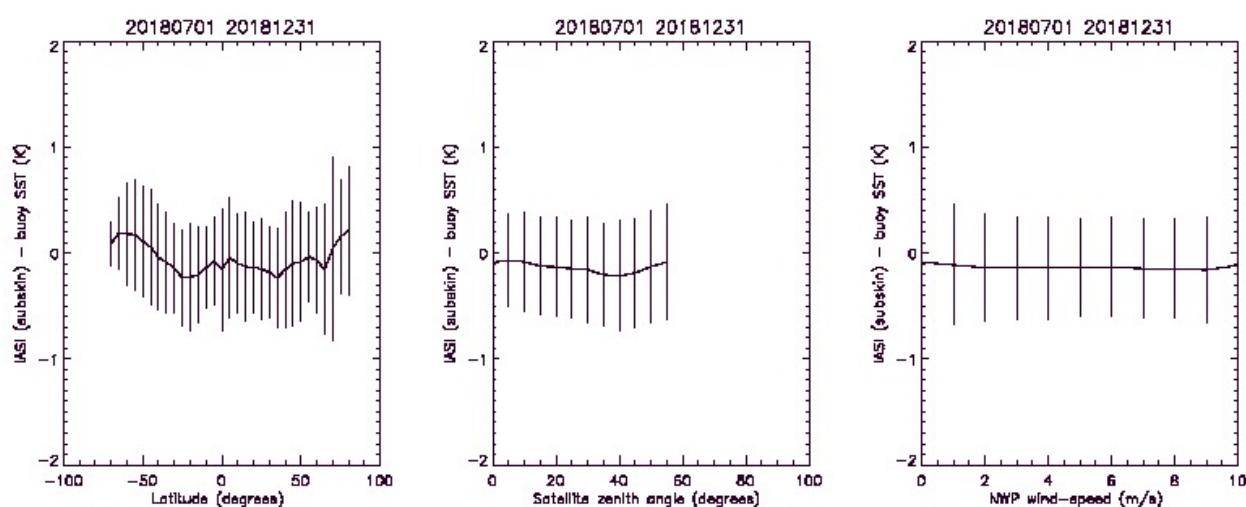
Figure 16: Monthly variations in mean difference for night-time (centred on 00:00) AHL SST product.

### 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 17: Mean Metop-B IASI night-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JUL. to DEC. 2018**



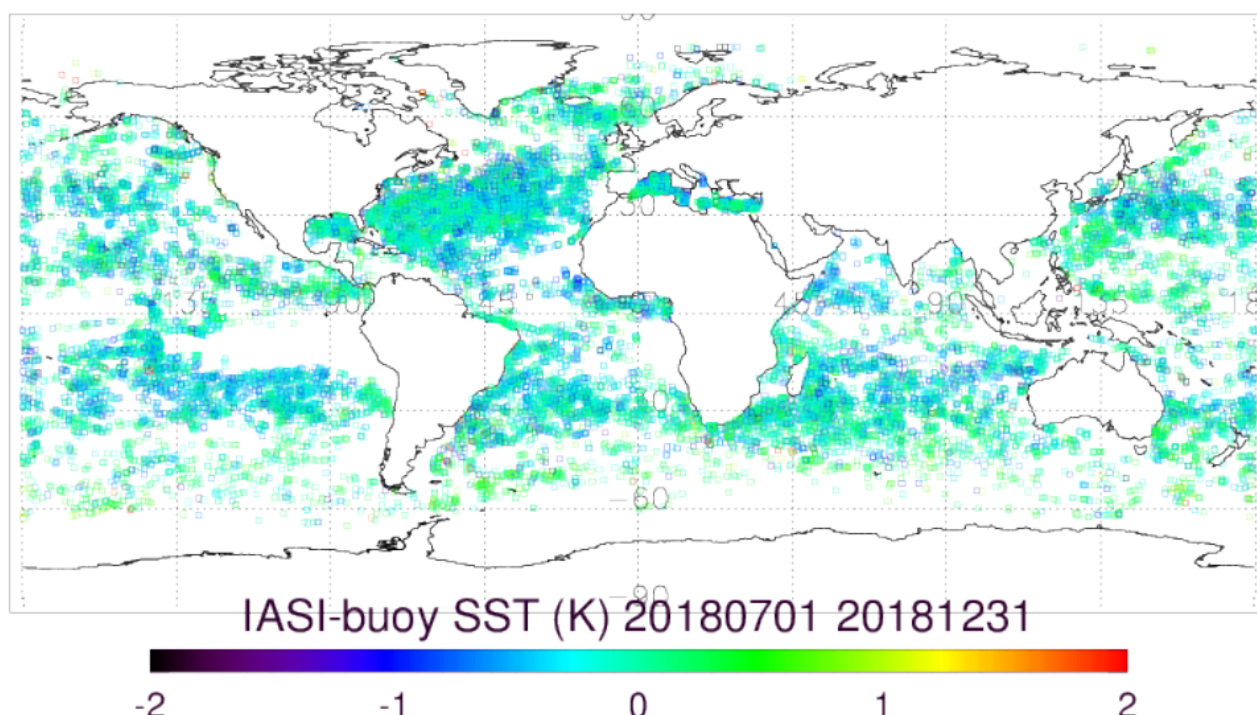
**Figure 18: Mean Metop-B IASI day-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JUL. to DEC. 2018**

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

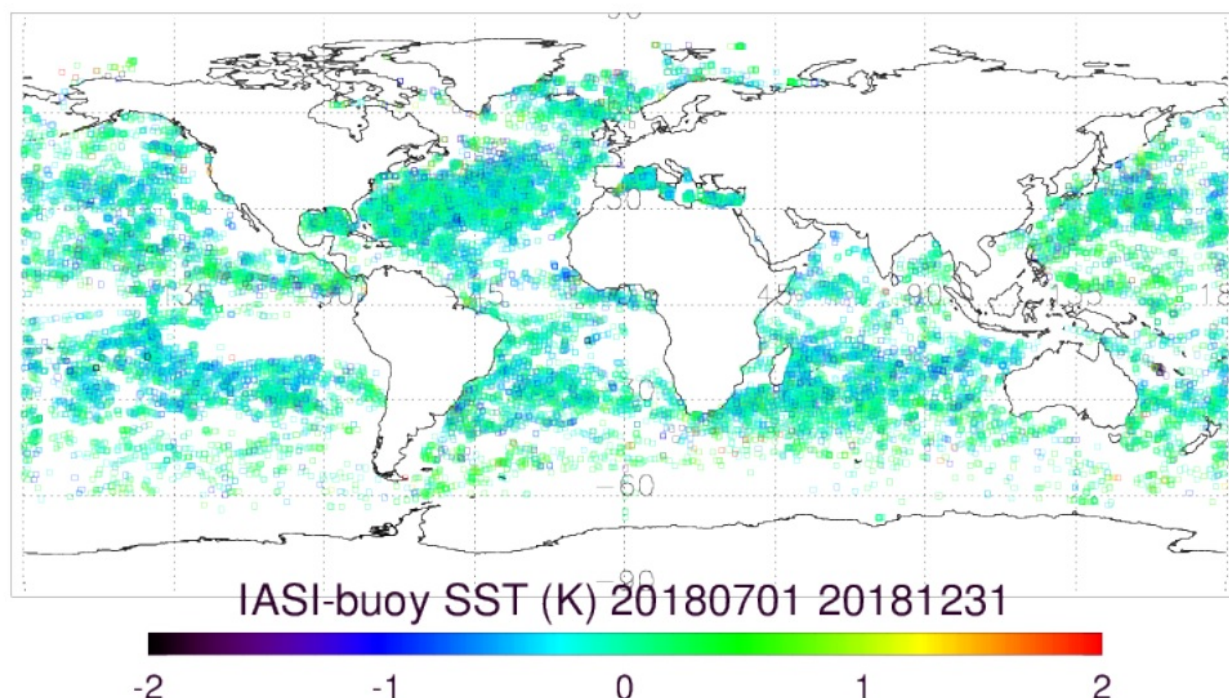
Global Metop-B IASI <u>night-time</u> SST quality results over 2nd half 2018					
Month	Number of cases	Mean diff. in K (req. : 0.5 K)	Mean diff. margin (*)	SD in K (req. : 0.8 K)	SD margin (**)
JUL. 2018	4225	-0.18	64	0.51	36
AUG. 2018	4540	-0.20	60	0.49	39
SEP. 2018	4529	-0.20	60	0.51	36
OCT. 2018	4562	-0.21	58	0.49	39
NOV. 2018	3694	-0.19	62	0.47	41
DEC. 2018	4193	-0.17	66	0.47	41
Global Metop-B IASI <u>day-time</u> SST quality results over 2nd half 2018					
JUL. 2018	4327	-0.14	72	0.53	34
AUG. 2018	4353	-0.14	72	0.50	38
SEP. 2018	4904	-0.16	68	0.50	38
OCT. 2018	4888	-0.15	70	0.48	40
NOV. 2018	4021	-0.11	78	0.47	41
DEC. 2018	4087	-0.10	80	0.46	43

(\*) Mean diff. margin =  $100 * (1 - (|\text{mean diff.} / \text{mean diff. req.}|))$   
(\*\*) SD margin =  $100 * (1 - (\text{SD} / \text{SD req.}))$   
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 global Metop-B IASI SST over 2nd half 2018, for Quality Levels 3, 4 and 5**



**Figure 19: Mean Metop-B IASI night-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JAN. 2018 to DEC. 2018**



**Figure 20: Mean Metop-B IASI day-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JAN. 2018 to DEC. 2018**

**Comments:**

All statistics are performing well and within the requirements. For the period 1<sup>st</sup> July to 31<sup>st</sup> December 2018, the global mean night-time IASI minus drifting buoy bias is -0.19K with standard deviation of 0.49K (n=25743), and for day-time the mean bias is -0.13K with standard deviation of 0.49K (n=26580).

## 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](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 year 2018								
Month	Number of cases	Mean DLI in Wm <sup>-2</sup>	Mean diff. in Wm <sup>-2</sup>	Mean diff. in % (req.: 5 %)	Mean diff. margin <sup>(*)</sup> in %	SD in Wm <sup>-2</sup>	SD in % (req. :10%)	SD margin <sup>(**)</sup> in %
JAN. 2018	5808	274.78	-6.77	-2.46	50.72	23.41	8.52	14.80
FEB. 2018	5316	268.16	-4.24	-1.58	68.38	18.04	6.73	32.73
MAR. 2018	5796	281.41	-3.90	-1.39	72.28	15.04	5.34	46.55
APR. 2018	5656	303.66	-2.05	-0.68	86.50	13.88	4.57	54.29
MAY 2018	4757	344.73	-0.60	-0.17	96.52	13.83	4.01	59.88
JUN. 2018	6344	361.66	-0.57	-0.16	96.85	14.37	3.97	60.27
JUL. 2018	5929	379.18	-0.35	-0.09	98.15	16.54	4.36	56.38
AUG. 2018	5897	374.49	-1.29	-0.34	93.11	16.58	4.43	55.73
SEP. 2018	5736	354.25	-1.90	-0.54	89.27	14.65	4.14	58.65
OCT. 2018	5918	321.07	-2.38	-0.74	85.17	13.93	4.34	56.61
NOV. 2018	4920	295.03	-4.63	-1.57	68.61	14.97	5.07	49.26
DEC. 2018	3599	283.82	-3.98	-1.40	71.95	19.14	6.74	32.56
<sup>(*)</sup> Mean diff. margin = 100 * (1 - ( mean diff. / mean diff. req. )) <sup>(**)</sup> 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: Geostationary DLI quality results over 2nd half 2018.**

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 year 2018								
Month	Number of cases	Mean DLI in Wm <sup>-2</sup>	Mean diff. in Wm <sup>-2</sup>	Mean diff. in % (req.: 5 %)	Mean diff. margin in % <sup>(*)</sup>	SD in Wm <sup>-2</sup>	SD in % (req.: 10 %)	SD margin <sup>(**)</sup> in %
JAN. 2018	2231	304.09	-12.50	-4.11	17.79	24.78	8.15	18.51
FEB. 2018	2014	258.32	-4.89	-1.89	62.14	19.79	7.66	23.39
MAR. 2018	2225	286.06	-6.20	-2.17	56.65	17.50	6.12	38.82
APR. 2018	2133	314.95	-1.64	-0.52	89.59	13.84	4.39	56.06
MAY 2018	1450	318.69	6.78	2.13	57.45	12.06	3.78	62.16
JUN. 2018	2098	346.98	2.24	0.65	87.09	13.14	3.79	62.13
JUL. 2018	2231	369.12	2.40	0.65	87.00	10.97	2.97	70.28
AUG. 2018	2178	360.98	2.65	0.73	85.32	12.82	3.55	64.49
SEP. 2018	2096	335.69	2.82	0.84	83.20	14.73	4.39	56.12
OCT. 2018	2208	321.98	-0.92	-0.29	94.29	17.07	5.30	46.98
NOV. 2018	1416	318.49	-4.92	-1.54	69.10	16.78	5.27	47.31
DEC. 2018	719	312.23	-13.08	-4.19	16.22	23.87	7.65	23.55
<sup>(*)</sup> Mean diff. margin = $100 * (1 - (  \text{mean diff.}   / \text{mean diff. req.} ))$ <sup>(**)</sup> SD margin = $100 * (1 - (SD / SD \text{ req.} ))$ 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: Meteosat Indian Ocean DLI quality results over 2nd half 2018.**

Comments:

Overall statistics are good and within the requirement.

### 5.2.1.3. *AHL DLI (OSI-301) quality*

The pyrgeometer stations used for quality assessment of the AHL DLI product are selected stations from Table 17. Specifically the following stations are currently used:

- Jan Mayen
- Bjørnøya
- Hopen
- Schleswig
- Hamburg-Fuhlsbuettel
- Sodankylä
- Jokionen
- Kiruna
- Svenska Högarna
- Visby

These stations are briefly described at <http://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 year 2018								
Month	Number of cases	Mean DLI in Wm <sup>-2</sup>	Mean diff. in Wm <sup>-2</sup>	Mean diff. in % (req.: 5 %)	Mean diff. margin in % <sup>(*)</sup>	SD in Wm <sup>-2</sup>	SD in % (req.: 10 %)	SD margin <sup>(**)</sup> in %
JAN. 2018	429	277.52	-8.20	3.01	39.8	17.97	6.56	34,4
FEB. 2018	386	257.62	-1.93	2.04	59.2	16.18	6.42	35,8
MAR. 2018	423	253.95	3.83	1.77	64.6	16.85	6.70	33
APR. 2018	387	286.62	1.57	4.37	12.6	16.52	5.83	41,7
MAY 2018	399	305.51	8.87	5.68	-13.6	15.99	5.28	47,2
JUN. 2018	375	323.22	7.58	5.79	-15.8	12.49	3.86	61,4
JUL. 2018	297	345.02	8.89	6.67	-33.4	12.65	3.65	63.5
AUG. 2018	286	338.66	8.84	5.59	-11.8	11.65	3.44	65.6
SEP. 2018	298	319.98	7.38	4.59	8.2	13.68	4.28	57.2
OCT. 2018	310	299.53	2.24	2.18	56.4	15.54	5.22	47.8
NOV. 2018	297	296.36	-6.20	2.37	52.6	13.77	4.69	53.1
DEC. 2018	295	288.62	-8.21	2.88	42.4	13.60	4.76	52.4
<sup>(*)</sup> Mean diff. margin = 100 * (1 - ( mean diff. / mean diff. req. )) <sup>(**)</sup> 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: AHL DLI quality results over JAN. 2018 to DEC. 2018.**

Comments:

Requirements for this period on bias are met in August and September. The deviation from the requirement is not very large and is caused primarily by an underestimation at Hamburg and Sodankylä and an overestimation at Hopen. The requirement on the standard deviation is met in all months.

