Norwegian Meteorological Institute

Use of CM SAF data for reprocessing activities at MET Norway

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AVHRR GAC

MET Norway is beta user for this dataset.

CryoClim:

- snow cover

NORMAP:

- sea surface and ice surface temperatures (SST + IST)
- radiative fluxes
- sea ice edge

SSM/I

ESA Sea Ice Climate Change Initiative:

- sea ice concentration

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AVHRR GAC in CryoClim

- Financed by ESA 2008 – 2013
- Developed time series for satellite based cryospheric products (snow cover, sea ice concentration, glacier products..) + a portal allowing human and computer access to the products
- Goal for snow product: long time series, multi-sensor (optical + pmw) for full global coverage

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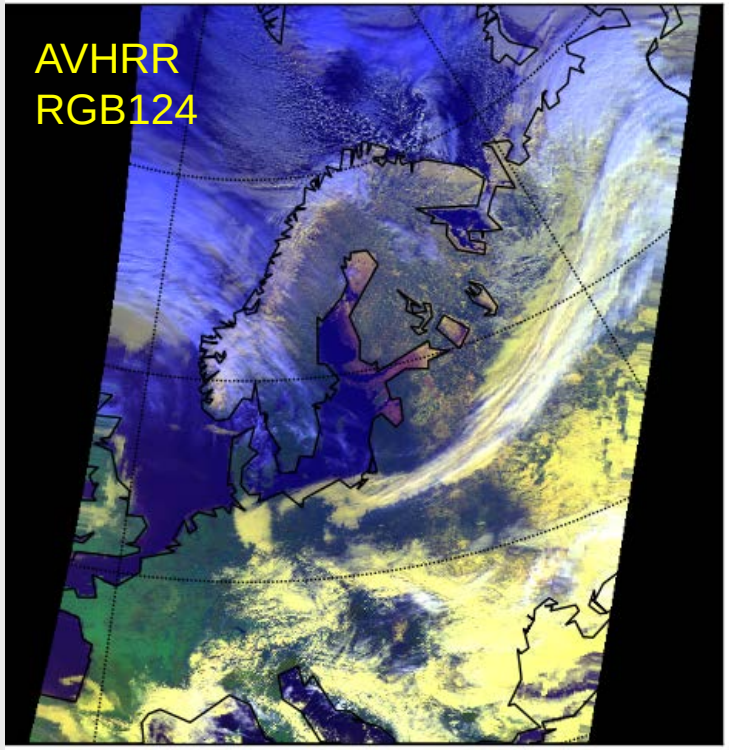
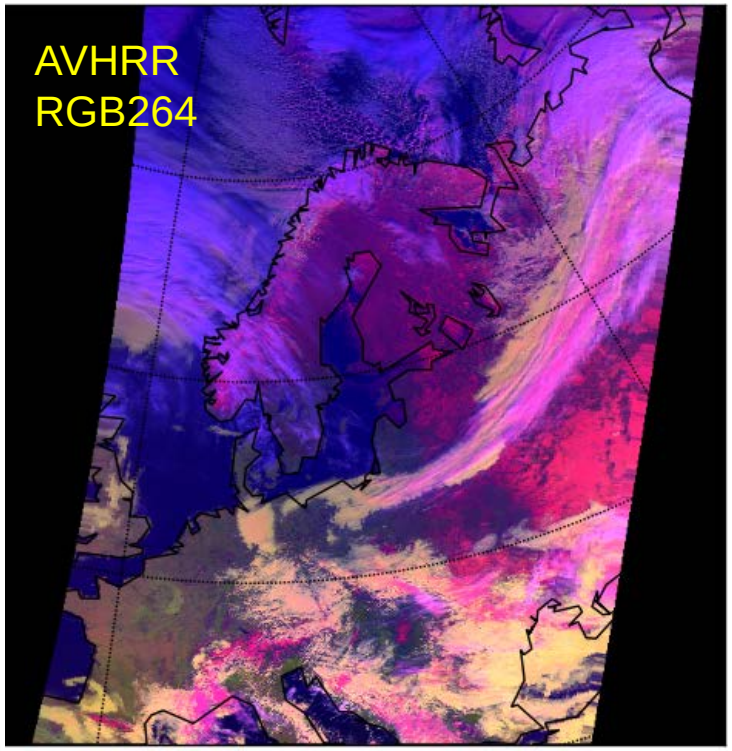
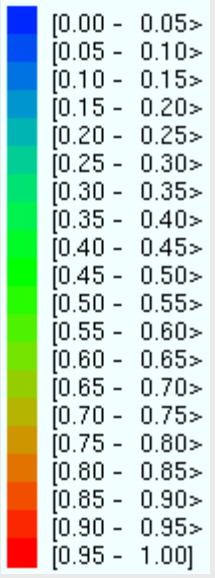
- For each AVHRR GAC swath: use Bayes approach to estimate probabilities for independent classes
    - snow
    - cloud
    - snow-free
- The classified swaths from one day are gridded and averaged, giving a daily, snow / no-snow product

