

# **Ocean and Sea Ice SAF**

## **Product Verification and Validation Report**

### **The Southern Hemisphere Sea Ice Product**



**Version 1.1**

**March 2007**

**Prepared by met.no and DMI**

|                                 |
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## 1. INTRODUCTION

### 1.1. Purpose of the document

This document presents the verification and validation of the Southern Hemisphere Sea Ice product developed as part of the development activities within the Ocean and Sea Ice Satellite Application Facility Initial Operational Phase (OSISAF IOP). The Southern Hemisphere Sea Ice product was developed according to work package 22330 'Global Sea Ice Products' as defined in the IOP Project Plan [R.D-1]. The Southern Hemisphere Sea Ice Product is produced operationally according to the agreement between met.no and DMI [R.D-2].

This document will verify and validate the Southern Hemisphere product in order to confirm that the requested quality and stability is present prior to operational release.

### 1.2. Applicable and reference documents

#### 1.2.1. Applicable Documents:

[A.D-1] Dop for O&SI SAF IOP, v1.2

[A.D-2] User Requirements Document, URD, v2.1

#### 1.2.2. Reference Documents

[R.D-1] IOP Project Plan, v2.0

[R.D-2] Agreement met.no/DMI, v1.0

[R.D-3] Sea Ice Product Manual, v3.0

[R.D-4] L. Toudal: Adaptation of SAFOSI sea ice processing system to southern hemisphere. Visiting Scientist deliverable report (SG06\_VS02)

#### 1.3. List of definitions, acronyms and abbreviations

|         |   |
|---------|---|
| AR      | Ambiguity Removal   |
| ASCAT   | Advanced SCATterometer  |
| AVHRR   | Advanced Very High Resolution Radiometer                                  |
| BUFR    | Binary Universal Format Representation                                    |
| Cal/Val | Calibration and Validation  |
| CIR     | Committed Information Rate  |
| CIS     | Canadian Ice Service  |
| CM      | Configuration Management  |
| CMOD    | C-band model, or geophysical transfer function of backscatter versus wind |
| CMS     | Centre de Météorologie Spatiale   |
| DCI     | Documentation Configuration Item  |
| DLI     | Downward Long wave Irradiance   |
| DMI     | Danish Meteorological Institute   |

|          |  |
|----------|--|
| DMSP     | Defence Meteorological Satellite Program                       |
| MET.NO   | Norske Meteorologiske Institutt                                |
| DOP      | Detailed Operational Proposal                                  |
| ECMWF    | European Centre for Medium range Weather Forecast              |
| EPS      | European Polar System  |
| ERS      | European Remote sensing Satellite                              |
| ESA      | European Space Agency  |
| FAQ      | Frequently Asked Question                                      |
| FTP      | File Transfer Protocol   |
| FY/MY    | First Year/Multi Year  |
| GLB      | Global oceans  |
| GOES     | Geostationary Operational Environmental Satellite              |
| 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   |
| IOP      | Initial Operational Phase                                      |
| IRR      | Integration Readiness Review                                   |
| IVRR     | Integration Verification Validation Results Review             |
| KNMI     | Koninklijk Nederlands Meteorologisch Instituut                 |
| LML      | Low and Mid Latitude   |
| LOG      | Développement et Maintenance Logiciels                         |
| LUT      | Look-Up Table  |
| MAP      | Merged Atlantic Product  |
| Met.no   | Meteorological Institute of Norway                             |
| METOP    | METEorological OPERational Satellite                           |
| M-F      | Météo-France   |
| MSG      | Meteosat Second Generation                                     |
| NESDIS   | National Environmental Satellite, Data and Information Service |
| NAR      | Northern Atlantic and Regional seas                            |
| NCEP     | National Centre for Environmental Prediction                   |
| NMS      | National Meteorological Service                                |
| NOAA     | National Oceanic and Atmospheric Administration                |
| NRT      | Near Real-time Terminal  |
| NWP      | Numerical Weather Prediction                                   |
| OR       | Operations Review  |
| ORR      | Operational Readiness Review                                   |
| O&SI SAF | Ocean and Sea Ice SAF  |
| PAR      | Products quality and applicability Assessment Review           |
| QC       | Quality Control  |
| RMDCN    | Regional Meteorological Data Communication Network             |
| RMS      | Root-Mean-Squared  |
| R&D      | Research and Development                                       |
| SADT     | Structured Analysis and Design Technique                       |
| SAF      | Satellite Application Facility                                 |
| SAFNWC   | NoWCasting and very short range forecasting SAF                |
| SAFNWP   | SAF for Numerical Weather Prediction                           |

|        |   |
|--------|---|
| SCAT   | (ERS) SCATterometer   |
| SEVIRI | Spinning Enhanced Visible and Infra-Red Imager              |
| SIRR   | Software Integration Readiness Review                       |
| SIVVRR | Software Integration Verification Validation Results Review |
| SMHI   | Swedish Meteorological and Hydrological Institute           |
| SRD    | Software Requirement Document                               |
| SSI    | Surface Short wave Irradiance                               |
| SSMI   | Special Sensor Microwave Imager                             |
| SSMIS  | Special Sensor Microwave Imager and Sounder                 |
| SST    | Sea Surface Temperature                                     |
| TBC    | To Be Confirmed   |
| TBD    | To Be Defined   |
| TSR    | Télécommunications Systèmes et Réseaux                      |
| UMARF  | Unified Meteorological Archive & Retrieval Facility         |
| WMO    | World Meteorological Organization                           |
| WWW    | World Wide Web  |

## 2 BACKGROUND

In response to numerous requests from the user community the Global ice product has been developed during IOP. The Global product is divided in a Northern Hemisphere (NH) product and a Southern Hemisphere (SH) product. Both the NH product and the SH product has been available pre-operationally in a test-mode since March 2005. The NH product is basically an extension of the former 'primary' ice product, the 'HL ice product' covering the North Atlantic Ocean. The NH product was declared fully operational by the OSI SAF steering group in December 2005.

This report provides the results from the basic verification and validation of the Southern Hemisphere product, with the aim being operational release.

The development of the Global Sea Ice product has been carried out as shared activities between met.no and DMI as defined in the work package 22330 in IOP Project Plan [R.D-1]. For the Southern Hemisphere following tasks have been completed:

### TASKS:

- Define a Southern Hemisphere (SH) O&SI SAF sea ice product area and grid
- Update the SSM/I tie points for the SH product area
- Implement the atmospheric correction with use of global ECMWF data
- Implement and validate the SH sea ice algorithms and products
- Implement and integrate the new products in the O&SI SAF HL production chain

## 3 PRODUCT DESCRIPTION

The operational setup of the SH product is the same as the setup for the NH product. The basic input satellite data is the same for both products. The same goes for the NWP data used in the atmospheric correction. The differences lie in tie points and the operational monitoring of the quality of products. Whereas independent validation data exists (from CIS, DMI, met.no) for the NH products in terms of sea ice charts based on high and medium resolution satellite data, from Radarsat/Envisat SAR, Modis, AVHRR, this is not the case for the Southern Hemisphere product. At the time of writing the most appropriate set of reference data are those provided by the National Ice Center (NIC) at the NOAA Satellite Operations Facility. NIC provides 2-weekly products for the Southern Hemisphere and based on a set of sensors, i.e. SSM/I, AVHRR, ENVISAT, QUICKSCAT, MODIS, OLS. The NIC products may not be independent from the SSM/I derived sea ice products due to the common use of SSM/I data. However, the stringent quality control procedures, which are not believed to be in place for any other routine product in the Antarctic, warrant their use as reference.

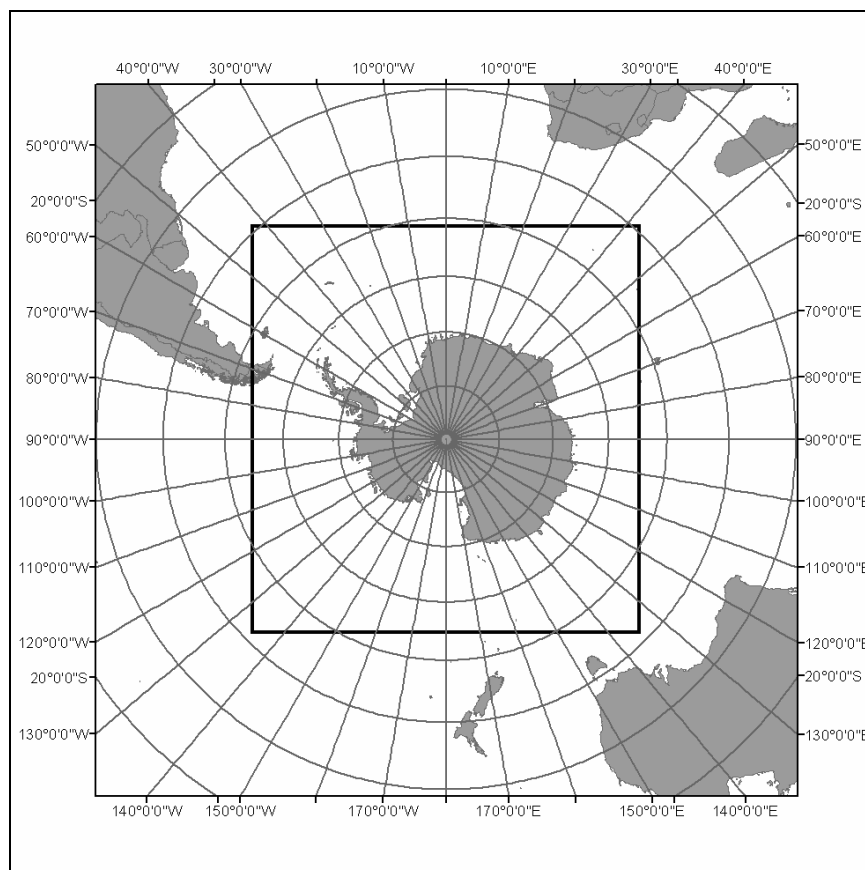
### 3.1 Grid characteristics

The product grid is adapted from the 25 km resolution Goddard Space Flight Center projections used to disseminate various SSM/I based products available at the National Snow and Ice Data Center (<http://nsidc.org>).

Below in Table 1 is given the details of the grid definitions. The grid extent is shown in Figure 1. Corner coordinates are referenced to pixel center. Projection definitions in the form of PROJ-4 initialization strings (<http://www.remotesensing.org/proj>) are also given.

| Geographical definition for Southern Hemisphere Grid, SH |  |
|--|--|
| Projection:  | Polar stereographic projection true at 70°S                                |
| Resolution:  | 10 km  |
| Size:  | 790 columns, 830 lines   |
| Central Meridian:  | 0°   |
| Lower left corner:                                       | 41.5015°S, 135.0000°W  |
| Radius of Earth:   | 6378273 x 6356889.44891 m  |
| PROJ-4 string:   | +proj=stere +a=6378273 +b=6356889.44891<br>+lat_0=-90 +lat_ts=-70 +lon_0=0 |

**Table 1 : Geographical definition for Southern Hemisphere Grid, SH**



**Figure 1: Extent of the SH product**



### **3.2 NWP data**

The atmospheric correction for the new Global Sea Ice product demands global NWP data. For the SH product NWP data originates from ECMWF in following setup:

|             |  |
|-------------|--|
| Parameters: | TCWV (Total Column Water Vapour)<br>T2m (Temperature at 2 m) |
| Analyses:   | 00 and 12  |
| Prognoses:  | +12, +15, +18, +21, +24                                      |

Parameters are interpolated temporally and spatially to match satellite input data in time and space.

## 4. VERIFICATION AND VALIDATION

### 4.1 Requirements

Following section will describe the requirements that should be met in order for the SH product to be considered operational.