### 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 over year 2018								
Month	Number of cases	Mean SSI in Wm <sup>-2</sup>	Mean diff. in Wm <sup>-2</sup>	Mean diff. in % (req.: 10 %)	Mean diff. margin <sup>(*)</sup> in %	SD in Wm <sup>-2</sup>	SD in % (req.: 30 %)	SD margin <sup>(**)</sup> in %
JAN. 2018	5096	301.09	1.38	0.46	95.42	69.60	23.12	22.95
FEB. 2018	5293	342.36	-6.24	-1.82	81.77	82.10	23.98	20.06
MAR. 2018	6712	374.06	6.34	1.69	83.05	82.25	21.99	26.71
APR. 2018	7177	428.24	11.98	2.80	72.03	89.65	20.93	30.22
MAY 2018	7249	453.90	-2.30	-0.51	94.93	83.85	18.47	38.42
JUN. 2018	8987	468.00	-3.66	-0.78	92.18	74.75	15.97	46.76
JUL. 2018	9018	489.54	-1.74	-0.36	96.45	72.47	14.80	50.65
AUG. 2018	8466	464.63	5.74	1.24	87.65	80.59	17.34	42.18
SEP. 2018	5649	431.25	-3.51	-0.81	91.86	61.80	14.33	52.23
OCT. 2018	6895	387.44	7.67	1.98	80.20	68.20	17.60	41.32
NOV. 2018	5606	337.39	3.70	1.10	89.03	68.14	20.20	32.68
DEC. 2018	4610	327.94	6.02	1.84	81.64	74.37	22.68	24.41
<sup>(*)</sup> Mean diff. margin = $100 * (1 - ( mean\ diff. / mean\ diff.\ req. ))$ <sup>(**)</sup> 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: Geostationary SSI quality results over 2nd half 2018.**

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 year 2018								
Month	Number of cases	Mean SSI in Wm <sup>-2</sup>	Mean diff. in Wm <sup>-2</sup>	Mean diff. in % (req. : 10 %)	Mean diff. margin <sup>(*)</sup> in %	SD in Wm <sup>-2</sup>	SD in % (req.: 30 %)	SD margin <sup>(**)</sup> in %
JAN. 2018	2872	258.93	8.81	3.40	65.98	57.59	22.24	25.86
FEB. 2018	3120	325.93	6.80	2.09	79.14	62.14	19.07	36.45
MAR. 2018	3991	344.85	3.92	1.14	88.63	66.24	19.21	35.97
APR. 2018	4404	421.10	7.32	1.74	82.62	62.80	14.91	50.29
MAY 2018	4394	464.26	-8.74	-1.88	81.17	72.21	15.55	48.15
JUN. 2018	5188	474.15	-6.15	-1.30	87.03	72.79	15.35	48.83
JUL. 2018	5316	501.11	-2.47	-0.49	95.07	65.70	13.11	56.30
AUG. 2018	4986	462.56	-3.86	-0.83	91.66	70.82	15.31	48.97
SEP. 2018	3659	462.42	-0.47	-0.10	98.98	61.80	13.36	55.45
OCT. 2018	3996	371.93	8.45	2.27	77.28	59.46	15.99	46.71
NOV. 2018	3141	344.37	13.51	3.92	60.77	66.05	19.18	36.07
DEC. 2018	2444	325.42	18.26	5.61	43.89	74.42	22.87	23.77
<sup>(*)</sup> Mean diff. margin = $100 * (1 - ( mean\ diff. / mean\ diff.\ req. ))$ <sup>(**)</sup> 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: Meteosat Indian Ocean SSI quality results over 2nd half 2018.**

Comments:

Overall statistics are good and within the requirement.

### 5.2.2.3. AHL SSI (OSI-302) quality

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

Station	Stld	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	In use
Fureneset	56420	61.30°N	5.05°E	SSI	In use
Tjøtta	76530	65.83°N	12.43°E	SSI	In use
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	Not used currently

Station	StId	Latitude	Longitude		Status
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	In use
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	Only DLI used so far.
Visby	02091	57.68°N	18.35°E	SSI, DLI	Only DLI used so far.
Svenska Högarna	02492	59.45°N	19.51°E	SSI, DLI	Only DLI used so far.

**Table 17: 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 selected stations from table 17. 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.

The following stations are currently used:

- Apelsvoll
- Landvik
- Særheim
- Fureneset
- Tjøtta
- Jan Mayen
- Bjørnøya

- Hopen
- Jokioinen

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](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 year 2018								
Month	Number of cases	Mean SSI in Wm <sup>-2</sup>	Mean diff. in Wm <sup>-2</sup>	Mean diff. in % (req.: 10%)	Mean diff. margin in % <sup>(*)</sup>	SD in Wm <sup>-2</sup>	SD in % (req.: 30 %)	SD margin <sup>(**)</sup> in %
JAN. 2018	429	9.74	-3.70	69.45	-594,5	10.93	91.90	-206,33
FEB. 2018	386	32.28	-13.20	38.13	-281,3	18.27	53.92	-79,73
MAR. 2018	423	89.95	-38.18	42.78	-327,8	30.61	34.61	-15,37
APR. 2018	387	149.79	-50.21	32.41	-224,1	36.18	24.65	17,83
MAY 2018	399	235.92	-52.77	21.65	-116,5	41.23	18.84	37,2
JUN. 2018	375	225.98	-52.66	23.08	-130,8	37.04	17.00	43,33
JUL. 2018	305	209.09	-37.04	17.08	-70,8	24.79	12.92	56,9
AUG. 2018	281	119.50	-22.92	19.74	-97,4	25.36	22.06	26,5
SEP. 2018	295	73.96	-15.67	20.46	-104,6	19.54	27.15	9,5
OCT. 2018	305	33.64	-8.41	24.42	-144,2	16.07	43.02	-43,4
NOV. 2018	295	8.27	-3.31	18.80	-88,0	10.42	74.59	-148,6
DEC. 2018	300	3.23	-	-	-	-	-	-
<sup>(*)</sup> Mean diff. margin = $100 * (1 - ( mean\ diff. / mean\ diff.\ req. ))$ <sup>(**)</sup> 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: AHL SSI quality results over JAN. 2018 to DEC. 2018**

**Comments:**

The requirement for this period on bias is not met. The reason for this is an overestimation of SSI on the southernmost stations implying that the atmospheric tuning factor should be modified. The standard deviation indicates that this is a consistent underestimation. Other factors may also affect this, but the immediate action is to tune the atmospheric factor. Whether this is related to the cloud factor or the clear sky factor is under investigation (using the full dataset for 2018). Looking at the Arctic stations alone, requirements are met on these, with a small overestimation at Hopen which is attributed to the mountains surrounding that station. For December too few of the validation stations had enough insolation to create good estimates.

## 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 originate 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.  $\pm 10\%$  and  $\pm 20\%$ . 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 19: 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-arktisk-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.

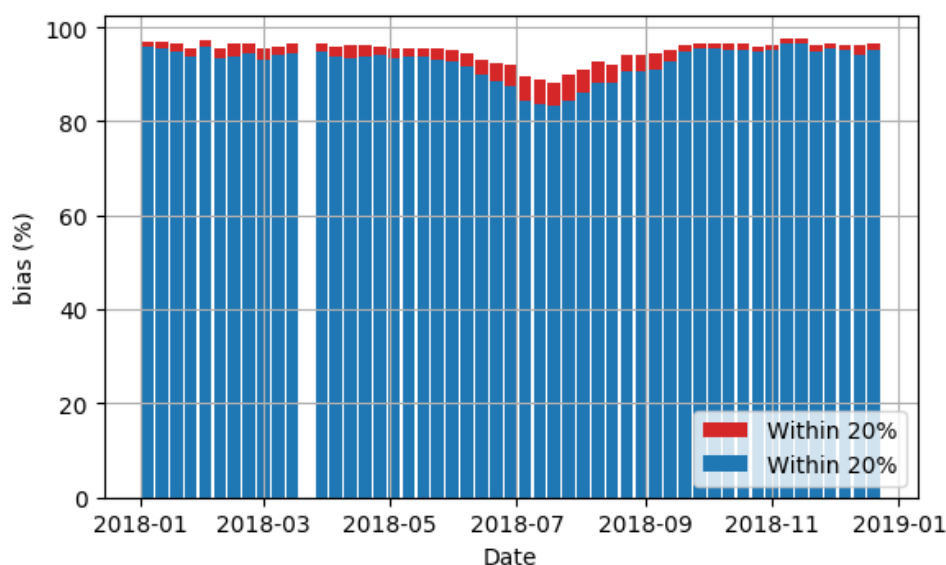


Figure 21: Comparison of ice concentrations from the Greenland overview charts made by DMI and the OSI SAF concentration product. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%.

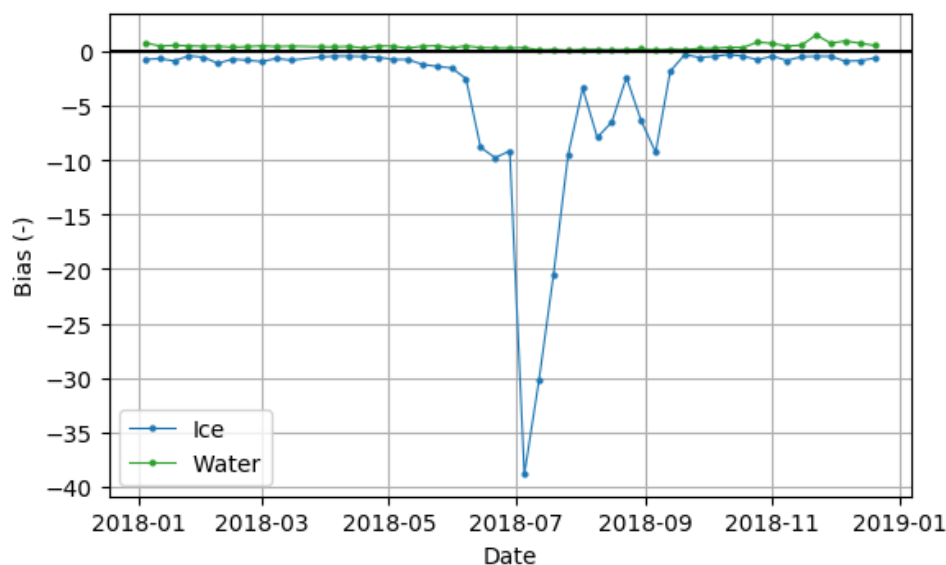
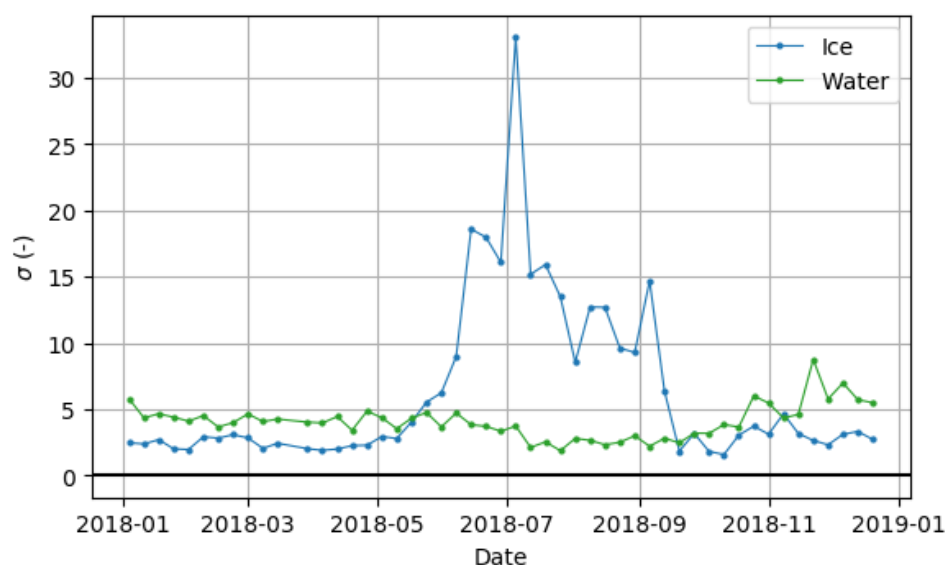
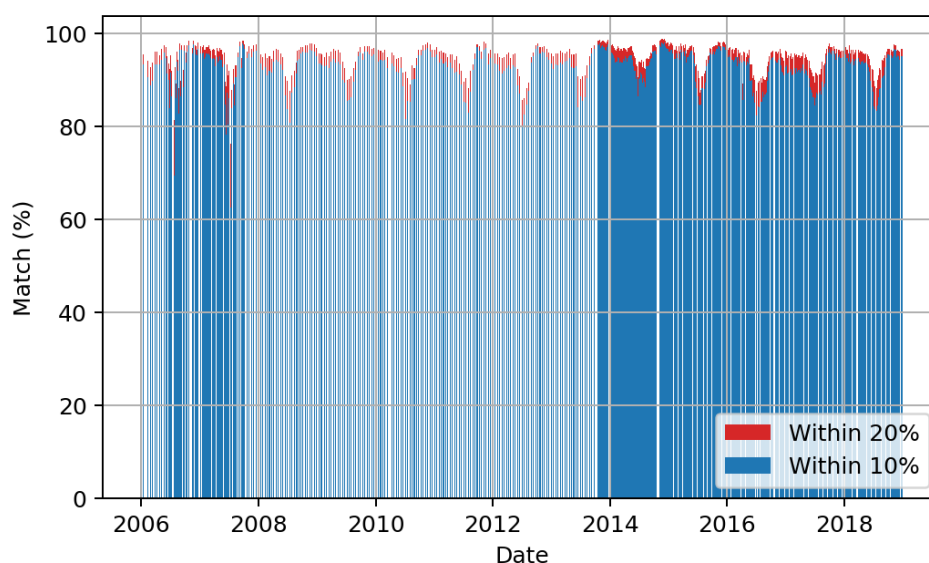


Figure 22: Difference between ice concentrations from the Greenland overview charts made by DMI and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Northern hemisphere.

