The EUMETSAT Network of Satellite Application Facilities

OSI SAF
Ocean and Sea Ice

OSI SAF CDOP2

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HALF-YEARLY OPERATIONS REPORT

–

2nd half 2016

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09 November 2017

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version 1.1

Prepared by DMI, Ifremer, KNMI, Meteo-France and MET Norway.

Table of contents

Document Change record

Document version	Date	Editor	Change description
1.0	08/02/2017	CH	First version
1.1	09/11/2017	CH	Updated version after annual OSI SAF operations review (25/10/2017) : • Update of dead links (due to web site update in April 2017) (RID 014) • Table 12 completed with Bias Marg in %, Std Dev in Wm^{-2} and Std Dev in % corrected (RID 023) • Table 15 completed with Bias Marg in % and Std Dev margin in % • Comments updated in 5.3.1 Global sea ice concentration (OSI-401-b) quality (RID 024) • Comments about ingestion summary updated in 6.3.2. Users and retrievals from EUMETSAT Data Center (RID 013)

1 Introduction

1.1 Scope of the document

The present report covers from 1st of July to 31 December 2016.

The objective of this document is to provide EUMETSAT and users, in complement with the web site *www.osi-saf.org*, 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 M-F 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 www.osi-saf.org, the OSI SAF web site.

1.3 Reference and applicable documents

1.3.1 Applicable documents

[AD-1] : Service Specification Document, SESP, version 2.9 (10/10/2016)

1.3.2 Reference documents

[RD-1] : ASCAT Wind Product User Manual
OSI-102, OSI-102-b, OSI-103, OSI-104, 0SI-104-b

[RD-2] : RapidScat Wind Product User Manual
OSI-109

[RD-3] : ASCAT L2 winds Data Record Product User Manual
OSI-150-a, OSI-150-b

[RD-4] : Reprocessed SeaWinds L2 winds Product User Manual
OSI-151-a, OSI-151-b

[RD-5] : Low Earth Orbiter Sea Surface Temperature Product User Manual
OSI-201-b, OSI-202-b, OSI-204-b, OSI-208-b

[RD-6] : Atlantic High Latitude L3 Sea Surface Temperature Product User Manual
OSI-203

[RD-7] : Geostationary Sea Surface Temperature Product User Manual
OSI-206, OSI-207

[RD-8] : Atlantic High Latitude Radiative Fluxes Product User Manual
OSI-301, OSI-302

[RD-9] : Geostationary Radiative Flux Product User Manual
OSI-303, OSI-304, OSI-305, OSI-306

[RD-10] : Product User Manual for OSI SAF Global Sea Ice Concentration
OSI-401-b

[RD-11] : Global Sea Ice Edge and Type Product User's Manual
OSI-402-b, OSI-403-b

[RD-12] : 50 Ghz Sea Ice Emissivity Product User Manual
OSI-404

[RD-13] : Low Resolution Sea Ice Drift Product User’s Manual
OSI-405-b

[RD-14] : Medium Resolution Sea Ice Drift Product User Manual
OSI-407

[RD-15] : Global Sea Ice Concentration Reprocessing Product User Manual
OSI-409, OSI-409-a, OSI-430

1.4 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.

The **RapidScat 2 hours and 3 hours wind products** originate from independent input data streams and have different timeliness requirements (120 minutes and 180 minutes). The availability is defined as the percentage of products which are available within the specified timeliness where valid input satellite data are available.

So the number of 3 hours products available within 180 minutes can be lower than the number of 2 hours products available within 120 minutes, depending on the received input data at KNMI.

No statistics are available for RapidScat winds after August since the instrument stopped working on August 19, 2016 following an irrecoverable failure.

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. 2016	AUG. 2016	SEP. 2016	OCT. 2016	NOV. 2016	DEC. 2016
OSI-102	ASCAT-A 25 km Wind	100	99.9	97.3	99.4	100	100
OSI-102-b	ASCAT-B 25 km Wind	100	99.9	97.3	99.5	100	100
OSI-104	ASCAT-A Coastal Wind	99.8	99.6	95.3	99.1	99.9	99.9
OSI-104-b	ASCAT-B Coastal Wind	99.9	99.8	95.5	99.4	99.9	99.9
OSI-109-a	RapidScat 25 km Wind 2 hours	99.5	98.9	-	-	-	-
OSI-109-b	RapidScat 50 km Wind 2 hours	99.5	99.6	-	-	-	-
OSI-109-c	RapidScat 25 km Wind 3 hours	99.3	99.3	-	-	-	-
OSI-109-d	RapidScat 50 km Wind 3 hours	99.5	99.6	-	-	-	-
OSI-201-b	GBL SST	100	100	93.3	95.1	95.0	100
OSI-202-b	NAR SST	95.9	100	93.3	92.7	94.1	100
OSI-203	AHL SST / NHL SSIST	100	100	96.6	100	100	100
OSI-204-b	MGR SST	99.6	99,9	93.0	99.9	95.4	100
OSI-206	METEOSAT SST	99.5	100	96.6	99.8	96.9	100
OSI-207	GOES-E SST	99.4	99,7	92.0	99.7	94.3	100
OSI-208-b	IASI SST	99.5	99,5	93.1	90.8	95.5	99,9
OSI-301	AHL DLI	100	100	96	100	100	100
OSI-302	AHL SSI	100	100	96	100	100	100
OSI-303	METEOSAT DLI - hourly	98.9	99.7	92.5	88.9	94.0	100
	METEOSAT DLI - daily	100	100	96.6	83.8	93.3	100
OSI-304	METEOSAT SSI - hourly	98.9	99.7	92.5	88.9	94.0	100
	METEOSAT SSI - daily	100	100	96.6	83.8	93.3	100
OSI-305	GOES-E DLI - hourly	98.9	99.4	90.9	84.4	95.0	100
	GOES-E DLI - daily	100	100	93.3	87.1	93.3	100
OSI-306	GOES-E SSI - hourly	98.9	99.4	90.9	84.4	95.0	100
	GOES-E SSI - daily	100	100	93.3	87.1	93.3	100
OSI-401-b	Global Sea Ice Concentration	100	96.8	100	96.8	100	100
OSI-402-b	Global Sea Ice Edge	100	100	100	96.7	100	100
OSI-403-b	Global Sea Ice Type	100	100	100	96.7	100	100
OSI-404	Global Sea Ice Emissivity	96.8	100	100	96.8	100	100
OSI-405-b	Low Res. Sea Ice Drift	100	100	100	93.5	96.6	100
OSI-407	Medium Res. Sea Ice Drift	98.4	98.4	96.8	95.2	100	98.4

table 2 : **Percentage of OSI SAF products available on the local FTP servers within the specified time over 2nd half 2016.**

2.2 Availability via EUMETCast

Ref.	Product	JUL. 2016	AUG. 2016	SEP. 2016	OCT. 2016	NOV. 2016	DEC. 2016
OSI-102	ASCAT-A 25 km Wind	100	99.9	97.3	99.4	100	100
OSI-102-b	ASCAT-B 25 km Wind	100	99.9	97.3	99.5	100	100
OSI-104	ASCAT-A Coastal Wind	99.8	99.6	95.3	99.1	99.9	99.9
OSI-104-b	ASCAT-B Coastal Wind	99.9	99.8	95.5	99.4	99.9	99.9
OSI-109-a	RapidScat 25 km Wind 2 hours	99.5	98.9	-	-	-	-
OSI-109-b	RapidScat 50 km Wind 2 hours	99.5	99.6	-	-	-	-
OSI-109-c	RapidScat 25 km Wind 3 hours	99.3	99.3	-	-	-	-
OSI-109-d	RapidScat 50 km Wind 3 hours	99.5	99.6	-	-	-	-
OSI-201-b	GBL SST	100	96.7	99.1	96.7	98.3	98.3
OSI-202-b	NAR SST	98.0	99.6	100	98.3	100.0	97.5
OSI-203	AHL SST / NHL SSIST	100	100	100	96.7	100	100
OSI-204-b	MGR SST	99.8	99.6	99.8	98.4	99.7	97.7
OSI-206	METEOSAT SST	100	100	100	96.9	99.6	97.7
OSI-207	GOES-E SST	99.9	99.1	100	97.3	99.6	97.5
OSI-208-b	IASI SST	99.9	96.1	99.6	99.1	99.9	97.7
OSI-301	AHL DLI	100	100	100	100	100	100
OSI-302	AHL SSI	100	100	100	100	100	100
OSI-303	METEOSAT DLI - hourly	99.7	100	99.7	96.2	99.8	97.5
	METEOSAT DLI - daily	100	100	100	100	100	100
OSI-304	METEOSAT SSI - hourly	99.8	99.7	99.8	96.2	99.8	97.5
	METEOSAT SSI - daily	100.0	100	100	100	100	100
OSI-305	GOES-E DLI - hourly	99.6	99.7	100	96.3	99.5	97.7
	GOES-E DLI - daily	100	100	100	100	100	100
OSI-306	GOES-E SSI - hourly	100	99.7	99.8	96.3	99.8	97.7
	GOES-E SSI - daily	96.7	100.0	96.6	96.7	100	100
OSI-401-b	Global Sea Ice Concentration	100	96.8	100	96.8	100	100
OSI-402-b	Global Sea Ice Edge	100	100	100	96.7	100	100
OSI-403-b	Global Sea Ice Type	100	100	100	96.7	100	100
OSI-404	Global Sea Ice Emissivity	96.8	100	100	96.8	100	100
OSI-405-b	Low Res. Sea Ice Drift	100	100	100	100	96.6	100
OSI-407	Medium Res. Sea Ice Drift	98.4	98.4	96.8	95.2	100	98.4

table 3 : **Percentage of OSI SAF products delivered via EUMETCast within the specified time over 2nd half 2016.**

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 www.osi-saf.org.

3.1 At SS1

Most of the performance anomalies on FTP servers are due to the lack of operators on the Ifremer side during the week-end.

This is the case in september, with a connection problem to the Ifremer FTP server starting during friday night 23th (4 hours duration), but finaly with problems until monday 25th. The return back to the nominal situation lasted until wednesday 27th, with delays during the period. Note that all the data concerned by the outage have also been resent in order to fill the gap.

In october, the Ifremer FTP server was not filled with data sent, temporarely from 6th to 9th;. This was also the case from sunday 9th morning to monday 10th end of the day with resolution after maintenance action on Ifremer side.

In november, the Ifremer FTP server was not available from Monday 14th 10TU to tuesday 15th 15:50TU due to a power outage.

Products METEOSAT SST and GOES-E SST in NetCDF dated 20161128 from 06TU to 11TU were late due to incomplete input (forecast model).

3.2 At SS2

30.08.2016 - The MR ice drift (OSI-407) was unavailable for one day.
This was due to a human error and was corrected immediately.

27.09.2016 - Update to fix geolocation issue on sea ice products
A small misplacement error (max ~7km) in the land mask and geolocation of the OSI SAF sea ice concentration (OSI-401-b), sea ice edge (OSI-402-b) and sea ice type (OSI-403-b) products on the polar stereographic grid was fixed on 27th September 2016. This shift changed the grid latitude and longitude of the products, while the land mask was unchanged and kept its position in the grid.
Test products were provided,
This small misplacement error also affects the reprocessed sea ice concentration data record (OSI-409 and OSI-409-a) and the continuous reprocessed sea ice concentration product (OSI-430), but only version in the polar stereographic projection. The misplacement error will NOT be corrected in the reprocessed products, as a new version of the data record will be available early 2017.
The misplacement error of OSI-401-b, OSI-402-b, and OSI-403-b was communicated to the users on 18th August and 26th August.
The online archive of products at ftp://osisaf.met.no was updated 21.10.2016.

18.10.2016 - Missing/empty sea ice products
Due to an outage of SSMIS data from NOAA, OSI SAF sea ice products based on SSMIS data (OSI-401b, 402b, 403b, 404, 430) were missing or with no data coverage in products with date label 20161017). Users were informed.

19.12.2016 - Spurious ice in sea ice concentration product
Strange artefacts was found in the ice concentration product (OSI-401-b). This was caused by a software bug that prevented SSMIS data from F18 to be processed. The product was then only based on F15 and F16. The bug was corrected and insured that this bug should not happen again.

3.3 At SS3

- The ASCAT-A winds have been unavailable on 22 July between 0:21 and 10:11 UTC sensing time due to a spacecraft anomaly.
- The ASCAT-A winds have been unavailable on 17 September between 11:33 and 17:57 UTC and between 17 September 19:30 and 18 September 14:15 UTC sensing time due to a power outage at KNMI. For the same reason, the ASCAT-B winds have been unavailable on 17 September between 12:15 and 18:51 UTC and between 17 September 20:24 and 18 September 15:09 UTC.
- The ASCAT-A 25 km winds have been unavailable between 21 September 17:45 and 22 September 6:09 UTC sensing time and the ASCAT-A coastal winds have been unavailable between 21 September 18:03 and 22 September 0:00 UTC sensing time due to an anomaly in the KNMI EUMETCast reception station. For the same reason, the ASCAT-B 25 km winds have been unavailable between 21 September 18:18 and 22 September 6:54 UTC sensing time and the ASCAT-B coastal winds have been unavailable between 21 September 18:15 and 22 September 0:54 UTC sensing time.
- The ASCAT-A winds have been unavailable on between 3 December 19:54 and 4 December 1:30 UTC sensing time due to a spacecraft anomaly.
- The ASCAT-B winds have been unavailable on 20 December between 9:03 and 9:54 UTC sensing time due to a ground segment anomaly.

3.4 Release of new data records and off-line products

The Metop-A ASCAT L2 winds Data Record (OSI-150-a and OSI-150-b) was officially released in October 2016. See http://www.knmi.nl/scatterometer/ascat_cdr/ for more information.

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 www.osi-saf.org.

4.1 At SS1

The Global Metop SST (GBL SST), North Atlantic Regional Metop and NPP SST (NAR SST), METEOSAT SST and GOES-E SST (Corresponding identifiers are OSI-201-b, OSI-202-b, OSI-206 and OSI-207) products, GHRSST compliant NetCDF, were disseminated to the whole EUMETCast user community from 12/07/2016.

4.2 At SS2

Spurious ice in sea ice concentration product
In December spurious ice was found in the ice concentration product. Some of the spurious ice was due to land spill over effects and some was due amongst others to weather conditions. Since then it has been investigated how to best remove as much spurious ice as possible without removing reel ice. This work was not finalised in December. As an interim solution a python program was provided to the users to filter spurious ice using the ice edge product.

4.3 At SS3

All RapidScat services are discontinued following an irrecoverable instrument failure on August 19, 2016. On the 9 December 2016, the SG declared by email that the RapidScat winds products (OSI-109-a, OSI-109-b, OSI-109-c, OSI-109-d) have now the status "discontinued".

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.

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

- monthly bias (Bias Req in following tables) less than 0.5° C,
- monthly difference standard deviation (Std Dev Req. in following tables) less than 1°C for the geostationary products (METEOSAT and GOES-E SST), and 0.8°C for the polar ones (GBL, NAR, AHL, MGR and IASI SST).

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 in situ measurements per box.

5.1.1 METEOSAT SST (OSI-206) quality

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

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

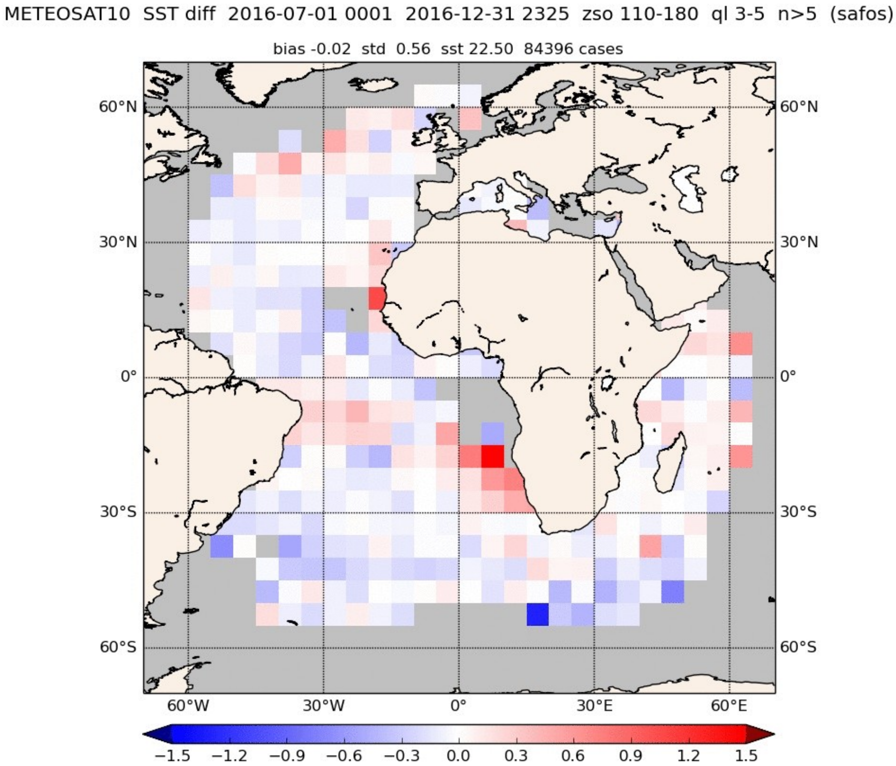


Figure 1 : mean METEOSAT <u>night</u>-time SST error with respect to buoys measurements for quality level 3,4,5

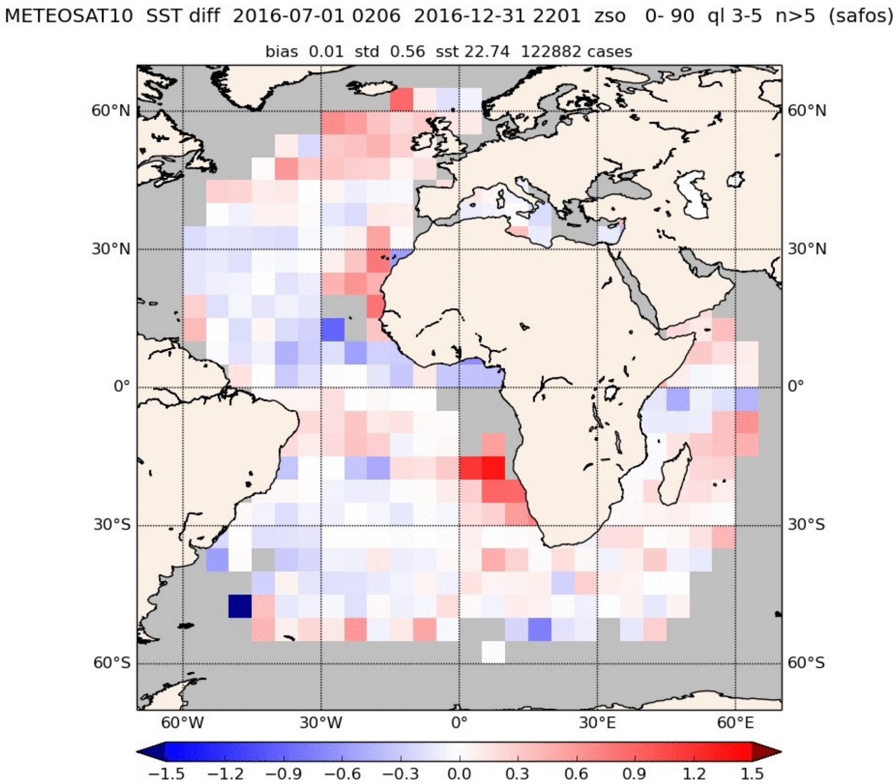


Figure 2 : mean METEOSAT <u>day</u>-time SST error with respect to buoys measurements for quality level 3,4,5

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

METEOSAT night-time SST quality results over 2nd half 2016							
Month	Number of cases	Bias °C	Bias Req °C	Bias Margin (*)	Std Dev °C	Std Dev Req °C	Std Dev margin (**)
JUL. 2016	14229	0.02	0.5	96	0.56	1	44
AUG. 2016	16065	0.00	0.5	100	0.59	1	41
SEP. 2016	14446	-0.01	0.5	98	0.56	1	44
OCT. 2016	14455	0.00	0.5	100	0.56	1	44
NOV. 2016	12990	-0.09	0.5	82	0.55	1	45
DEC. 2016	12116	-0.07	0.5	86	0.52	1	48
METEOSAT day-time SST quality results over 2nd half 2016							
JUL. 2016	22949	0.07	0.5	86	0.62	1	38
AUG. 2016	24355	0.01	0.5	98	0.60	1	40
SEP. 2016	19622	-0.01	0.5	98	0.56	1	44
OCT. 2016	18351	0.02	0.5	96	0.55	1	45
NOV. 2016	18670	-0.04	0.5	92	0.51	1	49
DEC. 2016	12183	-0.04	0.5	92	0.51	1	49

(*) Bias Margin = 100 * (1 - (|Bias / Bias 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 4 : METEOSAT SST quality results over 2nd half 2016, for 3, 4, 5 quality indexes.

Comments:
Overall quality results are good and quite stable.

The following graphs illustrate the evolution of METEOSAT-derived SST quality results over the past 12 months.

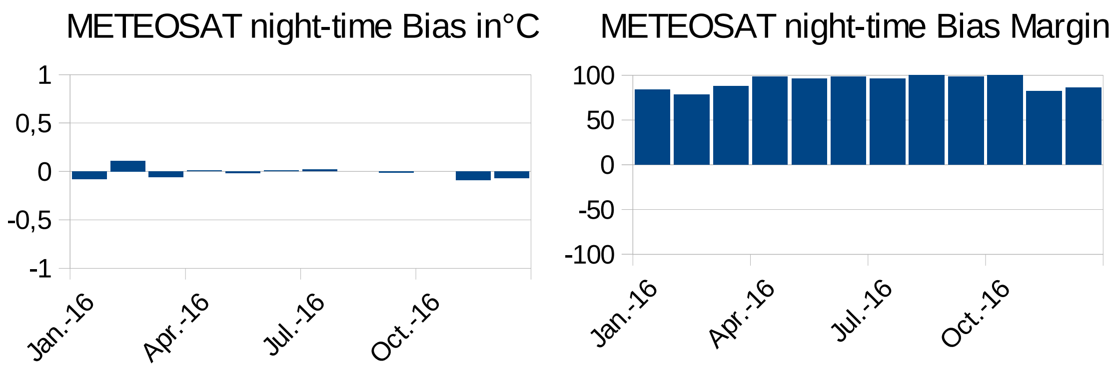


Figure 3 : Left: METEOSAT night-time SST Bias. Right METEOSAT night-time SST Bias Margin

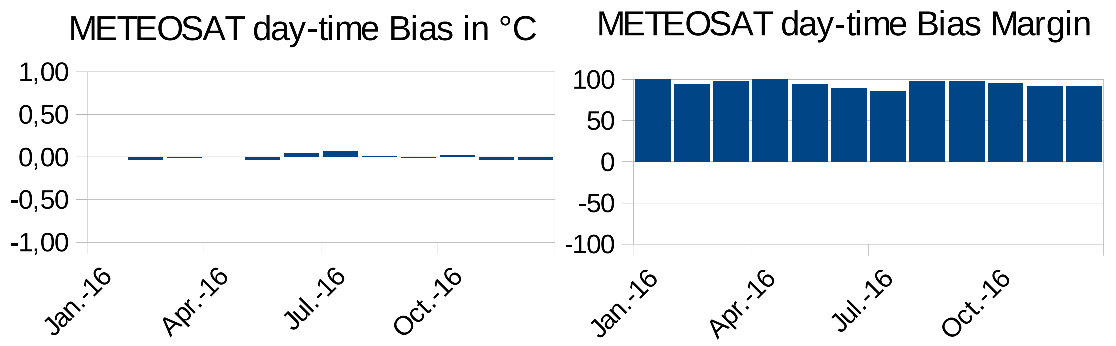


Figure 4 : Left: METEOSAT day-time SST Bias.
Right METEOSAT day-time SST Bias Margin

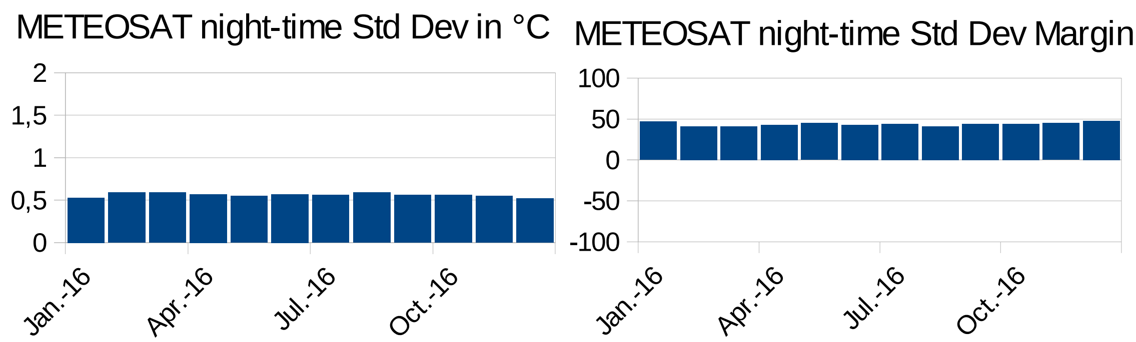


Figure 5 : Left: METEOSAT night-time SST Standard deviation.
Right METEOSAT night-time SST Standard deviation Margin.

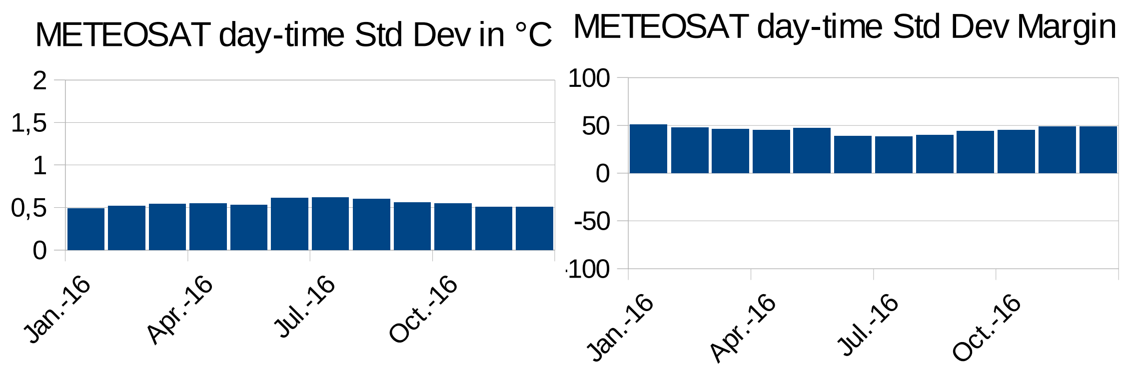


Figure 6 : Left: METEOSAT day-time SST Standard deviation.
Right METEOSAT day-time SST Standard deviation Margin.

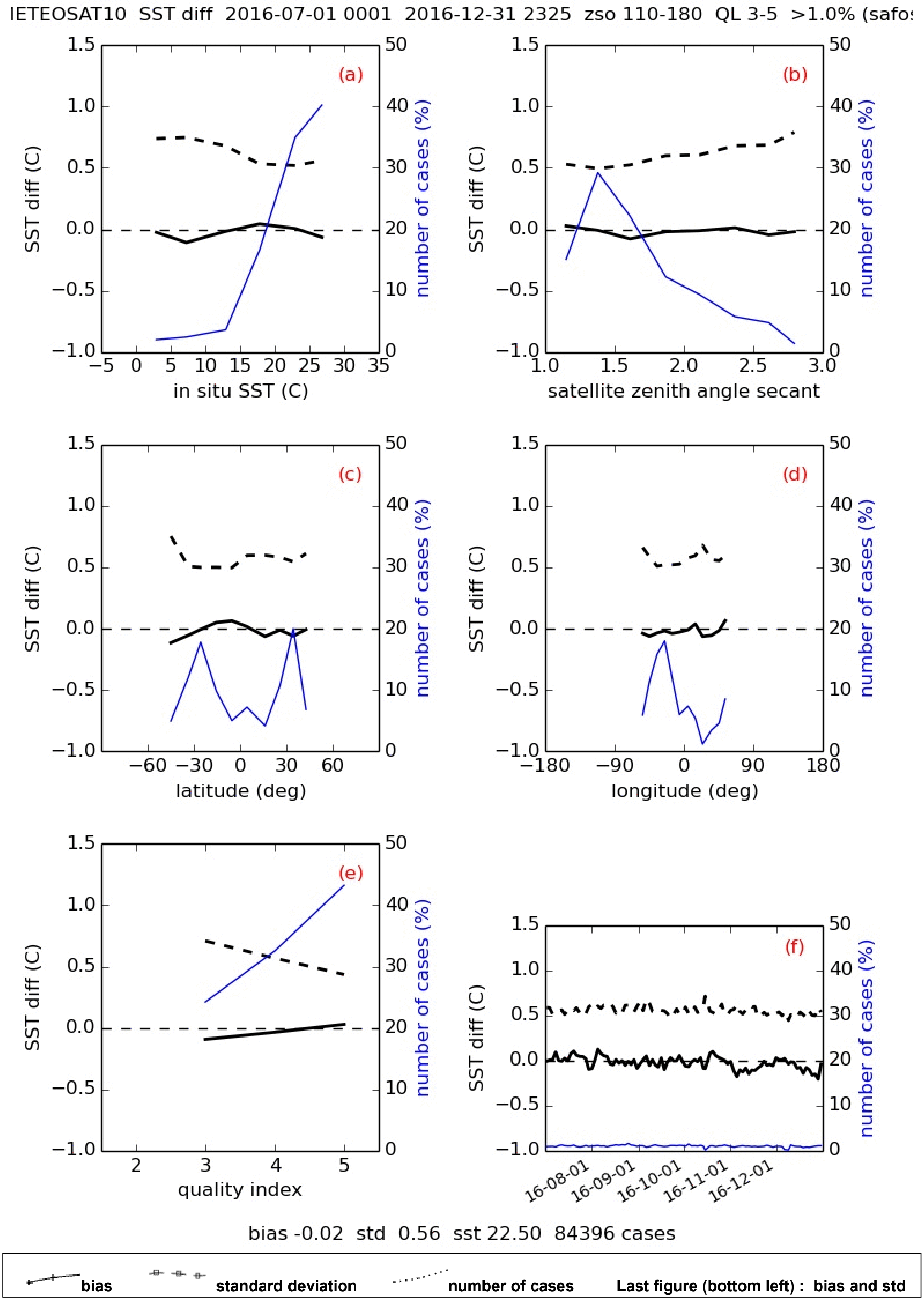


Figure 7 : Complementary quality assessment statistics on METEOSAT SST, <u>night</u>-time : dependence of the bias, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

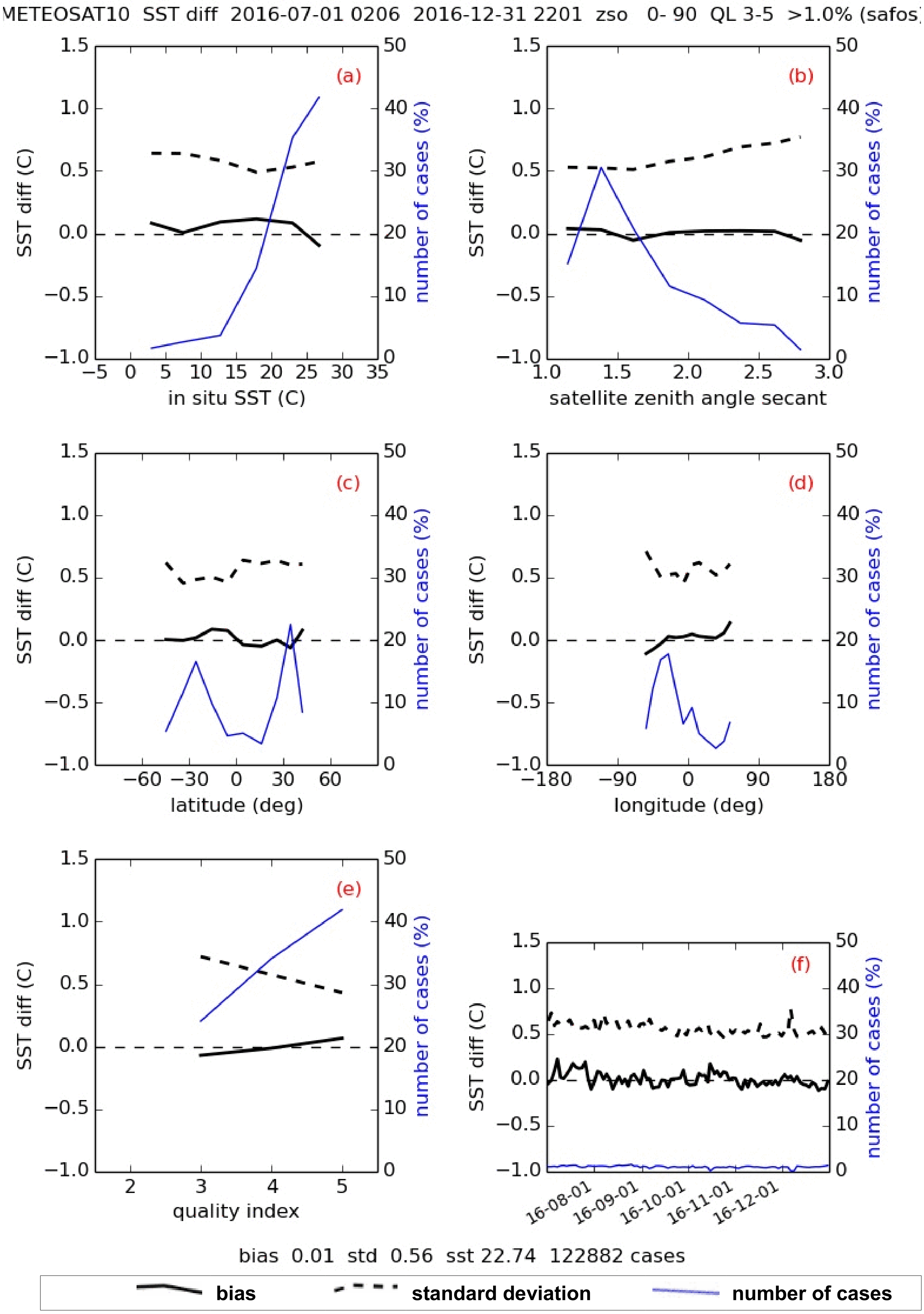


Figure 8 : Complementary quality assessment statistics on METEOSAT SST, day-time : dependence of the bias, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

5.1.2 GOES-E SST (OSI-207) quality

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

The operational SST retrieval from MSG/SEVIRI and GOES-E updated chain validation report v1.1 gives further details about the regional bias observed.

