



Norwegian
Meteorological
Institute

Nordic PRCC: Contributions

Eivind Støylen and colleagues (DMI,FMI,SMHI,IMO)

eivinds<at>met.no

08.11.16

Function of WMO RCCs

Mandatory Functions:

- 1) operational activities for long range forecasts (LRF)
- 2) operational activities for climate monitoring
- 3) operational data services to support LRF and climate monitoring
- 4) training in the use of operational RCC products and services

Highly Recommended Functions:

- climate prediction and climate projection;
- non-operational data services;
- coordination functions;
- training and capacity development; and
- research and development.

DMI – polarportal.dk

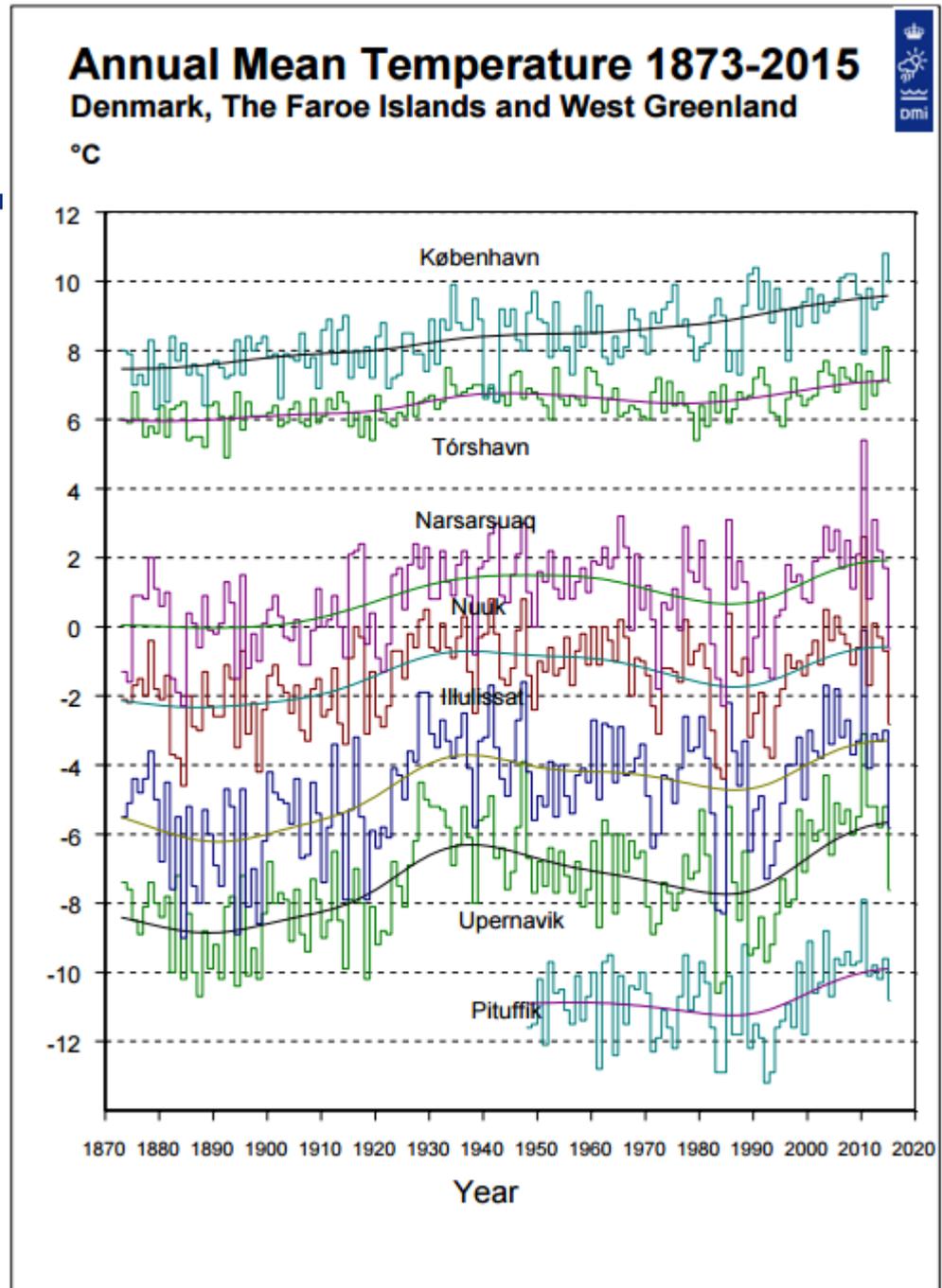
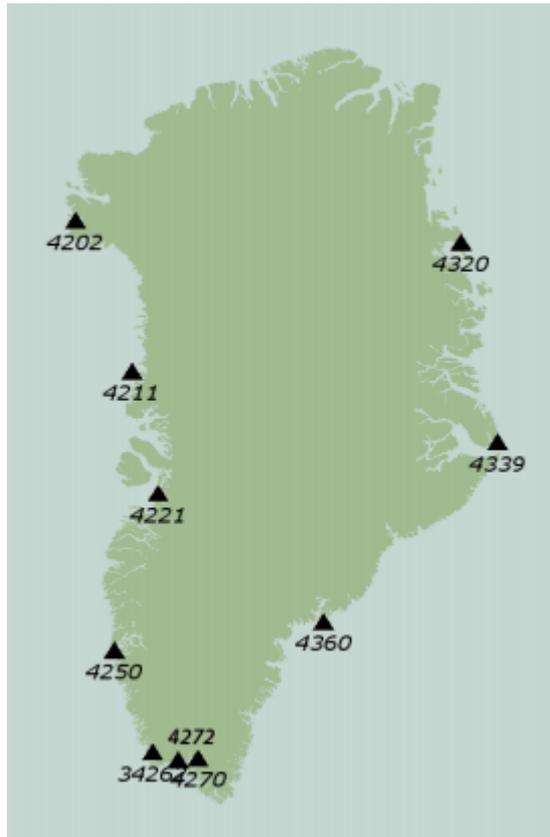
*3) Operational Data Services,
to support operational LRF and climate monitoring*

Denmark: Greenland and Pan-Arctic model and satellite data,
Greenland station data

DMI Report 16-04

**Greenland - DMI Historical Climate Data Collection
1784-2015**

John Cappelen (ed)



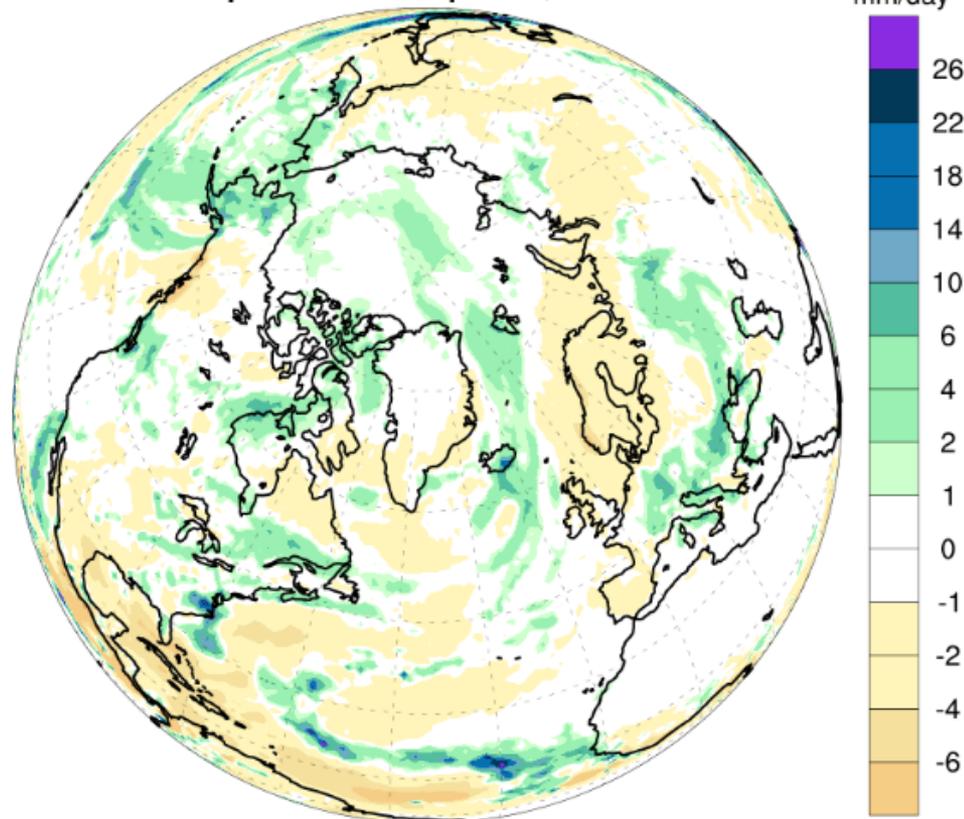


Welcome to the new arctic monitoring web-site
The Danish Arctic research institutions present updated knowledge on the condition of two major components of the Arctic: The Greenland Ice Sheet and the sea ice

WEATHER

[Temperature and wind](#) [Temperature anomaly and wind](#) **[Precipitation anomaly](#)**