#### 4.1.1 Verification

The production environment, methods and schedule resembles that of the NH sea ice product. The following demands should be verified prior to release:

- the algorithms used are the same for the NH and the SH product
- three products are generated (concentration, edge and type) on a daily basis
- products are generated in HDF5, GRIB and NetCDF
- specifications of products are in accordance with PUM
- products are made available at the local FTP server and distributed for access via EumetCast
- products are distributed according to timeliness specifications

#### 4.1.2 Timeliness

The products are valid for one day (24 hours) with central time 12 UTC (note that central time is used in the file name). The cut-off time is 4 hours, which means that the production is pending until 0400 UTC in order to get full temporal data coverage. The timeliness is therefore 4 hours cut-off time plus 2 hours for production and distribution, i.e. 6 hours. As the SH products are produced together with the NH products, these two products usually have the same timeliness. Validation of the timeliness requirements is therefore not addressed in this report, but will be part of the quarterly reports.

#### 4.1.2 Operational readiness validation

The adaptation of the sea ice products to the Southern Hemisphere consisted in 1) tuning tie points for the ice concentration and atmospheric correction modules, 2) deriving statistics for the ice edge and ice type products, 3) adapting the processing chain to use auxiliary and NWP model data from the Antarctic region, and 4) setting up regular inter-comparison with ice charts. The adaptation is validated in two steps: By validation of the tie points addressing (1) and by comparison of the final output from the SH sea ice module with independent ice charts addressing the remaining points. Due to the more complicated surface and atmospheric setting in the Southern Hemisphere, the performance of the SH products must be expected to be slightly lower than that for the NH products. It is therefore possible that the objectives defined in [A.D-2] for the NH ice concentration product must be amended with a separate objective for the Southern Hemisphere. In the following the validation steps outlined above are described in more details along with results.

## 4.2 Methods

### Tie point verification

The tie points were verified in the frame of the associated scientist project undertaken by Leif Toudal of the Technical University of Denmark [R.D-4]. Please see [R.D-4] for a description of the methodology Applied.

### Verification of ice concentration and ice edge against reference data

The integration of the SH product is verified against operational ice charts from the US National Ice Center (NIC). As mentioned, NIC is presently the only institution that conducts regular mapping of the sea ice in the entire Antarctic region. The ice charts are based on all available observations, including SAR data, passive microwave, scatterometry and VIS/IR satellite data. The data is synthesized into ice charts by manual interpretation following the standard NIC methodology and conforming to WMO standards. There is presently no way to distinguish ice chart polygons based on passive microwave radiometry from polygons that are based on high resolution data. This may lead to smaller differences against the OSISAF products; however the ice chart data is undergoing a meticulous quality control, which ensures a reasonable degree of independence. Hence it is considered justified to base the operational readiness validation as well as the regular quality control and performance estimation of the products on these data.

The NIC SH ice charts are compiled every 2 weeks. In the present analysis a total number of 31 charts have been used in the collocation with OSISAF products. The 31 ice charts from NIC span the time from 5<sup>th</sup> September 2005 to 30<sup>th</sup> October 2006. For each ice chart a collocation is made on a cell-by-cell basis between the OSISAF concentration/edge product and the NIC ice chart. The collocation covers all cells within the OSISAF SH grid which are not land. The OSISAF products used in the collocation are chosen for the day matching the valid time of the NIC SH ice chart. For each collocation a set of statistics are derived (see Appendix A):

Statistics on sea ice concentration:

- For each SIGRID concentration interval in the ice chart, the number of cells with a given deviation in the OSISAF sea ice concentration are derived.
- For the total number of cells covering water or ice in the NIC SH ice chart, the relative deviations between OSISAF sea ice concentration and NIC SH ice chart are derived.
- For the total number of cells covering ice in the NIC SH ice chart, the relative deviations between OSISAF sea ice concentration and NIC SH ice chart are derived.
- The bias and standard deviation for the differences between NIC SH ice chart and OSISAF sea ice concentration are given according to each SIGRID concentration interval in the NIC SH ice chart.

- The bias and standard deviation for the differences between NIC SH ice chart and OSISAF sea ice concentration are given for the total number of cells covering water or ice in the NIC SH ice chart.
- The bias and standard deviation for the differences between NIC SH ice chart and OSISAF sea ice concentration are given for the total number of cells covering ice in the NIC SH ice chart.

Statistics on sea ice edge:

- The number of cells with ice in both NIC SH ice chart and OSISAF edge product.
- The number of cells with water in both NIC SH ice chart and OSISAF edge product.
- The number of cells with water in NIC SH ice chart and ice in OSISAF edge product.
- The number of cells with ice in NIC SH ice chart and water in OSISAF edge product.

## 4.3 Results and discussion

### Tie point verification

Pages 18 and 16 of [R.D-4] list the resulting uncertainties of ice concentration retrievals at low (termed “Ti-w”) and high concentration (termed “Ti-i”). For the Bristol and Bootstrap frequency mode algorithms, respectively. Recall that these are the algorithms used in the current version of the OSISAF NH ice concentration product. Figure 2 reveals that the uncertainties in the Antarctic are higher by 4.4% on average, compared to the Arctic. Consequently, it is not likely that the Antarctic product will be able to fulfill the accuracy objectives defined in [A.D-2].

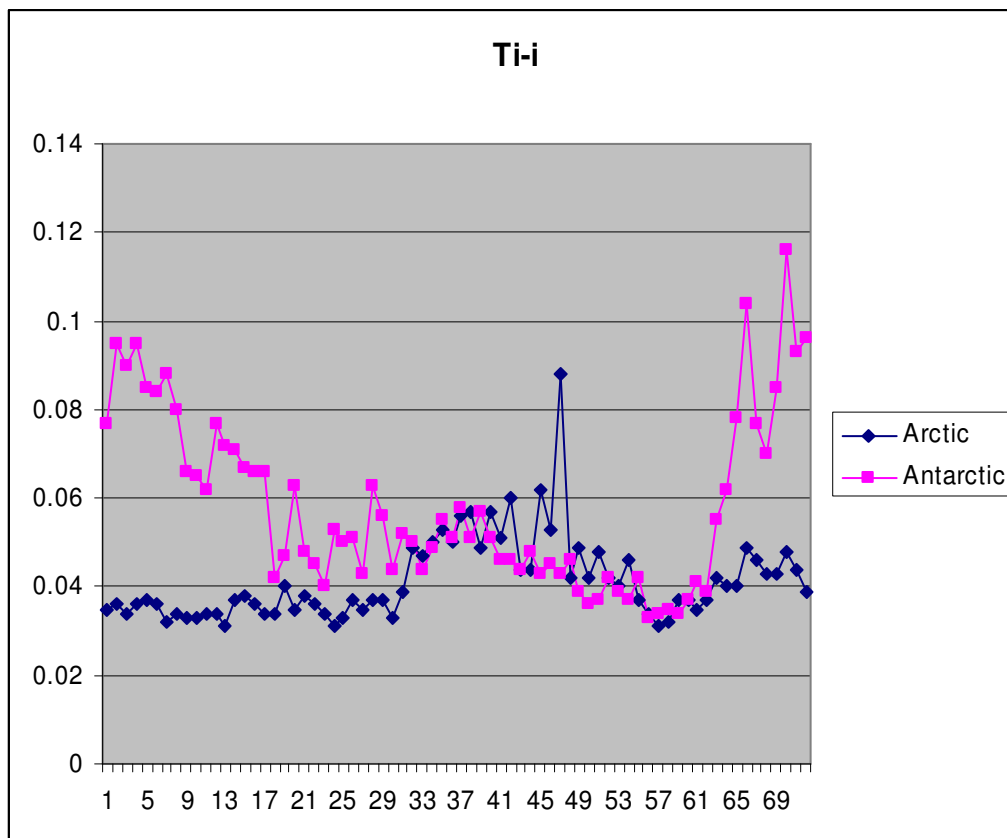
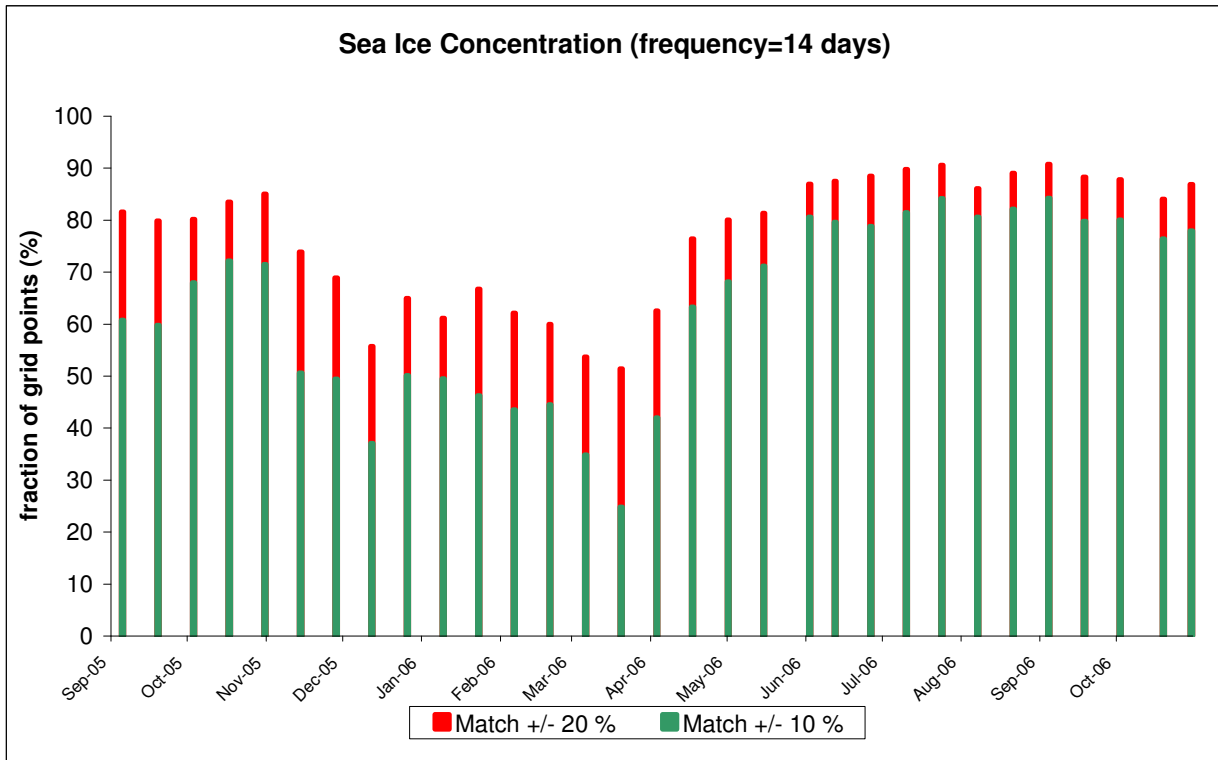