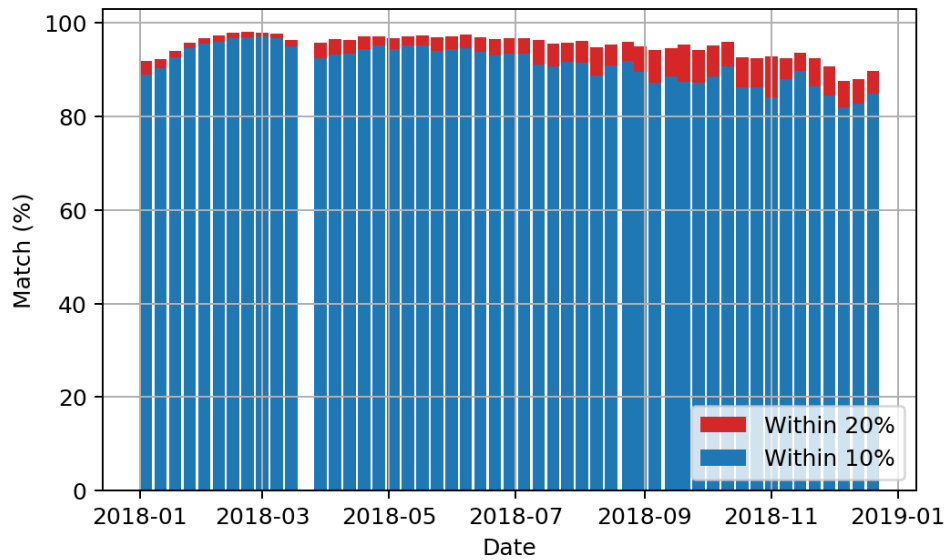




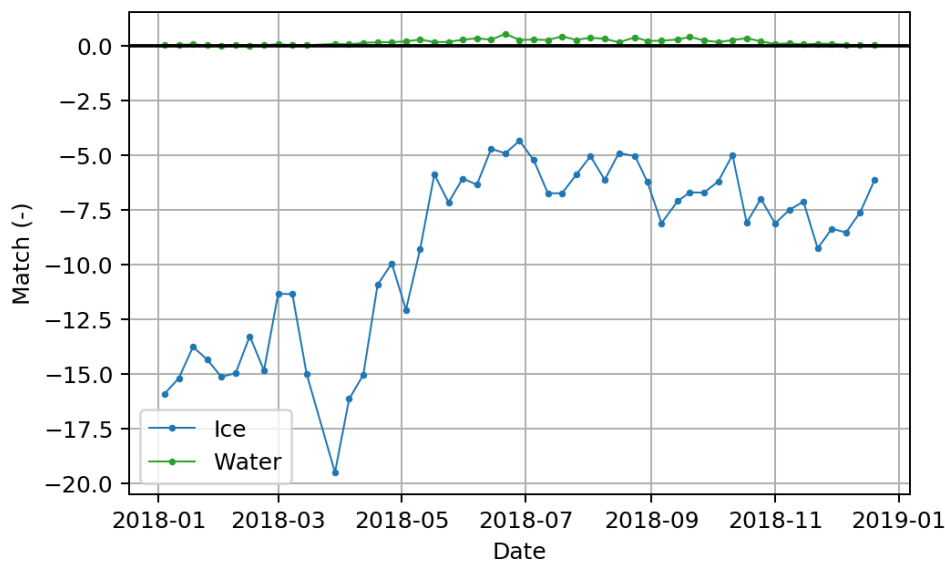
**Figure 23: Standard deviation of the difference in ice concentrations from the Greenland overview charts made by DMI and OSI SAF concentration product for two categories: water and ice. Northern hemisphere.**



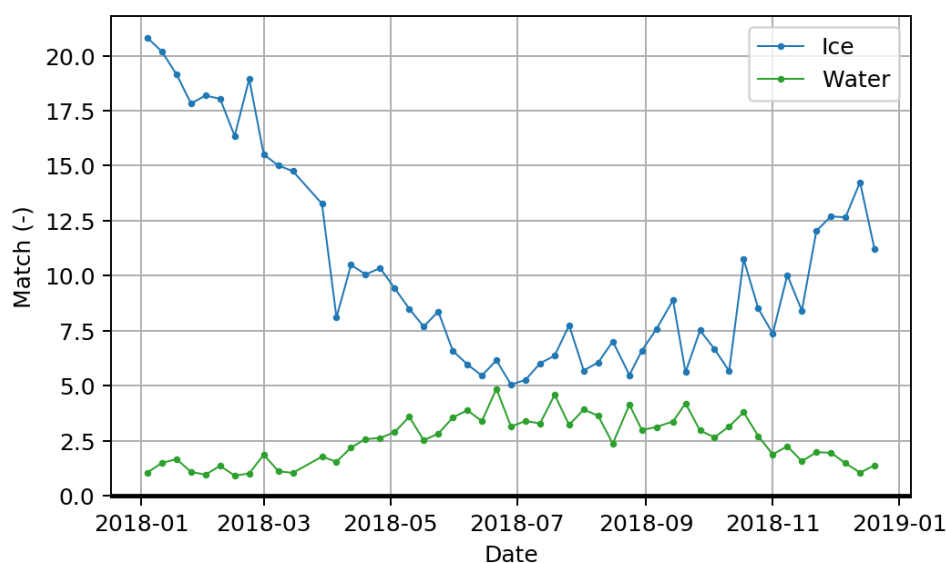
**Figure 24: Multiyear variability. Comparison between ice concentrations from the Greenland overview charts made by DMI and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Northern hemisphere.**



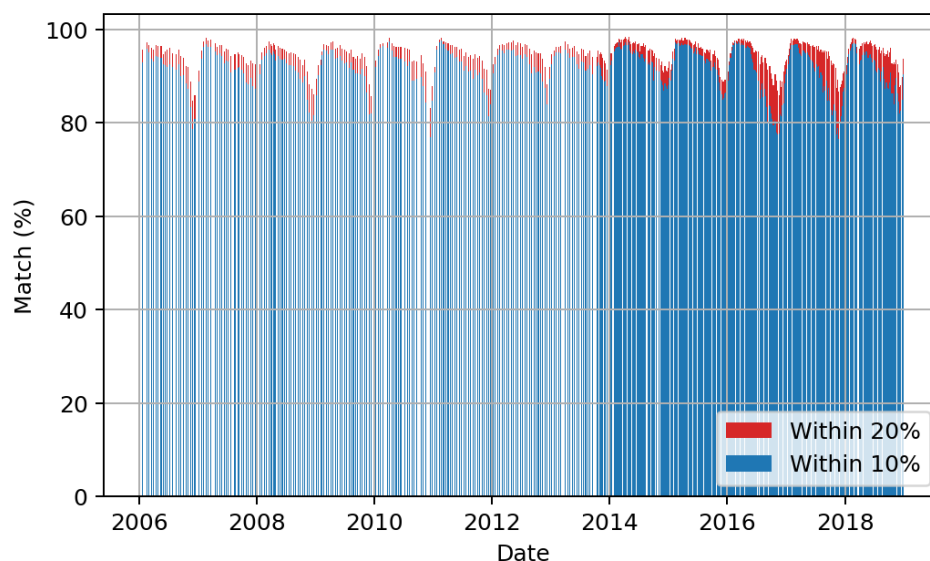
**Figure 25: Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/-10%, and likewise for +/-20%. Southern hemisphere.**



**Figure 26: 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 27: 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 28: Multiyear variability. Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Southern hemisphere.**

Concentration product					
Month	+/- 10% [%]	+/- 20% [%]	Mean difference [%]	SD [%]	Number of obs.
JAN. 2018	96.6	97.7	-1.5	6.1	283966
FEB. 2018	97.1	97.9	-1.3	6.1	292168
MAR. 2018	96.3	97.3	-1.6	6.8	303520
APR. 2018	96.5	97.6	-1.4	6.3	296816
MAY 2018	95.3	96.3	-1.7	7.1	352512
JUN. 2018	93.6	94.7	-2.3	8.2	462608
JUL. 2018	92.2	93.2	-3.3	11.1	530629
AUG. 2018	96.3	97.0	-1.3	6.4	591009
SEP. 2018	98.1	98.6	-0.7	4.5	495207
OCT. 2018	99.0	99.3	-0.4	2.8	582221
NOV. 2018	98.2	98.8	-0.6	3.6	484838
DEC. 2018	97.3	98.1	-1.0	4.6	342949

**Table 20: Monthly quality assessment results from comparing the OSI SAF sea ice concentration product to MET Norway ice service analysis for the Svalbard area. From JAN. 2018 to DEC. 2018. 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
JUL. 2018	74.12	25.88	0	0	0	0
AUG. 2018	79.27	20.73	0	0	0	0
SEP. 2018	84.09	15.91	0	0	0	0
OCT. 2018	81.68	18.32	0	0	0	0
NOV. 2018	78.75	21.25	0	0	0	0
DEC. 2018	76.37	23.63	0	0	0	0

**Table 21: Statistics for sea ice concentration confidence levels, Code 0-5, Northern Hemisphere.**

Month	Code=5	code=4	code=3	code=2	code=1	Unprocessed
JUL. 2018	70.71	29.29	0	0	0	0
AUG. 2018	65.75	34.25	0	0	0	0.02
SEP. 2018	66.97	33.03	0	0	0	0.03
OCT. 2018	68.93	31.07	0	0	0	0.03
NOV. 2018	67.88	32.12	0	0	0	0.02
DEC. 2018	78.26	21.74	0	0	0	0

**Table 22: Statistics for sea ice concentration confidence levels, Code 0-5, Southern Hemisphere.**

#### Comments:

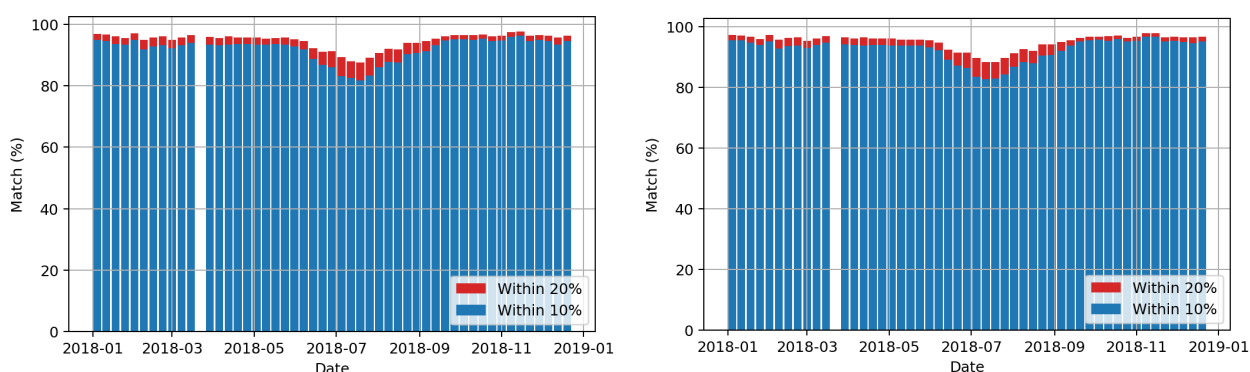
Figure 23 and Figure 27 provide the essential information on the compliance of the sea ice concentration product accuracy, showing the std. dev. of the difference in ice concentration between the OSI SAF product and the DMI ice analysis for NH and the NIC ice analysis for SH, respectively. Tables of statistics for confidence levels show that both the NH and SH product quality is good and rather stable.

Average yearly std. dev. for the period Jul. 2018 – Dec. 2018 can be seen in table just below. The average yearly std. dev. is below 10% and 15% for the NH and SH hemisphere products, respectively, and thus fulfill the service specifications.

	Average yearly std. dev. ice	Average yearly std. dev. water
Northern hemisphere	6.26	4.06
Southern hemisphere	10.33	2.53

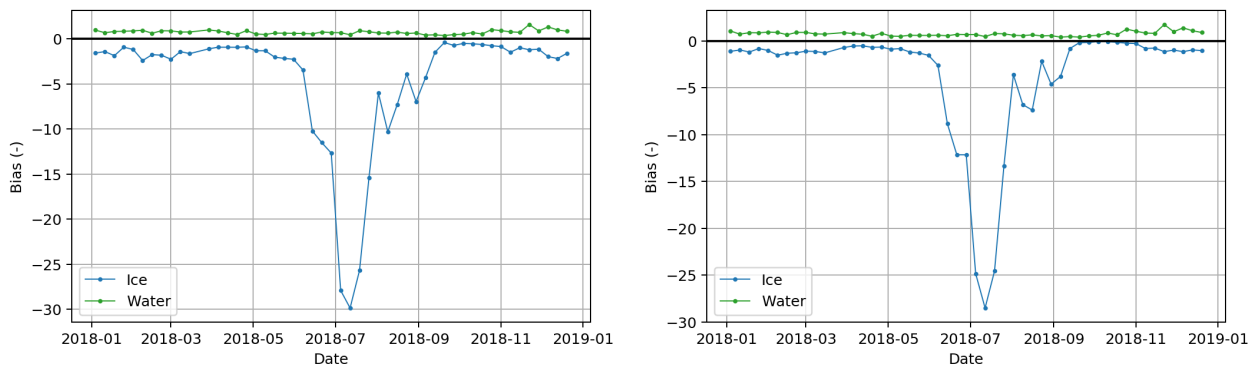
### 5.3.2. Global sea ice concentration (OSI-408) quality

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.