Sep 17 to Sep 21, 2016



ECMWF forecast: Precipitation
Anomaly relative to ERA-Interim 2004-2013

polarportal.org



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[Sea ice extent and thickness](#)

[Sea ice temperatures](#)

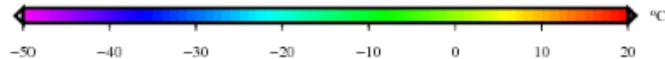
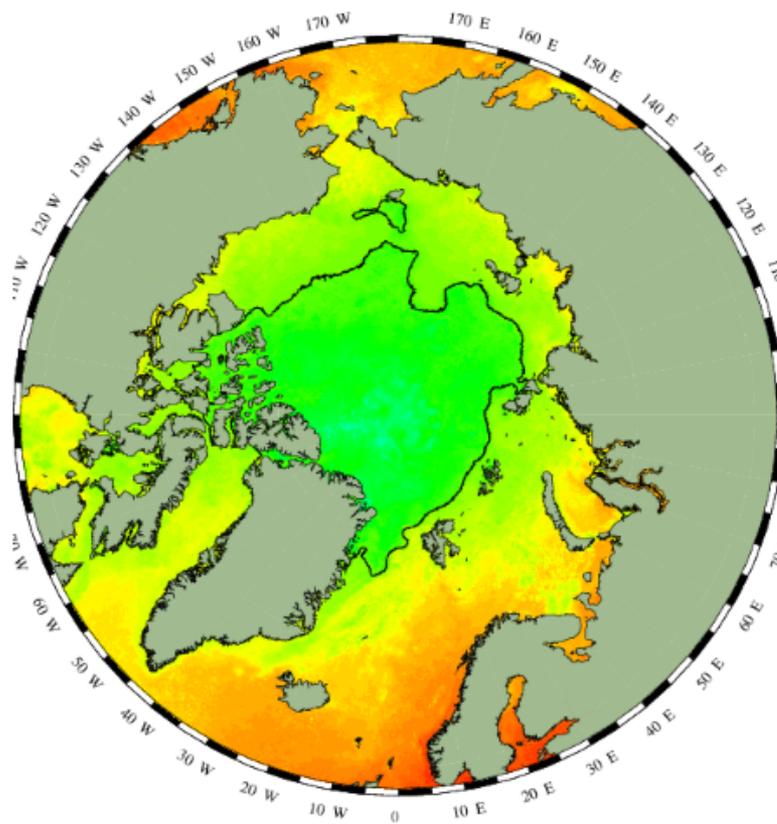
[Understanding the Arctic sea ice](#)

[More ice-monitoring products](#)

[Links](#)

Sea ice temperatures

Scp_21_2016





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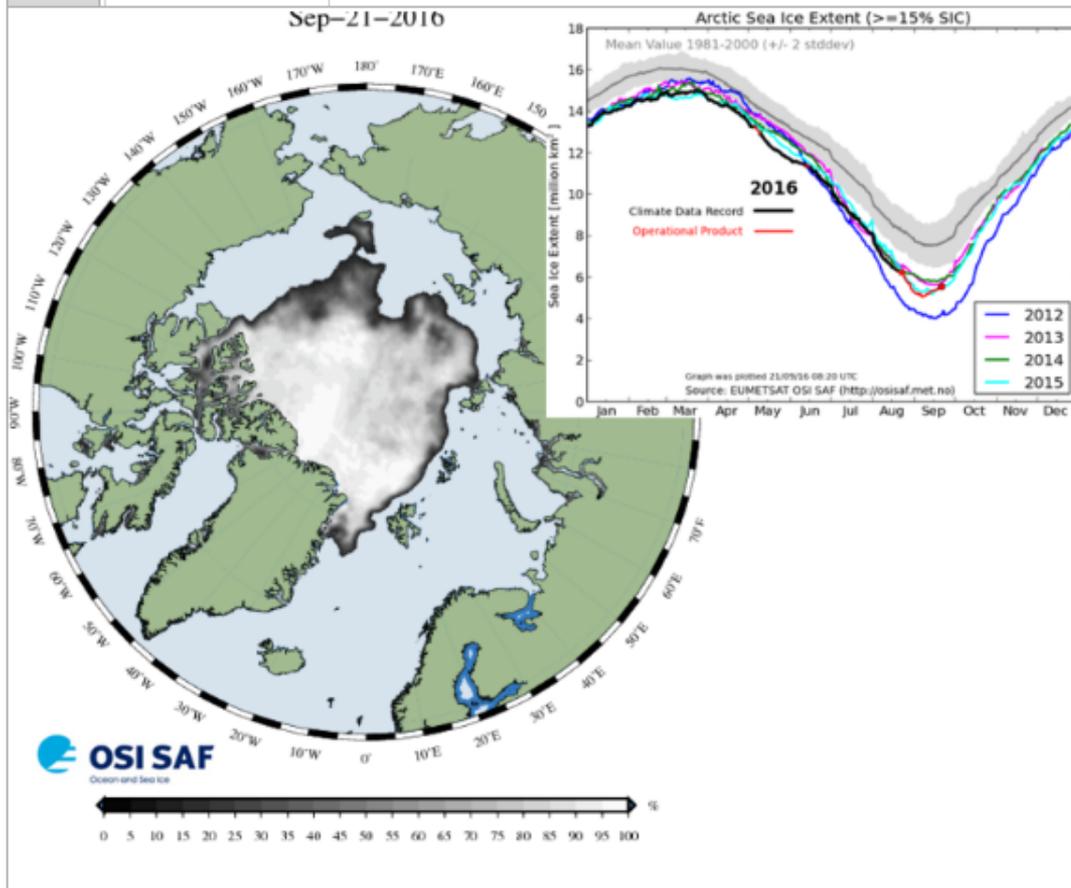
[More ice-monitoring products](#)

[Links](#)

Sea ice extent and thickness

[Extent](#) [Thickness and volume](#)

Sep-21-2016





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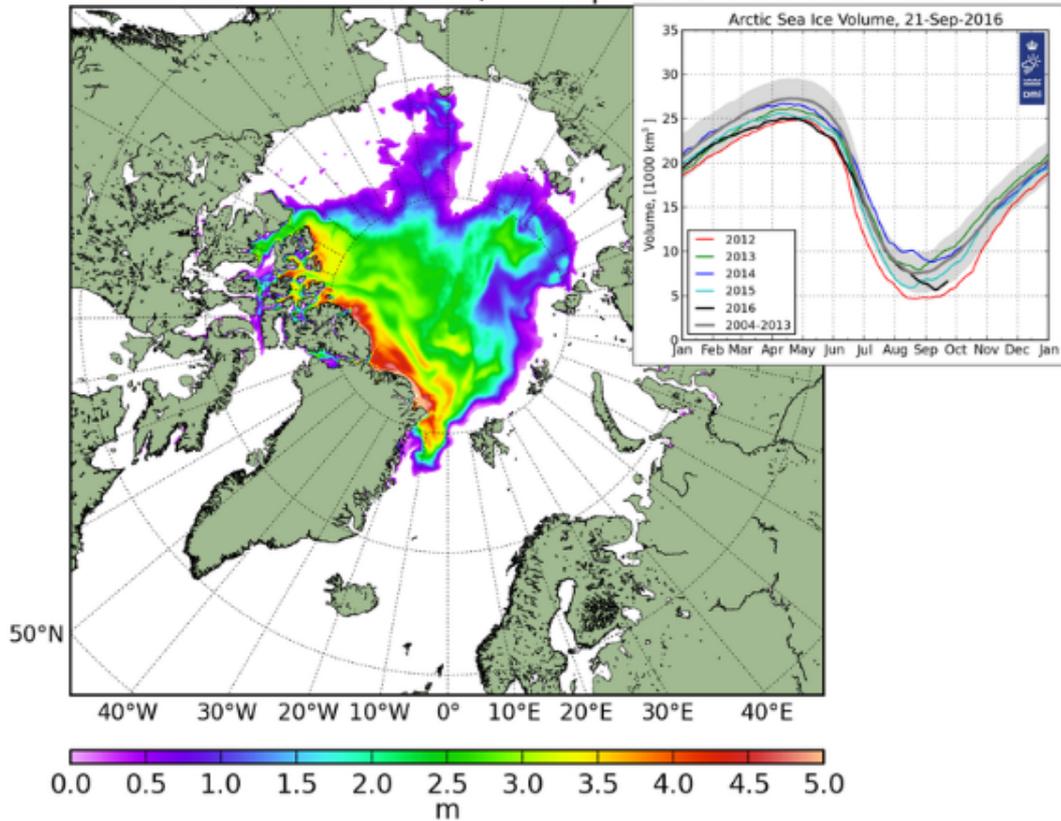
[More ice-monitoring products](#)

[Links](#)

Sea ice extent and thickness

[Extent](#) [Thickness and volume](#)

Sea Ice Thickness, 21-Sep-2016





Welcome to the new arctic monitoring web-site

The Danish Arctic research institutions present updated knowledge on the condition of two major components of the Arctic: The Greenland Ice Sheet and the sea ice

Surface conditions

Glacier front positions

Total mass change

Understanding the Greenland Ice Sheet

More ice-monitoring products

Links

Total mass change

This page illustrates the total change in mass of the Greenland Ice Sheet. Here you can follow how the ice sheet gains mass through snowfall accumulating on the surface and how it shrinks through melting from the surface and discharge of icebergs from glaciers that end in the sea.