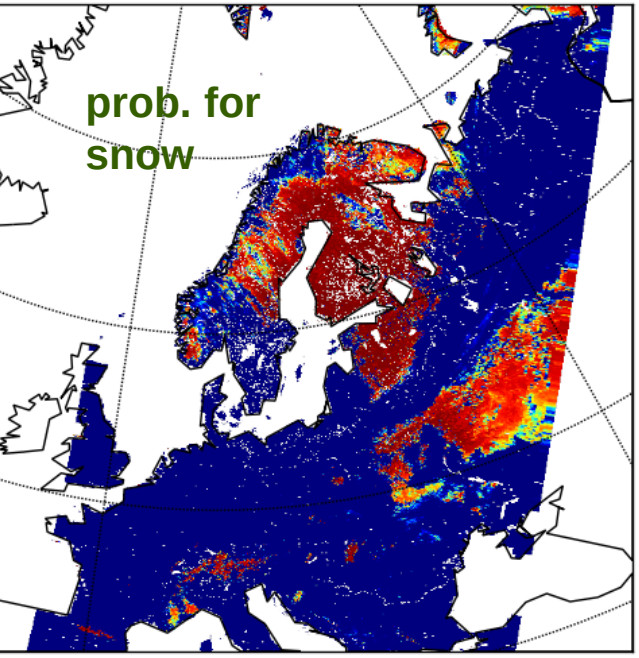
AVHRR
GAC
passage
product

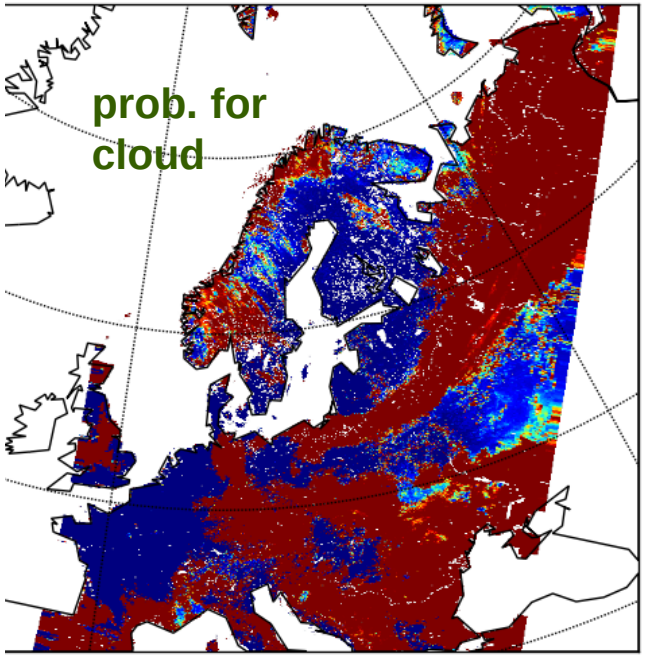
NOAA-17
March 15
2003
09:15
UTC

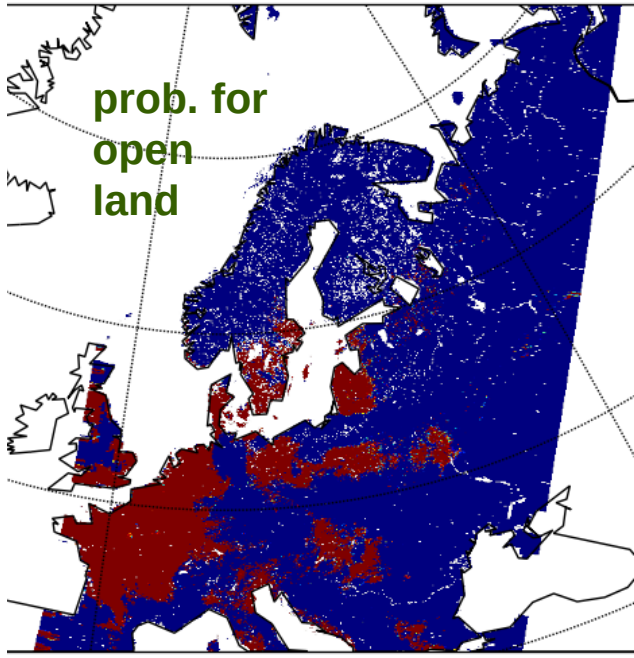


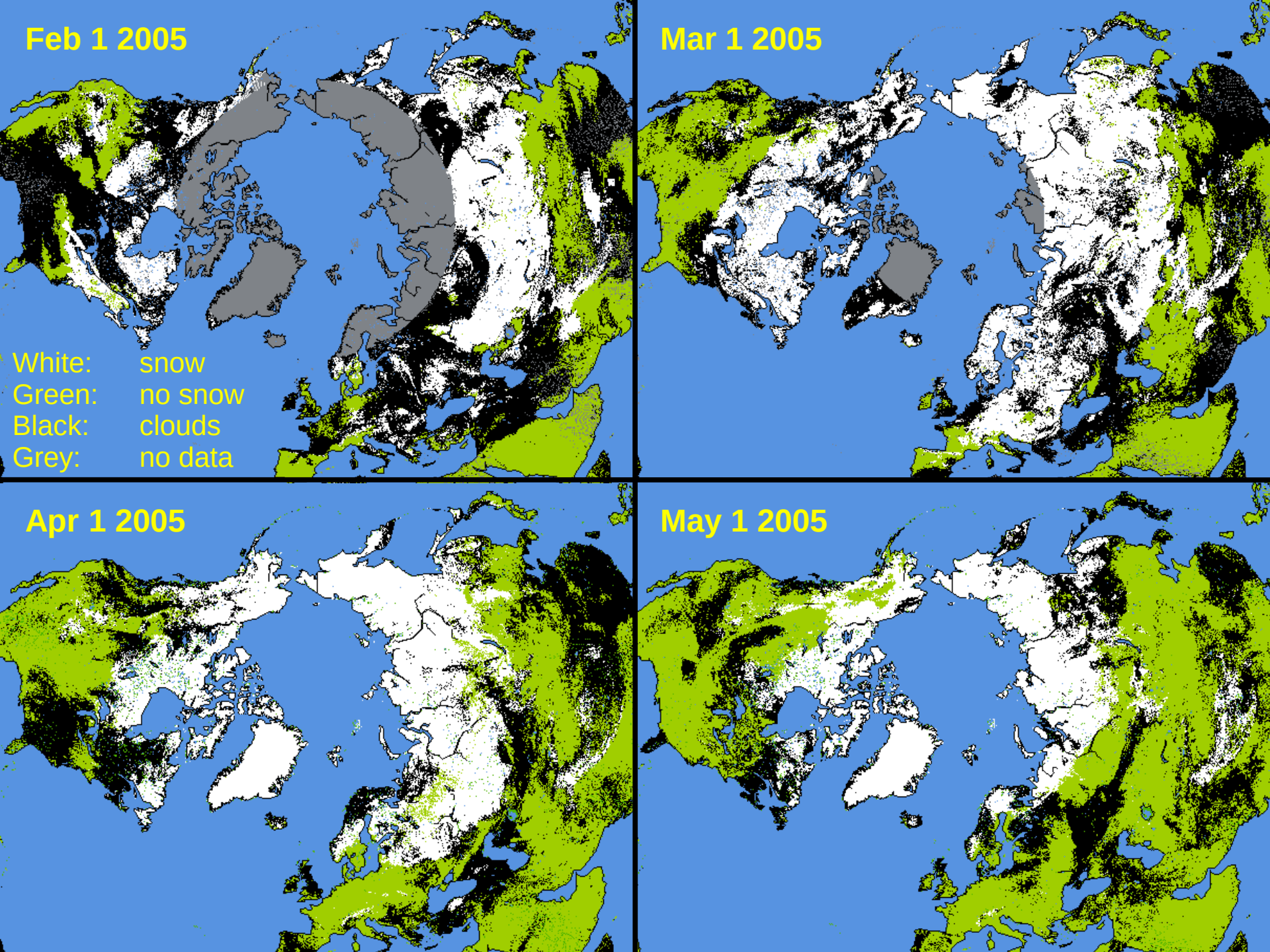




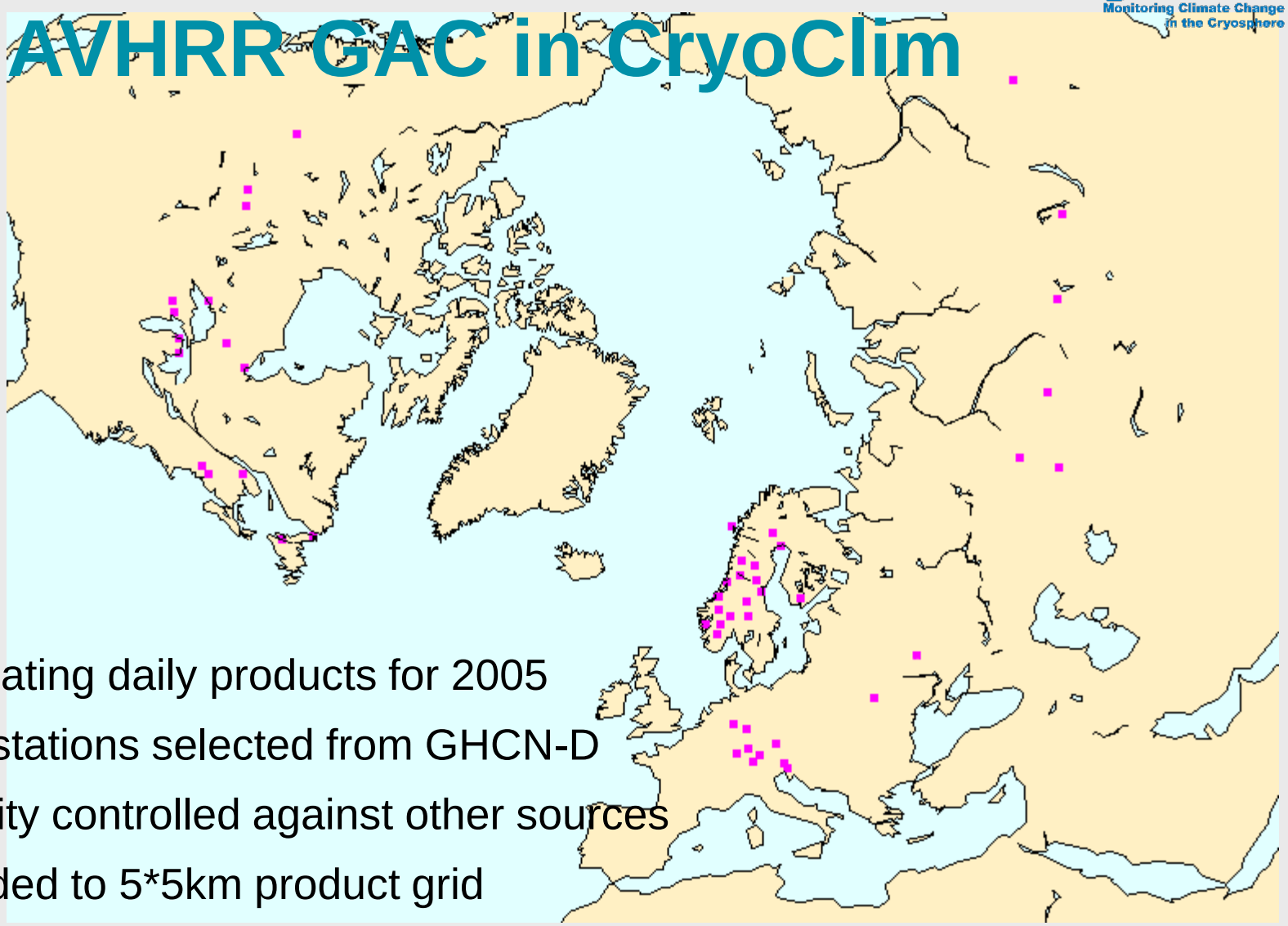







Feb 1 2005
White: snow
Green: no snow