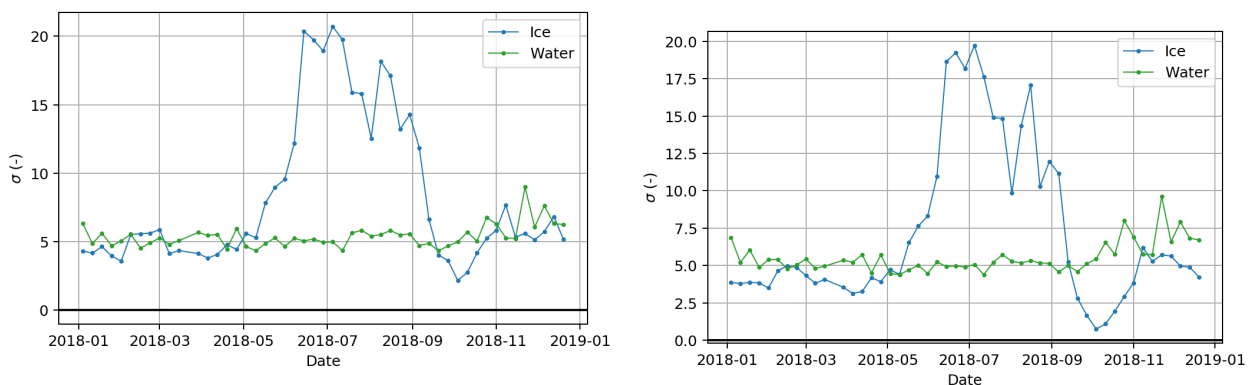


**Figure 29: Comparison of ice concentrations from the Greenland overview charts made by DMI and the OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%**

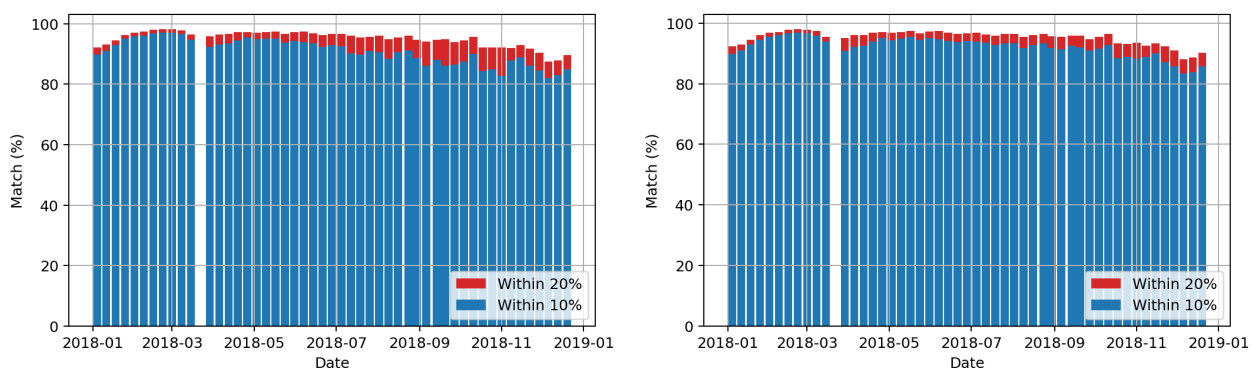




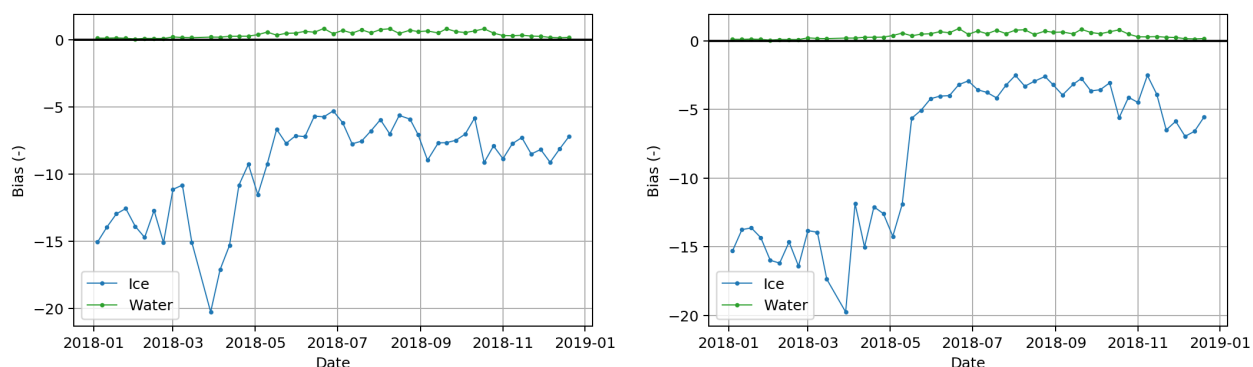
**Figure 30: Difference between ice concentrations from the Greenland overview charts made by DMI and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern Hemisphere**



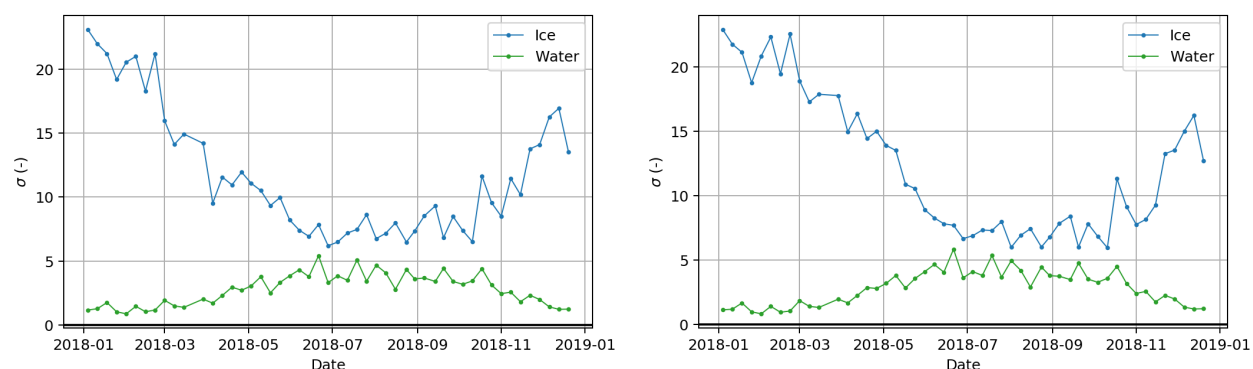
**Figure 31: Standard deviation of the difference in ice concentrations from the Greenland overview charts made by DMI and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern hemisphere.**



**Figure 32: 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 33: 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 34: 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:

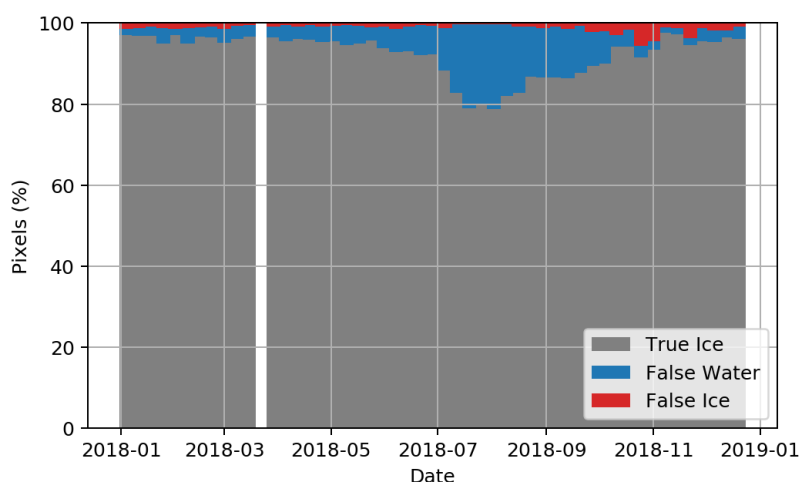
Figure 31 and Figure 34 provide the essential information on the compliance of the sea ice concentration product accuracy, showing the std. dev. of the difference in ice concentration between the OSI SAF product and the DMI ice analysis for NH and NIC ice analysis for SH, respectively.

Average yearly std. dev. for the period can be seen in table just below. On average the standard deviation is within target accuracy of 10% and 15% for the NH and SH hemisphere products, respectively.

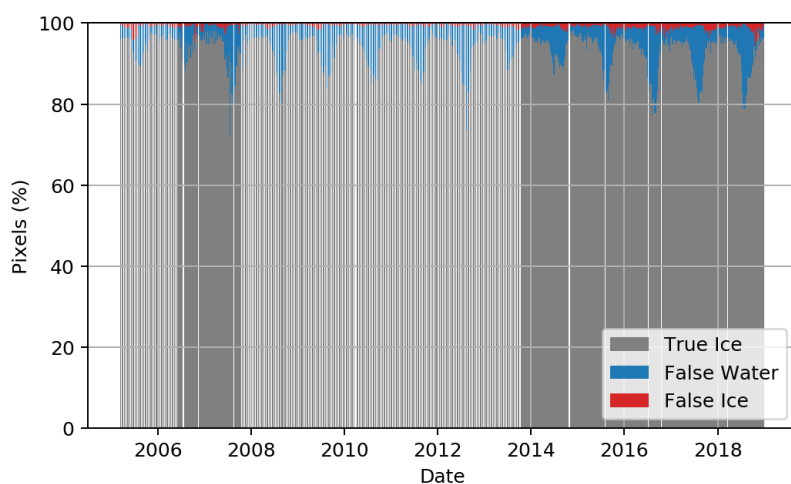
	Average yearly std. dev. ice	Average yearly std. dev. water
OSHD algorithm NH	8.33	5,39
TUD algorithm NH	7.22	5.52
OSHD algorithm SH	11.71	2.78
TUD algorithm SH	12.25	2.87

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

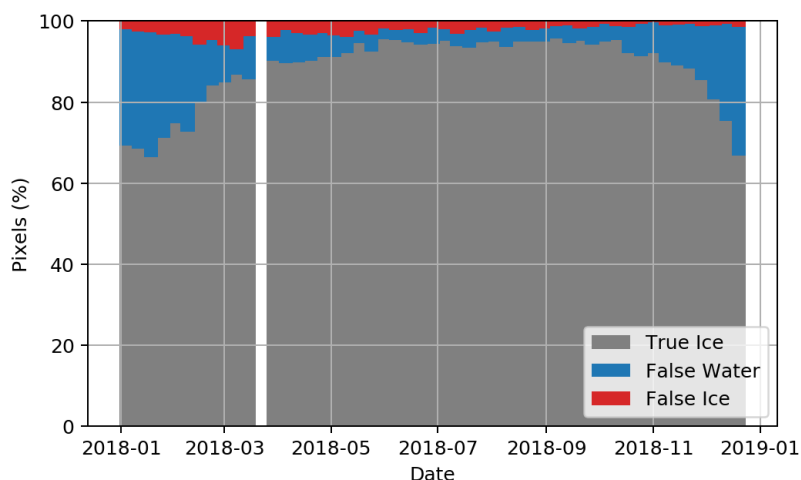
The OSI SAF sea ice edge product is validated against navigational ice charts, as explained under the previous section on ice concentration.



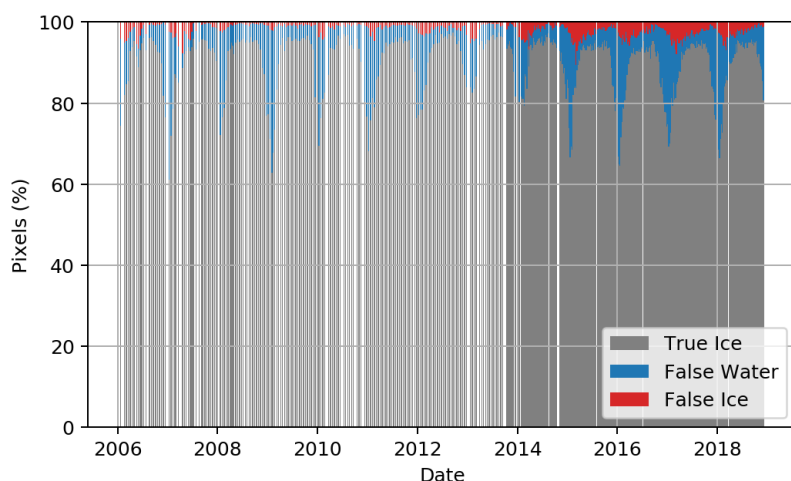
**Figure 35: Comparison between the Greenland overview charts made by DMI and the OSI SAF sea ice edge product. Northern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the DMI ice analysis indicated ice and vice versa for the 'False Ice' category.**



**Figure 36: 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 37: 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 38: Multiyear variability. Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'False Water' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'False Ice' category.**

Month	Correct [%]	SAF lower [%]	SAF higher [%]	Mean edge diff [km]	Number of obs.
JAN. 2018	97.82	1.02	1.16	10.43	511057
FEB. 2018	97.76	0.80	1.45	9.23	495197
MAR. 2018	98.09	1.10	0.81	10.44	594587
APR. 2018	98.31	1.08	0.61	11.54	613606
MAY 2018	97.80	1.04	1.17	13.09	619844
JUN. 2018	97.77	1.43	0.80	23.59	699951
JUL. 2018	94.85	4.96	0.19	33.00	704245
AUG. 2018	98.32	1.24	0.44	27.93	717898
SEP. 2018	99.19	0.33	0.48	20.69	600476
OCT. 2018	99.29	0.17	0.54	9.86	739303
NOV. 2018	98.73	0.69	0.58	12.48	650385
DEC. 2018	98.19	0.77	1.04	12.94	554406

**Table 23: Monthly quality assessment results from comparing OSI SAF sea ice products to MET Norway ice service analysis for the Svalbard area, from JAN. 2018 to DEC. 2018. 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.
JAN. 2018	97.33	2.31	0.36	47.40	460895
FEB. 2018	98.89	0.84	0.26	19.24	369104
MAR. 2018	99.09	0.65	0.26	21.68	369416
APR. 2018	98.95	0.61	0.44	18.34	276573
MAY 2018	-	-	-	-	-
JUN. 2018	-	-	-	-	-
JUL. 2018	-	-	-	-	-
AUG. 2018	-	-	-	-	-
SEP. 2018	98.83	0.46	0.71	15.94	92043
OCT. 2018	98.48	1.28	0.24	28.32	460215
NOV. 2018	97.88	1.85	0.27	32.40	368172
DEC. 2018	90.76	9.96	0.28	69.30	368248

**Table 24: Monthly quality assessment results from comparing OSI SAF sea ice products to MET Norway ice service analysis for the Weddell Sea area, from JAN. 2018 to DEC. 2018. 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
JUL. 2018	84.90	1.54	5.79	6.09	1.68	51.47
AUG. 2018	90.21	1.47	3.84	3.59	0.89	51.33
SEP. 2018	92.22	1.63	3.16	2.48	0.51	51.65
OCT. 2018	93.29	1.27	2.94	1.97	0.52	52.41
NOV. 2018	86.69	1.85	7.95	2.90	0.61	53.15
DEC. 2018	80.52	3.40	12.06	3.41	0.62	53.72

**Table 25: Statistics for sea ice edge confidence levels, Code 0-5, Northern Hemisphere.**



Month	Code=5	code=4	code=3	code=2	code=1	Unprocessed
JUL. 2018	73.09	7.85	11.94	6.23	0.89	22.41
AUG. 2018	68.55	8.26	15.24	6.85	1.10	22.44
SEP. 2018	66.05	7.03	17.53	8.24	1.16	22.41
OCT. 2018	72.20	9.45	9.78	7.17	1.41	22.41
NOV. 2018	72.25	5.42	11.51	8.57	2.24	22.41
DEC. 2018	82.96	1.73	5.79	6.33	3.19	22.41

**Table 26: Statistics for sea ice edge confidence levels, Code 0-5, Southern Hemisphere.**

**Comments:**

In Table 23 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 12 months is 16.3 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 summer months of June to September, when melting of snow and ice makes the product quality worse.