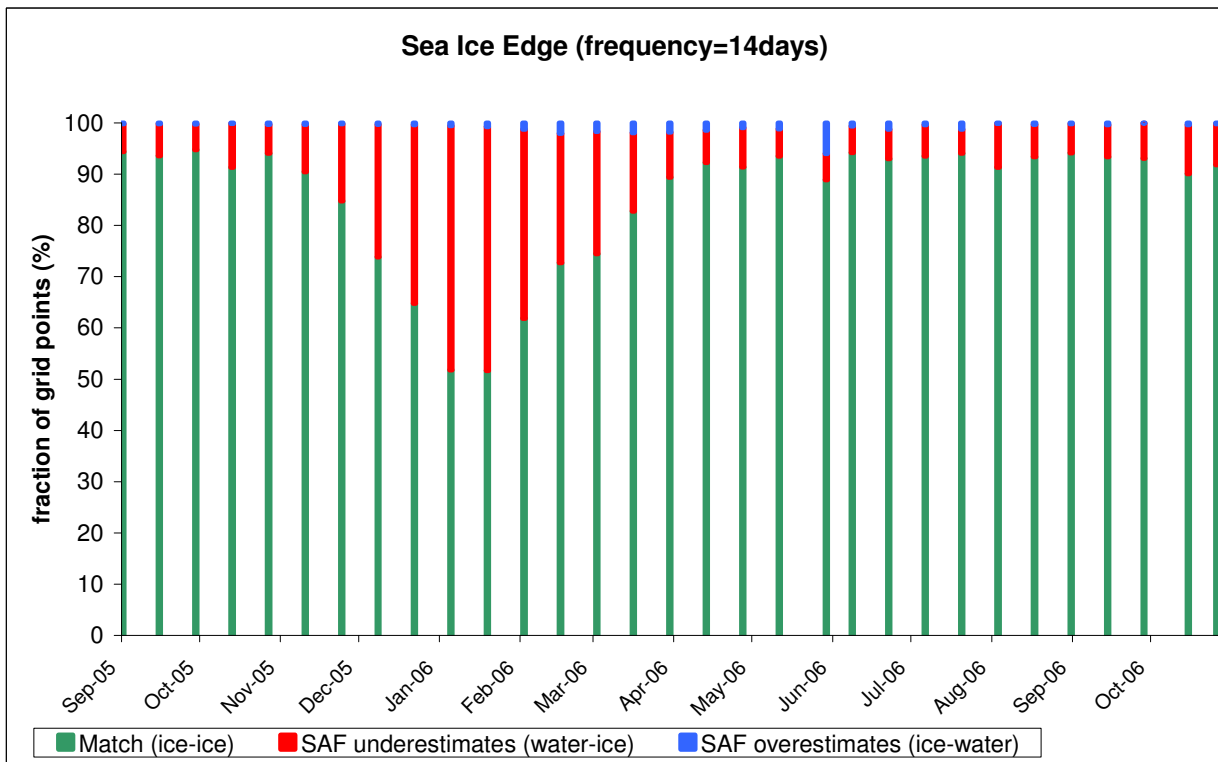
Figure 2 : Tiepoint uncertainty expressed in unit of ice concentration fraction (0 to 1) for the Arctic and Antarctic Bristol algorithm tie points. Units on X-axis are 5 days intervals from January through December as in [R.D-4]

### Collocation results from OSISAF output against NIC reference data

In the following is shown the results from collocation between the NIC ice charts and the OSISAF products.



**Figure 3 :** Comparison between ice concentration from the 2-weekly NIC ice analysis and the SAF concentration product. 'Match +/- 10 %' corresponds to those grid points where concentration deviates within the range of +/-10 % and likewise for +/-20 %.



**Figure 4 :** Comparison between the 2-weekly NIC ice analysis and the SAF edge product. 'SAF underestimates' means grid points where the SAF product indicated water and the NIC ice analysis indicated ice and vice versa for 'SAF overestimates'.

**NB:** match+underestimate+overestimate=100%

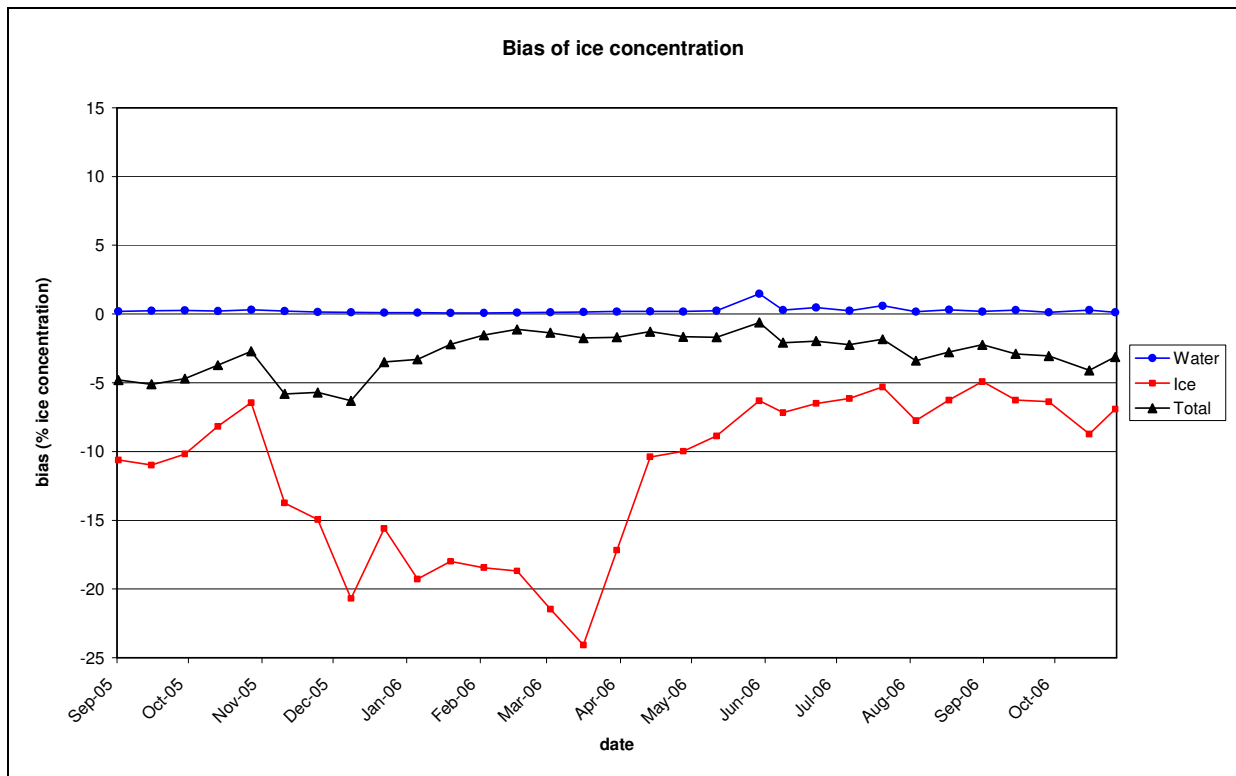
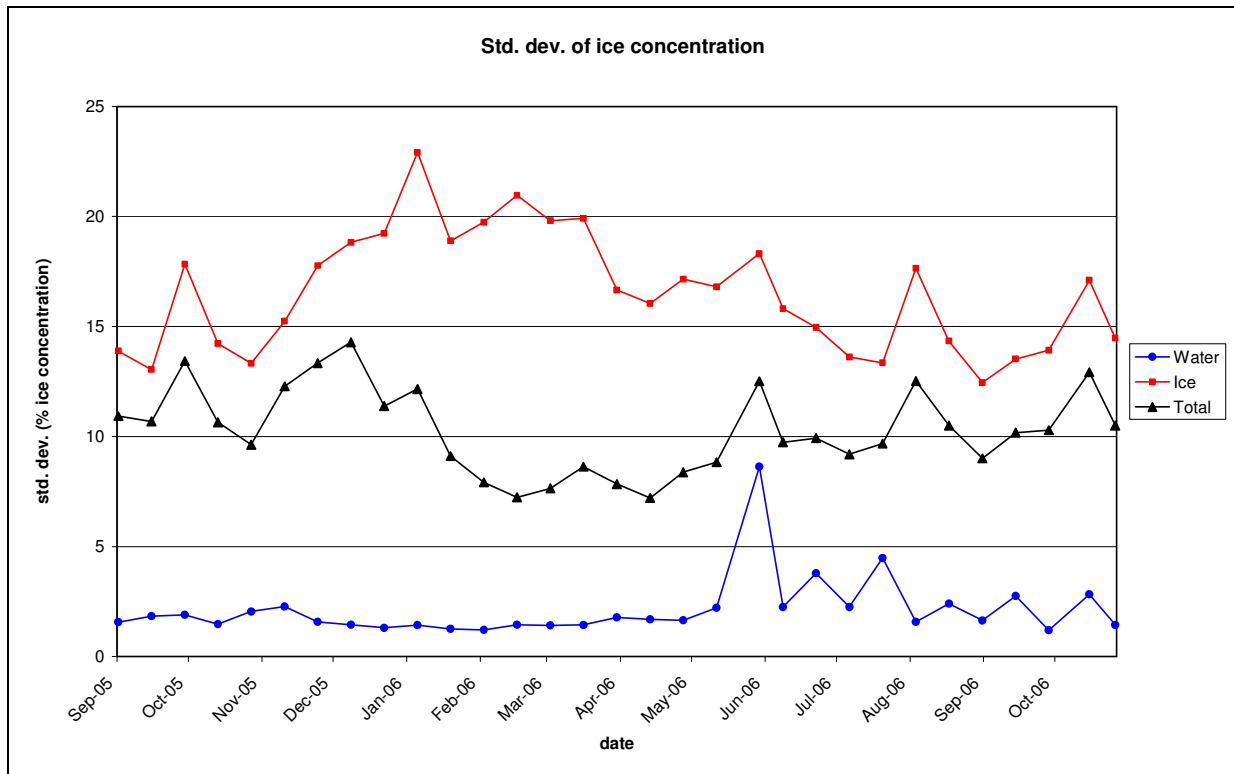


Figure 5 : The bias of ice concentration for three categories: water, ice and total. When bias is below zero the SAF ice concentration tends to underestimate.



**Figure 6 : The standard deviation of ice concentration for three categories: water, ice and total.**

As can be seen from the figures above there is a seasonal variation revealing lower accuracy during austral summer (melting season). The pattern resembles that of the NH product, however being slightly more pronounced in the SH case. The lower accuracy, especially for the ice concentration during austral summer is in sync with the pattern observed for the tie point accuracy, also showing lower accuracy during austral summer, see Figure 2.



## 5. CONCLUSION

A verification task of the OSISAF Southern Hemisphere sea ice products has been carried out, consisting of 1) validation of tie points used in the sea ice algorithms and 2) validation of the sea ice concentration and sea ice edge through comparison with Southern Hemisphere ice charts from National Ice Center (NIC).

In general the uncertainties in the SH tie points are higher than those for the NH product. This is justified by the additional uncertainty in the tie point emissivity of 4.4 % ice concentration on average. Consequently it is recommended to amend **[A.D-2]** with a separate accuracy objective for the SH ice concentration product that is correspondingly higher (user requirement UR-ICE-31).

As shown in the comparison study with NIC ice charts, there is a seasonal variation in quality of the sea ice concentration and sea ice edge product. The seasonal variation pattern resembles that of the Northern Hemisphere product, however being slightly more pronounced in the SH case. The differences are more pronounced for the ice concentration product.

In overall the SH sea ice products has shown deviations within acceptable limits when compared to the reference data set, the uncertainty falls within the revised accuracy objective, argued for above (user requirement UR-ICE-31). The SH products meets all the other user requirements for sea ice.