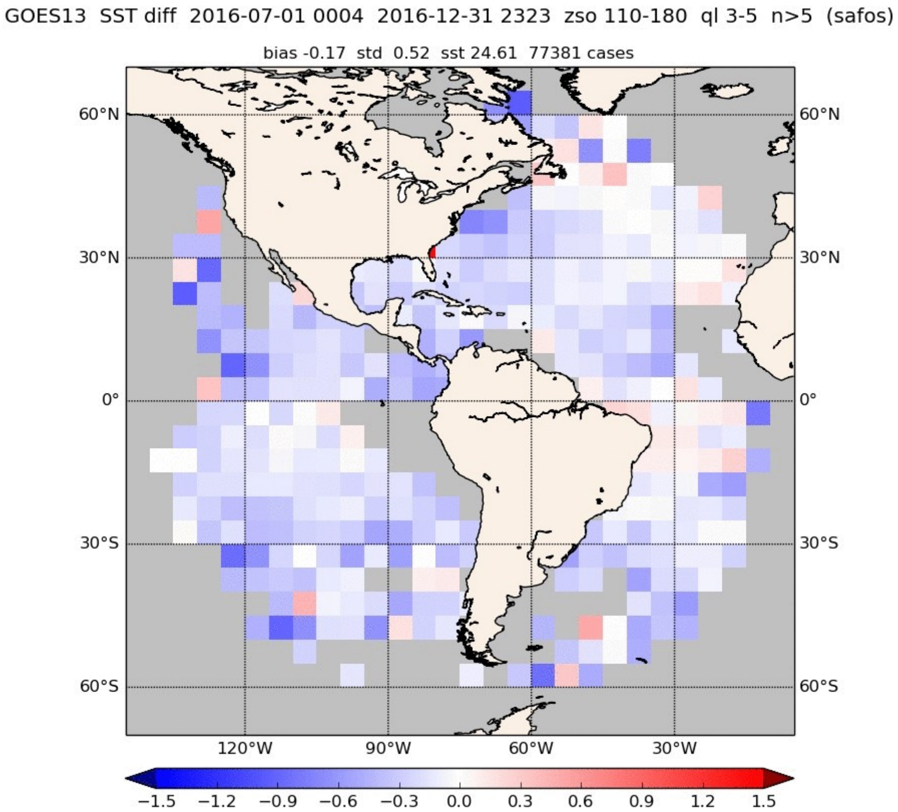


Figure 9 : mean GOES-E night-time SST error with respect to buoys measurements for quality level 3,4,5

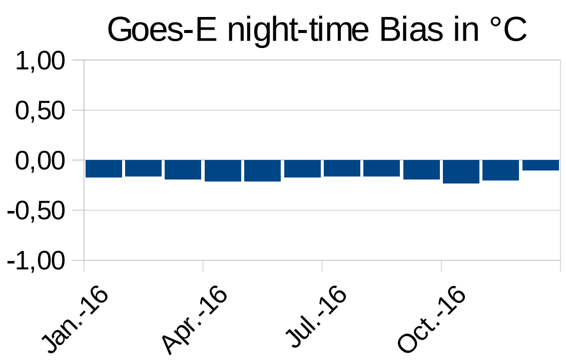
The following table provides the GOES-E-derived SST quality results over the reporting period.

GOES-E night-time SST quality results 2nd half 2016							
Month	Number of cases	Bias °C	Bias Req °C	Bias Margin (*)	Std Dev °C	Std Dev Req °C	Std Dev margin (**)
JUL. 2016	13390	-0.16	0.5	68	0.47	1	53
AUG. 2016	14885	-0.16	0.5	68	0.52	1	48
SEP. 2016	14045	-0.19	0.5	62	0.52	1	48
OCT. 2016	12149	-0.23	0.5	54	0.59	1	41
NOV. 2016	10810	-0.20	0.5	60	0.57	1	43
DEC. 2016	12059	-0.10	0.5	80	0.47	1	53
(*) Bias Margin = 100 * (1 - (|Bias / Bias 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 5 : GOES-E SST quality results over 2nd half 2016, for 3, 4, 5 quality indexes

Comments:
Overall quality results are good and quite stable.

The following graphs illustrate the evolution of GOES-E-derived SST quality results over the past 12 months.



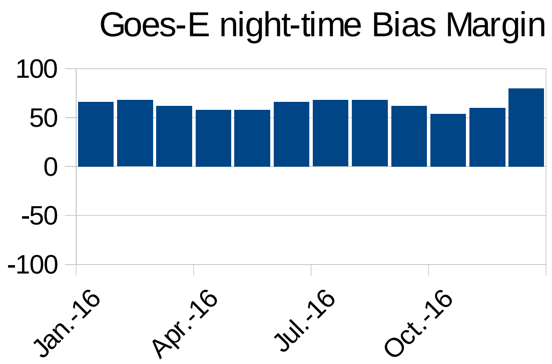
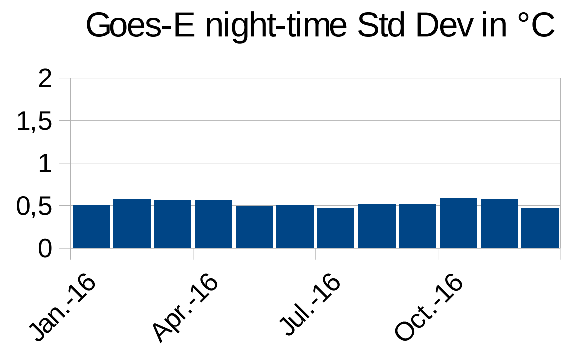


Figure 10 : Left: Goes-E night-time SST Bias.
Right: Goes-E night-time SST Bias Margin.



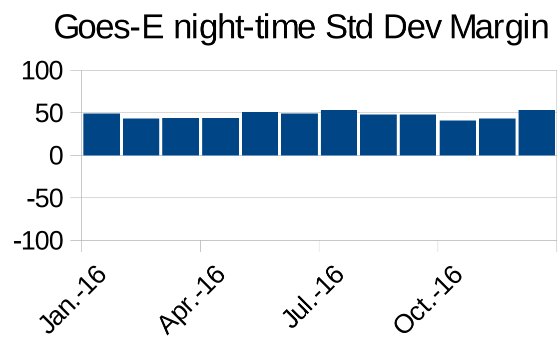


Figure 11 : Left: Goes-E night-time SST Standard deviation.
Right Goes-E night-time SST Standard deviation Margin.

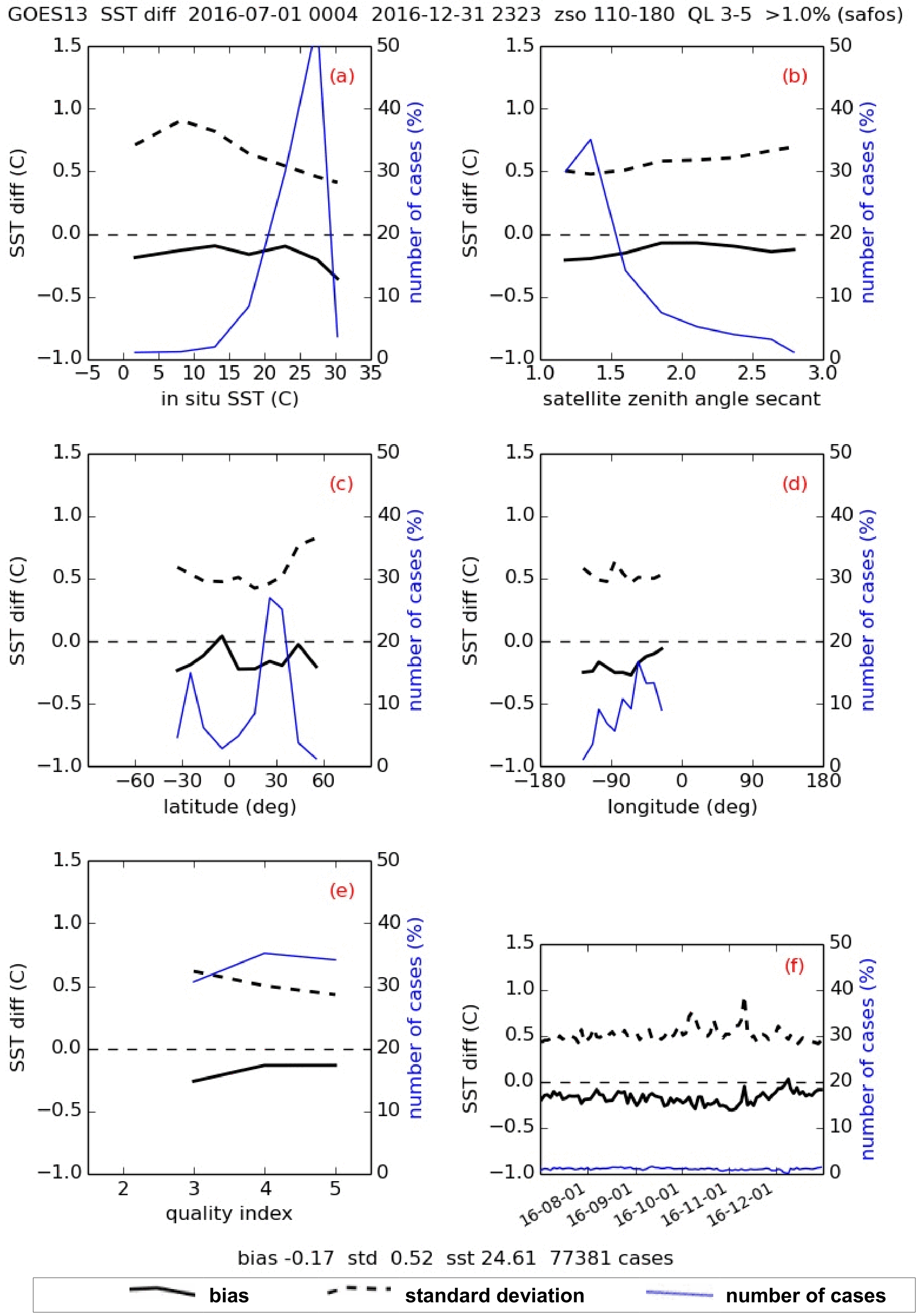


Figure 12 : Complementary quality assessment statistics on GOES-E SST, <u>night</u>-time : dependence of the bias, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

5.1.3 NAR SST (OSI-202-b) quality

The operational NAR SST is processed for satellite/sensor, Metop/AVHRR and S-NPP/VIIRS.
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 S-NPP and Metop satellite.

5.1.3.1 NPP NAR SST quality

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

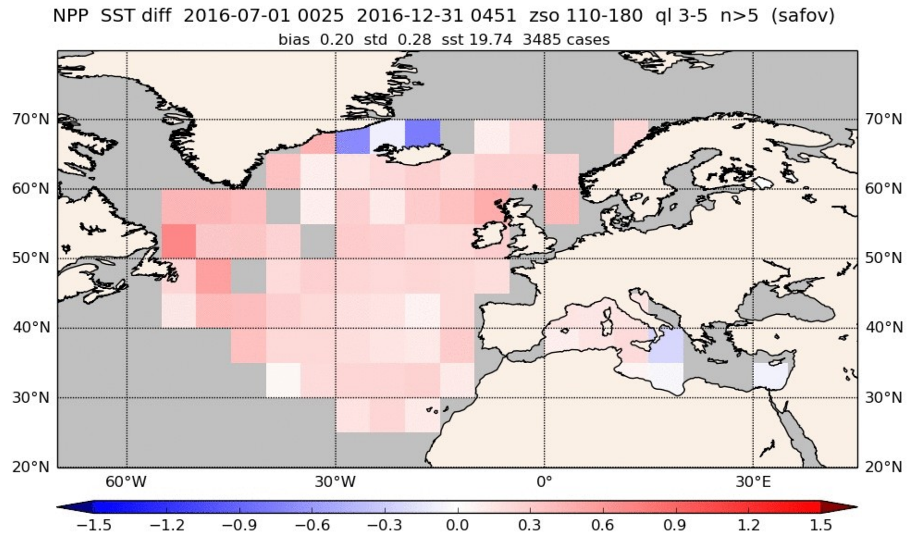


Figure 13 : mean NPP NAR night-time SST error with respect to buoys measurements for quality level 3,4,5

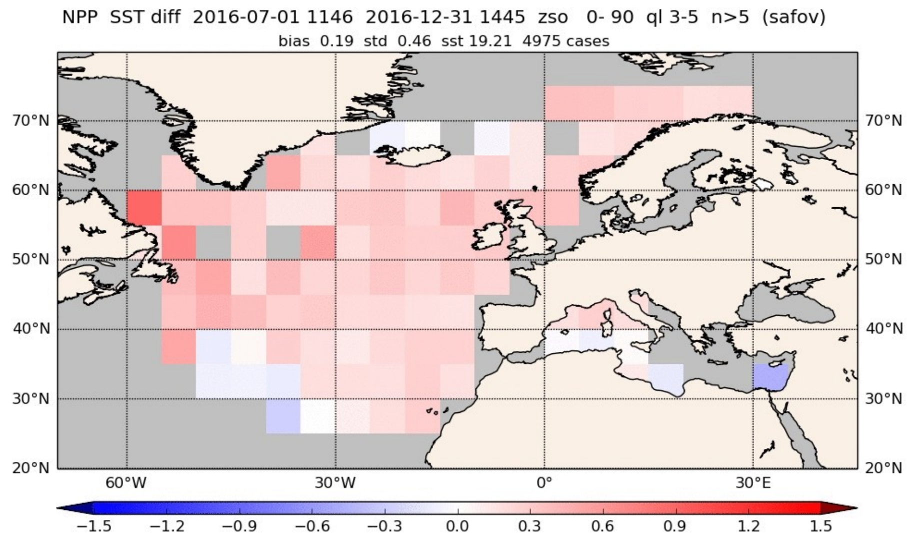


Figure 14 : mean NPP NAR day-time SST error with respect to buoys measurements for quality level 3,4,5

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

NPP NAR night-time SST quality results over 2nd half 2016							
Month	Number of cases	Bias °C	Bias Req °C	Bias Margin (*)	Std Dev °C	Std Dev Req °C	Std Dev margin (**)
JUL. 2016	404	0.20	0.5	60	0.29	0.8	63.75
AUG. 2016	735	0.16	0.5	68	0.26	0.8	67.50
SEP. 2016	774	0.19	0.5	62	0.27	0.8	66.25
OCT. 2016	684	0.20	0.5	60	0.33	0.8	58.75
NOV. 2016	455	0.27	0.5	46	0.29	0.8	63.75
DEC. 2016	426	0.21	0.5	58	0.23	0.8	71.25
NPP NAR day-time SST quality results over 2nd half 2016							
JUL. 2016	910	0.16	0.5	68	0.53	0.8	33.75
AUG. 2016	1191	0.17	0.5	66	0.43	0.8	46.25
SEP. 2016	1029	0.22	0.5	56	0.42	0.8	47.50
OCT. 2016	780	0.15	0.5	70	0.48	0.8	40.00
NOV. 2016	566	0.25	0.5	50	0.38	0.8	52.50
DEC. 2016	485	0.20	0.5	60	0.48	0.8	40.00
(*) Bias Margin = 100 * (1 - (|Bias / Bias 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 : Quality results for NPP NAR SST over 2nd half 2016, for 3, 4, 5 quality indexes

Comments:
Overall quality results are good and quite stable.

The following graphs illustrate the evolution of NPP NAR SST quality results over the past 12 months.

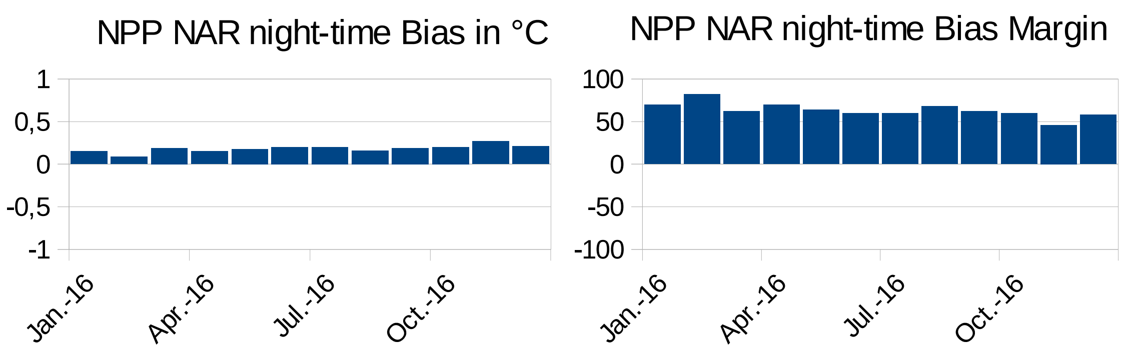


Figure 15 : Left: NPP NAR night-time SST Bias.
Right : NPP NAR night-time SST Bias Margin.

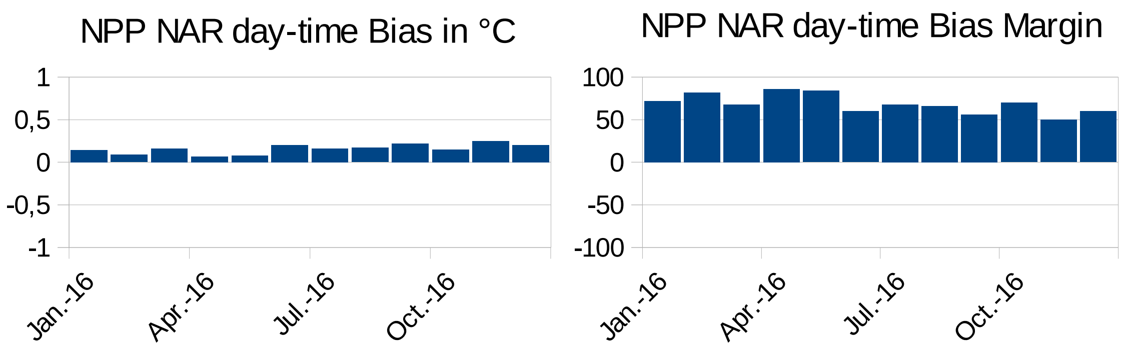


Figure 16 : Left: NPP NAR day-time SST Bias.
Right : NPP NAR day-time SST Bias Margin.

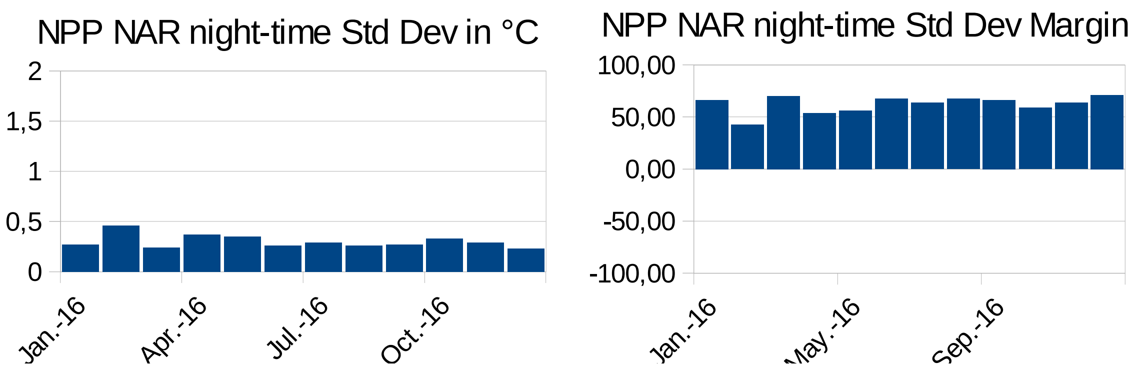


Figure 17 : Left: NPP NAR night-time SST Standard deviation.
Right : NPP NAR night-time SST Standard deviation Margin.

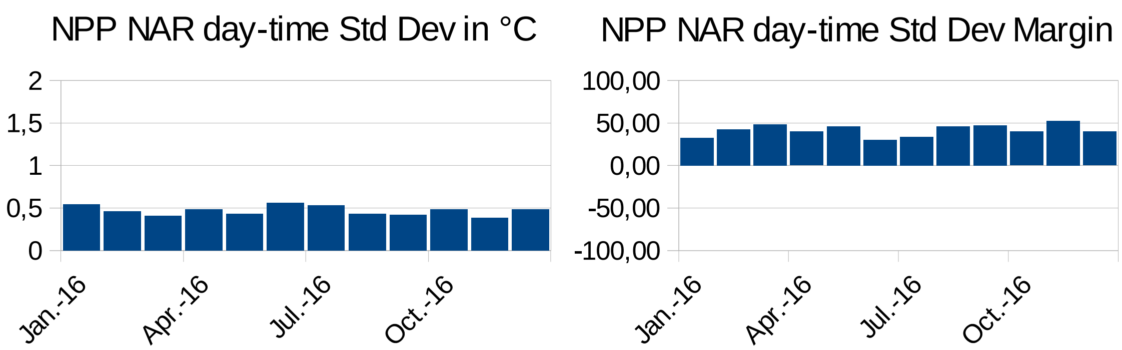


Figure 18 : Left: NPP NAR day-time SST Standard deviation.
Right : NPP NAR day-time SST Standard deviation Margin.

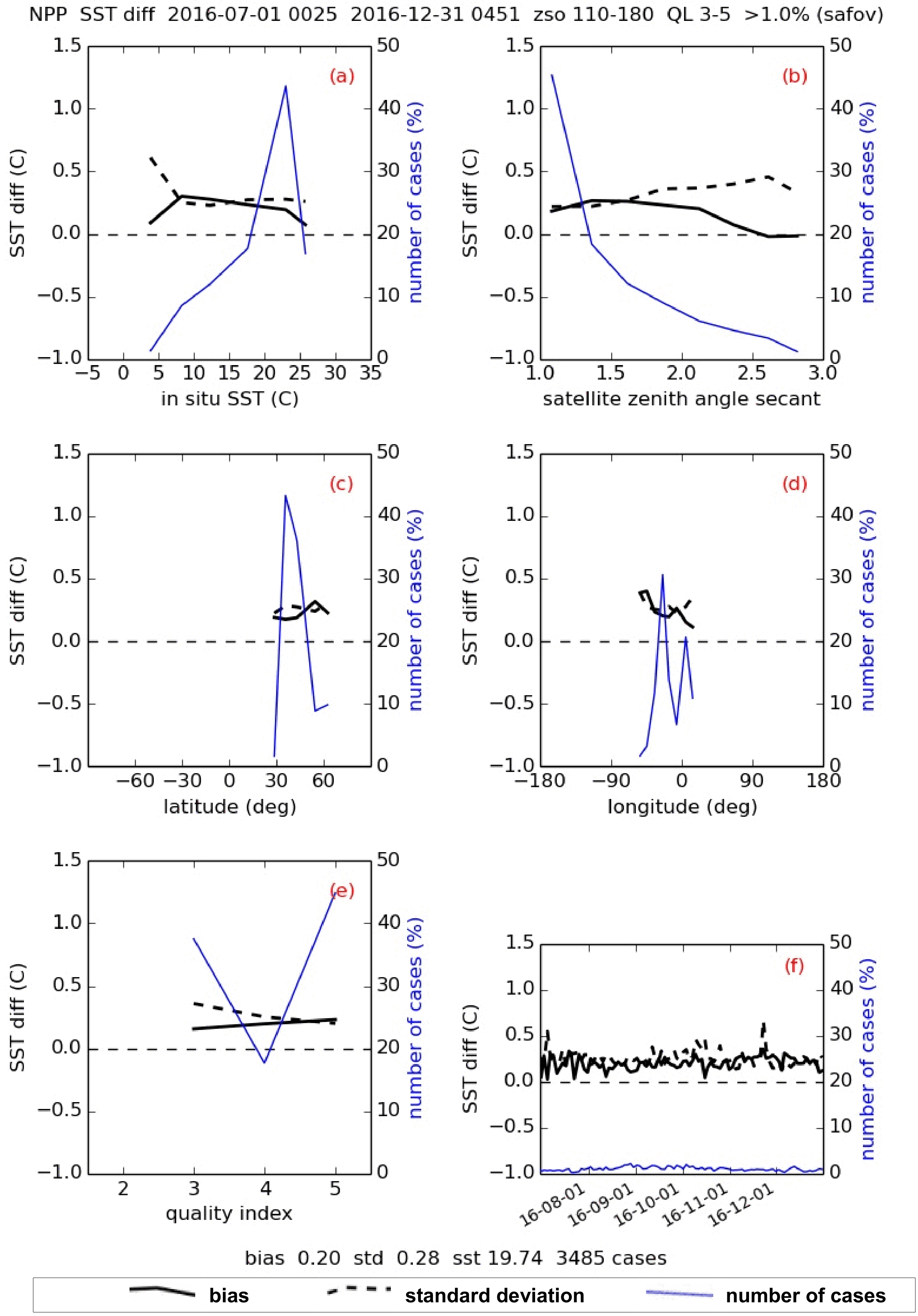


Figure 19 : Complementary quality assessment statistics on NPP NAR SST night-time : dependence of the bias, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

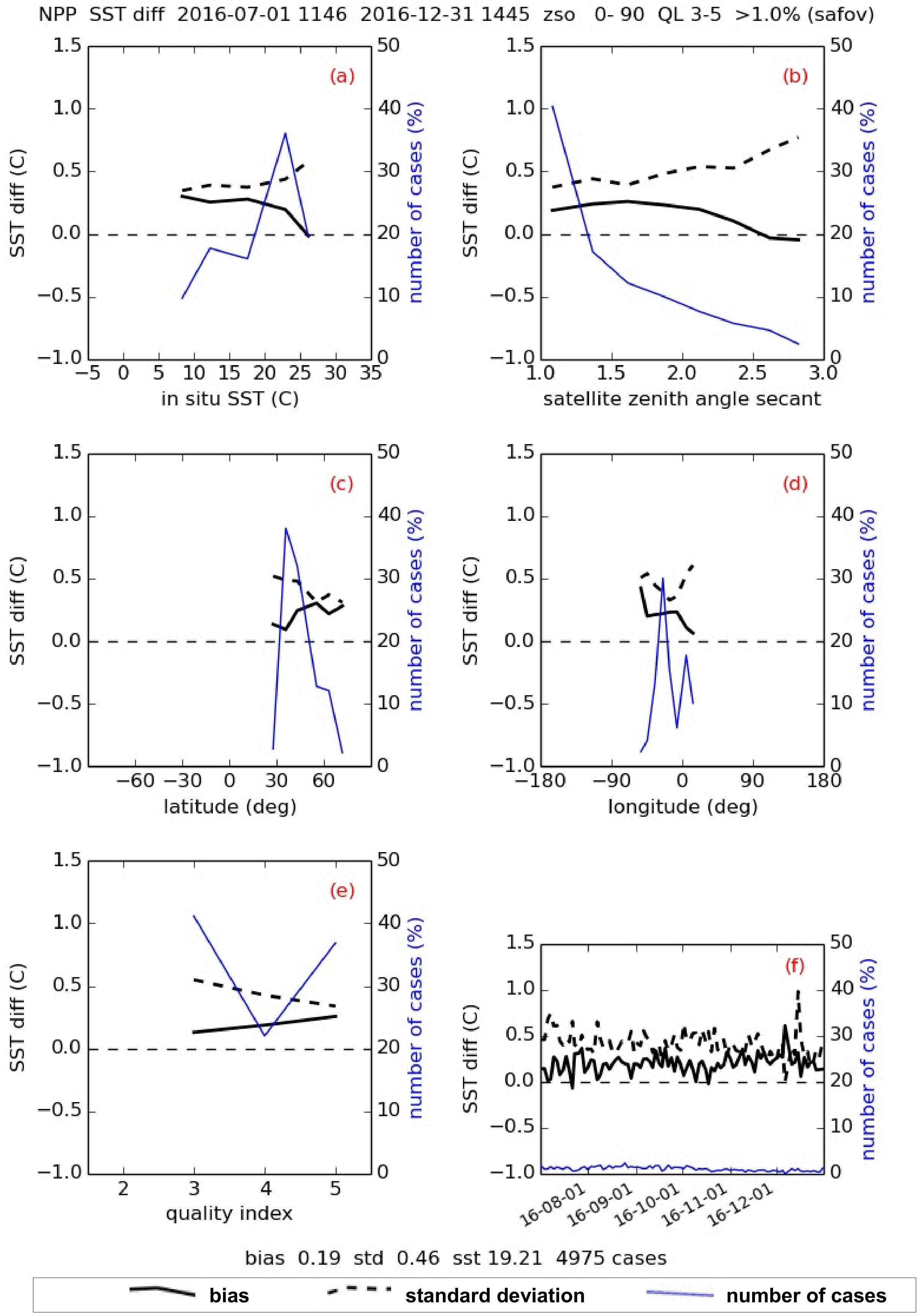


Figure 20 : Complementary quality assessment statistics on NPP NAR SST <u>day-time</u> : dependence of the bias, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

5.1.3.2 Metop NAR SST quality

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

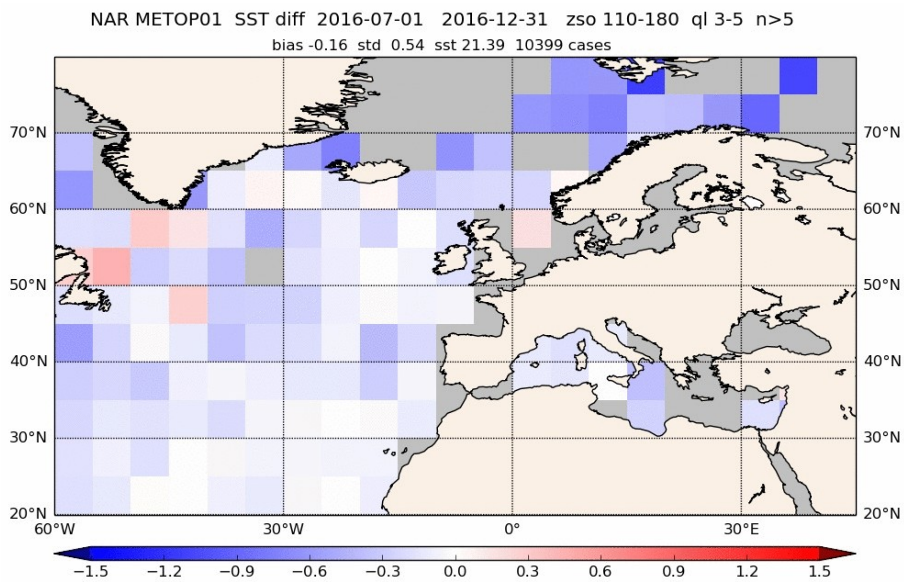


Figure 21 : mean Metop-B NAR night-time SST error with respect to buoys measurements for quality level 3,4,5

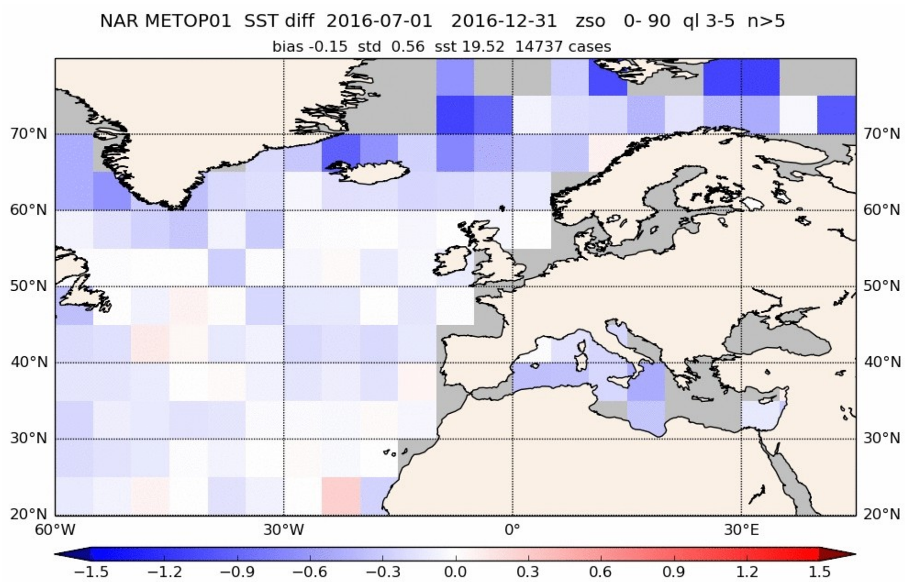


Figure 22 : mean Metop-B NAR day-time SST error with respect to buoys measurements for quality level 3,4,5

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

Month	Number of cases	Bias °C	Bias Req °C	Bias Margin (*)	Std Dev °C	Std Dev Req °C	Std Dev margin (**)
Metop-B NAR night-time SST quality results over 2nd half 2016							
JUL. 2016	933	-0.13	0.5	74	0.42	0.8	47.50
AUG. 2016	1685	-0.18	0.5	64	0.45	0.8	43.75
SEP. 2016	2050	-0.16	0.5	68	0.52	0.8	35.00
OCT. 2016	2102	-0.17	0.5	66	0.52	0.8	35.00
NOV. 2016	1984	-0.18	0.5	64	0.69	0.8	13.75
DEC. 2016	1654	-0.13	0.5	74	0.56	0.8	30.00
Metop-B NAR day-time SST quality results over 2nd half 2016							
JUL. 2016	3057	-0.15	0.5	70	0.69	0.8	13.75
AUG. 2016	3291	-0.17	0.5	66	0.57	0.8	28.75
SEP. 2016	2842	-0.21	0.5	58	0.50	0.8	37.50
OCT. 2016	2255	-0.21	0.5	58	0.52	0.8	35.00
NOV. 2016	1852	-0.08	0.5	84	0.51	0.8	36.25
DEC. 2016	1457	-0.03	0.5	94	0.41	0.8	48.75

(*) Bias Margin = 100 * (1 - (|Bias / Bias 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 Metop-B NAR SST over 2nd half 2016, for 3, 4, 5 quality indexes

Comments:
Overall quality results are good and quite stable.