Black: clouds
Grey: no data
Mar 1 2005
Apr 1 2005
May 1 2005

AVHRR GAC in CryoClim



Validating daily products for 2005

~50 stations selected from GHCN-D

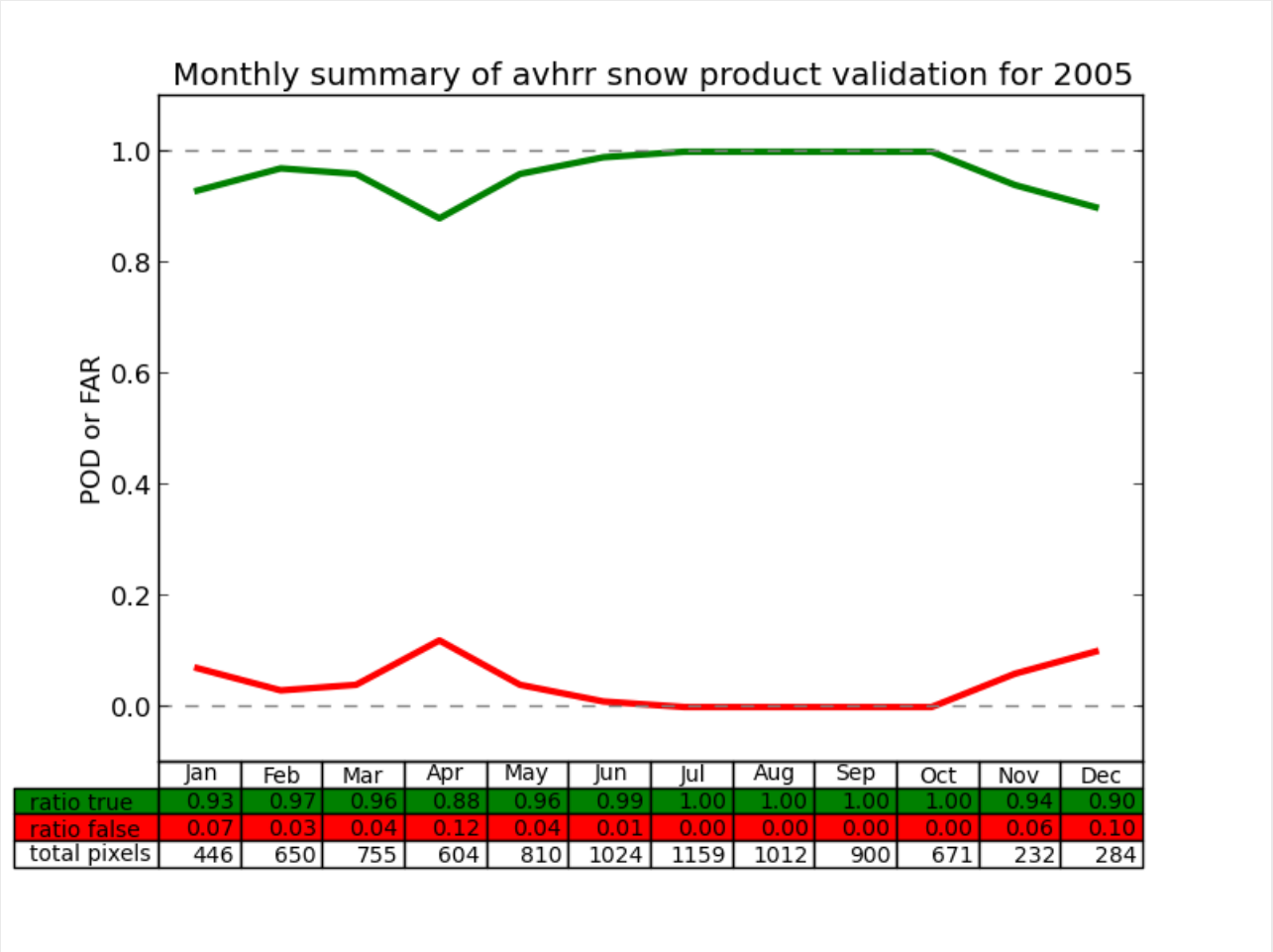
Quality controlled against other sources

Gridded to 5*5km product grid

AVHRR GAC in CryoClim

Above 90% POD except in April (88%)

Fewer pixels compared in wintertime



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ratio true	0.93	0.97	0.96	0.88	0.96	0.99	1.00	1.00	1.00	1.00	0.94	0.90
ratio false	0.07	0.03	0.04	0.12	0.04	0.01	0.00	0.00	0.00	0.00	0.06	0.10
total pixels	446	650	755	604	810	1024	1159	1012	900	671	232	284

