EUMETSAT

OSI SAF

OCEAN AND SEA ICE

Half-Yearly Operations Report

2nd half 2017

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1.0	2018-02-20	CH	First version
1.1	2018-10-30	CH	Updated after Operation Review n°14 in October 2018 (see review report for answer to RIDs)

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1. Introduction

1.1. Scope of the document

The present report covers from 1st July to 31th December 2017.

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 MF 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 Document [AD.1] available on *http://osi-saf.eumetsat.int*, the OSI SAF web site.

1.3. Applicable documents

[AD.1] OSI SAF
CDOP 3 Service Specification (SeSp)
SAF/OSI/CDOP3/MF/MGT/PL/003, version 1.4, 09/02/2018

1.4. Reference documents

[RD.1] ASCAT Wind Product User Manual
OSI-102, OSI-102-b, OSI-103 (discontinued), OSI-104, 0SI-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] ASCAT L2 winds Data Record Product User Manual
OSI-150-a, OSI-150-b
SAF/OSI/CDOP2/KNMI/TEC/MA/238

[RD.4] Reprocessed SeaWinds L2 winds Product User Manual
OSI-151-a, OSI-151-b
SAF/OSI/CDOP2/KNMI/TEC/MA/220

[RD.16] ERS L2 winds Data Record Product User Manual
OSI-152
SAF/OSI/CDOP2/KNMI/TEC/MA/279

[RD.18] Oceansat-2 L2 winds Data Record Product User Manual
OSI-153-a, OSI-153-b
SAF/OSI/CDOP3/KNMI/TEC/MA/297

[RD.5] Low Earth Orbiter Sea Surface Temperature Product User Manual
OSI-201-b, OSI-202-b, OSI-204-b, OSI-208-b
SAF/OSI/CDOP/M-F/TEC/MA/127

[RD.6] Atlantic High Latitude L3 Sea Surface Temperature Product User Manual
OSI-203
SAF/OSI/CDOP/met.no/TEC/MA/115

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

[RD.8] Atlantic High Latitude Radiative Fluxes Product User Manual
OSI-301, OSI-302
SAF/OSI/CDOP/met.no/TEC/MA/116

[RD.9] Geostationary Radiative Flux Product User Manual
OSI-303, OSI-304, OSI-305, OSI-306, OSI-IO-DLI, OSI-IO-SSI
SAF/OSI/CDOP3/MF/TEC/MA/182

[RD.10] Product User Manual for OSI SAF Global Sea Ice Concentration
OSI-401-b
SAF/OSI/CDOP3/DMI_MET/TEC/MA/204

[RD.11] 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.12] 50 Ghz Sea Ice Emissivity Product User Manual
OSI-404
SAF/OSI/CDOP/DMI/TEC/MA/191

[RD.13] Low Resolution Sea Ice Drift Product User's Manual
OSI-405-c
SAF/OSI/CDOP/met.no/TEC/MA/128

[RD.14] Medium Resolution Sea Ice Drift Product User Manual
OSI-407
SAF/OSI/CDOP/DMI/TEC/MA/137

[RD.15] Global Sea Ice Concentration Reprocessing Product User Manual
OSI-409, OSI-409-a, OSI-430
SAF/OSI/CDOP3/MET-Norway/TEC/MA/138

[RD.17] 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
Std Dev	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

Table 1: Definitions, acronyms and abbreviations

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 local 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. 2017	AUG. 2017	SEP. 2017	OCT. 2017	NOV. 2017	DEC. 2017
OSI-102	ASCAT-A 25 km Wind	99.4	99.9	99.9	100	99.9	99.9
OSI-102-b	ASCAT-B 25 km Wind	99.7	100	99.9	100	99.9	99.9
OSI-104	ASCAT-A Coastal Wind	99.5	99.7	99.8	99.9	99.7	99.5
OSI-104-b	ASCAT-B Coastal Wind	99.5	99.8	99.8	99.9	99.7	99.6
OSI-201-b	GBL SST	100.0	100.0	100.0	98.4	100.0	100.0
OSI-202-b	NAR SST	100.0	99.2	100.0	98.4	99.2	98.4
OSI-203	AHL SST/IST (L3)	100.0	100.0	100.0	100.0	100.0	100.0
OSI-204-b	MGR SST	100.0	100.0	100.0	99.1	99.7	100.0
OSI-205	SST/IST (L2)	96.2	99.8	100	99.9	100	100
OSI-206	Meteosat SST	99.9	99.5	100.0	99.3	99.4	100.0
OSI-207	GOES-East SST	99.9	99.9	100.0	99.1	99.3	95.3
OSI-208-b	IASI SST	100.0	99.9	100.0	99.3	99.7	100.0
OSI-301	AHL DLI	96.7	100.0	96.7	100.0	100.0	100.0
OSI-302	AHL SSI	96.7	100.0	96.7	100.0	100.0	100.0
OSI-303	Meteosat DLI - hourly	99.5	99.7	100.0	99.2	99.2	100.0
OSI-303	Meteosat DLI - daily	100.0	100.0	100.0	100.0	100.0	100.0
OSI-304	Meteosat SSI - hourly	99.5	99.7	100.0	99.2	99.2	100.0
OSI-304	Meteosat SSI - daily	100.0	100.0	100.0	100.0	100.0	100.0
OSI-305	GOES-East DLI - hourly	97.8	98.8	99.2	98.9	99.3	96.3
OSI-305	GOES-East DLI - daily	100.0	100.0	100.0	100.0	100.0	100.0
OSI-306	GOES-East SSI - hourly	97.8	98.8	99.2	98.9	99.3	96.3
OSI-306	GOES-East SSI - daily	100.0	100.0	100.0	100.0	100.0	100.0
OSI-401-b	Global Sea Ice Concentration (SSMIS)	100	100	100	100	100	100
OSI-402-c	Global Sea Ice Edge	100.0	100.0	100.0	100.0	100.0	100.0
OSI-403-c	Global Sea Ice Type	100.0	100.0	100.0	100.0	100.0	100.0
OSI-404	Global Sea Ice Emissivity	100	96.8	100	100	100	100
OSI-405-c	Low Res. Sea Ice Drift	100.0	96.8	100.0	100.0	100.0	100.0
OSI-407	Medium Res. Sea Ice Drift	93.5	95.2	100	100	100	100
OSI-408	Global Sea Ice Concentration (AMSR-2)	96.8	100	98.3	100	98.3	100
OSI-430	Global Reproc Sea Ice Conc Updates	100.0	100.0	100.0	100.0	100.0	100.0

Table 2: Percentage of OSI SAF products available on the local FTP servers within the specified time over 2nd half 2017.

2.2. Availability via EUMETCast

Ref.	Product	JUL. 2017	AUG. 2017	SEP. 2017	OCT. 2017	NOV. 2017	DEC. 2017
OSI-102	ASCAT-A 25 km Wind	99.4	99.9	99.9	100	99.9	99.9
OSI-102-b	ASCAT-B 25 km Wind	99.7	100	99.9	100	99.9	99.9
OSI-104	ASCAT-A Coastal Wind	99.5	99.7	99.8	99.9	99.7	99.5
OSI-104-b	ASCAT-B Coastal Wind	99.5	99.8	99.8	99.9	99.7	99.6
OSI-201-b	GBL SST	100.0	100.0	100.0	100.0	100.0	100.0
OSI-202-b	NAR SST	100.0	100.0	100.0	100.0	100.0	99.2
OSI-203	AHL SST/IST (L3)	NA	100.0	100.0	100.0	100.0	100.0
OSI-204-b	MGR SST	100.0	99.9	99.9	100.0	100.0	99.9
OSI-205	SST/IST (L2)	96.2	99.8	100	99.9	100	100
OSI-206	METEOSAT SST	100.0	99.5	100.0	100.0	99.9	100.0
OSI-207	GOES-East SST	99.9	99.6	99.9	99.9	99.9	97.0
OSI-208-b	IASI SST	100.0	99.6	99.8	99.9	99.9	99.9
OSI-301	AHL DLI	NA	100.0	100.0	96.8	100.0	100.0
OSI-302	AHL SSI	NA	100.0	100.0	96.8	100.0	100.0
OSI-303	Meteosat DLI - hourly	100.0	99.7	100.0	100.0	100.0	100.0
OSI-303	Meteosat DLI - daily	100.0	100.0	100.0	100.0	100.0	100.0
OSI-304	Meteosat SSI - hourly	99.9	99.6	100.0	100.0	100.0	100.0
OSI-304	Meteosat SSI - daily	100.0	100.0	100.0	100.0	100.0	100.0
OSI-305	GOES-East DLI - hourly	98.1	97.0	100.0	100.0	100.0	97.6
OSI-305	GOES-East DLI - daily	100.0	100.0	100.0	100.0	100.0	100.0
OSI-306	GOES-East SSI - hourly	98.4	97.0	100.0	99.9	100.0	97.6
OSI-306	GOES-East SSI - daily	100.0	100.0	100.0	100.0	100.0	100.0
OSI-401-b	Global Sea Ice Concentration (SSMIS)	100	100	100	100	100	100
OSI-402-c	Global Sea Ice Edge	NA	83.9	100.0	96.8	96.7	100.0
OSI-403-c	Global Sea Ice Type	NA	83.9	100.0	96.8	96.7	100.0
OSI-404	Global Sea Ice Emissivity	100	96.8	100	100	100	100
OSI-405-c	Low Res. Sea Ice Drift	NA	96,8	100.0	100.0	100.0	100.0
OSI-407	Medium Res. Sea Ice Drift	93.5	95.2	100	100	100	100
OSI-408	Global Sea Ice Concentration (AMSR-2)	96.8	100	98.3	100	98.3	100

Table 3: Percentage of OSI SAF products delivered via EUMETCast within the specified time over 2nd half 2017.

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
2017-12-16,17,20, 21,24,25	GOES-East SST,DLI,SSI OSI-207-a, OSI-305-a, OSI-306-a	Problem on NOAA Server providing input data (from the GOES new generation)	Direct acquisition planned

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

Date	Impacted products or services	Anomaly	Corrective and preventive measures
2017-07-10	SSMIS SICO OSI-401-b	A 5 km shift in grid coordinates was noticed since the update in SICO on 4th July 2017. The ice concentration field and other grids were not affected.	The issue was corrected and the affected SICO products (from 4-11 July) were regenerated.
2017-07-13	AMSR-2 SICO OSI-408	One product contained missing and corrupted data due to a retrograde maneuver conducted by GCOM-W1 on July 12, 2017 to maintain its orbit. During the maneuver the observation of AMSR-2 was suspended and data loss occurred.	
2017-07-15	MR SIDR OSI-407	4 files were not distributed on schedule due to problems with ingesting the input file correctly.	The problem was corrected.
2017-07-17	HL L2 SST/IST OSI-205	Dissemination of IST was stopped for a few hours.	An anomaly was found that caused some products not to be produced.
2017-07-19	AMSR-2 SICO OSI-408	One product was not distributed on schedule.	The product was distributed as soon as possible the same day.
2017-07	Reporting on timeliness at MET Norway	The logs of EUMETCast timeliness was by mistake not archived in July and until 4th August, therefore the corresponding column in 3 is missing.	Fixed archiving of logs.

Date	Impacted products or services	Anomaly	Corrective and preventive measures
2017-08	Dissemination via EUMETCast	The ice edge and type products were up to 5 minutes late on EUMETCast on 5 days in August.	Dissemination has been optimized to avoid this. After optimization this only happened once in October and once in November.
2017-08-07	HL L3 SST/IST OSI-203	The OSI SAF High Latitude L3 SST product (OSI-203) from this date was empty due to a problem with the AVHRR pre-processing.	Corrected processing and sent service message. Product was not reprocessed.
2017-08-10	HL L2 SST/IST OSI-205	Due to a problem with a data receiver server data from EUMETSAT was not received and hence the product was not produced.	The issue with the server was solved the same day and the production was resumed.
2017-09-29 2017-11-27	AMSR-2 SICO OSI-408	Due to an outage of AMSR2 data from JAXA the AMSR2 SIC have missing sectors or reduced quality where the AMSR2 data are missing.	
2017-12-05	SSMIS SICO OSI-401-b	One product was not distributed on schedule.	The product was distributed as soon as possible the same day.

3.3. At Wind subsystem (KNMI)

Date	Impacted products or services	Anomaly	Corrective and preventive measures
2017-09-13	Metop-B ASCAT winds between 10:57 and 16:03 UTC sensing time	Outage due to Metop-B out of plane maneuver.	
2017-12-10	Metop-A ASCAT winds between 9:42 and 15:51 UTC sensing time	Outage due to an anomaly in the KNMI EUMETCast reception station.	Solved by technicians.
2017-12-10	Metop-B ASCAT winds between 10:39 and 16:30 UTC sensing time	Outage due to an anomaly in the KNMI EUMETCast reception station.	Solved by technicians.

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
2017-07-18	New SST, DLI, SSI over Indian Ocean	Available for demonstration on Ifremer FTP (in NetCDF4)
2017-12-14	GOES-East SST, DLI, SSI OSI-207-a, OSI-305-a, OSI-306-a	Switch from GOES-13 to GOES-16
2017-12-14	GOES-East and Meteosat DLI, SSI OSI-303-a, OSI-304-a OSI-305-a, OSI-306-a	Stop of GRIB and NetCDF3 format. NetCDF4 is the unique format available

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

Date	Impacted products or services	Events and modifications, maintenance activiti
2017-07-04	SSMIS SICO OSI-401-b	Product updated with a filtered sea ice concentration variable
2017-08-07 and 2017-10-17	HL FTP server	Maintenance on MET Norway infrastructure, with possibility of impact on HL FTP servers. Users were informed.
2017-10-05	SSMIS SICO OSI-401-b	NetCDF files is now distributed through EUMETCast as well.
2017-12-01	SSMIS SICO OSI-401-b SIED, SITY OSI-402-c, OSI-403-c	Announced that the OSI-401-b, 402-c and 403-c products will not be distributed on GRIB and HDF5 format after 5th April 2018.
2017-12-04	SSMIS SICO OSI-401-b	A filter was updated to remove spurious ice in the sea west of Iceland.

4.3. At Wind subsystem (KNMI)

Date	Impacted products or services	Events and modifications, maintenance activities
2017-09-12	ScatSat-1 winds	ScatSat-1 25 and 50 km near-real time wind products (OSI-112) are available for evaluation

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

2017-09-07: Release of Oceansat-2 Scatterometer wind data records (OSI-153-a, OSI-153-b)

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

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

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

5.1.1. Meteosat SST (OSI-206) quality

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

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

METEOSAT10 SST diff 2017-07-01 0001 2017-12-31 2326 zso 110-180 ql 3-5 n>5 (safos)

bias -0.08 std 0.56 sst 23.02 100588 cases
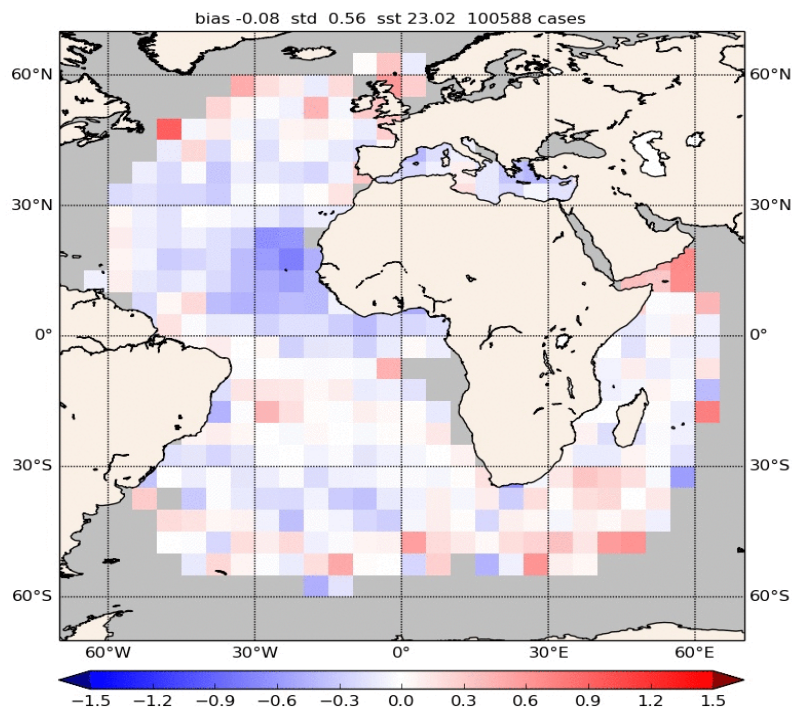
Figure 1: Mean Meteosat night-time SST mean difference with respect to buoys measurements for quality level 3,4,5

METEOSAT10 SST diff 2017-07-01 0206 2017-12-31 2216 zso 0- 90 ql 3-5 n>5 (safos)

bias -0.07 std 0.57 sst 23.11 148237 cases
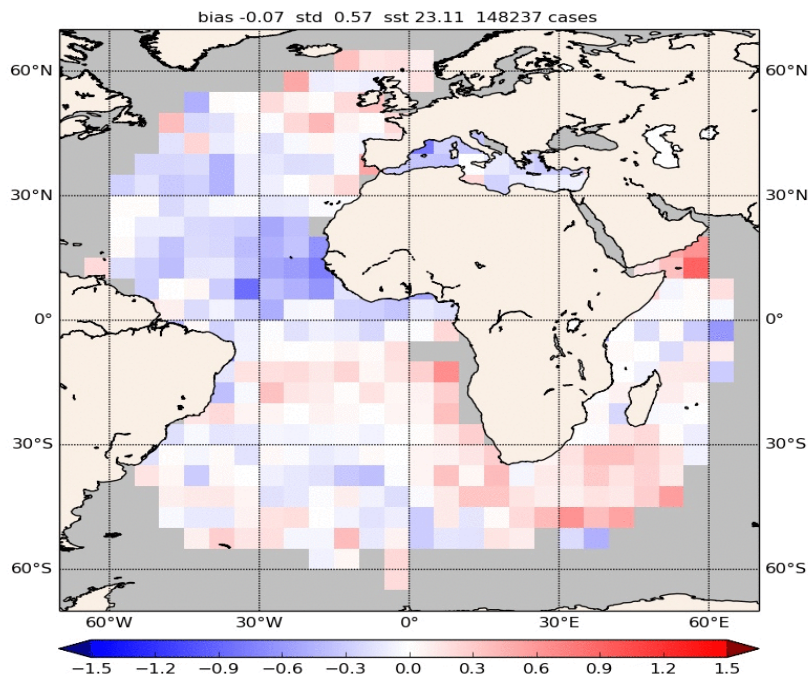
Figure 2: Mean Meteosat day-time SST mean differencemean difference with respect to buoys measurements for quality level 3,4,5

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

| Meteosat night-time SST quality results over 2nd half 2017							
Month	Number of cases	mean difference °C	mean difference req. °C	mean difference margin (*)	Std Dev °C	Std Dev Req. °C	Std Dev margin (**)
JUL. 2017	17784	-0.10	0.5	80	0.58	1	42
AUG. 2017	18342	-0.17	0.5	66	0.61	1	39
SEP. 2017	17523	-0.05	0.5	90	0.56	1	44
OCT. 2017	18463	-0.03	0.5	94	0.55	1	45
NOV. 2017	15461	-0.08	0.5	84	0.54	1	46
DEC. 2017	13183	-0.03	0.5	94	0.54	1	46
Meteosat day-time SST quality results over 2nd half 2017							
JUL. 2017	29849	-0.17	0.5	66	0.64	1	36
AUG. 2017	27894	-0.15	0.5	70	0.62	1	38
SEP. 2017	24186	0.00	0.5	100	0.55	1	45
OCT. 2017	24120	0.00	0.5	100	0.52	1	48
NOV. 2017	22524	-0.05	0.5	90	0.52	1	48
DEC. 2017	20018	-0.03	0.5	94	0.52	1	48
(*) mean difference Margin = 100 * (1 - (| mean difference / mean difference Req.|)) (**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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: Meteosat SST quality results over 2nd half 2017, for 3, 4, 5 quality indexes.

Comments: Overall quality assessment results are good and quite stable.

The following graphs illustrate the evolution of Meteosat-derived SST quality results over the past 12 months.
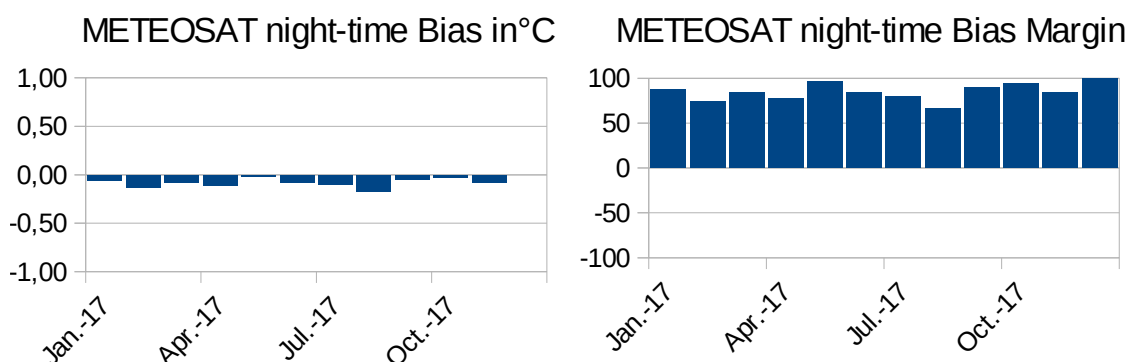
Figure 3:   Left: Meteosat night-time SST mean difference.
Right: Meteosat night-time SST mean difference margin.
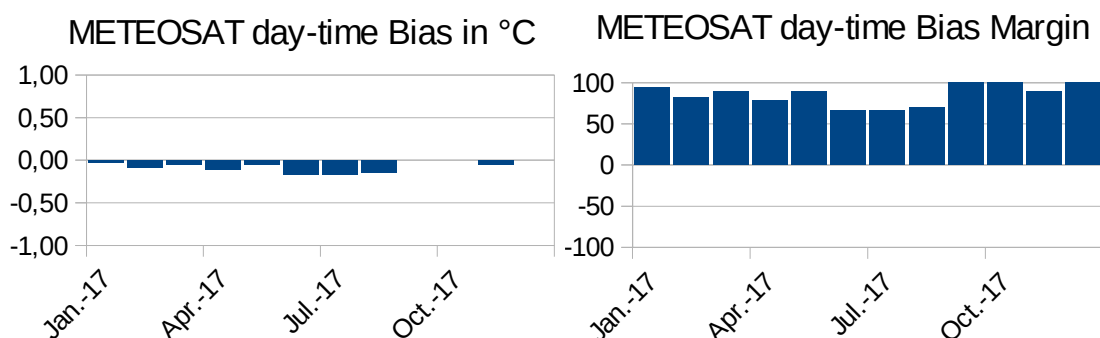
Figure 4: Left: Meteosat day-time SST mean difference.
Right: Meteosat day-time SST mean difference margin.
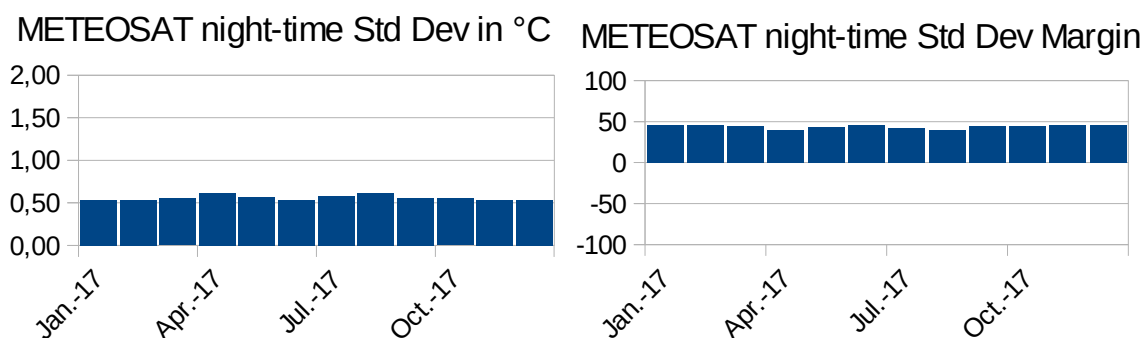
Figure 5: Left: Meteosat night-time SST standard deviation.
Right Meteosat night-time SST standard deviation margin.
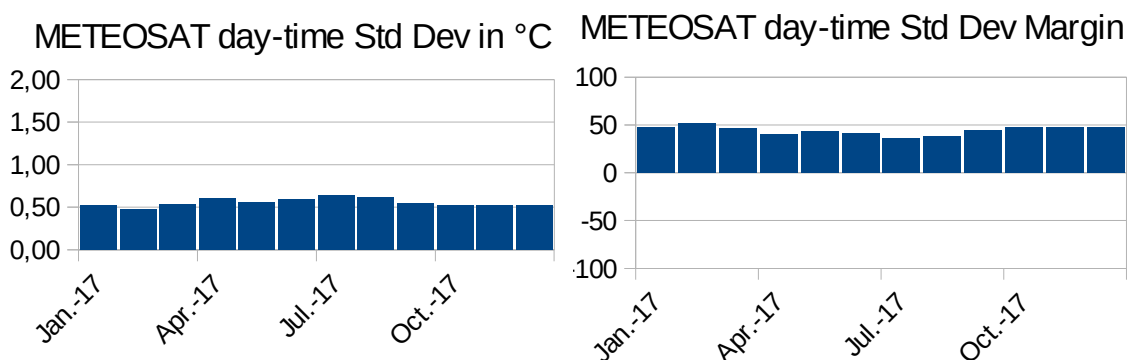
Figure 6: Left: Meteosat day-time SST Standard deviation.
Right: Meteosat day-time SST Standard deviation Margin.
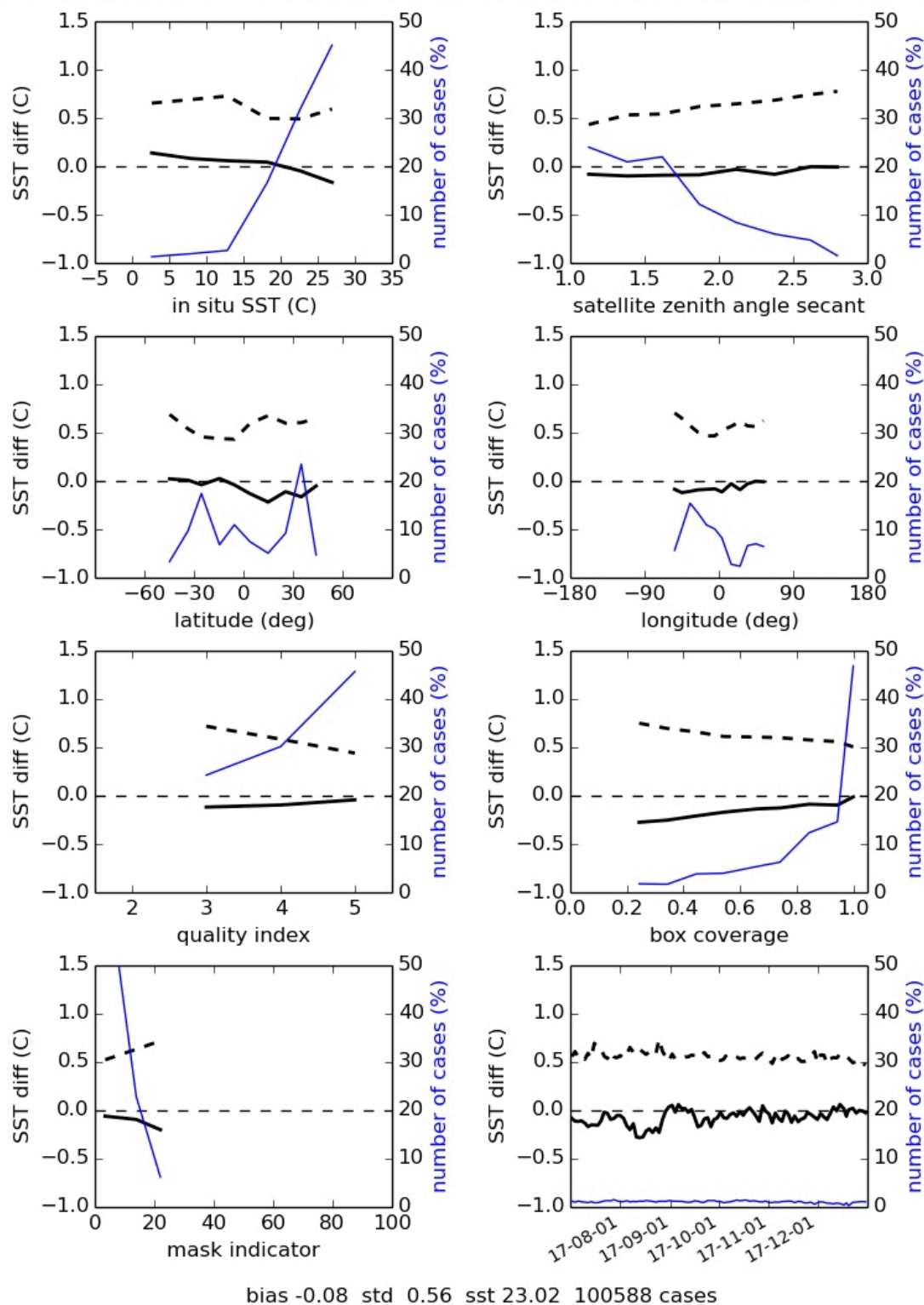
Figure 7: Complementary quality assessment statistics on Meteosat SST, night-time: dependence of the mean difference, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

METEOSAT10 SST diff 2017-07-01 0206 2017-12-31 2216 zso 0- 90 QL 3-5 >1.0% (safos)

bias -0.07 std 0.57 sst 23.11 148237 cases

mean difference — standard deviation — number of cases
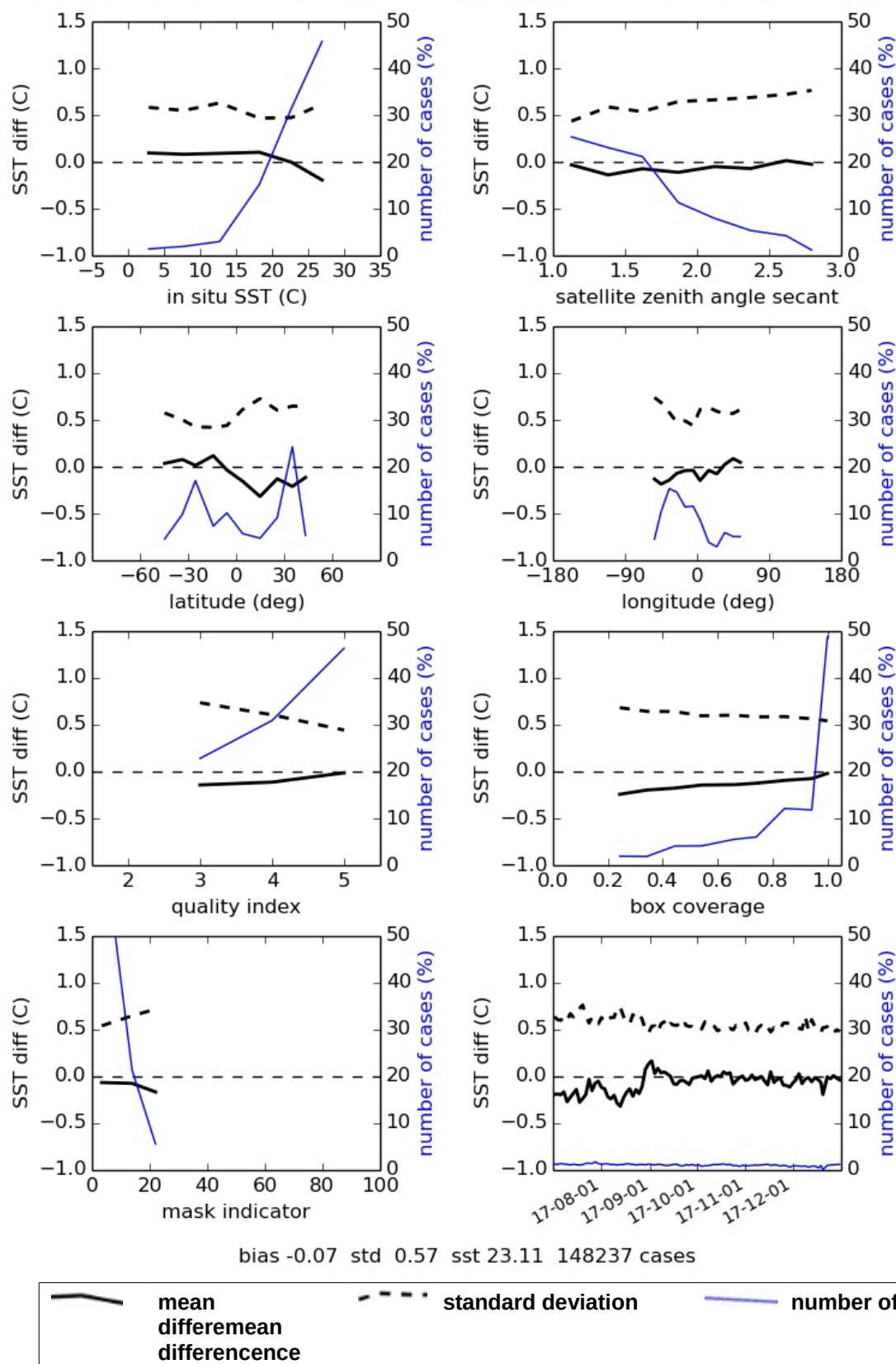
Figure 8: Complementary quality assessment statistics on Meteosat SST, day-time: dependence of the mean difference, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

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

The present GOES-E platform (GOES-13) does not have a 12 micron channel enabling daytime SST calculations; GOES-E derived SST are restricted to nighttime conditions.