The following graphs illustrate the evolution of Metop-A/B NAR SST quality results over the past 12 months.

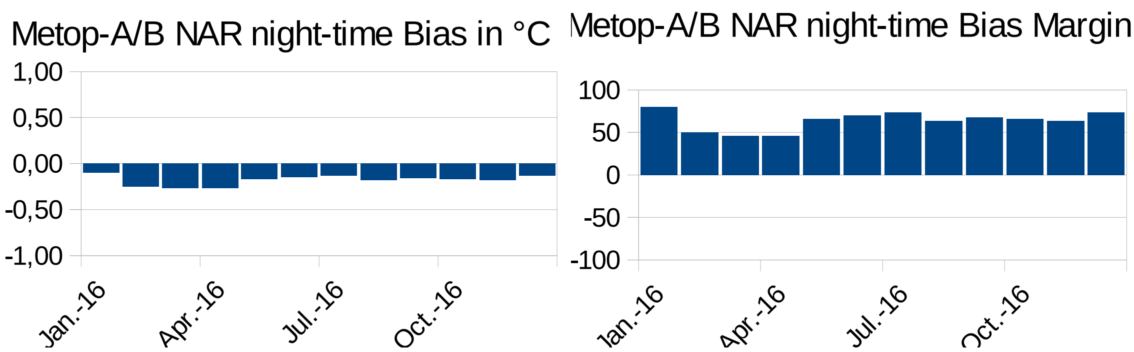


**Figure 23 : Left: Metop-A/B NAR night-time SST Bias.
Right: Metop-A/B NAR night-time SST Bias Margin.**

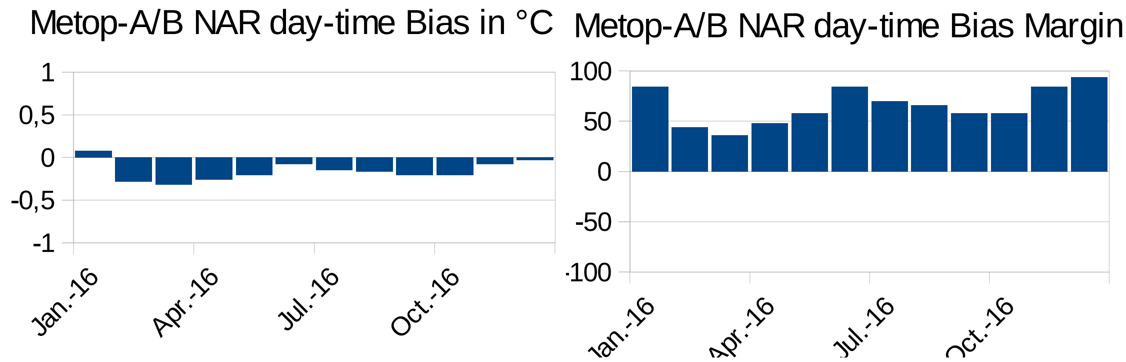


Figure 24 : Left: Metop-A/B NAR day-time SST Bias.
Right: Metop-A/B NAR day-time SST Bias Margin.

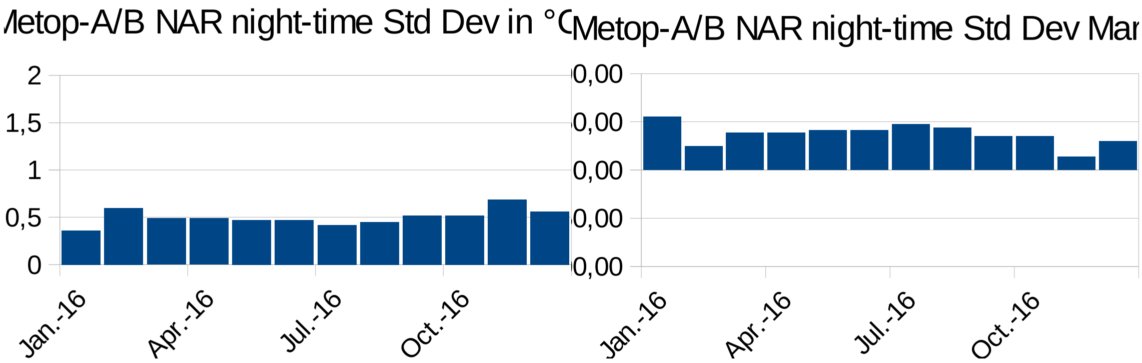


Figure 25 : Left: Metop-A/B NAR night-time SST Standard deviation.
Right: Metop-A/B NAR night-time SST Standard deviation Margin.

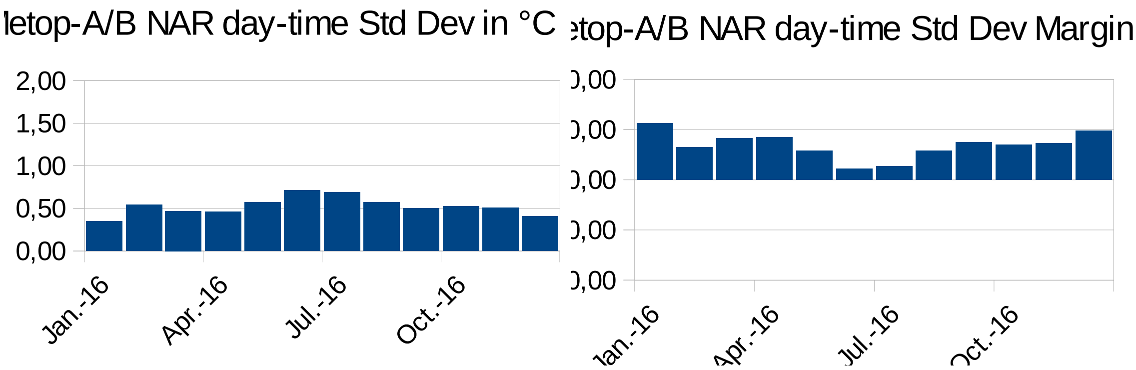


Figure 26 : Left: Metop-A/B NAR day-time SST Standard deviation.
Right: Metop-A/B NAR day-time SST Standard deviation Margin.

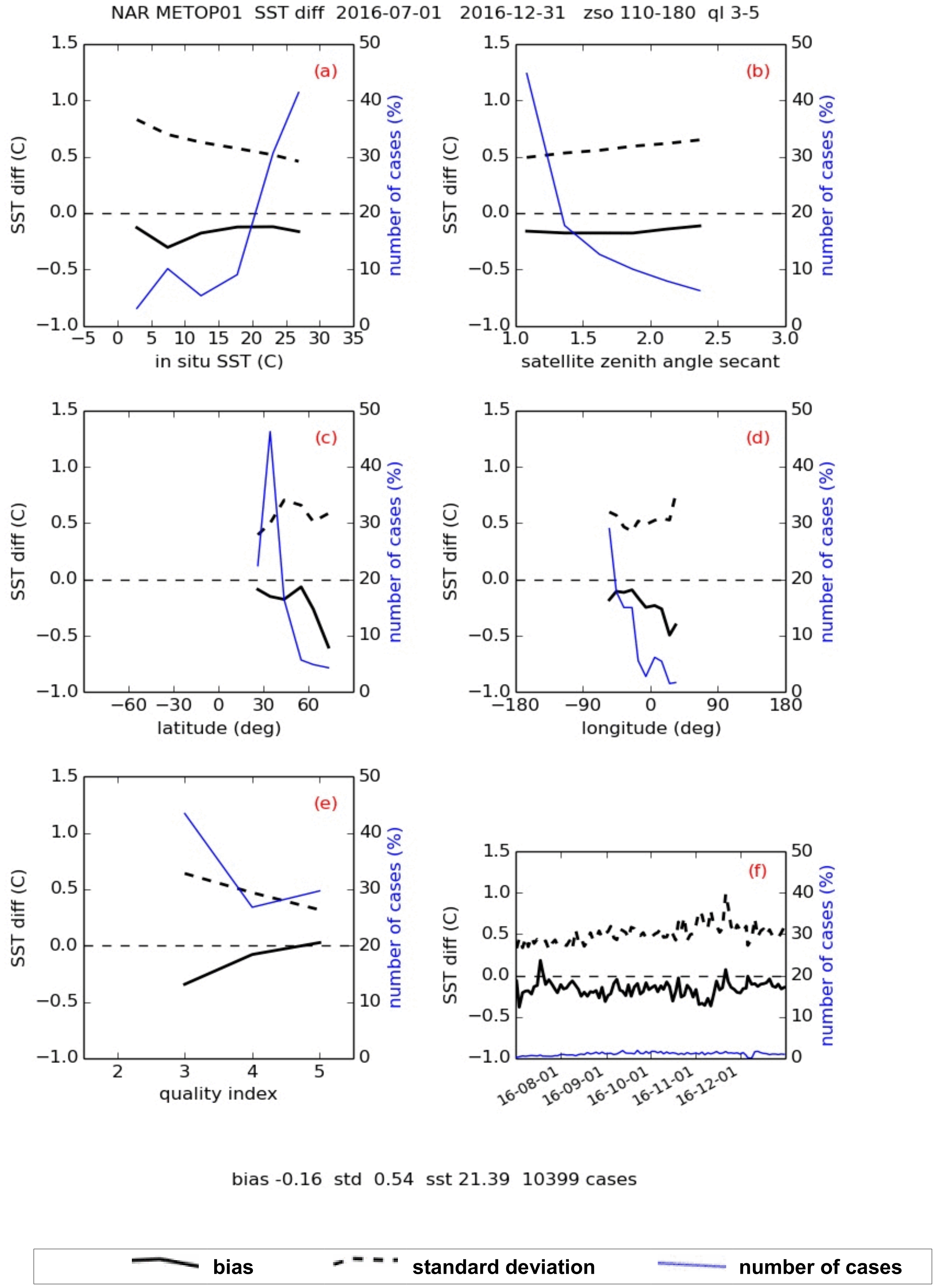


Figure 27 : Complementary quality assessment statistics on Metop NAR SST night-time : dependence of the bias, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

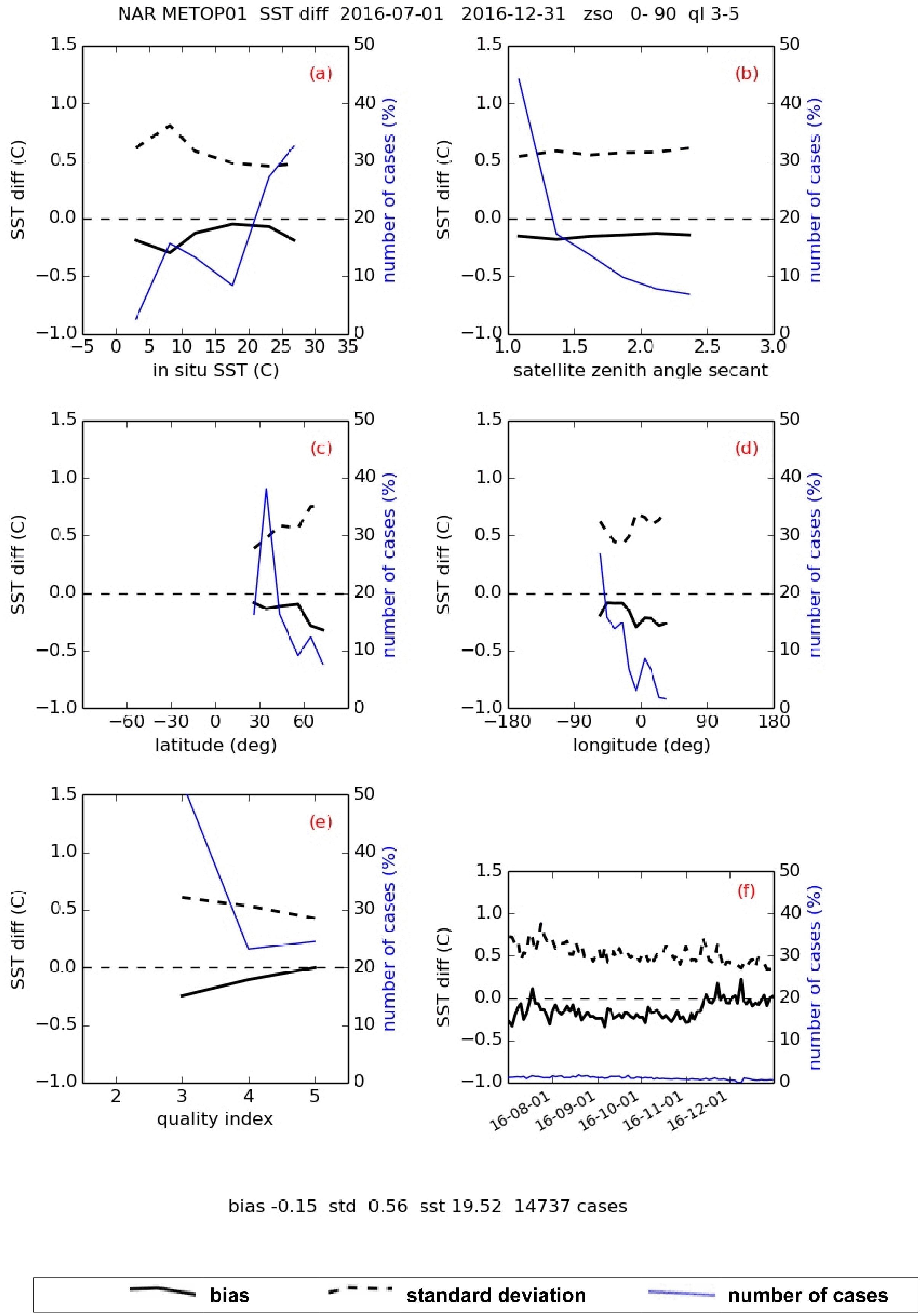


Figure 28 : Complementary quality assessment statistics on Metop NAR SST day-time : dependence of the bias, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

5.1.4 GBL SST (OSI-201-b) and MGR SST (OSI-204-b) quality

The OSI SAF SST products on global coverage (GBL SST and MGR SST) are based on Metop/AVHRR data, currently Metop-B.
The following maps indicate the mean night-time and day-time SST error with respect to buoys measurements for quality level 3,4,5 over the reporting period. Monthly maps are available on http://www.osi-saf.org/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 bias observed and their origin.

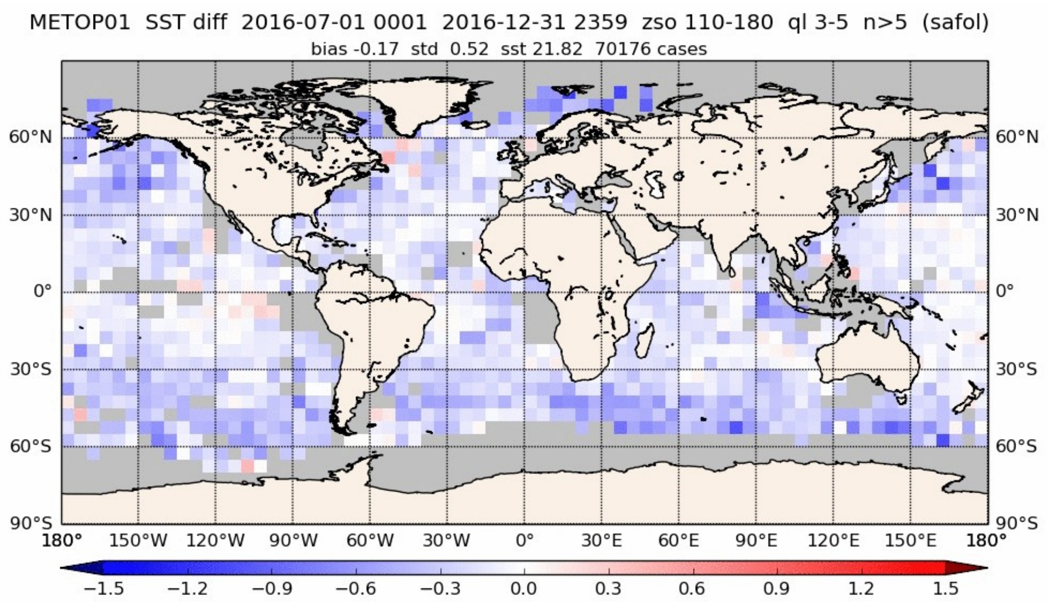


Figure 29 : mean Metop-B <u>night</u>-time SST error with respect to buoys measurements for quality level 3,4,5

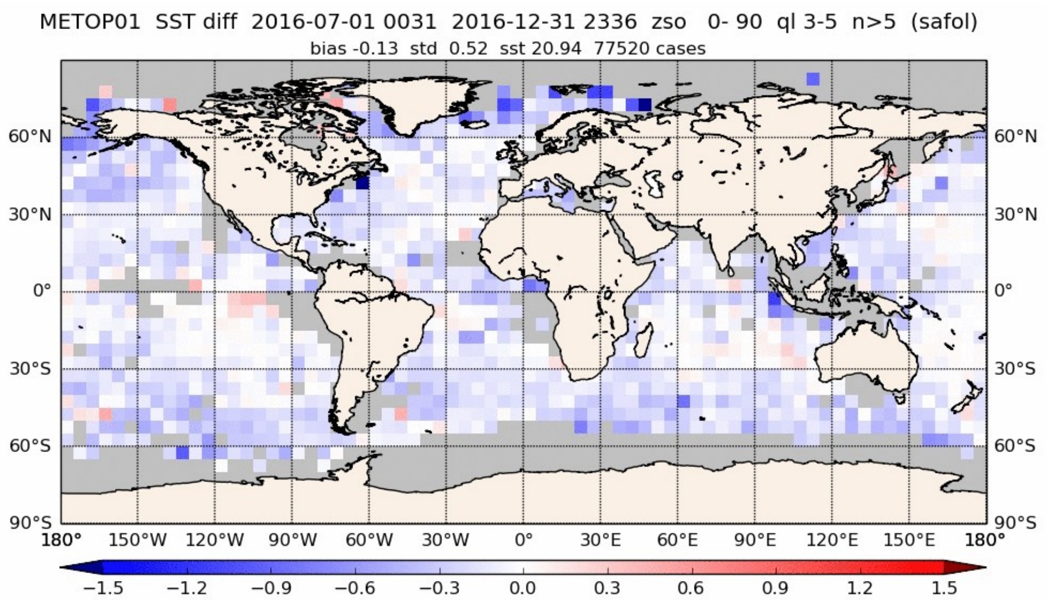


Figure 30 : mean Metop-B <u>day</u>-time SST error with respect to buoys measurements for quality level 3,4,5

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 2016							
Month	Number of cases	Bias °C	Bias Req °C	Bias Margin (*)	Std Dev °C	Std Dev Req °C	Std Dev margin (**)
JUL. 2016	10480	-0.15	0.5	70	0.51	0.8	36.25
AUG. 2016	11337	-0.17	0.5	66	0.53	0.8	33.75
SEP. 2016	12044	-0.18	0.5	64	0.55	0.8	31.25
OCT. 2016	13312	-0.18	0.5	64	0.53	0.8	33.75
NOV. 2016	12151	-0.17	0.5	66	0.46	0.8	42.50
DEC. 2016	10921	-0.17	0.5	66	0.49	0.8	38.75
Global Metop-B day-time SST quality results over 2nd half 2016							
JUL. 2016	13502	-0.12	0.5	76	0.62	0.8	22.50
AUG. 2016	13786	-0.12	0.5	76	0.57	0.8	28.75
SEP. 2016	13323	-0.15	0.5	70	0.51	0.8	36.25
OCT. 2016	13495	-0.14	0.5	72	0.48	0.8	40.00
NOV. 2016	12120	-0.12	0.5	76	0.46	0.8	42.50
DEC. 2016	11363	-0.11	0.5	78	0.44	0.8	45.00
(*) Bias Margin = 100 * (1 - (|Bias / Bias 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 global METOP-B SST over 2nd half 2016, for 3,4,5 quality indexes

Comments:
Overall quality results are good and quite stable.

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

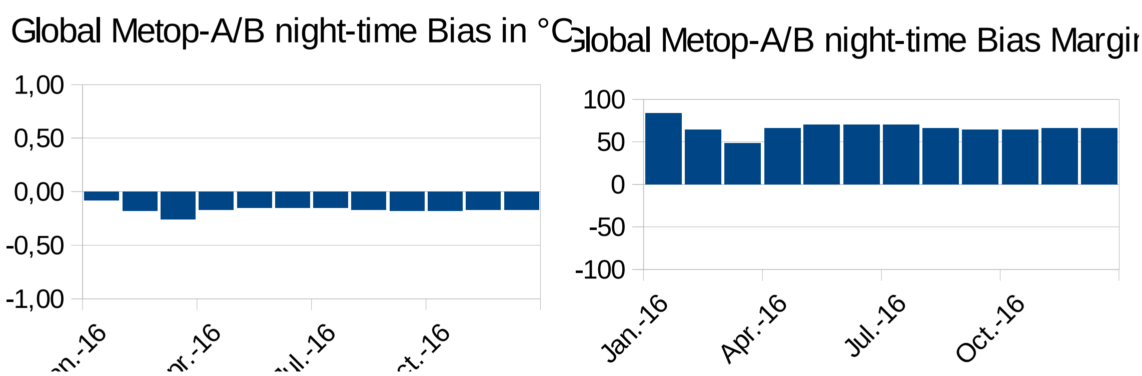


**Figure 31 : Left : global Metop-A/B night-time SST Bias.
Right : global Metop-A/B night-time SST Bias Margin.**

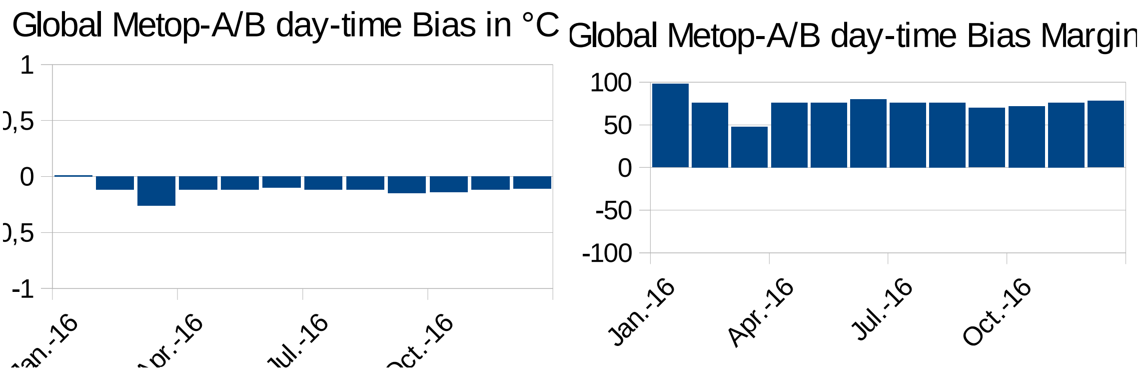


Figure 32 : Left : global Metop-A/B day-time SST Bias.
Right : global Metop-A/B day-time SST Bias Margin.

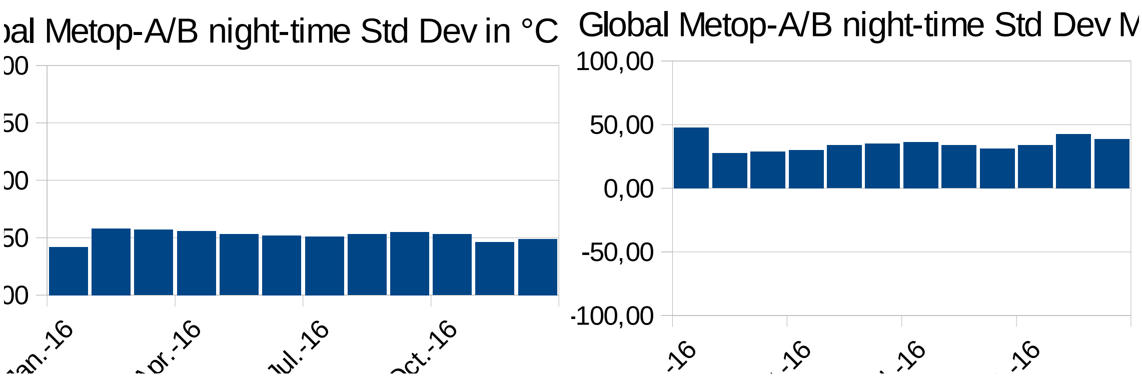


Figure 33 : Left: global Metop-A/B night-time SST Standard deviation.
Right: global Metop-A/B night-time SST Standard deviation Margin.

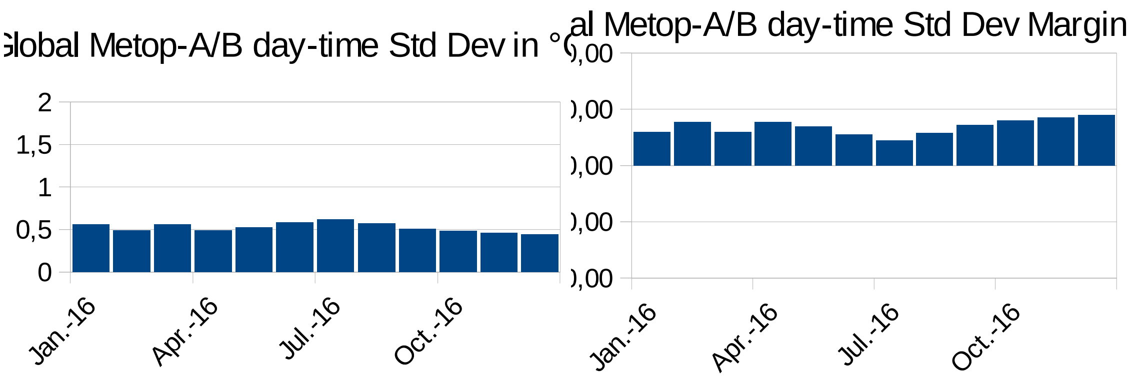


Figure 34 : Left: global Metop-A/B day-time SST Standard deviation.
Right: global Metop-A/B day-time SST Standard deviation Margin.

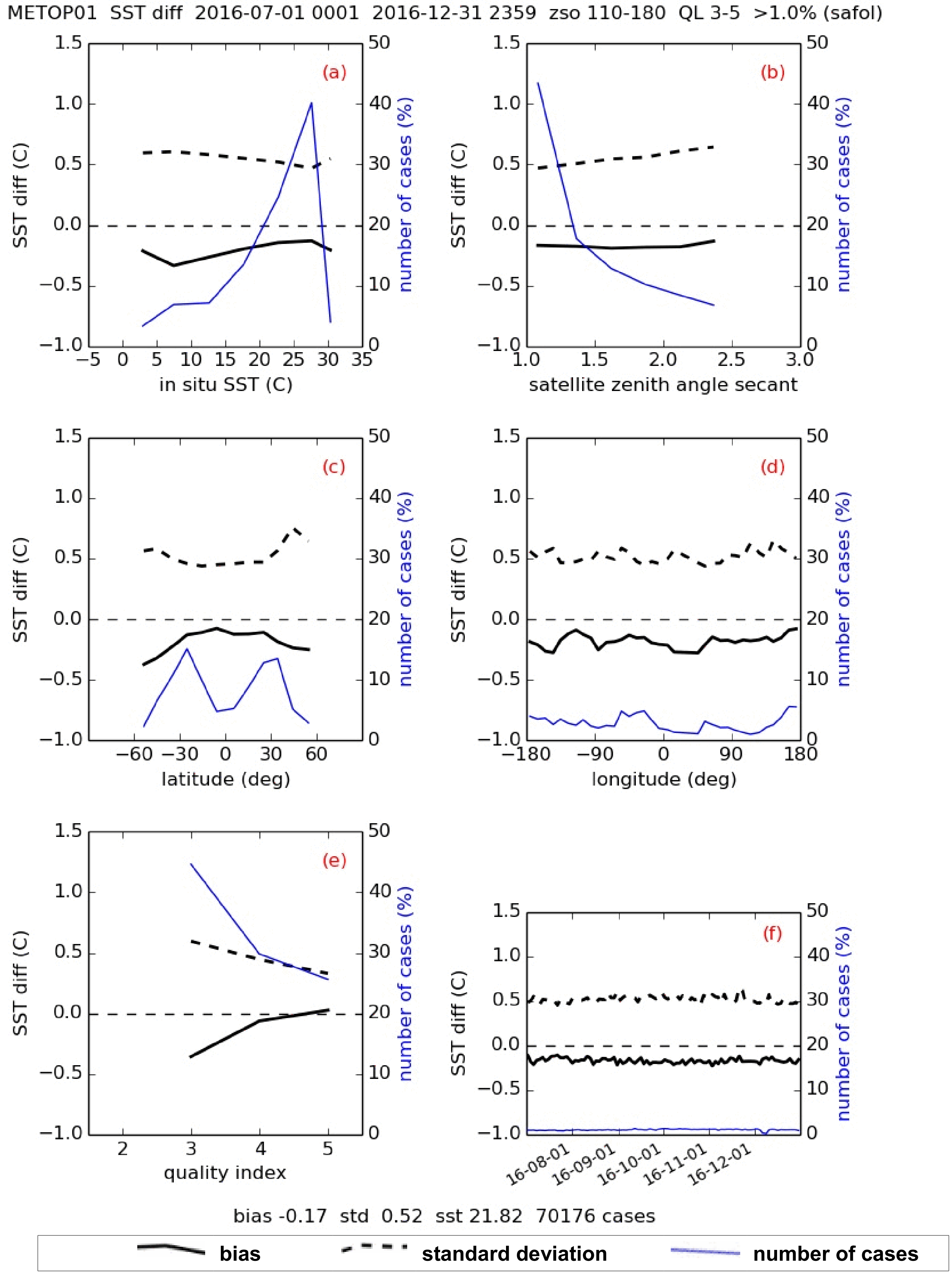


Figure 35 : Complementary quality assessment statistics on Metop GBL SST night-time : dependence of the bias, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

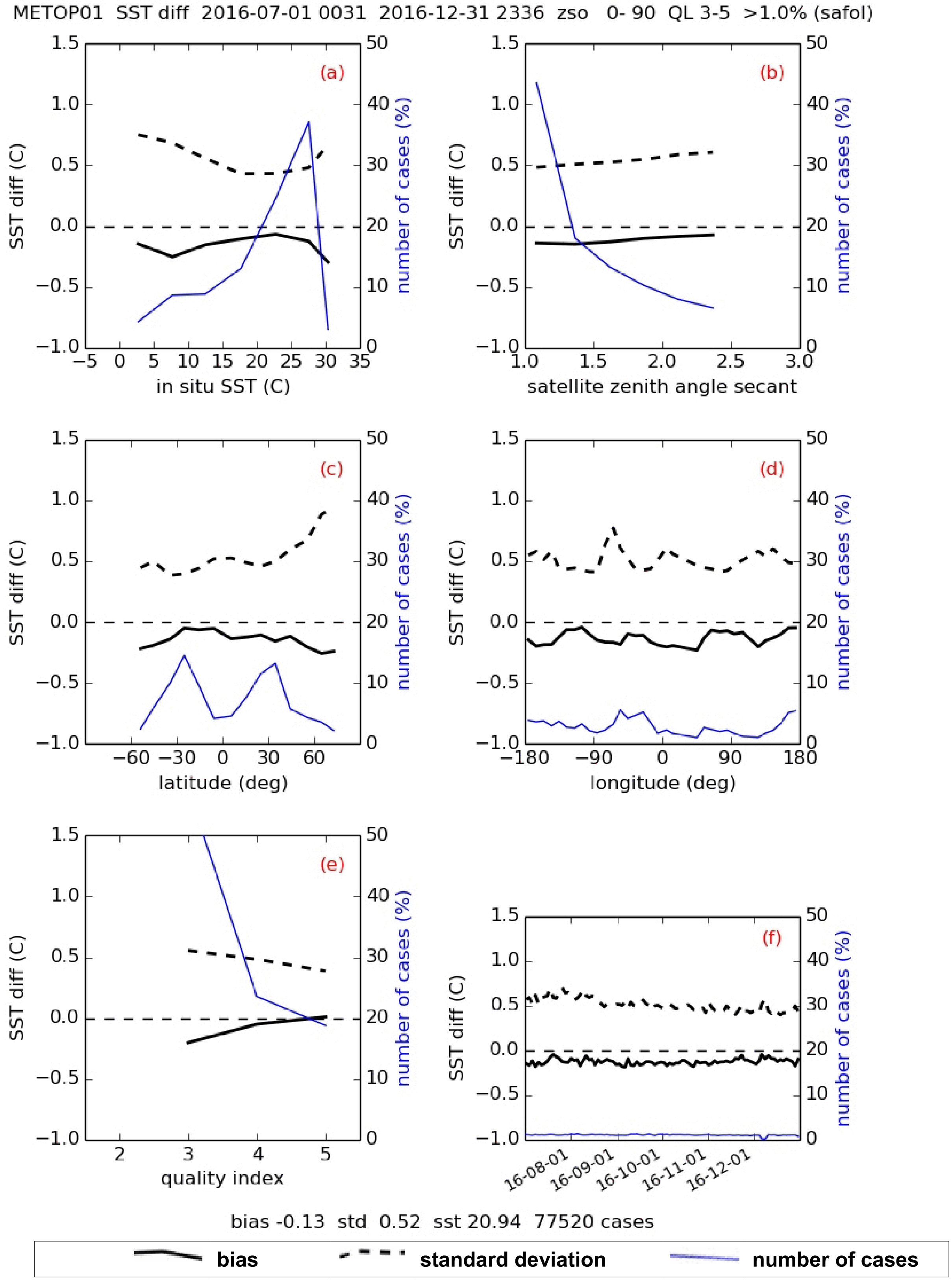


Figure 36 : Complementary quality assessment statistics on Metop GBL SST day-time : dependence of the bias, standard deviation and number of matchups as a function of in situ SST (a), satellite zenith angle secant (b), latitude (c), longitude (d), confidence level (e), and time (f)

5.1.5 AHL SST (OSI-203) quality

The Atlantic High Latitude SST (AHL SST) is derived from polar satellites data, currently AVHRR on NOAA-18, NOAA-19 and METOP-A.