- The map illustrates the latest GRACE satellite-derived mass changes.
- The curve shows the change in the total mass balance month by month measured in gigatonnes (1 Gt is 1 billion tonnes or 1 km^3 of water. 100 Gt corresponds to 0.28 mm global sea level). All mass changes are relative to June 2006.

The figures are based on monthly measurements of changes in gravity. Gravity changes as the amount of ice changes and this can be detected by the GRACE satellites. Scientists at DTU Space have contributed to developing the methods used to derive ice mass changes from the gravity changes. The raw GRACE satellite data is carefully processed and validated before it is released to the user, and the product presented here might be delayed by 2-3 months. See [Barletta et al. 2013](#).

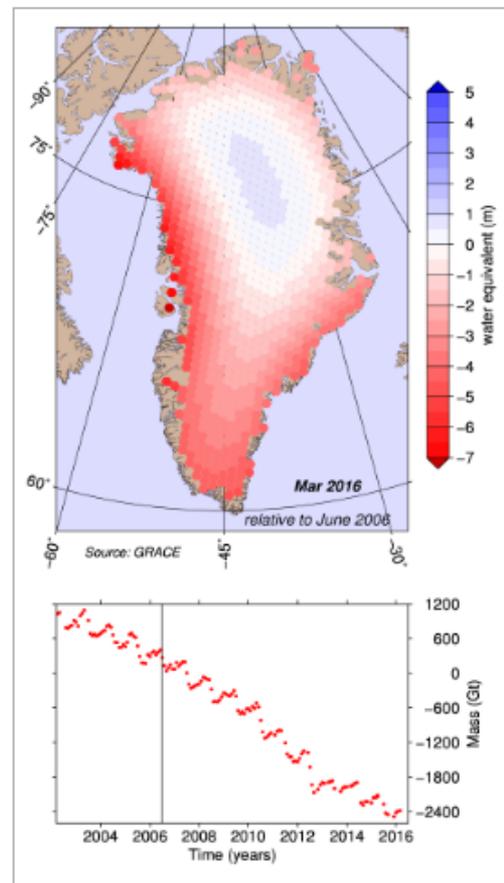
The map illustrates the latest monthly mass change map derived from the GRACE satellite data. The curve illustrates the total mass change month by month measured in gigatonnes (1 Gt is 1 billion tonnes or 1 km^3 of water. 100 Gt corresponds to 0.28 mm global sea level).

The GRACE data reveal that most of the ice loss has been from the areas near the ice sheet margins where other observations show ice thinning, glacier retreat on land and in fjords, and increased surface melting. High in the ice sheet interior, GRACE satellite measurements show a slight ice mass gain that is again consistent with other measurements of slightly increased snowfall.

Overall, the Greenland Ice Sheet has during 2003-2011 on average seen a net annual ice loss corresponding to 234 km^3 of water. Or approximately 0.65 mm in average annual contribution to global sea level rise ([Barletta et al. 2013](#)).

Origin of data

The gravity data comes from the NASA and German Aerospace Center (DLR) GRACE mission. Data are processed at different processing centers, which provide monthly models of the gravity field to the user. These monthly models are processed after [Barletta et al. \(2013\)](#) to derive ice mass changes.





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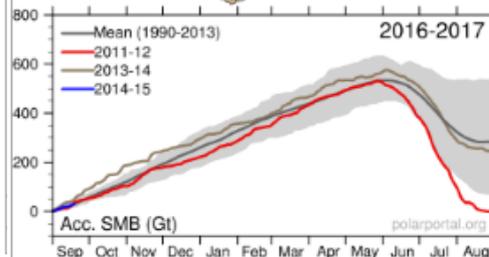
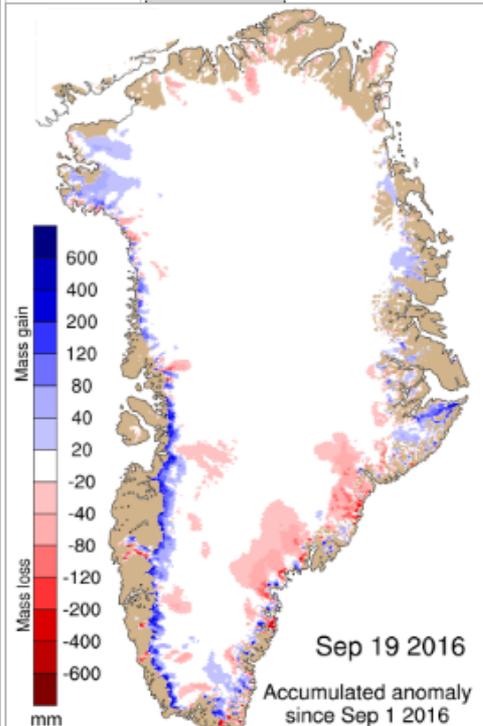
[Understanding the Greenland Ice Sheet](#)

[More ice-monitoring products](#)

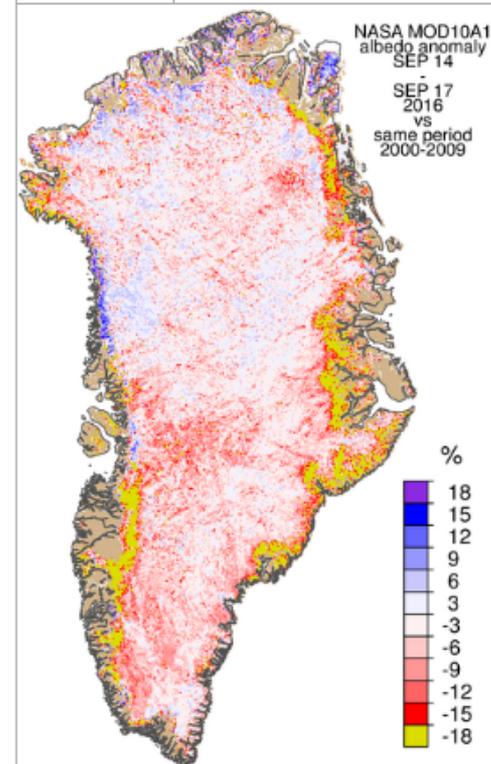
[Links](#)

Surface conditions

[Daily change](#) [Accumulated](#)



[Albedo anomaly](#)



[Large version of latest image](#)

Date:



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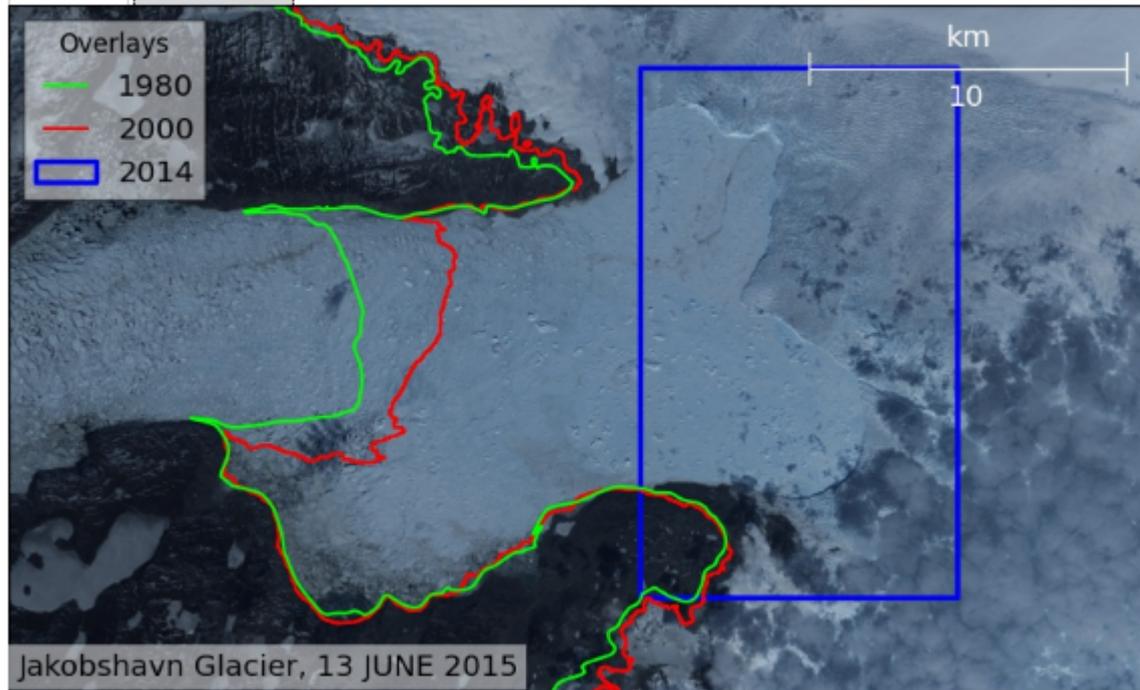
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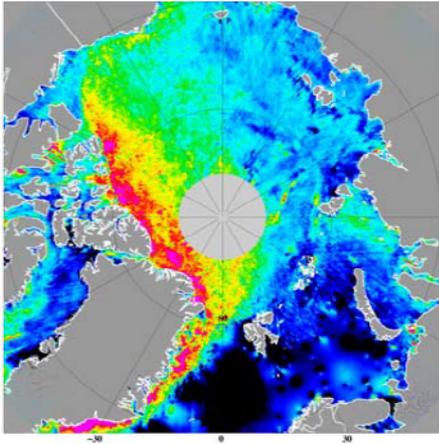
Glacier front positions