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

The operational SST retrieval from MSG/SEVIRI and GOES-East updated chain validation report v1.1 (http://osi-saf.eumetsat.int/lml/#doc_SST) gives further details about the regional mean difference observed.
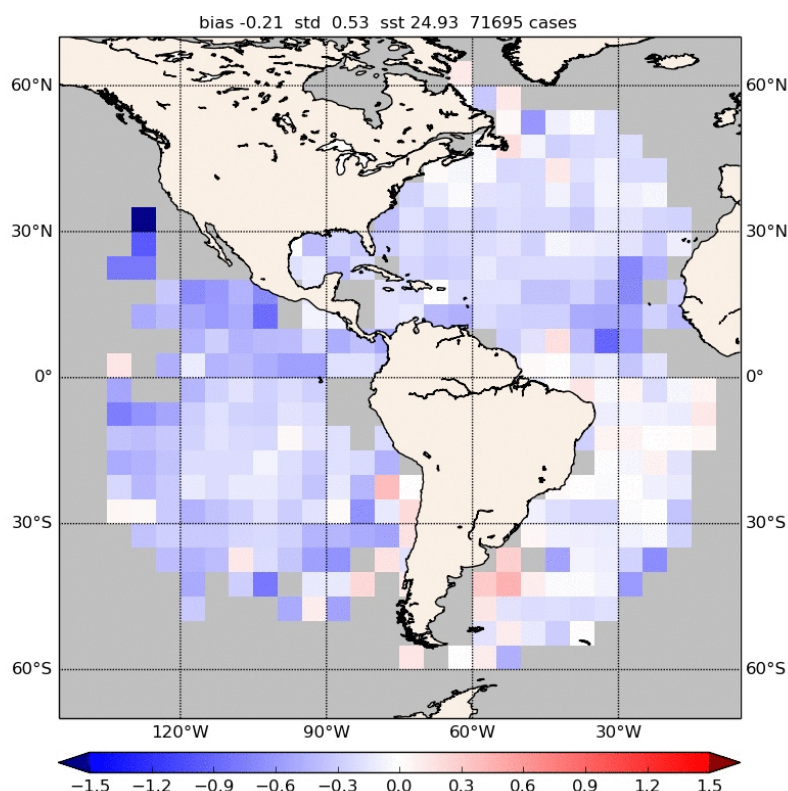
Figure 9: Mean GOES-East night-time SST mean differencemean difference with respect to buoys measurements for quality level 3,4,5

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

GOES-East night-time SST quality results 2nd half 2017							
Month	Number of cases	mean difference °C	mean difference req. °C	mean difference Margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
JUL. 2017	12416	-0.35	0.5	30	0.49	1	51
AUG. 2017	15171	-0.29	0.5	42	0.50	1	50
SEP. 2017	12837	-0.18	0.5	64	0.53	1	47

OCT. 2017	12160	-0.13	0.5	74	0.58	1	42
NOV. 2017	13344	-0.14	0.5	72	0.53	1	47
DEC. 2017	5731	-0.08	0.5	84	0.53	1	47
(*) mean difference margin = 100 * (1 - (| mean difference / mean difference req.|)) (**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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: GOES-East SST quality results over 2nd half 2017, for 3, 4, 5 quality indexes

Comments: Overall quality assessment results are good and quite stable.

The following graphs illustrate the evolution of GOES-E-derived SST quality results over the past 12 months.
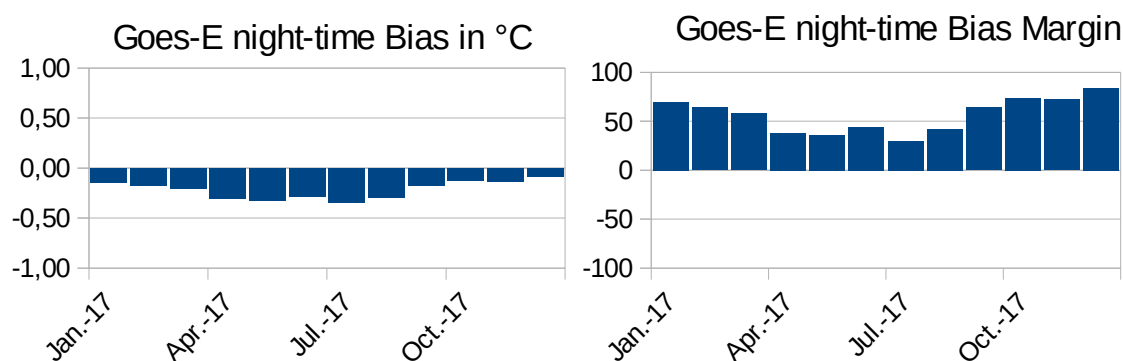
Figure 10: **Left: Goes-East night-time SST mean difference.**
Right: Goes-East night-time SST mean difference margin.
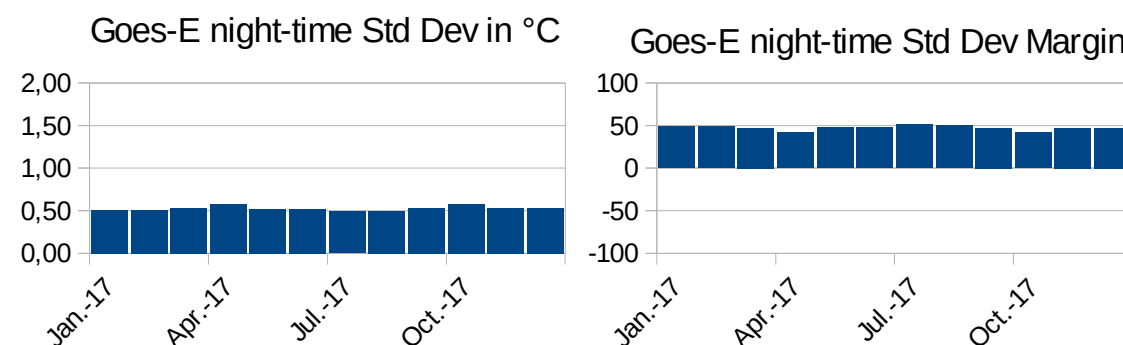
Figure 11: **Left: Goes-East night-time SST standard deviation.**
Right Goes-East night-time SST standard deviation margin.
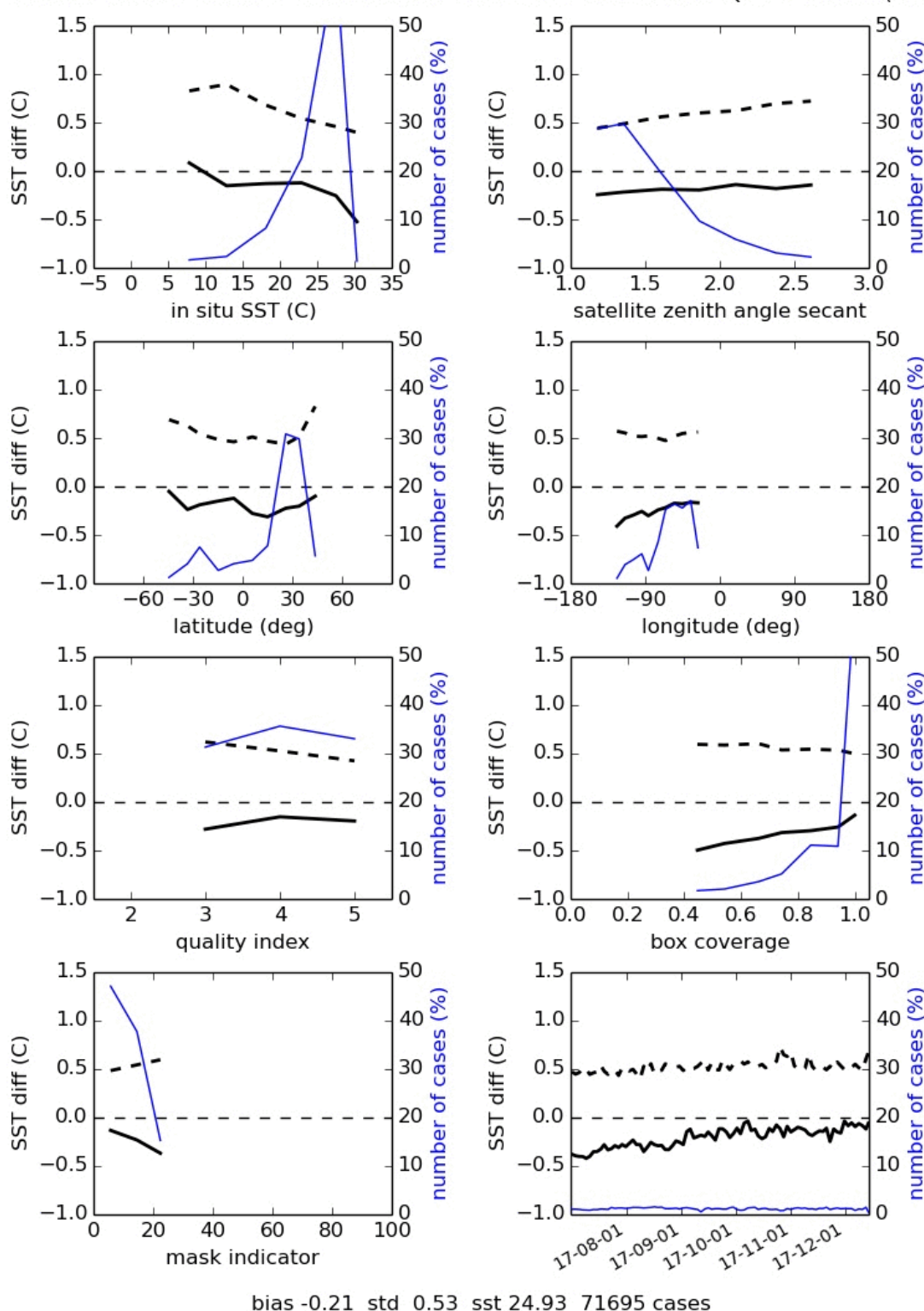
Figure 12: Complementary quality assmean differenceessment statistics on GOES-East SST, night-time: dependence of the mean difference, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

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

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

The following maps indicate the mean night-time and day-time SST mean difference with respect to buoys measurements for quality level 3,4,5 over the reporting period.
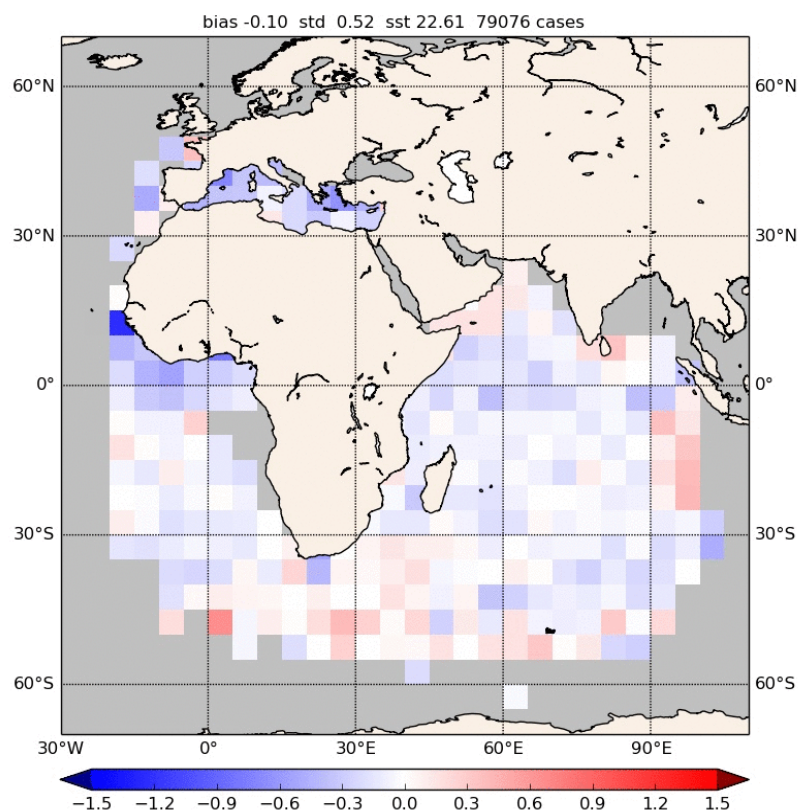
Figure 13: Mean Meteosat Indian Ocean night-time SST mean differencemean difference with respect to buoys measurements for quality level 3,4,5
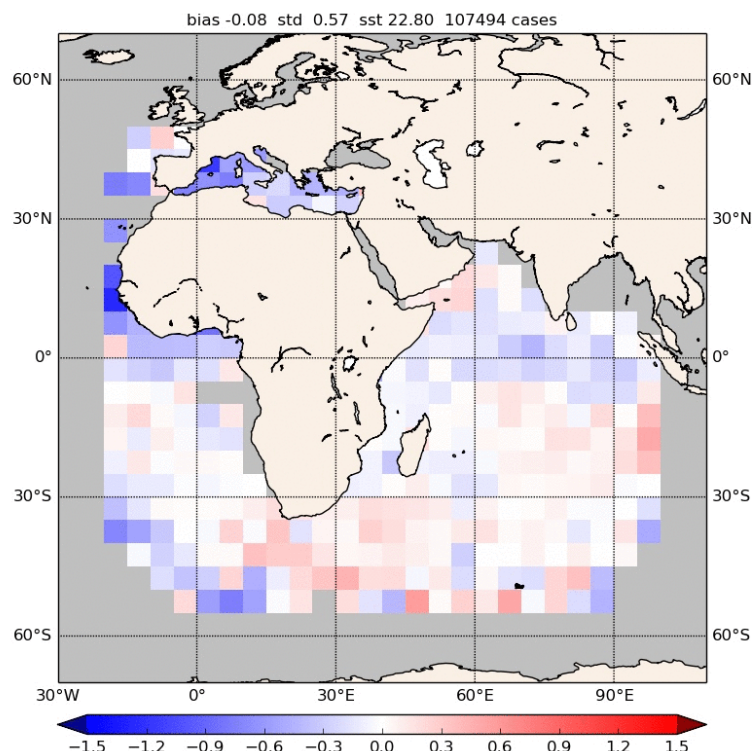
Figure 14: Mean Meteosat Indian Ocean day-time SST mean differencemean difference with respect to buoys measurements for quality level 3,4,5

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

| Month	Number of cases	mean difference °C	mean difference Req °C	mean difference Margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
Meteosat Indian Ocean <u>night</u>-time SST quality results over 2nd half 2017							
JUL. 2017	16983	-0.06	0.5	88	0.51	1	49
AUG. 2017	14112	-0.12	0.5	76	0.57	1	43
SEP. 2017	14179	-0.09	0.5	82	0.49	1	51
OCT. 2017	16052	-0.12	0.5	76	0.51	1	49
NOV. 2017	11286	-0.14	0.5	72	0.51	1	49
DEC. 2017	6605	-0.06	0.5	88	0.51	1	49
Meteosat Indian Ocean <u>day</u>-time SST quality results over 2nd half 2017							
JUL. 2017	20673	-0.15	0.5	70	0.65	1	35
AUG. 2017	17801	-0.14	0.5	72	0.69	1	31
SEP. 2017	17416	-0.01	0.5	98	0.52	1	48
OCT. 2017	21378	-0.06	0.5	88	0.49	1	51
NOV. 2017	18239	-0.07	0.5	86	0.47	1	53
DEC. 2017	12709	-0.05	0.5	90	0.51	1	49
(*) Mean difference Margin = 100 * (1 - (| mean difference / mean difference req.|)) (**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 fulfill the requirement.							

Table 6: Meteosat Indian Ocean SST quality results over 2nd half 2017, for 3, 4, 5 quality indexes.

Comments: Overall quality assessment results are good and quite stable.

The following graphs illustrate the evolution of Meteosat Indian Ocean-derived SST quality results over the past 12 months.
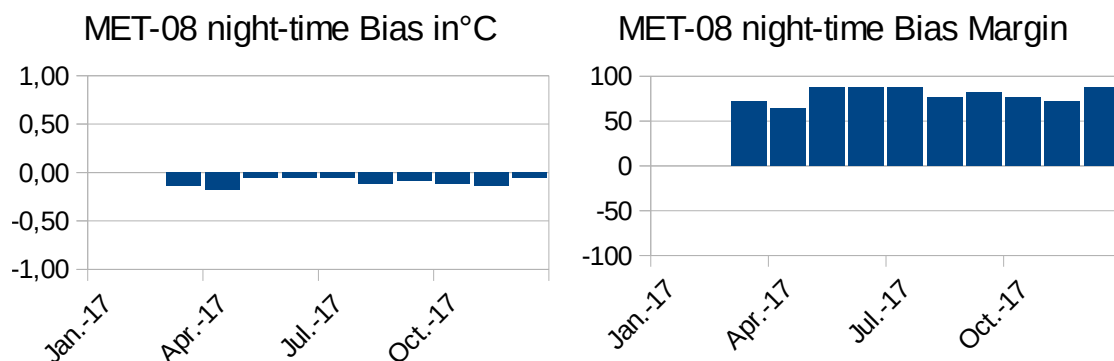
Figure 15: Left: Meteosat Indian Ocean night-time SST mean difference.
Right Meteosat Indian Ocean night-time SST mean difference margin.
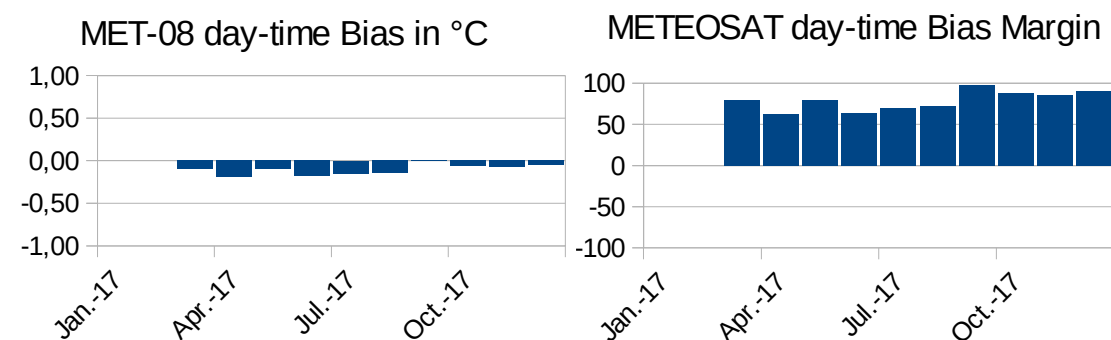
Figure 16: Left: Meteosat Indian Ocean day-time SST mean difference.
Right Meteosat Indian Ocean day-time SST mean difference margin.
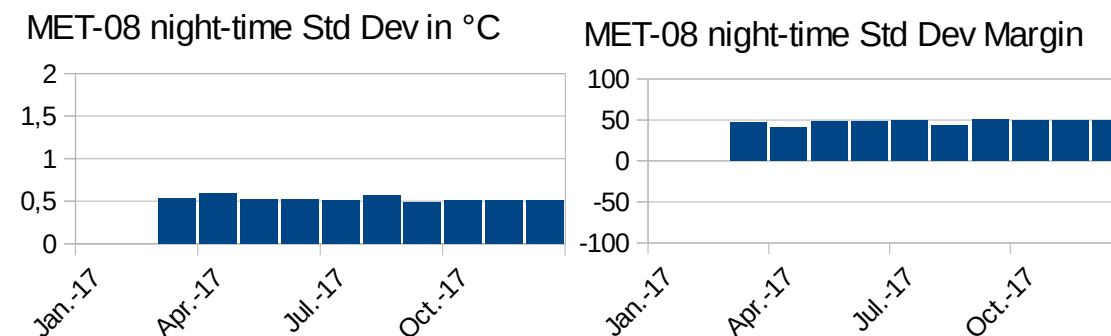
Figure 17: Left: Meteosat Indian Ocean night-time SST standard deviation.
Right Meteosat Indian Ocean night-time SST standard deviation margin.
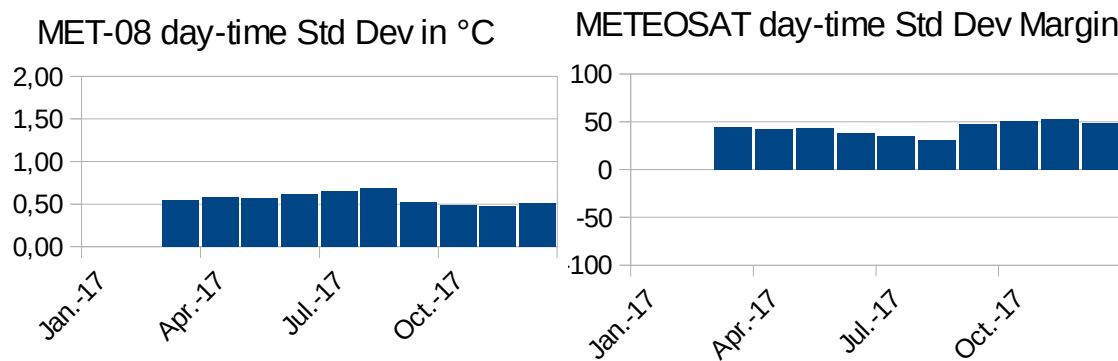
Figure 18:   **Left: Meteosat Indian Ocean day-time SST Standard deviation.**
                     Right Meteosat Indian Ocean day-time SST Standard deviation Margin.

Figure 19: Complementary quality assessment statistics on Meteosat Indian Ocean SST, night-time: dependence of the mean difference, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

Figure 20: Complementary quality assessment statistics Meteosat Indian Ocean SST, day-time: dependence of the mean difference, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

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

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

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

5.1.4.1. NPP NAR SST quality

The following maps indicate the mean night-time and day-time SST mean difference with respect to buoys measurements for quality level 3,4,5 over the reporting period. Monthly maps are available on http://osi-saf.eumetsat.int/lml/#qua_SST%SNPP%20NAR%20SST_monthly%20map_monthly_Night%20time.
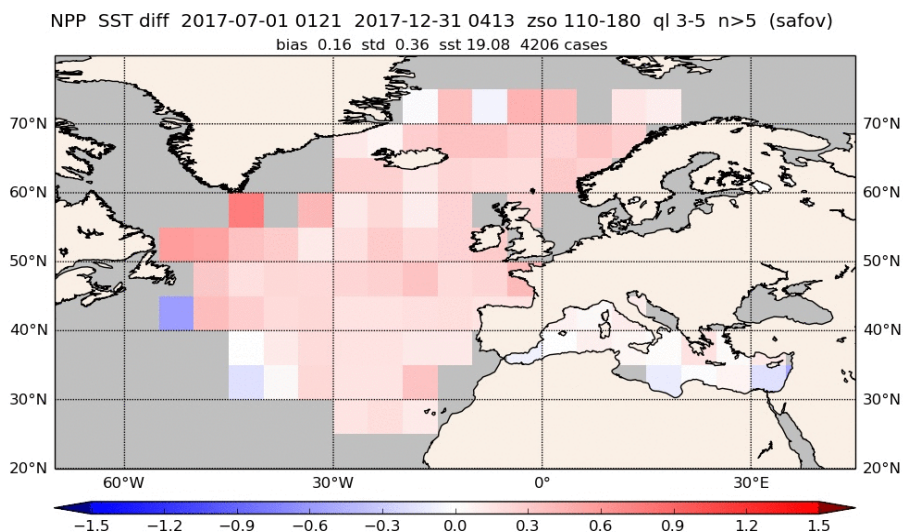
Figure 21: Mean NPP NAR night-time SST mean differencemean difference with respect to buoys measurements for quality level 3,4,5
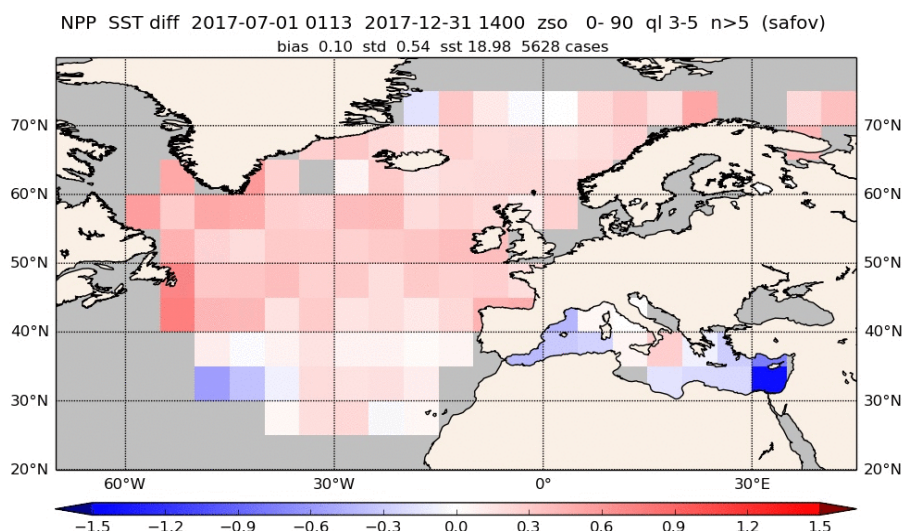
Figure 22: Mean NPP NAR day-time SST mean differencemean difference with respect to buoys measurements for quality level 3,4,5

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

| NPP NAR <u>night</u>-time SST quality results over 2nd half 2017							
Month	Number of cases	mean difference °C	mean difference Req °C	mean difference Margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
JUL. 2017	600	0.12	0.5	76	0.36	0.8	55.00
AUG. 2017	732	0.04	0.5	92	0.43	0.8	46.25
SEP. 2017	740	0.16	0.5	68	0.36	0.8	55.00
OCT. 2017	828	0.18	0.5	64	0.33	0.8	58.75
NOV. 2017	669	0.22	0.5	56	0.28	0.8	65.00
DEC. 2017	625	0.21	0.5	58	0.34	0.8	57.50
NPP NAR <u>day</u>-time SST quality results over 2nd half 2017							
JUL. 2017	1365	0.01	0.5	98	0.66	0.8	17.50
AUG. 2017	1185	0.02	0.5	96	0.61	0.8	23.75
SEP. 2017	1008	0.15	0.5	70	0.46	0.8	42.50
OCT. 2017	866	0.15	0.5	70	0.42	0.8	47.50
NOV. 2017	698	0.23	0.5	54	0.38	0.8	52.50
DEC. 2017	494	0.21	0.5	58	0.34	0.8	57.50
(*) Mean difference Margin = 100 * (1 - (| mean difference / mean difference req.|)) (**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 fulfill the requirement.							

Table 7: Quality results for NPP NAR SST over 2nd half 2017, for 3, 4, 5 quality indexes

Comments: Overall quality assessment results are good and quite stable.

The following graphs illustrate the evolution of NPP NAR SST quality results over the past 12 months.
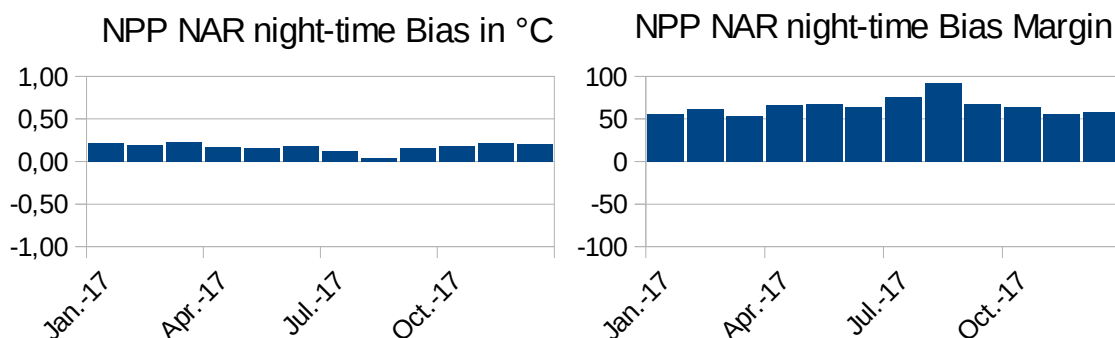
Figure 23: Left: NPP NAR night-time SST mean difference.
Right: NPP NAR night-time SST mean difference margin.
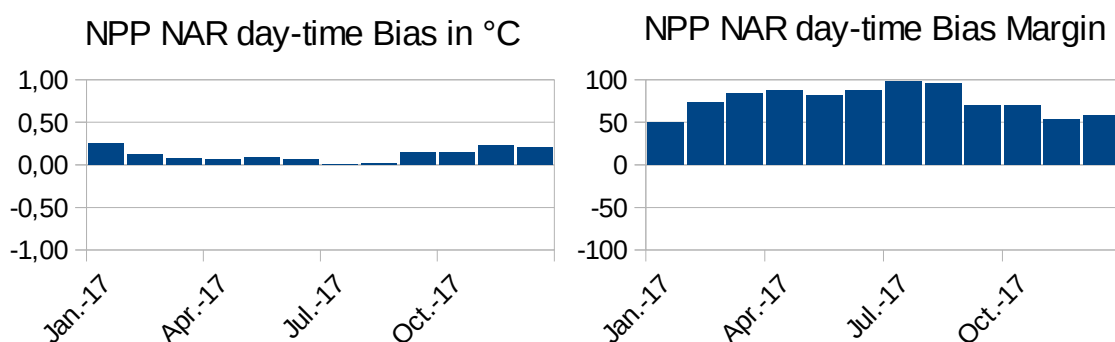
Figure 24: Left: NPP NAR day-time SST mean difference.
Right: NPP NAR day-time SST mean difference margin.
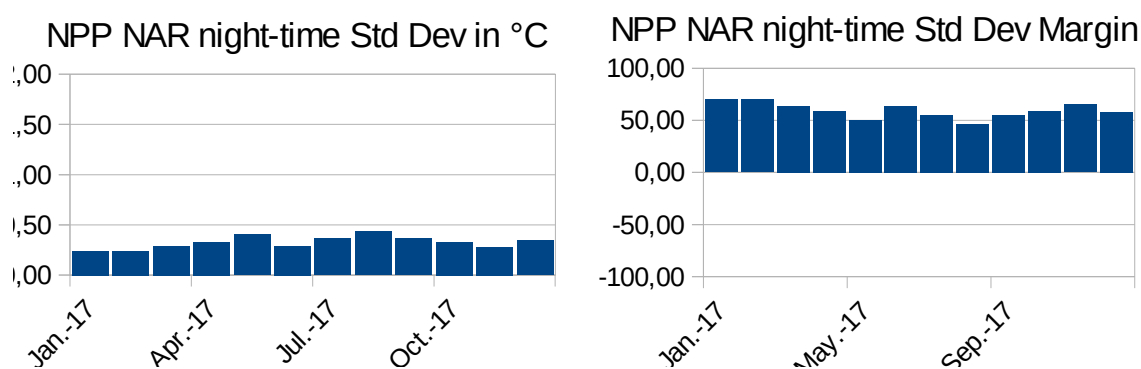
Figure 25: Left: NPP NAR night-time SST standard deviation.
Right : NPP NAR night-time SST standard deviation margin.