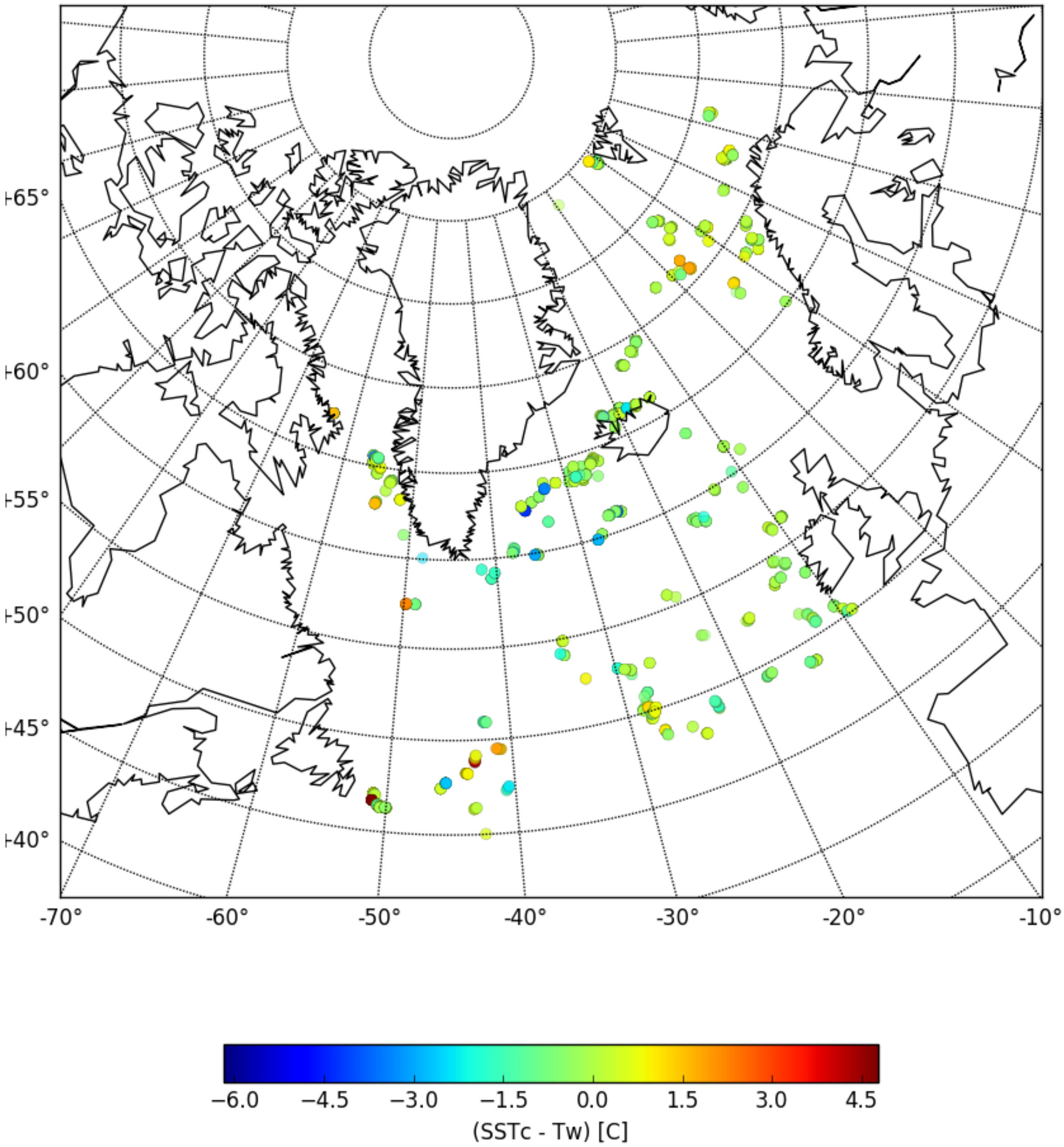


Figure 37 : JUL. 2016 to DEC. 2016 mean AHL night-time SST error with respect to buoys measurements for quality level 3,4,5

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

AHL AVHRR SST quality results over JAN. 2016 to DEC. 2016, night-time							
Month	Number of cases	Bias °C	Bias Req °C	Bias Margin (*)	Std Dev °C	Std Dev Req °C	Std Dev margin (**)
JAN. 2016	319	-0.24	0.5	51.3	0.74	0.8	7.8
FEB. 2016	96	-0.36	0.5	27.9	0.74	0.8	7.3
MAR. 2016	122	-0.24	0.5	52.6	0.71	0.8	10.9
APR. 2016	163	-0.37	0.5	26.7	0.67	0.8	15.6
MAY 2016	163	-0.33	0.5	34.7	0.65	0.8	19.2
JUN. 2016	123	-0.12	0.5	76.0	0.85	0.8	-6.8
JUL. 2016	128	-0.07	0.5	85.5	0.73	0.8	9.3
AUG. 2016	191	-0.17	0.5	65.7	0.65	0.8	18.5
SEP. 2016	148	-0.29	0.5	42.8	0.73	0.8	9.0
OCT. 2016	206	-0.38	0.5	24.1	0.82	0.8	-2.3
NOV. 2016	51	-0.81	0.5	-61.8	0.71	0.8	10.7
DEC. 2016	40	-0.35	0.5	30.1	0.59	0.8	25.8
AHL AVHRR SST quality results over JAN. 2016 to DEC. 2016, day-time							
Month	Number of cases	Bias °C	Bias Req °C	Bias Margin (*)	Std Dev °C	Std Dev Req °C	Std Dev margin (**)
JAN. 2016	965	0.38	0.5	23.4	0.77	0.8	4.2
FEB. 2016	731	-0.29	0.5	41.8	0.66	0.8	17.2
MAR. 2016	709	-0.22	0.5	55.7	0.58	0.8	27.1
APR. 2016	766	-0.22	0.5	56.7	0.57	0.8	28.4
MAY 2016	756	-0.15	0.5	70.7	0.59	0.8	26.1
JUN. 2016	531	-0.14	0.5	71.6	0.73	0.8	9.1
JUL. 2016	586	-0.04	0.5	92.3	0.86	0.8	-8.0
AUG. 2016	753	-0.14	0.5	70.5	0.83	0.8	-3.3
SEP. 2016	698	-0.19	0.5	61.2	0.74	0.8	8.1
OCT. 2016	704	-0.40	0.5	19.6	0.81	0.8	-1.2
NOV. 2016	140	-0.77	0.5	-53.2	0.88	0.8	-10.1
DEC. 2016	109	-0.41	0.5	18.5	0.58	0.8	27.2
(*) Bias Margin = 100 * (1 - (|Bias / Bias 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 9 : **Quality results for AHL AVHRR SST over JAN. 2016 to DEC. 2016, for 3,4,5 quality indexes, by night and by day.**

Comments:

For the sectond half of 2016, the validation results for the AHL SST product show similar results as usual. There is a small negative bias that increases towards winter. The bias is outside the requirement in November. The standard deviation has no systematic variation, and for nighttime it is outside requirement only in October. But for daytime the standard deviation is a bit higher and around the requirement of 0.8, being slightly out of requirement for 4 of the months.

The AHL SST processing is being updated with a ORR review soon, so no further work is being performed to improve the current operational product.

5.1.6 IASI SST (OSI-208-b) quality

The product requirements for IASI SSTs are to have a target accuracy of 0.5K bias and 0.8K standard deviation compared to drifting buoy SSTs.

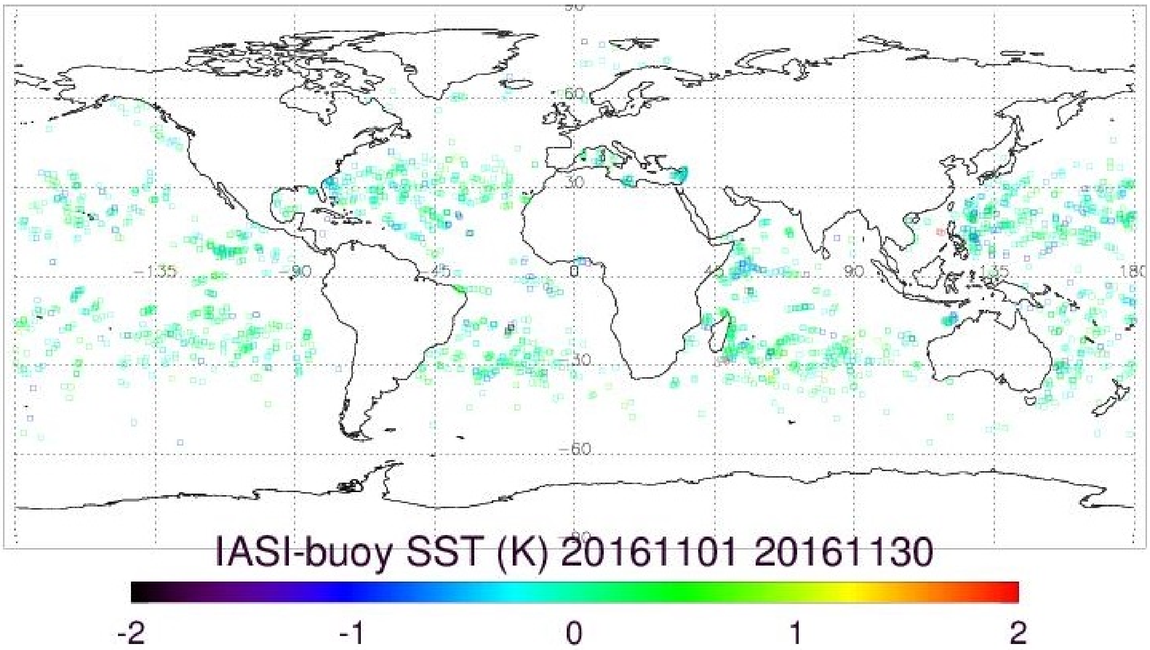


Figure 38 : Mean Metop-A IASI night-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 January to June 2015

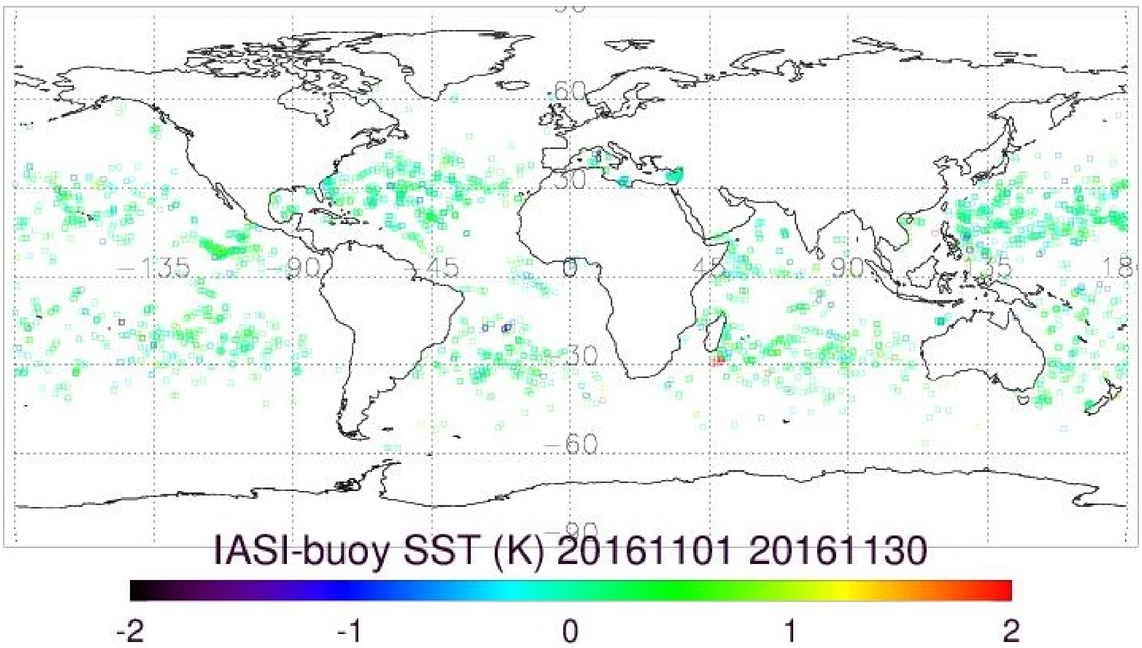


Figure 39 : Mean Metop-A IASI day-time SST minus drifting buoy SST for Quality Levels 3, 4 and 5 January to June 2015

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

Global Metop-A IASI night-time SST quality results over 2nd half 2016							
Month	Number of cases	Bias °C	Bias Req °C	Bias Margin (*)	Std Dev °C	Std Dev Req °C	Std Dev margin (**)
JUL. 2016	2169	0.08	0.5	84	0.41	0.8	49
AUG. 2016	2967	0.08	0.5	84	0.43	0.8	46
SEP. 2016	2722	0.11	0.5	78	0.43	0.8	46
OCT. 2016	2890	0.05	0.5	90	0.44	0.8	45
NOV. 2016	2429	0.0	0.5	100	0.44	0.8	45
DEC. 2016	2592	0.06	0.5	88	0.43	0.8	46
Global Metop-A IASI day-time SST quality results over 2nd half 2016							
JUL. 2016	2244	0.14	0.5	72	0.41	0.8	49
AUG. 2016	3170	0.14	0.5	72	0.41	0.8	49
SEP. 2016	3202	0.18	0.5	64	0.40	0.8	50
OCT. 2016	3384	0.14	0.5	72	0.40	0.8	50
NOV. 2016	2906	0.12	0.5	76	0.42	0.8	48
DEC. 2016	2825	0.15	0.5	70	0.39	0.8	51
(*) Bias Margin = 100 * (1 - (|Bias / Bias 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 global METOP-A IASI SST over 2nd half 2016, for Quality Levels 3, 4 and 5**

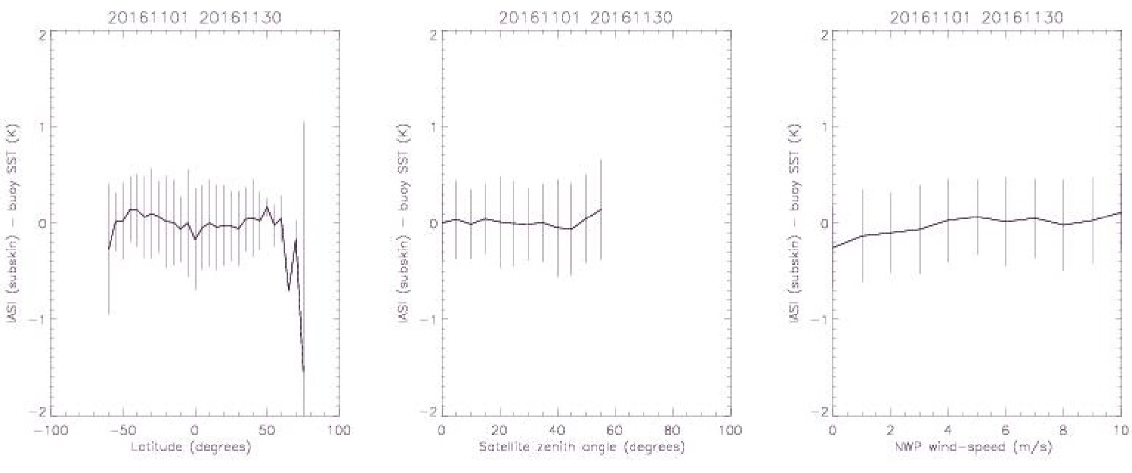


Figure 40 : **Mean Metop-A IASI night-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JAN. 2016 to DEC. 2016**

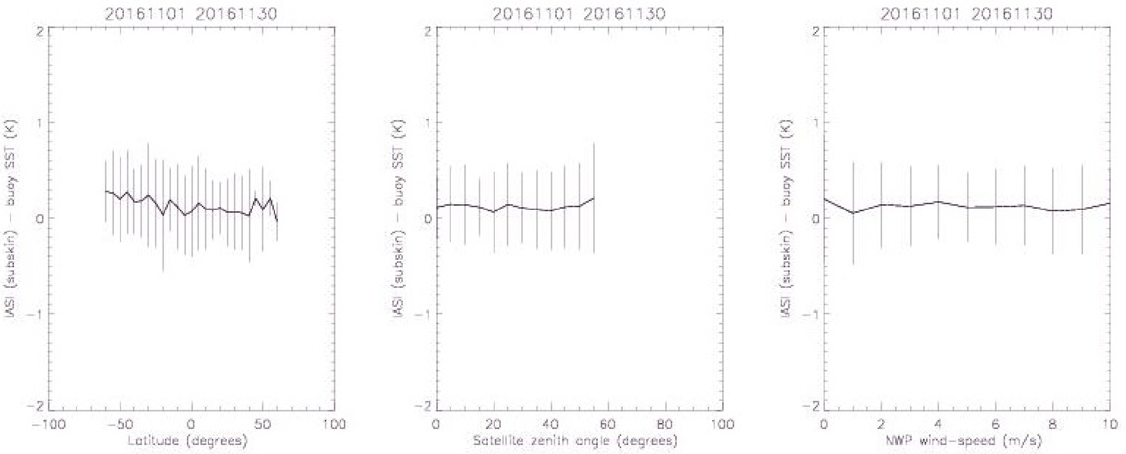


Figure 41 : **Mean Metop-A IASI day-time SST minus drifting buoy SST analyses for Quality Levels 3, 4 and 5, JAN. 2016 to DEC. 2016**

Comments:
All statistics are performing well and within the requirements. For the period 9th July to 31st December 2016, then global mean night-time IASI minus drifting buoy bias is 0.06K with standard deviation of 0.43K (n=15769), and for day-time the mean bias is 0.14K with standard deviation of 0.40K (n=17731).

5.2 Radiative Fluxes quality

5.2.1 DLI quality

DLI products are constituted of the geostationary products (METEOSAT DLI and GOES-E DLI) and the polar ones (AHL DLI). DLI values are required to have the following accuracy when compared to land pyrgeometer measurements :

- monthly relative bias 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-E 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://www.osi-saf.org/voir_images.php?image1=/images/flx_map_stations_2b.gif

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

Geostationary METEOSAT & GOES-E DLI quality results over 2nd half 2016										
Month	Number of cases	Mean DLI in Wm^{-2}	Bias in Wm^{-2}	Bias in %	Bias Req In %	Bias Marg in %(*)	Std Dev in Wm^{-2}	Std Dev in %	Std Dev Req In %	Std Dev margin (**) in %
JAN. 2016	5157	265.13	-9.84	-3.71	5,0	25.77	21.81	8.23	10,0	17.74
FEB. 2016	4158	275.94	-6.52	-2.36	5,0	52.74	18.92	6.86	10,0	31.43
MAR. 2016	4684	297.25	-4.73	-1.59	5,0	68.17	19.03	6.40	10,0	35.98
APR. 2016	4128	309.03	-3.65	-1.18	5,0	76.38	17.13	5.54	10,0	44.60
MAY 2016	4414	335.64	-2.96	-0.88	5,0	82.36	16.66	5.54	10,0	44.60
JUN. 2016	4168	364.50	-1.56	-0.43	5,0	91.44	15.04	4.13	10,0	58.70
JUL. 2016	4271	377.06	0.31	0.08	5,0	98.36	15.75	4.18	10,0	58.20
AUG. 2016	5149	373.24	-1.13	-0.30	5,0	93.94	15,49	4.15	10,0	58.50
SEP. 2016	4315	354.07	-1.73	-0.49	5,0	90.23	14.83	4.19	10,0	58.12
OCT. 2016	3730	323.29	-3.08	-0.95	5,0	80.95	20.97	6.49	10,0	35.14
NOV. 2016	4235	292.89	-4.84	-1.65	5,0	66.95	29.62	10.11	10,0	-1.13
DEC. 2016	4418	272.25	-9.32	-3.42	5,0	31.53	21.17	7.78	10,0	22.24
(*) Bias Margin = 100 * (1 - (|Bias / Bias 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 : Geostationary DLI quality results over 2nd half 2016.

Comments:
The negative DLI bias observed in December 2016 is typical of winter conditions. The formation of inversion layers during clear nights reduced the air temperature at 2 m compared to the atmospheric upper layer temperatures. The DLI algorithm only uses the 2m temperature, leading to an underestimation in such conditions. The high standard deviation observed in November 2016 lead us to examine the day to day results. An unusual negative error occured on 28 November, due to some

missing fields in the air temperature and humidity forecasts. The problem affect the whole DLI product at several hours and consequently the daily product. The erroneous hourly and daily products have been eliminated from Ifremer and EUMETSAT archives.

Files removed from EUMETSAT archive	Files removed from Ifremer archive
S-OSI_-FRA_-MSG_-D__DLI_FIELD-201611281200Z.grb.gz (daily)	20161128120000-OSISAF-RADFLX-24H-MSG3.nc.bz2
S-OSI_-FRA_-MSG_-H__DLI_FIELD-201611280600Z.grb.gz (hourly)	20161128060000-OSISAF-RADFLX-01H-MSG3.nc.bz2
S-OSI_-FRA_-MSG_-H__DLI_FIELD-201611280700Z.grb.gz (hourly)	20161128070000-OSISAF-RADFLX-01H-MSG3.nc.bz2
S-OSI_-FRA_-MSG_-H__DLI_FIELD-201611280800Z.grb.gz (hourly)	20161128080000-OSISAF-RADFLX-01H-MSG3.nc.bz2
S-OSI_-FRA_-MSG_-H__DLI_FIELD-201611281000Z.grb.gz (hourly)	20161128100000-OSISAF-RADFLX-01H-MSG3.nc.bz2
S-OSI_-FRA_-MSG_-H__DLI_FIELD-201611281100Z.grb.gz (hourly)	20161128110000-OSISAF-RADFLX-01H-MSG3.nc.bz2

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

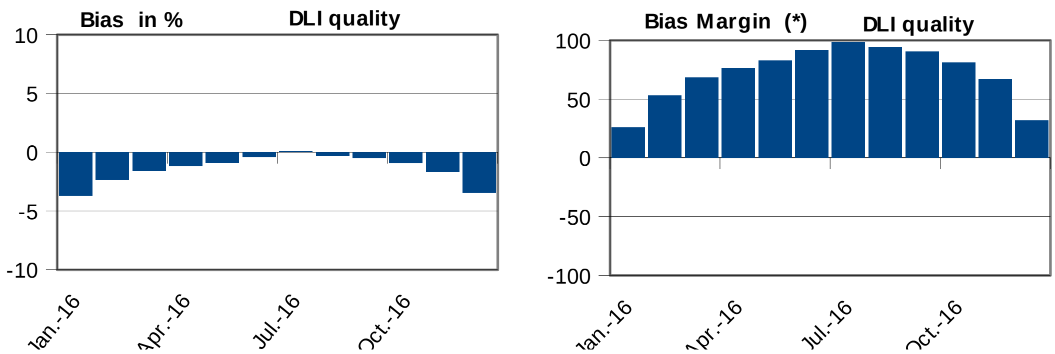


Figure 42 : Left: Geostationary DLI Bias. Right Geostationary DLI Bias Margin .

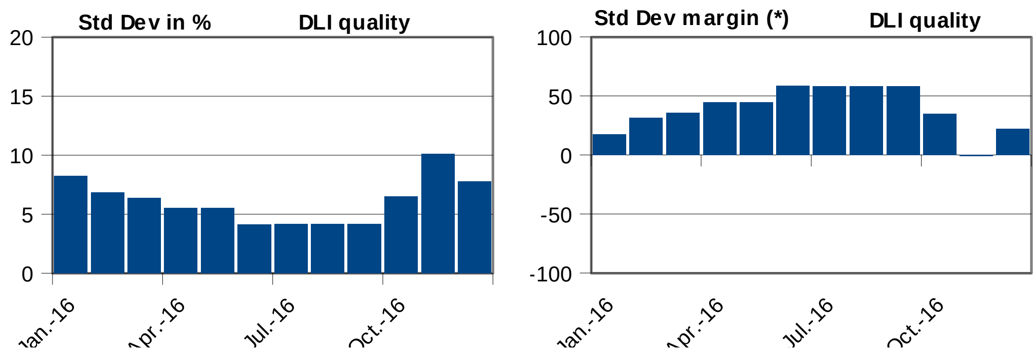


Figure 43 : Left: Geostationary DLI Standard deviation. Right DLI Geostationary Standard deviation Margin.

5.2.1.2 AHL DLI (OSI-301) quality

The pyrgeometer stations used for quality assessment of the AHL DLI product are selected stations from Table 14. Specifically the following stations are currently used

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

More information on the stations is provided in 5.2.2.2.

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

AHL DLI quality results over JAN. 2016 to DEC. 2016									
Month	Number of cases	Mean DLI in Wm^{-2}	Bias in %	Bias Req in %	Bias Marg in %(*)	Std Dev in Wm^{-2}	Std Dev in %	Std Dev Req in %	Std Dev margin (**) in %
JAN. 2016	310	264.04	2.76	5.0	44.8	-	6.92	10.0	30.8
FEB. 2016	288	275.57	3.77	5.0	24.6	-	5.84	10.0	41.6
MAR. 2016	288	273.33	3.27	5.0	34.6	-	6.48	10.0	35.2
APR. 2016	296	278.74	3.64	5.0	27.2	-	4.67	10.0	53.3
MAY 2016	300	301.01	6.55	5.0	-31	-	4.44	10.0	55.6
JUN. 2016	275	319.56	5.07	5.0	-1.4	-	4.25	10.0	57.5
JUL. 2016	154	348.71	4.49	5.0	10.2	10.87	3.24	10.0	67.6
AUG. 2016	94	329.03	5.25	5.0	-5.0	13.27	4.05	10.0	59.5
SEP. 2016	60	325.37	6.14	5.0	-22.8	11.59	3.56	10.0	64.4
OCT. 2016	62	317.76	4.96	5.0	0.8	14.79	4.67	10.0	53.3
NOV. 2016	69	292.21	1.05	5.0	79.0	23.74	8.13	10.0	18.7
DEC. 2016	60	277.49	1.41	5.0	71.8	15.03	5.47	10.0	45.3
(*) Bias Margin = 100 * (1 - (|Bias / Bias 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 : AHL DLI quality results over JAN. 2016 to DEC. 2016.

Comments:
This validation period many of the stations did not report longwave observations. The reason for this is not known. Requirements are not met in August and September. The reason for this is underestimation of the incoming longwave irradiance at Arctic stations (Jan Mayen and Hopen).

5.2.2 SSI quality

SSI products are constituted of the geostationary products (METEOSAT SSI and GOES-E SSI) and polar ones (AHL SSI). SSI values are required to have the following accuracy when compared to land pyranometer measurements :

- monthly relative bias 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-E SSI (OSI-306) quality

The list of pyranometer stations used for validating the geostationary SSI products is available on the OSI SAF Web Site from the following page:
http://www.osi-saf.org/lml/img/flx_map_stations_2b.gif

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

Geostationary METEOSAT & GOES-E SSI quality results over 2nd half 2016										
Month	Number of cases	Mean SSI in Wm^{-2}	Bias in Wm^{-2}	Bias in %	Bias Req in %	Bias Marg in %(*)	Std Dev in Wm^{-2}	Std Dev in %	Std Dev Req in %	Std Dev margin (**) in %
JAN. 2016	4901	312.73	15.17	4.85	10.0	51.49	87.58	28.00	30.0	6.65
FEB. 2016	5152	330.93	13.18	3.98	10.0	60.17	76.8	23.21	30.0	22.64
MAR. 2016	6572	397.72	13.30	3.34	10.0	66.56	86.3	21.70	30.0	27.67
APR. 2016	6181	421.77	14.55	3.45	10.0	65.50	84.89	20.13	30.0	32.91
MAY 2016	7546	448.53	-3.59	-0.80	10.0	92.00	80.61	17.97	30.0	40.09
JUN. 2016	7418	463.72	-1.13	-0.24	10.0	97.60	80.69	17.40	30.0	42.00
JUL. 2016	7100	489.07	-0.39	-0.08	10.0	99.20	86.07	17.60	30.0	41.33
AUG. 2016	7295	478.2	2.92	0.61	10.0	93.89	81.91	17.13	30.0	42.90
SEP. 2016	6214	446.67	9.56	2.14	10.0	78.60	83.59	18.71	30.0	37.62
OCT. 2016	5383	400.79	14.42	3.60	10.0	64.02	78.58	19.61	30.0	34.65
NOV. 2016	5134	350.85	13.45	3.83	10.0	61.66	75.3	21.46	30.0	28.46
DEC. 2016	4485	322.54	5.90	1.83	10.0	81.71	76.05	23.58	30.0	21.41
(*) Bias Margin = 100 * (1 - (|Bias / Bias 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.										

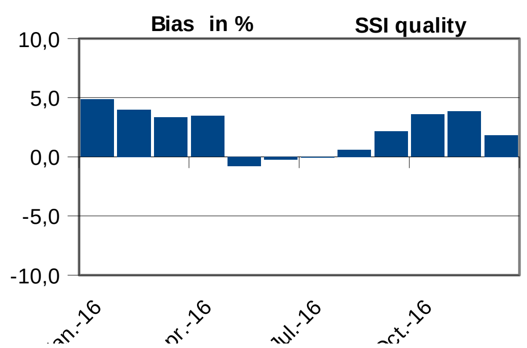
table 13 : **Geostationary SSI quality results over 2nd half 2016.**

Comments:

The SSI results are with the expected margins.

Hourly and daily SSI products on 28 November 2016 have been eliminated from Ifremer archive as they are in the same file as the DLI.