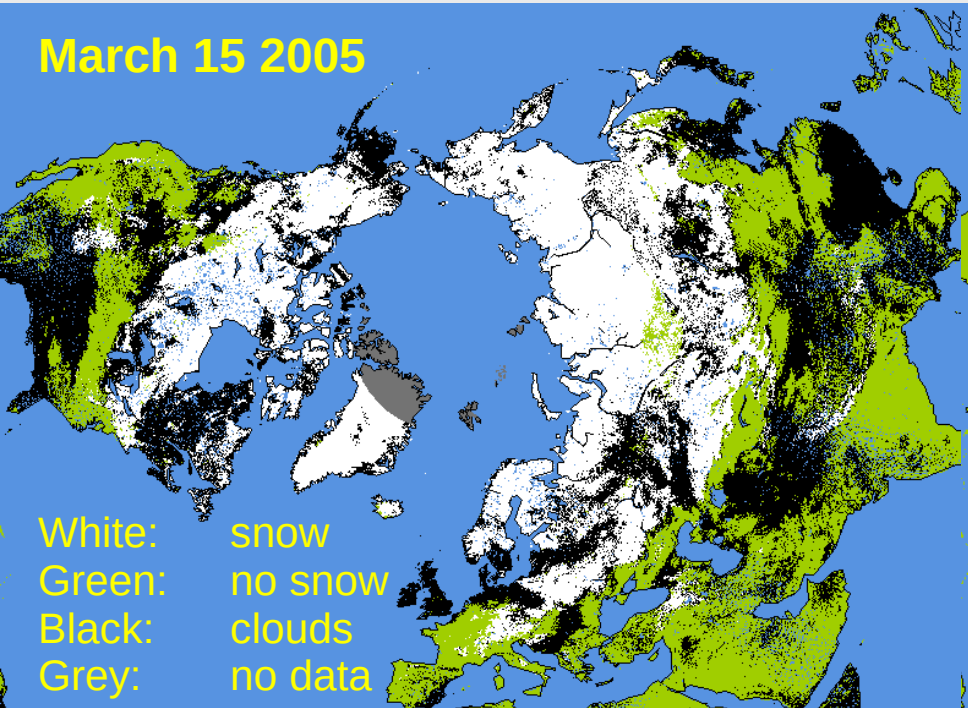
AVHRR GAC in CryoClim

CryoClim goal for snow cover product:

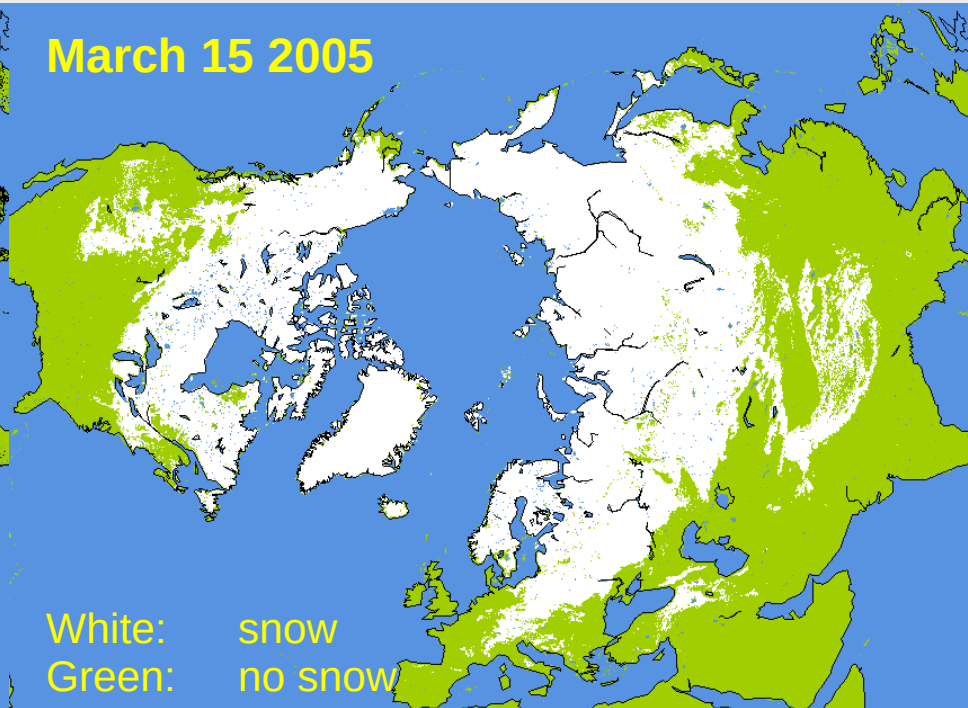
- ➔ full global coverage through the year.