[Overview](#) [Glacier fronts](#)



DTU Space input to Arctic-PRCC

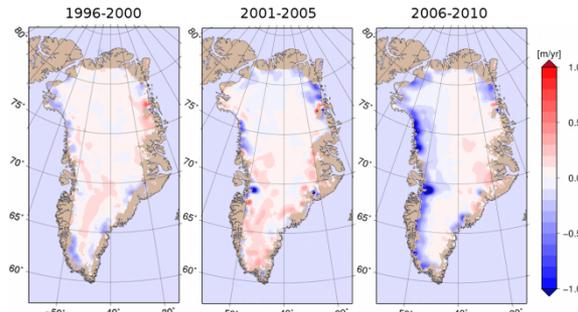
February - March 2006



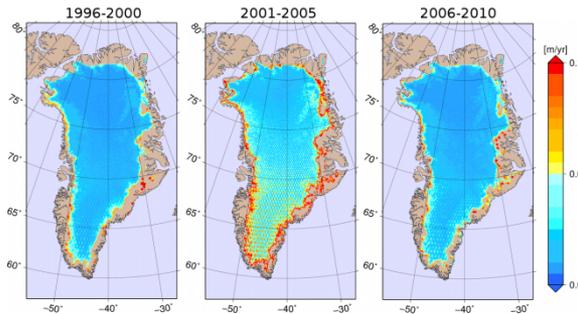
Sea ice freeboards or ice thickness from CryoSat-2 and Sentinel-3

Monthly maps

Mean 5-year surface elevation changes

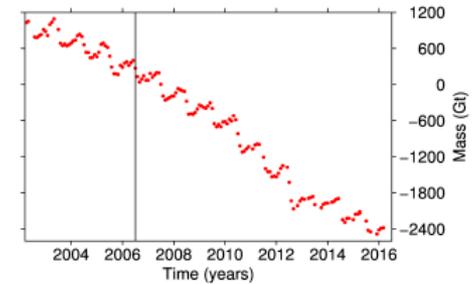
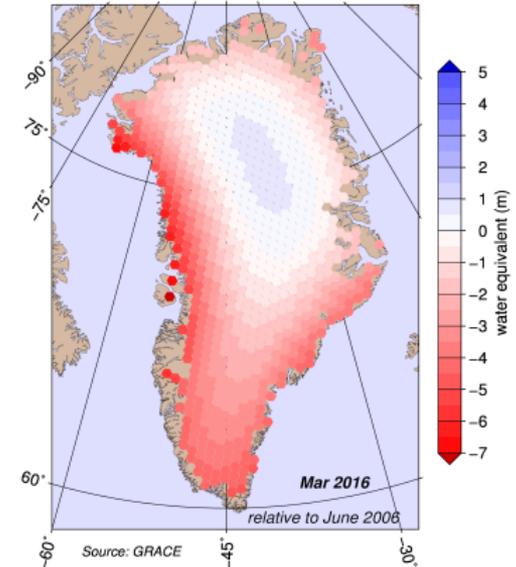


Associated errors



**Altimetry elevation changes
Annual update of 5-yr mean or
4 times per year of elevation
anomalies**

****ESA CCI Greenland Ice Sheet****



**GRACE mass changes.
~5 times per year
** Polarportal ****

FMI contributions

Apoligies for lack of fancy slides...

Operational Activities for Long Range Forecasts (LRF)

Finland: operational LRF for Finland; ocean and sea ice forecasts for Baltic Sea, Barents Sea and Kara Sea, Altimeter based sea ice classification for Arctic

Operational Activities for Climate Monitoring

Finland: climate bulletin (Finland), SWE tracker

Operational Data Services, to support operational LRF and climate monitoring

Finland: Finnish datasets, marine data (Baltic Sea), Global/Polar surface albedo data sets, Arctic/Hemispheric snow cover and soil frost state data

Training in the use of operational RCC products and services

Finland: Training arrangements for Finland

IMO contributions

2.1 Overview of datasets provided under mandatory functions

Climate reports, reference climatology, data sets

2.2 Overview of datasets products and services offered under highly recommended functions

Downscaling assistance, reanalysis, glacier data, risk assessment

Overview of datasets provided under mandatory functions

RCC Function Activity Criteria	Dataset Product Service	Prod.	Areal Coverage	Time of Issuance	Means of service provision	Remarks
Operational activities for climate monitoring: <u>Report climate diagnostics</u>	<i>Weather</i>	<i>IMO</i>	<i>Iceland and coastal environment</i>	<i>Monthly</i>	<i>Web</i>	<i>Text in Icelandic</i>
Operational activities for climate monitoring: <u>Establish an historical reference climatology</u>	<i>Weather Hydrology</i>	<i>IMO</i>	<i>Iceland and coastal environment</i>	<i>Hourly Daily Monthly Seasonal Annual</i>	<i>Data, maps and plot available on web.</i>	<i>Raw data can be made available through web service More than 100 rivers, currently part of Arctic Hycos</i>
Activities supporting LRF <u>Develop quality controlled datasets gridded where applicable</u>	<i>Weather Hydrology</i>	<i>IMO</i>	<i>Iceland and coastal environment</i>	<i>Annual/ Ad hoc</i>	<i>Datasets available on web</i>	<i>Interpolated precipitation and temperature, augmented with reanalysis</i>

Overview of datasets provided under mandatory functions

RCC Function Activity Criteria	Dataset Product Service	Prod.	Areal Coverage	Ad hoc	Means of service provision	Remarks
Climate predict/ projection <u>Assist RCC users using CMIP and downscaled data. Provide information for use in adaptation.</u>	Climate projections downscaling and assessments	IMO from CMIPs and similar data	Iceland and coastal environment	Ad hoc	Web and stakeholder interaction	
Climate predict/ projection <u>Downscaling and baseline for comparison with scenarios.</u>	Downscaled climate data Re-analysis	IMO	Iceland and coastal environment	Ad hoc	Key variables on web: Air temperature, Precipitation, Pressure, Snow accumulation, Potential runoff	Key variables from gridded data available online, but more on request
Non-operational data services <u>Develop and maintain historical climate datasets</u>	Glacier mass balance Glacier outlines and glacier fronts	IMO	Select glaciers in Iceland	Ad hoc Seasonal	tbd	Some glacier data already made available through Cryonet under Global Cryo-sphere Watch
Research and development	Avalanche risk analysis and prediction	IMO	Select locations in Iceland	Daily to Seasonal	tbd	

Other services not listed in WMO reply

Sea ice

- ▶ Monitoring of sea ice in Icelandic waters
 - ▲ Operational duty of IMO
 - ▲ DMI also has responsibilities in a large region along the Greenland coast
 - ▲ Sea ice is a „climate sensitive“ variable and thus of interest for long term monitoring

Items listed in the reply to WMO are tailored to operational (short term) or climate scenario (long term) parts of the CS spectrum.

- ▶ IMO is also interested in developing societally relevant services for the near Arctic and for the intermediate parts of the CS spectrum
 - ▲ Will be happy to collaborate

Potential Swedish contributions to Arctic-PRRC

- Observations
 - Temperature, Precipitation, Ice concentration, River runoff
 - Sweden + Baltic sea
- Models
 - Pan-arctic hydrological model (Arctic-HYPE) assimilating runoff observations from WMO Arctic-HYCOS
 - River runoff to Arctic ocean
 - Arctic ocean drainage basin hydrological regime
- Services
 - Hydrological model data: <http://hypeweb.smhi.se/arctichype>
 - C3S Service for water indicators in Climate Change Adaptation - SWICCA <http://swicca.climate.copernicus.eu/>

- SMHI Open data (www.smhi.se)

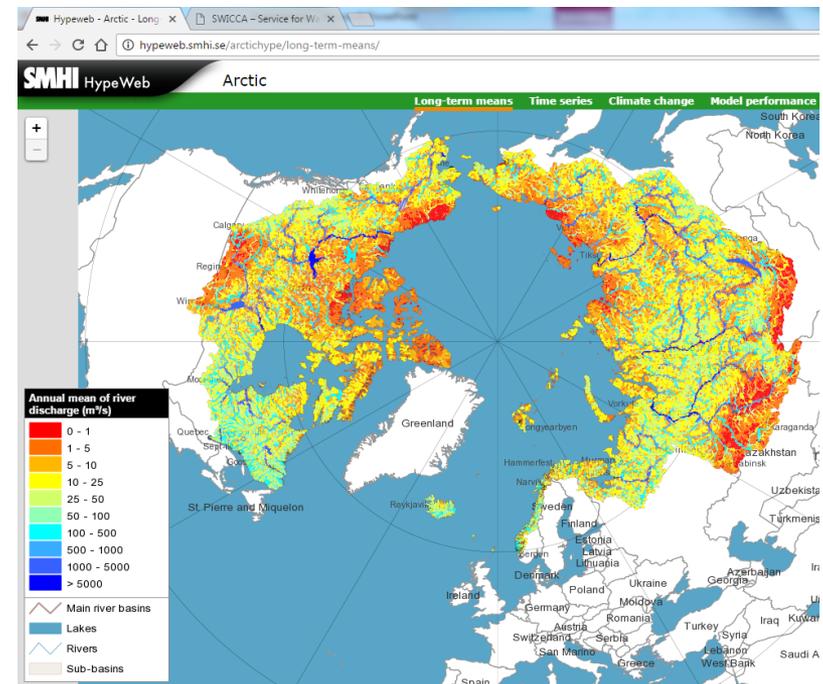
Arctic-HYPE

Pan-Arctic hydrological model/service

- Modelling key water storages and fluxes in the Arctic drainage basin:
 - explain observed trends in river flow
 - estimate flow in non-gauged basins
 - flow-to-ocean and upstream hydrological regime
 - Hindcast, forecasts, climatology, climate change scenario impacts