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



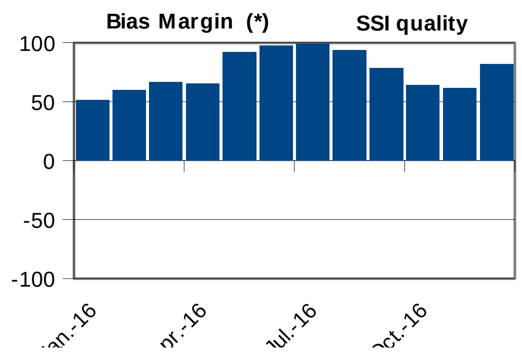
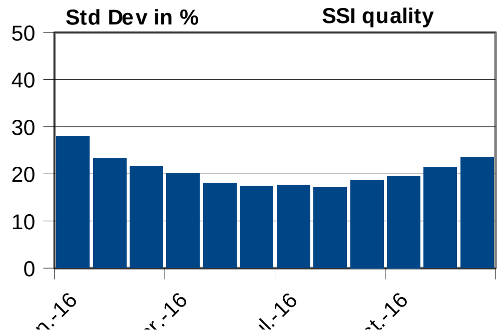


Figure 44 : Left: Geostationary SSI Bias. Right Geostationary SSI Bias Margin.



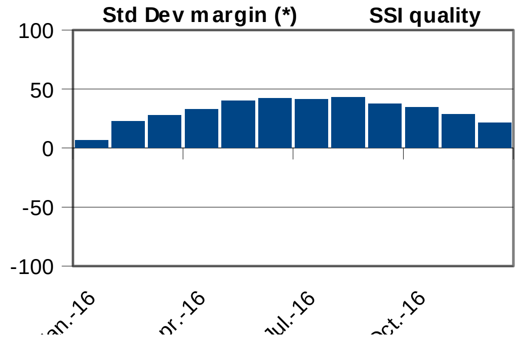


Figure 45 : Left: Geostationary SSI Standard deviation. Right Geostationary SSI Standard deviation Margin.

5.2.2.2 AHL SSI (OSI-302) quality

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

Station	StId	Latitude	Longitude		Status
Apelsvoll	11500	60.70°N	10.87°E	SSI	In use, under examination due to shadow effects.
Løken	23500	61.12°N	9.07°E	SSI	Not used currently
Landvik	38140	58.33°N	8.52°E	SSI	In use
Særheim	44300	58.78°N	5.68°E	SSI	In use
Fureneset	56420	61.30°N	5.05°E	SSI	In use
Tjøtta	76530	65.83°N	12.43°E	SSI	In use
Ekofisk	76920	56.50°N	3.2°E	SSI, DLI	The station was closed due to change platforms in the position. Instrumentation is recovered and work in progress to remount equipment.
Holt	90400	69.67°N	18.93°E	SSI	Not used currently
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

Station	StId	Latitude	Longitude		Status
					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 14 : ***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 14. 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 JAN. 2016 to DEC. 2016										
Month	Number of cases	Mean SSI in Wm^{-2}	Bias in Wm^{-2}	Bias in %	Bias Req in %	Bias Marg in %(*)	Std Dev in Wm^{-2}	Std Dev in %	Std Dev Req in %	Std Dev margin (**) in %
JAN. 2016	306	8.31	5.04	49.26	10.0	-392.6	7.58	48.50	30.0	-61.67
FEB. 2016	286	27.94	7.21	28.12	10.0	-181.2	14.99	52.15	30.0	-73.83
MAR. 2016	306	68.72	14.84	21.51	10.0	-115.1	17.56	26.08	30.0	13.07
APR. 2016	296	135.90	17.29	13.31	10.0	-33.1	25.01	18.46	30.0	38.47
MAY 2016	296	199.17	14.08	8.10	10.0	19	25.93	13.45	30.0	55.17
JUN. 2016	289	214.79	12.91	7.74	10.0	22.6	29.67	13.89	30.0	53.7
JUL. 2016	270	169.43	12.73	10.09	10.0	-0.9	27.21	15.21	30.0	49.3
AUG. 2016	213	147.96	7.37	7.61	10.0	23.9	27.47	18.59	30.0	38.0
SEP. 2016	175	91.33	4.89	6.27	10.0	37.3	17.70	20.88	30.0	30.4
OCT. 2016	181	45.93	0.84	7.59	10.0	24.1	11.64	28.08	30.0	6.4
NOV. 2016	175	12.62	3.4	22.20	10.0	-122	8.14	48.96	30.0	-63.2
DEC. 2016	180	4.89	NA	NA	10.0	NA	NA	NA	30.0	NA
(*) Bias Margin = 100 * (1 - (|Bias / Bias 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 15 : **AHLSSI quality results over JAN. 2016 to DEC. 2016**

Comments:
Requirements are not met in July (marginally) and November. The reason for the failure in July is the performance at the station 10147 – Hamburg-Fuhlsbuttel and in November it is the performance at the station 11500 – Apelsvoll. For the situation in July, very few observations were available for the station and this is probably related to the problem. For the situation in November this is related to the winter night and the performance of the algorithm under marginal conditions.

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 OSISAF ice concentration is calculated. Afterwards deviations are grouped into categories, i.e. ±10% and ±20%. Furthermore the bias and standard deviation is calculated for each concentration level. The bias and standard deviation are reported for ice (> 0% ice concentration), for water (0% ice concentration) and for both ice and water as a total. 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 16 : 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.

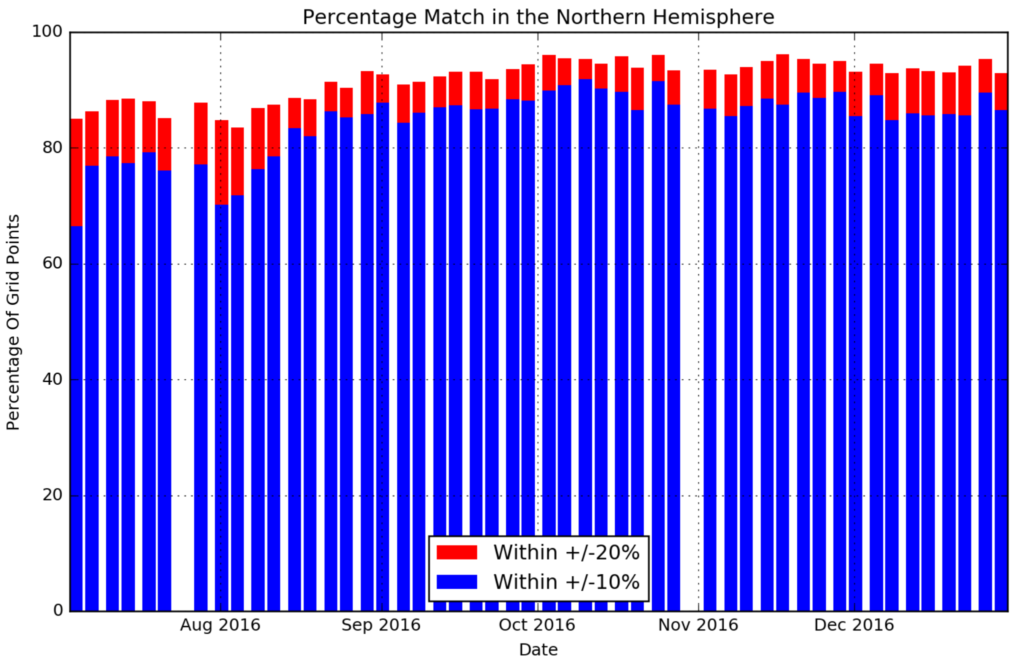


Figure 46 : Comparison of ice concentrations from the Greenland overview charts made by DMI and the OSI SAF concentration product. Northern hemisphere. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%.

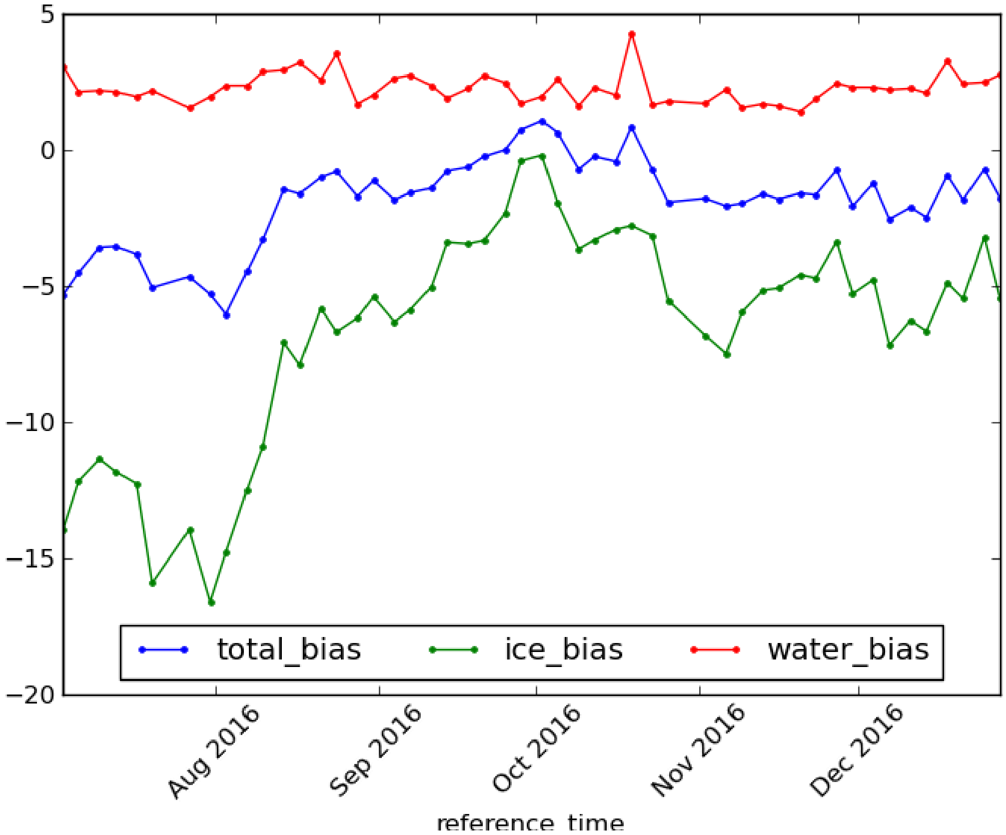


Figure 47 : **Difference between ice concentrations from the Greenland overview charts made by DMI and OSI SAF concentration product for three categories: water, ice and total. The total difference is the difference between the ice analysis and sea ice concentration product within the area covered by the ice analysis including both ice and water. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Northern hemisphere.**

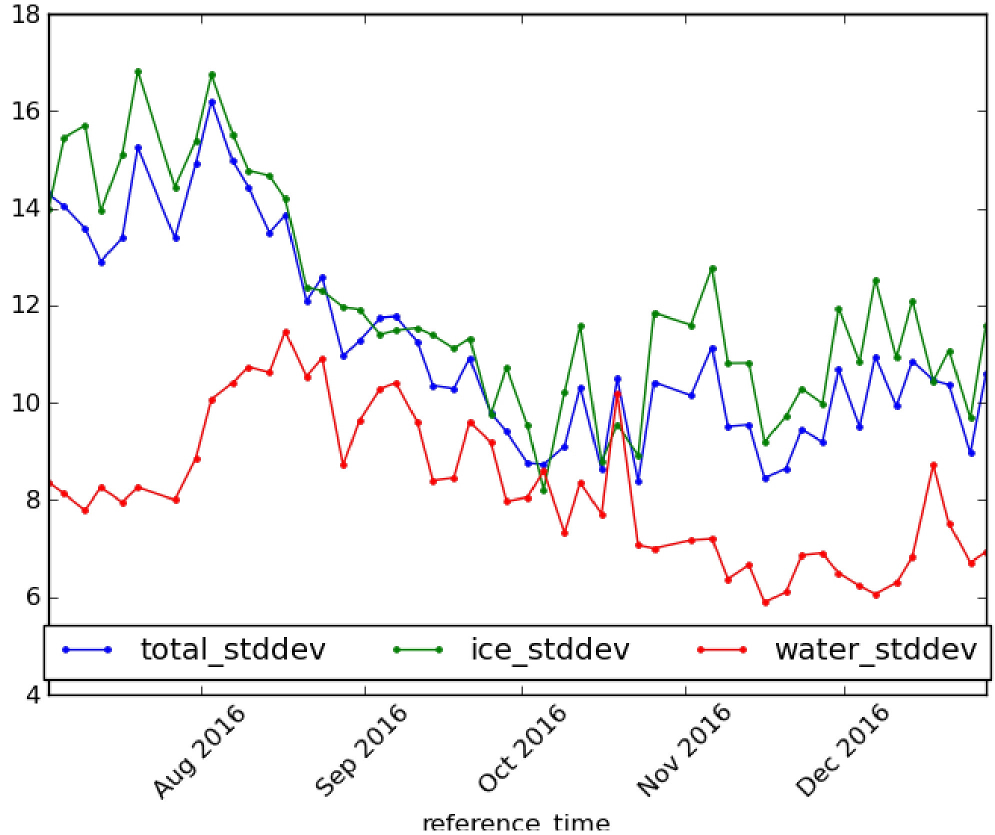


Figure 48 : Standard deviation of the difference in ice concentrations from the Greenland overview charts made by DMI and OSI SAF concentration product for three categories: water, ice and total. Northern hemisphere.

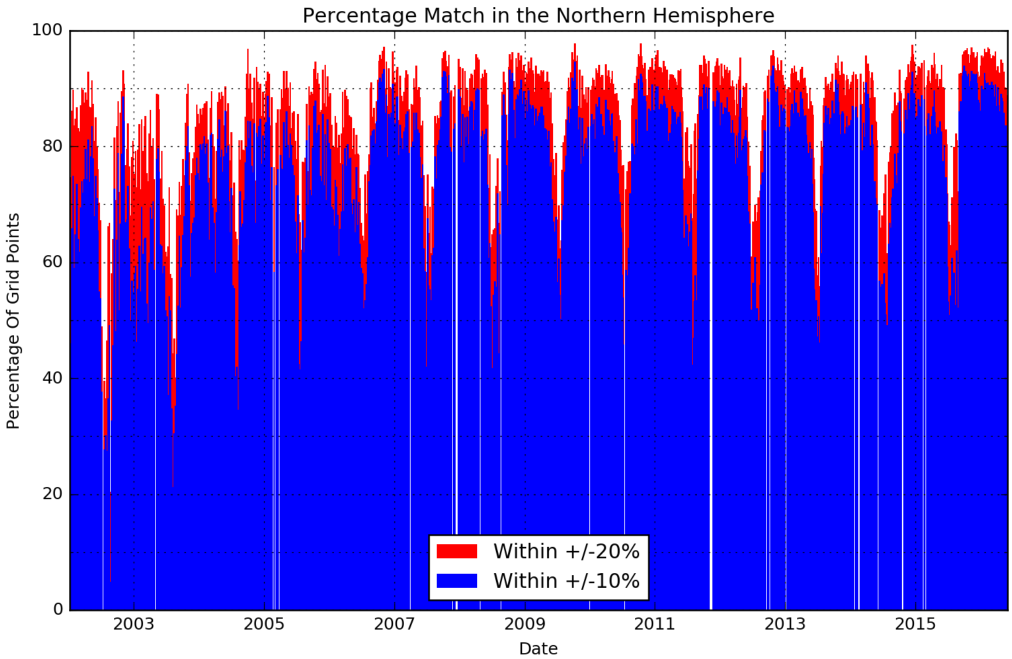


Figure 49 : Multiyear variability. Comparison between ice concentrations from the Greenland overview charts made by DMI and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Northern hemisphere.

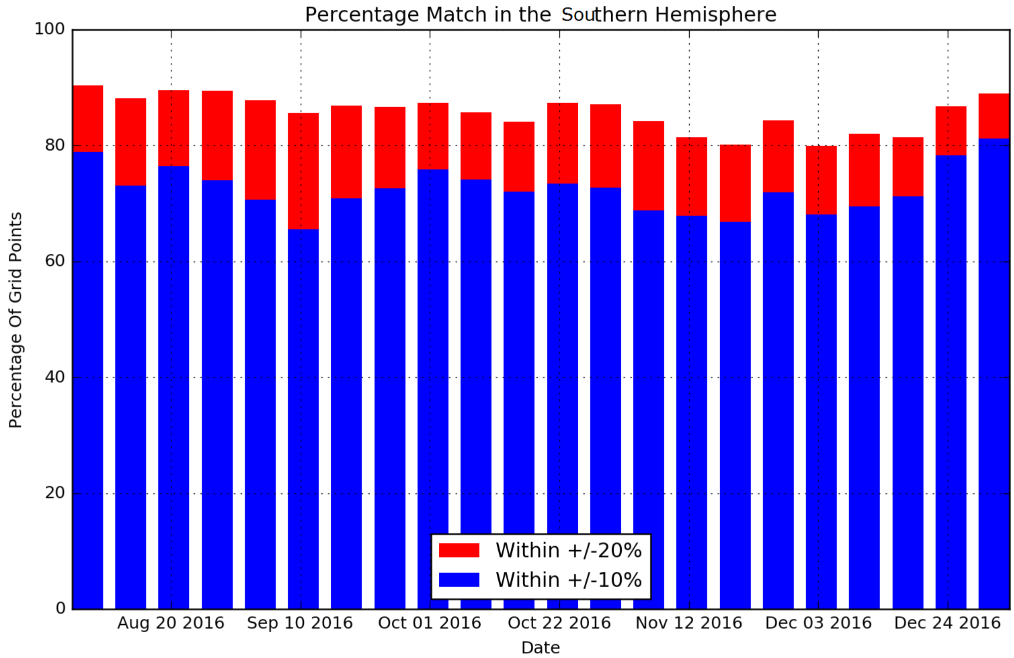


Figure 50 : Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/-10%, and likewise for +/-20%. Southern hemisphere.

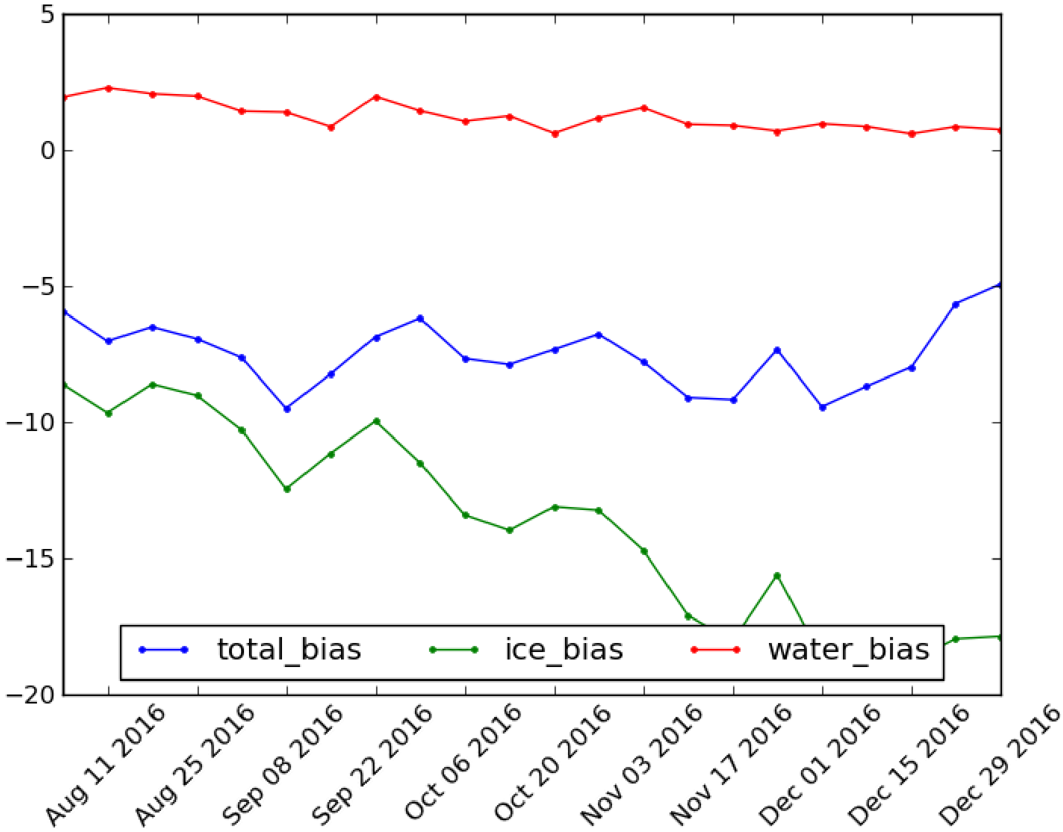


Figure 51 : Difference between the ice concentrations from the NIC ice analysis and OSI SAF concentration product for three categories: water, ice and total. The total difference is the difference between the ice analysis and sea ice concentration product within the area covered by the ice analysis including both ice and water. When the difference is below zero, the OSI SAF sea ice concentration has a lower estimate than the ice analysis. Southern hemisphere.

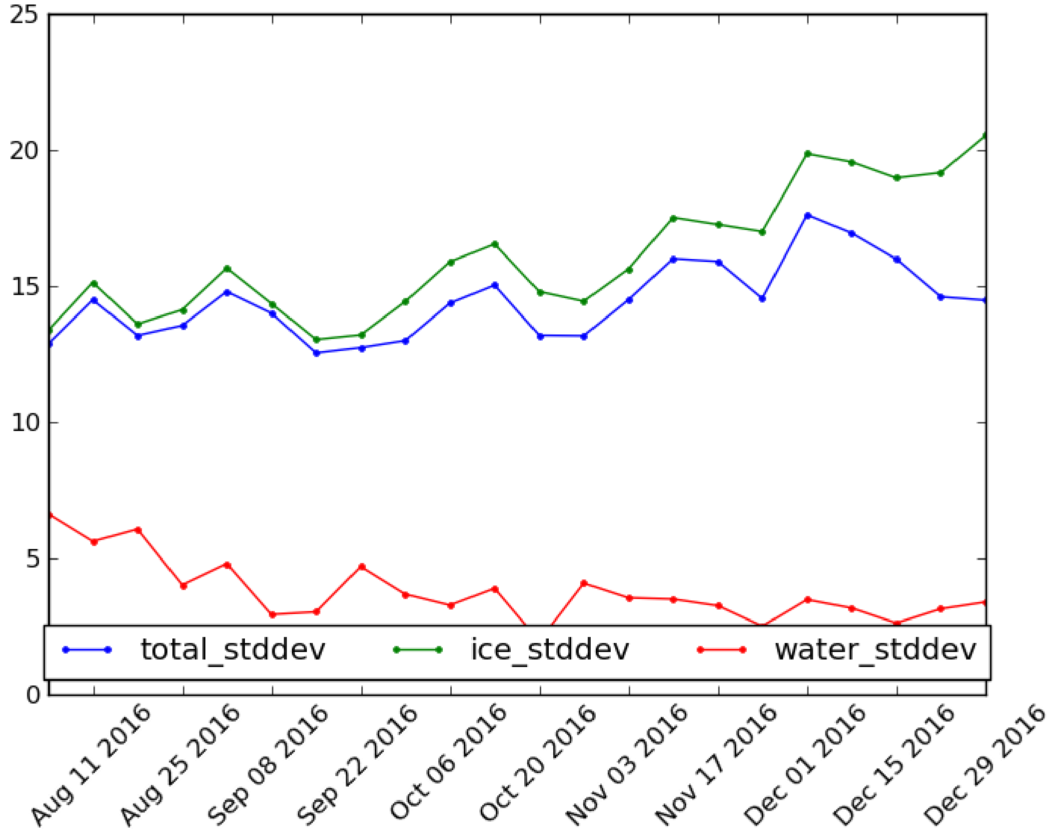


Figure 52 : Standard deviation of the difference in ice concentrations from the NIC ice analysis and OSI SAF concentration product for three categories: water, ice and total. Southern hemisphere.

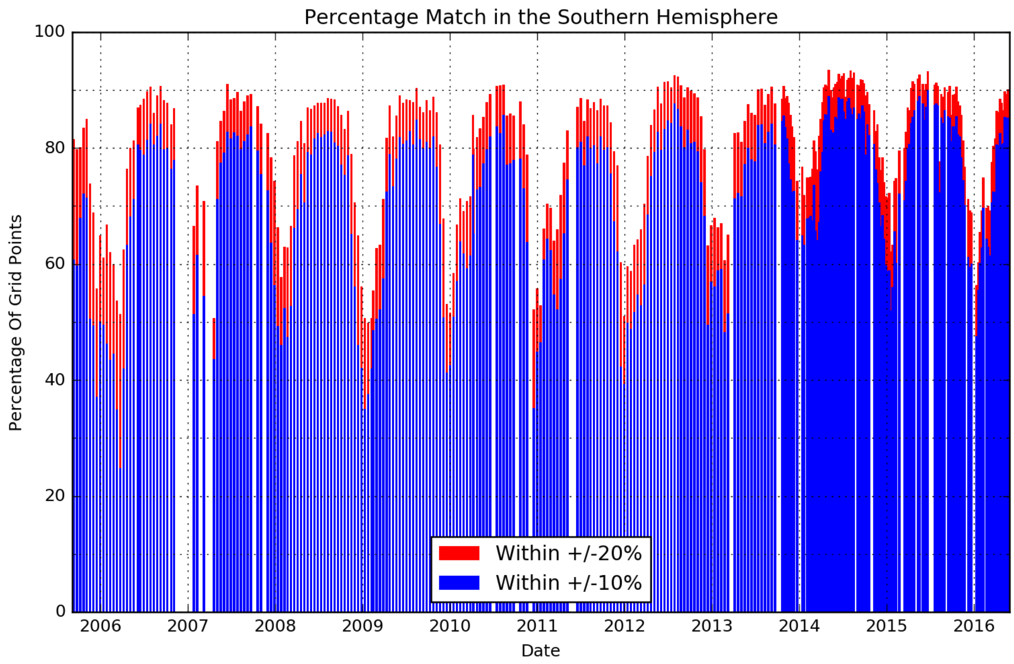


Figure 53 : Multiyear variability. Comparison between ice concentrations from the NIC ice analysis and the OSI SAF concentration product. 'Match +/- 10%' corresponds to those grid points where concentrations are within the range of +/- 10%, and likewise for +/-20%. Southern hemisphere.

Concentration product					
Month	+/- 10% [%]	+/- 20% [%]	Bias [%]	Stdev [%]	Num obs
JAN. 2016	83.72	92.18	-2.71	9.92	93146
FEB. 2016	83.68	91.58	-3.26	10.22	111214
MAR. 2016	80.21	88.57	-1.74	12.86	104517
APR. 2016	78.95	88.18	-2.12	11.62	101317
MAY 2016	74.68	86.85	-5.92	11.71	106914
JUN. 2016	72.15	82.24	-7.42	14.75	72043
JUL. 2016	72.42	81.35	-8.42	14.55	71189
AUG. 2016	81.88	88.25	-4.92	11.48	64542
SEP. 2016	82.01	88.64	-1.29	14.04	71863
OCT. 2016	91.15	96.12	-1.81	7.20	48097
NOV. 2016	82.15	92.14	-3.89	9.87	93366
DEC. 2016	79.79	89.76	-4.94	10.70	83163

table 17 : **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. 2016 to DEC. 2016. 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. Explanation (see Product User Manual for more details): 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. 2016	77.24	22.76	0.00	0.00	0.00	2.00
AUG. 2016	78.83	21.17	0.00	0.00	0.00	2.02
SEP. 2016	79.13	20.87	0.00	0.00	0.00	2.01
OCT. 2016	78.86	21.14	0.00	0.00	0.00	2.00
NOV. 2016	77.97	22.03	0.00	0.00	0.00	1.99
DEC. 2016	76.94	23.06	0.00	0.00	0.00	1.99

table 18 : **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. 2016	55.69	44.31	0.00	0.00	0.00	0.00
AUG. 2016	53.68	46.32	0.00	0.00	0.00	0.00
SEP. 2016	52.83	47.17	0.00	0.00	0.00	0.01
OCT. 2016	52.67	47.33	0.00	0.00	0.00	0.01
NOV. 2016	53.19	46.81	0.00	0.00	0.00	0.01
DEC. 2016	55.14	44.86	0.00	0.00	0.00	0.01

table 19 : **Statistics for sea ice concentration confidence levels, Code 0-5, Southern Hemisphere.**

Comments:

The figures showing the std. dev. of the difference in ice concentration between OSI SAF product and the DMI ice analysis for NH and NIC ice analys for SH, respectively, provides the essential information on the compliance of the sea ice concentration product accuracy. To fulfill the service specification of 10 % yearly std. dev. for NH and 15 % for SH, the total std. dev. (blue curve) shall on average throughout the year be below 10 % and 15 %, respectively.

For the Nothern hemisphere the average yearly std. dev. is 13.7 and for the Southern Hemisphere it is 14.5. That is for the Southern Hemisphere the Sea Ice Concentration is below target requirements, but for the Northern Hemisphere it is above target requirements, but below threshold requirements of 20%.

5.3.2 Global sea ice edge (OSI-402-b) quality

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

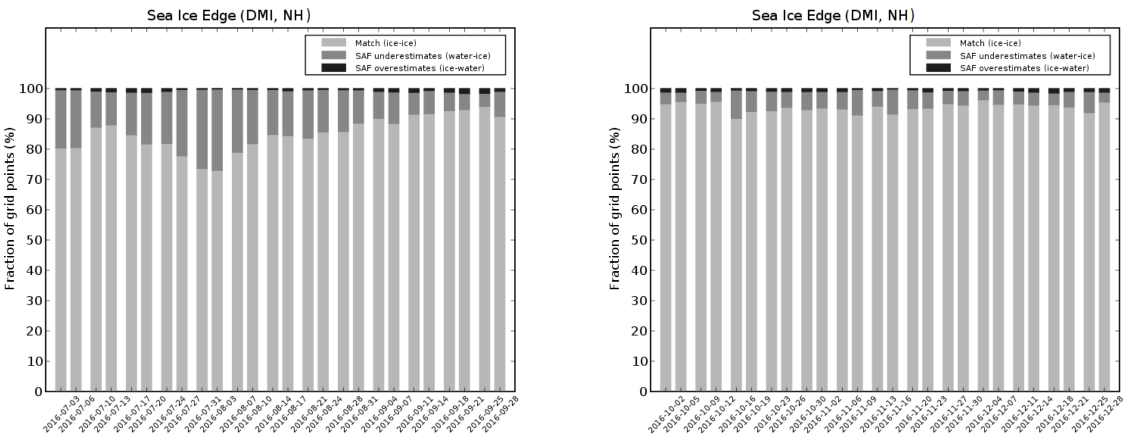


Figure 54 : **Comparison between the Greenland overview charts made by DMI and the OSI SAF sea ice edge product. Northern hemisphere. 'SAF water – DMI ice' means grid points where the OSI SAF product indicated water and the DMI ice analysis indicated ice and vice versa for the 'SAF ice – DMI water' category.**

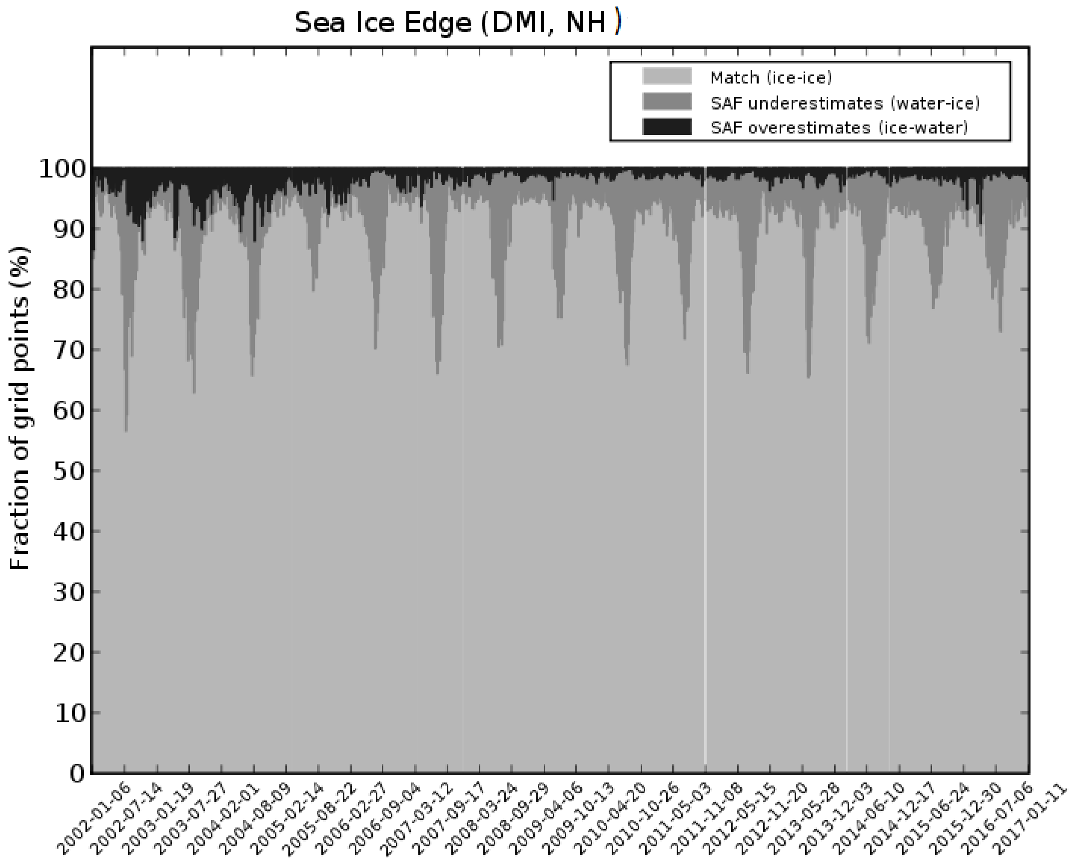


Figure 55 : Multiyear variability. Comparison between the Greenland overview charts made by DMI and the OSI SAF sea ice edge product. Northern hemisphere. 'SAF water – DMI ice' means grid points where the OSI SAF product indicated water and the DMI ice analysis indicated ice and vice versa for the 'SAF ice – DMI water' category.