## APPENDIX A: STATISTICS FROM COLLOCATIONS

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc050905.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200509051200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200509051200.hdf

Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 222530 | 0     | 0     | 0     | 95    | 4     | 0     | 0     | 0.20   | 1.57  |
| 0 - 10    | 750    | 0     | 0     | 0     | 100   | 0     | 0     | 0     | 0.00   | 0.09  |
| 10 - 30   | 2306   | 0     | 0     | 50    | 44    | 4     | 1     | 1     | -2.13  | 4.99  |
| 20 - 40   | 3837   | 0     | 39    | 28    | 28    | 2     | 1     | 1     | -7.52  | 8.63  |
| 30 - 50   | 4188   | 42    | 21    | 18    | 18    | 1     | 0     | 0     | -15.51 | 11.53 |
| 40 - 60   | 1315   | 48    | 29    | 15    | 8     | 1     | 0     | 0     | -19.00 | 11.92 |
| 50 - 70   | 1044   | 49    | 14    | 20    | 17    | 0     | 0     | 0     | -20.43 | 16.37 |
| 60 - 80   | 2494   | 56    | 15    | 15    | 14    | 0     | 0     | 0     | -22.55 | 16.09 |
| 70 - 90   | 7808   | 60    | 16    | 17    | 7     | 0     | 0     | 0     | -29.13 | 21.81 |
| 80 - 100  | 9988   | 52    | 17    | 18    | 13    | 0     | 0     | 0     | -24.10 | 20.69 |
| 90 - 100  | 155084 | 13    | 21    | 35    | 31    | 0     | 0     | 0     | -8.49  | 11.44 |
| 100-100   | 2347   | 37    | 36    | 25    | 2     | 0     | 0     | 0     | -17.97 | 12.37 |
| Total:    | 413691 | 8     | 10    | 15    | 64    | 2     | 0     | 0     | -4.80  | 10.93 |
| Ice only: | 191161 | 18    | 21    | 32    | 28    | 0     | 0     | 0     | -10.61 | 13.89 |

Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 181367 | 10319  |
| Water  | 412    | 222118 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc050919.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200509191200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200509191200.hdf

Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 216667 | 0     | 0     | 0     | 96    | 3     | 1     | 0     | 0.24   | 1.84  |
| 10 - 30   | 1597   | 0     | 0     | 66    | 32    | 1     | 0     | 0     | -4.66  | 4.86  |
| 20 - 40   | 2922   | 0     | 56    | 26    | 17    | 1     | 0     | 0     | -10.46 | 7.31  |
| 30 - 50   | 4666   | 46    | 13    | 19    | 15    | 4     | 3     | 1     | -14.81 | 13.89 |
| 40 - 60   | 271    | 31    | 48    | 19    | 2     | 0     | 0     | 0     | -16.17 | 7.44  |
| 50 - 70   | 8798   | 58    | 19    | 11    | 11    | 1     | 1     | 0     | -23.70 | 16.25 |
| 60 - 80   | 3986   | 47    | 17    | 14    | 18    | 4     | 0     | 0     | -20.50 | 18.09 |
| 70 - 90   | 12705  | 38    | 22    | 20    | 21    | 0     | 0     | 0     | -18.11 | 17.33 |
| 80 - 100  | 11867  | 26    | 26    | 27    | 21    | 0     | 0     | 0     | -15.82 | 19.04 |
| 90 - 100  | 148084 | 15    | 19    | 37    | 29    | 1     | 0     | 0     | -8.84  | 10.64 |
| 100-100   | 2146   | 33    | 42    | 25    | 0     | 0     | 0     | 0     | -17.52 | 11.23 |
| Total:    | 413709 | 10    | 10    | 16    | 63    | 2     | 0     | 0     | -5.11  | 10.69 |
| Ice only: | 197042 | 20    | 20    | 33    | 26    | 1     | 0     | 0     | -10.99 | 13.04 |

Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 185302 | 12289  |
| Water  | 405    | 216263 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc051003.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200510031200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200510031200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 216840 | 0     | 0     | 0     | 92    | 7     | 1     | 0     | 0.27   | 1.90  |
| 0 - 10    | 603    | 0     | 0     | 0     | 62    | 20    | 12    | 6     | 4.21   | 7.48  |
| 10 - 30   | 174    | 0     | 0     | 44    | 48    | 5     | 2     | 1     | -1.31  | 5.24  |
| 20 - 40   | 2822   | 0     | 54    | 28    | 16    | 1     | 0     | 0     | -10.28 | 7.61  |
| 30 - 50   | 4439   | 44    | 18    | 13    | 14    | 6     | 4     | 1     | -14.31 | 14.24 |
| 40 - 60   | 4109   | 36    | 16    | 16    | 25    | 6     | 2     | 0     | -14.26 | 15.37 |
| 50 - 70   | 5736   | 36    | 11    | 7     | 19    | 13    | 12    | 2     | -13.19 | 22.05 |
| 60 - 80   | 2965   | 76    | 8     | 6     | 8     | 1     | 1     | 0     | -32.03 | 18.28 |
| 70 - 90   | 4951   | 57    | 18    | 10    | 13    | 1     | 0     | 0     | -28.38 | 21.24 |
| 80 - 100  | 12021  | 36    | 18    | 17    | 29    | 0     | 0     | 0     | -18.16 | 20.06 |
| 90 - 100  | 156974 | 15    | 10    | 15    | 55    | 5     | 0     | 0     | -8.33  | 16.88 |
| 100-100   | 2044   | 17    | 17    | 41    | 21    | 4     | 0     | 0     | -8.90  | 11.22 |
| Total:    | 413678 | 9     | 6     | 7     | 71    | 6     | 1     | 0     | -4.70  | 13.43 |
| Ice only: | 196838 | 20    | 12    | 15    | 48    | 5     | 1     | 0     | -10.18 | 17.83 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 187455 | 9893   |
| Water  | 447    | 216439 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc051017.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200510171200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200510171200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 220023 | 0     | 0     | 0     | 90    | 10    | 0     | 0     | 0.22   | 1.47  |
| 10 - 30   | 4347   | 0     | 0     | 52    | 43    | 3     | 1     | 0     | -2.95  | 4.76  |
| 20 - 40   | 3617   | 0     | 57    | 19    | 13    | 3     | 3     | 4     | -8.89  | 12.17 |
| 30 - 50   | 1740   | 65    | 15    | 10    | 9     | 1     | 0     | 0     | -20.54 | 10.24 |
| 40 - 60   | 4832   | 21    | 27    | 31    | 20    | 0     | 0     | 0     | -11.71 | 11.27 |
| 50 - 70   | 7789   | 35    | 8     | 13    | 29    | 6     | 4     | 4     | -12.98 | 19.78 |
| 60 - 80   | 2915   | 87    | 5     | 3     | 3     | 1     | 2     | 0     | -38.81 | 17.46 |
| 70 - 90   | 14252  | 62    | 13    | 13    | 11    | 1     | 0     | 0     | -29.43 | 20.72 |
| 80 - 100  | 23665  | 19    | 14    | 17    | 47    | 3     | 0     | 0     | -9.64  | 14.66 |
| 90 - 100  | 128713 | 8     | 9     | 16    | 60    | 7     | 0     | 0     | -4.38  | 9.04  |
| 100-100   | 1757   | 26    | 12    | 22    | 33    | 7     | 0     | 0     | -10.70 | 14.51 |
| Total:    | 413650 | 8     | 5     | 8     | 71    | 8     | 0     | 0     | -3.71  | 10.65 |
| Ice only: | 193627 | 16    | 11    | 17    | 50    | 5     | 0     | 0     | -8.17  | 14.23 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 177537 | 16645  |
| Water  | 259    | 219799 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc051031.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200510311200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200510311200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 229339 | 0     | 0     | 0     | 92    | 7     | 1     | 0     | 0.30   | 2.05  |
| 0 - 10    | 38     | 0     | 0     | 0     | 0     | 8     | 45    | 47    | 22.50  | 13.62 |
| 10 - 30   | 4304   | 0     | 0     | 30    | 45    | 11    | 8     | 6     | 1.70   | 9.47  |
| 20 - 40   | 705    | 0     | 34    | 24    | 26    | 5     | 4     | 6     | -3.55  | 11.74 |
| 30 - 50   | 5997   | 41    | 26    | 13    | 12    | 5     | 2     | 1     | -14.51 | 12.65 |
| 40 - 60   | 14713  | 10    | 8     | 9     | 27    | 16    | 16    | 14    | 2.35   | 15.42 |
| 50 - 70   | 3523   | 20    | 14    | 17    | 40    | 7     | 1     | 1     | -8.32  | 13.28 |
| 60 - 80   | 3575   | 22    | 16    | 22    | 30    | 7     | 3     | 0     | -10.58 | 15.32 |
| 70 - 90   | 11498  | 30    | 9     | 15    | 36    | 10    | 0     | 0     | -13.47 | 19.18 |
| 80 - 100  | 5516   | 23    | 14    | 15    | 47    | 0     | 0     | 0     | -12.49 | 18.53 |
| 90 - 100  | 132815 | 11    | 12    | 21    | 53    | 4     | 0     | 0     | -6.22  | 11.34 |
| 100-100   | 1681   | 32    | 24    | 29    | 13    | 3     | 0     | 0     | -14.81 | 13.87 |
| Total:    | 413704 | 6     | 5     | 9     | 72    | 7     | 1     | 1     | -2.71  | 9.63  |
| Ice only: | 184365 | 13    | 12    | 19    | 47    | 6     | 2     | 1     | -6.45  | 13.33 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 174506 | 10368  |
| Water  | 623    | 228759 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc051114.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200511141200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200511141200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 235065 | 0     | 0     | 0     | 96    | 3     | 0     | 0     | 0.21   | 2.27  |
| 0 - 10    | 328    | 0     | 0     | 0     | 54    | 7     | 5     | 34    | 18.38  | 26.50 |
| 10 - 30   | 2324   | 0     | 0     | 69    | 21    | 1     | 1     | 8     | -2.08  | 14.96 |
| 20 - 40   | 1564   | 0     | 57    | 16    | 13    | 2     | 2     | 10    | -5.84  | 21.05 |
| 30 - 50   | 1975   | 61    | 22    | 10    | 4     | 1     | 1     | 2     | -19.66 | 12.13 |
| 40 - 60   | 5606   | 48    | 12    | 15    | 22    | 1     | 1     | 0     | -18.18 | 15.32 |
| 50 - 70   | 14230  | 56    | 19    | 14    | 10    | 1     | 0     | 0     | -23.28 | 15.69 |
| 60 - 80   | 7096   | 59    | 12    | 12    | 15    | 2     | 0     | 0     | -26.77 | 20.06 |
| 70 - 90   | 18896  | 28    | 15    | 23    | 33    | 0     | 0     | 0     | -14.38 | 17.66 |
| 80 - 100  | 3049   | 29    | 28    | 31    | 12    | 0     | 0     | 0     | -15.00 | 13.11 |
| 90 - 100  | 122032 | 19    | 26    | 31    | 24    | 0     | 0     | 0     | -11.77 | 13.21 |
| 100-100   | 1497   | 44    | 28    | 24    | 3     | 1     | 0     | 0     | -20.41 | 15.64 |
| Total:    | 413662 | 11    | 10    | 12    | 64    | 2     | 0     | 0     | -5.81  | 12.28 |
| Ice only: | 178597 | 26    | 23    | 28    | 23    | 0     | 0     | 0     | -13.74 | 15.24 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 162474 | 16647  |
| Water  | 579    | 234509 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc051128.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200511281200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200511281200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 253465 | 0     | 0     | 0     | 95    | 5     | 0     | 0     | 0.15   | 1.58  |
| 0 - 10    | 1488   | 0     | 0     | 0     | 63    | 19    | 9     | 9     | 5.73   | 12.62 |
| 10 - 30   | 4459   | 0     | 0     | 56    | 29    | 7     | 4     | 4     | -1.85  | 9.49  |
| 20 - 40   | 1755   | 0     | 50    | 23    | 16    | 2     | 2     | 6     | -6.97  | 11.96 |
| 30 - 50   | 1690   | 31    | 27    | 25    | 11    | 1     | 3     | 2     | -11.77 | 12.50 |
| 40 - 60   | 7166   | 68    | 14    | 9     | 8     | 1     | 1     | 0     | -24.08 | 13.29 |
| 50 - 70   | 16708  | 33    | 12    | 12    | 23    | 11    | 8     | 1     | -12.00 | 18.12 |
| 60 - 80   | 9767   | 65    | 12    | 11    | 10    | 1     | 1     | 0     | -31.38 | 21.71 |
| 70 - 90   | 25428  | 47    | 18    | 14    | 21    | 0     | 0     | 0     | -22.53 | 20.21 |
| 80 - 100  | 12472  | 35    | 19    | 25    | 21    | 0     | 0     | 0     | -17.70 | 18.48 |
| 90 - 100  | 77969  | 19    | 21    | 28    | 31    | 0     | 0     | 0     | -11.06 | 14.01 |
| 100-100   | 1356   | 41    | 28    | 25    | 5     | 1     | 0     | 0     | -20.80 | 18.10 |
| Total:    | 413723 | 12    | 7     | 9     | 68    | 4     | 1     | 0     | -5.70  | 13.34 |
| Ice only: | 160258 | 31    | 18    | 23    | 25    | 2     | 1     | 0     | -14.95 | 17.77 |