AVHRR product is combined with SSM/I. Ongoing work by Norwegian Computing Center. Daily product files available at www.cryoclim.net

AVHRR



AVHRR + SSM/I



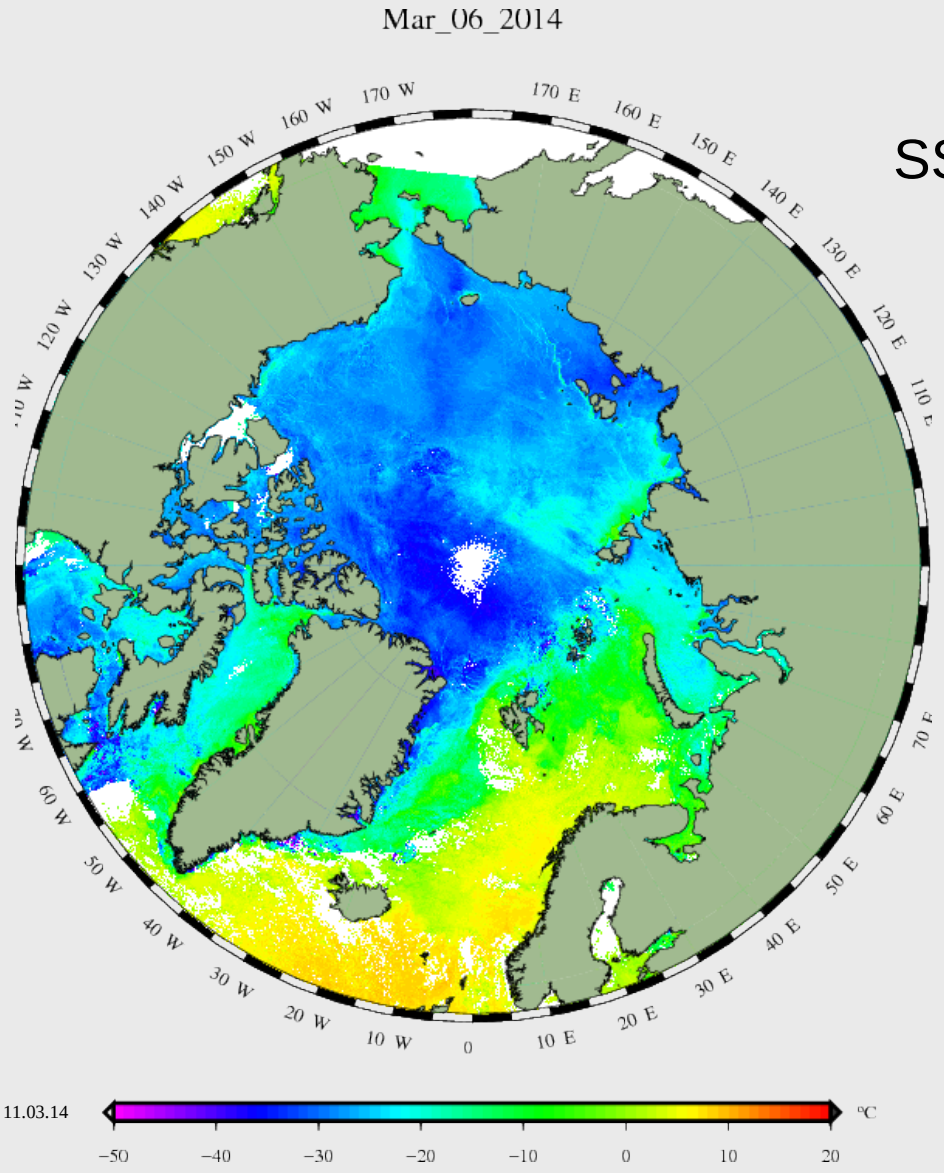
AVHRR GAC in NORMAP

Financed by the Norwegian Research Council

Reprocess CM SAF data to produce time series of

- sea and ice surface temperature (SST + IST) – in cooperation with DMI
- surface shortwave irradiance (SSI)
- downward longwave irradiance (DLI)
- sea ice edge

AVHRR GAC in NORMAP



SST and IST example, provided by Gorm Dybkjær, DMI

Processing steps include:

- use PPS from CM SAF dataset as a cloudmask
- additional cloud tests necessary to assure cloud-free conditions over sea and ice

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AVHRR GAC “user report”

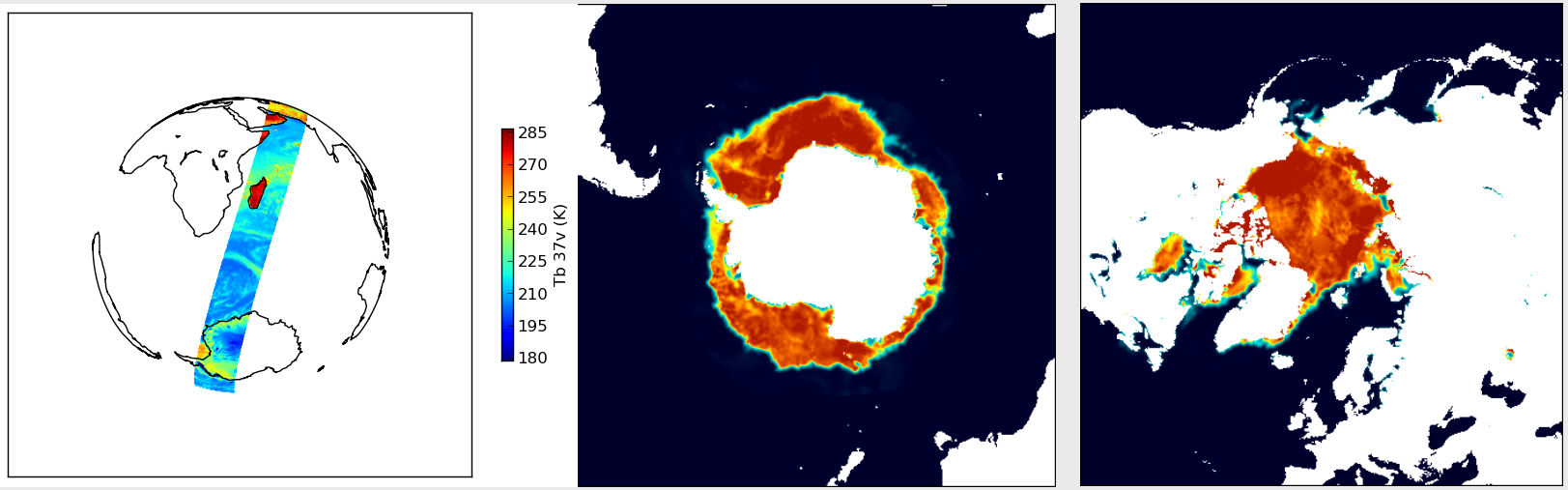
- Corrupted date field in some swath files (has been reported earlier)
- Documentation (on calibration etc.) not easily available?
- In general: very happy with the files, and very grateful to get access to the dataset