Validation for the ice edge product for Southern Hemisphere compared with the National Ice Center ice charts is shown in Figures 37 and 38 and shows no differences for 2018 relative to previous years.

In Table 24, the Southern Hemisphere OSI SAF ice edge product is compared with weekly navigational ice charts from the Weddell Sea region (MET Norway ice service). The 2018 yearly averaged edge difference is 31.6 km for the 8 months where Weddell Sea ice charts are available 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 summer months of January and 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 100.000km<sup>2</sup> to meet the target accuracy requirement.

Month	SD wrt running mean [km <sup>2</sup> ]	Mean MYI coverage [km <sup>2</sup> ]
JAN. 2018	66193	1775249
FEB. 2018	122466	1434066
MAR. 2018	57414	1804740
APR. 2018	46046	1297505
MAY 2018	63696	1094630
JUN. 2018	-	-
JUL. 2018	-	-
AUG. 2018	-	-
SEP. 2018	-	-
OCT. 2018	73744	2632062
NOV. 2018	34490	2311415
DEC. 2018	42689	1995398

**Table 27: 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
JUL. 2018	83.50	0.37	0.35	15.52	0.26	51.47
AUG. 2018	88.59	0.28	0.26	10.71	0.16	51.33
SEP. 2018	90.08	0.18	0.19	9.46	0.08	51.65
OCT. 2018	98.22	0.54	0.72	0.44	0.08	52.41
NOV. 2018	97.12	0.55	1.79	0.43	0.11	53.15
DEC. 2018	94.19	0.70	4.42	0.57	0.12	53.72

**Table 28: Statistics for sea ice type confidence levels, Northern Hemisphere.**

Month	Code=5	code=4	code=3	code=2	code=1	Unprocessed
JUL. 2018	69.82	0.21	0.31	29.54	0.12	22.41
AUG. 2018	66.21	0.24	0.34	33.06	0.14	22.44
SEP. 2018	65.07	0.24	0.36	34.19	0.14	22.41
OCT. 2018	65.67	0.25	0.40	33.49	0.18	22.41
NOV. 2018	70.92	0.39	0.53	27.87	0.29	22.41
DEC. 2018	82.81	0.54	0.63	15.51	0.51	22.41

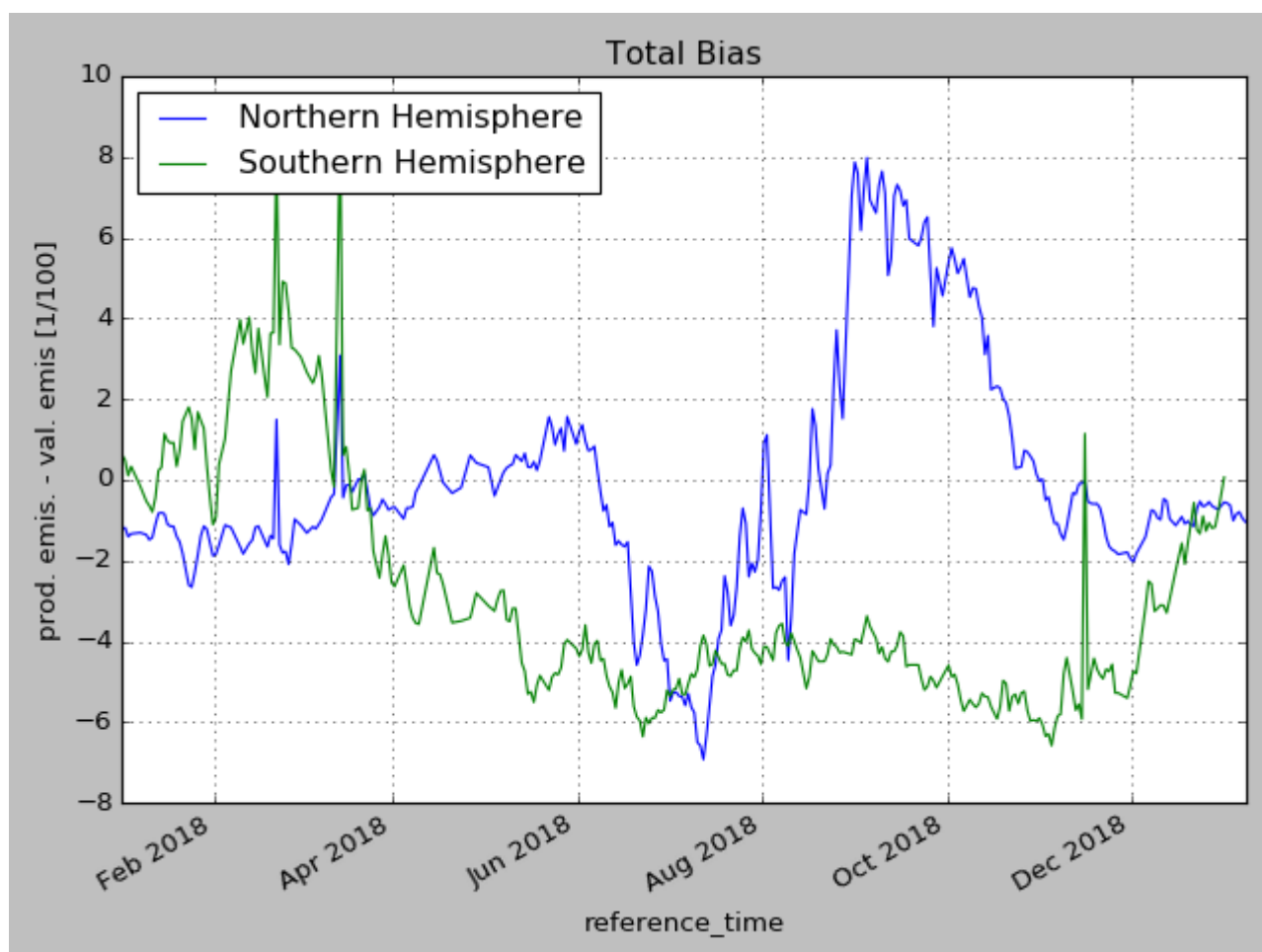
**Table 29: Statistics for sea ice type confidence levels, Southern Hemisphere.**

**Comments:**

In Table 27, the mid-column represents the monthly standard deviations of the daily MYI coverage variability. All months, except February, have values well below the requirement of 100.000 km<sup>2</sup>. The higher value for February was discussed in previous half-yearly report.

### 5.3.5. Sea ice emissivity (OSI-404) quality

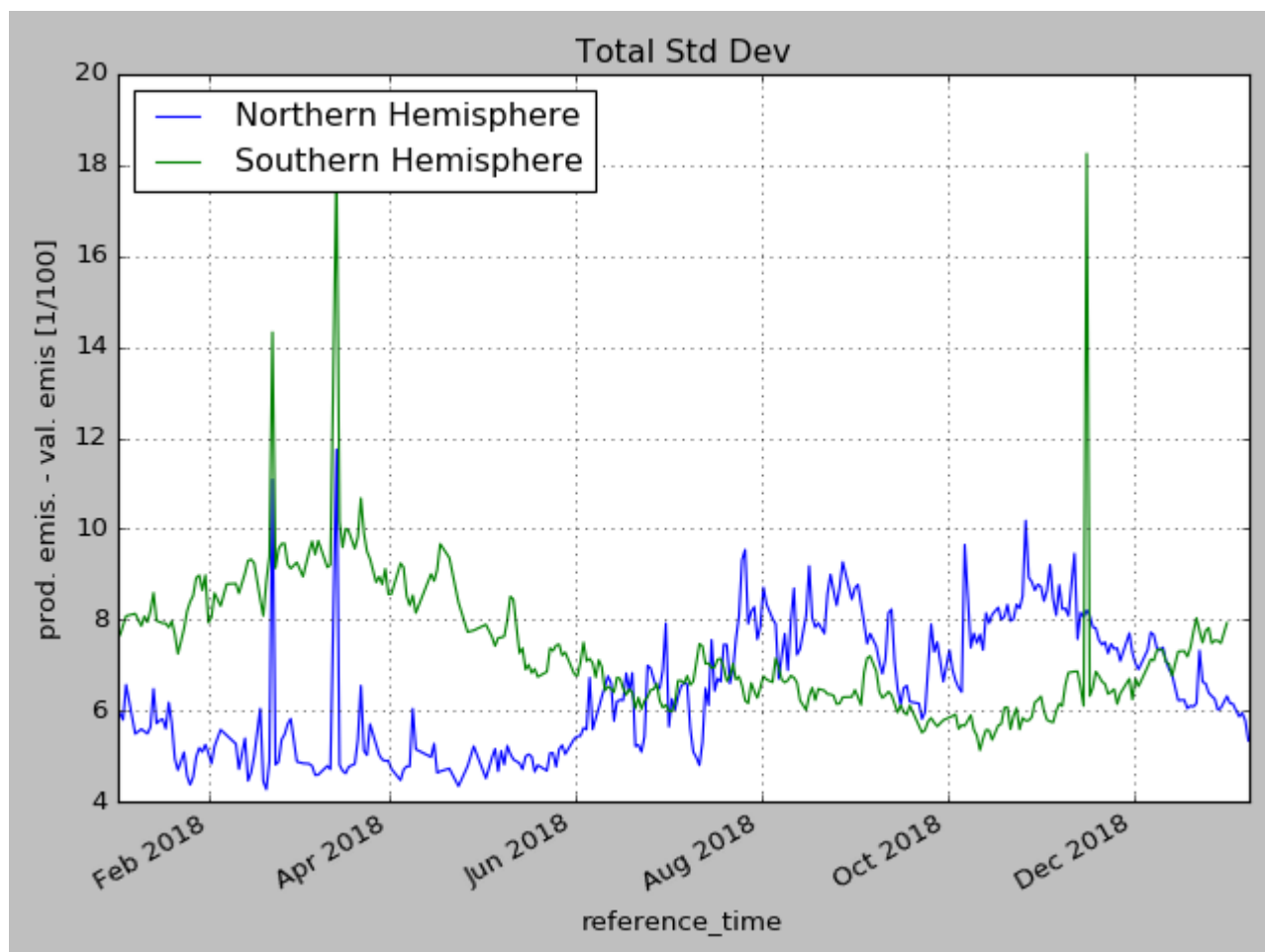
The near 50 GHz sea ice emissivity product is compared to the 50.3 GHz and 52.8 GHz vertical polarized surface emissivity (which is the same at these two frequencies) at an incidence angle at 50 degrees. The product emissivity covers all incidence angles from nadir to 60 degrees but the validation product 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 from Jan. 2018 to Apr. 2018 giving a positive bias, and the product emissivity is smaller than the validation emissivity from Apr. 2018 to Dec. 2018 giving a negative bias. The northern hemisphere has a bias near zero but with some negative deviations in July and positive deviations in September. The mean annual difference on the northern hemisphere is -0.00184 and on the southern hemisphere it is 0.0290. There is no clear seasonal cycle neither on the northern nor southern hemisphere.



**Figure 39: 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)**

Comments:

The total emissivity STD has a seasonal cycle on both the NH and the SH where the STD is doubled during melt compared to cold conditions. The SH STD is in between about 0.05 and 0.10 and the NH STD is between about 0.45 and 0.9.



**Figure 40: The standard deviation of the difference between the OSI SAF operational product and the validation product for the northern and southern hemispheres. The y-axis unit is in hundreds (1/100)**

Comments:

The emissivity mean difference and the emissivity STD are summarized in Table 30 and compared to target and threshold accuracies. The emissivity product is well within the threshold accuracy.

	Mean difference	SD	Target accuracy	Threshold accuracy
NH	-0.0018	0.065	0.05	0.15
SH	-0.029	0.073	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 this report. 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 challenged 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.

#### Quality assessment statistics

In the following tables, quality assessment statistics for the Northern Hemisphere (NH) 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  $\sigma()$  the standard deviation of the  $\varepsilon(X) = X_{\text{prod}} - X_{\text{ref}}$ . Columns  $\alpha$ ,  $\beta$  and  $\rho$  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.



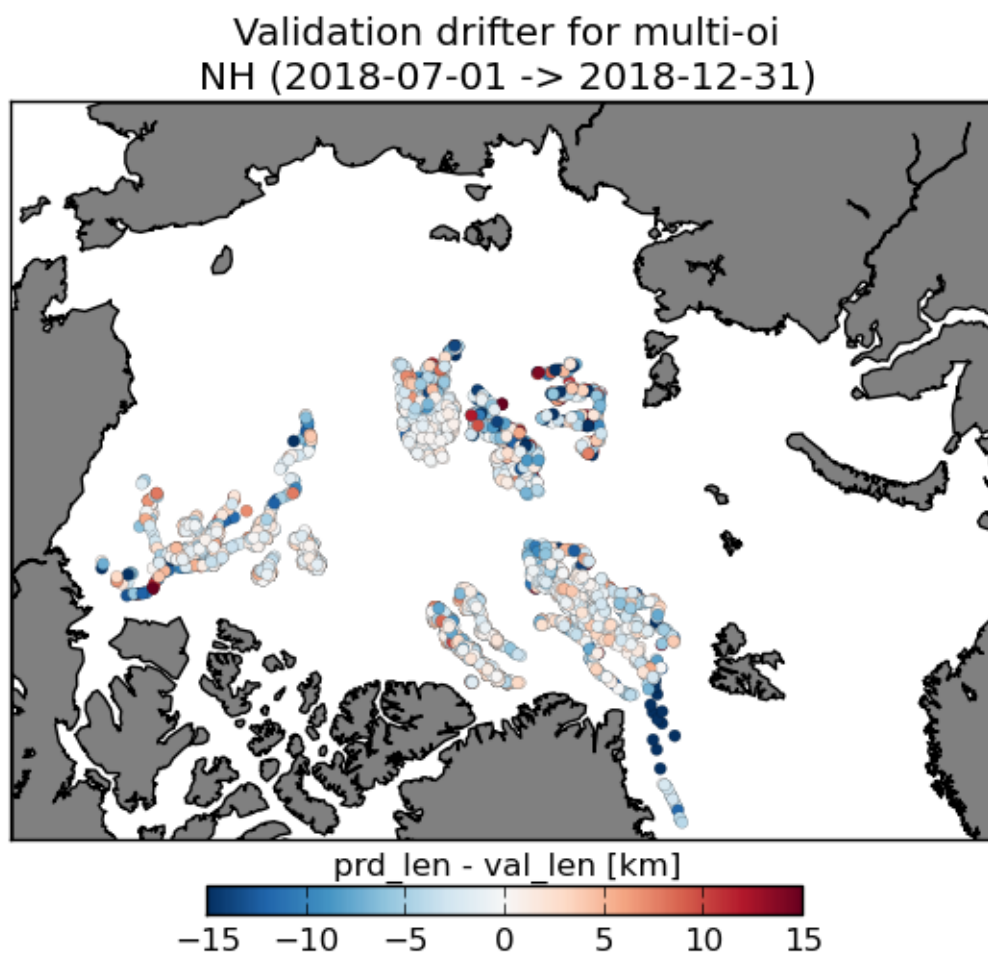


Figure 41: Location of GPS drifters for the quality assessment period (JUL. 2018 to DEC. 2018). The shade of each symbol represents the mean difference (prod-ref) in drift length (km over 2 days) for the multi-oi product.