## Ice edge stats

| IA/SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 136627 | 24144  |
| Water  | 351    | 253135 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc051212.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200512121200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200512121200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 285619 | 0     | 0     | 0     | 97    | 3     | 0     | 0     | 0.13   | 1.45  |
| 0 - 10    | 595    | 0     | 0     | 0     | 69    | 15    | 8     | 8     | 5.17   | 12.76 |
| 10 - 30   | 6640   | 0     | 0     | 80    | 14    | 2     | 1     | 2     | -5.12  | 7.72  |
| 20 - 40   | 5785   | 0     | 61    | 14    | 15    | 6     | 2     | 2     | -10.29 | 11.16 |
| 30 - 50   | 5237   | 45    | 18    | 16    | 14    | 3     | 2     | 1     | -14.21 | 12.46 |
| 40 - 60   | 3010   | 56    | 14    | 15    | 13    | 2     | 0     | 0     | -21.17 | 14.63 |
| 50 - 70   | 8797   | 79    | 7     | 5     | 9     | 1     | 0     | 0     | -31.94 | 15.75 |
| 60 - 80   | 12156  | 83    | 6     | 5     | 5     | 1     | 0     | 0     | -36.66 | 16.90 |
| 70 - 90   | 14117  | 67    | 14    | 12    | 6     | 0     | 0     | 0     | -30.17 | 19.19 |
| 80 - 100  | 17553  | 61    | 19    | 12    | 7     | 0     | 0     | 0     | -26.44 | 17.20 |
| 90 - 100  | 52916  | 27    | 22    | 27    | 23    | 1     | 0     | 0     | -14.67 | 17.15 |
| 100-100   | 1273   | 51    | 26    | 23    | 0     | 0     | 0     | 0     | -22.71 | 15.23 |
| Total:    | 413698 | 14    | 6     | 7     | 71    | 2     | 0     | 0     | -6.31  | 14.28 |
| Ice only: | 128079 | 44    | 18    | 21    | 15    | 1     | 0     | 0     | -20.69 | 18.83 |

## Ice edge stats

| IA/SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 95230 | 33374  |
| Water  | 423   | 285215 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc051226.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200512261200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200512261200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 318881 | 0     | 0     | 0     | 98    | 2     | 0     | 0     | 0.10   | 1.31  |
| 0 - 10    | 9326   | 0     | 0     | 0     | 82    | 7     | 4     | 7     | 3.63   | 11.31 |
| 10 - 30   | 8730   | 0     | 0     | 84    | 11    | 2     | 1     | 2     | -6.52  | 7.31  |
| 20 - 40   | 6361   | 0     | 54    | 19    | 17    | 4     | 2     | 3     | -8.68  | 11.31 |
| 30 - 50   | 4240   | 64    | 20    | 8     | 8     | 1     | 0     | 0     | -20.68 | 10.51 |
| 40 - 60   | 3926   | 53    | 22    | 10    | 10    | 2     | 1     | 1     | -19.94 | 14.19 |
| 50 - 70   | 4401   | 50    | 21    | 18    | 11    | 0     | 0     | 0     | -20.47 | 14.44 |
| 60 - 80   | 3027   | 75    | 9     | 5     | 7     | 3     | 0     | 0     | -28.89 | 15.84 |
| 70 - 90   | 9080   | 71    | 9     | 6     | 7     | 7     | 0     | 0     | -33.29 | 21.90 |
| 80 - 100  | 9416   | 65    | 19    | 8     | 9     | 0     | 0     | 0     | -27.46 | 17.06 |
| 90 - 100  | 35140  | 28    | 12    | 13    | 43    | 3     | 0     | 0     | -13.52 | 18.82 |
| 100-100   | 1192   | 33    | 17    | 33    | 14    | 4     | 0     | 0     | -17.23 | 20.26 |
| Total:    | 413720 | 8     | 3     | 4     | 82    | 2     | 0     | 0     | -3.50  | 11.38 |
| Ice only: | 94839  | 34    | 14    | 17    | 29    | 3     | 1     | 1     | -15.59 | 19.23 |

## Ice edge stats

| IA\SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 61977 | 33371  |
| Water  | 358   | 318550 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060109.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200601091200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200601091200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 341300 | 0     | 0     | 0     | 99    | 1     | 0     | 0     | 0.09   | 1.43  |
| 0 - 10    | 5895   | 0     | 0     | 0     | 81    | 7     | 5     | 7     | 3.51   | 10.24 |
| 10 - 30   | 7642   | 0     | 0     | 83    | 11    | 2     | 2     | 2     | -6.44  | 7.71  |
| 20 - 40   | 5363   | 0     | 62    | 17    | 13    | 4     | 1     | 2     | -10.40 | 12.25 |
| 30 - 50   | 3566   | 67    | 13    | 7     | 7     | 2     | 1     | 2     | -20.08 | 13.65 |
| 40 - 60   | 4379   | 85    | 7     | 3     | 4     | 1     | 1     | 0     | -32.46 | 12.32 |
| 50 - 70   | 3250   | 75    | 6     | 5     | 9     | 4     | 2     | 0     | -29.37 | 18.01 |
| 60 - 80   | 2101   | 74    | 5     | 5     | 12    | 3     | 0     | 0     | -34.16 | 20.92 |
| 70 - 90   | 12200  | 84    | 5     | 4     | 6     | 1     | 0     | 0     | -44.95 | 21.71 |
| 80 - 100  | 11998  | 42    | 10    | 10    | 37    | 2     | 0     | 0     | -22.22 | 25.01 |
| 90 - 100  | 15036  | 11    | 9     | 26    | 50    | 3     | 0     | 0     | -6.57  | 12.42 |
| 100-100   | 969    | 33    | 21    | 30    | 15    | 2     | 0     | 0     | -17.59 | 19.77 |
| Total:    | 413699 | 7     | 2     | 3     | 86    | 1     | 0     | 0     | -3.30  | 12.16 |
| Ice only: | 72399  | 38    | 11    | 19    | 28    | 3     | 1     | 1     | -19.28 | 22.91 |

## Ice edge stats

| IA\SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 37984 | 34941  |
| Water  | 400   | 340928 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060123.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200601231200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200601231200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 353679 | 0     | 0     | 0     | 99    | 1     | 0     | 0     | 0.08   | 1.26  |
| 0 - 10    | 4393   | 0     | 0     | 0     | 87    | 6     | 3     | 4     | 2.25   | 8.49  |
| 10 - 30   | 7237   | 0     | 0     | 92    | 5     | 1     | 1     | 2     | -7.82  | 7.42  |
| 20 - 40   | 5749   | 0     | 85    | 8     | 6     | 1     | 0     | 1     | -16.40 | 7.28  |
| 30 - 50   | 1307   | 53    | 21    | 16    | 7     | 2     | 1     | 1     | -18.37 | 11.70 |
| 40 - 60   | 2822   | 88    | 4     | 2     | 3     | 1     | 1     | 2     | -31.31 | 13.27 |
| 50 - 70   | 2409   | 74    | 14    | 7     | 4     | 1     | 0     | 0     | -29.15 | 14.03 |
| 60 - 80   | 1135   | 87    | 6     | 5     | 2     | 0     | 0     | 0     | -42.63 | 16.53 |
| 70 - 90   | 5437   | 87    | 6     | 5     | 2     | 0     | 0     | 0     | -43.03 | 18.07 |
| 80 - 100  | 4536   | 50    | 14    | 12    | 23    | 1     | 0     | 0     | -24.80 | 22.88 |
| 90 - 100  | 15793  | 22    | 23    | 25    | 30    | 1     | 0     | 0     | -12.08 | 14.16 |
| 100-100   | 686    | 52    | 18    | 29    | 1     | 0     | 0     | 0     | -25.62 | 21.90 |
| Total:    | 405183 | 4     | 3     | 3     | 89    | 1     | 0     | 0     | -2.21  | 9.11  |
| Ice only: | 51504  | 33    | 20    | 24    | 21    | 1     | 0     | 1     | -17.99 | 18.89 |

## Ice edge stats

| IA\SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 27044 | 24974  |
| Water  | 372   | 353350 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060206.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200602061200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200602061200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 369812 | 0     | 0     | 0     | 98    | 1     | 0     | 0     | 0.08   | 1.21  |
| 0 - 10    | 5128   | 0     | 0     | 0     | 89    | 5     | 3     | 3     | 1.76   | 7.09  |
| 10 - 30   | 2372   | 0     | 0     | 80    | 12    | 4     | 2     | 2     | -5.78  | 7.69  |
| 20 - 40   | 1220   | 0     | 82    | 7     | 5     | 2     | 3     | 1     | -14.57 | 9.03  |
| 30 - 50   | 1798   | 77    | 11    | 6     | 5     | 1     | 1     | 0     | -23.28 | 9.95  |
| 40 - 60   | 846    | 50    | 16    | 15    | 14    | 4     | 0     | 0     | -18.54 | 13.91 |
| 50 - 70   | 1307   | 77    | 7     | 7     | 9     | 1     | 0     | 0     | -33.50 | 17.30 |
| 60 - 80   | 1771   | 83    | 8     | 6     | 3     | 0     | 0     | 0     | -43.55 | 18.58 |
| 70 - 90   | 2572   | 85    | 6     | 3     | 3     | 3     | 0     | 0     | -38.72 | 17.98 |
| 80 - 100  | 3888   | 61    | 12    | 13    | 13    | 0     | 0     | 0     | -28.47 | 21.28 |
| 90 - 100  | 13815  | 28    | 29    | 26    | 16    | 1     | 0     | 0     | -15.71 | 15.45 |
| 100-100   | 647    | 74    | 18    | 8     | 0     | 0     | 0     | 0     | -36.70 | 22.80 |
| Total:    | 405176 | 3     | 2     | 2     | 92    | 1     | 0     | 0     | -1.53  | 7.92  |
| Ice only: | 35364  | 37    | 18    | 19    | 23    | 2     | 1     | 1     | -18.44 | 19.74 |

## Ice edge stats

| IA\SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 22427 | 13389  |
| Water  | 458   | 369465 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060220.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200602201200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200602201200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 378605 | 0     | 0     | 0     | 98    | 1     | 0     | 0     | 0.11   | 1.45  |
| 0 - 10    | 2232   | 0     | 0     | 0     | 74    | 13    | 6     | 8     | 3.89   | 9.67  |
| 10 - 30   | 1301   | 0     | 0     | 60    | 30    | 5     | 2     | 3     | -3.39  | 7.92  |
| 20 - 40   | 593    | 0     | 41    | 25    | 16    | 5     | 5     | 7     | -4.92  | 13.20 |
| 30 - 50   | 744    | 38    | 14    | 17    | 20    | 5     | 3     | 3     | -11.50 | 14.97 |
| 40 - 60   | 1139   | 74    | 12    | 7     | 6     | 1     | 0     | 0     | -26.01 | 12.37 |
| 50 - 70   | 896    | 82    | 16    | 1     | 1     | 0     | 0     | 0     | -31.47 | 11.18 |
| 60 - 80   | 1099   | 95    | 3     | 1     | 1     | 0     | 0     | 0     | -45.12 | 11.59 |
| 70 - 90   | 1561   | 66    | 16    | 10    | 8     | 0     | 0     | 0     | -25.75 | 15.11 |
| 80 - 100  | 3489   | 56    | 17    | 15    | 13    | 0     | 0     | 0     | -26.81 | 21.18 |
| 90 - 100  | 12993  | 31    | 18    | 33    | 18    | 0     | 0     | 0     | -17.35 | 20.21 |
| 100-100   | 548    | 84    | 14    | 2     | 0     | 0     | 0     | 0     | -41.99 | 22.78 |
| Total:    | 405200 | 3     | 1     | 2     | 93    | 1     | 0     | 0     | -1.12  | 7.24  |
| Ice only: | 26595  | 39    | 15    | 23    | 20    | 2     | 1     | 1     | -18.68 | 20.97 |