Figure 26: Left: NPP NAR day-time SST standard deviation.
Right : NPP NAR day-time SST standard deviation margin.
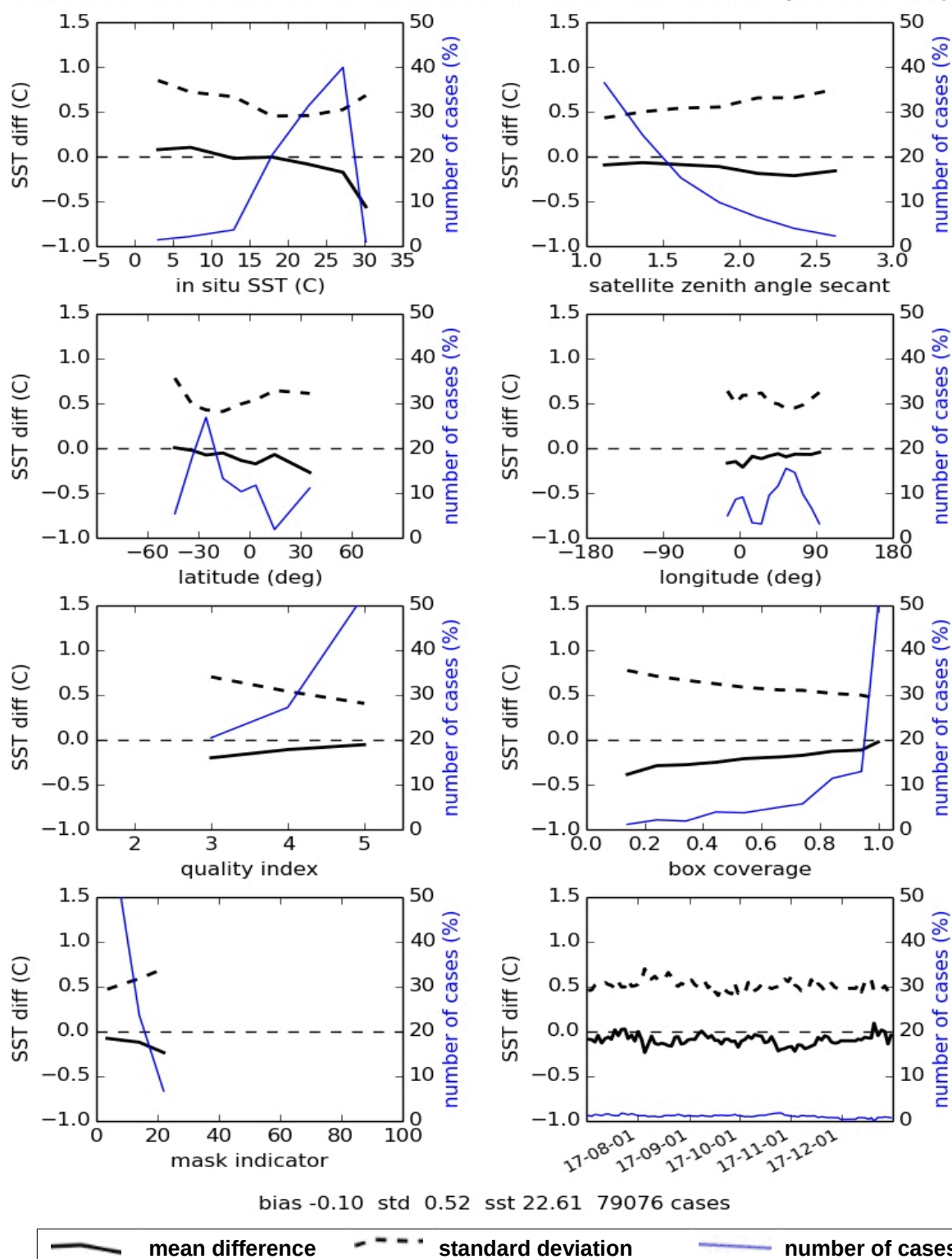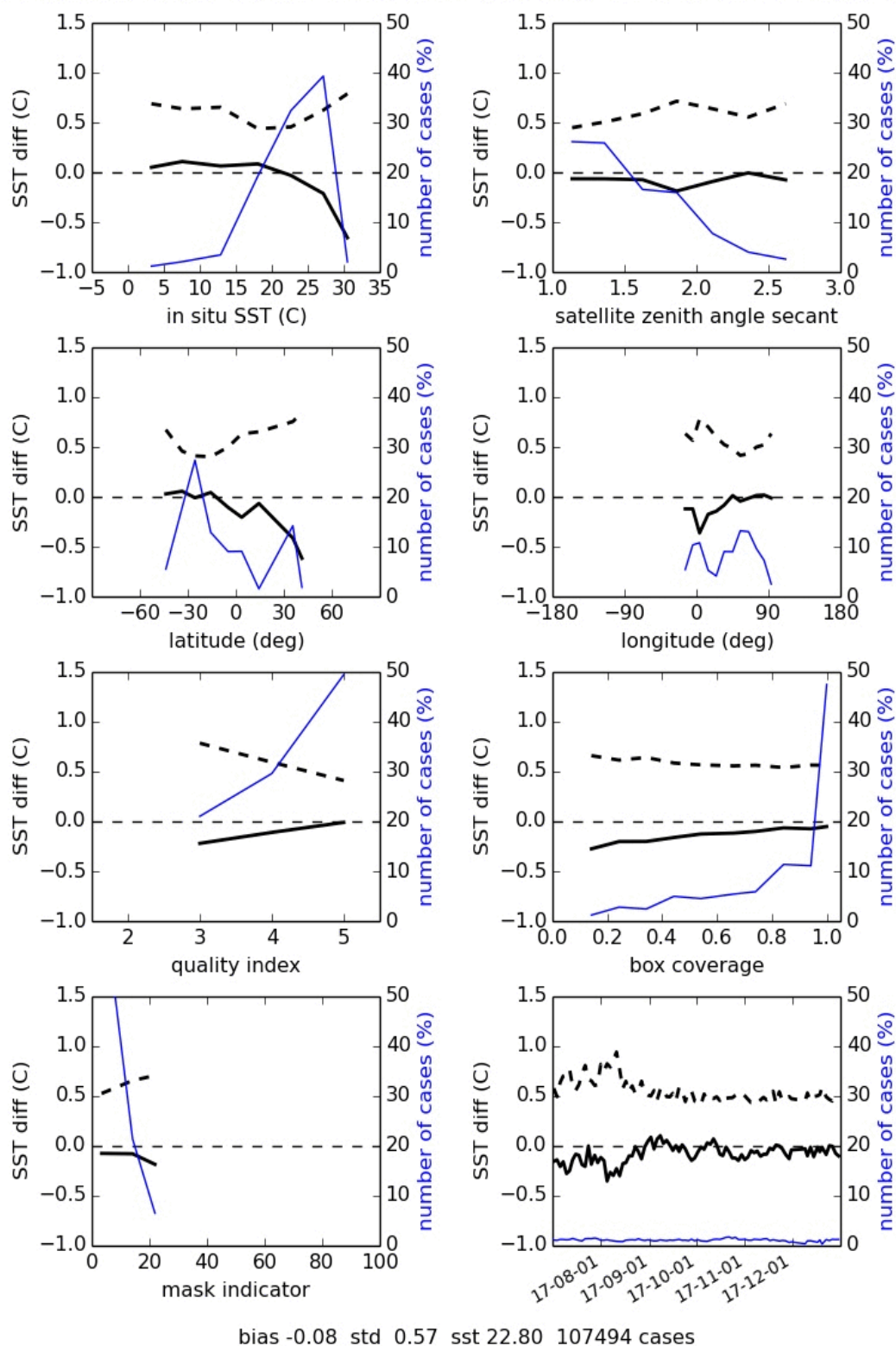
Figure 27: Complementary quality assessment statistics on NPP NAR SST night-time: dependence of the mean difference, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)
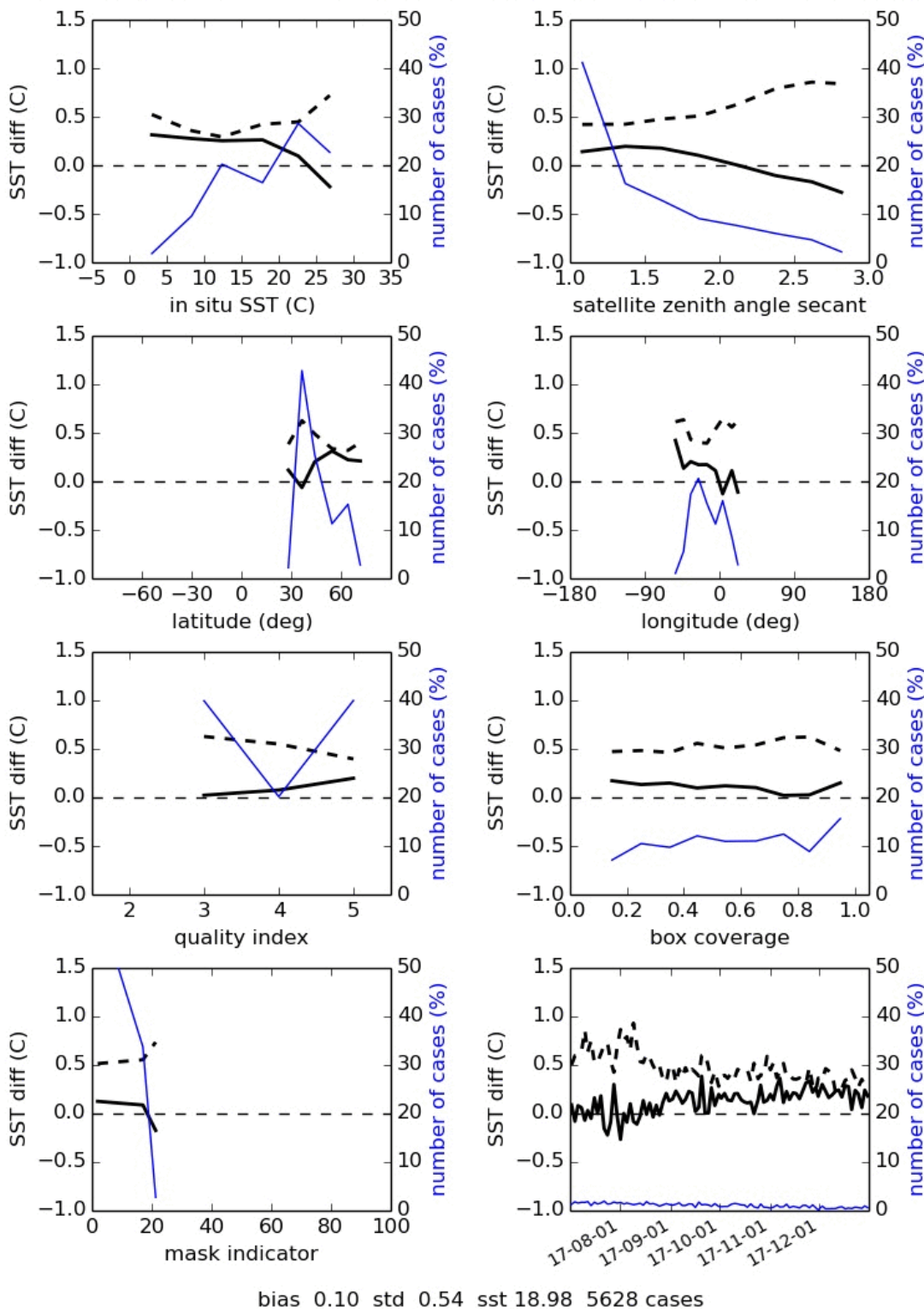
Figure 29: Complementary quality assessment statistics on NPP NAR SST day-time: dependence of the mean differencemean difference, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

5.1.4.2. Metop NAR SST quality

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

Figure 30: Mean Metop-B NAR night-time SST mean differencemean difference with respect to buoys measurements for quality level 3,4,5

Figure 31: Mean Metop-B NAR day-time SST mean differencemean 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 2017							
Month	Number of cases	mean difference °C	mean difference req. °C	mean difference Margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
JUL. 2017	915	-0.32	0.5	36	0.43	0.8	46.25
AUG. 2017	1765	-0.30	0.5	40	0.48	0.8	40.00
SEP. 2017	2308	-0.15	0.5	70	0.54	0.8	32.50
OCT. 2017	2468	-0.12	0.5	76	0.61	0.8	23.75
NOV. 2017	2260	-0.16	0.5	68	0.58	0.8	27.50
DEC. 2017	2156	-0.14	0.5	72	0.59	0.8	26.25
Metop-B NAR day-time SST quality results over 2nd half 2017							
JUL. 2017	3527	-0.24	0.5	52	0.73	0.8	8.75
AUG. 2017	3283	-0.21	0.5	58	0.61	0.8	23.75
SEP. 2017	3405	-0.11	0.5	78	0.56	0.8	30.00
OCT. 2017	2844	-0.08	0.5	84	0.58	0.8	27.50
NOV. 2017	1920	-0.05	0.5	90	0.48	0.8	40.00
DEC. 2017	1677	-0.05	0.5	90	0.47	0.8	41.25

(*) Mean difference margin = 100 * (1 - (| mean difference / mean difference req.|))
(**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 fulfill the requirement.

**Table 8: Quality results for Metop-B NAR SST over 2nd half 2017, for 3, 4, 5 quality indexes**

Comments: Overall quality assessment results are good and quite stable.

The following graphs illustrate the evolution of Metop-B NAR SST quality results over the past 12 months.
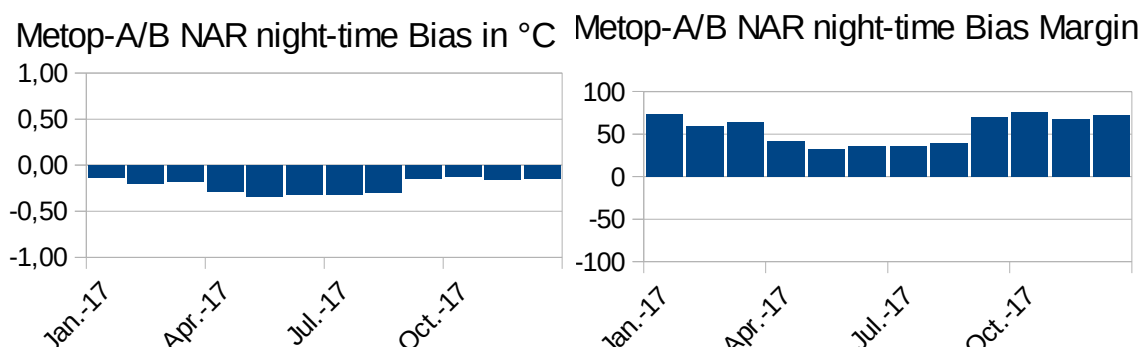
Figure 32:   Left: Metop-B NAR night-time SST mean difference.
            Right: Metop-B NAR night-time SST mean difference mmean differenceargin.

Metop-A/B NAR day-time Bias in °C

Metop-A/B NAR day-time Bias Margin
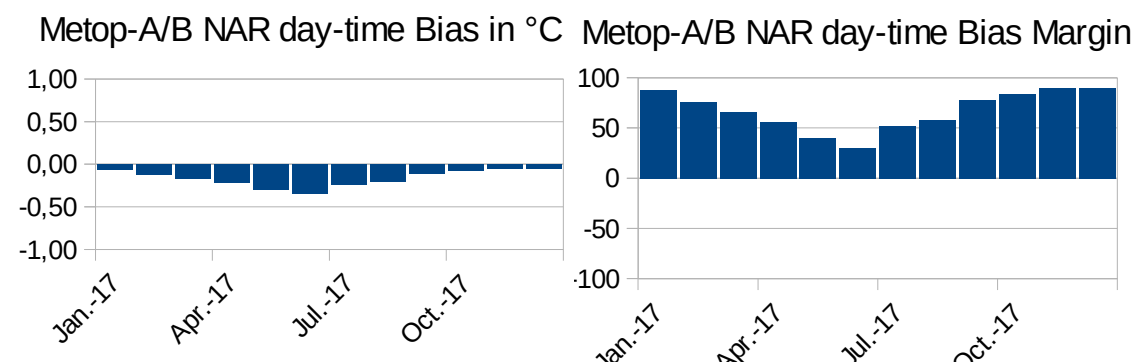
Figure 33: Left: Metop-B NAR day-time SST mean difference.
Right: Metop-B NAR day-time SST mean difference margin.

Metop-A/B NAR night-time Std Dev in °C

Metop-A/B NAR night-time Std Dev Mar
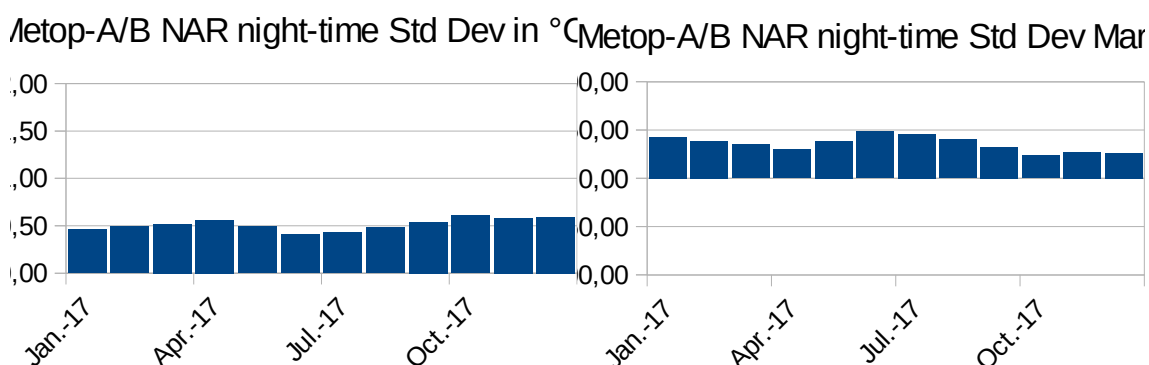
Figure 34: Left: Metop-B NAR night-time SST standard deviation.
Right: Metop-B NAR night-time SST standard deviation margin.

Metop-A/B NAR day-time Std Dev in °C

Metop-A/B NAR day-time Std Dev Margin
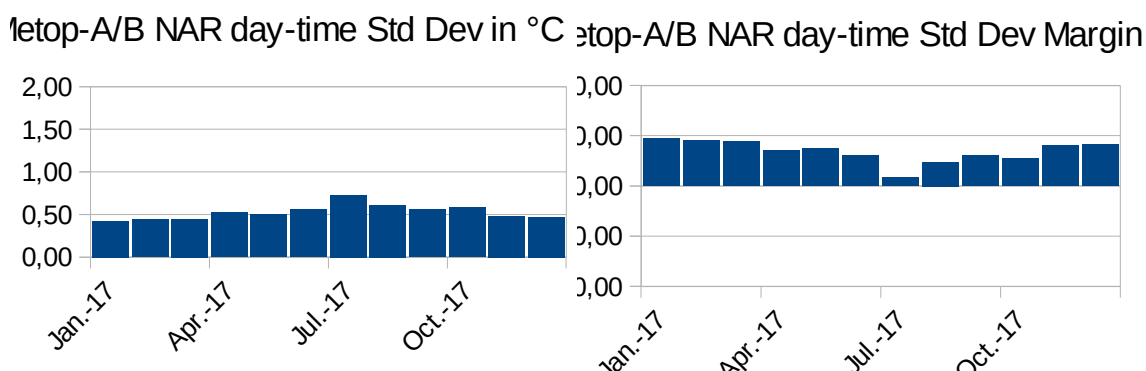
Figure 35: Left: Metop-B NAR day-time SST Standard deviation.
Right: Metop-B NAR day-time SST Standard deviation Margin.
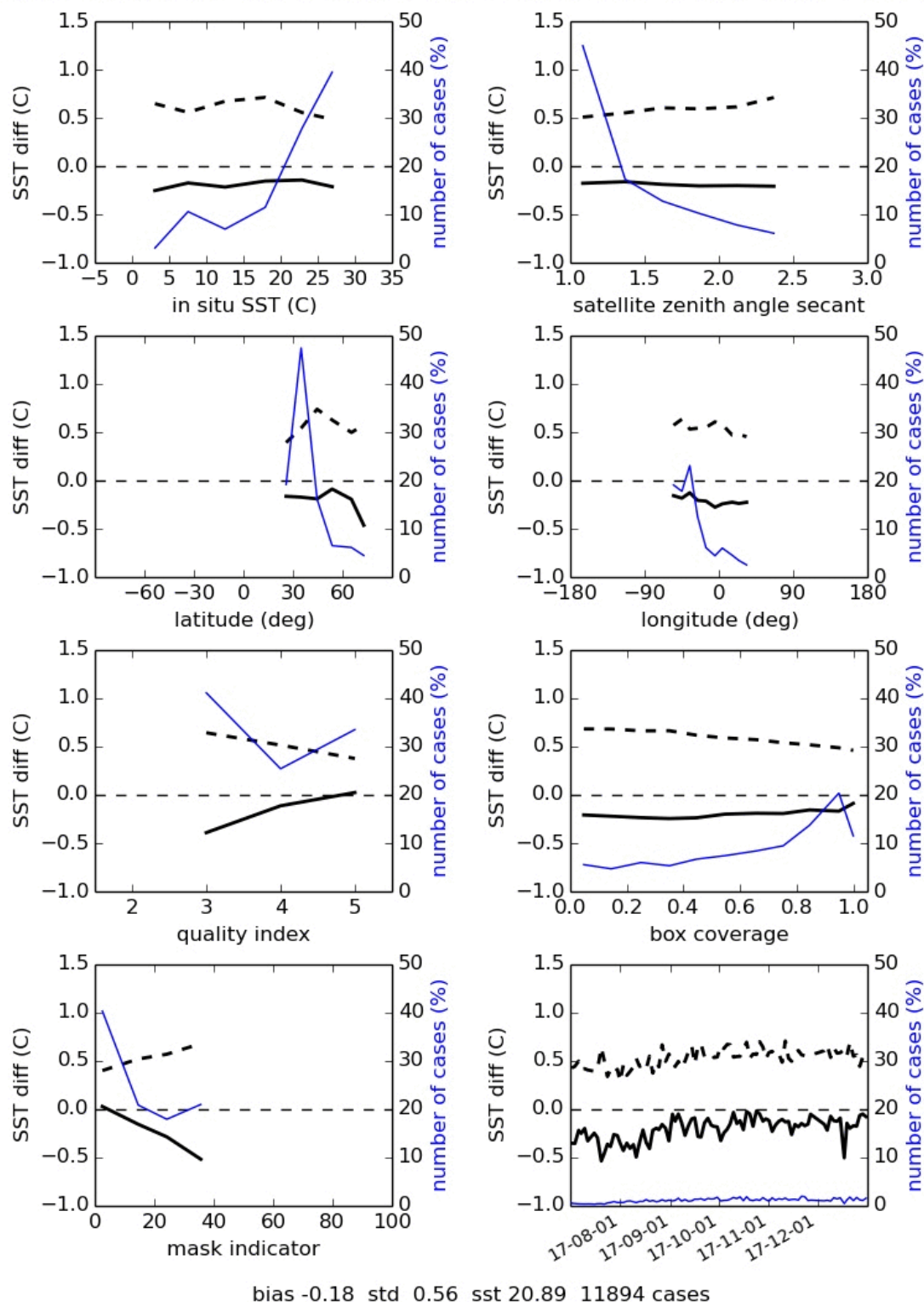
bias -0.18 std 0.56 sst 20.89 11894 cases

Figure 36: Complementary quality assessment statistics on Metop NAR SST night-time : dependence of the mean difference, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)
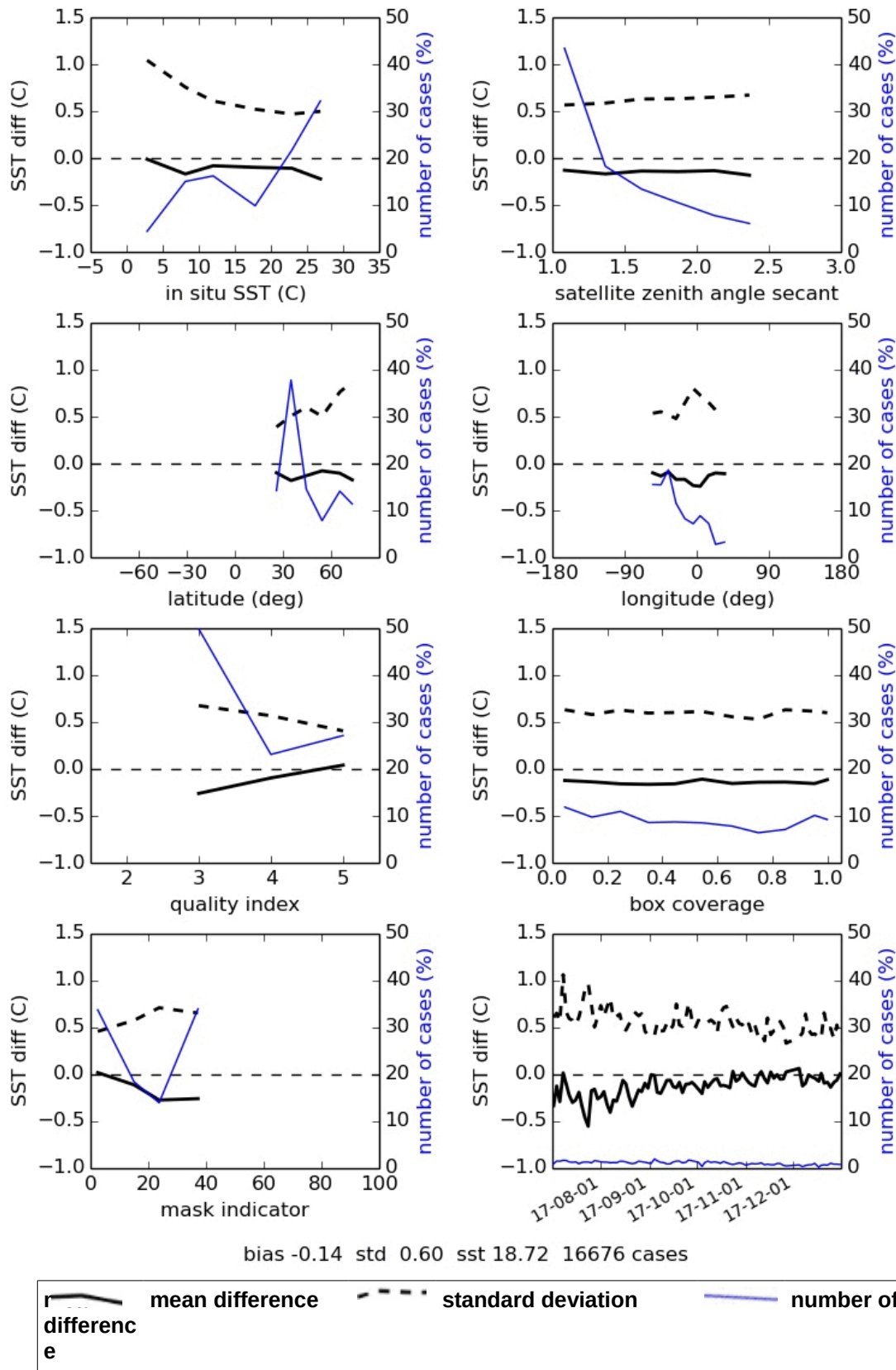
Figure 37: Complementary quality assessment statistics on Metop NAR SST day-time: dependence of the mean difference, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

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

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

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

The Metop/AVHRR SST validation report, available on www.osi-saf.org, gives further details about the regional mean difference observed and their origin.
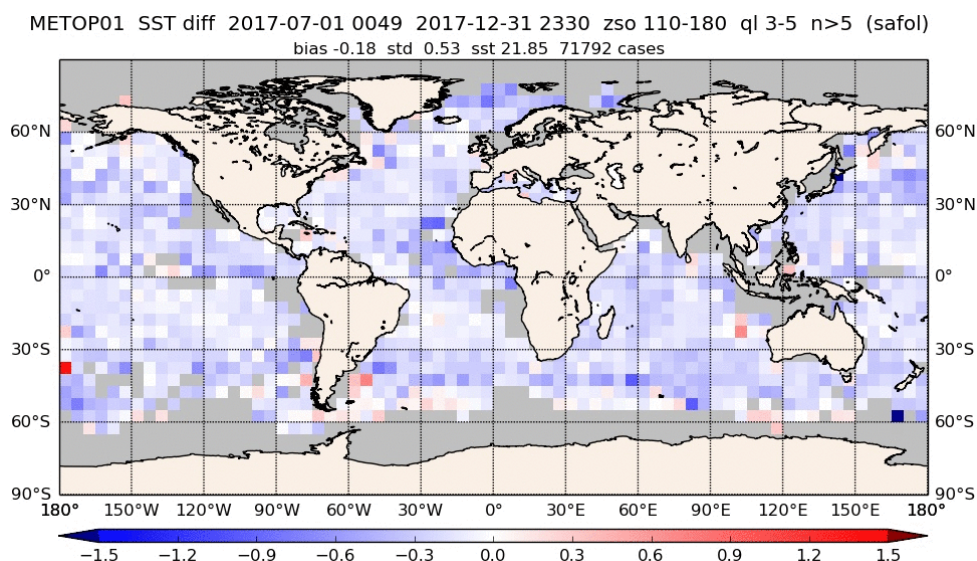
Figure 38: Mean Metop-B night-time SST mean difference with respect to buoys measurements for quality level 3,4,5
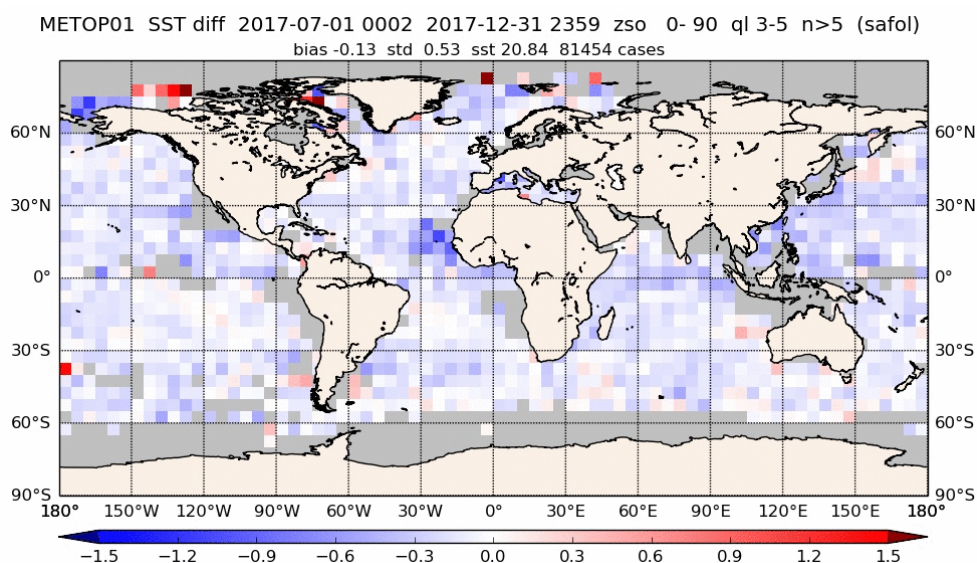
Figure 39: Mean Metop-B day-time SST mean difference with respect to buoys measurements for quality level 3,4,5

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

Global Metop-B night-time SST quality results over 2nd half 2017							
Month	Number of cases	mean difference °C	mean difference req. °C	mean difference Margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
JUL. 2017	11103	-0.19	0.5	62	0.51	0.8	36.25
AUG. 2017	12030	-0.22	0.5	56	0.51	0.8	36.25
SEP. 2017	13266	-0.18	0.5	64	0.52	0.8	35.00
OCT. 2017	13619	-0.16	0.5	68	0.55	0.8	31.25
NOV. 2017	11260	-0.18	0.5	64	0.52	0.8	35.00
DEC. 2017	10483	-0.19	0.5	62	0.55	0.8	31.25
Global Metop-B day-time SST quality results over 1st half 2018							
JUL. 2017	15229	-0.19	0.5	62	0.61	0.8	23.75
AUG. 2017	14668	-0.17	0.5	66	0.58	0.8	27.50
SEP. 2017	15128	-0.12	0.5	76	0.52	0.8	35.00
OCT. 2017	14200	-0.10	0.5	80	0.50	0.8	37.50
NOV. 2017	11303	-0.09	0.5	82	0.45	0.8	43.75
DEC. 2017	10881	-0.12	0.5	76	0.47	0.8	41.25

Table 9: Quality results for global METOP SST over 2nd half 2017, for 3,4,5 quality indexes

Comments: Overall quality assessment results are good and quite stable.

The following graphs illustrate the evolution of global Metop SST quality results over the past 12 months.

Figure 40:   **Left: global Metop-B night-time SST mean difference.**
             Right: global Metop-B night-time SST mean difference mmean differenceargin.

Global Metop-A/B day-time Bias in °C

Global Metop-A/B day-time Bias Margin

Figure 41: **Left: global Metop-B day-time SST mean difference.**
Right: global Metop-B day-time SST mean difference margin.

Global Metop-A/B night-time Std Dev in °C

Global Metop-A/B night-time Std Dev M

Figure 42: **Left: global Metop-B night-time SST Standard deviation.**
Right: global Metop-B night-time SST Standard deviation Margin.

Global Metop-A/B day-time Std Dev in °C

Global Metop-A/B day-time Std Dev Margin

Figure 43: **Left: global Metop-B day-time SST Standard deviation.**
Right: global Metop-B day-time SST Standard deviation Margin.