Month	b(X) [km]	b(Y) [km]	$\sigma(X)$ [km]	$\sigma(Y)$ [km]	$\alpha$	$\beta$ [km]	$\rho$	N
JAN. 2018	-0,38	0,14	2,39	2,07	0,97	0,14	0,98	258
FEB. 2018	0,24	0,24	1,75	1,71	0,98	0,29	0,99	219
MAR. 2018	-0,32	-0,05	2,34	2,1	0,94	0,42	0,98	251
APR. 2018	0,2	-0,15	1,71	1,83	0,98	0,08	0,98	231
MAY 2018	1,06	-1,38	3,72	2,44	0,96	-0,34	0,94	26
JUN. 2018	-0,58	-1,27	4,09	4,23	0,9	-0,71	0,93	140
JUL. 2018	0,17	0,46	5,43	6,18	0,87	0,56	0,89	222
AUG. 2018	0,87	0,07	5,26	5,54	0,84	0,5	0,92	294
SEP. 2018	0,24	-0,26	6,66	4,87	0,84	0,55	0,89	487
OCT. 2018	-0,44	-0,37	5,83	4,54	0,84	0,4	0,89	894
NOV. 2018	-0,2	-0,21	4,44	4,88	0,86	0,3	0,91	919
DEC. 2018	-0,4	-0,07	4,4	5,83	0,88	0,27	0,92	890
Last 12 months	-0.138	-0.159	5.256	5.184	0.86	0.381	0.91	3706

**Table 30: Quality assessment results for the LRSID (multi-oi) product (NH) for JAN. 2018 to DEC. 2018.**

Month	b(X) [km]	b(Y) [km]	$\sigma(X)$ [km]	$\sigma(Y)$ [km]	$\alpha$	$\beta$ [km]	$\rho$	N
JAN. 2018	0,28	-0,47	4,7	4,83	0,91	0,06	0,93	295
FEB. 2018	-0,54	-0,08	3,42	3,62	0,96	-0,03	0,96	218
MAR. 2018	0,33	0,22	3,5	3	0,97	0,34	0,96	215
APR. 2018	-0,37	-0,23	3,69	3,53	0,93	0,34	0,95	243
MAY 2018	0,53	-0,3	3,29	3,37	1,02	0,05	0,93	215
JUN. 2018	--	--	--	--	--	--	--	0
JUL. 2018	--	--	--	--	--	--	--	0
AUG. 2018	--	--	--	--	--	--	--	0
SEP. 2018	--	--	--	--	--	--	--	0
OCT. 2018	-0,2	-0,82	7,42	5,95	0,84	0,25	0,81	656
NOV. 2018	0,05	0,02	5,58	4,92	0,88	0,43	0,89	855
DEC. 2018	-0,29	0,19	5,36	4,75	0,91	0,03	0,91	427
Last 12 months	-0.108	-0.227	6.216	5.270	0.88	0.237	0.87	1938

**Table 31: Quality assessment results for the LRSID (SSMIS-F17) product (NH) for JAN. 2018 to DEC. 2018.**

#### Comments:

The statistics reported here for H2 2018 show a slightly worse validation than the nominal. Especially, the observed bias  $b(X)$  and  $b(Y)$  are more negative than usual. In H2 2018, the larger biases seem related to an over-representation of buoy trajectories reaching Fram Strait and drifting along the East Greenland coast (see Figure 78). The Fram Strait is known as a challenging region for OSI-405 because of the strong variations of sea-ice motion (both in time and space). By running the H2 2018 validation and excluding Fram Strait positions, the biases are reduced to  $b(X) = -0.086$  km and  $b(Y) = -0.048$  km for multi-oi over the JAN-DEC 2018 period (to be compared with "last 12 months" row in Table 32). Discarding the Fram Strait validation records also has an impact on the yearly std values, yielding  $s(X)=5.221$  km and  $s(Y)=4.907$  km, thus close to target requirements for the product (5km yearly stddev).

### **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  $\pm 60$  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.

**Medium resolution sea ice drift validation results are not yet available. This section will be updated in a next version of this report.**

#### **Quality assessment statistics**

The table below shows 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 ( $\alpha$ ) and correlation coefficient (r). N, indicate the number of data pairs that are applied in the mean difference statistics.

Month	$b(X)$ [m]	$b(Y)$ [m]	$\sigma(X)$ [m]	$\sigma(Y)$ [m]	$\alpha$	$\beta$ [m]	$\rho$	N
JAN. 2018								
FEB. 2018								
MAR. 2018								
APR. 2018								
MAY 2018								
JUN. 2018								
JUL. 2018								
AUG. 2018								
SEP. 2018								
OCT. 2018								
NOV. 2018								
DEC. 2018								
Last 12 months								

**Table 32: MR sea ice drift product (OSI-407) performance, JAN. 2018 to DEC. 2018**

Comments:

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

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

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

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

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

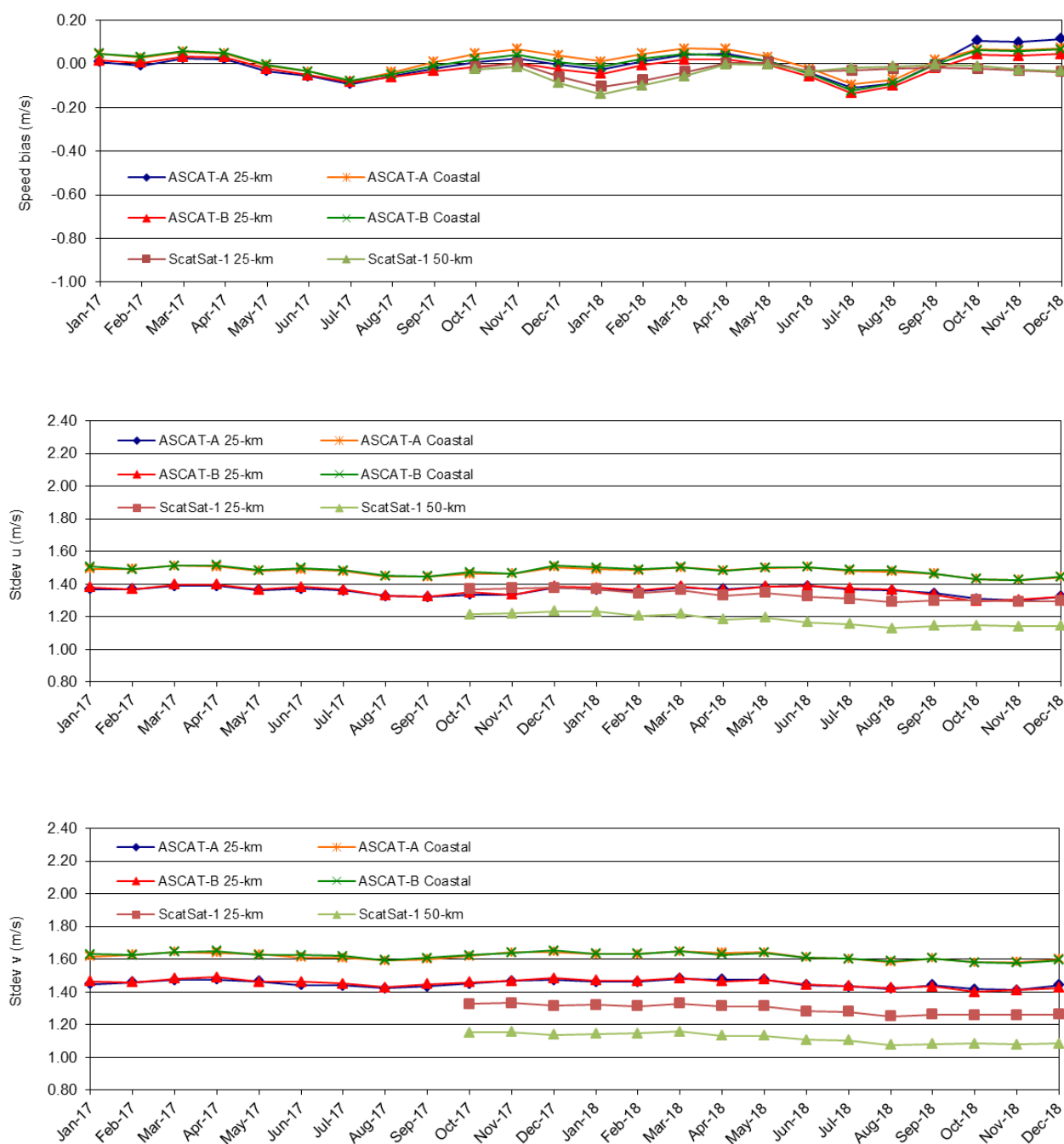
We have studied the scatterometer wind speed mean differences against buoy winds for the tropics and the Northern Hemisphere mid latitudes separately. It appears that the mean differences in the tropics are fairly constant throughout the year, whereas the wind speed mean differences in the NH are higher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

##### 5.4.1. Comparison with ECMWF model wind data

The figure below shows the monthly results of January 2017 to December 2018. 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 42: 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.**

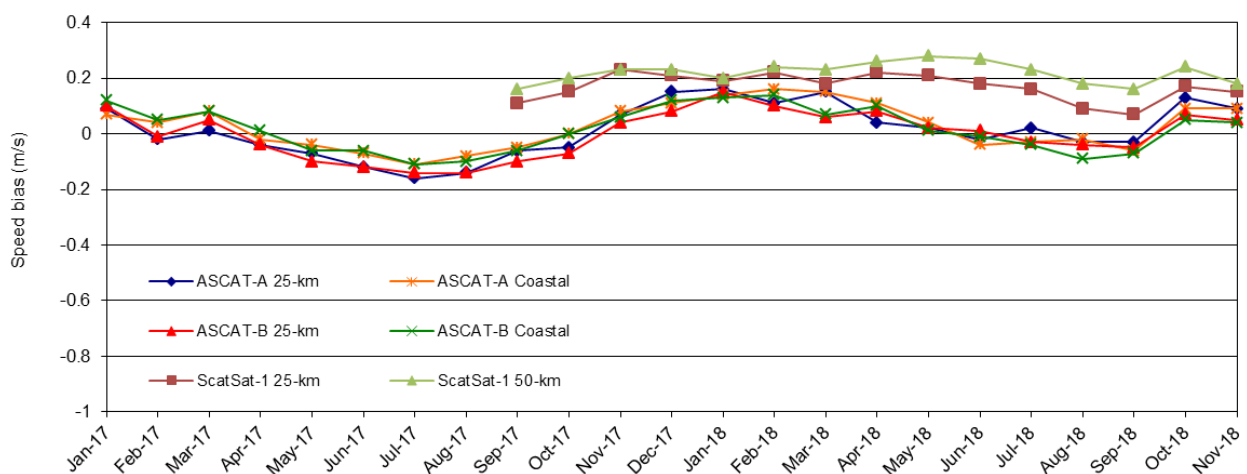
### 5.4.2. Comparison with buoys

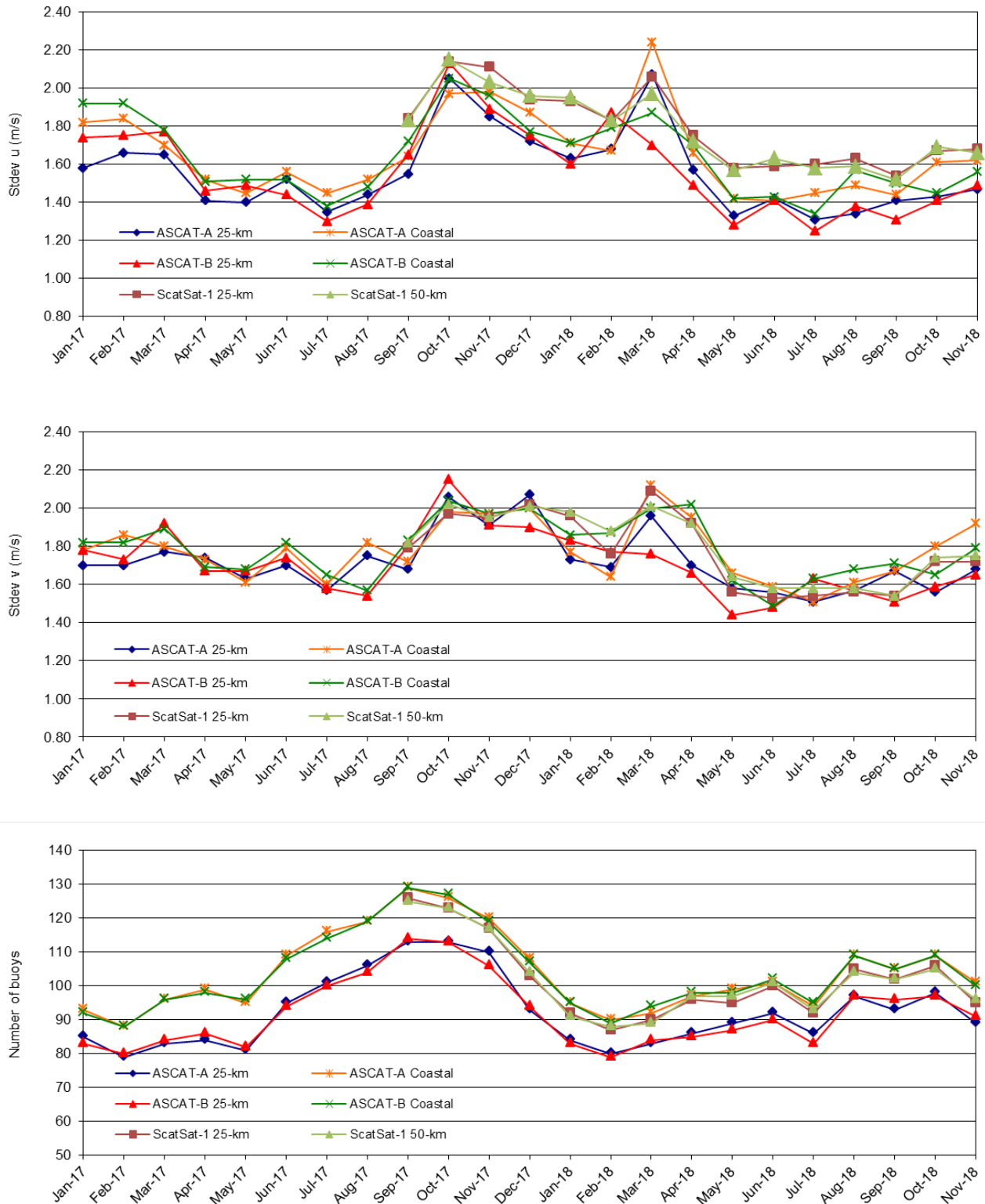
We compare the scatterometer winds with wind data from moored buoys on a monthly basis. The buoy data of approximately 150 buoys spread over the oceans (most of them in the tropical oceans and near Europe and North America) are retrieved from the ECMWF MARS archive and collocated with scatterometer winds. 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 January 2017 to November 2018.