## Ice edge stats

| IA\SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 20033 | 6953   |
| Water  | 561   | 378192 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060306.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200603061200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200603061200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 377424 | 0     | 0     | 0     | 98    | 1     | 0     | 0     | 0.12   | 1.42  |
| 0 - 10    | 1276   | 0     | 0     | 0     | 59    | 23    | 10    | 8     | 5.12   | 10.14 |
| 10 - 30   | 1581   | 0     | 0     | 58    | 30    | 8     | 3     | 2     | -3.66  | 7.44  |
| 20 - 40   | 1773   | 0     | 58    | 21    | 18    | 2     | 1     | 0     | -10.37 | 8.19  |
| 30 - 50   | 780    | 60    | 19    | 13    | 6     | 1     | 1     | 0     | -19.90 | 11.16 |
| 40 - 60   | 914    | 37    | 33    | 15    | 11    | 2     | 1     | 1     | -15.86 | 12.88 |
| 50 - 70   | 310    | 72    | 6     | 8     | 13    | 1     | 0     | 0     | -28.02 | 16.46 |
| 60 - 80   | 733    | 86    | 8     | 5     | 2     | 0     | 0     | 0     | -37.91 | 15.46 |
| 70 - 90   | 3546   | 86    | 9     | 4     | 2     | 0     | 0     | 0     | -36.95 | 15.17 |
| 80 - 100  | 5161   | 49    | 11    | 25    | 15    | 0     | 0     | 0     | -22.96 | 21.25 |
| 90 - 100  | 11044  | 45    | 23    | 22    | 11    | 0     | 0     | 0     | -20.86 | 17.53 |
| 100-100   | 669    | 90    | 10    | 1     | 0     | 0     | 0     | 0     | -48.08 | 21.91 |
| Total:    | 405211 | 3     | 1     | 1     | 92    | 1     | 0     | 0     | -1.36  | 7.65  |
| Ice only: | 27787  | 46    | 18    | 19    | 13    | 2     | 1     | 1     | -21.46 | 19.81 |

## Ice edge stats

| IA\SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 21362 | 6837   |
| Water  | 484   | 377056 |



IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060320.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200603201200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200603201200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 373831 | 0     | 0     | 0     | 98    | 2     | 0     | 0     | 0.14   | 1.44  |
| 0 - 10    | 442    | 0     | 0     | 0     | 40    | 29    | 18    | 13    | 7.45   | 9.74  |
| 10 - 30   | 947    | 0     | 0     | 29    | 46    | 11    | 8     | 6     | 1.90   | 8.99  |
| 20 - 40   | 1296   | 0     | 44    | 14    | 29    | 8     | 4     | 1     | -7.06  | 10.52 |
| 30 - 50   | 187    | 20    | 22    | 19    | 28    | 8     | 4     | 0     | -8.51  | 11.54 |
| 40 - 60   | 700    | 63    | 16    | 6     | 10    | 2     | 3     | 0     | -22.73 | 15.14 |
| 50 - 70   | 1239   | 50    | 21    | 13    | 16    | 1     | 0     | 0     | -22.67 | 17.31 |
| 60 - 80   | 914    | 76    | 11    | 9     | 4     | 0     | 0     | 0     | -40.12 | 20.95 |
| 70 - 90   | 2972   | 73    | 12    | 10    | 6     | 0     | 0     | 0     | -34.88 | 20.21 |
| 80 - 100  | 4458   | 62    | 13    | 22    | 3     | 0     | 0     | 0     | -26.81 | 18.04 |
| 90 - 100  | 17524  | 45    | 34    | 19    | 2     | 0     | 0     | 0     | -24.07 | 18.67 |
| 100-100   | 667    | 77    | 21    | 3     | 0     | 0     | 0     | 0     | -34.50 | 19.76 |
| Total:    | 405177 | 4     | 2     | 1     | 91    | 2     | 0     | 0     | -1.74  | 8.63  |
| Ice only: | 31346  | 48    | 26    | 17    | 6     | 1     | 1     | 0     | -24.07 | 19.92 |

## Ice edge stats

| IA\SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 26887 | 4970   |
| Water  | 630   | 373253 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060403.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200604031200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200604031200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 361667 | 0     | 0     | 0     | 96    | 4     | 0     | 0     | 0.19   | 1.78  |
| 10 - 30   | 707    | 0     | 0     | 40    | 51    | 6     | 1     | 3     | -1.79  | 7.03  |
| 20 - 40   | 1379   | 0     | 36    | 26    | 28    | 4     | 3     | 4     | -5.26  | 10.78 |
| 30 - 50   | 939    | 29    | 26    | 24    | 15    | 4     | 2     | 0     | -12.14 | 10.90 |
| 40 - 60   | 1105   | 63    | 19    | 13    | 4     | 0     | 0     | 0     | -23.98 | 12.47 |
| 50 - 70   | 1420   | 68    | 13    | 10    | 8     | 1     | 0     | 0     | -28.34 | 16.58 |
| 60 - 80   | 445    | 63    | 22    | 9     | 7     | 0     | 0     | 0     | -24.42 | 13.55 |
| 70 - 90   | 3453   | 57    | 19    | 8     | 15    | 1     | 0     | 0     | -25.00 | 18.05 |
| 80 - 100  | 4696   | 46    | 18    | 16    | 20    | 0     | 0     | 0     | -20.05 | 17.86 |
| 90 - 100  | 28976  | 33    | 21    | 27    | 19    | 0     | 0     | 0     | -15.67 | 15.73 |
| 100-100   | 407    | 80    | 19    | 1     | 0     | 0     | 0     | 0     | -38.00 | 22.35 |
| Total:    | 405194 | 4     | 2     | 2     | 87    | 3     | 0     | 0     | -1.68  | 7.84  |
| Ice only: | 43527  | 37    | 20    | 23    | 18    | 1     | 0     | 0     | -17.17 | 16.66 |

## Ice edge stats

| IA\SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 40079 | 3946   |
| Water  | 822   | 360891 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060417.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200604171200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200604171200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BAS    | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 348602 | 0     | 0     | 0     | 95    | 4     | 0     | 0     | 0.20   | 1.69  |
| 0 - 10    | 203    | 0     | 0     | 0     | 49    | 29    | 15    | 6     | 5.20   | 7.81  |
| 10 - 30   | 256    | 0     | 0     | 13    | 70    | 14    | 2     | 0     | 0.20   | 3.58  |
| 20 - 40   | 734    | 0     | 47    | 10    | 19    | 8     | 8     | 8     | -4.73  | 13.90 |
| 30 - 50   | 1394   | 16    | 12    | 14    | 26    | 10    | 9     | 12    | -1.59  | 16.45 |
| 40 - 60   | 1350   | 68    | 15    | 9     | 6     | 1     | 0     | 0     | -25.74 | 13.98 |
| 50 - 70   | 1506   | 75    | 11    | 8     | 5     | 1     | 0     | 0     | -30.14 | 15.73 |
| 60 - 80   | 1030   | 67    | 15    | 8     | 10    | 1     | 0     | 0     | -27.37 | 16.66 |
| 70 - 90   | 4833   | 32    | 13    | 14    | 28    | 13    | 0     | 0     | -13.76 | 18.33 |
| 80 - 100  | 6184   | 11    | 7     | 21    | 60    | 1     | 0     | 0     | -6.14  | 12.41 |
| 90 - 100  | 38692  | 20    | 13    | 13    | 52    | 3     | 0     | 0     | -9.24  | 14.82 |
| 100-100   | 416    | 67    | 24    | 9     | 0     | 0     | 0     | 0     | -32.54 | 22.86 |
| Total:    | 405200 | 3     | 2     | 2     | 88    | 4     | 0     | 0     | -1.28  | 7.21  |
| Ice only: | 56598  | 23    | 13    | 14    | 46    | 4     | 0     | 0     | -10.39 | 16.05 |

## Ice edge stats

| IA\SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 53472 | 3638   |
| Water  | 834   | 347796 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060501.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200605011200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200605011200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | -10% | exact | 10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|------|-------|-----|-------|-------|--------|-------|
| 0 - 0     | 332490 | 0     | 0     | 0    | 94    | 6   | 0     | 0     | 0.18   | 1.65  |
| 0 - 10    | 18     | 0     | 0     | 0    | 44    | 56  | 0     | 0     | 2.49   | 3.03  |
| 10 - 30   | 811    | 0     | 0     | 57   | 29    | 6   | 3     | 6     | -1.35  | 10.61 |
| 20 - 40   | 1165   | 0     | 64    | 22   | 11    | 2   | 0     | 0     | -12.37 | 7.85  |
| 30 - 50   | 3011   | 23    | 33    | 21   | 17    | 3   | 1     | 1     | -11.22 | 10.34 |
| 40 - 60   | 1339   | 62    | 12    | 6    | 9     | 4   | 4     | 3     | -20.50 | 17.49 |
| 50 - 70   | 600    | 45    | 16    | 9    | 12    | 1   | 6     | 12    | -13.10 | 21.03 |
| 60 - 80   | 236    | 43    | 31    | 14   | 10    | 2   | 0     | 0     | -18.68 | 12.75 |
| 70 - 90   | 1000   | 76    | 8     | 7    | 7     | 3   | 0     | 0     | -35.91 | 21.18 |
| 80 - 100  | 1168   | 80    | 2     | 2    | 15    | 1   | 0     | 0     | -47.60 | 26.39 |
| 90 - 100  | 62844  | 17    | 10    | 11   | 57    | 6   | 0     | 0     | -8.51  | 15.88 |
| 100-100   | 497    | 33    | 26    | 22   | 15    | 4   | 0     | 0     | -20.77 | 24.58 |
| Total:    | 405179 | 4     | 2     | 2    | 86    | 6   | 0     | 0     | -1.65  | 8.38  |
| Ice only: | 72689  | 20    | 11    | 12   | 51    | 6   | 0     | 0     | -9.98  | 17.15 |

## Ice edge stats

| IA\SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 67557 | 5656   |
| Water  | 687   | 331838 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060515.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200605151200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200605151200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 318207 | 0     | 0     | 0     | 94    | 5     | 0     | 0     | 0.25   | 2.22  |
| 10 - 30   | 698    | 0     | 0     | 36    | 55    | 6     | 2     | 1     | -1.06  | 5.73  |
| 20 - 40   | 389    | 0     | 16    | 28    | 36    | 11    | 5     | 4     | -1.33  | 9.27  |
| 30 - 50   | 951    | 50    | 23    | 12    | 10    | 2     | 1     | 1     | -17.25 | 12.28 |
| 40 - 60   | 3715   | 38    | 18    | 14    | 18    | 5     | 3     | 5     | -12.48 | 17.29 |
| 50 - 70   | 804    | 59    | 11    | 8     | 12    | 4     | 4     | 1     | -23.92 | 20.29 |
| 60 - 80   | 552    | 60    | 10    | 9     | 14    | 6     | 1     | 0     | -23.93 | 18.15 |
| 70 - 90   | 2538   | 41    | 9     | 7     | 18    | 21    | 3     | 0     | -18.11 | 25.51 |
| 80 - 100  | 2249   | 36    | 21    | 20    | 23    | 0     | 0     | 0     | -17.62 | 18.47 |
| 90 - 100  | 73483  | 15    | 9     | 10    | 59    | 7     | 0     | 0     | -7.74  | 15.93 |
| 100-100   | 609    | 42    | 11    | 19    | 23    | 5     | 0     | 0     | -20.39 | 24.16 |
| Total:    | 404195 | 4     | 2     | 2     | 85    | 6     | 0     | 0     | -1.69  | 8.83  |
| Ice only: | 85988  | 18    | 10    | 11    | 53    | 7     | 0     | 0     | -8.87  | 16.81 |