- Model data service:
 - <http://hypeweb.smhi.se/arctichype>

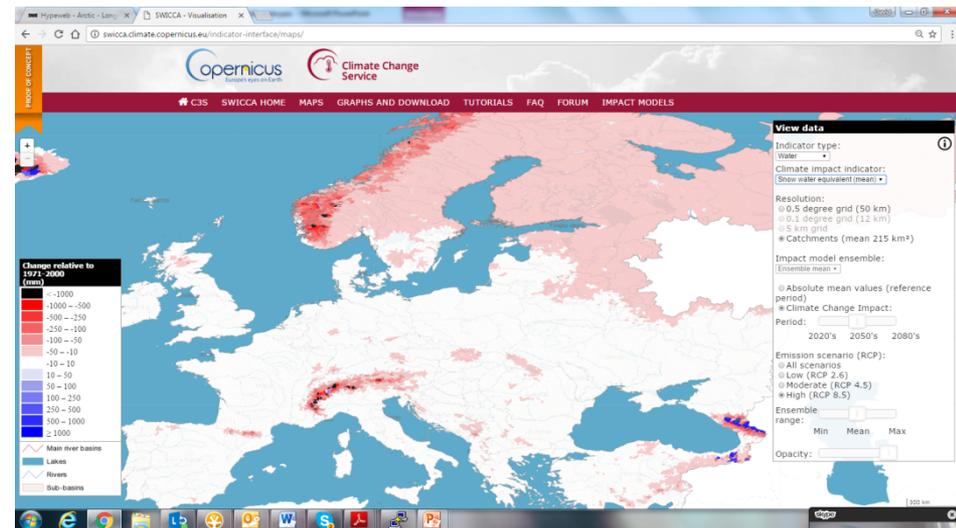
- Part of WMO Arctic-HYCOS project (National hydrological services in Canada (lead), Denmark, Iceland, Finland, Norway, Russian Federation, Sweden, and United States of America, WMO and GRDC)



SWICCA – C3S service for water indicators in Climate change

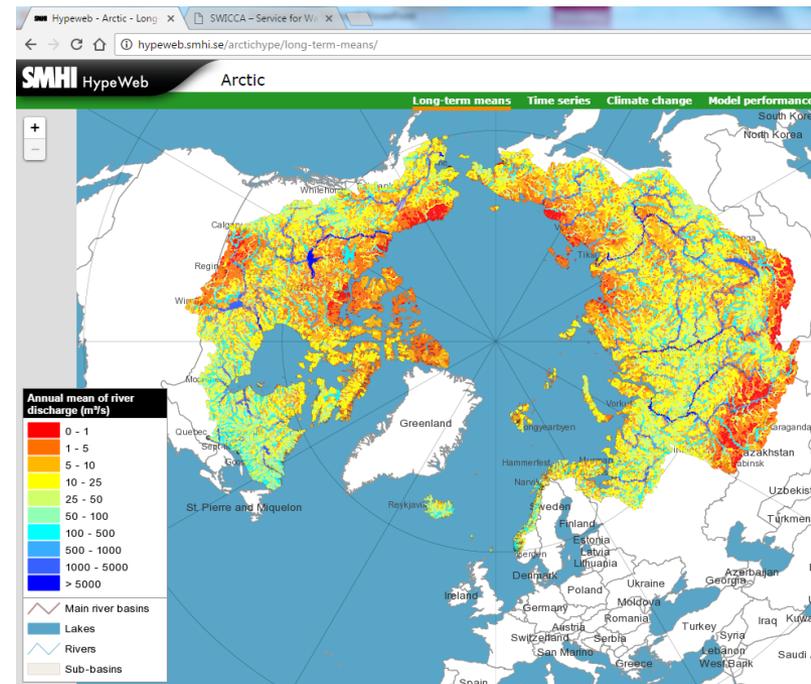
- Demonstrator of a Copernicus climate change service for the water sector
- Data and guidance for climate impact assessment for water sector
- Targeted for consulting engineers (Purveyors) working with climate change adaptation in the water sector
- Web service:

<http://swicca.climate.copernicus.eu/>



Nordic PRCC node

- Good opportunity for further nordic collaboration on Arctic hydrology
- Observations and knowledge has been shared for a long time between Nordic national hydrological services
- Arctic-HYCOS collaboration provides interface also to Canada, Russian federation and USA
- Denmark and Greenland could get more involved in Arctic-HYCOS!
- On-going work at SMHI to extend Arctic-HYPE to Greenland - opportunity for collaboration with DMI, GEUS, DTU, Asiaq



Outline – MET Norway

Datasets/products:

- Observations or observation based products
 - Sea ice: OSISAF
- Model based products
 - Arctic MFC; ROMS, TOPAZ

Data management framework for interoperability

- Global Cryosphere Watch, International Polar Year and Year Of Polar Prediction databases

Basic principles for MET Norway products

Open and free data policy

Internationally standardized framework for interoperability

- Heritage from GCW, IPY and YOPP databases, as well as national databases
- Based on metadata protocols,