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 43: 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.

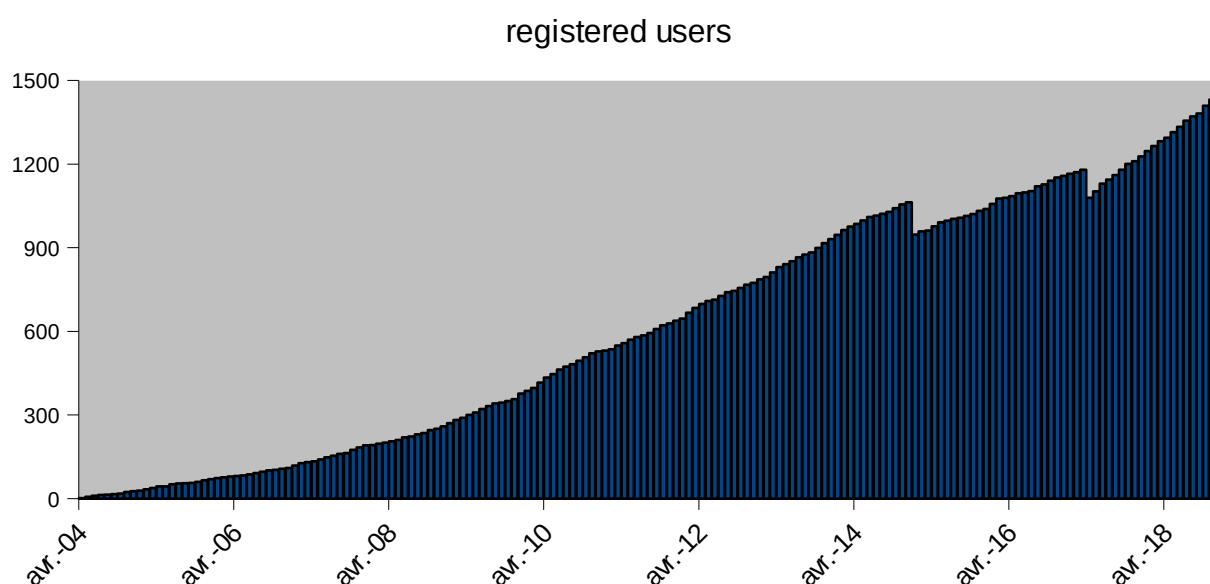
Users are recommended to make requests preferably through the central web site Help desk, with the guarantee that their demand will be acknowledged or answered quickly. However for requests concerning the HL or Wind products they may get access to direct contact points at MET Norway or KNMI.

#### 6.1.1. Statistics on the central OSI SAF web site and help desk

##### 6.1.1.1. Statistics on the registered users

Month	Registered users	Pages
JUL. 2018	1356	1302
AUG. 2018	1371	1286
SEP. 2018	1381	1372
OCT. 2018	1409	1568
NOV. 2018	1431	1452
DEC. 2018	1444	1278

**Table 33: Statistics on central OSI SAF web site use over 2nd half 2018.**



**Figure 44: Evolution of external registered users on the central Web Site from April 2004 to DEC. 2018.**

The following table lists the institutions or companies of the new registered users.

Country	Institution, establishment or company	Acronym
China	Qingdao Observatory	QO
China	Wuhan University	WHU
China	Shandong University of Science and Technology	SDUST
China	Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences	RADI
Finland	Satakunta University of applied sciences	SAMK
Hong Kong	Institute of Space and Earth Information, Science, Chinese University of Hong Kong	ISEIS, CUHK
Ireland	Irish Windsuit Team	IWT
Libya	Sebha University	SU
Oman	Oman Met Office	OMO
Pakistan	Comsats University Islamabad	CUI
Portugal	Universidade do Algarve	UALG
Russia	SIBINTEK	SIBINTEK
Russia	Saint Petersburg State University	SPBU
Spain	Instituto Español de Oceanografía	IEO
Thailand	Chulalongkorn University	CU
Togo	Direction Générale de la météorologie Nationale du Togo	Meteo-Togo
United Kingdom	Scott Polar Research Institute, University of Cambridge	SPRI
United Kingdom	Newcastle University	NCL.AC
United States	University of Colorado Boulder	CU
United States	Ga Tech University – Atmospheric Sciences	GTU-AS

**Table 34: List of institutes of the new registered users over 2nd half 2018 on the central Web Site**

Moreover some 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 2nd half 2018 (pages views)						
Countries	JUL. 2018	AUG. 2018	SEP. 2018	OCT. 2018	NOV. 2018	DEC. 2018
China	299	357	416	503	407	388
USA	307	316	299	370	390	348
France	250	145	181	182	150	123
United Kingdom	75	104	85	76	77	49
Russia	43	22	36	37	41	24
Spain	27	27	32	49	26	27
Japan	37	41	28	35	16	31
South Korea	18	24	33	22	22	28
Italia	26	43	20	16	20	9
Germany	13	27	24	26	18	13
Others/Commercial	35	39	58	36	49	37

**Table 35: Usage of the OSI SAF central Web Site by country (top 10) over 2nd half 2018**

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

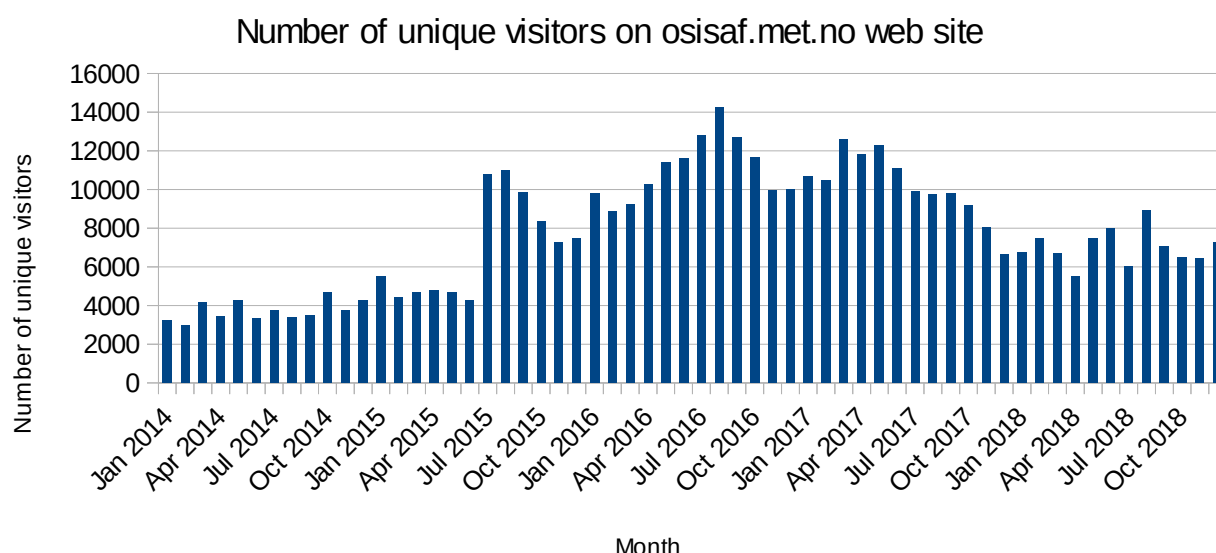
The total number of OSI SAF helpdesk inquiries at the LML subsystem in this half year was 10. All requests were acknowledged or answered within three working days. 5 were categorized as 'info', 0 as 'archive', 4 as 'unavailable' and 1 as 'anomaly'. The 'unavailable' inquiries were about missing input data and the Meteosat 0° SST 12 UTC product sometimes missing due to cloud mask lack.

The total number of OSI SAF helpdesk inquiries at the HL subsystem in this half year was 12. All requests were acknowledged or answered within three working days. 10 were categorized as 'info', 0 as 'archive', 2 as 'unavailable' and 0 as 'anomaly'. The two 'unavailable' inquiries were about an FTP server outage.

The total number of OSI SAF helpdesk inquiries at scat@knmi in this half year was 43. All requests were acknowledged or answered within three working days. 32 were categorized as 'info', 7 as 'archive' and 3 as 'unavailable', in the latter category all requests were referring to ScatSat-1 development status products. There was one inquiry in the category 'anomaly', about a bug in the multi product web viewer.

### 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/>).

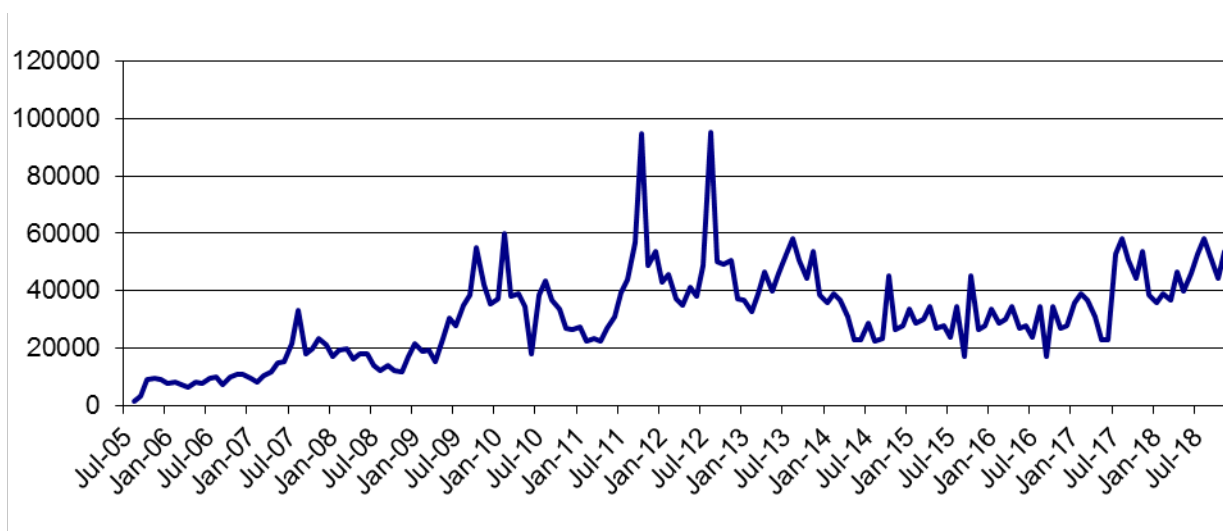


**Figure 45: Evolution of unique visitors on the HL OSI SAF Sea Ice portal from January 2014 to December 2018 (<http://osisaf.met.no/>)**

### 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 December 2018. Only external sessions (from outside KNMI) are counted.





**Figure 46: Number of page views on KNMI scatterometer website per month**

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

Entity	Shortened name	Country
Private user		Brazil
2 private users		China
Polar Research Institute of China		China
Hungarian Meteorological Service		Hungary
Private user		The Netherlands
Istituto di Scienze dell'Atmosfera e del Clima		Italy
Korea Maritime and Ocean University		Korea

**Table 36: 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.

		JUL. 2018		AUG. 2018		SEP. 2018		OCT. 2018		NOV. 2018		DEC. 2018	
		Ifremer FTP	PO.DAAC	Ifremer FTP	PO.DAAC	Ifremer FTP	PO.DAAC	Ifremer FTP	PO.DAAC	Ifremer FTP	PO.DAAC	Ifremer FTP	PO.DAAC
SST MAP +LML		2	x	0	x	0	x	0	x	0	x	0	x
SSI MAP +LML		0	x	0	x	0	x	0	x	0	x	0	x
DLI MAP +LML		0	x	15	x	0	x	0	x	0	x	0	x
OSI-201/-b	GBL SST	5097	1011	2575	10863	3019	3466	5512	575	2903	1309	3298	10372
OSI-202/-b	NAR SST	1633	288	541	4069	472	2210	1128	1608	481	1134	494	724
OSI-204/-b	MGR SST	274501	27731	472023	29159	397440	26962	414899	17896	758827	20549	503696	37920
OSI-206/-a	Meteosat SST	188631	624	46968	36573	50570	14624	51898	0	224656	6683	23649	1815
OSI-207/-a	GOES-East SST	1429	348	1928	1	1381	1	1427	25	1368	126887	1430	17
OSI-IO-SST	Meteosat-8 SST	31240	1	19892	1	26795	619	20245	395	19013	925	19267	1844
OSI-208/-b	IASI SST	41735	13723	43852	13478	41694	13566	43919	4134	40124	4797	44085	21677
OSI-250	Meteosat SST Data record	77500	0	0	0	1020	0	81553	0	192	0	0	0
OSI-303/-a	Meteosat DLI	51128	x	113747	x	49486	x	58802	x	53409	x	50573	x
OSI-304/-a	Meteosat SSI	51128	x	113747	x	49486	x	58802	x	53409	x	50573	x
OSI-305/-a	GOES-East DLI	48602	x	33520	x	8788	x	66127	x	67880	x	8395	x
OSI-306/-a	GOES-East SSI	48602	x	33520	x	8788	x	66127	x	67880	x	8395	x
OSI-IO-DLI	Meteosat-8 DLI	44614	x	22764	x	2246	x	2330	x	2236	x	1675	x
OSI-IO-SSI	Meteosat-8 SSI	44614	x	22764	x	2246	x	2330	x	2236	x	1675	x

**Table 37: Number of OSI SAF products downloaded from Ifremer FTP server and PO.DAAC server over 2nd half 2018.**

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. The Copernicus CMEMS statistics are not started on OSI SAF products for OSI-401,2,3,5 at present, but we are in dialogue with CMEMS to improve this.