Figure 44: Complementary quality assessment statistics on Metop GBL SST night-time: dependence of the mean difference, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)
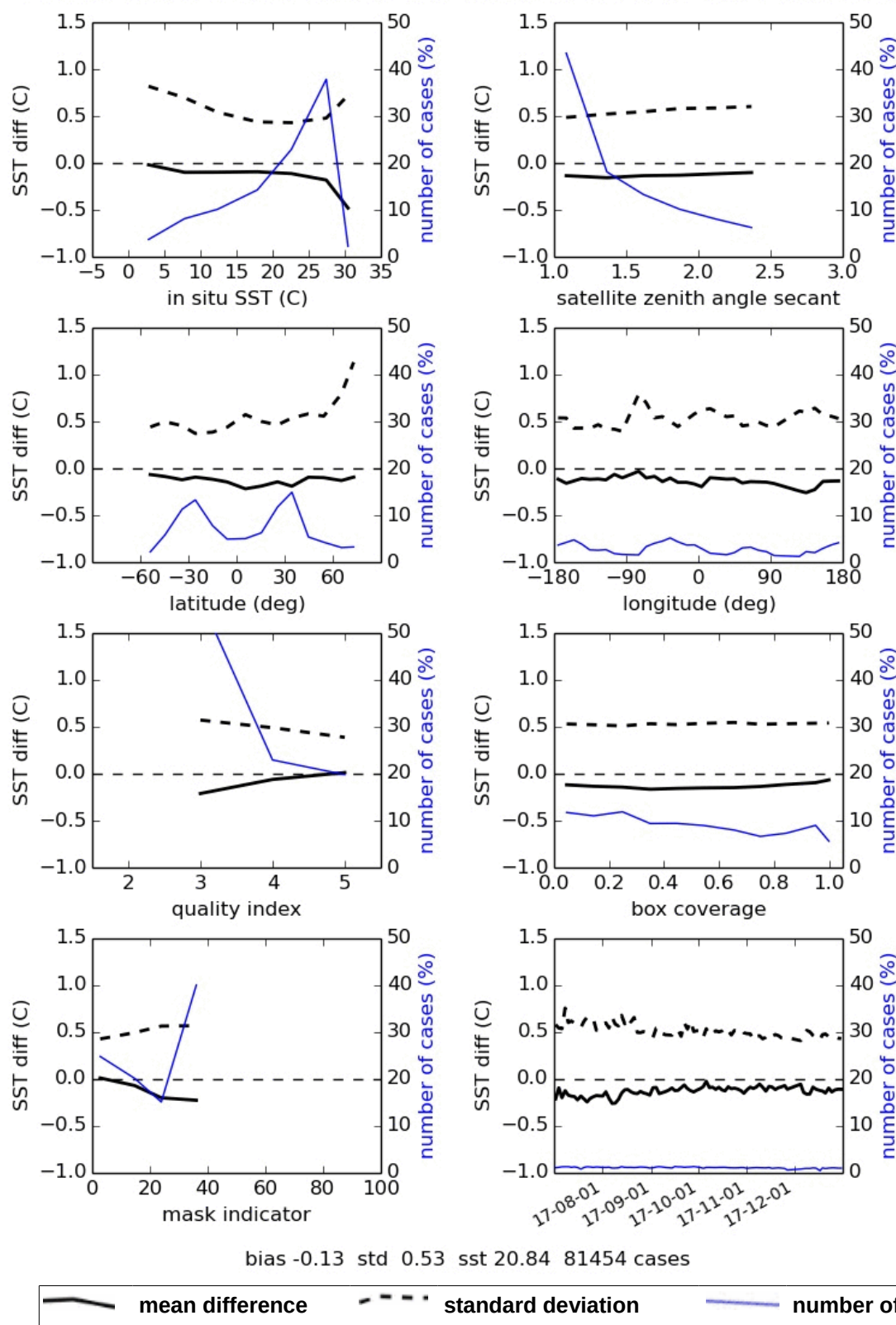
Figure 45: Complementary quality assessment statistics on Metop GBL SST day-time: dependence of the mean differencemean difference, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

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

Level 2 HL SST/IST (OSI-205)

The Level 2 HL SST/IST (OSI-205) is derived from polar satellites data, currently from Metop-A. The OSI-205 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 (Std) and mean differences are calculated for monthly averages for both day- and nighttime (table values) and all day (graph). Where quality levels 4 and 5 are included in the data that are stratified by day and night data and only best quality data (ql 5) are used in the all-day-quality graph. Daytime is defined for data with sun-zenith angles smaller than 90 degrees and nighttime data is defined for sun-zenith angles greater than 110 degrees. In situ observations and the centre of the OSI-205 level-2 pixel must be within 3 km of each other and observation times must be within 15 minutes.

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). Only validation results for OSI-205 vs. traditional buoy data (air temperatures) are subject to the quality assessment requirements.

The following table provide the monthly mean quality results over the reporting period.

Quality results for OSI-205 HL SST in Northern Hemisphere over Jan. 2017 to Dec. 2017, for quality level 5 (best qualities), by night and by day.

OSI-205 SST NH quality results over 2nd half of 2017 and 1st half 2018, night-time						
Month	Number of cases	Mean diff. °C	Mean diff. req. °C	Mean diff. Margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
JAN. 2017	474	-7.46	-3.5	-149	5.21	3.0	-30
FEB. 2017	480	-4.78	-3.5	-59	4.35	3.0	-9
MAR. 2017	25	-1.20	-3.5	60	1.11	3.0	72
APR. 2017	NA	NA	-3.5	NA	NA	3.0	NA
MAY 2017	NA	NA	-3.5	NA	NA	3.0	NA
JUN. 2017	NA	NA	-3.5	NA	NA	3.0	NA
JUL. 2017	NA	NA	0.7	NA	NA	1.0	NA
AUG. 2017	NA	NA	0.7	NA	NA	1.0	NA
SEP. 2017	178	-0.21	0.7	70.0	0.40	1.0	60.0
OCT. 2017	987	-0.26	0.7	62.9	0.47	1.0	53.0
NOV. 2017	858	-0.28	0.7	60.0	0.44	1.0	56.0
DEC. 2017	1013	-0.33	0.7	52.9	0.39	1.0	61.0
OSI-205 SST NH quality results over 2nd half of 2017 and 1st half 2018, day-time						
Month	Number of cases	Mean diff. °C	Mean diff. req. °C	Mean diff. Margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
JAN. 2017	93	-3.64	-3.5	-21	2.99	3.0	25
FEB. 2017	1002	-5.43	-3.5	-81	4.30	3.0	-7
MAR. 2017	4818	-5.24	-3.5	-75	3.76	3.0	6
APR. 2017	9228	-4.70	-3.5	-57	3.40	3.0	15
MAY 2017	4335	-4.78	-3.5	-59	3.83	3.0	4
JUN. 2017	20	-4.22	-3.5	-41	2.12	3.0	47
JUL. 2017	557	-0.36	0.7	48.6	1.06*	1.0	-6.0
AUG. 2017	902	-0.28	0.7	60.0	0.88	1.0	12.0
SEP. 2017	2644	-0.24	0.7	65.7	0.65	1.0	35.0
OCT. 2017	1475	-0.33	0.7	52.9	0.54	1.0	46.0
NOV. 2017	458	-0.36	0.7	48.6	0.43	1.0	57.0
DEC. 2017	121	-0.35	0.7	50.0	0.34	1.0	66.0

(*) Mean difference Margin = 100 * (1 - (| mean difference / mean difference req.|))
(**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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.

Comments:
The validation results for OSI-205 HL SST for the last half year show that mean differences and standard deviations are usually within target requirements. Only exception is July 2017 (*) day-time data that is slightly outside the target requirement on standard deviation, due to a few outliers.
An automatic routine will be developed for further quality control and inspection of extreme outliers.
Due to sparse or no qualified night-time data in the spring and summer months, there are no statistics reported for July and August 2017.

Quality results for OSI-205 Metop AVHRR IST over July 2017 to Dec. 2017, for quality level 5 (best quality), day-time.						
OSI-205 IST quality results over 2nd half of 2017 and 1st half 2018, day-time						
Month	Number of cases	Mean diff. °C	Mean diff. req. °C	Mean diff. Margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
JUL. 2017	NA	NA	3.5	NA	NA	3.0	NA
AUG. 2017	38	-4.92*	3.5	-40.6	4.23*	3.0	-41.0
SEP. 2017	761	-2.19	3.5	37.4	2.63	3.0	12.3
OCT. 2017	417	-1.44	3.5	58.9	1.50	3.0	50.0
NOV 2017	NA	NA	3.5	NA	NA	3.0	NA
DEC. 2017	NA	NA	3.5	NA	NA	3.0	NA

(*) Mean difference Margin = 100 * (1 - (| mean difference / mean difference req.|))
(**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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.

JUL. to DEC. 2017 quality results for OSI-205 Metop AVHRR IST in Southern Hemisphere for quality level 5 (best quality, day-time).						
OSI-205 IST SH quality results over 2nd half of 2017, day-time						
Month	Number of cases	Mean diff. °C	Mean diff. Req. °C	Mean diff. Margin (*)	Std Dev °C	Std Dev Req. °C	Std Dev margin (**)
JUL. 2017	NA	NA	3.5	NA	NA	3.0	NA
AUG. 2017	NA	NA	3.5	NA	NA	3.0	NA
SEP. 2017	117	-1.39	3.5	60.3	1.83	3.0	39.0
OCT. 2017	2629	-2.47	3.5	29.4	2.34	3.0	22.0
NOV. 2017	NA	NA	3.5	NA	NA	3.0	NA
DEC. 2017	NA	NA	3.5	NA	NA	3.0	NA

(*) Mean difference Margin = 100 * (1 - (| mean difference / mean difference req.|))
(**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 fulfill the requirement.

Quality results for OSI-205 Metop AVHRR IST validated against in-situ IR radiometers over JUL. to DEC. 2017, for quality level 5 (best qualitiy, day-time).						
OSI-205 IST NH quality results over 2nd half of 2017, day-time						
Month	Number of cases	Mean diff. °C	Mean diff. °C	Mean diff. margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
JUL. 2017	136	-0.61	-1.5	59.3	0.65	2.0	67.5
AUG. 2017	315	-1.41	-1.5	6.0	0.88	2.0	56.0
SEP. 2017	340	-2.01*	-1.5	-34.0	1.34	2.0	33.0
OCT. 2017	NA	NA	-1.5	NA	NA	2.0	NA
NOV. 2017	NA	NA	-1.5	NA	NA	2.0	NA
DEC. 2017	NA	NA	-1.5	NA	NA	2.0	NA

(*) Mean difference Margin = 100 * (1 - (| Mean difference / Mean difference req.|))
(**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 fulfill the requirement.

Comments:

First table shows Northern Hemisphere validation results for OSI-205 IST for the last half year. Validation is using best quality level 5 data only thus no night-time data is evaluated. Mean difference and standard deviations are usually within target requirements. The only exception (*) is August 2017, due to sparse data.

Second table shows quality results for OSI-205 IST on Southern Hemisphere compared to in-situ drifter data in 2nd half-year of 2017. Results are available for September and October 2017 only, when using best quality data (quality level 5) in the validation and due to a limited amount of buoys available. Mean differences and standard deviations are within target requirements.

Last table is included for reference, to show quality results for OSI-205 NH IST compared to in-situ IR radiometer measurements from the PROMICE program (stations on Greenland Ice Sheet). Quality results are shown for those three months where best quality data was available (quality level 5, day-time); Mean differences and standard deviations lie within those target requirements adherent to the validation against IR radiometers, except for mean difference in September 2017 that is slightly above, due to a few outliers. Results are better than when comparing OSI-205 IST with in-situ drifters, due to the IR radiometers measuring the actual ice surface skin temperature, as well as the that fact that there is less cloudcover over the Greenland ice sheet than over the Arctic ocean.

Level 3 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 JAN. 2017 to DEC. 2017, night-time							
Month	Number of cases	mean difference °C	mean difference req. °C	mean difference Margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
JAN. 2017	173	-0.36	0.5	27.9	0.77	0.8	3.5
FEB. 2017	150	-0.27	0.5	46.3	0.67	0.8	16.2
MAR. 2017	162	-0.20	0.5	60.9	0.60	0.8	24.9
APR. 2017	133	-0.30	0.5	40.4	0.84	0.8	-5.0
MAY 2017	175	-0.03	0.5	93.7	0.44	0.8	44.2
JUN. 2017	93	-0.22	0.5	56.5	0.58	0.8	26.9
JUL. 2017	275	0.03	0.5	94.5	0.66	0.8	17.4
AUG. 2017	234	-0.11	0.5	78.0	0.76	0.8	4.9
SEP. 2017	292	-0.22	0.5	56.2	0.87	0.8	-8.9
OCT. 2017	239	-0.43	0.5	13.8	0.85	0.8	-6.8
NOV. 2017	299	-0.38	0.5	23.6	0.76	0.8	5.1
DEC. 2017	293	-0.58	0.5	-15.6	0.70	0.8	12.4
OSI-203 AHL AVHRR SST quality results over JAN. 2017 to DEC. 2017, day-time							
Month	Number of cases	mean difference °C	mean difference req. °C	mean difference Margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
JAN. 2017	260	-0.22	0.5	56.5	0.70	0.8	12.7
FEB. 2017	491	-0.22	0.5	55.5	0.63	0.8	21.5
MAR. 2017	629	-0.25	0.5	49.6	0.59	0.8	26.1
APR. 2017	529	-0.22	0.5	55.8	0.60	0.8	24.7
MAY 2017	517	-0.05	0.5	90.9	0.66	0.8	16.9
JUN. 2017	596	0.06	0.5	88.5	0.56	0.8	30.1
JUL. 2017	771	0.13	0.5	72.7	0.74	0.8	6.9
AUG. 2017	812	-0.04	0.5	90.5	0.78	0.8	2.9
SEP. 2017	941	-0.08	0.5	84.5	0.71	0.8	11.4
OCT. 2017	912	-0.47	0.5	6.5	0.89	0.8	-11.2
NOV. 2017	1175	-0.48	0.5	3.8	0.71	0.8	10.8
DEC. 2017	1161	-0.48	0.5	3.2	0.76	0.8	4.7
(*) mean difference margin = 100 * (1 - (| mean difference / mean difference req.|)) (**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 fulfill the requirement.							

Table 10: Quality results for OSI-203AHL AVHRR SST over JAN. 2017 to DEC. 2017, for 3,4,5 quality indexes, by night and by day.

Comments: The validation results for Level 3 AHL SST (OSI-203) for this period (July to December) show the usual behavious for OSI-203; the mean difference and standard deviations are usually within or slightly outside target requirements and always inside threshold requirement. The mean difference is just outside target requirement for night time in December and std deviations just outside for nighttime in September and October and daytime in October.

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.
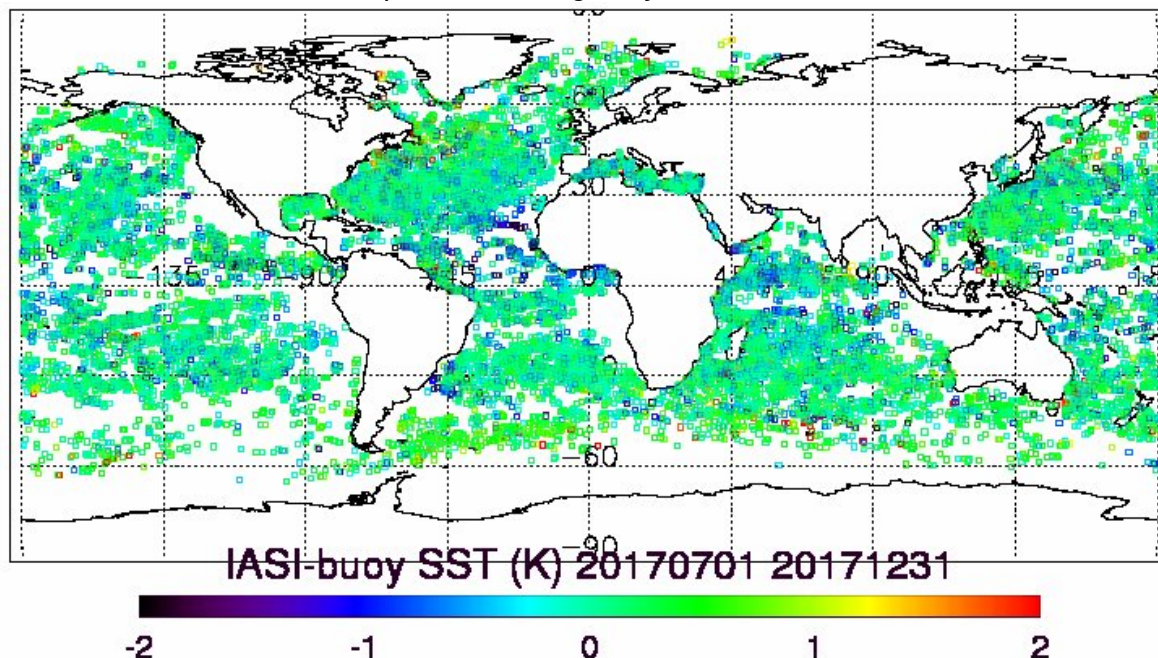
Figure 46: Mean Metop-B IASI night-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JUL. 2017 to DEC. 2017
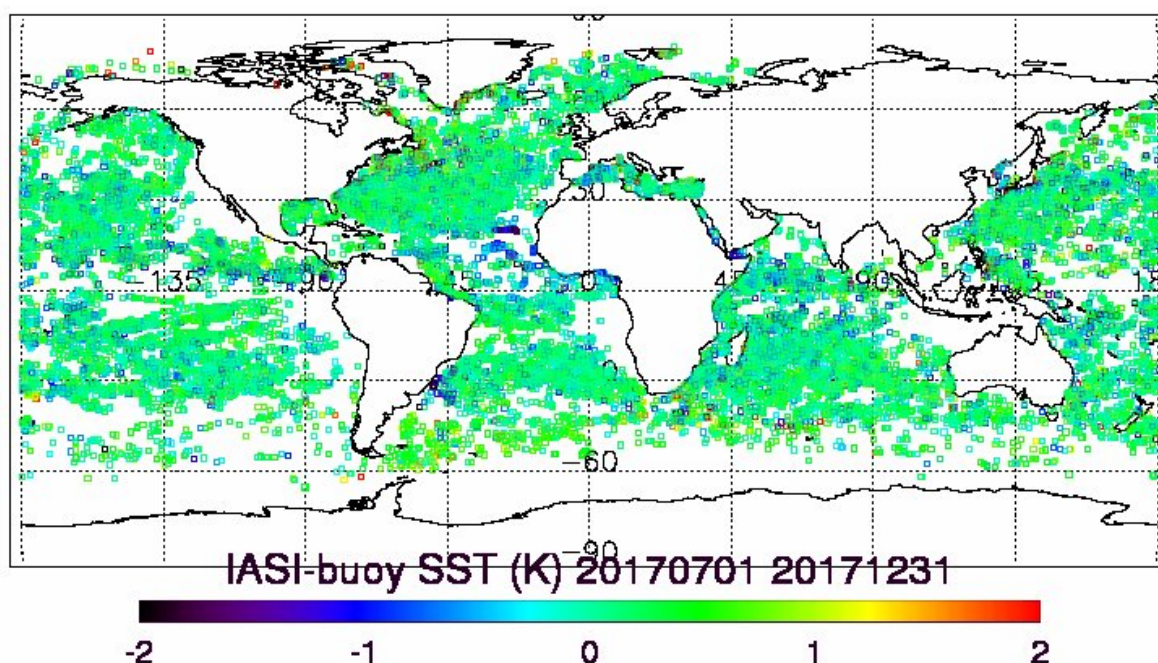
Figure 47: Mean Metop-B IASI day-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 from JUL. 2017 to DEC. 2017

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

Global Metop-B IASI night-time SST quality results over 2nd half 2017							
Month	Number of cases	Mean difference °C	Mean difference req. °C	Mean difference Margin (*)	Std Dev °C	Std Dev req. °C	Std Dev margin (**)
JUL. 2017	4788	-0.03	0.5	94	0.58	0.8	28
AUG. 2017	1492	-0.03	0.5	94	0.57	0.8	29
SEP. 2017	4582	0.03	0.5	94	0.60	0.8	25
OCT. 2017	4500	0.02	0.5	96	0.61	0.8	24
NOV. 2017	4017	0.01	0.5	98	0.56	0.8	30
DEC. 2017	1274	-0.01	0.5	98	0.57	0.8	29
Global Metop-B IASI day-time SST quality results over 2nd half 2017							
JUL. 2017	4968	0.04	0.5	92	0.52	0.8	35
AUG. 2017	1436	0.05	0.5	90	0.60	0.8	25
SEP. 2017	5179	0.09	0.5	82	0.51	0.8	36
OCT. 2017	5058	0.09	0.5	82	0.55	0.8	31
NOV. 2017	4482	0.08	0.5	84	0.51	0.8	36
DEC. 2017	1304	0.06	0.5	88	0.53	0.8	34
(*) Mean difference margin = 100 * (1 - (	mean difference / mean difference req.|)) (**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 fulfill the requirement.						

Table 11: Quality results for global Metop-B IASI SST over 2nd half 2017, for Quality Levels 3, 4 and 5
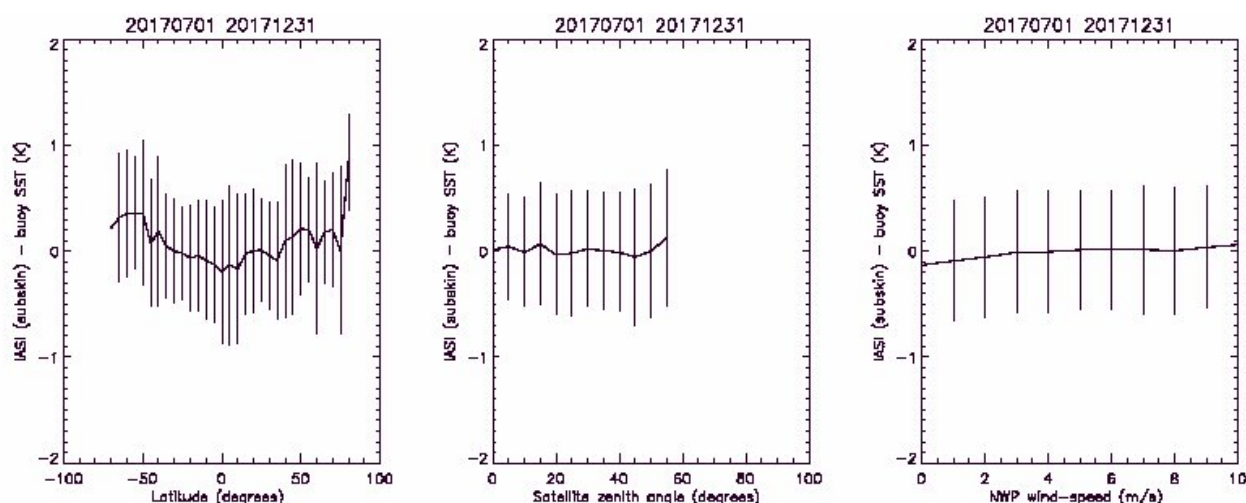
Figure 48: Mean Metop-B IASI night-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JAN. 2017 to DEC. 2017
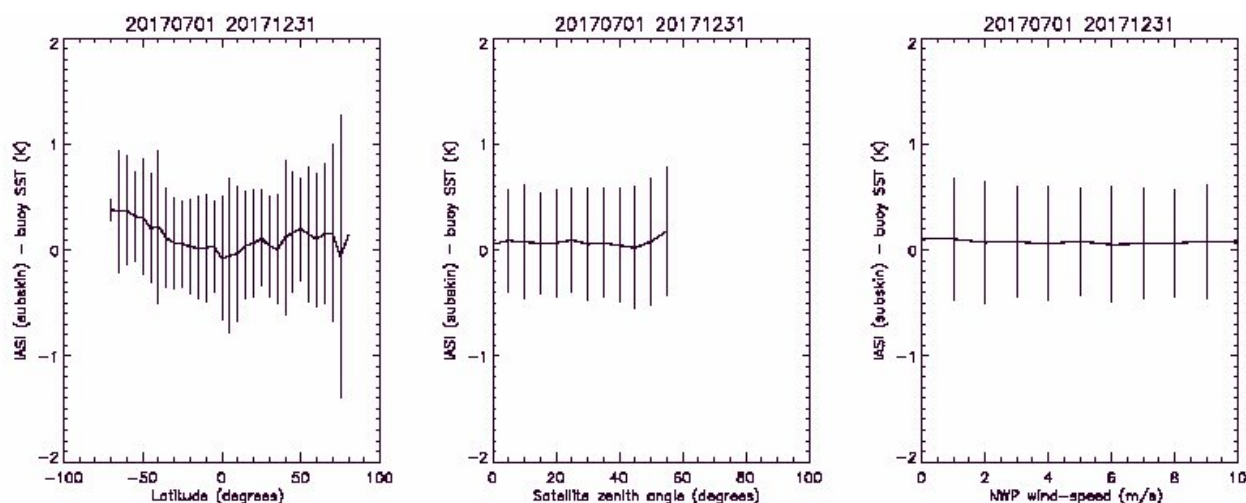
Figure 49: Mean Metop-B IASI day-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JAN. 2017 to DEC. 2017

Comments: All statistics are performing well and within the requirements. For the period 1st July to 31st December 2017, then global mean day-time IASI minus drifting buoy mean difference is 0.07K with standard deviation of 0.53K (n=25727), and for night-time the mean difference is 0.0K with standard deviation of 0.58K (n=23793). The night-time standard deviation has increased by around 0.16K with the implementation of the IASI PPF v4.3 in June 2017, in order to achieve a higher yield of observations at higher latitudes as per a user request, but it still within specification.

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_2b.gif

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

Geostationary Meteosat & GOES-East DLI quality results over 2nd half 2017										
Month	Number of cases	Mean DLI in Wm^{-2}	mean diff. in Wm^{-2}	mean diff. in %	mean diff. req. in %	mean diff. marg in % (*)	Std Dev in Wm^{-2}	Std Dev in %	Std Dev req. in %	Std Dev margin (**) in %
JAN. 2017	4149	278.32	-12.31	-4.42	5.00	11.54	22.24	7.99	10.00	20.09
FEB. 2017	4020	288.89	-7.39	-2.56	5.00	48.84	20.13	6.97	10.00	30.32
MAR. 2017	5158	296.30	-4.92	-1.66	5.00	66.79	18.69	6.31	10.00	36.92
APR. 2017	3972	314.76	-1.96	-0.62	5.00	87.55	17.16	5.45	10.00	45.48
MAY 2017	5220	309.39	-1.99	-0.64	5.00	87.14	16.49	5.33	10.00	46.70
JUN. 2017	4050	357.36	-1.63	-0.46	5.00	90.88	17.85	4.99	10.00	50.05
JUL. 2017	5090	377.33	-2.59	-0.69	5.00	86.27	18.75	4.97	10.00	50.31
AUG. 2017	5107	367.64	-2.18	-0.59	5.00	88.14	18.60	5.06	10.00	49.41
SEP. 2017	4248	347.88	-3.61	-1.04	5.00	79.25	17.83	5.13	10.00	48.75
OCT. 2017	4444	320.33	-3.10	-0.97	5.00	80.64	17.08	5.33	10.00	46.68
NOV. 2017	4222	290.74	-4.43	-1.52	5.00	69.53	18.46	6.35	10.00	36.51
DEC. 2017	4016	269.65	-4.60	-1.71	5.00	65.88	19.41	7.20	10.00	28.02
(*) Mean difference margin = 100 * (1 - (	mean difference / mean difference req.|)) (**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 fulfill the requirement.									

Table 12: Geostationary DLI quality results over 2nd half 2017.

Comments: The DLI results are within the expected margins.

The following graphs illustrate the evolution of Geostationary DLI quality over the past 12 months.

Figure 50:   **Left: Geostationary DLI standard deviation.**

Right: DLI Geostationary standard deviation mmean differenceargin.

Figure 51:   **Left: Geostationary DLI mean difference.**

Right: Geostationary DLI mean difference margin.

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 2nd half 2017 |
Month	Number of cases	Mean DLI in Wm^{-2}	Mean diff. in Wm^{-2}	Mean diff. in %	Mean diff. req. In %	Mean diff. Marg in %(*)	Std Dev in Wm^{-2}	Std Dev in %	Std Dev req. In %	Std Dev margin (**) in %
JAN. 2017					5.00				10.00	
FEB. 2017					5.00				10.00	
MAR. 2017					5.00				10.00	
APR. 2017					5.00				10.00	
MAY 2017					5.00				10.00	
JUN. 2017	1990	345.94	2.94	0.85	5.00	83.00	13.17	3.81	10.00	61.93
JUL. 2017	2148	354.78	2.19	0.62	5.00	87.65	12.56	3.54	10.00	64.60
AUG. 2017	1387	351.01	3.51	1.00	5.00	80.00	14.32	4.08	10.00	59.20
SEP. 2017	648	337.11	2.81	0.83	5.00	83.33	14.11	4.19	10.00	58.14
OCT. 2017	736	331.79	-2.08	-0.63	5.00	87.46	18.19	5.48	10.00	45.18
NOV. 2017	1319	304.85	-8.84	-2.90	5.00	42.00	24.28	7.96	10.00	20.35
DEC. 2017	706	309.30	-9.12	-2.95	5.00	41.03	22.15	7.16	10.00	28.39

(*) Mean difference margin = 100 * (1 - (| mean difference / mean difference req.|))
(**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 2017.

Comments: The monthly variations are higher than in 5.2.1.1, this may be due to the small number of validation stations. However, the DLI results are within the expected margins.

The following graphs illustrate the evolution of Meteosat Indian Ocean DLI quality over the past 12 months.
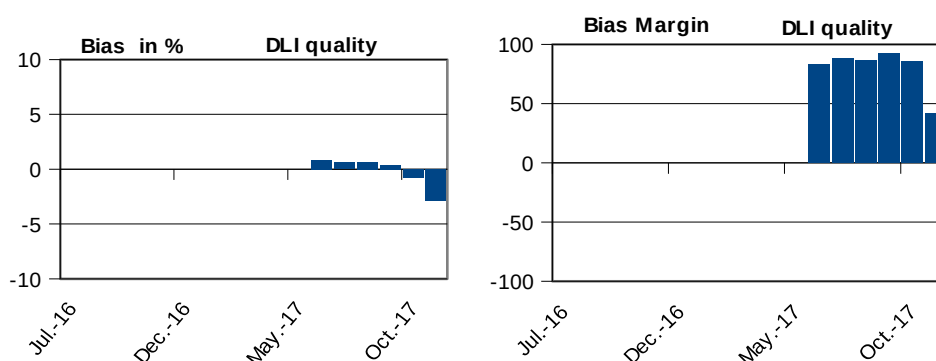
Figure 52:   Left : Meteosat Indian Ocean DLI mean difference.

Right : Meteosat Indian Ocean DLI mean difference mmean differenceargin.
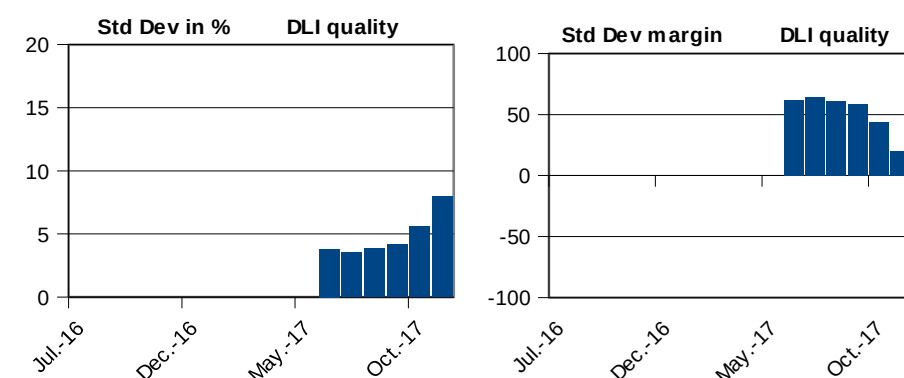
Figure 53:   Left : Meteosat Indian Ocean DLI standard deviation.

Right : Meteosat Indian Ocean DLI standard deviation Margin.

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 JUL. 2017 to DEC. 2017										
Month	Number of cases	Mean DLI in Wm^{-2}	mean diff. in Wm^{-2}	mean diff. in %	mean diff. Req In %	mean diff. Marg in %(*)	Std Dev in Wm^{-2}	Std Dev In %	Std Dev Req In %	Std Dev margin (**) in %
JUL. 2017	90	324.2	-8.18	5.82	5.00	-16.4	11.99	3.71	10.00	62.9
AUG. 2017	104	326.4	-6.84	5.25	5.00	-5	13.80	4.25	10.00	57.5
SEP. 2017	116	331.2	-12.06	5.29	5.00	-5.8	13.39	4.06	10.00	59.4
OCT. 2017	124	309.9	-6.92	3.94	5.00	21.2	15.87	5.13	10.00	48.7
NOV. 2017	120	284.1	1.55	2.18	5.00	56.4	13.84	4.86	10.00	51.4
DEC. 2017	120	282.0	-6.21	2.52	5.00	49.6	16.63	5.93	10.00	40.7
(*) Mean difference Margin = 100 * (1 - (	mean difference / mean difference req.|)) (**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 fulfill the requirement.									