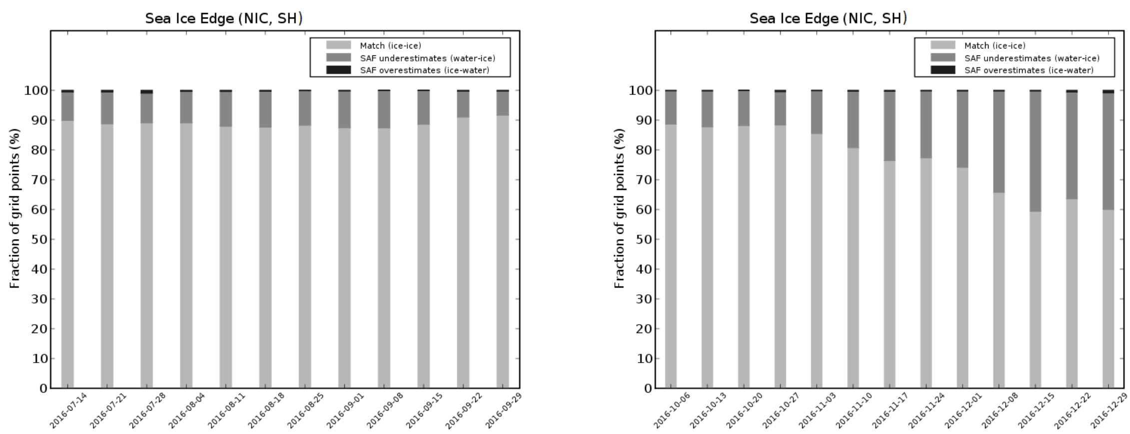


Figure 56 : Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'SAF water – NIC ice' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'SAF ice – NIC water' category.

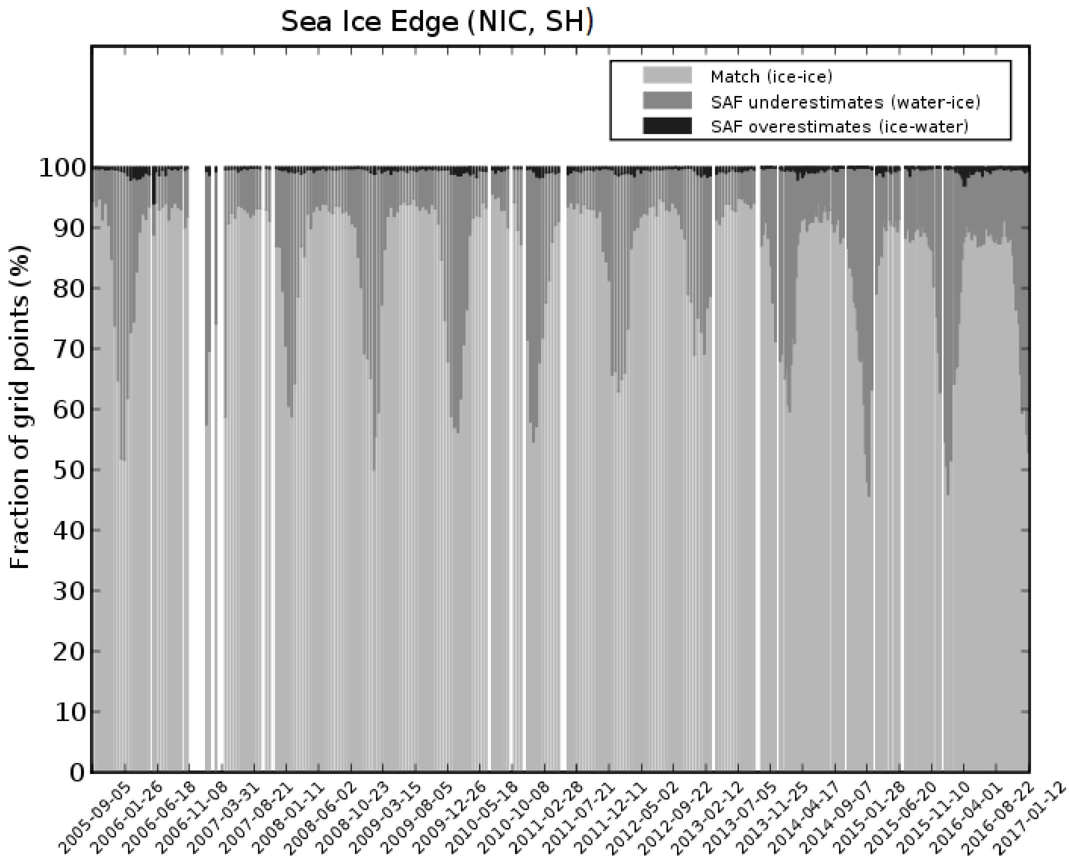


Figure 57 : Multiyear variability. Comparison between the NIC ice analysis and the OSI SAF sea ice edge product. Southern hemisphere. 'SAF water – NIC ice' means grid points where the OSI SAF product indicated water and the NIC ice analysis indicated ice and vice versa for the 'SAF ice – NIC water' category.

Month	Correct (%)	SAF lower (%)	SAF higher (%)	Mean edge diff (km)	Num obs
JAN. 2016	96.56	1.73	1.71	13.10	100992
FEB. 2016	96.70	1.37	1.93	14.74	120349
MAR. 2016	94.43	2.08	3.49	17.25	113551
APR. 2016	96.92	1.53	1.56	16.50	109945
MAY 2016	96.75	1.65	1.60	13.78	115467
JUN. 2016	95.07	3.56	1.36	21.04	77826
JUL. 2016	95.87	3.49	0.64	20.93	74479
AUG. 2016	97.24	2.31	0.45	33.82	67857
SEP. 2016	94.87	1.58	3.55	22.82	76774
OCT. 2016	98.34	0.57	1.10	11.20	60526
NOV. 2016	97.40	1.48	1.13	12.56	101715
DEC. 2016	96.43	2.36	1.21	15.88	86129

table 20 : Monthly quality assessment results from comparing OSI SAF sea ice products to MET Norway ice service analysis for the Svalbard area, from JAN. 2016 to DEC. 2016. 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. 2016	85.98	1.93	5.22	5.37	1.50	51.22
AUG. 2016	88.49	1.48	4.22	4.51	1.30	51.20
SEP. 2016	90.21	1.26	3.61	3.80	1.13	51.30
OCT. 2016	91.19	1.28	3.27	3.28	0.99	51.59
NOV. 2016	91.49	1.43	3.14	3.05	0.90	51.89
DEC. 2016	91.27	1.60	3.23	3.02	0.87	52.20

table 21 : 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. 2016	82.41	5.04	6.92	4.94	0.70	22.42
AUG. 2016	82.78	4.54	6.73	5.21	0.75	22.50
SEP. 2016	81.32	5.19	7.08	5.64	0.77	22.49
OCT. 2016	79.99	5.57	7.40	6.13	0.91	22.47
NOV. 2016	79.63	5.45	7.31	6.44	1.16	22.46
DEC. 2016	81.11	4.79	6.65	6.15	1.30	22.46

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

Comments :
The yearly averaged edge difference is 17.8 km (average of monthly values) and the target accuracy requirement of 20 km edge difference is hence met. The monthly differences are below the yearly requirement all months except the summer months of June to September, when melting of snow and ice makes the product quality worse.
Validation for the ice edge product for southern hemisphere is not yet in place.

5.3.3 Global sea ice type (OSI-403-b) 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. 2016 F17	67203	2162049
FEB. 2016 F17	59477	2041543
MAR. 2016 F17	68648	2039555
APR. 2016 F17	*156920*	*1633922*
APR. 2016	33477	1601852
MAY 2016	43035	1046333
JUN. 2016	-	-
JUL. 2016	-	-
AUG. 2016	-	-
SEP. 2016	-	-
OCT. 2016	161636	2630767
NOV. 2016	99443	1828339
DEC. 2016	109742	1887107

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table 23 : 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. 2016	84.24	0.29	0.38	14.88	0.21	51.22
AUG. 2016	86.52	0.32	0.39	12.58	0.19	51.20
SEP. 2016	87.67	0.31	0.39	11.47	0.16	51.30
OCT. 2016	89.82	0.53	0.70	8.80	0.15	51.59
NOV. 2016	91.02	0.67	0.92	7.24	0.14	51.89
DEC. 2016	91.37	0.75	1.56	6.17	0.14	52.20

table 24 : Statistics for sea ice type confidence levels, Northern Hemisphere.

Month	Code=5	code=4	code=3	code=2	code=1	Unprocessed
JUL. 2016	69.17	0.19	0.27	30.31	0.07	22.42
AUG. 2016	67.33	0.20	0.29	32.11	0.07	22.50
SEP. 2016	66.59	0.20	0.29	32.85	0.07	22.49
OCT. 2016	66.51	0.22	0.31	32.87	0.09	22.47
NOV. 2016	67.76	0.25	0.34	31.52	0.12	22.46
DEC. 2016	70.61	0.28	0.37	28.59	0.15	22.46

table 25 : Statistics for sea ice type confidence levels, Southern Hemisphere.

Comments :

Note, that in Table 23 the first rows from “JAN. 2016 F17” to “APR. 2016 F17” contain values based on SSMIS data from F17. The following months contain values based on SSMIS data from F18 instead of F17. This was mentioned already in the previous Half-yearly operations report for 1st half of 2016.

In Table 23 is seen in the mid-column the monthly standard deviations of the daily MYI coverage variability. The standard deviations for October to December are all relatively high compared to the values from the first half of 2016. In addition, the standard deviations for both October and December are *not* below the requirement of 100.000 km^2.

We see that this period in the end of 2016 has been influenced by several events of strong Warm Air Intrusion to the Arctic Ocen. Warm Air Intrusions may affect the physical properties of the ice surface in such a way that large areas of MYI can be misinterpreted as FYI. In addition, the SSMIS data have not been fully stable. On October the 17th the SSMIS data were missing resulting in missing ice products on this day (see News message from October on osisaf.met.no). In the following days, after this event, the monitored MYI coverage first showed an increase in area followed by a large and rapid decrease. This gives rise to the large standard deviation in October.

A deeper understanding of these relatively higher standard deviations in the second half of 2016 requires a more comprehensive validation of the products. However, an upgraded algorithm of sea ice edge and type including AMSR-2 data is soon to be released. A similar monitoring of these pre-operational ice type product for the same period, October to December, shows standard deviations below the required 100.000 km^2 for the whole period.

5.3.4 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 OSISAF 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 58 is the difference between the hemispheric OSISAF product and the validation product. The OSISAF operational emissivity is higher than the validation product giving a positive bias. The mean annual bias on the northern hemisphere is 0.104 and on the southern hemisphere it is 0.117. There is no clear seasonal cycle neither on the northern nor southern hemisphere. The large spike in May 2016 is coincident on both the northern and southern hemisphere thus ruling out that it is due a geophysical reason.

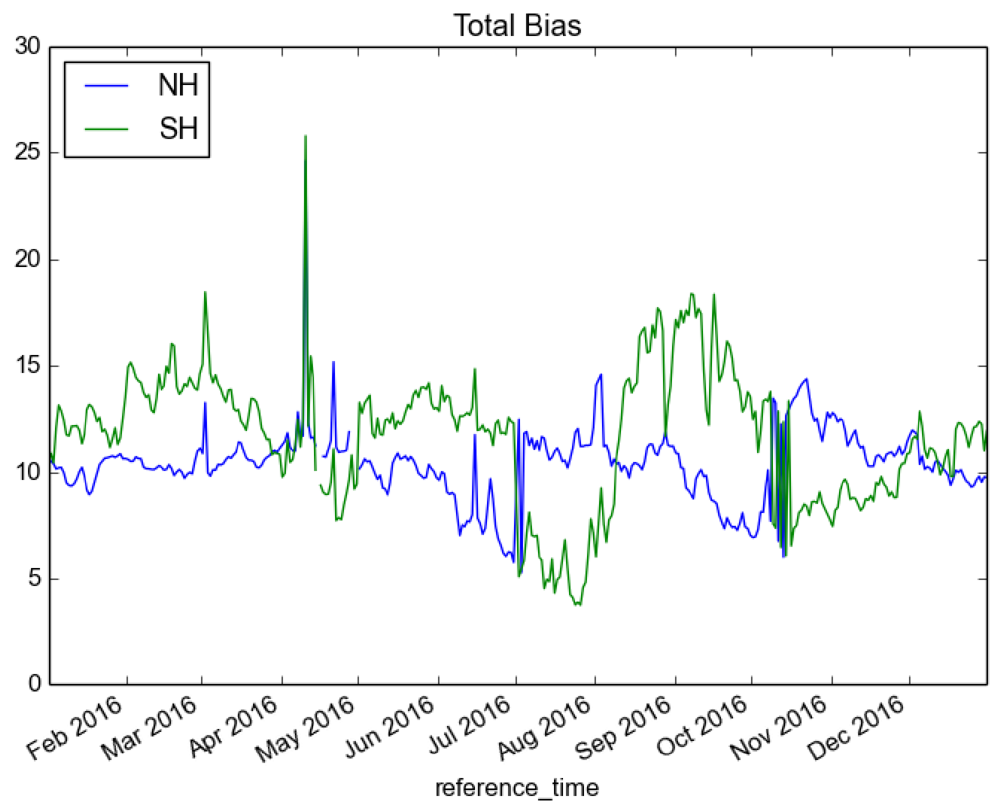


Figure 58 : The mean hemispheric difference between the OSI SAF operational product and the validation product derived from NWP and SSMIS data. The y-axis unit is in hundreds (1/100)

The standard deviation of the difference between the OSISAF product and the validation product is shown in figure 59. On both hemispheres there is a clear seasonal cycle. The northern hemisphere has values near 0.04 during winter and 0.06-0.07 during summer and an annual mean of 0.0551. The southern hemisphere has values near 0.08 and 0.09 during Austral summer and 0.06 – 0.07 during Austral winter and an annual mean of 0.0718. The spike in May 2016 is coincident on both hemispheres which mean that the explanation for that is not geophysical.

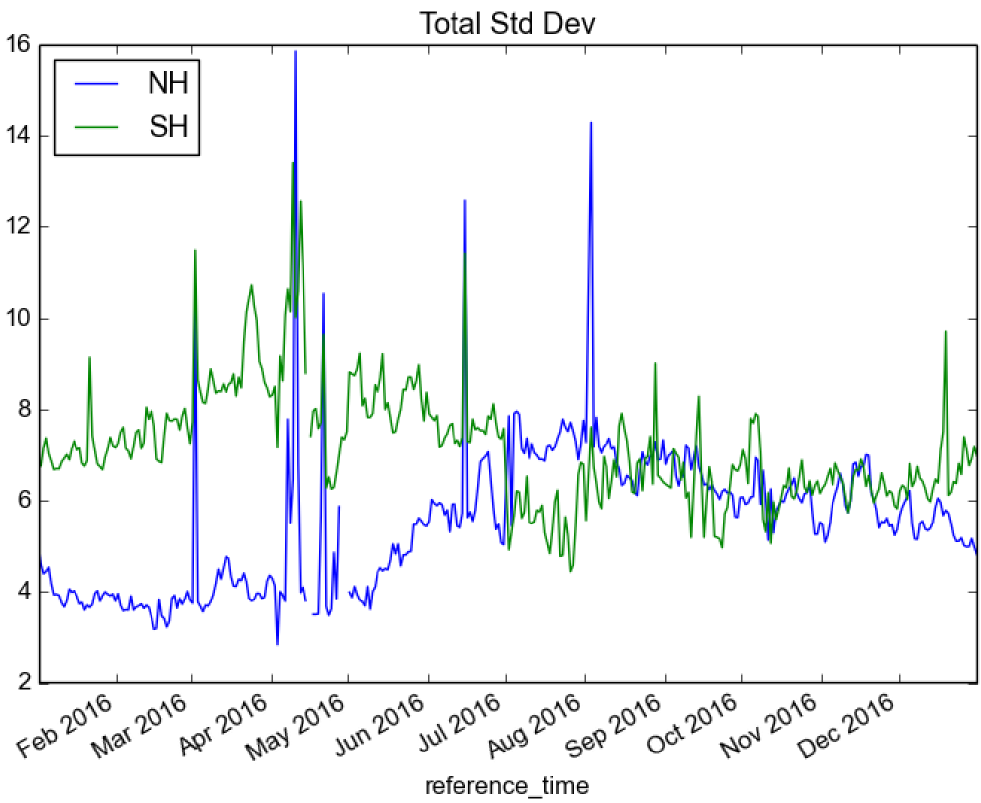


Figure 59 : The standard deviation of the difference between the OSI SAF operational product and the validation product for the northern and southern hemispheres. The y-axis unit is in hundreds (1/100)

The standard deviation of the difference between the OSISAF product and the validation product is the measure on which the product is evaluated according to the PRD. The target requirement is 0.10 on the northern hemisphere and 0.15 on the southern hemisphere. 2016 is well within both targets at all times during the season and the annual mean. This is summarized in table 26.

	Bias	STD	Target
NH	0.104	0.0551	0.10
SH	0.117	0.0718	0.15

table 26 : Summarising the numbers in the text.

5.3.5 Low resolution sea ice drift (OSI-405-b) 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 production is limited to the autumn-winter-spring period each year. No ice drift vectors are retrieved from 1st May to 30th September in the Arctic.

The Low Resolution Sea Ice Drift product comprises several single-sensor (e.g. SSM/I F15 or ASCAT Metop-A) 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 σ () the standard deviation of the error ε(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.

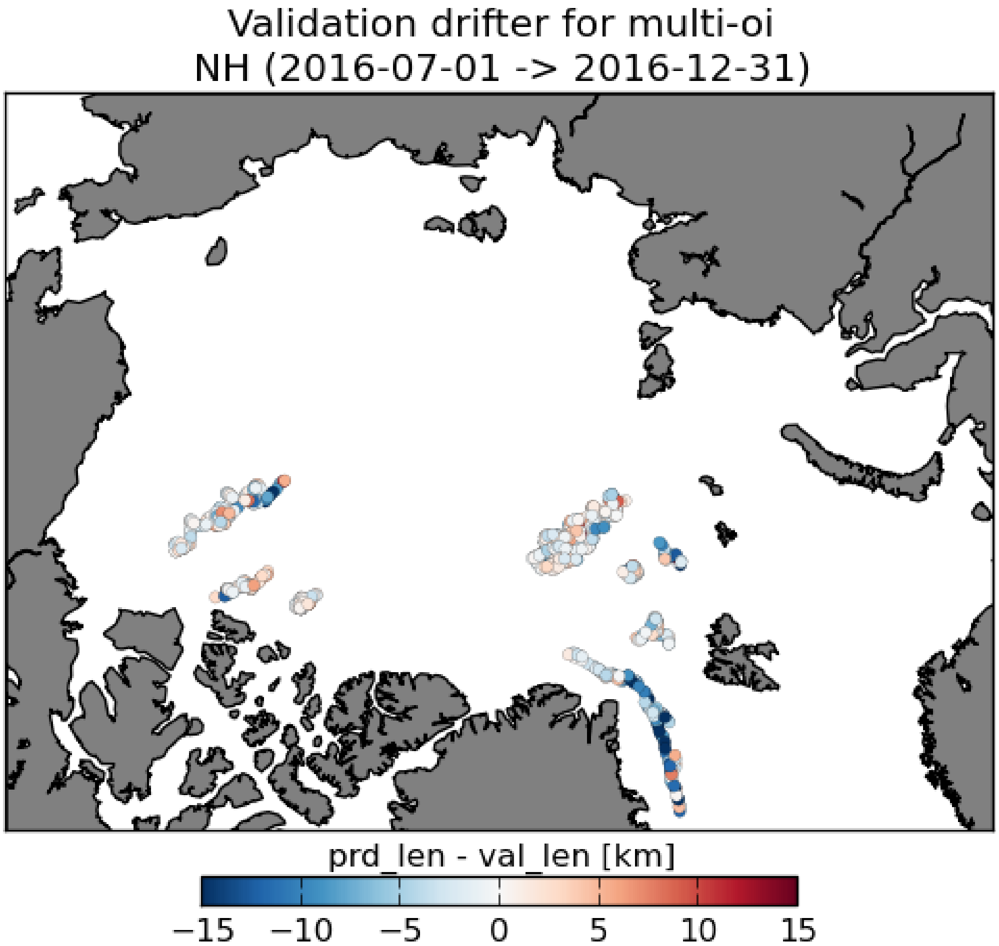


Figure 60 : **Location of GPS drifters for the quality assessment period (JUL. 2016 to DEC. 2016). The shade of each symbol represents the bias (prod-ref) in drift length (km over 2 days).**

Month	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
JAN. 2016	-0,05	-0,15	2,36	2,43	0,95	-0,04	0,98	613
FEB. 2016	-0,26	0,26	2,67	2,35	0,96	0,04	0,98	536
MAR. 2016	-0,46	-0,14	2,78	2,23	0,91	-0,11	0,95	508
APR. 2016	0,1	-0,54	1,63	2,15	0,96	-0,11	0,97	446
MAY 2016	--	--	--	--	--	--	--	0
JUN. 2016	--	--	--	--	--	--	--	0
JUL. 2016	--	--	--	--	--	--	--	0
AUG. 2016	--	--	--	--	--	--	--	0
SEP. 2016	--	--	--	--	--	--	--	0
OCT. 2016	0,39	-0,33	5,1	4,61	0,88	0,21	0,94	379
NOV. 2016	-0,41	-0,51	3,84	4,41	0,9	-0,41	0,96	385
DEC. 2016	0,1	-0,95	3,17	4,82	0,88	-0,18	0,96	335
Last 12 months	-0.106	-0.281	**3.133**	**3.296**	0.92	-0.065	0.96	3202

table 27 : **Quality assessment results for the LRSID (multi-oi) product (NH) for JAN. 2016 to DEC. 2016.**

Month	b(X) [km]	b(Y) [km]	σ(X) [km]	σ(Y) [km]	α	β[km]	ρ	N
JAN. 2016	0	-0,14	3,82	4,09	0,98	-0,05	0,94	525
FEB. 2016	-0,29	0,41	4,45	3,83	0,96	0,11	0,94	438
MAR. 2016	-0,17	-0,67	3,41	3,83	0,97	-0,38	0,9	367
APR. 2016	0,24	-0,46	3,01	3,13	0,99	-0,09	0,93	370
MAY 2016	--	--	--	--	--	--	--	0
JUN. 2016	--	--	--	--	--	--	--	0
JUL. 2016	--	--	--	--	--	--	--	0
AUG. 2016	--	--	--	--	--	--	--	0
SEP. 2016	--	--	--	--	--	--	--	0
OCT. 2016	0,55	-0,58	4,92	4,78	0,89	0,14	0,94	310
NOV. 2016	0,23	-0,18	4,92	4,52	0,93	-0,02	0,94	340
DEC. 2016	0,28	-0,47	4,7	4,83	0,91	0,06	0,93	295
Last 12 months	0.086	-0.260	**4.181**	**4.141**	0.94	-0.013	0.94	2645

table 28 : **Quality assessment results for the LRSID (ssmis-f17) product (NH) for JAN. 2016 to DEC. 2016.**

Comments:
The OSI-405-b validation statistics for Fall 2016 are inside the required thresholds. They appear slightly degraded wrt to earlier periods, mainly because of the sampling of challenging regions by the available validation data – namely Fram Strait and East Greenland Sea (see Fig 58).

5.3.6 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 error 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 29 below show selected error statistics against drifting buoys. Bias (x-bias, y-bias) and standard deviation of errors (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 error statistics.

Month	b(X) [m]	b(Y) [m]	σ(X) [m]	σ(Y) [m]	α	β [m]	ρ	N
JAN. 2016	51	184	909	1233	0.94	-59	0.96	756
FEB. 2016	-166	-28	1209	1681	0.98	43	0.98	570
MAR. 2016	-137	207	951	1011	0.99	-40	0.98	1853
APR. 2016	-98	261	1281	1244	0.99	-104	0.97	1626
MAY 2016	334	458	3024	1650	0.80	-346	0.89	288
JUN. 2016	-73	359	987	1899	0.88	54	0.96	100
JUL. 2016	549	-659	1148	1380	0.99	56	0.86	101
AUG. 2016	-144	596	673	368	0.88	-190	0.97	20
SEP. 2016	-	-	-	-	-	-	-	-
OCT. 2016	-	-	-	-	-	-	-	-
NOV. 2016	58	675	820	430	0.97	-361	0.97	82
DEC. 2016	-245	-193	818	1351	0.94	258	0.97	309
Last 12 months	-70	182	1260	1276	0.97	-77	0.97	5705

table 29 : MR sea ice drift product (OSI-407) performance, JAN. 2016 to DEC. 2016

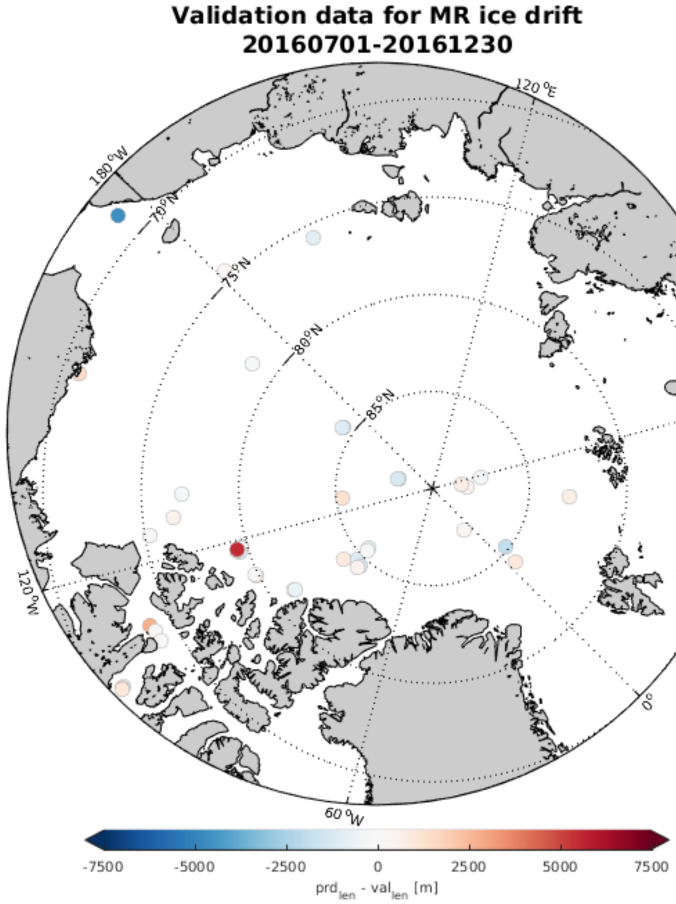


Figure 61 : **Location of GPS drifters for the quality assessment period (JUL. 2016 to DEC. 2016). The shade of each symbol represents the difference (prod-ref) in drift length in meters**

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. All momnths, except from May 2016 show reasonable correlation with buoy drift. Large std in May 2016 is to some extent due to little data for comparison (N). In September and October 2016 there was no validation data match-up, thus no validation statistics. In second half of 2016 there were only match-ups with 20 individual bouys. For comparison, in second half of 2015 there were match-ups with 55 individual bouys. Atest production will be set up where the summer mode /Visible AVHRR channel 2) is extended into September and October, to see if this gives more and better results. Also, the test production will run 4 times a day (currently running 2 times a day) to allow for better and more frequent coverage. 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 October 2012 to December 2016. 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) when they are compared to ECMWF forecast winds. 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/.

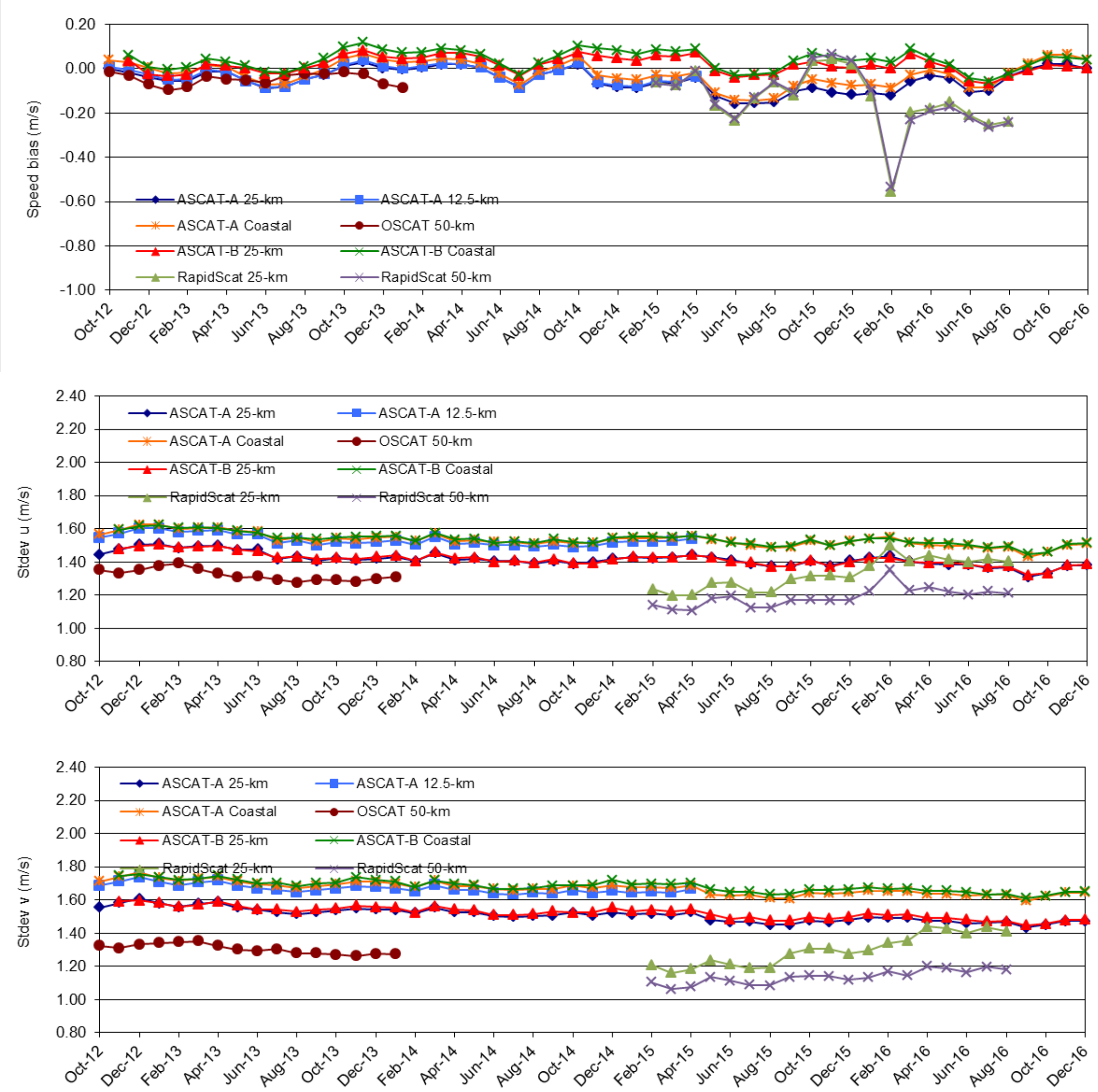


Figure 62 : Comparison of scatterometer winds against ECMWF NWP forecast winds (monthly averages). For each product, the wind speed bias (scatterometer minus ECMWF, top), wind *u* component standard deviation (middle) and wind *v* component standard deviation (bottom) are shown.