## Ice edge stats

| IA\SAF | Ice   | Water  |
|--------|-------|--------|
| Ice    | 82794 | 4697   |
| Water  | 1054  | 317190 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060602.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200606021200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200606021200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 295106 | 0     | 0     | 0     | 92    | 5     | 1     | 3     | 1.47   | 8.63  |
| 0 - 10    | 16     | 0     | 0     | 0     | 0     | 13    | 19    | 69    | 27.80  | 12.53 |
| 10 - 30   | 695    | 0     | 0     | 28    | 8     | 8     | 9     | 48    | 18.21  | 22.87 |
| 20 - 40   | 303    | 0     | 40    | 3     | 9     | 3     | 14    | 31    | 4.90   | 22.77 |
| 30 - 50   | 2819   | 14    | 3     | 2     | 7     | 8     | 15    | 51    | 15.76  | 22.81 |
| 40 - 60   | 1122   | 38    | 10    | 10    | 20    | 10    | 8     | 5     | -12.33 | 19.49 |
| 50 - 70   | 1052   | 50    | 5     | 9     | 17    | 6     | 9     | 3     | -21.22 | 25.09 |
| 60 - 80   | 778    | 7     | 5     | 14    | 63    | 11    | 0     | 0     | -4.38  | 13.49 |
| 70 - 90   | 13769  | 20    | 3     | 6     | 43    | 28    | 0     | 0     | -10.48 | 23.90 |
| 80 - 100  | 1663   | 3     | 3     | 9     | 85    | 0     | 0     | 0     | -1.82  | 6.84  |
| 90 - 100  | 85684  | 9     | 6     | 22    | 62    | 1     | 0     | 0     | -6.33  | 16.16 |
| 100-100   | 489    | 54    | 34    | 13    | 0     | 0     | 0     | 0     | -28.84 | 21.27 |
| Total:    | 403496 | 3     | 2     | 5     | 82    | 5     | 1     | 2     | -0.62  | 12.51 |
| Ice only: | 108390 | 12    | 6     | 19    | 57    | 5     | 1     | 2     | -6.31  | 18.32 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 102835 | 5927   |
| Water  | 6948   | 288198 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060612.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200606121200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200606121200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 275439 | 0     | 0     | 0     | 91    | 8     | 1     | 0     | 0.28   | 2.25  |
| 10 - 30   | 1975   | 0     | 0     | 46    | 41    | 9     | 3     | 1     | -1.52  | 5.40  |
| 20 - 40   | 978    | 0     | 45    | 25    | 23    | 4     | 2     | 1     | -7.97  | 9.07  |
| 30 - 50   | 299    | 41    | 10    | 8     | 14    | 5     | 9     | 11    | -9.06  | 19.08 |
| 40 - 60   | 1012   | 40    | 17    | 15    | 19    | 4     | 3     | 2     | -14.94 | 15.94 |
| 50 - 70   | 517    | 50    | 21    | 16    | 9     | 2     | 2     | 0     | -20.37 | 15.31 |
| 60 - 80   | 789    | 38    | 12    | 14    | 29    | 7     | 0     | 0     | -16.57 | 18.44 |
| 70 - 90   | 4840   | 50    | 10    | 11    | 27    | 2     | 0     | 0     | -26.72 | 25.98 |
| 80 - 100  | 415    | 64    | 25    | 7     | 4     | 0     | 0     | 0     | -31.30 | 19.50 |
| 90 - 100  | 116548 | 10    | 7     | 17    | 64    | 1     | 0     | 0     | -6.07  | 14.55 |
| 100-100   | 728    | 53    | 28    | 19    | 0     | 0     | 0     | 0     | -24.60 | 19.35 |
| Total:    | 403540 | 4     | 3     | 6     | 81    | 6     | 0     | 0     | -2.09  | 9.74  |
| Ice only: | 128101 | 12    | 8     | 18    | 61    | 2     | 0     | 0     | -7.18  | 15.81 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 121723 | 6717   |
| Water  | 808    | 274660 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060626.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200606261200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200606261200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 262322 | 0     | 0     | 0     | 94    | 5     | 1     | 1     | 0.46   | 3.78  |
| 0 - 10    | 51     | 0     | 0     | 0     | 75    | 22    | 4     | 0     | 1.65   | 3.73  |
| 10 - 30   | 1623   | 0     | 0     | 58    | 21    | 7     | 5     | 9     | -0.60  | 13.75 |
| 20 - 40   | 2860   | 0     | 27    | 6     | 15    | 18    | 19    | 14    | 2.37   | 15.57 |
| 30 - 50   | 1226   | 28    | 30    | 21    | 17    | 2     | 1     | 1     | -12.44 | 10.73 |
| 40 - 60   | 2725   | 29    | 8     | 7     | 19    | 15    | 14    | 8     | -6.07  | 20.18 |
| 50 - 70   | 644    | 32    | 6     | 7     | 16    | 7     | 17    | 15    | -7.86  | 25.60 |
| 60 - 80   | 1026   | 43    | 9     | 14    | 20    | 5     | 8     | 0     | -20.86 | 25.14 |
| 70 - 90   | 6307   | 56    | 8     | 9     | 21    | 6     | 0     | 0     | -30.52 | 27.16 |
| 80 - 100  | 2574   | 48    | 13    | 19    | 19    | 0     | 0     | 0     | -26.88 | 26.62 |
| 90 - 100  | 121158 | 7     | 8     | 26    | 58    | 1     | 0     | 0     | -4.83  | 11.47 |
| 100-100   | 1024   | 34    | 41    | 25    | 0     | 0     | 0     | 0     | -18.04 | 12.97 |
| Total:    | 403540 | 4     | 3     | 9     | 79    | 4     | 1     | 1     | -1.97  | 9.93  |
| Ice only: | 141218 | 11    | 9     | 25    | 52    | 2     | 1     | 1     | -6.50  | 14.96 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 133366 | 8200   |
| Water  | 1852   | 260489 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060710.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200607101200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200607101200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 247133 | 0     | 0     | 0     | 92    | 7     | 0     | 0     | 0.25   | 2.25  |
| 10 - 30   | 1774   | 0     | 0     | 58    | 25    | 7     | 5     | 5     | -1.69  | 9.18  |
| 20 - 40   | 3371   | 0     | 66    | 15    | 12    | 3     | 2     | 1     | -11.23 | 9.65  |
| 30 - 50   | 484    | 42    | 23    | 19    | 15    | 1     | 0     | 0     | -15.45 | 10.97 |
| 40 - 60   | 2408   | 50    | 14    | 11    | 19    | 5     | 2     | 0     | -19.00 | 16.45 |
| 50 - 70   | 570    | 77    | 17    | 5     | 1     | 0     | 0     | 0     | -30.87 | 12.79 |
| 60 - 80   | 1727   | 32    | 10    | 21    | 36    | 1     | 0     | 0     | -15.38 | 19.17 |
| 70 - 90   | 8725   | 34    | 9     | 12    | 36    | 9     | 0     | 0     | -15.88 | 21.01 |
| 80 - 100  | 5827   | 43    | 14    | 13    | 30    | 0     | 0     | 0     | -22.24 | 23.74 |
| 90 - 100  | 130084 | 6     | 6     | 23    | 65    | 1     | 0     | 0     | -4.09  | 10.95 |
| 100-100   | 1440   | 25    | 36    | 38    | 1     | 0     | 0     | 0     | -16.17 | 14.14 |
| Total:    | 403543 | 4     | 3     | 8     | 79    | 5     | 0     | 0     | -2.23  | 9.20  |
| Ice only: | 156410 | 10    | 8     | 22    | 58    | 1     | 0     | 0     | -6.15  | 13.62 |

## Ice edge stats

| IA/SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 147189 | 9566   |
| Water  | 654    | 246494 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060724.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200607241200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200607241200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 237119 | 0     | 0     | 0     | 91    | 8     | 1     | 1     | 0.60   | 4.48  |
| 10 - 30   | 2502   | 0     | 0     | 69    | 18    | 5     | 4     | 5     | -3.18  | 9.84  |
| 20 - 40   | 477    | 0     | 20    | 13    | 13    | 9     | 12    | 33    | 8.49   | 18.36 |
| 30 - 50   | 906    | 40    | 16    | 14    | 19    | 5     | 4     | 2     | -12.55 | 14.22 |
| 40 - 60   | 555    | 44    | 11    | 6     | 12    | 9     | 8     | 10    | -12.36 | 22.08 |
| 50 - 70   | 2929   | 71    | 9     | 7     | 8     | 4     | 1     | 0     | -28.97 | 17.68 |
| 60 - 80   | 369    | 83    | 5     | 4     | 5     | 1     | 1     | 0     | -39.52 | 19.54 |
| 70 - 90   | 5306   | 44    | 12    | 15    | 25    | 5     | 0     | 0     | -21.52 | 22.58 |
| 80 - 100  | 10843  | 26    | 15    | 18    | 42    | 0     | 0     | 0     | -13.88 | 19.66 |
| 90 - 100  | 141110 | 5     | 5     | 21    | 69    | 1     | 0     | 0     | -3.37  | 10.43 |
| 100-100   | 1431   | 22    | 34    | 42    | 2     | 0     | 0     | 0     | -15.25 | 15.90 |
| Total:    | 403547 | 4     | 2     | 9     | 79    | 5     | 0     | 1     | -1.84  | 9.68  |
| Ice only: | 166428 | 9     | 6     | 21    | 62    | 1     | 0     | 0     | -5.31  | 13.35 |