Table 14: AHL DLI quality results over JUL. 2017 to DEC. 2017.

Comments: This validation period many of the stations disseminated through GTS did not report longwave observations. The reason for this is not known. Requirements on mean difference are not met in August, September and October although the deviation from the requirement is not very large. No specific station seem to be causing the poor performance although there is a slight overestimation at the stations Hopen and Bjørnøya.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.

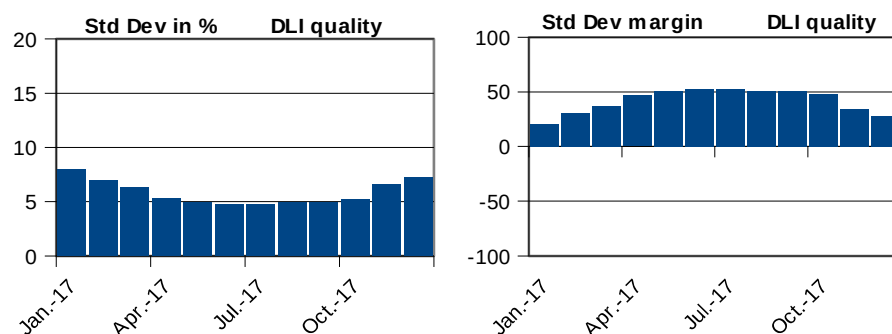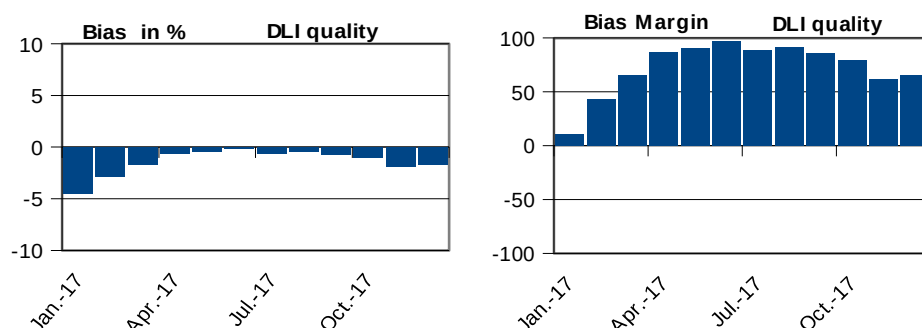### 5.2.2.1. Meteosat SSI (OSI-304) and GOES-East SSI (OSI-306) quality

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

Geostationary Meteosat & GOES-East SSI quality results over 2nd half 2017										
Month	Number of cases	Mean SSI in Wm^{-2}	mean diff. in Wm^{-2}	mean diff. in %	mean diff. req in %	mean diff. margin in %(*)	Std Dev in Wm^{-2}	Std Dev in %	Std Dev req. in %	Std Dev margin (**) in %
JAN. 2017	4475	311.73	7.60	2.44	10.00	75.62	81.19	26.04	30.00	13.18
FEB. 2017	4781	344.89	10.90	3.16	10.00	68.40	81.21	23.55	30.00	21.51
MAR. 2017	6134	383.93	9.59	2.50	10.00	75.02	82.27	21.43	30.00	28.57

|										
APR. 2017	5580	452.24	8.74	1.93	10.00	80.67	75.16	16.62	30.00	44.60
MAY 2017	6279	444.35	8.03	1.81	10.00	81.93	73.89	16.63	30.00	44.57
JUN. 2017	6720	497.20	-0.90	-0.18	10.00	98.19	74.38	14.96	30.00	50.13
JUL. 2017	7367	469.84	-0.32	-0.07	10.00	99.32	77.96	16.59	30.00	44.69
AUG. 2017	6914	455.61	-0.32	-0.07	10.00	99.30	81.84	17.96	30.00	40.12
SEP. 2017	5817	418.94	11.35	2.71	10.00	72.91	74.84	17.86	30.00	40.45
OCT. 2017	5436	392.00	11.22	2.86	10.00	71.38	70.00	17.86	30.00	40.48
NOV. 2017	4516	339.25	12.93	3.81	10.00	61.89	77.56	22.86	30.00	23.79
DEC. 2017	3942	296.80	-0.56	-0.19	10.00	98.11	73.15	24.65	30.00	17.85
(*) Mean difference Margin = 100 * (1 - (| mean difference / mean difference req.|)) (**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 2017.

Comments: A positive mean difference is observed from September to November, which is mainly due to the tropical station results. However, the SSI results are within the expected margins.

The following graphs illustrate the evolution of Geostationary SSI quality over the past 12 months.
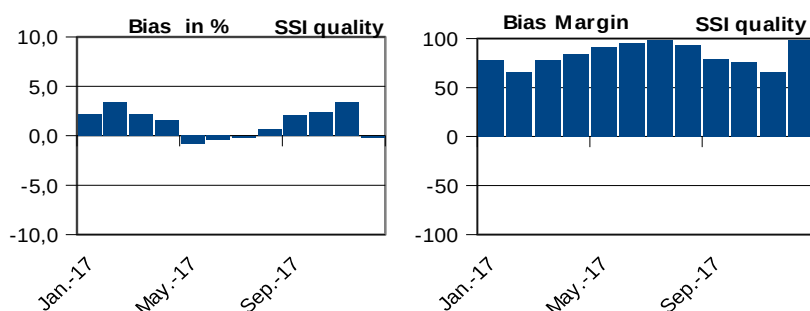
Figure 54:   **Left: Geostationary SSI mean difference.**
            Right Geostationary SSI mean difference mmean differenceargin.
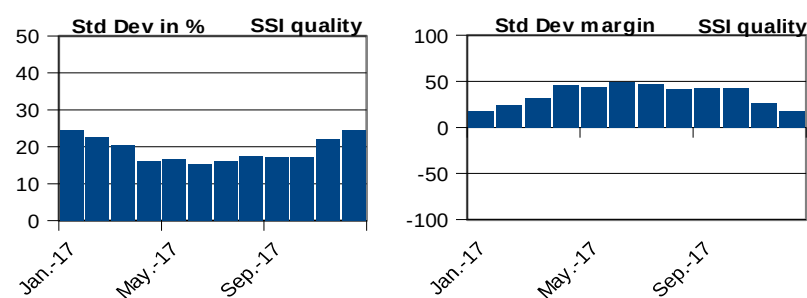
Figure 55:   **Left: Geostationary SSI Standard deviation.**
            Right Geostationary SSI Standard deviation Margin.

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

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

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

Month	Number of cases	Mean SSI in Wm^{-2}	Mean diff. in Wm^{-2}	mean diff. in %	mean diff. req. in %	mean diff. margin in %(*)	Std Dev in Wm^{-2}	Std Dev in %	Std Dev req. in %	Std Dev margin (**) in %
JAN. 2017					10.0				30.0	
FEB. 2017					10.0				30.0	
MAR. 2017					10.0				30.0	
APR. 2017					10.0				30.0	
MAY 2017					10.0				30.0	
JUN. 2017	4524	491.23	-0.95	-0.19	10.0	98.07	68.85	14.02	30.0	53.28
JUL. 2017	4972	461.42	-5.70	-1.24	10.0	87.65	65.55	14.21	30.0	52.65
AUG. 2017	4692	444.71	-5.73	-1.29	10.0	87.12	64.60	14.53	30.0	51.58
SEP. 2017	4039	393.36	-3.77	-0.96	10.0	90.42	66.27	16.85	30.0	43.84
OCT. 2017	3640	370.05	3.48	0.94	10.0	90.60	59.92	16.19	30.0	46.03
NOV. 2017	2678	310.86	3.60	1.16	10.0	88.42	67.69	21.78	30.0	27.42
DEC. 2017	1983	263.87	7.23	2.74	10.0	72.60	62.83	23.81	30.0	20.63

Title row: Meteosat Indian Ocean SSI quality results over 2nd half 2017

(*) Mean difference Margin = 100 * (1 - (| mean difference / mean difference req.|))
(**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 fulfill the requirement.

Table 16: Meteosat Indian Ocean SSI quality results over 2nd half 2017.

Comments: The SSI results are within the expected margins.

The following graphs illustrate the evolution of Meteosat Indian Ocean SSI quality over the past 12 months.
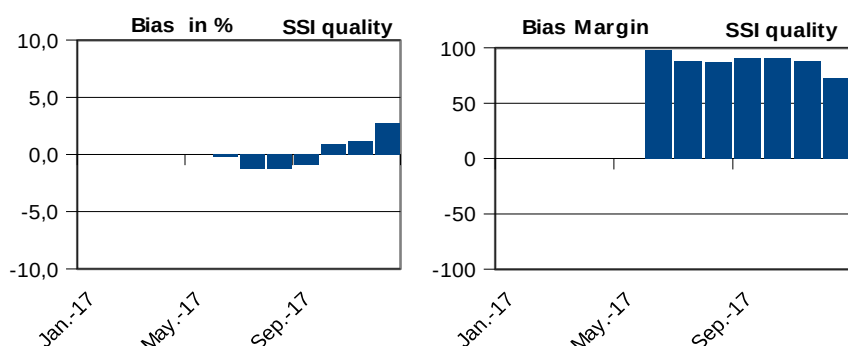
Figure 56:   Left: Meteosat Indian Ocean SSI mean difference.
Right: Meteosat Indian Ocean y SSI mean difference margin.
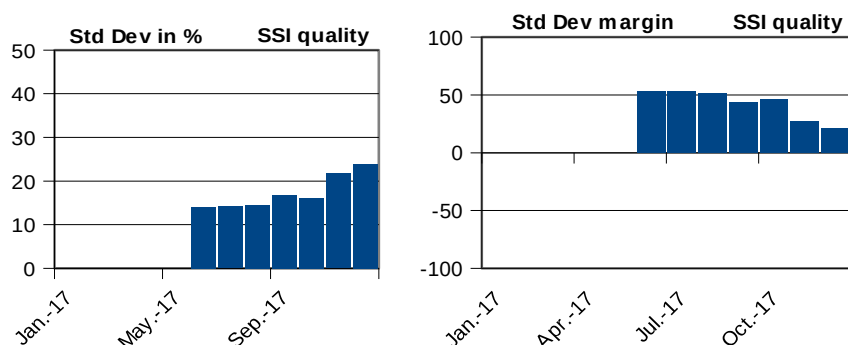
Figure 57: Left: Meteosat Indian Ocean SSI Standard deviation.
Right : Meteosat Indian Ocean SSI Standard deviation Margin.

5.2.2.3. AHL SSI (OSI-302) quality

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

Station	StId	Latitude	Longitude		Status
Apelsvoll	11500	60.70°N	10.87°E	SSI	In use, under examination due to shadow effects.
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.
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
- Schleswig
- Hamburg-Fuhlsbuettel
- 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

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

| AHL SSI quality results over JUL. 2017 to DEC. 2017										
Month	Number of cases	Mean SSI in Wm^{-2}	mean diff. in Wm^{-2}	mean diff. in %	mean diff. req. in %	mean diff. margin in %(*)	Std Dev in Wm^{-2}	Std Dev in %	Std Dev req. in %	Std Dev margin (**) in %
JUL. 2017	231	180.9	-38.54	20.66	10.0	-106.6	28.65	16.23	30.0	45.9
AUG. 2017	234	119.2	-19.28	20.50	10.0	-105	24.76	21.0	30.0	30
SEP. 2017	232	65.1	-7.73	12.65	10.0	-26.5	16.71	29.54	30.0	1.53
OCT. 2017	241	27.0	-6.00	19.87	10.0	-98.7	12.37	38.02	30.0	-26.73
NOV. 2017	233	7.1	-1.61	8.71	10.0	12.9	9.31	53.72	30.0	-79.07
DEC. 2017	240	2.3	NA	NA	10.0	NA	NA	NA	30.0	NA
(*) Mean difference Margin = 100 * (1 - (	mean difference / mean difference req.|)) (**) Std Dev margin = 100 * (1 - (Std Dev / Std Dev 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 fulfill the requirement.									

Table 18: AHL SSI quality results over JUL. 2017 to DEC. 2017

Comments: As for the longwave measurements, many of the stations that earlier reported on GTS were missing this time. The reason why is under investigation. The requirements on mean difference are not met in several months. All months, July through October July under-perform while the requirement is met in November. The reason for the poor performance is not known in detail, but it is believed that change of atmospheric model input may be one of the reasons. The performance on the Arctic stations seems to be better than the performance on the stations along the Norwegian coast which is consistent with the difference in performance of the new NWP model used and the previous one. However, this issue require further investigation. The requirements for the standard deviation of the estimates are not met in October and November.

5.3. Sea Ice quality

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

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

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

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

They cover the waters surrounding Greenland including the Lincoln Sea, the Fram Strait, the Greenland Sea, the Denmark Strait and Iceland, the Southern Greenland area including Cape Farewell, the Davis Strait and all of Baffin Bay.
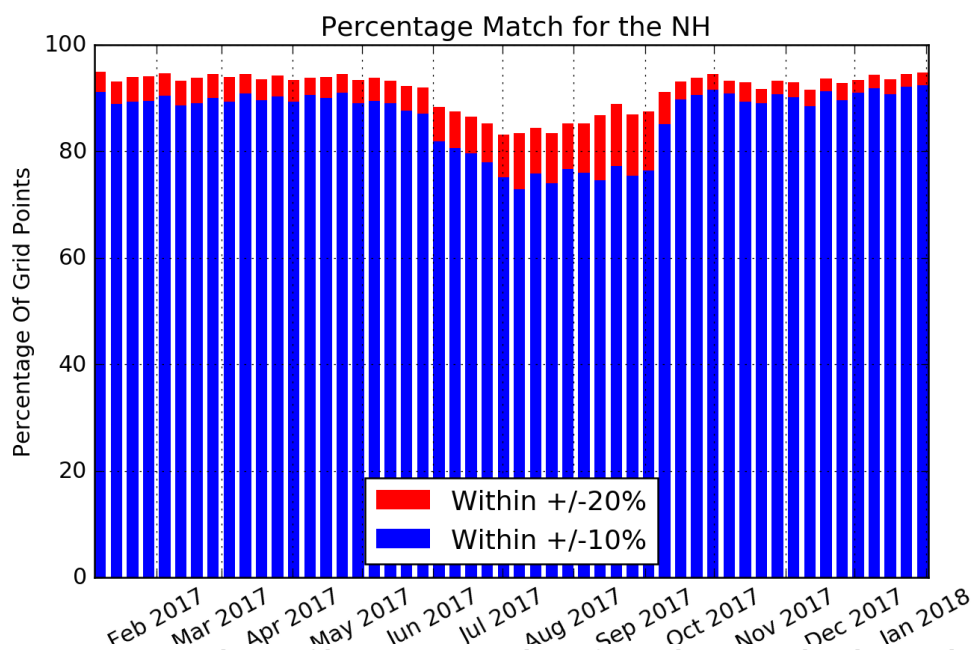
Figure 58: Comparison of ice concentrations from the Greenland overview charts made by DMI and the OSI SAF concentration product. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%.
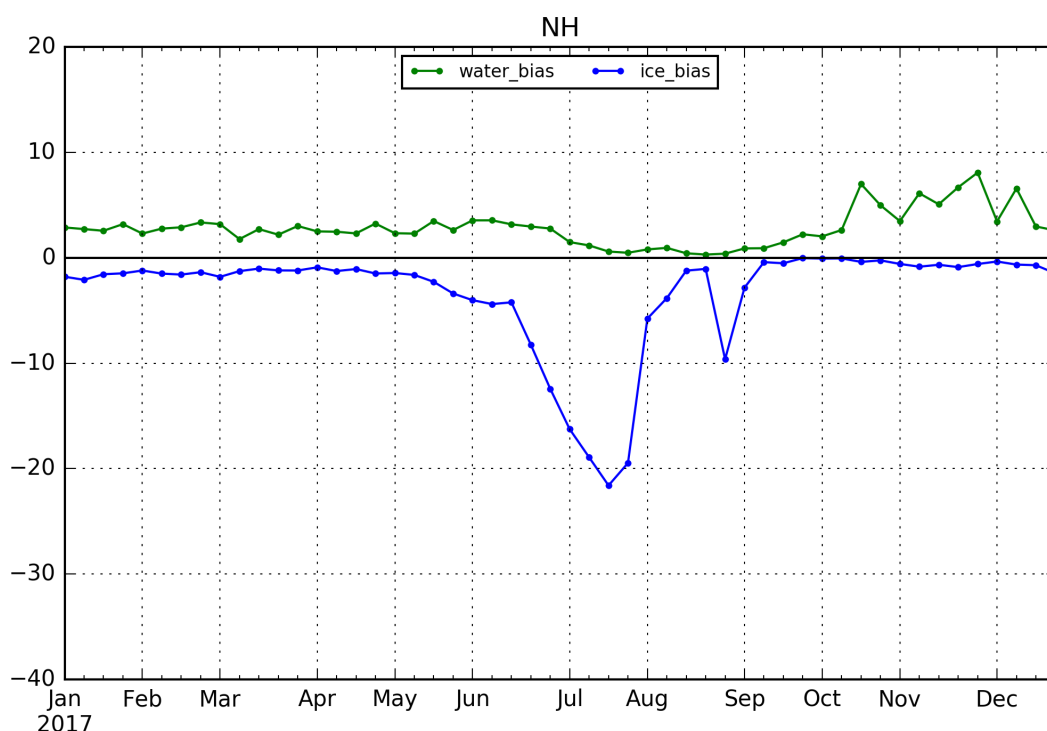
Figure 59: Difference between ice concentrations from the Greenland overview charts made by DMI and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Northern hemisphere.
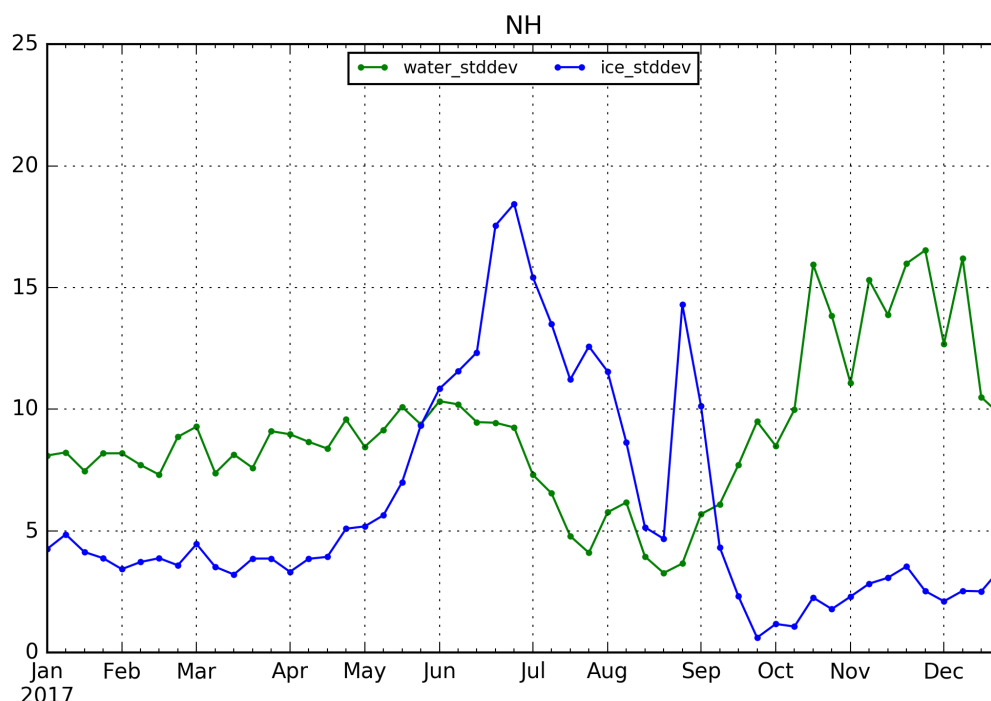
Figure 60: Standard deviation of the difference in ice concentrations from the Greenland overview charts made by DMI and OSI SAF concentration product for two categories: water and ice. Northern hemisphere.

Figure 61: 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 62: 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.
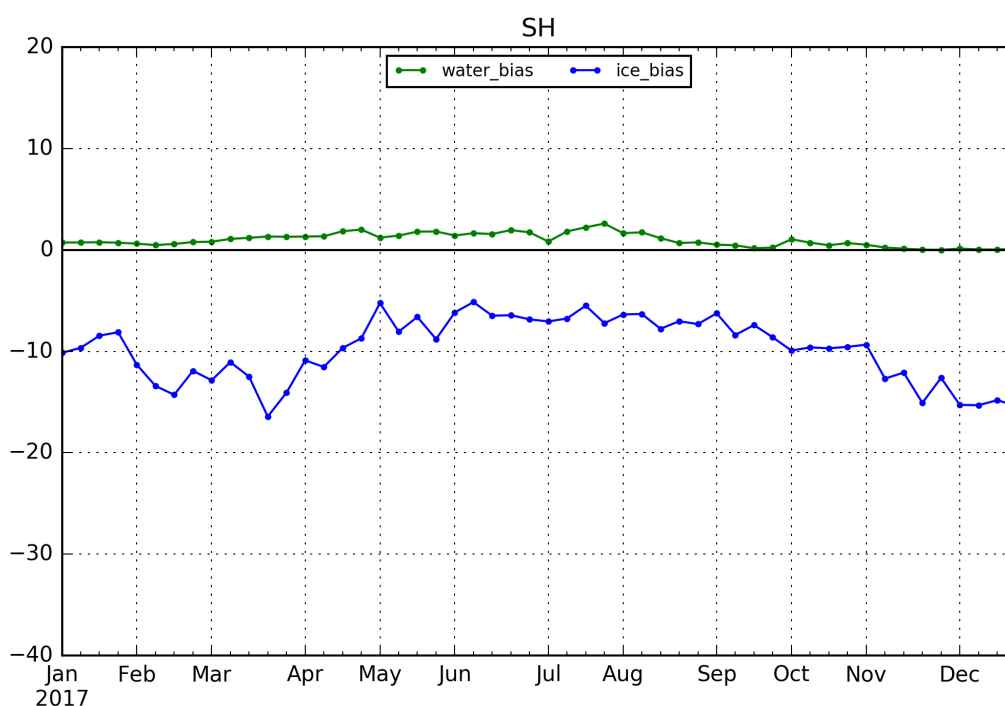
Figure 63: Difference between the ice concentrations from the NIC ice analysis and OSI SAF concentration product for two categories: water and ice. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Southern hemisphere.

Figure 64: 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.
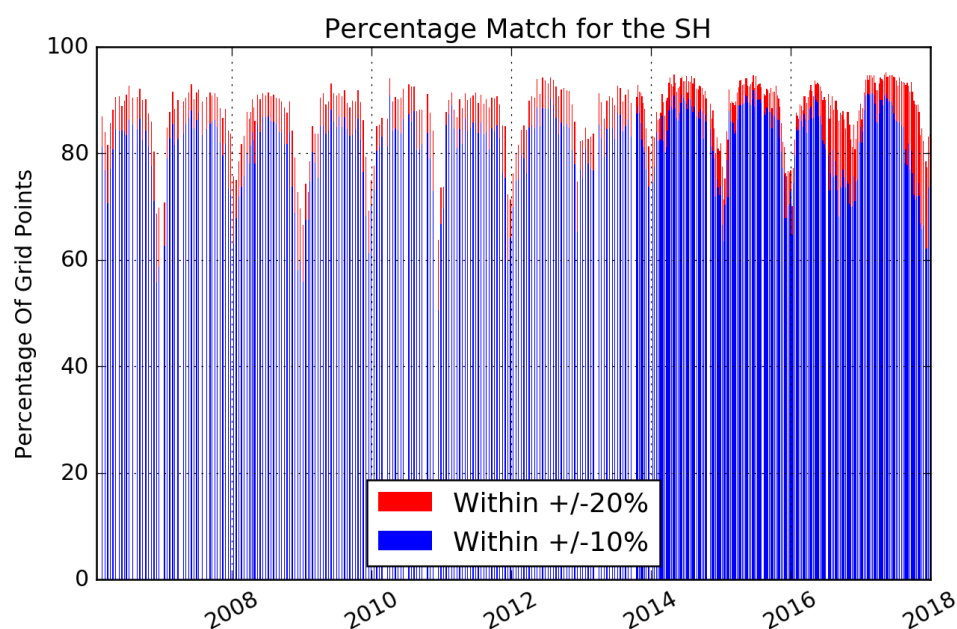
Figure 65: Multiyear variability. Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Southern hemisphere.

Concentration product					
Month	+/- 10% [%]	+/- 20% [%]	Bias [%]	Stdev [%]	Num obs
JAN. 2017	84.0	86.3	6.6	21.6	92117
FEB. 2017	86.7	88.7	4.8	19.5	72338
MAR. 2017	83.7	86.2	6.8	21.6	120732
APR. 2017	84.9	87.4	5.4	19.2	126119
MAY 2017	87.8	90.0	4.8	17.9	964985
JUN. 2017	89.3	91.2	3.8	17.0	164985
JUL. 2017	89.9	91.7	-4.2	13.6	312269
AUG. 2017	91.6	93.1	-2.9	9.5	241282
SEP. 2017	96.4	97.2	-1.3	6.5	386873
OCT. 2017	98.4	98.9	-0.6	4.2	171818
NOV. 2017	97.8	98.6	-0.9	4.4	195725
DEC. 2017	97.2	98.1	-1.1	5.1	250950

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. 2017 to DEC. 2017. 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. 2017	73.97	26.03	0.00	0.00	0.00	0.00
AUG. 2017	80.43	19.57	0.00	0.00	0.00	0.00
SEP. 2017	84.31	15.69	0.00	0.00	0.00	0.00
OCT. 2017	83.87	16.13	0.00	0.00	0.00	0.00
NOV. 2017	79.52	20.48	0.00	0.00	0.00	0.00
DEC. 2017	77.11	22.89	0.00	0.00	0.00	0.00

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. 2017	69.13	30.87	0.00	0.00	0.00	0.00
AUG. 2017	66.84	33.16	0.00	0.00	0.00	0.02
SEP. 2017	66.00	34.00	0.00	0.00	0.00	0.03
OCT. 2017	66.52	33.48	0.00	0.00	0.00	0.03
NOV. 2017	69.11	30.89	0.00	0.00	0.00	0.02
DEC. 2017	78.84	21.16	0.00	0.00	0.00	0.00

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

Comments: Figure 60 and Figure 64 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 JAN. 2017 – DEC. 2017 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 fullfill the service specifications.
Tables of statistics for confidence levels show that the NH product has the best quality during the Arctic fall freeze-up and that the SH product quality decreases somewhat during Antarctic spring melting.
The OSI-401-b product was updated on 4th July 2017 (products with datestamp 20170703) with a filtering of the ice concentration. The update also included adding a landmask to the confidence level field in the files. This has meant a small change in the way the statistics is calculated, since the land area was previously processed. Due to this change, the two files from 20170701 and 20170702 is not included in the July statistics.

Average yearly standard deviation		
	Average std.dev. Ice	Average std.dev. Water
Northern hemisphere	5.96	9.07
Southern hemisphere	11.02	4.41

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.
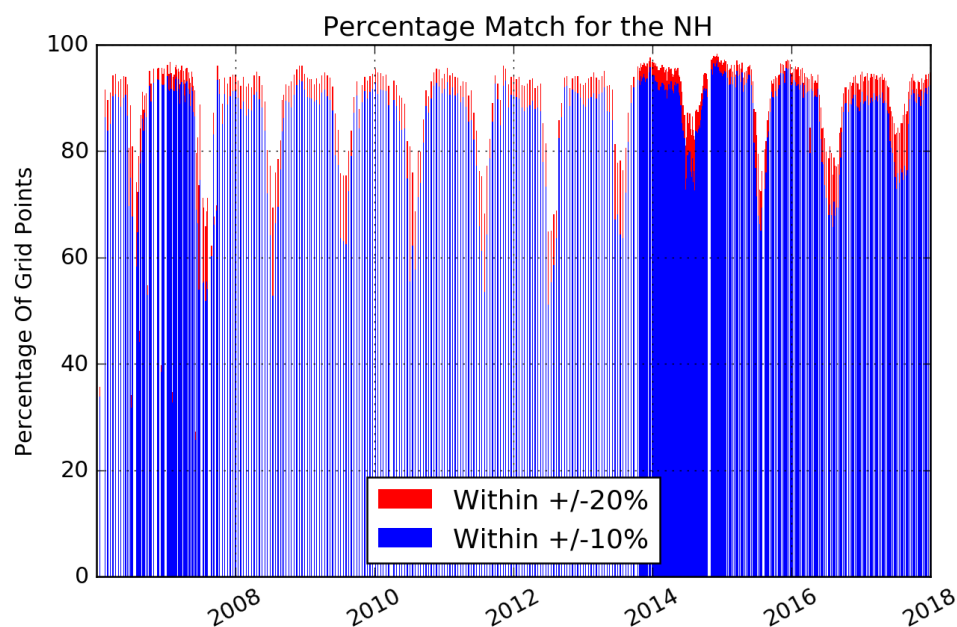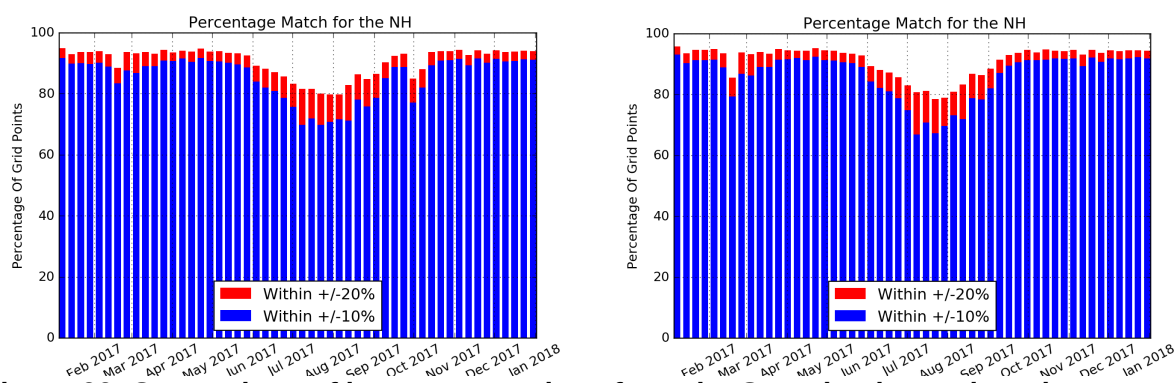