5.4.2 Comparison with buoys

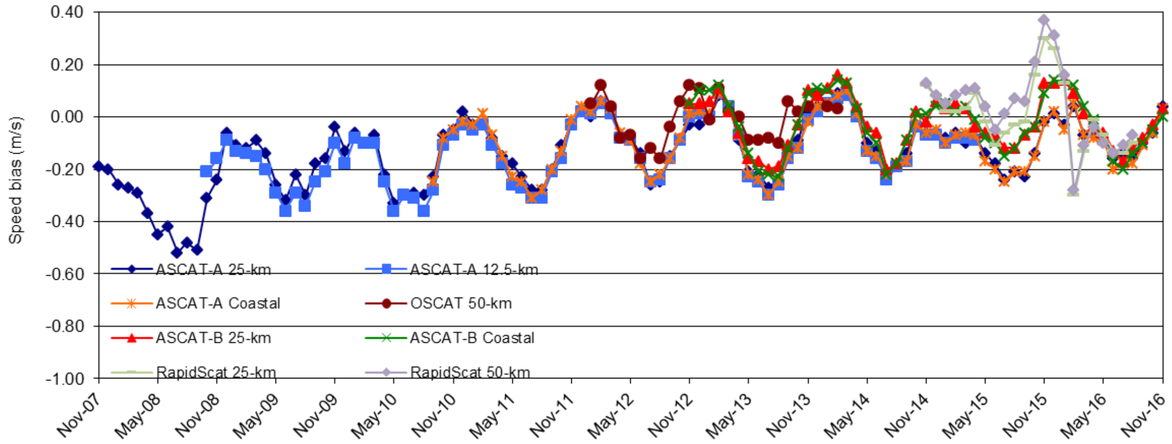
We compare the scatterometer winds with wind data from moored buoys on a monthly basis. The buoy data of approximately 150 buoys spread over the oceans (most of them in the tropical oceans and near Europe and North America) are retrieved from the ECMWF MARS archive and collocated with scatterometer winds.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

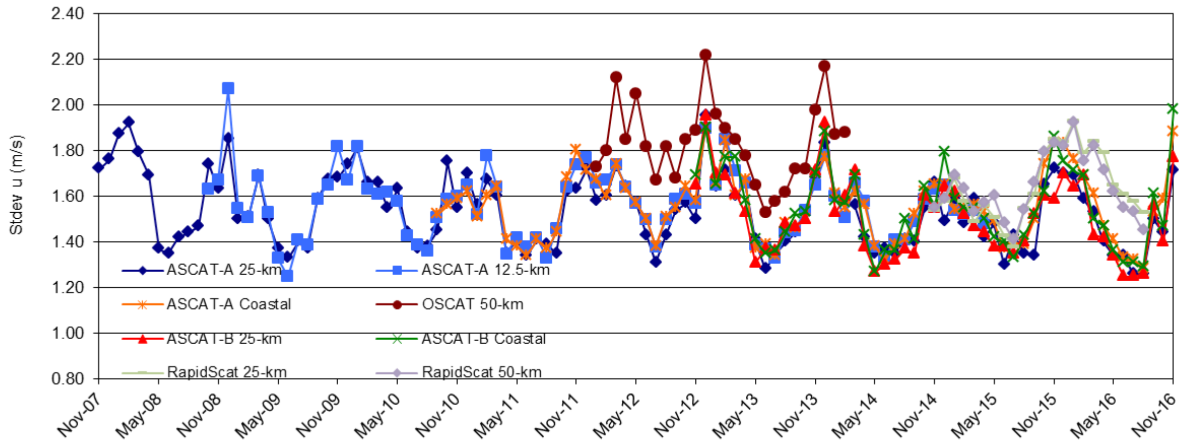
The figure below shows the monthly results of November 2007 to November 2016.

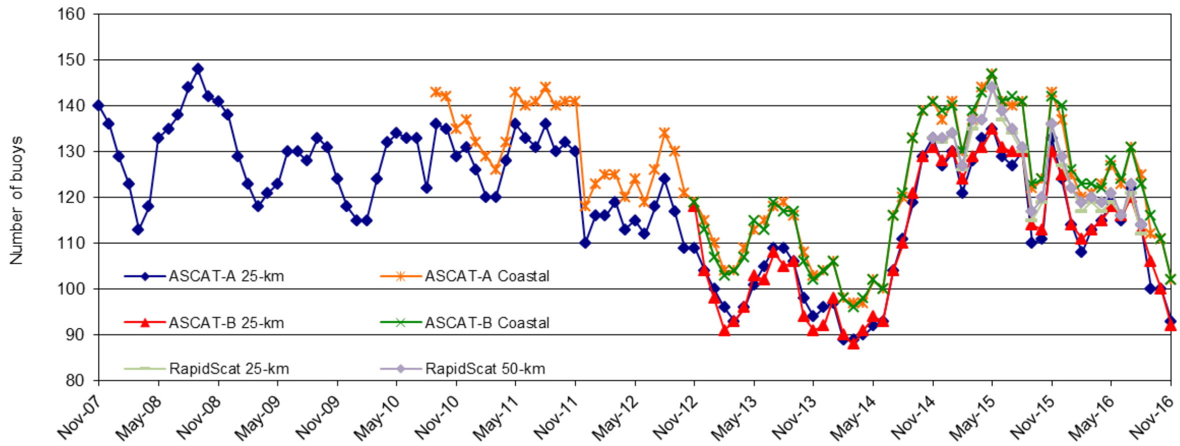
Note that the ASCAT winds before 20 November 2008 are real winds rather than neutral winds. Neutral scatterometer winds are known to be 0.2 m/s higher than real scatterometer winds.

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.







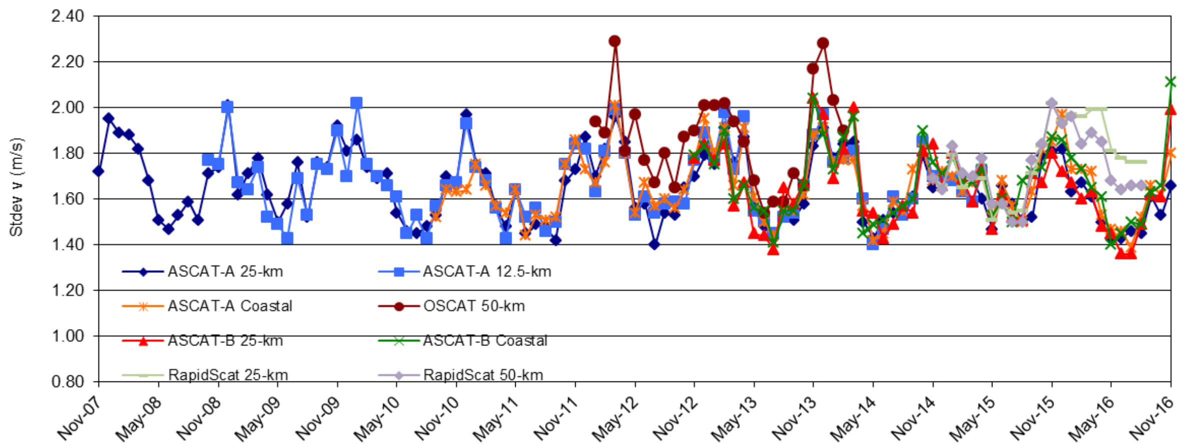


Figure 63 : Comparison of scatterometer winds against buoy winds (monthly averages). For each product, the wind speed bias (scatterometer minus buoy, top), wind *u* component standard deviation (2nd plot) and wind *v* component standard deviation (3rd plot) are shown. Also the number of buoys available 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, www.osi-saf.org, managed by MF/CMS,
- a web site for SS1, http://www.osi-saf.org/lml/, managed by MF/CMS,
- a web site for SS2, http://osisaf.met.no/, managed by MET Norway,
- a web site for SS3, http://www.knmi.nl/scatterometer/osisaf/, managed by KNMI.

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

6.1.1 Statistics on the central OSI SAF Web Site and help desk

6.1.1.1. Statistics on the registered users

Statistics on the central Web site use			
Month	Registered users	Pages	User requests
JUL. 2016	1103	NA	9
AUG. 2016	1120	NA	8
SEP. 2016	1127	NA	15
OCT. 2016	1140	NA	11
NOV. 2016	1152	NA	12
DEC. 2016	1158	NA	16

table 30 : **Statistics on central OSI SAF Web site use over 2nd half 2016.**

The following graph illustrates the evolution of external registered users on the central Web Site.

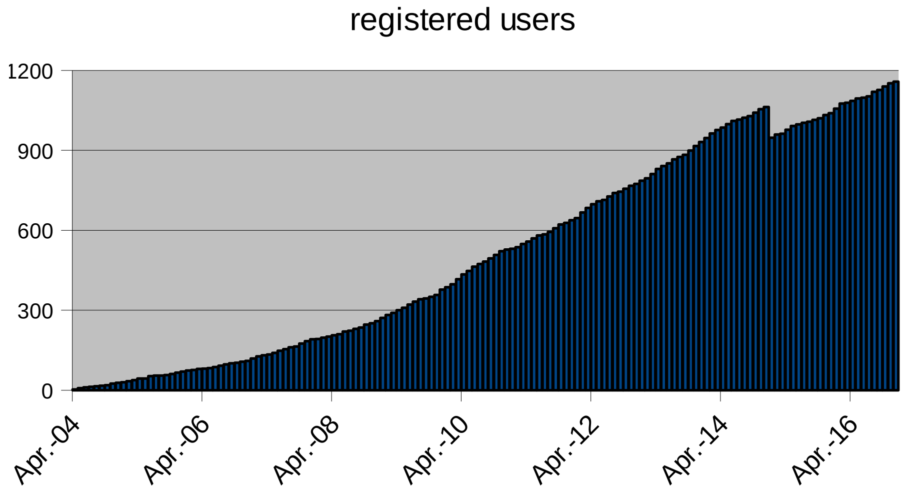


Figure 64 : **Evolution of external registered users on the central Web Site from April 2004 to December 2016.**

The following table details the list of institutions or companies the registered users are from. Last registrations, made over the reporting period, are overlined in cyan blue.

Country	Institution, establishment or company	Acronym
Algeria	Unité de Recherche en Energies Renouvelables en Milieu Saharien Adrar	URER-MS Adrar
Argentina	AgriSatelital	AgS
Australia	Bureau of Meteorology	BOM
Australia	Griffith University	Griff
Australia	James Cook University	University of Windsor
Australia	Tidetech LTD	Tidetech
Australia	University of Melbourne	Unimelb
Australia	University Of New South Wales	UNSW
Australia	University of Tasmania	ACE CRC
Australia	eMarine Information Infrastructure (eMII), Integrated Marine Observing System (IMOS)	eMII
Belgium	Signal and Image Center	SIC
Belgium	Institut Royal Météorologique de Belgique	IRMB
Belgium	Université catholique de Louvain	UCL/TECLIM
Belgium	Université de Liège	UL
Brazil	Admiral Paulo Moreira Marine Research Institute	IEAPM
Brazil	Centro de Previsao de Tempo e Estudos Climáticos	CPTEC/INPE
Brazil	Fugro Brasil	FGB
Brazil	Instituto de Ciências Atmosféricas, Universidade Federal de Alagoas	UFAL/ICAT
Brazil	Instituto Nacional de Pesquisas Espaciais	INPE
Brazil	Universidade de Brasília - Instituto de Geociências	UNB-IG
Brazil	Universidade de São Paulo	USP
Brazil	Universidade Federal de Alagoas	UFAL
Brazil	Universitade Federal do Rio de Janeiro	LAMCE/COPPE/UFRJ
Brazil	Universidade Federal do Rio Grande	FURG
Brazil	Universidade Federal do Espírito Santo	UFES
Bulgaria	National Institute of Meteorology and Hydrology	NIMH
Canada	Canadian Ice Service	CIS
Canada	Canadian Meteorological Centre	CMC
Canada	Centre for Earth Observation Science	CEOS
Canada	Data Assimilation and Satellite Meteorology, Meteorological Research Branch Environment Canada	ARMA/MRB
Canada	Fisheries and Oceans Canada	DFO/IML/MPO
Canada	Institut National de la Recherche Scientifique	INRS
Canada	Institut de Recherche et de Développement en Agroenvironnement	IRDA
Canada	JASCO Research Ltd	JASCO
Canada	Memorial University of Newfoundland	MUN
Canada	McGill University	McGill U.
Canada	University of Waterloo	UW
Canada	University of Windsor	UWD
Canada	Wildlife Conservation Society Canada	WCS
Chile	Centro de Estudios Avanzados en Zonas Aridas	CEAZA
Chile	Centro i-mar, Universidad de Los Lagos	I-MAR
Chile	Institut de Fomento Pesquero	IFOP
Chile	Universidad Catolica de la Santisima Concepcion	UCSC
Chile	Universidad de Chile	U Chile
China	anhuigongyedaxue	ahut
China	Chinese Academy of Meteorological Sciences	CAMS
China	China Meteorological Agency	CMA
China	Chinese Academy of Sciences	IOCAS
China	Dalian Maritime University	DMU

China	First Institute of Oceanography, State Oceanic Administration	FIO
China	Fujian Meteorological Observatory	MS
China	HK Observatory	HKO
China	Hust University	
China	Institute of Oceanology, Chinese Academy of Sciences	IOCAS
China	Institute of Remote Sensing Applications of Chinese Academy of Sciences	IRSA/CAS
China	Institute of Tropical and Marine Meteorology	ITMM
China	Nanjing University of Information Science and Technology	NUIST
China	National Marine and Environmental Forecasting Center	NMEFC
China	National Ocean Data Information Service	NODIS
China	National Ocean Technology Center	NOCT
China	National Satellite Meteorological Center	NSMC
China	National Satellite Ocean Application Service	NSOAS
China	Ocean Remote Sensing Institute	ORSI
China	Ocean University of China	OUC
China	Second Institute of Oceanography	SOI
China	Shandong Meteorology Bureau	SDMB
China	Shanghai Ocean University	SHOU
China	Shenzhen graduate school of tsinghua university	
China	South China Sea Institute of Oceanology, Chinese Academy of Sciences	SCSIO, CAS
China	Sun Yat-Sen University	SYSU
China	Third Institute Oceanography	TIO/SOA
China	Tianjin University	TJU
China	Tongji university	TJU
China	Xiamen University	XMU
China	Zhejiang Ocean University	ZOU
Colombia	Universidad de Medellín	UDEM
Colombia	Universidad Distrital Francisco Jose de Caldas	UDFJDC
Croatia	Rudjer Boskovic Institute	IRB/ZIMO
Croatia	Croatian Meteorological and Hydrological Service	CMHS
Cyprus	Offshore Monitoring Ltd	OSM
Denmark	Aarhus University - Department of Bioscience	BIOS
Denmark	Danish Defense Acquisition and Logistics Organization	DALO
Denmark	Danish Meteorological Institute	DMI
Denmark	Royal Danish Administration of Navigation and Hydrography	RDANH
Denmark	Technical University of Denmark, Risø	DTU
Denmark	University of Copenhagen	UoC
Denmark	DHI GRAS	DHI GRAS
El Savador	University of El Savador	UES
Estonia	Estonian Meteorological and Hydrological Institute	EMHI
Estonia	Tallinn University of Technology	TUT
Ethiopia	Addis Ababa University	AAU
Faroe Islands	Faroe Marine Research Institute	FAMRI
Finland	Finnish Institute of Marine Research	FIMR
Finland	Finnish Meteorological Institute	FMI
Finland	Valtion Teknillinen Tutkimuskeskus	VTT
France	ACRI-ST Brest	ACRI-ST
France	ACRI-ST sophia-antipolis	ACRI-ST
France	ARVALIS Institut du vegetal	ARVALIS
France	African Monitoring of the Environment for Sustainable Development	AMESD
France	Along-Track	Along-Track
France	ATMOSPHERE	ATMOSPHERE
France	Centre de Localisation Satellite	CLS
France	Centre de Soutien Météorologique aux Forces armées	CISMF
France	Centre National de la Recherche Scientifique	CNRS-LOB
France	Centre National de la Recherche Scientifique	CNRS/LOCEAN
France	Centre National de la Recherche Scientifique	CNRS/MIO

France	Centre National d'Etudes Spatiales	CNES
France	CNRS Laboratoire d'Etudes en Géophysique et Océanographie Spatiales	LEGOS/CNRS
France	Collecte Localisation Satellite	CLS
France	Creocean	Creocean
France	Ecole Nationale Supérieure des Mines de Paris	Mines Paris Tech
France	Ecole Nationale des Télécommunication de Bretagne	ENSTB
France	Ecole Nationale Supérieure des Techniques Avancées de Bretagne	ENSTA-Bretagne
France	Ecole Navale	ENGEP
France	Institut de Recherche pour le Développement	IRD
France	Institut Français de Recherché pour l’Exploitation de la MER	Ifremer
France	Institut National de la Recherche Agronomique	INRA
France	Institut National de l'Energie Solaire	INES
France	Institut Universitaire Européen de la Mer	IUEM
France	kedge business school	kedge bs
France	KiloWattsol	KiloWattsol
France	Laboratoire de Météorologie Dynamique	LMD
France	Laboratoire d'Océanographie et du Climat : Expérimentation et Approches Numériques	LOCEAN
France	Telespazio France	TelespazioFrance
France	Laboratoire de Physique des Océans, Université de Bretagne occidentale	LPO
France	Mercator Ocean	Mercator Ocean
France	Météo-France	M-F
France	Météo-France / Centre National de la Recherche Météorologique	M-F/CNRM
France	MeteoGroup	MG
France	Museum National d’Histoire Naturelle de Paris	MNHN Paris
France	Observatoire français des Tornades et des Orages Violents	KERAUNOS
France	Service Hydrographique et Océanographique de la Marine	SHOM
France	Tecsol	TECSOL
France	TELECOM Bretagne	TB
France	Université de Bretagne Occidentale	UBO
France	Université de Corse, UMR SPE CNRS 6134	UC
France	Université de Strasbourg	UDS
Gambia	Water Resources Department	WRD
Germany	Alfred Wegener Institute for Polar and Marine Research	AWI
Germany	Bundesamt für Seeschifffahrt und Hydrographie	BSH
Germany	Bundesanstalt für Gewässerkunde	BFG
Germany	Center for Integrated Climate System Analysis and Prediction	CLISAP
Germany	Deutscher Wetterdienst	DWD
Germany	Deutsches Luft- und Raumfahrtzentrum	DLR
Germany	Deutsches Museum	DM
Germany	Design & Data GmbH	
Germany	Drift and Noise Polar Services	DNPS
Germany	Energy & Meteo Systems GmbH.	EMSYS
Germany	EUMETSAT	EUMETSAT
Germany	EuroWind GmbH	EuroWind
Germany	FastOpt GmbH	FastOpt
Germany	Flottenkommando Abt GeoInfoD	Flottenkdo GeoInfoD
Germany	Freie Universität Berlin	FUB
Germany	German Aerospace Center	DLR
Germany	German Federal Maritime and Hydrographic Agency	BSH
Germany	HTWK Leipzig	HTWK Leipzig
Germany	Institute of Physics – University of Oldenburg	Uni OL
Germany	Institute for Atmospheric and Environmental Sciences	IAU
Germany	Institute for Environmental Physics Uni. Heidelberg	IUP-HD
Germany	Institute for environmental physics, University of Bremen	IUP, Uni B
Germany	Leibniz Institut fur Meereswissenschaften	IFM-GEOMAR

Germany	Leibniz Institute for Baltic Sea Research Warnemünde	IOW
Germany	Max-Planck-Institute for Meteorology	MPI-M
Germany	O.A.Sys – Ocean Atmosphere Systems GmbH	OASYS
Germany	TU Dresden	TU DD
Germany	Ulm University of Applied Science	HSU
Germany	University of Hamburg	IFM/Hamburg
Greece	Hellenic National Meteorological Service	HNMS
Greece	National Observatory of Athens	NOA
Iceland	Icelandic Meteorological Office	IMO
Iceland	University of Iceland, Institute of Geosciences	UofI
India	ANDHRA UNIVERSITY	AU
India	Anna University Chennai	GSK
India	Bharathiar University	BU
India	Center environment planning and technology	CEPT
India	Centre for Mathematical Modelling and Computer Simulation	CSIR C-MMACS
India	CONSOLIDATED ENERGY CONSULTANTS LTD	CECL
India	Indian Institute of Space Science and Technology	IIST
India	Indian Institute of Technology Delhi	IITD
India	India Meteorological Department	IMD
India	Indian National Centre for Ocean Information	INCOIS
India	Indian Navy	IN
India	Indian Space Research Organization	ISRO
India	Ministry of Earth Sciences	MOES
India	Nansen Environmental Research Centre	NERCI
India	National Centre for Medium Range Weather Forecasting	NCMRWF
India	National Institute of Ocean Technology	NIOT
India	National Institute of Technology Karnataka	NITK
India	Naval Physical and Oceanographic Laboratory	NPOL
India	National Remote Sensing Centre	NRSC
India	Oceanic Sciences Divisions, MOG , Indian Space Applications Centre	ISRO
India	South Asia Strategic Forum	SASFOR
India	The Energy and Resources Institute	TERI
India	University of Pune	UP
Indonesia	Bureau of Meteorology, Climatology and Geophysic Region IV Makassar	BMCGR
Indonesia	Indonesian Agency for Meteorology Climatology and Geophysics	BMKG
Indonesia	Maxxima	AIS
Indonesia	Ministry of Marine Affairs and Fisheries	MMAF
Indonesia	Hasanuddin University	UNHAS
Indonesia	Sekolah Tinggi Meteorologi Klimatologi dan Geofisika	STMKG
Indonesia	Trunojoyo University	UTM
Indonesia	Vertex	Mr
Iran	hakim sabzevari university	HSU
Iraq	University of Zakho	UoZ
Israel	Bar Ilan University	BIU
Israel	Israel Meteorological Service	IMS
Israel	The Hebrew University	HUJI
Italy	Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile	ENEA
Italy	Agenzia Spaziale Italiana	ASI
Italy	Centro Euro-Mediterraneo sui Cambiamenti Climatici	CEMCC
Italy	Centro Nazionale di Meteorologia e Climatologia Aeronautic	CNMCA
Italy	EC- Joint Research Centre	EC-JRC
Italy	ENEL TRADE spa	ENEL TRADE
Italy	Epson Meteo Center	EMC
Italy	ESA	ESA/ESRIN
Italy	Fondazione imc – onlus , International Marine Centre	IMC
Italy	GEO-K	GEO-K
Italy	Institute of Marine Science – CNR	ISMAR-CNR

Italy	Instituto di BioMeteorologia – Consiglio Nazionale delle Ricerche	IBIMET-CNR
Italy	Instituto Nazionale di Geofisica e Vulcanologia	INGV
Italy	Instituto Scienze dell'Atmosfera e del Clima – Consiglio Nazionale delle Ricerche	ISAC – CNR
Italy	Instituto Superiore per la Ricerca e la Protezione Ambientale	ISRPA
Italy	Italian Space Agency	ASI
Italy	National Aquatic Resources Research and Development Agency	CITS
Italy	NATO Undersea Research Centre	NURC
Italy	Ocean Project	ASD
Italy	Politecnico di Milano	PoliMi
Italy	Politecnico di Torino	DITIC POLITO
Italy	Universita degli Studi di Bari	USB
Italy	Univerità degli studi di palermo	UNIPA-DICAM
Italy	University of bologna	DISTA
Iran	Atmospheric Science and Meteorological Research Center	ASMERC
Japan	Advanced Industrial Science and Technology	AIST
Japan	Atmosphere and Ocean Research Institute, the University of Tokyo	AORI, UT
Japan	Center for Atmospheric and Oceanic Studies	CAOS
Japan	Hokkaido University	HU
Japan	Hydrospheric Atmospheric Research Center	HyARC
Japan	Japan Aerospace Exploration Agency	JAXA
Japan	Japan Agency for Marine-Earth Science and Technology	JAMSTEC
Japan	Japan Meteorological Agency	JMA
Japan	Meteorological Research Institute	MRI
Japan	Tokai University	Tokai U
Japan	Weathernews	WNI
Kenya	Jomo Kenyatta University of Agriculture and Technology	JKUAT
Latvia	Latvian Environment, Geology and Meteorology Centre	LEGMC
Lithuania	Institute of Aerial Geodesy	AGI
Lithuania	Lithuanian Hydrometeorological Service	LHMS
Lithuania	University of Vilnius	VU
Madagascar	Directorat Generale of Meteorology	DGM
Malaysia	Malaysian Remote Sensing Agency	MRSA
Malaysia	faculty of geoinformation and real estate	FGHT
Marocco	University Ibn Tofail	UIT
Mauritius	Mauritius Oceanography Institute	MOI
Mexico	Facultad de Ciencias Marinas, Universidad Autónoma de Baja California	FCM/UABC
Mexico	Instituto Oceanografico del Pacifico	IOP
Mexico	Universidad de Colima	UCOL
Netherlands	Bureau Waardenburg bv	BuWa
Netherlands	Delft University of Technology	TU Delft
Netherlands	Deltares	Deltares
Netherlands	Hermess bv	Hermess
Netherlands	Meteo Consult on behalf of MeteoGroup Ltd.	Meteo Consult
Netherlands	National Aerospace Laboratory	NLR
Netherlands	Nidera	Nidera
Netherlands	Rijksinstituut voor Kust en Zee	RIKZ
Netherlands	Royal Netherlands Meteorological Institute	KNMI
Netherlands	Shell international	Shell
Netherlands	WaterInsight	WaterInsight
New Zealand	Meteorological Service of New Zealand	MetService
New Zealand	University of Canterbury	UC
Niger	African Centre of Meteorological Applications for Development	ACMAD
Nigeria	African Centre of Meteorological Applications for Development	ACMAD
Norway	Institute of Marine Research	IMR
Norway	Kalkulo	
Norway	MyOcean SIW TAC	MyOcean SIW TAC
Norway	Nansen Environmental and Remote Sensing Center	NERSC

Norway	Norge Handelshoyskole	NHH
Norway	Norsk Polarinstitutt	NP
Norway	Norske Meteorologiske Institutt	MET Norway
Norway	Norwegian Defense Research Establishment	FFI
Norway	Norwegian Naval Training Establishment	NNTE
Norway	Norwegian Meteorological Institute	Met.no
Norway	Norwegian water resource	NVE
Norway	Statoil ASA	
Norway	StormGeo AS	StormGeo
Norway	The University Centre in Svalbard	UNIS
Norway	University of Bergen	UiB
Norway	Uni Research AS	URAS
Oman	Directorate General of Meteorology and Air Navigation	DGMAN
Peru	Instituto del Mar del Peru	IMARPE
Peru	Instituto Geofisico del Peru	IGP
Peru	Servicio Nacional de Meteorologia e Hidrologia	SENAMHI
Peru	Universidad Nacional Mayor de San Marcos	UNMSM
Philippines	Marine Science Institute, University of the Philippines	UP-MSI
Philippines	Ateneo de Manila University	ADMU
Poland	Centrum Badan Kosmicznych PAN	CBK PAN
Poland	Institute of Geophysics, University of Warsaw	IGF UW
Poland	Institute of Meteorology and Water Management	IMWM
Poland	Institute of Oceanology of the Polish Academy of Sciences	IOPAN
Poland	Maritime Academy Gdynia	AM/KN
Poland	Media Fm	Media Fm
Poland	Pomeranian University in S³upsk	AP
Poland	PRH BOBREK	Korn
Poland	University of Gdansk, Institute of Oceanography	UG/IO
Portugal	Centro de Estudos do Ambiente e do Mar – Univ Aveiro	CESAM
Portugal	CESAm and Aveiro University	CESAM/UA
Portugal	Instituto de Investigação das Pescas e do Mar	IPIMAR
Portugal	Instituto de Meteorologia	IM
Portugal	Instituto Politécnico de Viana do Castelo	IPVC
Portugal	Laboratório Nacional de Energia e Geologia	LNEG
Portugal	Museu Nacional de Historia Natural	MNHN
Portugal	National Remote Sensing Centre	NRSC
Portugal	Universidade de Lisboa	CGUL
Portugal	Universitade dos Acores	UAC
Portugal	Universidade Lusófona do Porto	ULP
Portugal	University of Evora	MJC
Romania	Mircea cel Batran Naval Academy	MBNA
Romania	National Meteorological Administration	NMA
Romania	University of Bucharest	UB
Russia	V.I.Il`ichev Pacific Oceanological Institute	VIIPOI
Russia	Atlantic Research institute of Marine fisheries and oceanography	AtlantNIRO
Russia	Far Eastern Federal University	FEFU
Russia	Femco-West Ltd brach in Murmansk	FEMCO WEST
Russia	Geophysical Center of Russian Academy of Sciences	GC RAS
Russia	Institute of Ecology and Evolution, Russian Academy of Sciences	IEE RAS
Russia	Russia HycroMetCenter	RHMC
Russia	Kaliningrad State Technical University	KLGTU – KSTU
Russia	Murmansk Marine Biological Institute	MMBI
Russia	Nansen International Environmental and Remote Sensing Center	NIERSC
Russia	Russia State Hydrometeorological University	RSHU
Russia	Shirshov Institute of Oceanology RAS	SIO RAS
Russia	SRC PLANETA Roshydromet	PLANETA
Russia	State research Center Planeta	SRC

Russia	V.I.Il`ichev Pacific Oceanological Institute	POI FEB RAS
Scotland	University of Edinburgh	Edin-Univ
Senegal	Centre de Recherches Océanographiques de Dakar-Thiaroye	CRODT
Senegal	Ecole Supérieure Polytechnique de Dakar	ESP/UCAD
Sao Tome	National Institute of Meteorology	INM
Singapore	Terra Weather Pte. Ltd.	TERRAWX
Singapore	Nanyang Technological University	NG
Slovakia	IBL Software Engineering	IBL
Slovenia	Slovenian Environment Agency	SEA
South Africa	Cape Peninsula University of Technology	CPUT
South Africa	Kaytad Fishing Company	KFC
South Africa	Marine and Coastal Management	MCM
South Africa	South African Weather Service-Cape Town Regional Office	SAWS
South Africa	Total Exploration and Production South Africa	TEPSA
South Africa	University of Cape Town	TPR
South Africa	University of Witwatersrand	Wits
South Korea	Korea Environmental Science @ Technology Institute	KESTI
South Korea	Korea Meteorological Administration	KMA
South Korea	Korea Ocean Research and Development Institute	KORDI
South Korea	Korea Ocean Satellite Center	KOSC
South Korea	Jeju National University	JNU
South Korea	NATIONAL INSTITUTE of METEOROLOGICAL RESEARCH	NIMR
South Korea	PKNU	MF
South Korea	Seoul National University	SNU
Spain	Basque Centre for Climate Change	BC3
Spain	Basque Meteorology Agency	EUSKALMET
Spain	Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas	CIEMAT
Spain	Fundacion Centro de Estudios Ambientales del Mediterraneo	CEAM
Spain	Isocero.com	ISOCERO
Spain	Instituto Català de Ciències del Clima	IC3
Spain	Instituto de Ciències del Mar	ICM
Spain	Instituto d’Estudis Espacials de Catalunya	IEEC
Spain	Instituto Canario de Ciencias Marinas	ICCM
Spain	Instituto de Hidráulica Ambiental de Cantabria – Universidad de Cantabria	IH
Spain	Instituto Español de Oceanografia	IEO
Spain	Instituto Mediterraneo de Estudios Avanzados	IMEDEA (CSIC-UIB)
Spain	Agencia Estatal de Meteorologia	AEMET
Spain	Instituto Nacional de Tecnica Aeroespacial	INTA
Spain	International Center for Numerical Methods in Engineering	CIMNE
Spain	MeteoGalicia – Departamento de Climatología y Observación	Meteogalicia
Spain	MINISTERIO DEFENSA – ARMADA ESPAÑOLA	MDEF/ESP NAVY – IHM
Spain	Mediterranean Institute for Advanced Studies	IMEDEA
Spain	Museo Nacional de Ciencias Naturales – Consejo Superior de Investigaciones Cientificas	MNCN-CSIC
Spain	Starlab Barcelona sl.	STARLAB BA
Spain	Universidad Autonoma de Madrid	UAM
Spain	University of Barcelona	UB
Spain	Universidad de Las Palmas de Gran Canaria	ULPGC
Spain	Universidad de Oviedo	UdO
Spain	Universidad Politécnica de Madrid	UPM
Spain	Universidad de Valencia	UV
Spain	Universidad de Valladolid	LATUV
Spain	University of Cadiz	UCA
Spain	University of Jaén	UJA
Spain	University of the Basque Country - Department of Applied Physics II - EOLO Group	UPV/EHU
Spain	University of Vigo	CACTI
Spain	Vortex	VORTEX
Sri Lanka	Department of Meteorology	DOM

Sri Lanka	National Aquatic Resources Research and Development Agency	NARA
Sweden	Chalmers University of Technology	CHALMERS
Sweden	Department of Earth Science, Uppsala University	DES-UU
Sweden	Stockholm University	SU
Sweden	Swedish Meteorological and Hydrological Institute	SMHI
Switzerland	Tecnavia S.A.	Tecnavia S.A.
Switzerland	World Meteorological Organization	WMO
Taiwan	Taiwan Ocean Research Institute	TORI
Taiwan	Fisheries Research Institute	FRI
Taiwan	Institute of Amos Physics, NCU ,Taiwan	ATM/NCU
Taiwan	National Central University	NCU/TAIWAN
Taiwan	Taiwan Ocean Research Institute	TORI
Taiwan	Taiwan Typhoon and Flood Research Institute	TTFRI
Turkey	Istanbul Technical University	YE
Turkey	Türkish State Meteorological Services	TSMS
Ukraine	Marine Hydrophysical Institute	MHI
Ukraine	World Data Center for Geoinformatics and Sustainable Development	WDCGSD
United Arab Emirates	International Center for Biosaline Agriculture	ICBA
United Kingdom	Asgard Consulting Limited	Asgard
United Kingdom	Bangor University, School of Ocean Sciences	Bangor SOS
United Kingdom	Centre for Polar Observation and Modelling	CPOM
United Kingdom	CGI	CGI
United Kingdom	Department of Zoology, University of Oxford	UOO
United Kingdom	ECMWF	ECMWF
United Kingdom	ExactEarth Europe Ltd	EEE
United Kingdom	Exprodat	Exprodat
United Kingdom	Flag Officer Sea Training - Hydrography and Meteorology	FOST HM
United Kingdom	Flasse Consulting Ltd	FCL
United Kingdom	GL Noble Denton	GLND
United Kingdom	HR Wallingford	HRW
United Kingdom	Imperial College of London	ICL
United Kingdom	International Centre for Island Technology-Heriot Watt University	ICIT-HWU
United Kingdom	Lutra Consulting	LTC
United Kingdom	National Oceanography Centre, Southampton	NOCS
United Kingdom	National Renewable Energy Centre	NAREC
United Kingdom	Plymouth Marine Laboratory	PML
United Kingdom	Terradat	TDAT
United Kingdom	Telespazio VEGA	VEGA
United Kingdom	The Scottish Association for Marine Science	SAMS
United Kingdom	Tullow Oil	
United Kingdom	UK Met Office	UKMO
United Kingdom	University of Bristol	UoB
United Kingdom	University of East Anglia	UEA
United Kingdom	University of Edinburgh	Edin-Univ
United Kingdom	University of Gloucestershire	Uglos
United Kingdom	University of Leeds	Leeds
United Kingdom	University of Leicester	UoL
United Kingdom	University of Manchester	UMcr
United Kingdom	University of Oxford	Uni of Oxford
United Kingdom	University of Plymouth	UOP
United Kingdom	University of Southampton	UoS
United Kingdom	Weatherquest Ltd	Weatherquest
Uruguay	DIRECCIÃ“N NACIONAL DE RECURSOS ACUÃTICOS	DNRA
USA	Alaska Department Of Fish and Game	ADFG
USA	Antarctic Support Contract	USAP
USA	Applied Weather Technology	AWT

USA	Atmospheric and Environmental Research	AER
USA	AWS Truepower	AWS
USA	Berkeley Earth Surface Temperature	BEST
USA	Center for Ocean-Atmosphere Prediction Studies	COAPS
USA	Clemson University	CU
USA	Colombia University	CU
USA	Colorado State University	CSU
USA	Cooperative Institute for Meteorological Studies	CIMSS
USA	Cooperative Institute for Research Environmental Sciences	CIRES
USA	Darmouth College	Dartmouth College
USA	Dept. of Environmental Conservation , Skagit Valley College	SVC
USA	Earth & Space Research	ESR
USA	Haskell Indian Nations University	INU
USA	International Pacific Research Institute - Univ. of Hawaii	IPRC
USA	Jet Propulsion Laboratory	JPL
USA	The John Hopkins University / Applied Physics Laboratory	JHU/APL
USA	Joint Typhoon Warning Center	JTWC
USA	Leidos	LEIDOS
USA	Locheed martin Corporation	LMCO
USA	NASA Langley Research Center, Affiliation Analytical Services and Materials, Inc.	NASA LaRC
USA	National Oceanic and Atmospheric Administration	NOAA/NESDIS
USA	National Oceanic and Atmospheric Administration	NOAA/NCDC
USA	National Oceanic and Atmospheric Administration	NOAA/NWS
USA	Naval Postgraduate School	NPS
USA	Ocean Weather Services	OWS
USA	Oregon State University	OSU
USA	Roffer's Ocean Fishing Forecasting Service	ROFFS
USA	Scripps Institution of Oceanography	SIO
USA	Stanford Research Institute International	SRI
USA	Starpath School of Navigation	Starpath
USA	Texas A&M University	TAMU
USA	Texas Commission on Environmental Quality	TCEQ
USA	Tuskegee University	TU
USA	United States Navy	USN
USA	University at Albany-SUNY	UAlbany
USA	University of California, Berkeley	UC Berkeley
USA	University of Maryland	UMCP
USA	University of Miami	RSMAS MPO
USA	University of South Carolina	USC
USA	University of South Florida	USF
USA	University of Washington	UW
USA	Vanderbilt University	VU
USA	Weather Routing Inc.	WRI
USA	Woods Hole Oceanographic Institution	WHOI
Venezuela	Escuela de Ingeniería Eléctrica Universidad	EIEU
Vietnam	Vietnam National Center for Hydro-Meteorological Forecast	NCHMF

table 31 : **List of Institutes registered on the central Web Site**

Moreover 13 new individual users, i.e. persons independent from any institute, establishment or company, registered on the period.