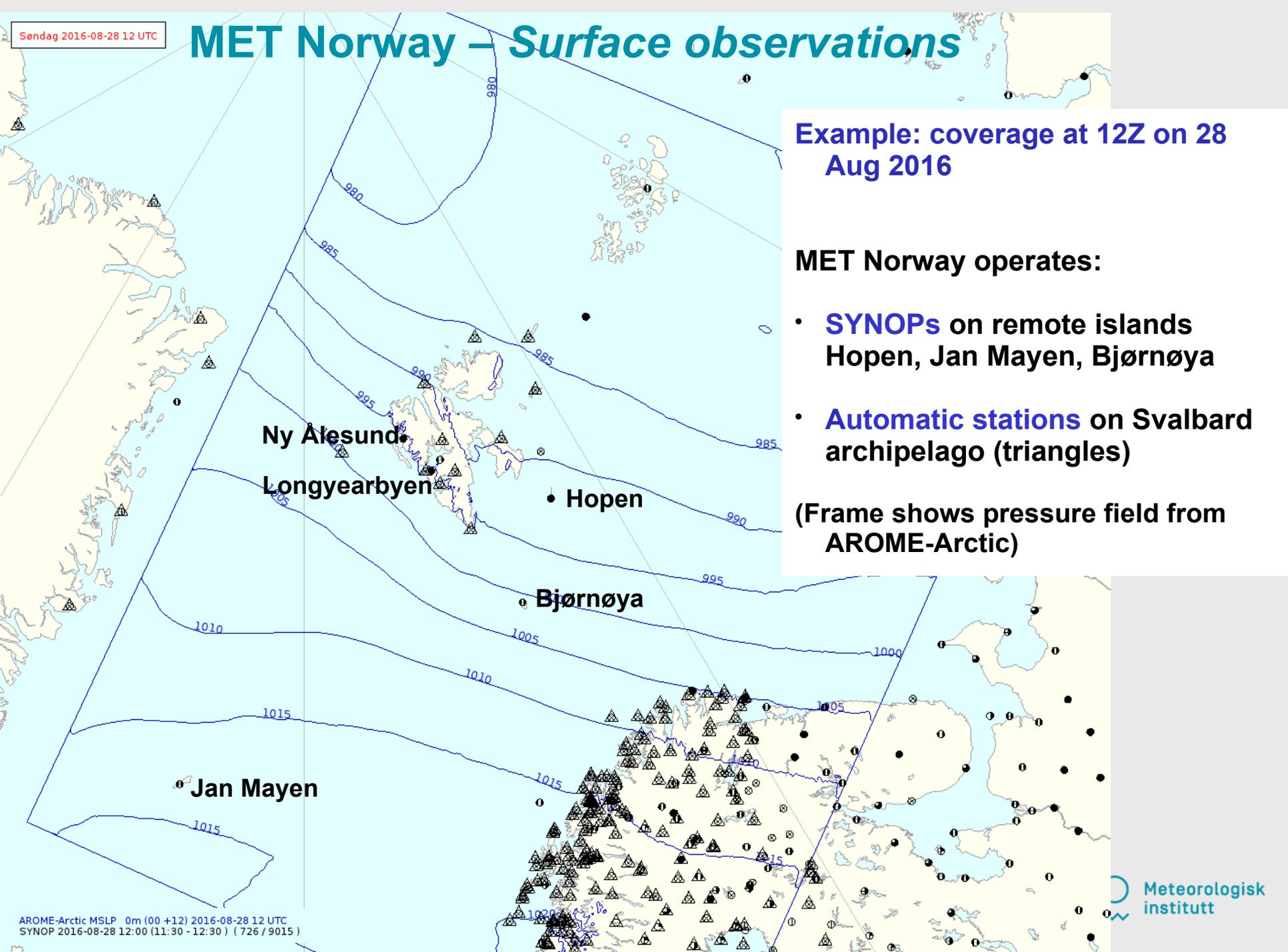
MET Norway – Surface observations

Example: coverage at 12Z on 28 Aug 2016

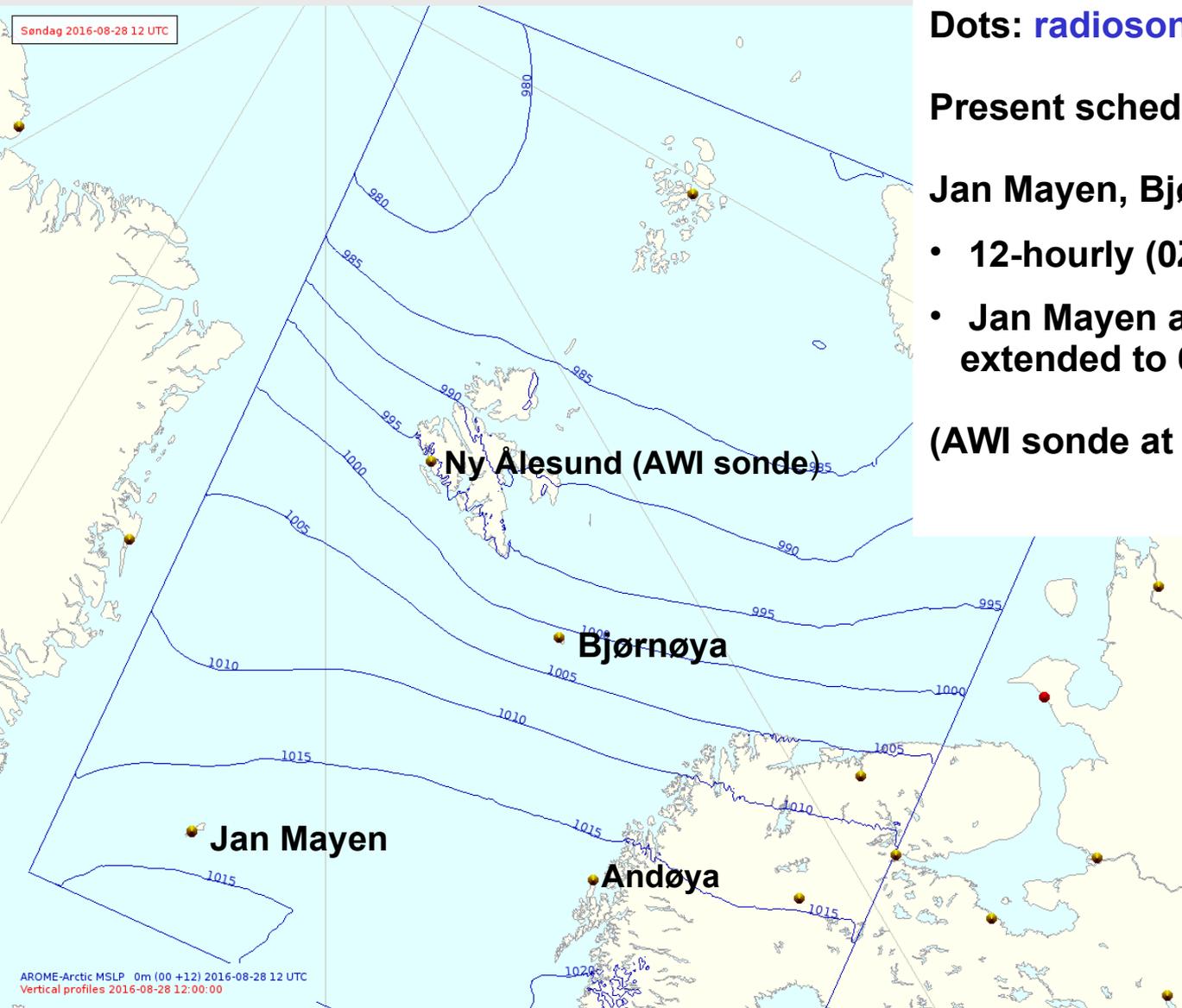
MET Norway operates:

- **SYNOPS** on remote islands Hopen, Jan Mayen, Bjørnøya
- **Automatic stations** on Svalbard archipelago (triangles)

(Frame shows pressure field from AROME-Arctic)



MET Norway – Radiosondes



Dots: **radiosondes**

Present schedule:

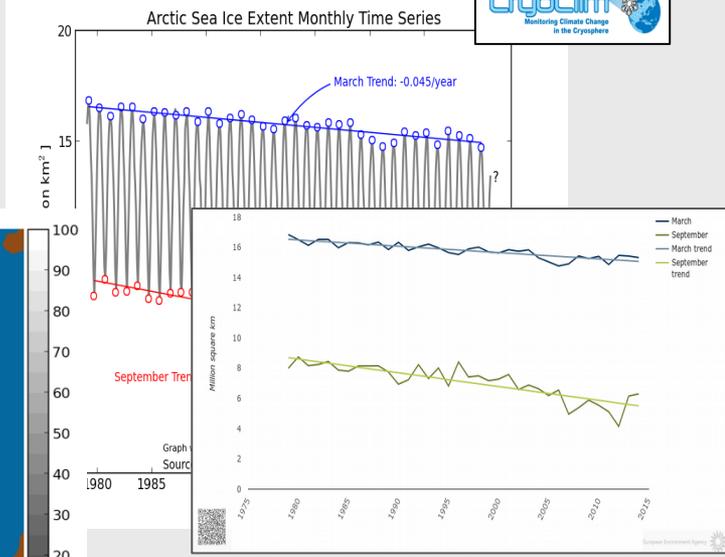
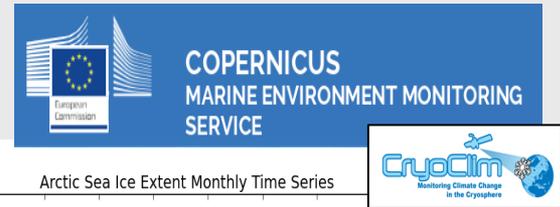
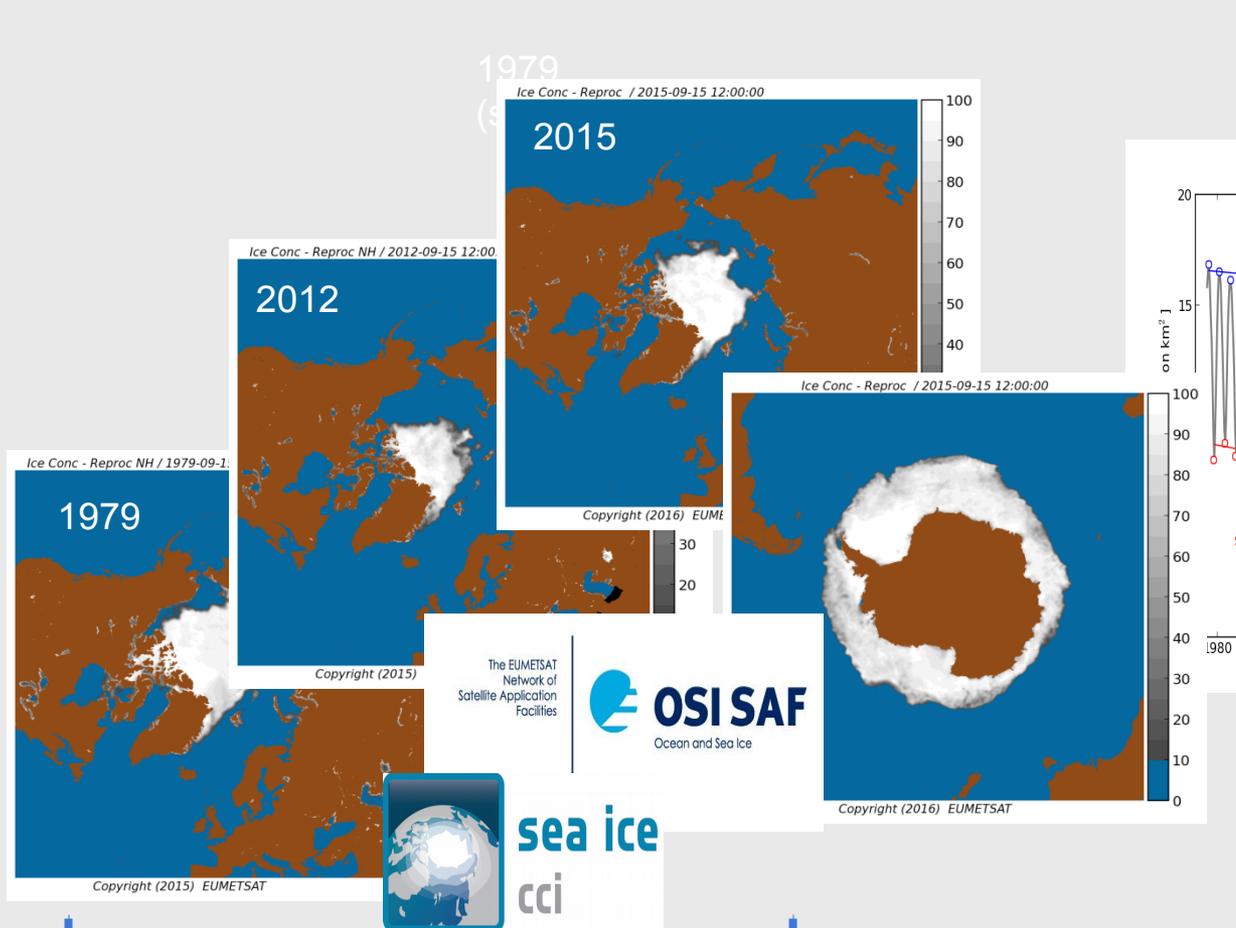
Jan Mayen, Bjørnøya, Andøya:

- 12-hourly (0Z and 12Z) annually
- Jan Mayen and Bjørnøya extended to 6-hourly in winter (6mnh)

(AWI sonde at Ny Ålesund: daily at 12Z)

Sea Ice Concentration Climate Data Record

(Thanks to Thomas Lavergne)



Future funding, and interaction model with C3S



OSISAF V3
SMMR+SSM/I+SSMIS (1978-2019)
AMSRE+AMSR2 (2002-2019)
2020

2010 2011

2014

June 2015 late 2016

OSISAF V1.0 (1978-2008) SMMR+SSM/I
OSISAF V1.1 (1978-2009) SMMR+SSM/I

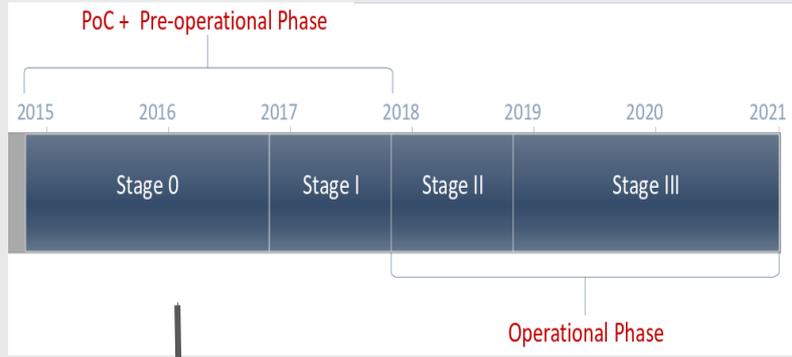
SICCI V1.1 (1992-2008) SSM/I (2002-2011) AMSR-E

OSISAF V1.2 (1978-2015) SMMR+SSM/I+SSMIS

OSISAF V2 (1978-2015) SMMR+SSM/I+SSMIS
SICCI V2 (2002-2015) AMSRE + AMSR2

- Two distinct projects, but:
- Same processing chain,
 - Same algorithms,
 - Same file format,
 - Same production center.

Time

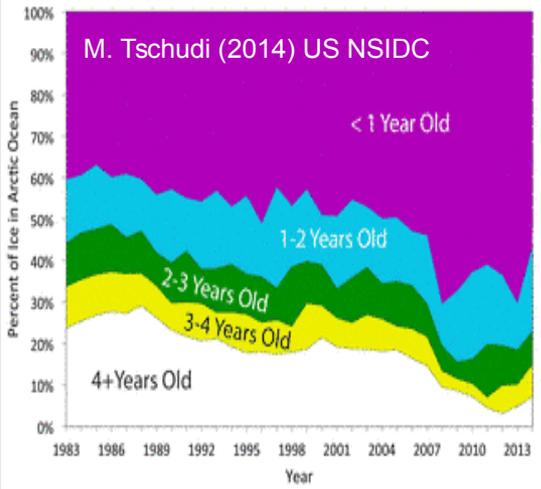
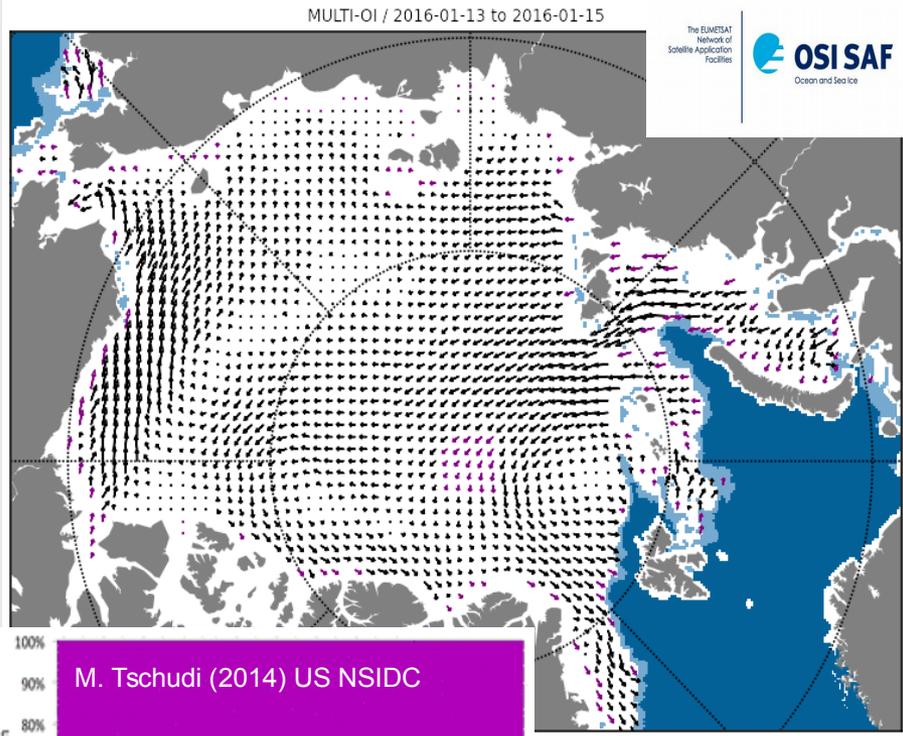
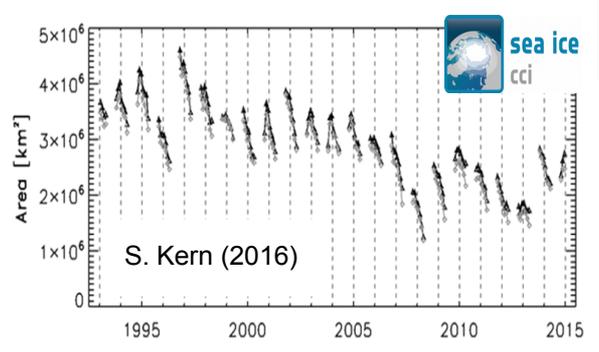
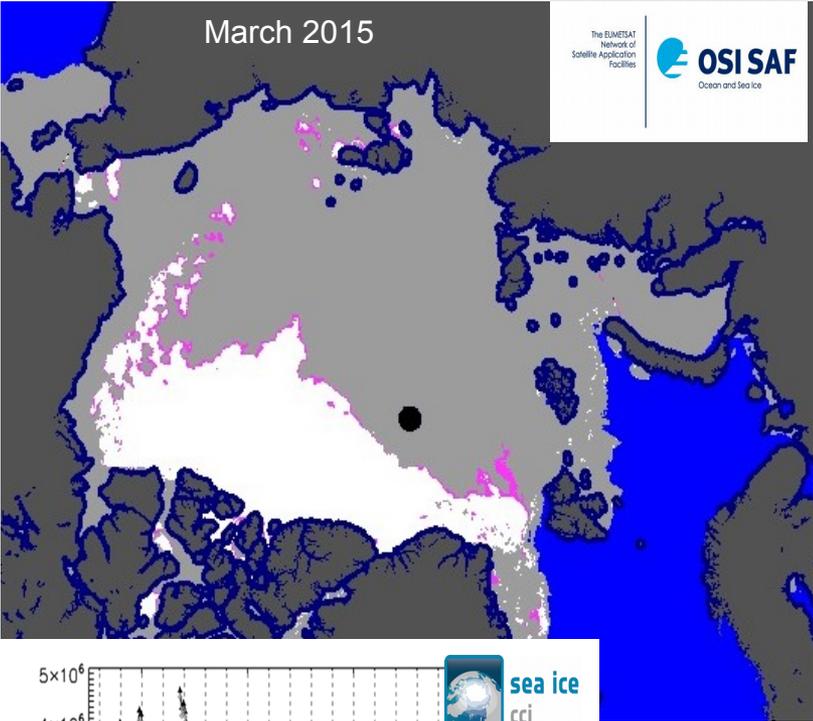


C3S:

Lot No: 1 Copernicus C3S_312(a) Production of ECV datasets based on EO — Sea Ice

This lot addresses the generation and delivery of long term **CDRs** describing the global evolution of sea ice, **including sea-ice concentration, edge and thickness [...] routine and sustained delivery and updates.**