Figure 66: Comparison of ice concentrations from the Greenland overview charts made by DMI and the OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%
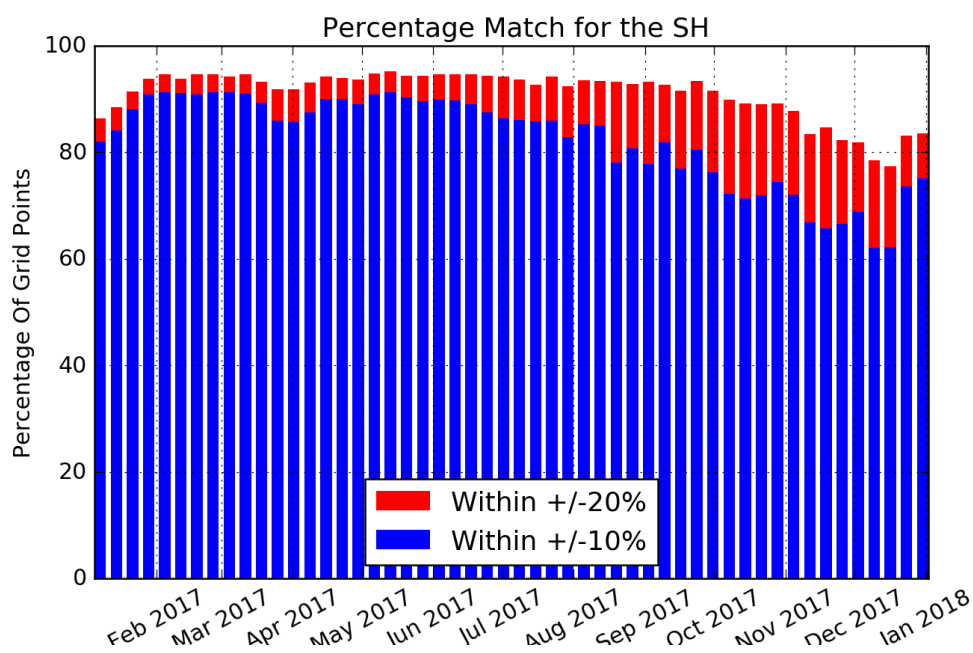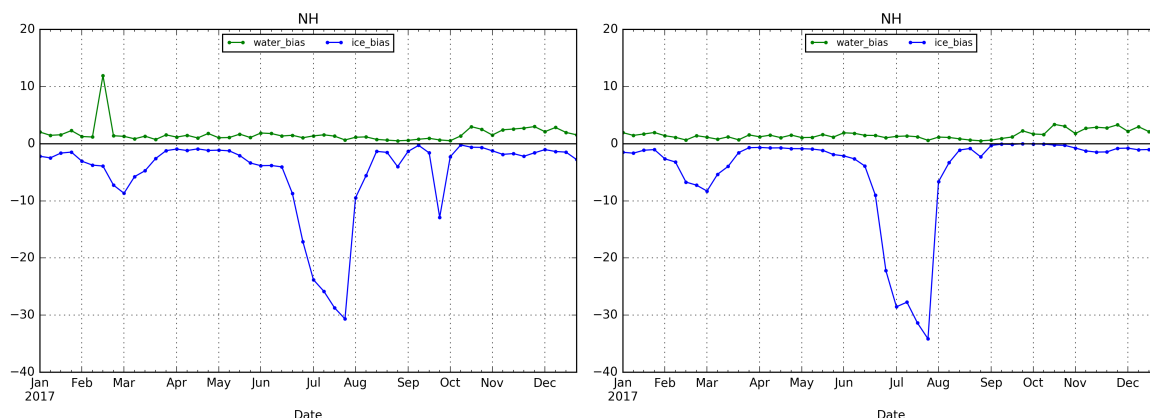
Figure 67: Difference between ice concentrations from the Greenland overview charts made by DMI and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern Hemisphere
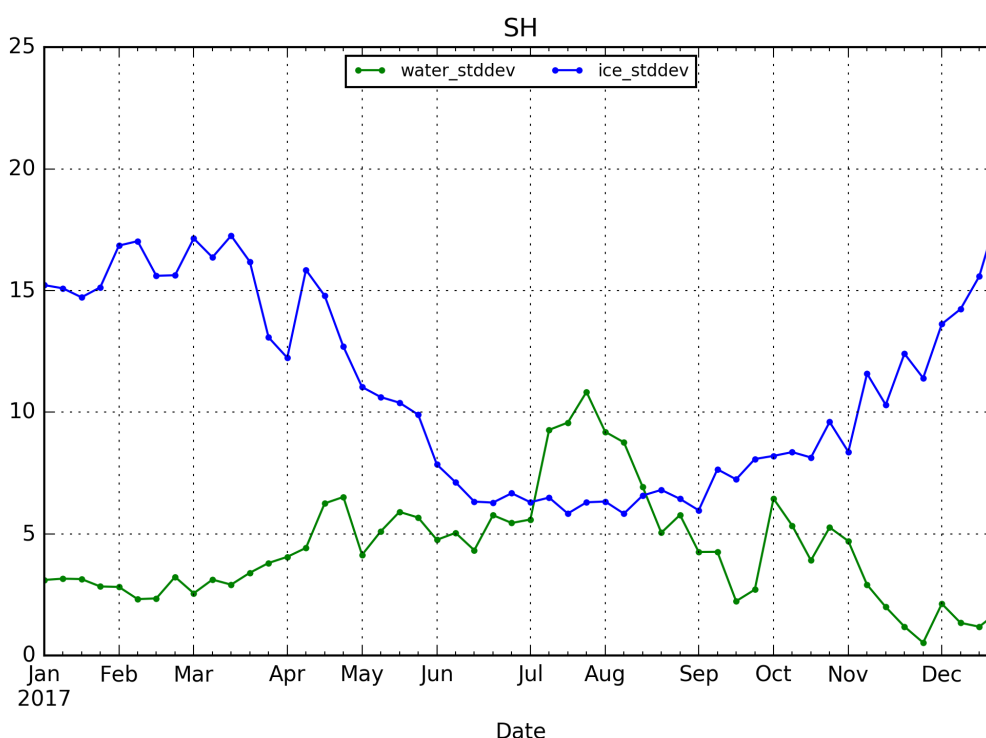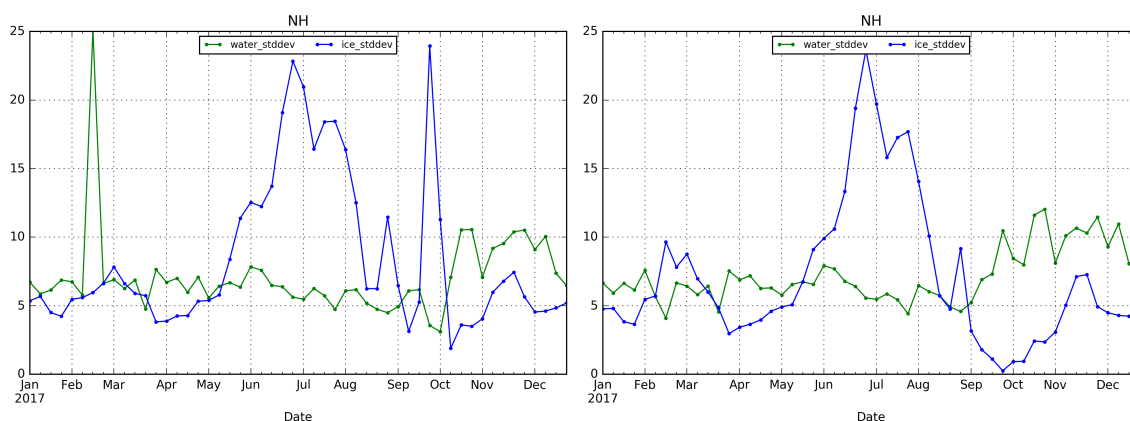

Figure 68: Standard deviation of the difference in ice concentrations from the Greenland overview charts made by DMI and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Northern hemisphere.
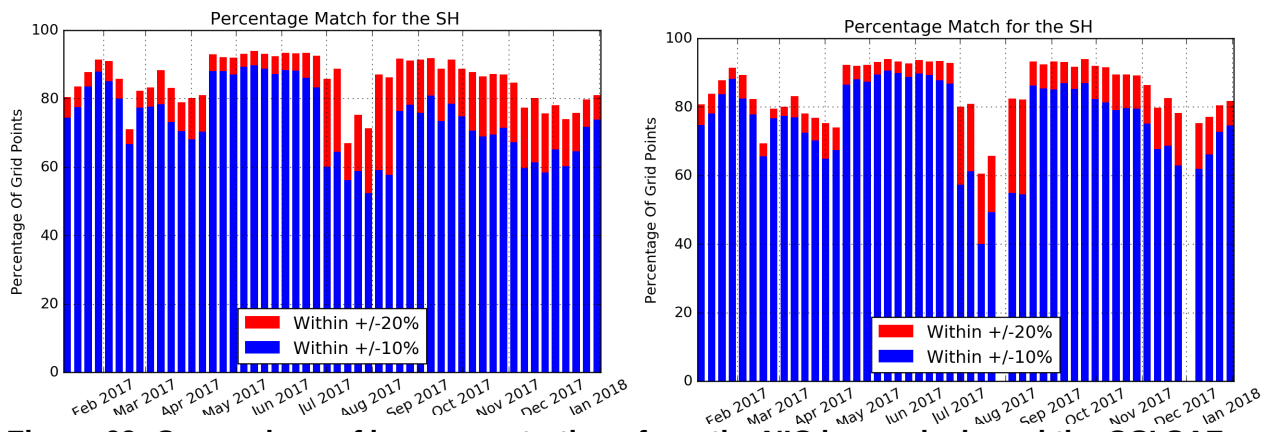
Figure 69: Comparison of ice concentrations from the NIC ice analysis and the OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right. Southern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%
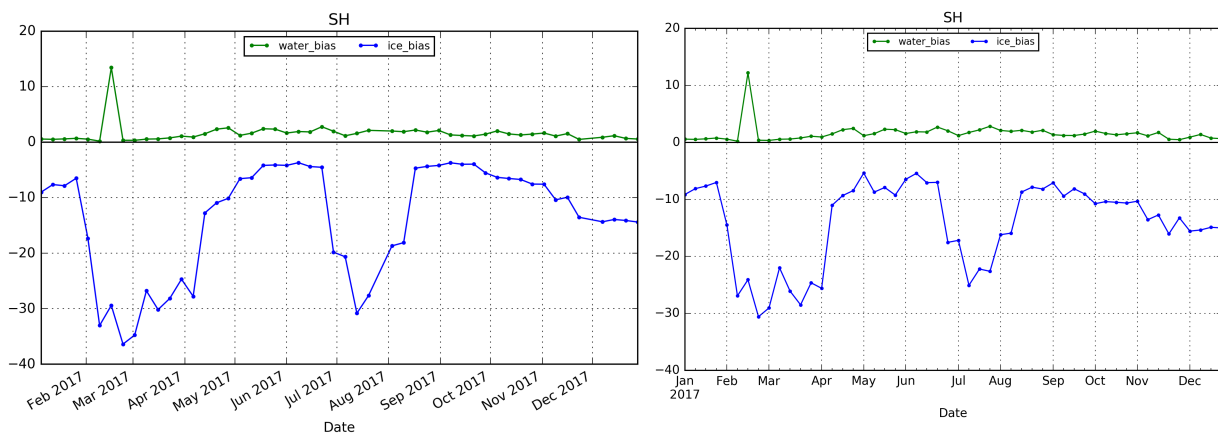
Figure 70: Difference between ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and ice. Southern Hemisphere
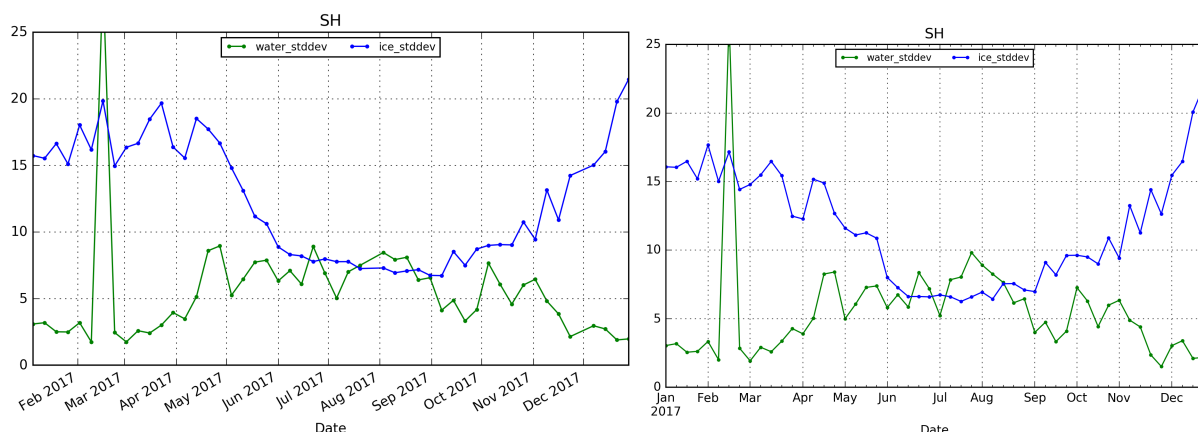
Figure 71: Standard deviation of the difference in ice concentrations from the NIC ice analysis and OSI SAF AMSR-2 concentration product based on OSHD algorithm to the left and based on TUD algorithm to the right for two categories: water and, ice. Southern hemisphere.

Comments: Figure 68 and Figure 71 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 standard deviation		
	Average std.dev. Ice	Average std.dev. Water
OSHD algorithm NH	8.42	7.09
TUD algorithm NH	7.01	7.15
OSHD algorithm SH	11.68	5.49
TUD algorithm SH	12.53	5.51

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.
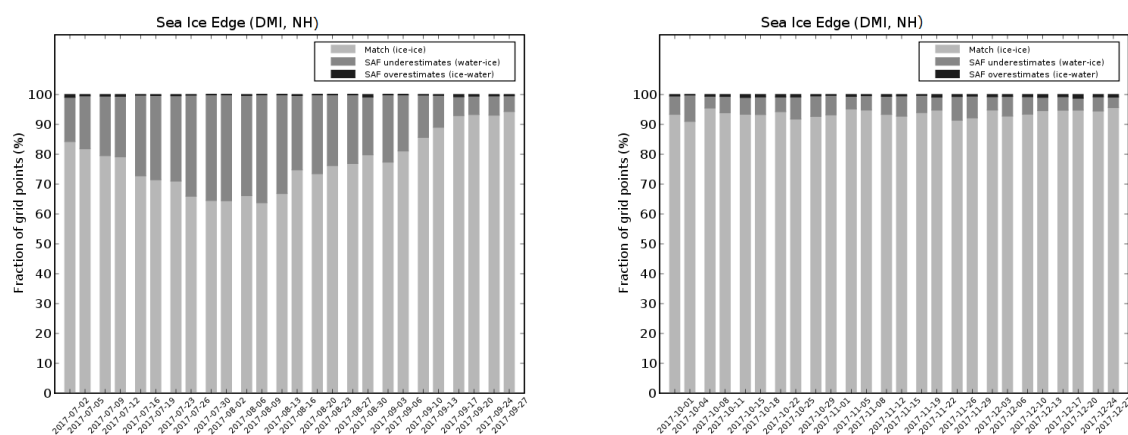
Figure 72: Comparison between the Greenland overview charts made by DMI and the OSI SAF sea ice edge product. Northern hemisphere. 'SAF water – DMI ice' means grid points where the OSI SAF product indicated water and the DMI ice analysis indicated ice and vice versa for the 'SAF ice – DMI water' category.
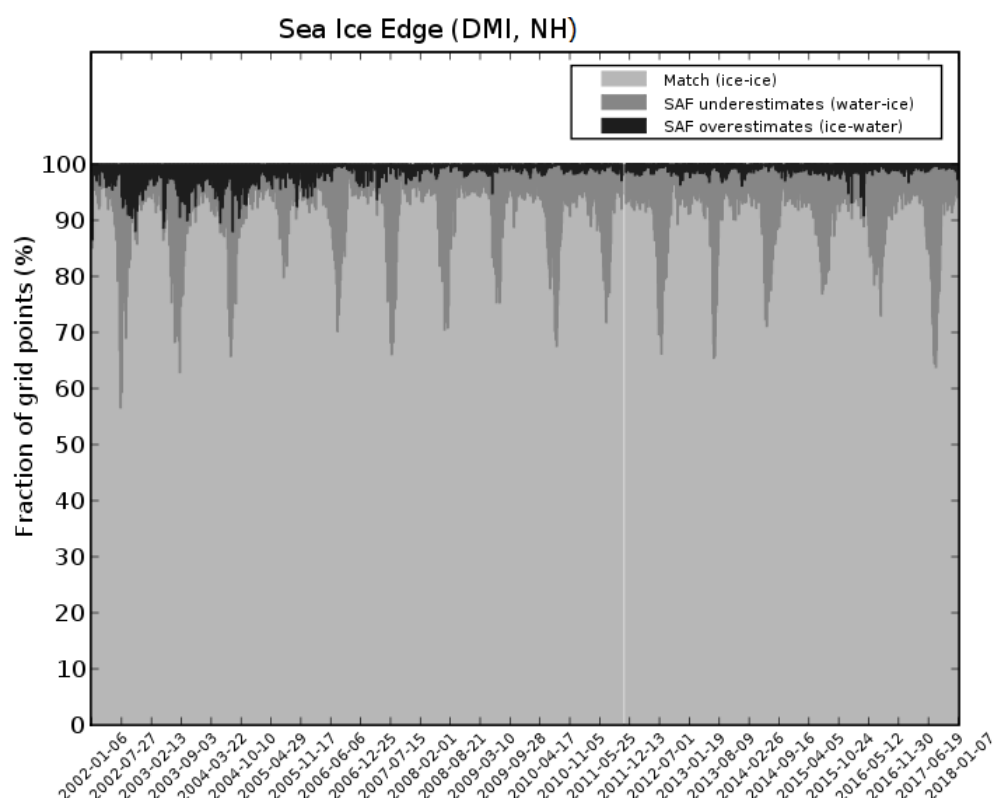
Figure 73: Multiyear variability. Comparison between the Greenland overview charts made by DMI and the OSI SAF sea ice edge product. Northern hemisphere. 'SAF water – DMI ice' means grid points where the OSI SAF product indicated water and the DMI ice analysis indicated ice and vice versa for the 'SAF ice – DMI water' category.
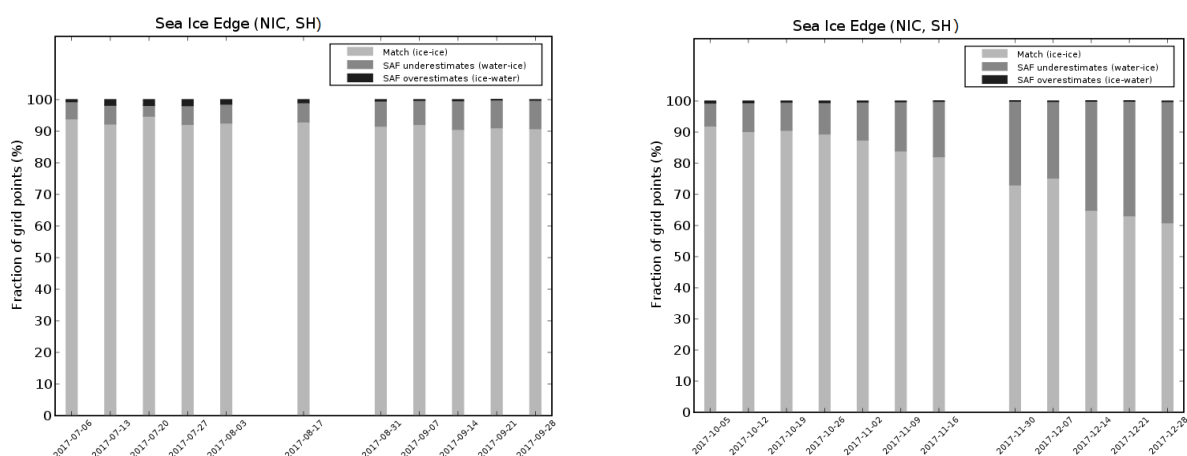
Figure 74: Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'SAF water – NIC ice' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'SAF ice – NIC water' category.
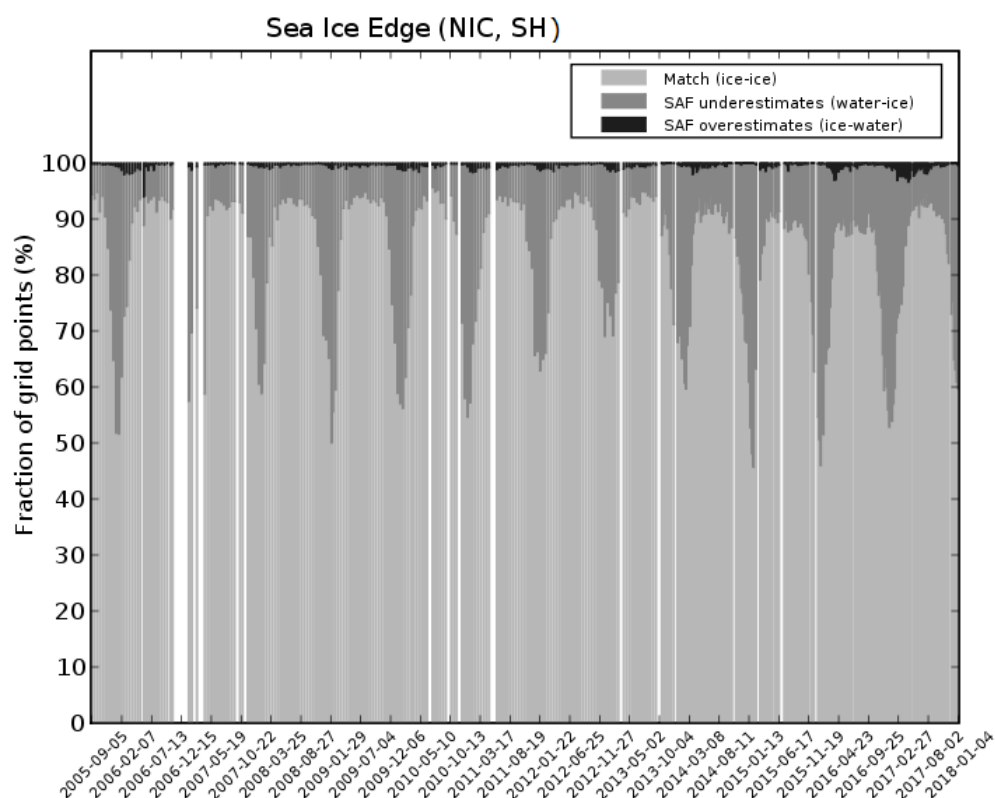
Figure 75: Multiyear variability. Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'SAF water – NIC ice' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'SAF ice – NIC water' category.

Month	Correct (%)	SAF lower (%)	SAF higher (%)	Mean edge diff (km)	Num obs
JAN. 2017	97.22	1.98	0.79	14.39	226386
FEB. 2017	97.46	1.44	1.10	10.76	201022
MAR. 2017	98.01	1.13	0.87	12.95	354146
APR. 2017	98.16	1.14	0.70	13.62	358311
MAY 2017	97.73	1.54	0.73	16.40	252766
JUN. 2017	96.62	2.67	0.71	29.02	414302
JUL. 2017	94.30	5.52	0.18	41.34	476651
AUG. 2017	97.27	2.50	0.24	42.70	391196
SEP. 2017	98.34	1.38	0.28	34.95	471673
OCT. 2017	99.19	0.43	0.38	11.53	245529
NOV. 2017	98.47	0.67	0.86	9.75	295609
DEC. 2017	98.39	0.89	0.72	11.61	302934

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. 2017 to DEC. 2017. 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. 2017	84.88	1.33	6.60	5.90	1.30	51.33
AUG. 2017	90.73	1.17	3.57	3.66	0.88	51.21
SEP. 2017	93.03	1.32	2.83	2.34	0.48	51.59
OCT. 2017	93.48	1.34	2.92	1.77	0.48	52.36
NOV. 2017	88.79	3.08	5.26	2.29	0.58	53.17
DEC. 2017	83.96	4.37	7.94	3.06	0.67	53.72

Table 24: 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. 2017	73.49	5.94	14.03	5.74	0.81	22.41
AUG. 2017	69.50	6.45	15.53	7.59	0.94	22.44
SEP. 2017	68.70	8.33	13.66	8.05	1.26	22.42
OCT. 2017	68.36	8.02	13.03	8.90	1.69	22.41
NOV. 2017	73.71	6.67	9.79	7.93	1.90	22.41
DEC. 2017	82.52	3.00	6.05	6.09	2.34	22.41

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

Comments: In Table 24 the 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 2017 is 20.8 km and the target accuracy requirement of 20 km edge difference is this year hence almost 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. For 2017 the summer months values of the mean edge difference to the navigational ice charts are all unusual high which influence the annual mean. Figure 73, comparing with navigational ice charts from regions around Greenland (DMI ice service), also shows 2017 summer to have a relatively high underestimation of the OSI SAF ice edge product, but not unusual high.

Validation for the ice edge product for southern hemisphere is shown in Figure 74 and Figure 75 compared with the National Ice Center ice charts and show no differences 2017 relative to previous years. The "mean edge difference" analysis for the Southern Hemisphere is still not yet in place due to technical constraints.

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

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

Month	Std dev wrt running mean [km²]	Mean MYI coverage [km²]
JAN. 2017	95455	1758280
FEB. 2017	112321	2018437
MAR. 2017	113447	2419011
APR. 2017	52417	2538049
MAY 2017	62751	2433190
JUN. 2017	-	-
JUL. 2017	-	-
AUG. 2017	-	-
SEP. 2017	-	-
OCT. 2017	94821	2189050
NOV. 2017	85541	2231136
DEC. 2017	60428	1989851

Table 26: 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. 2017	84.30	0.32	0.30	14.88	0.20	51.33
AUG. 2017	88.92	0.24	0.22	10.49	0.13	51.21
SEP. 2017	89.99	0.14	0.17	9.65	0.06	51.59
OCT. 2017	95.99	1.37	1.61	0.96	0.07	52.36
NOV. 2017	96.58	0.83	1.86	0.63	0.11	53.17
DEC. 2017	92.85	1.18	4.96	0.87	0.13	53.72

Table 27: Statistics for sea ice type confidence levels, Northern Hemisphere.

Month	Code=5	code=4	code=3	code=2	code=1	Unprocessed
JUL. 2017	70.51	0.23	0.32	28.82	0.12	22.41
AUG. 2017	66.63	0.24	0.34	32.68	0.11	22.44
SEP. 2017	65.37	0.25	0.39	33.84	0.15	22.42
OCT. 2017	65.59	0.25	0.37	33.61	0.19	22.41
NOV. 2017	71.34	0.38	0.51	27.49	0.27	22.41
DEC. 2017	82.44	0.42	0.53	16.24	0.37	22.41

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

Comments: The monthly standard deviations of the daily MYI coverage variability in 26 is below the requirement of 100.000 km2 in last half of the year 2017, that is October to December.

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 emissivity (which is the same at these two frequencies) at an incidence angle 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 bias plot in figure 76 is the difference between the hemispheric OSI SAF product and the validation product. The OSI SAF operational emissivity is higher than the validation product giving a positive bias. The mean bias for the second half of the year on the northern hemisphere is -0.0053 and on the southern hemisphere it is 0.035. There is no clear seasonal cycle neither on the northern nor southern hemisphere.
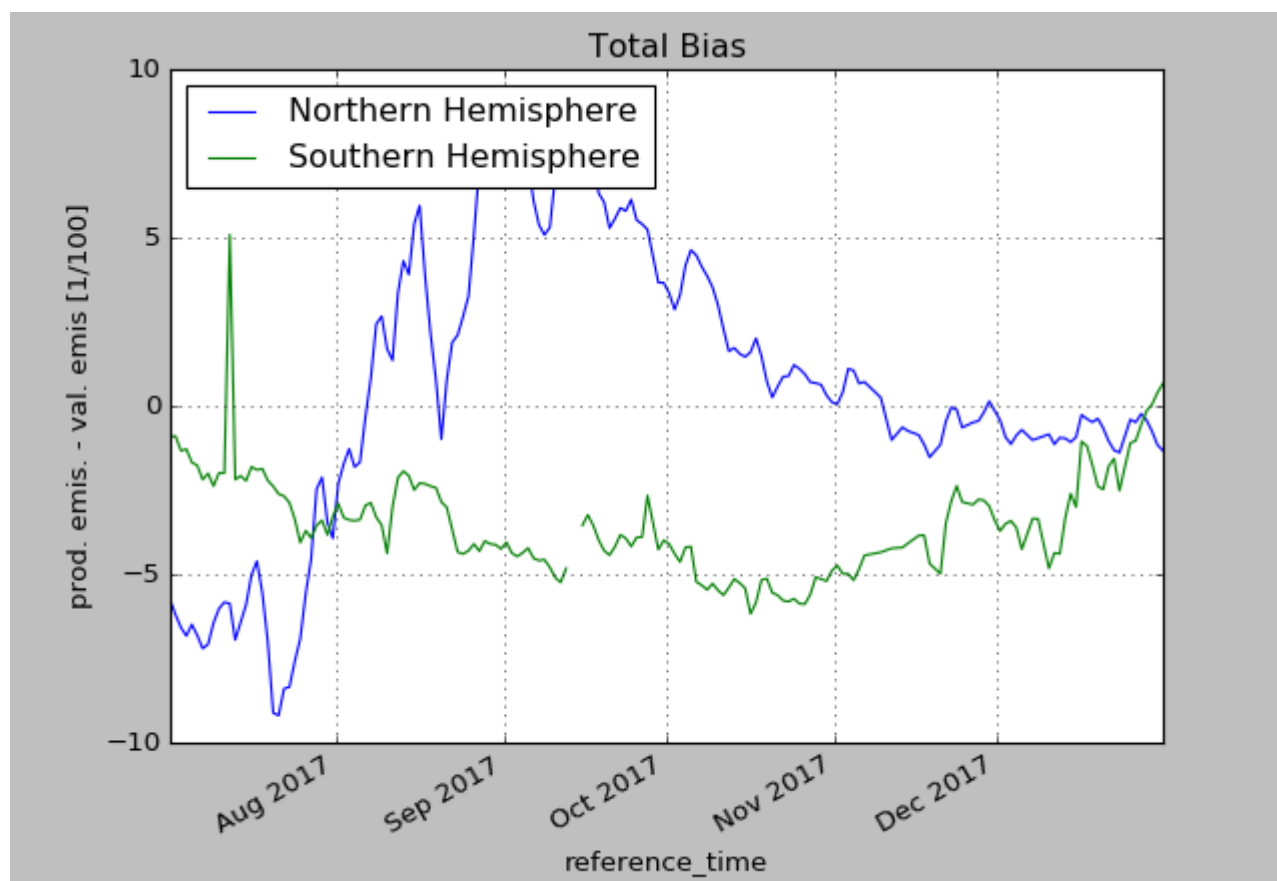
Figure 76: The mean hemispheric difference between the OSI SAF operational product and the validation product derived from NWP and SSMIS data. The y-axis unit is in hundreds (1/100)
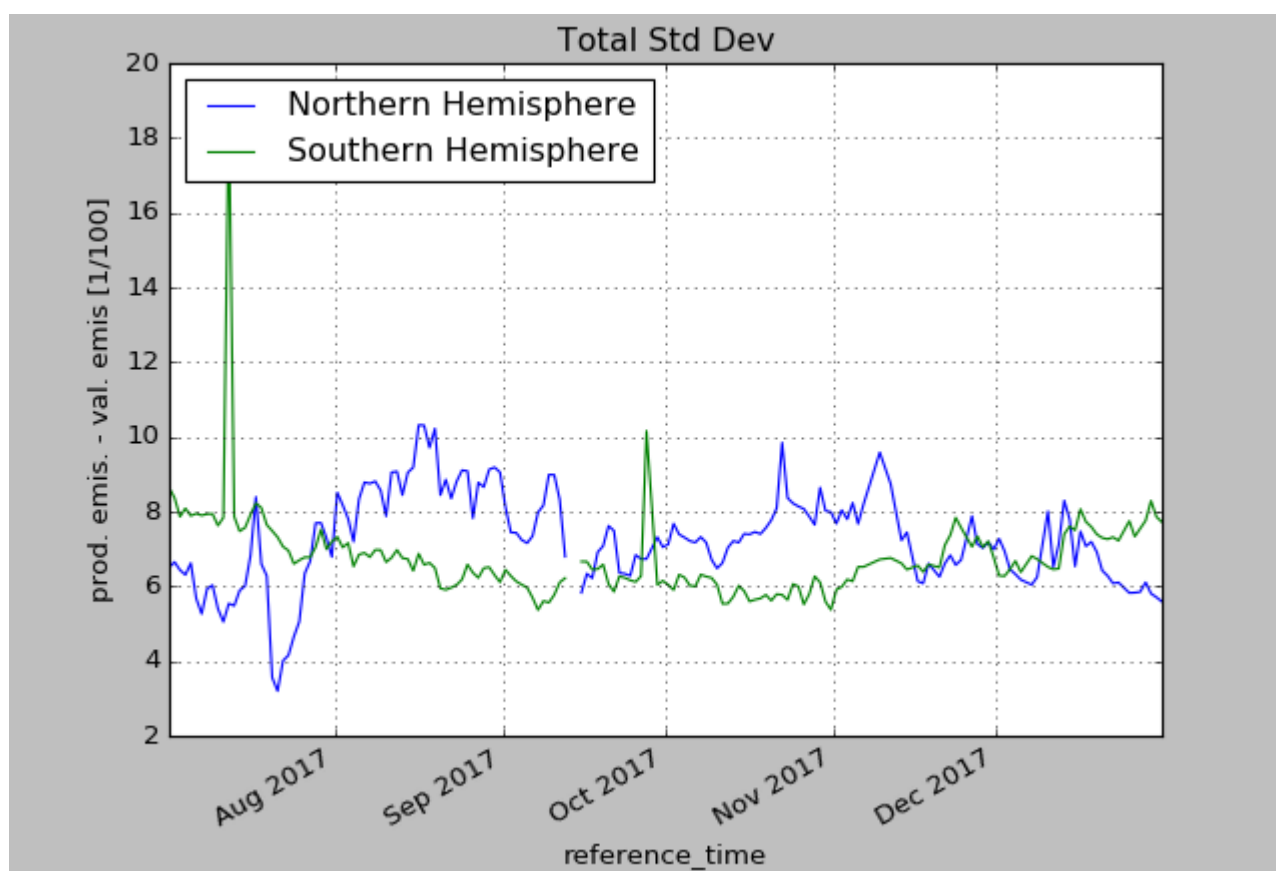
Figure 77: The standard deviation of the difference between the OSI SAF operational product and the validation product for the nothern and southern hemispheres. The y-axis unit is in hundreds (1/100)

Comments: The standard deviation of the difference between the OSI SAF product and the validation product is the measure on which the product is evaluated according to the SeSp. The target requirement is 0.05, the product accuracy is not below. But the product is within the threshold accuracy. This is summarized in Tableau 29.