6.1.1.2. 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	07-2016	HL	INFO	OSI-401-b on EASE grid	closed
Email	07-2016	HL	ARCHIVE	Download of OSI-409-a	closed
Email	07-2016	HL	ANOMALY	Spurious ice in OSI-401-b	open
Email	07-2016	HL	INFO	FTP downloading data	closed
Email	12/07/16	WIND	ARCHIVE	Historical ASCAT data	closed
Email	13/07/16	LML	ARCHIVE	Long time series but for a limited geographical coverage	closed
Email	20/07/16	WIND	ANOMALY	RapidScat winds	closed
Email	22/07/16	WIND	ANOMALY	Check KNMI FTP server	closed
Email	25/07/16	WIND	INFO	ASCAT winds	closed
Email	08-2016	HL	ANOMALY	Spurious ice in OSI-401-b	open
Email	08-2016	HL	INFO	Sea ice GMPE	closed
Email	03/08/16	WIND	ARCHIVE	Rapidscat winds	closed
Email	17/08/16	WIND	INFO	ASCAT level 1 data	closed
160006	19/08/16	WIND	ARCHIVE	OSCAT 50km surface wind	closed
Email	22/08/16	WIND	INFO	Historical ASCAT data	closed
160007	25/08/16	WIND	ARCHIVE	ASCAT Level3 grid 12.5km	closed
Email	29/08/16	LML	ARCHIVE	2004-2008 METEOSAT SST	closed
Email	09-2016	HL	INFO	Sea ice type product on HDF	closed
Email	09-2016	HL	INFO	Ice climatology from OSI-409-a	closed
Email	09-2016	HL	ANOMALY	Incorrect grid_mapping attribute	closed
Email	09-2016	HL	INFO	Where to get products	closed
Email	11/09/16	LML	INFO	Radio-soundings database	closed
Email	12/09/16	LML	ANOMALY	NPP warmer than Metop ?	closed
Email	13/09/16	LML	ANOMALY	Increase num of obs in MetOp-A ?	closed
Email	14/09/16	WIND	INFO	ASCAT winds for marine business	closed
Email	14/09/16	WIND	INFO	Rapidscat news ?	closed
Email	18/09/16	WIND	ANOMALY	Outages for ASCAT wind products	closed
Email	19/09/16	WIND	INFO	QuickSCAT quality flag	closed
Email	22/09/16	WIND	INFO	Removal from distribution lists	closed
Email	26/09/16	LML	ANOMALY	NPP NAR SST missing	closed
Email	27/09/16	HL	INFO	When sea ice type start discriminating between first year ice and multi-year ice again	closed
Email	30/09/16	WIND	ARCHIVE	ERA interim	closed
Email	10-2016	HL	INFO	Some date are missing in OSI-409-a	closed
Email	10-2016	HL	ANOMALY	Spurious ice in OSI-401-b	open
Email	10-2016	HL	INFO	About sea ice type	closed

Reference	Date	subsystem	Category	Subject	Status
Email	08/10/16	WIND	ARCHIVE	Reprocessed ASCAT winds datarecords	closed
Email	10/10/16	LML	ANOMALY	NPP NAR SST missing	closed
Email	13/10/16	LML	ARCHIVE	GBL SST data in 2014	closed
Email	16/10/16	WIND	INFO	Access to data	closed
Email	19/10/16	HL	ANOMALY	Missing/empty sea ice products	closed
Email	25/10/16	general	INFO	Long Term Data Preservation	closed
Email	25/10/16	WIND	INFO	Way to get and use winds products	closed
Email	29/10/16	LML	INFO	GBL SST	closed
Email	11-2016	HL	INFO	About update of grid in archive	closed
Email	11-2016	HL	ANOMALY	Spurious ice in OSI-401-b	open
Email	11-2016	HL	ANOMALY	Broken link on web portal	closed
Email	11-2016	HL	INFO	Info about ice concentration product	closed
Email	11-2016	HL	ANOMALY	Spurious ice in OSI-401-b	open
Email	09/11/16	WIND	INFO	Access to data	closed
Email	10/11/16	WIND	INFO	ASCAT L2 25 km winds data record release 1 - Metop	closed
Email	10/11/16	WIND	INFO	ERA interim	closed
Email	15/11/16	LML	ANOMALY	products missing on Ifremer FTP server	closed
Email	16/11/16	WIND	INFO	RapidScat status ?	closed
Email	28/11/16	LML	ANOMALY	Missing NetCDF SST	closed
Email	30/11/16	WIND	INFO	Request to be added to the KNMI scatterometer email list	closed
Email	09/12/16	WIND	INFO	Ascat winds in BUFR	closed
Email	14/12/16	WIND	ARCHIVE	Reprocessed ASCAT winds	closed
Email	20/12/16	WIND	INFO	ECMWF model winds	closed
Email	22/12/16	WIND	INFO	ASCAT winds both in NRT and archived	closed
Email	23/12/16	WIND	INFO	ASCAT winds	closed
Email	28/12/16	WIND	INFO	Pyhton code to decode BUFR	closed

table 32 : **Status of User requests made to the OSI SAF**

Following table provides the status of requests forwarded from EUMETSAT Help Desk.

reference	Date	subject	status
300033766	07/09/16	QuickSCAT and OSCAT winds	closed

table 33 : **Status of requests from EUMETSAT Help Desk.**

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

Usage of the OSI SAF Sea Ice Web portal and help desk by country (top 10) over 2nd half 2016 (pages views)						
Countries	JUL. 2016	AUG. 2016	SEP. 2016	OCT. 2016	NOV. 2016	DEC. 2016
.com	9940	8949	9479	6610	6879	6596
.net	1536	2237	2417	1870	1587	1614
.eu	896	384	327	148	108	113
.de	813	771	763	694	974	1149
.se	707	1623	618	411	503	650
.no	687	798	836	1717	1012	581
.nl	295		256			
.fr	254	360	408	460	520	356
.cn	20	418	65	30	42	4
.fi	83	190	226	460	230	240
.dk	95	1457	178	179	141	218
.int	15	238	55	176	69	268

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

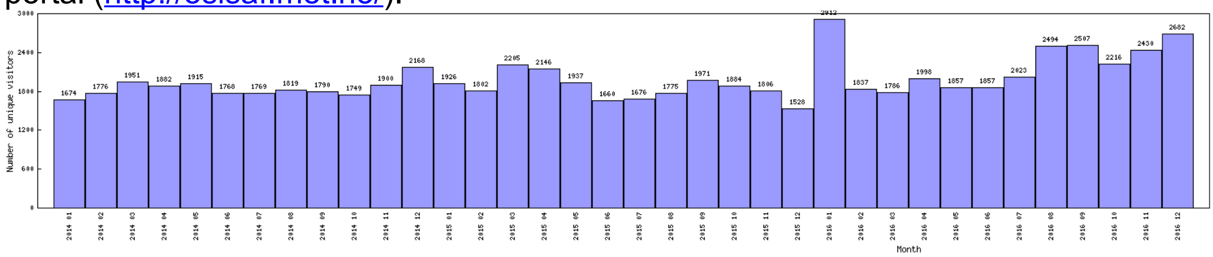


Figure 65 : Evolution of visitors on the HL OSI SAF Sea Ice portal from March 2011 to December 2016 (http://osisaf.met.no).

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 2016. Only external sessions (from outside KNMI) are counted.

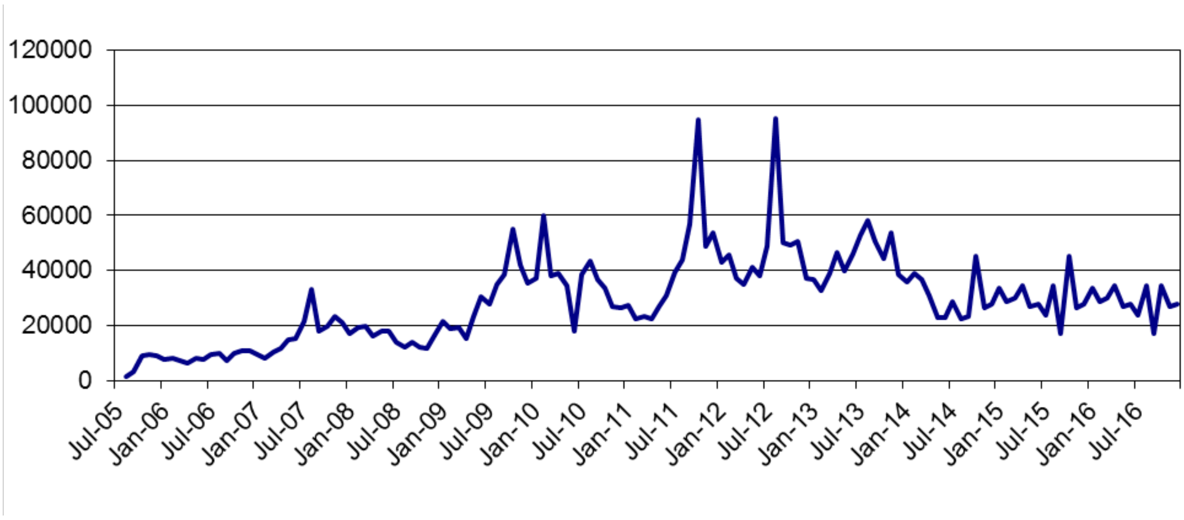


Figure 66 : Number of page views on KNMI scatterometer website per month.

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.

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.

Entity	Shortened name	Country
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
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.

Entity	Shortened name	Country
Charles Sturt University, Wagga Wagga		Australia
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
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
27 independent users (not affiliated to an organization)		

table 34 : List of registered Wind users at KNMI.

6.2 Statistics on the FTP sites use

6.2.1 Statistics on the SS1 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.

Number of OSI SAF products downloaded on Ifremer FTP server over 2nd half 2016													
		JUL. 2016		AUG. 2016		SEP. 2016		OCT. 2016		NOV. 2016		DEC. 2016	
		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		1	x	3853	x	0	x	0	x	0	x	1	x
DLI MAP +LML		0	x	0	x	0	x	0	x	1	x	0	x
OSI-201-b	GBL SST	0	250	831	32	710	89	0	176	0	237	0	257
OSI-202-b	NAR SST	446	666	0	36	2	101	0	499	0	91	0	2993
OSI-204-b	MGR SST	100961	131971	341448	44183	296570	43684	333335	87466	287871	30655	271496	46739
OSI-206	METEOSAT SST	12943	3625	8929	1572	4521	1566	3409	1543	3274	1886	13717	1513
OSI-207	GOES-E SST	1418	1950	1421	12	2616	5	1449	22	1356	11	1445	7
OSI-208-b	IASI SST	29529	24264	29318	14440	27739	14005	29624	8341	28589	9195	29062	22718
OSI-303	METEOSAT DLI	2279	x	1623	x	58	x	39	x	47	x	62	x
OSI-304	METEOSAT SSI	8322	x	41459	x	203518	x	7913	x	34843	x	126524	x
OSI-305	GOES-E DLI	93	x	91	x	78	x	67	x	71	x	92	x
OSI-306	GOES-E SSI	4168	x	4226	x	3716	x	47906	x	4108	x	11313	x

table 35 : Number of OSI SAF products downloaded from Ifremer FTP server and PO.DAAC server over 2nd half 2016.

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

6.2.2 Statistics on the SS2 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.

Number of Sea Ice products downloaded on High Latitude FTP server over 2nd half 2016													
		JUL. 2016		AUG. 2016		SEP. 2016		OCT. 2016		NOV. 2016		DEC. 2016	
		HL FTP	CMEMS	HL FTP	CMEMS	HL FTP	CMEMS	HL FTP	CMEMS	HL FTP	CMEMS	HL FTP	CMEMS
OSI-401-b	Global Sea Ice Concentration	17189	2448	7150	2549	12746	2709	17569	2561	22470	1967	9923	2606
OSI-402-b	Global Sea Ice Edge	6608	66	7634	63	2928	84	2540	118	3046	181	2998	128
OSI-403-b	Global Sea Ice Type	3823	66	30149	63	3336	141	4270	5342	5421	303	14322	135
OSI-404	Global Sea Ice Emissivity	462	X	1523	X	160	X	233	X	36	X	1306	X
OSI-405-b	Low resolution Sea Ice Drift	5346	1148	3110	934	2319	886	8692	1152	4610	685	9532	1215
OSI-407	Medium resolution Sea Ice Drift	3061	X	158	X	309	X	2155	X	4697	X	45	X
OSI-409	Reprocessed Ice Concentration	114341	0	11387	3	46308	91	102894	1	58698	2901	58908	843
Downloaded SST, DLI and SSI over the OSI SAF High Latitude FTP server													
OSI-203	AHL SST	472	X	468	X	450	X	582	X	403	X	419	X
OSI-301	AHL DLI	1	X	0	X	4	X	6	X	26	X	11	X
OSI-302	AHL SSI	4	X	0	X	0	X	0	X	0	X	0	X

table 36 : **Number of OSI SAF products downloaded from OSI SAF Sea Ice FTP server over 2nd half 2016.**

6.2.3 Statistics on the SS3 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.

Number of OSI SAF products downloaded on KNMI FTP server over 2nd half 2016													
		JUL. 2016		AUG. 2016		SEP. 2016		OCT. 2016		NOV. 2016		DEC. 2016	
		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), 24 per file (NetCDF)	155467	25 per file (BUFR), 24 per file (NetCDF)	69893	25 per file (BUFR), 24 per file (NetCDF)	348354	25 per file (BUFR), 21 per file (NetCDF)	102597	25 per file (BUFR), 21 per file (NetCDF)	64757	25 per file (BUFR), 21 per file (NetCDF)	261164
OSI-102-b	ASCAT-B 25km	20 per file (BUFR), 20 per file (NetCDF)	79419	20 per file (BUFR), 20 per file (NetCDF)	10805	20 per file (BUFR), 20 per file (NetCDF)	74719	20 per file (BUFR), 19 per file (NetCDF)	46226	20 per file (BUFR), 19 per file (NetCDF)	12739	20 per file (BUFR), 19 per file (NetCDF)	88937
OSI-103	ASCAT-A 12.5km		832		65614		3270		27221		34715		107009
OSI-104	ASCAT-A Coastal	20 per file (BUFR), 24 per file (NetCDF)	204032	20 per file (BUFR), 24 per file (NetCDF)	243479	20 per file (BUFR), 24 per file (NetCDF)	276663	20 per file (BUFR), 37 per file (NetCDF)	200340	20 per file (BUFR), 37 per file (NetCDF)	173649	20 per file (BUFR), 37 per file (NetCDF)	248748
OSI-104-b	ASCAT-B Coastal	20 per file (BUFR), 32 per file (NetCDF)	129225	20 per file (BUFR), 32 per file (NetCDF)	55217	20 per file (BUFR), 32 per file (NetCDF)	72930	20 per file (BUFR), 40 per file (NetCDF)	56967	20 per file (BUFR), 40 per file (NetCDF)	35788	20 per file (BUFR), 40 per file (NetCDF)	96049
OSI-109-a	RapidScat 25 km Wind 2 hours	15 per file (BUFR), 13 per file (NetCDF)	-	15 per file (BUFR), 13 per file (NetCDF)	-	-	-	-	-	-	-	-	-
OSI-109-b	RapidScat 50 km Wind 2 hours	10 per file (BUFR), 12 per file (NetCDF)	-	10 per file (BUFR), 12 per file (NetCDF)	-	-	-	-	-	-	-	-	-
OSI-109-c	RapidScat 25 km Wind 3 hours	14 per file (BUFR), 12 per file (NetCDF)	-	14 per file (BUFR), 12 per file (NetCDF)	-	-	-	-	-	-	-	-	-
OSI-109-d	RapidScat 50 km Wind 3 hours	9 per file (BUFR), 12 per file (NetCDF)	-	9 per file (BUFR), 12 per file (NetCDF)	-	-	-	-	-	-	-	-	-

table 37 : **Number of OSI SAF products downloaded from KNMI FTP server and PO.DAAC server over 2nd half 2016.**

We provided archived OSCAT data to one user during the reporting period.

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 43 shows the overall number of OSI SAF users by country at 27 July 2016.

Albania	3	Gabon	1	Nigeria	5
Algéria	4	Gambia	2	Norway	4
Angola	3	Germany	94	Oman	2
Argentina	1	Ghana	9	Peru	1
Armenia	1	Greece	13	Poland	11
Australia	1	Guinea	2	Portugal	5
Austria	18	Guinea-Bissau	3	Qatar	3
Azerbaijan	3	Hungary	8	Reunion	1
Bahrain	1	Iceland	1	Romania	5
Belgium	9	India	1	Russian Federation	7
Benin	3	Iran, Islamic Republic Of	4	Rwanda	5
Bosnia And Herzegovina	1	Iraq	1	San Marino	1
Botswana	6	Ireland	5	Sao Tome And Principe	2
Brazil	36	Isle Of Man	1	Saudi Arabia	4
Bulgaria	1	Israel	8	Senegal	7
Burkina Faso	3	Italy	248	Serbia	3
Burundi	2	Jordan	1	Seychelles	2
Cameroon	3	Kazakhstan	3	Sierra Leone	2
Canada	3	Kenya	12	Slovakia	4
Cape Verde	2	Korea, Republic Of	1	Slovenia	1
Central African Republic	2	Kuwait	2	Somalia	1
Chad	2	Kyrgyzstan	1	South Africa	17
China	2	Latvia	1	Spain	40
Comoros	2	Lebanon	3	Sudan	3
Congo	2	Lesotho	3	Swaziland	3
Congo, The Democratic Republic Of The	5	Liberia	2	Sweden	3
Côte D'Ivoire	5	Libyan Arab Jamahiriya	1	Switzerland	11
Croatia	2	Lithuania	2	Syrian Arab Republic	1
Cuba	1	Luxembourg	1	Tajikistan	1
Cyprus	1	Macedonia, The Former Yugoslav Republic Of	2	Tanzania, United Republic Of	4
Czech Republic	15	Madagascar	5	Togo	2
Denmark	6	Malawi	3	Tunisia	2
Djibouti	2	Mali	2	Turkey	6
Dominican Republic	1	Malta	2	Turkmenistan	1
Ecuador	0	Martinique	1	Uganda	3
Egypt	4	Mauritania	3	Ukraine	2
El Salvador	1	Mauritius	7	United Arab Emirates	5
Equatorial Guinea	2	Moldova, Republic Of	1	United Kingdom	116
Eritrea	2	Morocco	4	United States	6
Estonia	3	Mozambique	5	Uzbekistan	1
Ethiopia	6	Namibia	6	Viet Nam	1
Finland	4	Netherlands	24	Zambia	3
France	52	Niger	7	Zimbabwe	4

table 38 : **Overall number of EUMETCast users by country at 27 July 2016.**

6.3.2 Users and retrievals from EUMETSAT Data Center

Orders Summary over the 2nd half 2016

The table below lists the persons who download data from the EUMETSAT Data Center (EDC) and the volume of the downloaded data in megabytes (MB) by month. In yellow, the users who have downloaded more than 1GB of data at least during a month.

User Id.	JUL. 2016	AUG. 2016	SEP. 2016	OCT. 2016	NOV. 2016	DEC. 2016
arc_li	12192		4920			
benedicto	82	3				
bugraaktug	16					
DenizUlcay	35067					
ds5iej	58					
eargpte	71394					
meteovolos	4					
phessels	3740					
philippema	544					
reuniwatt	2726					
Hegemann		5137				
hl1aga		66				
jankanak		8	20		1	
mswu027		3448				
riyueyao		26567				
ruip25		293				
yunita		16				
antlopes			196			
fromano			16			
honglili			1144			
jsts111715			19843			
reddate			429			
thomas2			436			
bootneck				13		
cyn713				1484		
EadaoinDC				323		
HelloLiu				27		
mcelano				192		
narmour				1		
peeble_dev				78		
renelindeb				21952		
sateliteMB				1		
sdljustin				892		
sgharbi				396		
davids					76	

table 39 : Volume of data downloaded (in MB) by users and by month from EDC over 2nd half 2016.

Ingestion Summary over the 2nd half 2016

The next tables list 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%. In orange, the performance even below the target remains acceptable.

Id.	Product name	JUL. 2016	AUG. 2016	SEP. 2016	OCT. 2016	NOV. 2016	DEC. 2016
OSI-401-b	Global Sea Ice Concentration (DMSP-F17/18)	0	87.0	100	100	100	100
OSI-404	Global Sea Ice Emissivity (DMSP-F17/18)	100	96.7	100	100	100	100
OSI-305	Daily Downward Longwave Irradiance (GOES-13)	100	100	100	100	100	100
OSI-306	Daily Surface Solar Irradiance (GOES-13)	100	100	100	100	100	100
OSI-305	Hourly Downward Longwave Irradiance (GOES-13)	100	100	100	99.8	99.7	100
OSI-306	Hourly Surface Solar Irradiance (GOES-13)	100	100	100	99.8	99.7	100
OSI-207	Hourly Sea Surface Temperature (GOES-13)	100	99.7	100	99.7	99.7	100
OSI-207	Hourly Sea Surface Temperature (GOES-13) NetCDF	100	99.7	100	99.7	99.5	100
OSI-102-b	ASCAT 25km Wind (Metop-B)	100	100	95.5	100	96.3	100
OSI-104-b	ASCAT 12.5km Coastal Wind (Metop-B)	100	100	96.6	100	95.9	100
OSI-102	ASCAT 25km Wind (Metop-A)	99	100	95.5	100	96.8	100
OSI-104	ASCAT 12.5km Coastal Wind (Metop-A)	99	100	96.2	100	96.3	100
OSI-201-b	Global Sea Surface Temperature (Metop-A)	100	100	98.3	100	100	100
OSI-201-b	Global Sea Surface Temperature (Metop-A) NetCDF	67.7	100	100	100	100	100
OSI-202-b	NAR Sea Surface Temperature (Metop-A)	100	100	100	100	100	100
OSI-202-b	NAR Sea Surface Temperature (Metop-A) NetCDF	100	100	100	100	100	100
OSI-407	Global Medium Resolution Sea Ice Drift	100	98.3	98.3	96.7	100	100
OSI-301	AHL Downward Longwave Irradiance (Multi Mission)	100	100	100	96.7	100	100
OSI-405-b	Global Low resolution Sea Ice Drift (Multi Mission)	100	100	100	100	100	100
OSI-402-b	Global Sea Ice Edge (Multi Mission)	100	100	100	96.7	100	100
OSI-403-b	Global Sea Ice Type (Multi Mission)	100	100	100	96.7	100	100
OSI-302	AHL Surface Solar Irradiance (Multi Mission)	100	100	100	96.7	100	100
OSI-203	AHL Sea Surface Temperature (Multi Mission)	100	100	100	98.3	100	100
OSI-303	Daily Downward Longwave Irradiance (MSG)	100	100	100	96.7	100	100
OSI-304	Daily Surface Solar Irradiance (MSG)	100	100	100	96.7	100	100
OSI-303	Hourly Downward Longwave Irradiance (MSG)	100	100	100	100	99.7	100
OSI-304	Hourly Surface Solar Irradiance (MSG)	100	100	100	100	99.7	100
OSI-206	Hourly Sea Surface Temperature (MSG)	100	100	100	99.7	99.7	100
OSI-206	Hourly Sea Surface Temperature (MSG) NetCDF	93.5	100	100	99.7	99.5	100
OSI-202-b	NAR Sea Surface Temperature (NPP)	93.5	100	100	100	100	100
OSI-202-b	NAR Sea Surface Temperature (NPP) NetCDF	86.0	55.5	100	100	100	100
OSI-109-c	Rapidscat 25 km winds	86.0	55.5	discontinued	discontinued	discontinued	discontinued
OSI-109-d	Rapidscat 50 km winds	97.5	95.4	discontinued	discontinued	discontinued	discontinued

table 40 : **Percentage of received OSI SAF products in EDC in 2nd half 2016.**

Comments :

The OSI-401-b is operational from 26/05/2016. Nevertheless in July, EUMETSAT Secretariat detected that it was not ingested into EDC due to an invalid ASTI value : <ASTI number=ö3ö>F-15, F-16, F-18</ASTI>

The current schema only allows the current format:
<ASTI number=1>F-15</ASTI>
<ASTI number=2>F-16</ASTI>
<ASTI number=3>F-18</ASTI>
This wasn't detected earlier, because in the EUM control room, alarms concerning this product were filtered due to the parallel dissemination of OSI-401-a and OSI -401-b (until 09/08/2016)

OSI-201-b, OSI-202-b, OSI-206 and OSI-207 are distributed in GHRSST compliant NetCDF format from 12/07/2016, on top of the GRIB format which was stopped on 12/01/2017. EDC was configured to ingest OSI-202-b, OSI-206 and OSI-207 in June, whereas EDC was configured for OSI-201-b at the beginning of July: OSI-201-b have been ingested from the 12/07/2016.

7 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 (www.osi-saf.org).

Name of the document		Reference	Version	Date
OSI SAF CDOP-2 Half-yearly operations report 2016 1st half	HYR16-H1	SAF/OSI/CDOP2/M-F/TEC/RP/337	1.0	Aug. 2016
Operation Review (OR) n° 12 Organisation Note	OR12-ON	SAF/OSI/CDOP2/MF/MGT/ON/032	1.0	Sep. 2016
OSI SAF CDOP2 Service Specification Document	SeSp	SAF/OSI/CDOP2/M-F/MGT/PL/2-003	2.9	10 Oct. 2016
OSI SAF CDOP2 Product Requirements Document	PRD	SAF/OSI/CDOP2/M-F/MGT/PL/2-007	3.6	26 Sep. 2016
OSI SAF CDOP2 Master Schedule	MSch	SAF/OSI/CDOP2/M-F/MGT/PL/2-007	1.8	10 Oct. 2016
OSI SAF CDOP-2 Status Report n°10	SR10	SAF/OSI/CDOP2/M-F/TEC/RP/2-050	1.0	Oct. 2016
Minutes of 10th CDOP2 Steering Group meeting	SG10	SAF/OSI/CDOP2/M-F/MGT/RP/2-110	1.0	22 Nov. 2016

table 41 : Top-level documentation updates

Name of the document		Reference	Version	Date
ATBD for the OSI SAF Global Sea Ice Concentration Climate Data Record OSI-450	ATBD	SAF/OSI/CDOP2/DMI_Met/SCI/MA/270	1.1	7 Jul. 2016
OSI SAF Review Board Report for the PCR of the Sea Ice Concentration Data Record OSI-450	RP	SAF/OSI/CDOP2/DMI/MGT/RP/275	1.0	7 Jul. 2016
Data Set Generation Capability Description – Reprocessed Sea Ice Concentration (OSI-450)	DSGCD	SAF/OSI/CDOP2/MET/TEC/TN/269	1.2	8 Jul. 2016
Validation Report for the OSI SAF AMSR-2 Sea Ice Concentration OSI-408	SVR	SAF/OSI/CDOP2/DMI/SCI/RP/259	1.2	Aug. 2016
Product User Manual for the OSI SAF AMSR-2 Global Sea Ice Concentration (OSI-408)	RP	SAF/OSI/CDOP2/DMI/TEC/RP/265	1.1	Aug. 2016
Geostationary Radiative Fluxes (OSI-303,304,305,306) Product User	PUM	SAF/OSI/CDOP/M-F/TEC/MA/182/	1.4	16 Aug.

Name of the document		Reference	Version	Date
Manual				2016
LML Surface Solar Irradiance and Aerosol Studies related to CDOP2 WP 21800 (Products OSI-304, OSI-306)	RP	SAF/OSI/CDOP2/MF/TEC/RP/276	1.0	25 Aug. 2016
Global Sea Ice Edge and Type Validation Report (OSI-402-c, OSI-403-c)	SVR	SAF/OSI/CDOP2/MET-Norway/SCI/RP/224	2.1	Sep. 2016
Global Sea Ice Edge and Type PUM (OSI-402-c, OSI-403-c)	PUM	SAF/OSI/CDOP2/MET/TEC/MA/205	2.0	May 2016
Validation and Monitoring of the OSI SAF Low Resolution Sea Ice Drift Product (OSI-405-c)	VR	SAF/OSI/CDOP/MET/T&V/RP/131	5	May 2016
Low Resolution Sea Ice Drift PUM (OSI-405-c)	PUM	SAF/OSI/CDOP/MET/TEC/MA/128	1.8	May 2015
OSI SAF Review Board Report for the ORR of the global sea ice edge OSI-402-c, global sea ice type OSI-403-c and low resolution sea ice drift OSI-405-c	RP	SAF/OSI/CDOP2/MET/MGT/RP/277	1.0	17 Oct. 2016
Performance of the OSISAF sea ice concentration product as shown by the SIMPE system	RP	-	-	November 2016
Sea Ice Multi-Product Ensemble (SIMPE) technical report	RP	-	1a1	02 Feb. 2017
MAIA-PPS intercomparison report	RP	-	2	06 Feb. 2017

table 42 : Sub-systems documentation