		JUL. 2018		AUG. 2018		SEP. 2018		OCT. 2018		NOV. 2018		DEC. 2018	
		HL FTP	CMEMS C3S	HL FTP	CMEMS C3S	HL FTP	CMEMS C3S	HL FTP	CMEMS C3S	HL FTP	CMEMS C3S	HL FTP	CMEMS C3S
<b>Downloaded sea ice products</b>													
OSI-401 series	Global Sea Ice Concentration (SSMIS)	43474	14907	135083	18698	34043	20393	71222	26337	155915	33249	18239	27025
OSI-402 series	Global Sea Ice Edge	32913		110317		9229		5933		35663		7055	
OSI-403 series	Global Sea Ice Type	71930		67425		2533		14220		33717		4187	
OSI-405 series	Low resolution Sea Ice Drift	12674		34694		6675		11011		15301		10424	
OSI-404 series	Global Sea Ice Emissivity	3	x	3150	x	4	x	2	x	2	x	2	x
OSI-407 series	Medium resolution Sea Ice Drift	541	x	3827	x	4992	x	3274	x	9470	x	842	x
OSI-408 series	Global Sea Ice Concentration (AMSR-2)	4102	x	13306	x	1152	x	5363	x	2268	x	1885	x
OSI-409	Reprocessed Ice Concentration	65216	22	113934	1	89617	1566	43523	7202	1997	13239	60	15115
OSI-430	Continuous Reproc Ice Concentration v1p2	9007		20682		5660		14964		13701		541	
OSI-450	Reprocessed Ice Concentration v2.0	28280	x	77443	x	66836	x	100660	x	24773	x	48180	x
<b>Downloaded SST, DLI and SSI over the OSI SAF High Latitude FTP server</b>													
OSI-203 series	AHL SST	559	x	593	x	693	x	559	x	605	x	461	x
OSI-205 series	L2 SST/IST	49249	x	69295	x	741	x	3	x	5	x	243	x
OSI-301 series	AHL DLI	0	x	3	x	0	x	2	x	10	x	3	x
OSI-302 series	AHL SSI	0	x	0	x	1	x	0	x	6	x	1	x

**Table 38: Number of OSI SAF products downloaded from OSI SAF Sea Ice FTP server over 2nd half 2018**

### 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.

We provided archived SeaWinds data to 0 user and archived OSCAT data to 0 user during the reporting period.

		JUL. 2018		AUG. 2018		SEP. 2018		OCT. 2018		NOV. 2018		DEC. 2018	
		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 25km	20 per file (BUFR), 20 per file (NetCDF)	140998	20 per file (BUFR), 20 per file (NetCDF)	100857	20 per file (BUFR), 20 per file (NetCDF)	67232	20 per file (BUFR), 20 per file (NetCDF)	62818	20 per file (BUFR), 20 per file (NetCDF)	191757	20 per file (BUFR), 20 per file (NetCDF)	57935
OSI-102-b	ASCAT-B 25km	21 per file (BUFR), 18 per file (NetCDF)	61328	21 per file (BUFR), 18 per file (NetCDF)	23204	21 per file (BUFR), 18 per file (NetCDF)	58916	21 per file (BUFR), 18 per file (NetCDF)	38345	21 per file (BUFR), 18 per file (NetCDF)	100858	21 per file (BUFR), 18 per file (NetCDF)	27303
OSI-103	ASCAT-A 12.5km												
OSI-104	ASCAT-A Coastal	25 per file (BUFR), 40 per file (NetCDF)	108530	25 per file (BUFR), 40 per file (NetCDF)	56157	25 per file (BUFR), 40 per file (NetCDF)	120170	25 per file (BUFR), 40 per file (NetCDF)	259304	25 per file (BUFR), 40 per file (NetCDF)	117851	25 per file (BUFR), 40 per file (NetCDF)	18674
OSI-104-b	ASCAT-B Coastal	23 per file (BUFR), 40 per file (NetCDF)	62181	23 per file (BUFR), 40 per file (NetCDF)	77374	23 per file (BUFR), 40 per file (NetCDF)	119639	23 per file (BUFR), 40 per file (NetCDF)	89784	23 per file (BUFR), 40 per file (NetCDF)	72709	23 per file (BUFR), 40 per file (NetCDF)	9315

**Table 39: Number of OSI SAF products downloaded from KNMI FTP server and PO.DAAC server over 2nd half 2018**

## 6.3. Statistics from EUMETSAT central facilities

### 6.3.1. Users from EUMETCast

Here below the list of the OSI SAF users identified by EUMETSAT for the distribution by EUMETCast. The table below shows the overall number of OSI SAF users by country on the 12 September 2018.

Albania	4	Greece	13	Poland	11
Algeria	4	Guinea	2	Portugal	5
Angola	3	Guinea-Bissau	3	Oatar	3
Armenia	1	Hungary	9	Reunion	2
Austria	20	Iceland	1	Romania	6
Azerbaijan	3	India	2	Russian Federation	7
Bahrain	1	Iran. Islamic Republic Of	32	Rwanda	5
Belgium	9	Iraq	1	San Marino	1
Benin	4	Ireland	5	Sao Tome And Principe	2
Bosnia And Herzegovina	1	Isle Of Man	1	Saudi Arabia	3
Botswana	6	Israel	7	Senegal	8
Brazil	5	Italy	278	Serbia	2
Bulgaria	3	Jordan	2	Sevchelles	2
Burkina Faso	4	Kazakhstan	4	Sierra Leone	2
Burundi	2	Kenya	12	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	44
China	3	Lesotho	4	Sudan	3
Comoros	2	Liberia	2	Swaziland	3
Congo	3	Libyan Arab Jamahiriya	1	Sweden	3
Congo, The Democratic Republic Of The	5	Lithuania	2	Switzerland	11
Cote D'Ivoire	6	Luxembourg	1	Syrian Arab Republic	1
Croatia	2	Macedonia (Former Yugoslav Republic)	2	Tajikistan	1
Cyprus	1	Madagascar	6	Tanzania. United Republic Of	5
Czech Republic	17	Malawi	4	Togo	4
Denmark	7	Mali	3	Tunisia	2
Djibouti	2	Malta	2	Turkey	6
Egypt	4	Mauritania	4	Turkmenistan	1
Equatorial Guinea	2	Mauritius	7	Uganda	4
Eritrea	2	Moldova. Republic Of	1	Ukraine	2
Estonia	3	Morocco	4	United Arab Emirates	7
Ethiopia	7	Mozambique	5	United Kingdom	126
Finland	5	Namibia	6	United States	4
France	60	Netherlands	26	Uzbekistan	1
Gabon	2	Niger	7	Venezuela. Bolivarian Republic Of	1
Gambia	3	Nigeria	6	Viet Nam	1
Germany	101	Norway	5	Yemen	1
Ghana	10	Oman	4	Zambia	4
				Zimbabwe	4

**Table 40: Overall number of EUMETCast users by country on the 12 September 2018**

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

#### Orders Summary over the 2nd half 2018

The table below lists the products downloaded from the EUMETSAT Data Center (EDC), the volume of the downloaded data in megabytes (MB) and the number of files over the **2nd half 2018**.

	Item	Volume in MB	Number of files
OSI-152	ERS1_OR1ERW025_OPE	5216	19509
OSI-404-a	F-18_OSIEMGB_OPE	97	5
OSI-305 / OSI-306	GOES-13_ODDLISSI_OPE	2226	189
OSI-305 / OSI-306	GOES-13_OHDLISSI_OPE	55422	2106
OSI-305 / OSI-306	GOES-13_OSIDSSI_OPE	360	64
OSI-305 / OSI-306	GOES-13_OSIHSSI_OPE	29542	4613
OSI-305 / OSI-306	GOES-13_OSIHSST_OPE	745	815
OSI-305-a / OSI-306-a	GOES-16_ODDLISSI_OPE	26	2
OSI-305-a / OSI-306-a	GOES-16_OHDLISSI_OPE	93335	9382
OSI-305-a / OSI-306-a	GOES-16_OSIHSSTN_OPE	2295	216
OSI-408	GW-1_OSICOAMSRGB_OPE	198	18
OSI-102-b	M01_OAS025_OPE	75594	28475
OSI-104-b	M01_OASWC12_OPE	425493	31451
OSI-201-b	M01_OSSTGLB_OPE	1209	44
OSI-201-b	M01_OSSTGLBN_OPE	7883	210
OSI-205-a	M01_OSSTIST2_OPE	20100	1770
OSI-202-b	M01_OSSTNARN_OPE	51	2
OSI-103 (with soil moisture)	M02_OAS012_OPE	1349	450
OSI-102	M02_OAS025_OPE	81678	38206
OSI-103	M02_OASW012_OPE	1866	201
OSI-104	M02_OASWC12_OPE	426121	33044
OSI-407-a	M02_OMRSIDRN_OPE	415	61
OSI-150-a	M02_OR1ASW025_OPE	317	334
OSI-150-b	M02_OR1ASWC12_OPE	16839	5405
OSI-201	M02_OSSTGLB_OPE	506	29
OSI-205	M02_OSSTIST2_OPE	5018	700
OSI-409	MML_OR1SICGB_OPE	384	72
OSI-450	MML_OR2017SICGB_OPE	8107	1460
OSI-401-b	MML_OSICGBN_OPE	9635	1553
OSI-402-c	MML_OSIEDGBN_OPE	15	2



	Item	Volume in MB	Number of files
OSI-403-c	MML_OSITYGB_OPE	24	300
OSI-403-c	MML_OSITYGBN_OPE	751	182
OSI-203	MML_OSSTAHL_OPE	3	5
OSI-304	MSG1_OSIHSSI_OPE	29883	193
OSI-250	MSG2_OR1HSST_OPE	226	24
OSI-304	MSG2_OSIHSSI_OPE	162	24
OSI-303 / OSI-304	MSG3_ODDLISSI_OPE	4246	63
OSI-303 / OSI-304	MSG3_OHDLISSI_OPE	289353	20713
OSI-304	MSG3_OSIDSSI_OPE	752	65
OSI-304	MSG3_OSIHSSI_OPE	31534	4429
OSI-206	MSG3_OSIHSST_OPE	2006	816
OSI-206	MSG3_OSIHSSTN_OPE	270	24
OSI-303-a / OSI-304-a	MSG4_ODDLISSI_OPE	4937	353
OSI-303-a / OSI-304-a	MSG4_OHDLISSI_OPE	328562	23435
OSI-206-a	MSG4_OSIHSSTN_OPE	835	74
OSI-202	N19_OSSTNAR_OPE	10297	1376
OSI-151-a	QUIKSCAT_OR1SWW025_OPE	396992	52137
OSI-101	QUIKSCAT_OSWW025_OPE	1660	4823
OSI-110	QUIKSCAT_OSWW100_OPE	24	523

**Table 41: Volume of data downloaded (in MB) by products from EDC over 1st half 2017**

### Ingestion Summary over the 2nd half 2018

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

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

Product id.	Product name	JUL. 2018	AUG. 2018	SEP. 2018	OCT. 2018	NOV. 2018	DEC. 2018
OSI-404/-a	Global Sea Ice Emissivity (DMSP-F18)	100	100	100	100	100	100
OSI-305-a/OSI-306-a	Daily Downward Longwave Irradiance + Surface Solar Irradiance (GOES-16)	100	100	100	100	100	100
OSI-305-a/OSI-306-a	Hourly Downward Longwave Irradiance + Surface Solar Irradiance (GOES-16)	99.7	100	100	100	98.4	100
OSI-207-a	Hourly Sea Surface Temperature (GOES-16)	99.3	98.9	99.7	100	99.1	100
OSI-408	Sea Ice Concentration (AMSR-2)	100	100	98.3	100	100	100
OSI-102-b	ASCAT 25km Wind (Metop-B)	100	99.7	100	100	100	100
OSI-104-b	ASCAT 12.5km Coastal Wind (Metop-B)	99.7	100	100	100	99.7	100
OSI-102	ASCAT 25km Wind (Metop-A)	100	100	100	100	99.2	100
OSI-104	ASCAT 12.5km Coastal Wind (Metop-B)	99.7	99.7	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-407	Global Sea Ice Drift (Multi Mission)	100	100	100	29.0	0	0
OSI-407-a	Global Sea Ice Drift (Multi Mission)	0	0	0	138	198	190
OSI-205	SST/IST L2	100	100	100	100	100	100
OSI-301	AHL Downward Longwave Irradiance (Multi Mission)	100	100	100	100	100	100
OSI-401	Global Sea Ice Concentration (DMSP-18)	100	100	100	100	100	100
OSI-405	Global Low Resolution Sea Ice Drift	100	100	98.3	100	100	100
OSI-402	Global Sea Ice Edge (Multi Mission)	100	100	100	98.3	100	100
OSI-403	Global Sea Ice Type (Multi Mission)	100	98.3	100	100	100	100
OSI-302	AHL Surface Solar Irradiance (Multi Mission)	100	100	100	100	100	100
OSI-203	AHL Sea Surface Temperature (Multi Mission)	100	100	100	100	100	100
OSI-303-a/OSI-304-a	Daily Downward Longwave Irradiance + Surface Solar Irradiance (MSG)	100	100	100	100	100	100
OSI-303-a/OSI-304-a	Hourly Downward Longwave Irradiance + Surface Solar Irradiance (MSG)	98.7	99.8	100	100	98.1	100
OSI-206-a	Hourly Sea Surface Temperature (MSG)	98.6	99.8	100	100	99.1	99.8
OSI-202-b	NAR Sea Surface Temperature (NPP)	100	100	100	100	100	100

**Table 42: Percentage of received OSI SAF products in EDC in 2nd half 2018**

id	product	APNM	status	comment
OSI-150-a	Metop-A ASCAT L2 25 km winds data record	OR1ASW025	OK	Ingestion finished on the 2016-10-05
OSI-150-b	Metop-A ASCAT L2 12.5 km winds data record	OR1ASWC12	OK	Ingestion finished on the 2016-09-23
OSI-151-a	SeaWinds L2 25 km winds data record	OR1SWW025	OK	Ingestion finished on the 2016-12-21
OSI-151-b	SeaWinds L2 50 km winds data record	OR1SWW050	OK	Ingestion finished on the 2016-12-21
OSI-152	ERS L2 25 km winds data record	OR1ERW025	OK	Ingestion finished on the 2017-08-22
OSI-153-a	Oceansat-2 L2 25 km winds data record	OR1OSW025	OK	Ingestion finished on the 2018-09-24
OSI-153-b	Oceansat-2 L2 50 km winds data record	OR1OSW050	OK	
OSI-250	MSG/SEVIRI Sea Surface Temperature data record	OR1HSST	OK	Ingestion finished in 2018-08
OSI-409	Global Sea Ice Concentration data record (SSMR/SSMI)	OR1SICGB	OK	Ingestion finished on the 2018-06-06
OSI-409-a	Global Sea Ice Concentration data record (SSMI/SSMIS)	OR2SICGB	OK	
OSI-450	Global Sea Ice Concentration data record (SMMR/SSMI/SSMIS)	OR2017SICGB	OK	

**Table 43: OSI SAF Data records ingestion status in EDC in December 2018**

## 7. Training

The NWP SAF mesoscale data assimilation workshop was given on 18 September in Tallinn by Ad Stofelen.