	Bias	STD	Target accuracy	Threshold accuracy
NH	-0.0053	0.0725	0.05	0.15
SH	-0.0351	0.0677	0.05	0.15

Tableau 29: Summarising the numbers in the text

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 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 bias and $\sigma()$ the standard deviation of the $\varepsilon(X) = X_{prod} - X_{ref}$. Columns α, β and ρ are respectively the slope and intercept of the regression line between Prod and Ref data pairs and the Pearson correlation coefficient. N is the number of collocation data pairs.

Figure 78: Location of GPS drifters for the quality assessment period (JUL. 2017 to DEC. 2017). The shade of each symbol represents the mean difference (prod-ref) in drift length (km over 2 days).

Month	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
JAN. 2017	-0,38	0,14	2,39	2,07	0,97	0,14	0,98	258
FEB. 2017	0,24	0,24	1,75	1,71	0,98	0,29	0,99	219
MAR. 2017	-0,32	-0,05	2,34	2,1	0,94	0,42	0,98	251
APR. 2017	0,2	-0,15	1,71	1,83	0,98	0,08	0,98	231
MAY 2017	1,06	-1,38	3,72	2,44	0,96	-0,34	0,94	26
JUN. 2017	-0,58	-1,27	4,09	4,23	0,9	-0,71	0,93	140
JUL. 2017	-0,1	0,75	5,94	6,28	0,73	0,45	0,85	127
AUG. 2017	-0,56	1,92	9,26	8,07	0,7	1,35	0,76	52
SEP. 2017	-0,48	1	5,73	4,94	0,88	0,55	0,94	116
OCT. 2017	0,41	-0,37	2,68	2,65	0,94	0,1	0,97	142
NOV. 2017	-0,47	-0,24	2,5	3,75	0,93	-0,4	0,96	175
DEC. 2017	-1,09	-3,19	3,55	10,57	0,6	-1,67	0,85	30

Table 30: Quality assessment results for the LRSID (multi-oi) product (NH) for JAN. 2017 to DEC. 2017.

Month	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
JAN. 2017	0,28	-0,47	4,7	4,83	0,91	0,06	0,93	295
FEB. 2017	-0,54	-0,08	3,42	3,62	0,96	-0,03	0,96	218
MAR. 2017	0,33	0,22	3,5	3	0,97	0,34	0,96	215
APR. 2017	-0,37	-0,23	3,69	3,53	0,93	0,34	0,95	243
MAY 2017	0,53	-0,3	3,29	3,37	1,02	0,05	0,93	215
JUN. 2017	--	--	--	--	--	--	--	0
JUL. 2017	NA	NA	NA	NA	NA	NA	NA	0
AUG. 2017	NA	NA	NA	NA	NA	NA	NA	0
SEP. 2017	NA	NA	NA	NA	NA	NA	NA	0
OCT. 2017	0,57	0,16	4,84	4,1	0,95	0,39	0,94	111
NOV. 2017	0,06	0,44	4,01	3,92	0,99	0,24	0,95	138
DEC. 2017	-1	-2,26	4,96	8,49	0,82	-1,41	0,88	30

Table 31: Quality assessment results for the LRSID (SSMIS-F17) product (NH) for JAN. 2017 to DEC. 2017.

Comments:
The quality assessment of LRSID product OSI-405-c shows expected behaviour in the last 12 months, with nominal statistics, except for DEC 2017 for which only few validation data were available to us (only 30 matchups during one month). The DEC 2017 maps were assessed visually and the quality seemed the same as in earlier years.

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

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

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

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

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

Quality assessment statistics

Table 32 below, show selected mean difference statistics against drifting buoys. Bias (x-bias, y-bias) and standard deviation of mean differences (x-std, y-std) are shown, in meters, for the 2 perpendicular drift components (x, y). Statistics from the best fit between OSI-407 and buoy data are shown as slope of fit (α) and correlation coefficient (r). N, indicate the number of data pairs that are applied in the mean difference statistics.
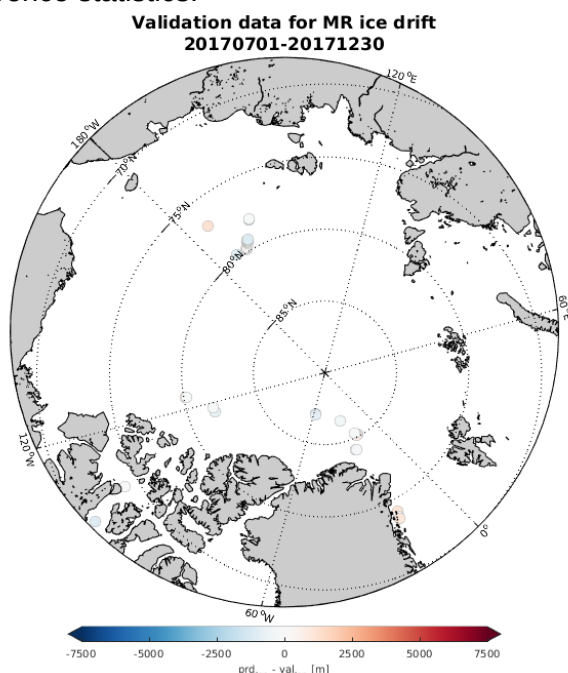
Figure 79: Location of GPS drifters for the quality assessment period (JAN. 2017 to DEC. 2017). The shade of each symbol represents the difference (prod-ref) in drift length in meters

Month	b(X) [m]	b(Y) [m]	σ(X) [m]	σ(Y) [m]	α	β [m]	ρ	N
JAN. 2017	-57	-75	1694	1200	0.93	107	0.928	1032
FEB. 2017	102	26	767	761	0.98	-50	0.986	700
MAR. 2017	69	251	855	710	0.96	-222	0.984	1236
APR. 2017	-154	229	877	908	0.97	-84	0.961	242
MAY 2017	-69	-220	1019	544	1.14	187	0.989	80
JUN. 2017	-276	484	891	1277	1.01	-110	0.960	404
JUL. 2017	43	-137	499	483	1.02	48	0.994	208
AUG. 2017	-	-	-	-	-	-	-	-
SEP. 2017	745	1593	0	471	1.09	-1112	0.997	24
OCT. 2017	-70	175	328	382	0.58	32	0.906	40
NOV. 2017	502	-43	711	706	1.04	175	0.989	220
DEC. 2017	54	82	698	780	1.00	-65	0.971	256
Last 12 months	21	116	1091	940	0.98	-76	0.972	4442

Table 32: MR sea ice drift product (OSI-407) performance, JAN. 2017 to DEC. 2017

Comments: Semi-automatic quality control (based on threshold on maximum buoy drift, visual inspection on drift scatter plots (buoy vs. satellite) and inspection of extreme outliers) has been carried out for second half year of 2017. All months (except August) show good correlation with buoy drift. Match-ups were found with 8 individual buoys during this period. A limited number of extreme outliers has been disqualified from the validation data, based on visual inspection of the bouy locations;

- Buoy ID 48770 supposedly stock In landfast ice northeast of Greenland between 20170809 and 20170909.

In August there were no match-ups with qualified buoy data, thus no validation statistics. Less good statistics in September is due to a limited number of match-ups.

A coming test production setup will test whether higher production frequency and extending the summer mode (Visible AVHRR channel-2) into September and October will give more and better results.

The product requirement target accuracy of 2 km on yearly standard deviation is met.

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

5.4.1. Comparison with ECMWF model wind data

The figure below shows the monthly results of July 2016 to December 2017. Note that the real model winds are converted to equivalent neutral winds by adding 0.2 m/s to the wind speed. In this way, a realistic comparison with the neutral scatterometer winds can be made.

It is clear from the plots in this section, that the products do meet the accuracy requirements from the Service Specification Document [AD-1] (bias 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/.
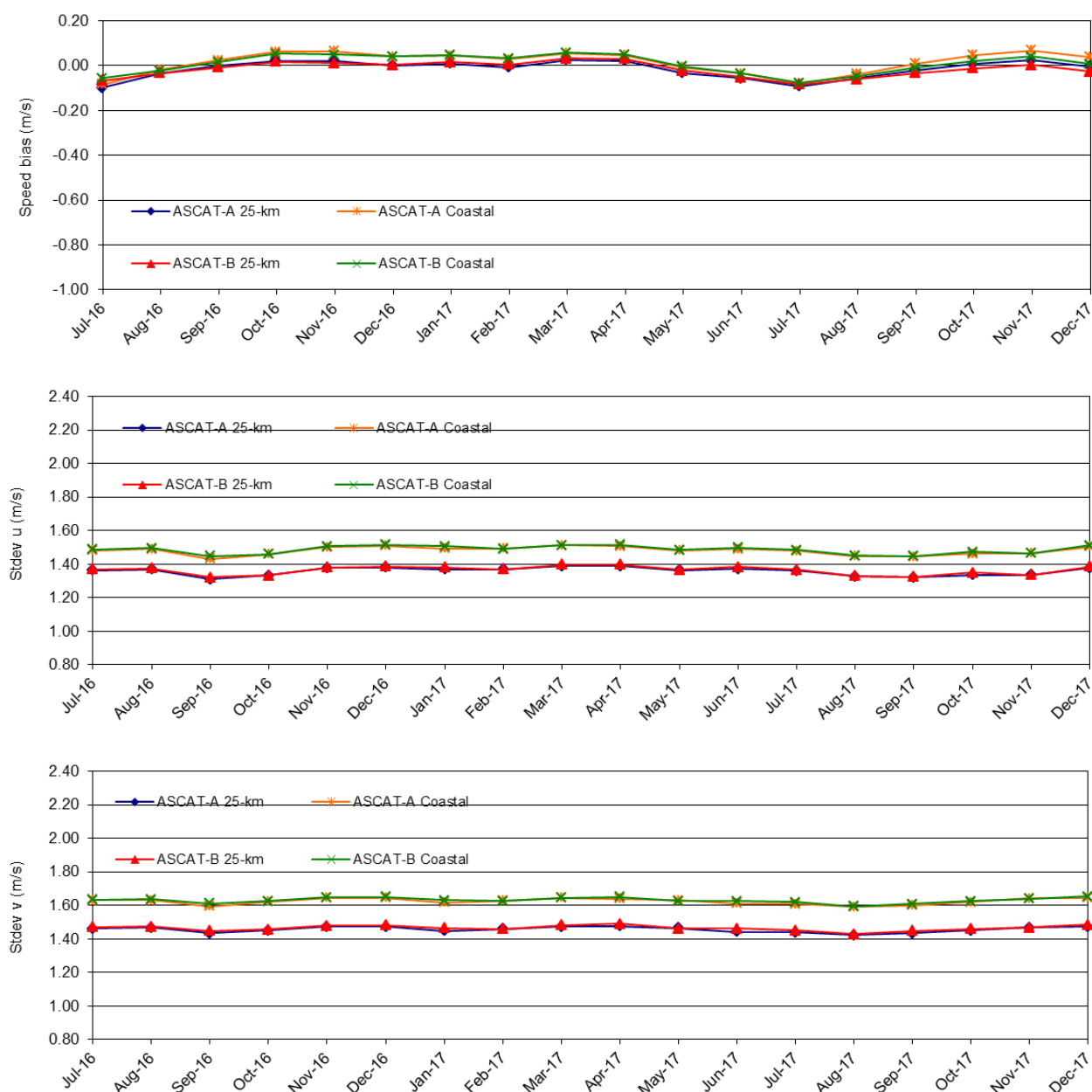
Figure 80: Comparison of scatterometer winds against ECMWF NWP forecast winds (monthly averages). For each product, the wind speed bias (scatterometer minus ECMWF, top), wind u component standard deviation (middle) and wind v component standard deviation (bottom) are shown.

5.4.2. Comparison with buoys

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

The figure below shows the monthly results of July 2016 to November 2017.

Note also 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 bias 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] (bias less than 0.5 m/s and wind component standard deviation accuracy better than 2 m/s) when they are compared to buoy winds.
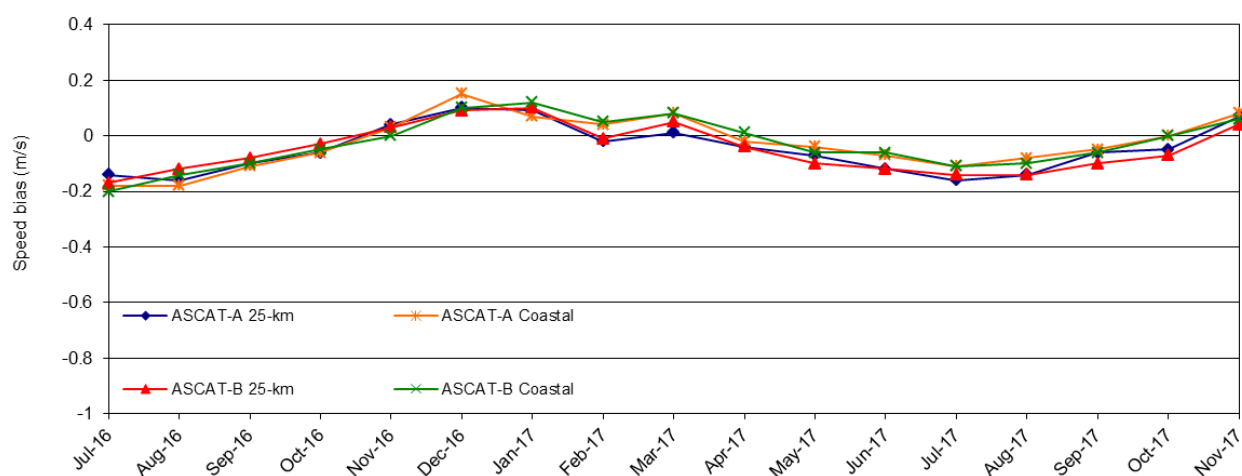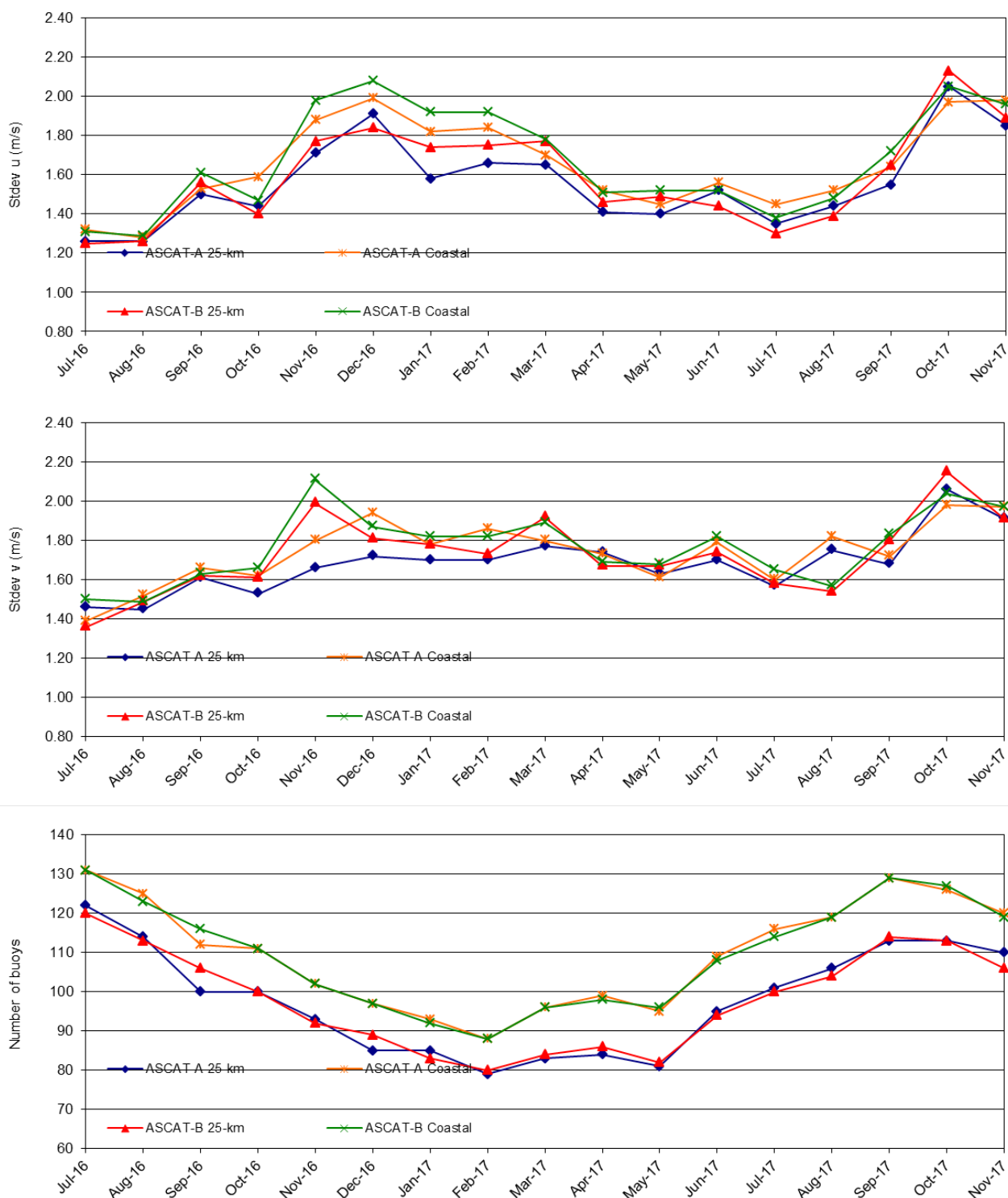
Figure 81: Comparison of scatterometer winds against buoy winds (monthly averages). For each product, the wind speed bias (scatterometer minus buoy, top), wind u component standard deviation (2nd plot) and wind v component standard deviation (3rd plot) are shown. Also the number of buoys available for the comparisons is shown (bottom).

6. Service and Product usage

6.1. Statistics on the web site and help desk

The OSI SAF offers to the users
- a central web site, http://osi-saf.eumetsat.int, managed by MF/CMS,
- a web site for SS1, http://osi-saf.eumetsat.int/lml/, managed by MF/CMS,
- a web site for SS2, http://osisaf.met.no/, managed by MET Norway,
- a web site for SS3, http://www.knmi.nl/scatterometer/osisaf/, managed by KNMI.

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

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

6.1.1.1. Statistics on the registered users

Statistics on the central Web site use			
Month	Registered users	Unique visits	User requests
JUL. 2017	1144	419	
AUG. 2017	1160	463	
SEP. 2017	1180	598	
OCT. 2017	1201	588	
NOV. 2017	1210	731	
DEC. 2017	1228	684	

Table 33: Statistics on central OSI SAF web site use over 2nd half 2017.

The following graph illustrates the evolution of external registered users on the central web site.
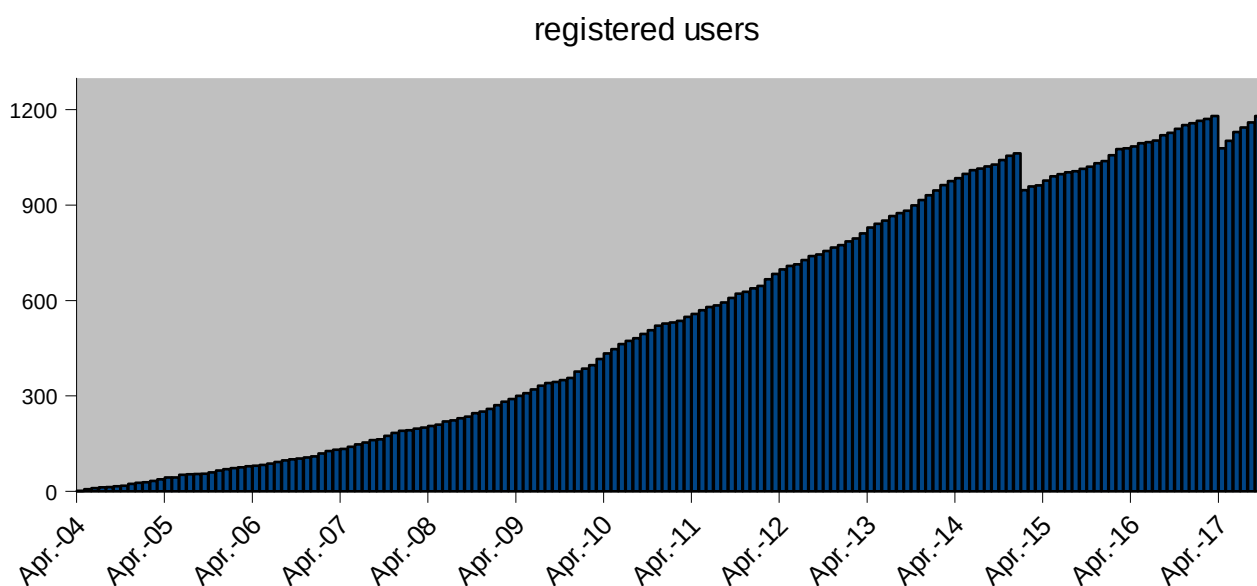
Figure 82: Evolution of external registered users on the central Web Site from April 2004 to December 2017.

Comments: In December 2014, a first cleaning of the registered user was done (143 accounts with errormean difference feedback on their email were removed). In April 2017, a new cleaning was implemented.

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

Visits of the OSI SAF central Web Site by country (top 10) over 2nd half 2017 (pages views)						
Countries	JUL. 2017	AUG. 2017	SEP. 2017	OCT. 2017	NOV. 2017	DEC. 2017
United States	205	248	317	264	277	268
France	166	168	184	191	185	241
China	29	59	117	113	195	207
Spain	28	21	39	26	33	57
United Kingdom	47	54	40	48	54	42
Russia	37	27	27	57	45	34
South Corea	25	23	18	12	18	21
Italy	19	10	16	15	21	21
Japan	7	36	21	12	17	18
Germany	29	13	18	14	25	17

Table 34: Usage of the OSI SAF central Web Site by country (top 10) over 2nd half 2017

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

Following table provides the status of requests made to the OSI SAF (includes the requests made on the OSI SAF help desk on the central web site, the requests made to osi-saf.manager@meteo.fr, the requests made to scat@knmi.nl assigned to the OSI SAF, the requests made by email directly to OSI SAF team).

The requests are classified with the following categories:
Anomaly in a product (ANOMALY),
Product not available (UNAVAIL),
Request for archived data (ARCHIVE),
Request for information (INFO).

Reference	Date	subsystem	Category	Subject	Status
email	11.07	HL	Info	Clarification about ice conc grid	Closed
#37	11.07	HL	Archive	High latitude SST/IST	Closed
email	11.07	WIND	Archive	Access to the FTP server	Closed
#38	13.07	HL	Archive	Regeneration of SICO products ?	Closed
#39	17.07	HL	Info	SICO grid problem	Closed
email	17.07	WIND	Info	Feedback on a ScatSat test data set	Closed
email	19.07	WIND	Info	Question on a ScatSat test data set	Closed
email	26.07	HL	Anomaly	SICO and SIED late ?	Closed
email	26.07	WIND	Info	RFSCAT simulator software	Closed
email	26.07	WIND	Info	Documentation	Closed
#40	10.08	WIND	Archive	Metop-A 2017-07 over Adiatic sea	Closed
#41	10.08	WIND	Archive	Metop-B 2017-07 over Adiatic sea	Closed
email	10.08	WIND	Info	Conditions of wind software use	Closed

Reference	Date	subsystem	Category	Subject	Status
email	21.08	HL	Info	About quality of ice conc in Fram Strait	Closed
email	23.08	HL	Info	About quality of ice type in 2016/2017 winter	Closed
email	25.08	WIND	Anomaly	Strange band of missing data	Closed
email	09.09	LML	Archive	GOES-East SSI missing (24/09 to 18/10 in 2012)	Closed
email	11.09	WIND	Archive	Wind on a specific point	Closed
#42	11.09	SPAM	-	-	-
email	12.09	HL	Anomaly	Low ice extent in OSI-409 in 2005	Closed
email	14.09	WIND	Info	Tool to collocate wind and model output	Closed
email	21.09	general	Info	Tool to read NetCDF	Closed
#43	22.09	LML	Info	Access to data	Closed
email	22.09	LML	Info	FTP access to data (GOES-East SSI)	Closed
email	24.09	HL	Archive	Availability of ice drift data for August 2010	Closed
#44	25.09	HL	Info	LR SIDR colour codes for the vectors	Closed
email	26.09	LML	Info	MSG SST data record	Closed
email	04.10	WIND	Info	Access to AWDP software	Closed
email	10.10	LML	Info	Access to non OSI SAF data	Closed
email	11.10	WIND	Info	Scatterometer winds	Closed
email	14.10	WIND	Archive	Access to KNMI FTP server	Closed
email	16.10	LML	Info	Access to Ifremer FTP server	Closed
email	17.10	HL	Info	Sea Ice concentration in White Sea (Russia)	Closed
#45	23.10	LML	Anomaly	Access to data on Ifremer FTP server	Closed
email	23.10	WIND	Archive	Access to KNMI FTP server	Closed
email	26.10	WIND	Anomaly	Missing demo data	Closed
email	30.10	LML	Info	Details on switch to GOES-16	Closed
email	03.11	WIND	Archive	Scatterometer winds data records	Closed
email	06.11	HL	Info	Sea ice data for art project	Closed
email	08.11	WIND	Info	Use data for commercial purpose	Closed
email	13.11	HL	Info	Request from CM SAF: Software to produce GRIB files from NetCDF sea ice concentration files when production of GRIB files are stopped in April 2018.	Closed
email	15.11	HL	Info	Details on sea ice products for assimilation	Closed
email	16.11	LML	Archive	Download data for specific areas (subset)	
email	21.11	HL	Info	About status of AMSR2 ice concentration product	Closed
email	26.11	WIND	Anomaly	Access to KNMI FTP server	Closed
email	30.11	WIND	Info	Quicklooks for demo data	Closed
email	01.12	WIND	Archive	Access to wind data records	Closed

Reference	Date	subsystem	Category	Subject	Status
email	06.12	HL	Anomaly	Attempt of re-ingestion in EDC	Closed
email	06.12	LML	Info	OSI SAF coefficients for NOAA-20	Closed
email	06.12	HL	Info	Mask issue occurred punctually or also earlier ?	Closed
email	10.12	WIND	Info	User publication	Closed
email	11.12	WIND	Info	Unsubscribe to mailing list	Closed
email	13.12	WIND	Info	Access to KNMI FTP server	Closed
email	14.12	WIND	Info	Questions on PenWP	Closed
email	15.12	WIND	Info	Access to KNMI FTP server	Closed
email	21.12	WIND	Archive	Access to demo data	Closed
email	19.12	HL	Info	SST HL data for students project	Closed
email	22.12	WIND	Archive	Get big volume of data	Closed
#46	24.12	HL	Info	Tool to open GRIB files	Closed
email	27.12	WIND	Archive	Access to demo data	Closed

Table 35: Status of User requests made to the OSI SAF

No request was forwarded from EUMETSAT Help Desk to OSI SAF.

6.1.2. Statistics on the OSI SAF Sea Ice Web portal and help desk

The following graph illustrates the evolution of visitors on the OSI SAF High Latitude portal (http://osisaf.met.no/).
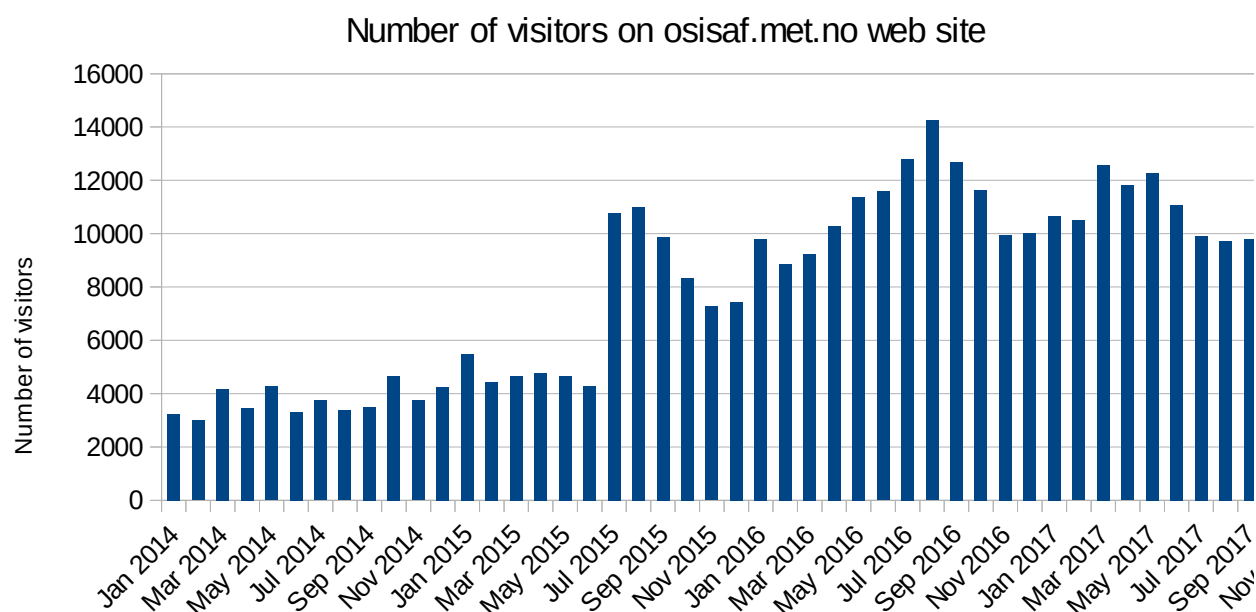
Figure 83: Evolution of visitors on the HL OSI SAF Sea Ice portal from JAN. 2014 to DEC. 2017 (http://osisaf.met.no)

6.1.3. Statistics on the OSI SAF KNMI scatterometer web page and helpdesk

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 2017. Only external sessions (from outside KNMI) are counted.
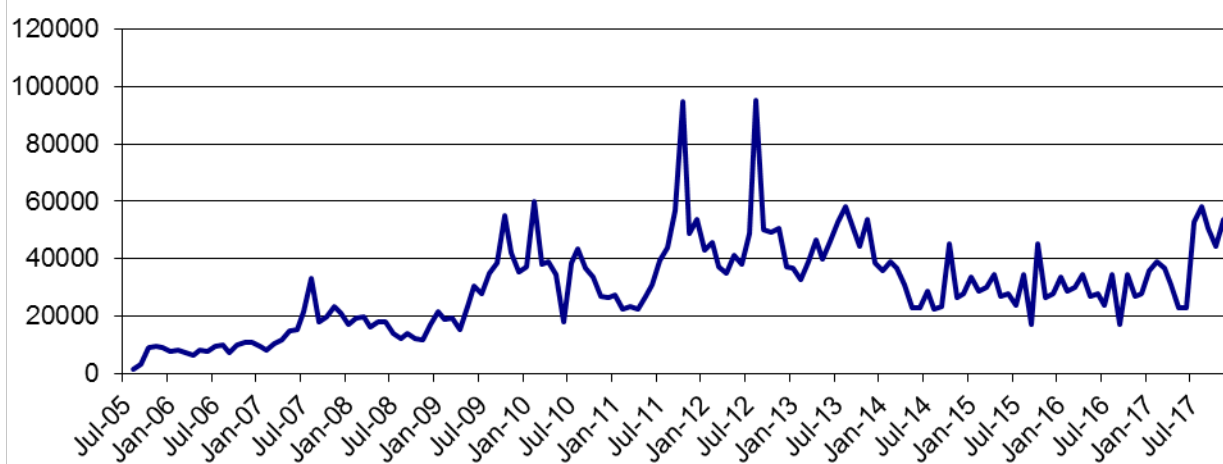
Figure 84: Number of page views on KNMI scatterometer website per month

The total number of OSI SAF helpdesk inquiries at scat@knmi in this half year was 28. All requests were acknowledged or answered within three working days. 21 were categorized as 'info', 5 as 'archive' and 2 as 'unavailable'.