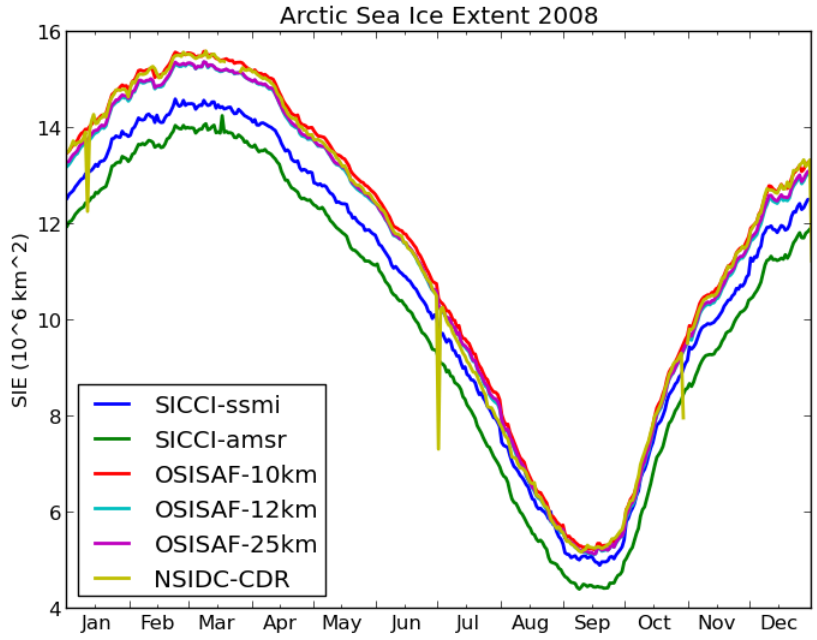
SSM/I in ESA Sea Ice CCI

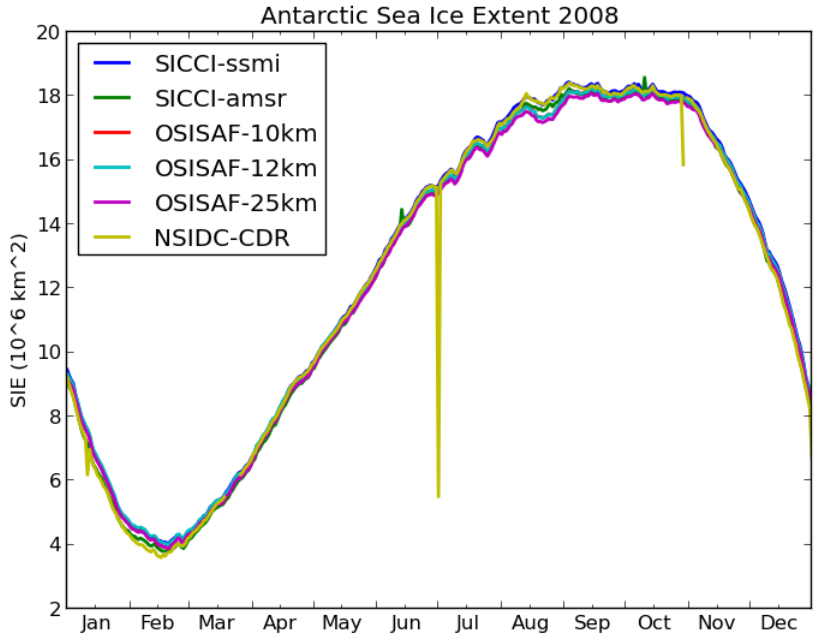
- MET Norway is responsible for production of a new Sea Ice Concentration (SIC) Essential Climate Variable (ECV) in the CCI Sea Ice project (2012-2014). Ref: P. Lecomte's presentation.
- Since our SIC algorithm uses swath (level 1b) data, the CM SAF SSM/I FCDR (CM-150) was a natural choice for an SSM/I Tb dataset (because free, openly reviewed, documented, European,...).
- A pre-cursor version of the SIC dataset (from the OSI SAF) was based on (expensive) Remote Sensing System (RSS/Wentz) data.
- The SIC dataset is being finalized as I speak.