## Ice edge stats

| IA/SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 158927 | 7845   |
| Water  | 2153   | 234976 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060807.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200608071200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200608071200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 222313 | 0     | 0     | 0     | 94    | 5     | 0     | 0     | 0.17   | 1.58  |
| 10 - 30   | 2009   | 0     | 0     | 39    | 37    | 9     | 6     | 9     | 1.57   | 11.13 |
| 20 - 40   | 1850   | 0     | 54    | 9     | 26    | 6     | 2     | 3     | -8.45  | 12.49 |
| 30 - 50   | 2442   | 82    | 6     | 4     | 6     | 1     | 0     | 0     | -24.86 | 9.77  |
| 40 - 60   | 1265   | 81    | 8     | 6     | 5     | 0     | 0     | 0     | -31.64 | 12.71 |
| 50 - 70   | 1903   | 76    | 8     | 6     | 8     | 2     | 1     | 0     | -32.75 | 17.96 |
| 60 - 80   | 1984   | 64    | 9     | 10    | 12    | 3     | 2     | 0     | -31.72 | 23.32 |
| 70 - 90   | 7070   | 66    | 10    | 10    | 14    | 1     | 0     | 0     | -34.18 | 24.59 |
| 80 - 100  | 6497   | 48    | 12    | 15    | 25    | 0     | 0     | 0     | -26.30 | 26.33 |
| 90 - 100  | 154708 | 7     | 4     | 15    | 71    | 2     | 0     | 0     | -4.70  | 14.34 |
| 100-100   | 1514   | 28    | 26    | 44    | 2     | 0     | 0     | 0     | -17.33 | 18.69 |
| Total:    | 403555 | 6     | 3     | 7     | 80    | 4     | 0     | 0     | -3.39  | 12.52 |
| Ice only: | 181242 | 14    | 6     | 15    | 63    | 2     | 0     | 0     | -7.75  | 17.65 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 165962 | 15622  |
| Water  | 225    | 222097 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060821.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200608211200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200608211200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 214405 | 0     | 0     | 0     | 94    | 5     | 1     | 0     | 0.32   | 2.40  |
| 10 - 30   | 3267   | 0     | 0     | 60    | 31    | 5     | 3     | 1     | -3.25  | 6.51  |
| 20 - 40   | 2321   | 0     | 46    | 19    | 23    | 7     | 3     | 2     | -7.25  | 10.79 |
| 30 - 50   | 2127   | 36    | 18    | 10    | 19    | 8     | 7     | 2     | -10.79 | 14.26 |
| 40 - 60   | 676    | 46    | 17    | 14    | 18    | 4     | 0     | 0     | -17.74 | 14.32 |
| 50 - 70   | 289    | 81    | 5     | 1     | 12    | 1     | 0     | 0     | -31.85 | 15.63 |
| 60 - 80   | 1565   | 55    | 10    | 10    | 20    | 5     | 0     | 0     | -25.70 | 21.83 |
| 70 - 90   | 13874  | 41    | 13    | 15    | 28    | 3     | 0     | 0     | -19.79 | 21.12 |
| 80 - 100  | 14602  | 34    | 10    | 18    | 39    | 0     | 0     | 0     | -17.51 | 22.40 |
| 90 - 100  | 149042 | 5     | 5     | 16    | 71    | 3     | 0     | 0     | -3.51  | 10.58 |
| 100-100   | 1358   | 24    | 25    | 45    | 5     | 1     | 0     | 0     | -14.19 | 15.80 |
| Total:    | 403526 | 5     | 3     | 8     | 79    | 4     | 0     | 0     | -2.77  | 10.50 |
| Ice only: | 189121 | 11    | 7     | 17    | 62    | 3     | 0     | 0     | -6.27  | 14.34 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 177573 | 11915  |
| Water  | 626    | 213787 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060904.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200609041200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200609041200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 212797 | 0     | 0     | 0     | 95    | 5     | 0     | 0     | 0.18   | 1.64  |
| 0 - 10    | 12     | 0     | 0     | 0     | 0     | 0     | 25    | 75    | 26.08  | 10.30 |
| 10 - 30   | 1615   | 0     | 0     | 66    | 28    | 4     | 1     | 1     | -4.28  | 5.27  |
| 20 - 40   | 2296   | 0     | 62    | 13    | 18    | 4     | 2     | 1     | -10.84 | 9.77  |
| 30 - 50   | 3505   | 22    | 14    | 11    | 15    | 9     | 13    | 16    | -0.99  | 19.74 |
| 40 - 60   | 1561   | 45    | 8     | 6     | 14    | 14    | 8     | 4     | -14.07 | 20.47 |
| 50 - 70   | 5349   | 50    | 12    | 10    | 19    | 6     | 3     | 0     | -20.15 | 19.08 |
| 60 - 80   | 1102   | 50    | 9     | 9     | 22    | 9     | 0     | 0     | -21.71 | 20.33 |
| 70 - 90   | 7662   | 49    | 9     | 13    | 26    | 4     | 0     | 0     | -23.03 | 22.66 |
| 80 - 100  | 20823  | 19    | 10    | 19    | 51    | 0     | 0     | 0     | -9.94  | 16.46 |
| 90 - 100  | 145204 | 3     | 4     | 18    | 73    | 3     | 0     | 0     | -2.36  | 7.90  |
| 100-100   | 1633   | 22    | 22    | 47    | 8     | 1     | 0     | 0     | -13.22 | 14.37 |
| Total:    | 403559 | 4     | 3     | 8     | 80    | 4     | 0     | 0     | -2.23  | 9.01  |
| Ice only: | 190762 | 9     | 6     | 18    | 64    | 3     | 0     | 0     | -4.91  | 12.46 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 180164 | 10944  |
| Water  | 288    | 212509 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc060918.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200609181200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200609181200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 207018 | 0     | 0     | 0     | 96    | 4     | 0     | 0     | 0.28   | 2.75  |
| 0 - 10    | 60     | 0     | 0     | 0     | 80    | 20    | 0     | 0     | 0.84   | 2.26  |
| 10 - 30   | 2521   | 0     | 0     | 55    | 23    | 7     | 5     | 11    | 0.17   | 13.56 |
| 20 - 40   | 3628   | 0     | 32    | 21    | 27    | 7     | 5     | 8     | -2.46  | 14.36 |
| 30 - 50   | 1142   | 49    | 16    | 12    | 12    | 5     | 4     | 2     | -15.03 | 14.64 |
| 40 - 60   | 3499   | 51    | 12    | 10    | 15    | 5     | 5     | 1     | -18.57 | 17.61 |
| 50 - 70   | 3005   | 50    | 23    | 12    | 11    | 3     | 0     | 0     | -21.66 | 15.85 |
| 60 - 80   | 2912   | 55    | 13    | 16    | 16    | 0     | 0     | 0     | -27.53 | 22.08 |
| 70 - 90   | 8747   | 41    | 12    | 12    | 30    | 5     | 0     | 0     | -20.01 | 22.27 |
| 80 - 100  | 12904  | 14    | 7     | 18    | 60    | 1     | 0     | 0     | -7.28  | 14.50 |
| 90 - 100  | 156661 | 7     | 7     | 20    | 64    | 2     | 0     | 0     | -4.45  | 10.94 |
| 100-100   | 1452   | 38    | 30    | 30    | 2     | 0     | 0     | 0     | -18.23 | 12.88 |
| Total:    | 403549 | 6     | 4     | 10    | 77    | 3     | 0     | 0     | -2.90  | 10.18 |
| Ice only: | 196531 | 11    | 8     | 20    | 58    | 2     | 0     | 0     | -6.25  | 13.52 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 184460 | 12426  |
| Water  | 679    | 206339 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc061002.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200610021200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200610021200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 206356 | 0     | 0     | 0     | 96    | 4     | 0     | 0     | 0.12   | 1.20  |
| 0 - 10    | 818    | 0     | 0     | 0     | 68    | 14    | 8     | 10    | 4.99   | 10.76 |
| 10 - 30   | 1634   | 0     | 0     | 60    | 27    | 6     | 3     | 4     | -2.85  | 8.60  |
| 20 - 40   | 3803   | 0     | 52    | 19    | 17    | 4     | 4     | 3     | -8.04  | 11.46 |
| 30 - 50   | 1131   | 42    | 25    | 14    | 16    | 3     | 0     | 0     | -15.56 | 10.92 |
| 40 - 60   | 2934   | 58    | 12    | 10    | 13    | 6     | 1     | 0     | -20.92 | 15.95 |
| 50 - 70   | 3195   | 33    | 11    | 13    | 25    | 10    | 7     | 1     | -12.16 | 18.29 |
| 60 - 80   | 1838   | 53    | 14    | 11    | 15    | 7     | 0     | 0     | -24.46 | 21.14 |
| 70 - 90   | 12432  | 49    | 15    | 19    | 16    | 0     | 0     | 0     | -23.68 | 20.83 |
| 80 - 100  | 11975  | 43    | 12    | 14    | 30    | 1     | 0     | 0     | -23.81 | 26.03 |
| 90 - 100  | 155969 | 5     | 5     | 16    | 71    | 3     | 0     | 0     | -2.94  | 8.04  |
| 100-100   | 1412   | 33    | 34    | 30    | 2     | 1     | 0     | 0     | -16.76 | 11.91 |
| Total:    | 403497 | 6     | 4     | 8     | 79    | 3     | 0     | 0     | -3.05  | 10.29 |
| Ice only: | 197141 | 12    | 8     | 17    | 60    | 3     | 0     | 0     | -6.37  | 13.92 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 183824 | 13678  |
| Water  | 100    | 206293 |

IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc061019.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200610191200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200610191200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 206874 | 0     | 0     | 0     | 97    | 2     | 0     | 1     | 0.28   | 2.83  |
| 0 - 10    | 132    | 0     | 0     | 0     | 95    | 5     | 0     | 0     | 0.18   | 0.97  |
| 10 - 30   | 3633   | 0     | 0     | 82    | 13    | 4     | 1     | 0     | -6.82  | 5.56  |
| 20 - 40   | 1596   | 0     | 71    | 10    | 11    | 4     | 3     | 2     | -12.45 | 10.54 |
| 30 - 50   | 1271   | 76    | 8     | 6     | 7     | 1     | 1     | 0     | -23.63 | 10.70 |
| 40 - 60   | 2205   | 74    | 8     | 6     | 12    | 1     | 0     | 0     | -28.99 | 15.35 |
| 50 - 70   | 5107   | 77    | 10    | 6     | 6     | 1     | 1     | 0     | -33.59 | 17.02 |
| 60 - 80   | 1907   | 66    | 9     | 9     | 12    | 1     | 2     | 0     | -31.30 | 22.19 |
| 70 - 90   | 10651  | 61    | 12    | 11    | 15    | 1     | 0     | 0     | -31.47 | 24.55 |
| 80 - 100  | 18297  | 33    | 11    | 14    | 41    | 0     | 0     | 0     | -17.77 | 23.35 |
| 90 - 100  | 150539 | 7     | 6     | 15    | 69    | 3     | 0     | 0     | -4.40  | 12.11 |
| 100-100   | 1280   | 36    | 31    | 30    | 3     | 0     | 0     | 0     | -18.33 | 15.81 |
| Total:    | 403492 | 8     | 4     | 8     | 78    | 2     | 0     | 0     | -4.11  | 12.92 |
| Ice only: | 196618 | 16    | 8     | 16    | 58    | 2     | 0     | 0     | -8.73  | 17.10 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 178145 | 18855  |
| Water  | 807    | 206090 |



IA file: /data2/validation/output/automatic/sikuout/nic/reform\_antarc061030.txt  
 CT file: /data2/dnmi\_mirror/saf.met.no/prod/ice/conc/ice\_conc\_sh\_200610301200.hdf  
 IE file: /data2/dnmi\_mirror/saf.met.no/prod/ice/edge/ice\_edge\_sh\_200610301200.hdf

## Error from IA range

| IA        | NP     | <-20% | >-20% | >-10% | exact | <+10% | <+20% | >+20% | BIAS   | STD   |
|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0 - 0     | 216902 | 0     | 0     | 0     | 96    | 3     | 0     | 0     | 0.12   | 1.44  |
| 0 - 10    | 114    | 0     | 0     | 0     | 65    | 22    | 5     | 8     | 3.88   | 8.15  |
| 10 - 30   | 439    | 0     | 0     | 61    | 15    | 4     | 4     | 16    | 2.60   | 19.24 |
| 20 - 40   | 4543   | 0     | 46    | 16    | 20    | 7     | 5     | 6     | -5.77  | 13.76 |
| 30 - 50   | 2637   | 65    | 17    | 11    | 5     | 0     | 0     | 3     | -20.44 | 12.64 |
| 40 - 60   | 2616   | 43    | 10    | 6     | 17    | 13    | 6     | 5     | -13.36 | 19.47 |
| 50 - 70   | 7287   | 42    | 13    | 10    | 23    | 8     | 4     | 0     | -15.76 | 18.11 |
| 60 - 80   | 13010  | 31    | 13    | 14    | 31    | 9     | 1     | 0     | -13.32 | 17.42 |
| 70 - 90   | 10459  | 44    | 8     | 10    | 34    | 4     | 0     | 0     | -24.06 | 26.59 |
| 80 - 100  | 14616  | 25    | 9     | 15    | 49    | 1     | 0     | 0     | -12.94 | 20.11 |
| 90 - 100  | 129513 | 4     | 6     | 23    | 65    | 2     | 0     | 0     | -3.24  | 8.50  |
| 100-100   | 1320   | 39    | 32    | 26    | 3     | 0     | 0     | 0     | -19.28 | 15.13 |
| Total:    | 403456 | 6     | 4     | 9     | 77    | 3     | 0     | 0     | -3.13  | 10.50 |
| Ice only: | 186554 | 13    | 8     | 20    | 55    | 3     | 0     | 0     | -6.90  | 14.47 |

## Ice edge stats

| IA\SAF | Ice    | Water  |
|--------|--------|--------|
| Ice    | 171907 | 15032  |
| Water  | 279    | 216674 |