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

Entity	Shortened name	Country
Environment Canada		Canada
Koninklijk Nederlands Meteorologisch Instituut	KNMI	Netherlands
Centre Mediterrani d'Investigacions Marines I Ambientals	CMIMA-CSIC	Spain
Italian Air Force Weather Service		Italy
Norwegian Meteorological Institute	Met.no	Norway
BMT Argoss		Netherlands
Danish Meteorological Institute	DMI	Denmark
Jet Propulsion Laboratory	JPL	U.S.A.
EUMETSAT		Germany
Institute of Meteorology and Water Management Poland	IMGW	Poland
University of Concepcion CHILE		Chile
Turkish State Meteorological Services		Turkey
National Centre for Medium Range Weather Forecasting India		India
Nanjing University		China
Indian National Centre for Ocean Information Service	INCOIS	India
Rudjer Boskovic Institute / Center for Marine Research		Croatia
Consiglio Nazionale delle Ricerche – ISAC Laboratorio		Italy
Ifremer		France
NOAA/NESDIS		U.S.A.
MetService		New Zealand
UAE Met. Department		United Arab Erimates
The Ohio State University, Dept. of Electrical Eng.		U.S.A.
University of Wisconsin-Madison		U.S.A.
BYU Center for Remote Sensing, Brigham Young University		U.S.A.
Woods Hole Oceanographic Institution		U.S.A.
Remote Sensing Systems		U.S.A.
Institute of Low Temperature Science, Hokkaido University		Japan
Center for Atmospheric and Oceanic Studies, Tohoku University		Japan
Naval Research Laboratory	NRL	U.S.A.
ComSine Ltd		U.K.
Met Office		U.K.
Meteorology and Oceanography Group, Space Applications Centre, ISRO		India
Numerical Prediction Division, Japan Meteorological Agency		Japan
The First Institute of Oceanography	FIO	China
PO.DAAC Data Engineering Team		U.S.A.
ECMWF		U.K.
Satellite Observing Systems		U.K.
Météo France	M-F	France
School of Marine Science and Technology, Tokai University		Japan
Northwest Research Associates		U.S.A.
University of Washington		U.S.A.
Naval Hydrographic Service, Ministry of Defence		Argentina
Swedish Meteorological and Hydrological Institute	SMHI	Sweden
Chalmers University of Technology		Sweden
Typhoon Research Department, Meteorological Research Institute		Japan
Gujarat University		India
Consiglio Nazionale delle Ricerche	CNR	Italy
Oceanweather Inc.		U.S.A.
Ocean University of China		China
Nanjing University of China		China
Hydrometeorological Research Center of Russia		Russia

Entity	Shortened name	Country
Meteorology Scientific Institution of ShanDong Province		China
VisioTerra		France
China Meteorological Administration	CMA	China
Institut de Recherche pour le Développement	IRD	France
Weathernews Inc		Japan
NECTEC		Thailand
University of Ioannina		Greece
Bermuda Weather Service		Bermuda
Chinese Academy of Sciences		China
Naval Postgraduate School		U.S.A.
University of Hawaii		U.S.A.
Chinese Culture University		Taiwan
Federal University of Rio de Janeiro		Brazil
Flanders Marine Institute		Belgium
V. I. Il`ichev Pacific Oceanological Institute		Russia
Jet Propulsion Laboratory	JPL	U.S.A.
NASA		U.S.A.
National Center for Atmospheric Research	NCAR	U.S.A.
Chinese Academy of Meteorology Science		China
Weather Routing, Inc.	WRI	U.S.A.
Instituto Oceanográfico de la Armada		Equador
Leibniz Institute for Baltic Sea Research		Germany
Nansen Environmental and Remote Sensing Center		Norway
UNMSM		Peru
Centro de Estudos do Ambiente e do Mar		Portugal
Andhra University, Visakhapatnam		India
Unidad de Tecnología Marina (UTM – CSIC)		Spain
MyOcean Sea Ice Wind TAC (Ifremer)		France
Jeju National University		Korea
Weather Data Marine Ltd.		U.K.
Admiral Paulo Moreira Marine Research Institute		Brazil
IMEDEA (UIB-CSIC)		Spain
Hong Kong Observatory		Hong Kong
Observatoire Midi-Pyrenees		France
Tidetech		Australia
Weatherguy.com		U.S.A.
Marine Data Literacy		U.S.A.
Hong Kong University of Science and Technology		Hong Kong
Environmental Agency of the Republic of Slovenia		Slovenia
Fisheries and Sea Research Institute		Portugal
National Meteorological Center		China
National Oceanography Centre, Southampton		U.K.
National Taiwan University		Taiwan
Florida State University		U.S.A.
Marine and Coastal Management		South Africa
Gent University		Belgium
Department of Meteorology		Sri-Lanka
Gwangju Institute of Science & Technology		South Korea
University of Hamburg		Germany
University of Las Palmas de Gran Canaria		Spain
The Third Institute of Oceanography		China
South China Sea Institute of Oceanology		China
Environmental Research Institute, University College Cork		Ireland
Shan dong meteorologic bureau		China

Entity	Shortened name	Country
RPS MetOcean Pty Ltd		Australia
APL-UW		China
Korea Ocean Research and Development Institute		Korea
XMU		China
Collecte Localisation Satellites	CLS	France
Instituto de Meteorologia		Portugal
ISRO - NRSC		India
ACMAD		Niger
UTL-Technical University of Lisbon		Portugal
Bureau of Meteorology		Australia
CPTEC - INPE		Brazil
StormGeo AS		Norway
Vienna University of Technology (TU Wien)		Austria
NSOAS		China
Deutscher Wetterdienst	DWD	Germany
Far-Eastern Centre for Reception and Processing of Satellite Data		Russia
Roshydromet		Russia
Sorbonne Universities		France
Brazilian Navy		Brazil
Hofstra University		U.S.A.
University of Tehran		Iran
Finnish Meteorological Institute	FMI	Finland
Stretch Space Ltd.		U.K.
Korea Institute of Ocean Science and Technology		South Korea
National Satellite Meteorological Center	NSMC	China
Irvin & Johnson Holding Company		South Africa
Fleet Numerical Meteorology and Oceanography Center, US Navy		U.S.A.
Shanghai Ocean University		China
Marine forecast station of Xiamen		China
Jiangsu Meteorological Bureau of China		China
Geological Survey of Denmark and Greenland		Denmark
Universidad Nacional Del Noroeste		Argentina
Institute of Meteorological Sciences, Hainan Province		China
Deltares		Netherlands
Icelandic Meteorological Office		Iceland
State Oceanic Administration		China
Hellenic National Meteorological Service		Greece
EWE		Germany
National University of Defense Technology		China
Beijing Piesat Information Technology		China
Climatempo		Brazil
Direction de la Météorologie Nationale		Morocco
OceanDataLab		France
29 independent users (not affiliated to an organization)		

Table 36: List of registered wind users at KNMI

6.2. Statistics on the FTP sites use

6.2.1. Statistics on the LML subsystem and PO.DAAC FTP site use

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. 2017		AUG. 2017		SEP. 2017		OCT. 2017		NOV. 2017		DEC. 2017	
		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		0	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	0	x	0	x	0	x	0	x	9854	x
OSI-201/-b	GBL SST	4783	362	5351	5855	5048	252	6448	400	6366	1011	6901	217
OSI-202/-b	NAR SST	3843	439	4328	11248	3866	815	20824	555	3228	288	3142	1067
OSI-204/-b	MGR SST	298735	39184	1129556	1356440	364110	32292	850886	28651	284646	27731	315809	38156
OSI-206	Meteosat SST	33141	9989	39940	1343	46290	1093	28424	599	73766	624	40058	1427
OSI-207	GOES-East SST	1416	457	1419	556	1380	384	1404	1	1377	348	986	1074
OSI-IO-SST	Meteosat-8 SST	10	0	28	0	676	75	2183	0	10297	1	7807	48
OSI-208/-b	IASI SST	58942	24535	58878	26156	56707	19502	48562	14179	61940	13723	56679	23010
OSI-303	Meteosat DLI	62	x	68	x	93	x	61	x	488	x	615	x
OSI-304	Meteosat SSI	52023	x	96678	x	60385	x	33890	x	75477	x	55591	x
OSI-305	GOES-East DLI	62	x	65	x	71	x	65	x	60	x	31	x
OSI-306	GOES-East SSI	6128	x	14835	x	6661	x	4959	x	26177	x	6351	x
OSI-IO-DLI	Meteosat-8 DLI	0	x	2	x	30	x	0	x	1	x	0	x
OSI-IO-SSI	Meteosat-8 SSI	0	x	0	x	246	x	0	x	0	x	1	x

Table 37: Number of OSI SAF products downloaded from Ifremer FTP server and PO.DAAC server over 2nd half 2017.

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. Statistics on the HL subsystem and CMEMS FTP site use

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.

		JUL. 2017		AUG. 2017		SEP. 2017		OCT. 2017		NOV. 2017		DEC. 2017	
		HL FTP	CMEMS	HL FTP	CMEMS	HL FTP	CMEMS	HL FTP	CMEMS	HL FTP	CMEMS	HL FTP	CMEMS
Downloaded sea ice products													
OSI-401 series	Global Sea Ice Concentration (SSMIS)	112743	9130	17790	2903	15872	1750	15374	12160	16542	1670	10429	1809
OSI-402 series	Global Sea Ice Edge	3799	5869	4068	186	3221	382	3635	9591	3172	244	3396	308
OSI-403 series	Global Sea Ice Type	21348	6282	48883	42910	23462	443	35663	9467	78933	387	13533	252
OSI-404 series	Global Sea Ice Emissivity	249	x	97	x	124	x	113	x	893	x	562	x
OSI-405 series	Low resolution Sea Ice Drift	9236	685	11866	675	15923	747	13820	5433	16011	889	9460	816
OSI-407 series	Medium resolution Sea Ice Drift	3197	x	141	x	27	x	165	x	256	x	1	x
OSI-408 series	Global Sea Ice Concentration (AMSR-2)	226	x	460	x	630	x	124	x	212	x	320	x
OSI-409	Reprocessed Ice Concentration	28843	0	39670	0	1754	0	24329	0	154453	0	8202	0
OSI-430	Continuous Reproc Ice Concentration v1p2	543	0	5784	0	903	172	4514	33596	5096	1	84	4
OSI-450	Reprocessed Ice Concentration v2.0	2458	x	633	x	74379	x	27435	x	89598	x	2894	x
Downloaded SST, DLI and SSI over the OSI SAF High Latitude FTP server													
OSI-203 series	AHL SST	7721	x	2413	x	6356	x	455	x	831	x	291	x
OSI-205 series	L2 SST/IST	33998	x	2519	x	3804	x	42574	x	10825	x	238	x
OSI-301 series	AHL DLI	184	x	663	x	98	x	4	x	1	x	3	x
OSI-302 series	AHL SSI	644	x	405	x	81	x	172	x	239	x	1	x

Table 38: Number of OSI SAF products downloaded from OSI SAF Sea Ice FTP server over 2nd half 2017

6.2.3. Statistics on the WIND subsystem and PO.DAAC FTP site use

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.

| | | JUL. 2017 | | AUG. 2017 | | SEP. 2017 | | OCT. 2017 | | NOV. 2017 | | DEC. 2017 | |
		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	25 per file (BUFR), 21 per file (NetCDF)	43565	25 per file (BUFR), 21 per file (NetCDF)	1143957	25 per file (BUFR), 21 per file (NetCDF)	21770	20 per file (BUFR), 18 per file (NetCDF)	1879	20 per file (BUFR), 18 per file (NetCDF)	92600	20 per file (BUFR), 18 per file (NetCDF)	35636
OSI-102-b	ASCAT-B 25km	20 per file (BUFR), 15 per file (NetCDF)	64735	20 per file (BUFR), 15 per file (NetCDF)	311071	20 per file (BUFR), 15 per file (NetCDF)	39674	20 per file (BUFR), 16 per file (NetCDF)	763	20 per file (BUFR), 16 per file (NetCDF)	65346	20 per file (BUFR), 16 per file (NetCDF)	36033
OSI-103	ASCAT-A 12.5km	N/A	189147	N/A	593543	N/A	6073	N/A	5781	N/A	619	N/A	68132
OSI-104	ASCAT-A Coastal	30 per file (BUFR), 35 per file (NetCDF)	236693	30 per file (BUFR), 35 per file (NetCDF)	795403	30 per file (BUFR), 35 per file (NetCDF)	93826	25 per file (BUFR), 30 per file (NetCDF)	1639	25 per file (BUFR), 30 per file (NetCDF)	125952	25 per file (BUFR), 30 per file (NetCDF)	169023
OSI-104-b	ASCAT-B Coastal	35 per file (BUFR), 40 per file (NetCDF)	68711	35 per file (BUFR), 40 per file (NetCDF)	338982	35 per file (BUFR), 40 per file (NetCDF)	59827	35 per file (BUFR), 40 per file (NetCDF)	988	35 per file (BUFR), 40 per file (NetCDF)	62968	35 per file (BUFR), 40 per file (NetCDF)	69217

Table 39: Number of OSI SAF products downloaded from KNMI FTP server and PO.DAAC server over 2nd half 2017

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 34 shows the overall number of OSI SAF users by country at 2017-07-28.

Country	N	Country	N	Country	N
Albania	3	Greece	13	Poland	11
Algeria	4	Guinea	2	Portugal	5
Angola	3	Guinea-Bissau	3	Qatar	3
Armenia	1	Hungary	8	Reunion	1
Austria	19	Iceland	1	Romania	5
Azerbaijan	3	India	2	Russian Federation	6
Bahrain	1	Iran, Islamic Republic Of	21	Rwanda	5
Belgium	9	Iraq	1	San Marino	1
Benin	5	Ireland	5	Sao Tome And Principe	2
Bosnia And Herzegovina	1	Isle Of Man	1	Saudi Arabia	4
Botswana	6	Israel	8	Senegal	8
Brazil	4	Italy	256	Serbia	3
Bulgaria	2	Jordan	1	Seychelles	2
Burkina Faso	3	Kazakhstan	4	Sierra Leone	2
Burundi	2	Kenya	12	Slovakia	4
Cameroon	3	Korea, Republic Of	1	Slovenia	1
Canada	2	Kuwait	1	Somalia	1
Cape Verde	2	Kyrgyzstan	1	South Africa	19
Central African Republic	2	Latvia	1	South Sudan	1
Chad	2	Lebanon	3	Spain	43
China	3	Lesotho	4	Sudan	3
Comoros	2	Liberia	2	Swaziland	3
Congo	2	Libyan Arab Jamahiriya	1	Sweden	3
Congo, The Democratic Republic Of The	5	Lithuania	2	Switzerland	11
Cote D'Ivoire	5	Luxembourg	1	Syrian Arab Republic	1
Croatia	2	Macedonia, The Former Yugoslav Republic Of	2	Tajikistan	1
Cyprus	1	Madagascar	6	Tanzania, United Republic Of	5
Czech Republic	16	Malawi	3	Togo	3
Denmark	6	Mali	3	Tunisia	2
Djibouti	2	Malta	2	Turkey	6
Egypt	4	Mauritania	3	Turkmenistan	1
Equatorial Guinea	2	Mauritius	7	Uganda	4
Eritrea	2	Moldova, Republic Of	1	Ukraine	2
Estonia	3	Morocco	4	United Arab Emirates	4
Ethiopia	6	Mozambique	5	United Kingdom	117
Finland	4	Namibia	6	United States	3
France	52	Netherlands	27	Uzbekistan	1
Gabon	1	Niger	7	Viet Nam	1
Gambia	3	Nigeria	6	Yemen	1
Germany	97	Norway	4	Zambia	3
Ghana	10	Oman	2	Zimbabwe	4

Table 40: Overall number of EUMETCast users by country at 2017-07-28

6.3.2. Users and retrievals from EUMETSAT Data Center

Orders Summary over the 2nd half 2017

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 2017**.

Product id	Item	Volume in MB	Number of files
OSI-305, OSI-306 (daily)	GOES-13_ODDLISSI_OPE	12	1
OSI-305, OSI-306 (hourly)	GOES-13_OHDLISSI_OPE	118	14
OSI-305 (daily)	GOES-13_OSIDDLI_OPE	2059	181
OSI-306 (daily)	GOES-13_OSIDSSI_OPE	16918	1481
OSI-306 (hourly)	GOES-13_OSIHSSI_OPE	195448	29004
OSI-207	GOES-13_OSIHSST_OPE	1243	350
OSI-207 (NetCDF4)	GOES-13_OSIHSSTN_OPE	135	24
OSI-102-b	M01_OAS025_OPE	8604	4698
OSI-104-b	M01_OASWC12_OPE	129753	12487
OSI-201-b	M01_OSSTGLB_OPE	408	23
OSI-201-b (NetCDF4)	M01_OSSTGLBN_OPE	111	3
OSI-103	M02_OAS012_OPE	20182	6142
OSI-102	M02_OAS025_OPE	39052	20405
OSI-103 ?	M02_OASW012_OPE	24	8
OSI-102 ?	M02_OASW025_OPE	13368	17891
OSI-104	M02_OASWC12_OPE	129632	12986
OSI-407	M02_OMRSIDRN_OPE	17	12
OSI-201-a	M02_OSSTGLB_OPE	1272	483
OSI-205	M02_OSSTIST2_OPE	34	3
OSI-401 series	MML_OSICOGB_OPE	2279	654
OSI-401 series (NetCDF)	MML_OSICOGBN_OPE	599	76
OSI-405 series	MML_OSIDRGB_OPE	7910	10917
OSI-203	MML_OSSTAHL_OPE	23	62
OSI-304 (daily)	MSG1_OSIDSSI_OPE	33206	44
OSI-304 (hourly)	MSG1_OSIHSSI_OPE	92582	941
OSI-304 (daily)	MSG2_OSIDSSI_OPE	44494	599
OSI-304 (hourly)	MSG2_OSIHSSI_OPE	161466	188
OSI-303, OSI-304 (daily)	MSG3_ODDLISSI_OPE	453	38
OSI-303, OSI-304 (hourly)	MSG3_OHDLISSI_OPE	16210	1878

Product id	Item	Volume in MB	Number of files
OSI-303 (daily)	MSG3_OSIDDLI_OPE	2063	181
OSI-304 (daily)	MSG3_OSIDSSI_OPE	43934	3422
OSI-304 (hourly)	MSG3_OSIHSSI_OPE	337640	56220
OSI-206	MSG3_OSIHSST_OPE	13638	3273
OSI-206 (NetCDF)	MSG3_OSIHSSTN_OPE	766	72
OSI-202	N18_OSSTNAR_OPE	87	39

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

Ingestion Summary over the 2nd half 2017

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).

id	product	JUL. 2017	AUG. 2017	SEP. 2017	OCT. 2017	NOV. 2017	DEC. 2017
OSI-404	Global Sea Ice Emissivity (DMSP-F18)	100	96.7	100	100	100	100
OSI-305	Daily Downward Longwave Irradiance (GOES-13)	100	96.7	100	100	100	100
OSI-306	Daily Surface Solar Irradiance (GOES-13)	100	96.7	100	100	100	100
OSI-305	Hourly Downward Longwave Irradiance (GOES-13)	100	97.9	100	99.5	100	99.0
OSI-306	Hourly Surface Solar Irradiance (GOES-13)	100	97.9	99.8	99.5	100	99.0
OSI-207	Hourly Sea Surface Temperature (GOES-13)	100	97.8	99.8	99.5	99.8	84.4
OSI-408	Sea Ice Concentration (AMSR-2)	100	96.7	100	100	100	100
OSI-102-b	ASCAT 25km Wind (Metop-B)	100	98.4	100	100	100	100
OSI-104-b	ASCAT 12.5km Coastal Wind (Metop-B)	100	98.4	100	100	100	99.5
OSI-102	ASCAT 25km Wind (Metop-A)	100	98.4	100	100	100	99.5
OSI-104	ASCAT 12.5km Coastal Wind (Metop-A)	99.3	98.4	99.7	100	99.7	99.3
OSI-201-b	Global Sea Surface Temperature (Metop-A)	100	98.3	100	98.3	100	100

id	product	JUL. 2017	AUG. 2017	SEP. 2017	OCT. 2017	NOV. 2017	DEC. 2017
OSI-202-b	NAR Sea Surface Temperature (Metop-A)	100	96.7	100	100	100	100
OSI-407	Global Sea Ice Drift (Multi Mission)	100	96.7	100	100	100	98.3
OSI-205	SST/IST L2	100	100	100	100	100	100
OSI-301	AHL Downward Longwave Irradiance (Multi Mission)	100	96.7	96.6	100	100	100
OSI-401	Global Sea Ice Concentration (DMSP-18)	100	96.7	100	100	100	96.7
OSI-405	Global Low Resolution Sea Ice Drift	100	95.1	100	100	100	98.3
OSI-402	Global Sea Ice Edge (Multi Mission)	100	96.7	100	100	100	100
OSI-403	Global Sea Ice Type (Multi Mission)	100	96.7	100	100	100	100
OSI-302	AHL Surface Solar Irradiance (Multi Mission)	100	96.7	96.6	100	100	100
OSI-203	AHL Sea Surface Temperature (Multi Mission)	100	98.3	100	100	100	100
OSI-303	Daily Downward Longwave Irradiance (MSG)	100	96.7	100	100	100	100
OSI-304	Daily Surface Solar Irradiance (MSG)	100	96.7	100	100	100	100
OSI-303	Hourly Downward Longwave Irradiance (MSG)	100	97.8	100	99.5	100	99.8
OSI-304	Hourly Surface Solar Irradiance (MSG)	100	97.8	100	99.5	100	99.8
OSI-206	Hourly Sea Surface Temperature (MSG)	100	97.8	100	99.5	99.8	100
OSI-202-b	NAR Sea Surface Temperature (NPP)	100	98.3	100	98.3	100	98.3

Table 42: Percentage of received OSI SAF products in EDC in 2nd half 2017

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	NOK	Configuration in UMARF is still on-going.

id	product	APNM	status	comment
OSI-153-b	Oceansat-2 L2 50 km winds data record	OR1OSW050	NOK	Configuration in UMARF is still on-going.
OSI-409	Global Sea Ice Concentration data record (SSMR/SSMI)	OR1SICOGB	NOK	Initial test data provided used for configuration in UMARF didn't fully represent the real data. Correction of current configuration in UMARF is on-going.
OSI-409-a	Global Sea Ice Concentration data record (SSMI/SSMIS)	OR2SICOGB	NOK	Initial test data provided used for configuration in UMARF didn't fully represent the real data. Correction of current configuration in UMARF is on-going.
OSI-450	Global Sea Ice Concentration data record (SMMR/SSMI/SSMIS)	OR2017SICO GB	NOK	Configuration in UMARF is still on-going.

Table 43: OSI SAF Data records ingestion in EDC status on 31 December 2017

7. Training

1. Operational Marine Surface Analysis using EUMETSAT's Copernicus Marine Data Stream!
   http://training.eumetsat.int/enrol/index.php?id=276

2. EUMeTrain Marine Course 2017
   http://www.eumetrain.org/courses/marine_forecasting_2017.html

3. Met Eireann Initial Forecasters course, Met Eireann, 16 oct 2017 – 10 jan 2018, provided by KNMI, Scatterometry on 5 Dec. 2017.

8. Documentation update

The following table provides the list of documents modified during the reporting period, as well as new documents made available to users. Last version of documents and new documents are available on the central Web Site (http://osi-saf.eumetsat.int).

Title	-	Reference	Latest version	date
CDOP 3 Funding Release Plan	FRP	SAF/OSI/CDOP/MF/MGT/PL/3-008	1.0	28/04/2017
CDOP 3 Product Requirement Document	PRD	SAF/OSI/CDOP3/MF/MGT/PL/2-001	1.1	20/11/2017
CDOP 3 Project Plan	PP	SAF/OSI/CDOP3/MF/MGT/PL/3-005	1.1	20/11/2017
CDOP 3 Master Schedule	MSch	SAF/OSI/CDOP3/MF/MGT/PL/3-007	1.1	20/11/2017
CDOP 3 Configuration Management Plan	CMP	SAF/OSI/CDOP3/MF/MGT/PL/3-009	1.0	28/04/2017
Service Specification	SeSp	SAF/OSI/CDOP3/MF/MGT/PL/003	1.4	09/02/2018
Joint Operation Procedures and Interface Control Document	JOP/ OICD	EUM/OPS/ICD/04/0201	8E	21/04/2017

Table 44: Top-level documentation updates

Title	Product ref.	Doc ref.	Version	Date
OSI SAF ScatSat-1 wind Product User Manual	OSI-112	SAF/OSI/CDOP2/KNMI/TEC/MA/287	1.0	02/2017
OSI SAF Algorithm Theoretical Basis Document for Medium Resolution Sea Ice Drift Product	OSI-407-a	SAF/OSI/CDOP2/DMI/SCI/MA/132	2.1	02/2017
OSI SAF Algorithm theoretical basis document for the 50GHz sea ice emissivity model	OSI-404-a	SAF/OSI/CDOP3/DMI/SCI/MA/139	2.1	02/2017
OSI SAF Review Board Report for the PCR of the MR Sea Ice Drift	OSI-407-a	SAF/OSI/CDOP2/DMI/MGT/RP/295	1.0	03/03/2017
OSI SAF Review Board Report for the PCR of the ScatSat-1 winds	OSI-112	SAF/OSI/CDOP2/KNMI/MGT/RP/289	1.1	07/03/2017
OSI SAF Global Sea Ice Concentration Climate Data Record Product User Manual	OSI-450	SAF/OSI/CDOP2/MET/TEC/MA/288	1.0	22/03/2017
OSI SAF Review Board Report for the PCR of the Sea Ice Emissivity	OSI-404-a	SAF/OSI/CDOP3/DMI/MGT/RP/303	1.1	07/04/2017
OSI SAF Algorithms Theoretical Basis Document for MTG radiative fluxes	OSI-303-b, OSI-304-b	SAF/OSI/CDOP3/MF/SCI/MA/299	0.2	04/05/2017
OSI SAF Algorithm Theoretical Basis Document for MTG Sea Surface Temperature	OSI-206-b	SAF/OSI/CDOP3/	0.2	05/05/2017
OSI SAF Sea Ice Concentration Climate Data Record Validation Report	OSI-450	SAF/OSI/CDOP2/DMI/SCI/RP/285	1.0	10/05/2017
OSI SAF Oceansat-2 L2 winds Data Record Product User Manual	OSI-153-a, OSI-153-b	SAF/OSI/CDOP3/KNMI/TEC/MA/297	1.1	06/2017
OSI SAF Oceansat-2 L2 winds Data Record validation report	OSI-153-a, OSI-153-b	SAF/OSI/CDOP3/KNMI/TEC/RP/298	1.1	06/2017
OSI SAF Radiative fluxes over Indian Ocean from Meteosat-8 data, validation report	OSI-IO-DLI, OSI-IO-SSI	SAF/OSI/CDOP3/MF/SCI/RP/305	1.0	13/07/2017
OSI SAF Sea Surface Temperature over Indian Ocean from Meteosat-8 data, validation report	OSI-IO-DLI, OSI-IO-SSI	SAF/OSI/CDOP3/MF/SCI/RP/306	1.0	13/07/2017
OSI SAF Geostationary Radiative Fluxes Product User Manual	OSI-303, OSI-304, OSI-305-a, OSI-306-a, OSI-IO-DLI, OSI-IO-SSI	SAF/OSI/CDOP3/MF/TEC/MA/182	1.5	13/07/2017
OSI SAF Geostationary Sea Surface Temperature Product User Manual	OSI-206, OSI-207, OSI-IO-SST	SAF/OSI/CDOP3/MF/TEC/MA/181	1.6	13/07/2017
OSI SAF System and Component VERification File (SCVERF) for the MTG subsystem	OSI-206-b, OSI-303-b, OSI-304-b	SAF/OSI/CDOP3/MF/TEC/TN/301	0.2	25/09/2017

Title	Product ref.	Doc ref.	Version	Date
OSI SAF System Verification and Validation Plan for the MTG subsystem	OSI-206-b, OSI-303-b, OSI-304-b	SAF/OSI/CDOP3/MF/TEC/PL/215	2.1	25/09/2017
OSI SAF Product User Manual for Global Sea Ice Concentration	OSI-401-b	SAF/OSI/CDOP3/DMI_MET/TEC/MA/204	1.6	27/09/2017
OSI SAF Global Sea Ice Edge and Type Product User's Manual	OSI-402-c, OSI-403-c	SAF/OSI/CDOP2/MET-Norway/TEC/MA/205	2.2	27/09/2017
OSI SAF Product User Manual for Global Sea Ice Concentration	OSI-401-b	SAF/OSI/CDOP3/DMI_MET/TEC/MA/204	1.6	09/2017
OSI SAF System VALidation File (SVALF) for the MTG subsystem	OSI-206-b, OSI-303-b, OSI-304-b	SAF/OSI/CDOP3/MF/TEC/TN/302	0.3	16/10/2017
OSI SAF Architecture and Component Design Document for the MTG subsystem	OSI-206-b, OSI-303-b, OSI-304-b	SAF/OSI/CDOP3/MF/TEC/TN/304	1.2	16/10/2017
OSI SAF System and Component Requirement Document for the MTG subsystem	OSI-206-b, OSI-303-b, OSI-304-b	SAF/OSI/CDOP3/MF/TEC/TN/212	1.4	13/11/2017
OSI SAF Geostationary Radiative Fluxes Product User Manual	OSI-303, OSI-304, OSI-305-a, OSI-306-a, OSI-IO-DLI, OSI-IO-SSI	SAF/OSI/CDOP3/MF/TEC/MA/182	1.6	13/12/2017
OSI SAF Geostationary Sea Surface Temperature Product User Manual	OSI-206, OSI-207-a, OSI-IO-SST	SAF/OSI/CDOP3/MF/TEC/MA/181	1.7	13/12/2017

Table 45: Subsystems documentation updates

9. Recent publications

9.1. Peer review papers written by OSI SAF users

About OSI SAF winds

Marseille, G & Stoffelen, Ad. (2017). **Toward Scatterometer Winds Assimilation in the Mesoscale HARMONIE Model**. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing. PP. 1-11. 10.1109/JSTARS.2016.2640339.

About OSI SAF sea ice type (OSI-403 series)

Rachel L. Tilling, Andy Ridout, Andrew Shepherd, **Estimating Arctic sea ice thickness and volume using CryoSat-2 radar altimeter data**, In Advances in Space Research, 2017, ISSN 0273-1177, https://doi.org/10.1016/j.asr.2017.10.051.

About OSI SAF reprocessed sea ice concentration

Jack C. Landy, Jens K. Ehn, David G. Babb, Nathalie Thériault, David G. Barber, **Sea ice thickness in the Eastern Canadian Arctic: Hudson Bay Complex & Baffin Bay**, Remote Sensing of Environment, Volume 200, 2017, Pages 281-294, http://dx.doi.org/10.1016/j.rse.2017.08.019.

Koldunov, N. V., Köhl, A., Serra, N., and Stammer, D.: **Sea ice assimilation into a coupled ocean–sea ice model using its adjoint**, The Cryosphere, 11, 2265-2281, https://doi.org/10.5194/tc-11-2265-2017, 2017.

9.2. Peer review papers written by OSI SAF team on work done within OSI SAF or on OSI SAF products

Belmonte Rivas, Maria & Stoffelen, Ad & Verspeek, Jeroen & Verhoef, Anton & Neyt, Xavier & Anderson, Craig. (2017). **Cone Metrics: A New Tool for the Intercomparison of Scatterometer Records**. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing. PP. . 10.1109/JSTARS.2017.2647842.

Otosaka, Ines & Belmonte Rivas, Maria & Stoffelen, Ad. (2017). **Bayesian Sea Ice Detection With the ERS Scatterometer and Sea Ice Backscatter Model at C-Band**. IEEE Transactions on Geoscience and Remote Sensing. 99. 0. 10.1109/TGRS.2017.2777670.

Verhoef, Anton & Vogelzang, Jur & Verspeek, Jeroen & Stoffelen, Ad. (2016). **Long-Term Scatterometer Wind Climate Data Records**. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing. PP. 1-9. 10.1109/JSTARS.2016.2615873.

Lin, Wenming & Portabella, M & Stoffelen, Ad & Verhoef, Anton. (2016). **Toward an Improved Wind Inversion Algorithm for RapidScat**. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing. PP. 1-9. 10.1109/JSTARS.2016.2616889.

9.3. Peer review papers written by OSI SAF team on other works

Stoffelen, Ad & Aaboe, Signe & Calvet, Jean-Christophe & Cotton, James & De Chiara, Giovanna & Figa-saldaña, J & Aurelien Mouche, Alexis & Portabella, M & Scipal, Klaus & Wagner, Wolfgang. (2017). **Scientific Developments and the EPS-SG Scatterometer**. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing. PP. 1-12. 10.1109/JSTARS.2017.2696424.

Figa-saldaña, J & Scipal, Klaus & Long, D.G. & Bourassa, Mark & Stoffelen, Ad & Wagner, Wolfgang. (2017). **Foreword to the Special Issue on "New Challenges and Opportunities in Scatterometry"**. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing. PP. 1-3. 10.1109/JSTARS.2017.2694898.

J. Wentz, Frank & Ricciardulli, Lucrezia & Rodriguez, Ernesto & W. Stiles, Bryan & Bourassa, Mark & Long, David & Hoffman, Ross & Stoffelen, Ad & Verhoef, Anton & W. ONeill, Larry & Tomas Farrar, J & Van-demark, Douglas & Fore, Alexander & Hristova-Veleva, Svetla & Joseph Turk, F & Gaston, Robert & Tyler, Douglas. (2017). **Evaluating and Extending the Ocean Wind Climate Data Record**. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing. PP. 1-21. 10.1109/JSTARS.2016.2643641.