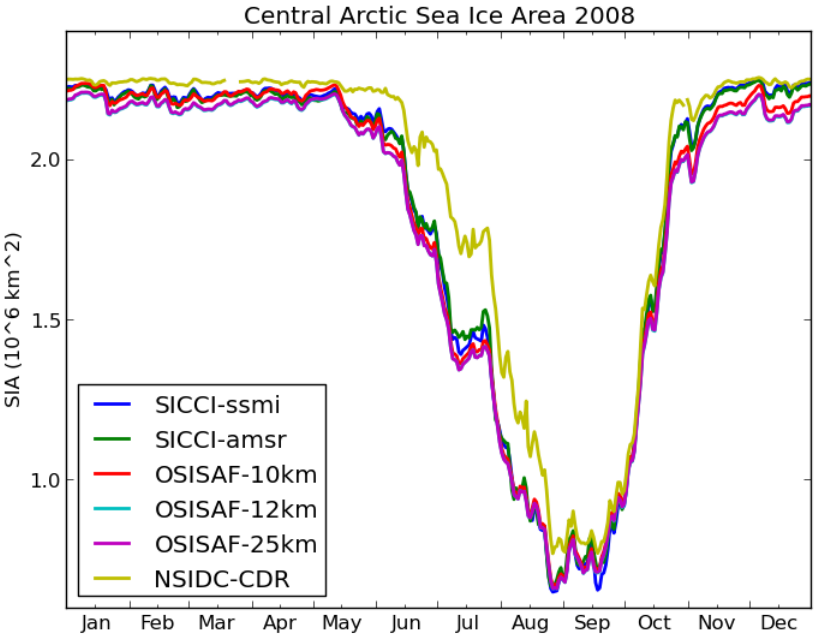
SSM/I in ESA Sea Ice CCI

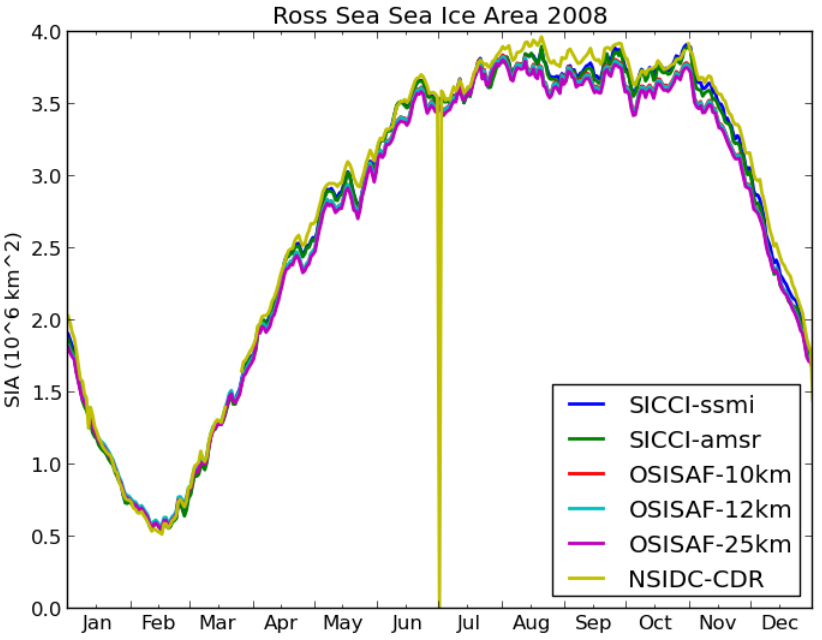
- With respect to other existing datasets, the SICCI processing chain features:
  - A new algorithm, selected after intercomparison of 20+ published ones;
  - Correction of atmospheric noise with a Radiative Transfer Model (RTM);
  - Dynamical tuning of the algorithm coefficients (*aka* Tie-Points);
  - Per-pixel uncertainties.
- First version of the dataset will be using SSM/I (from CM SAF, 1987-2008) and AMSR-E (from NSIDC, 2002-2011).




Arctic Sea Ice Extent 2008
SIE (10^6 km^2)
SICCI-ssmi
SICCI-amsr
OSISAF-10km
OSISAF-12km
OSISAF-25km
NSIDC-CDR
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Antarctic Sea Ice Extent 2008
SIE (10^6 km^2)
SICCI-ssmi
SICCI-amsr
OSISAF-10km
OSISAF-12km
OSISAF-25km
NSIDC-CDR
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Central Arctic Sea Ice Area 2008
SIA (10^6 km^2)
SICCI-ssmi
SICCI-amsr
OSISAF-10km
OSISAF-12km
OSISAF-25km
NSIDC-CDR
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Ross Sea Sea Ice Area 2008
SIA (10^6 km^2)
SICCI-ssmi
SICCI-amsr
OSISAF-10km
OSISAF-12km
OSISAF-25km
NSIDC-CDR
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

SSM/I CM150 “user report”

- Very good documentation both outside and inside the files;
- Very efficient support team;
- The various QC flag variables were a bit cumbersome to decipher (but not sure it could be made easier);
- We found some few occurrences of un-flagged bad scans at the beginning of the SSM/I F08 time series (reported to CM SAF, revision 2 already issued).
- Change of file format between “beta” (nc3) and “v1” (nc4) was slightly annoying, and more format change planned for next version (CM-12001).
- CM-150 stops end of 2008, we wish CM-12001 could cover until “today” (end of 2013?) because we are going to use it in next phase of SICCI project (planned 2015-2018).

Conclusion from MET Norway:

- Very satisfied with both AVHRR GAC and SSM/I datasets, grateful to be beta user of AVHRR GAC
- Grateful that someone has done the job of creating good FCDRs