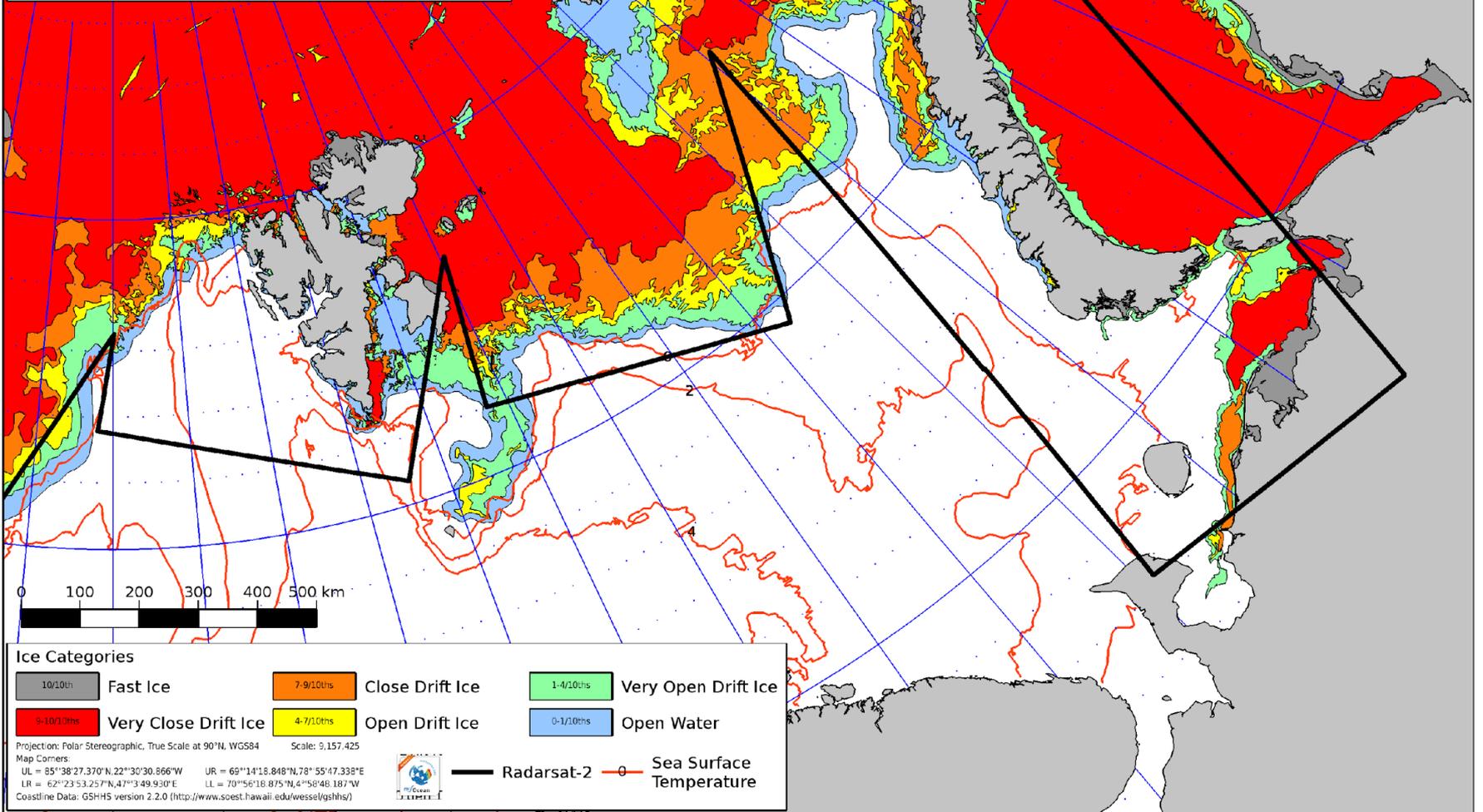
Sea Ice Type, Sea Ice Drift, ...



15th May 2014
 Valid 15:00 UTC

Forecasting Division for Northern Norway
 N-9293 Tromsø, Norway

Tel: +47 77 62 14 62 Fax: +47 77 62 13 01 E-mail: istjenesten@met.no



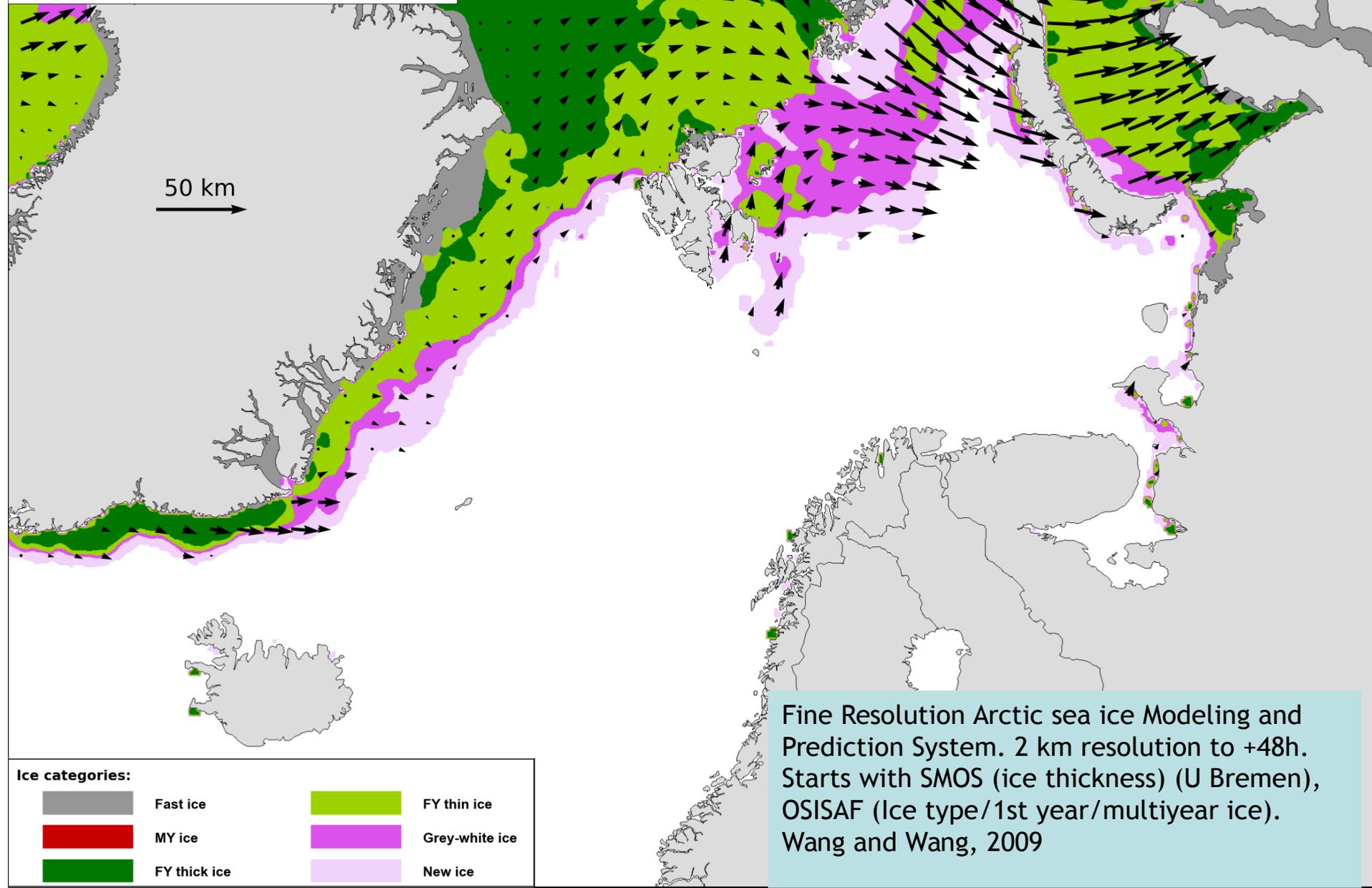


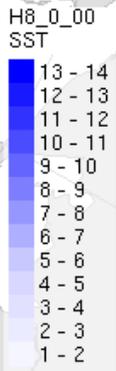
Meteorologisk
institutt
met.no

May 15th 2014
24 hours forecast

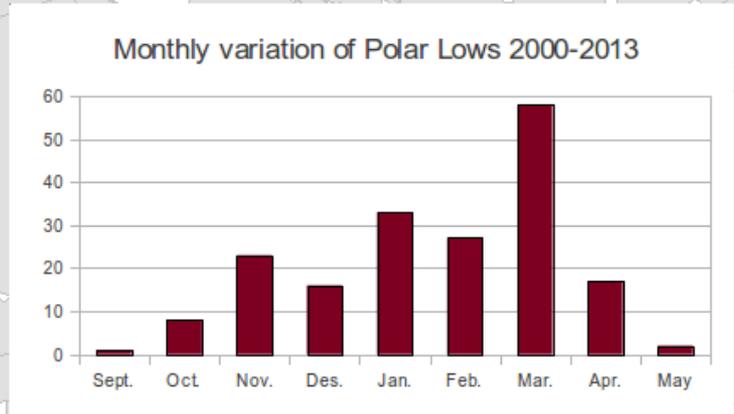
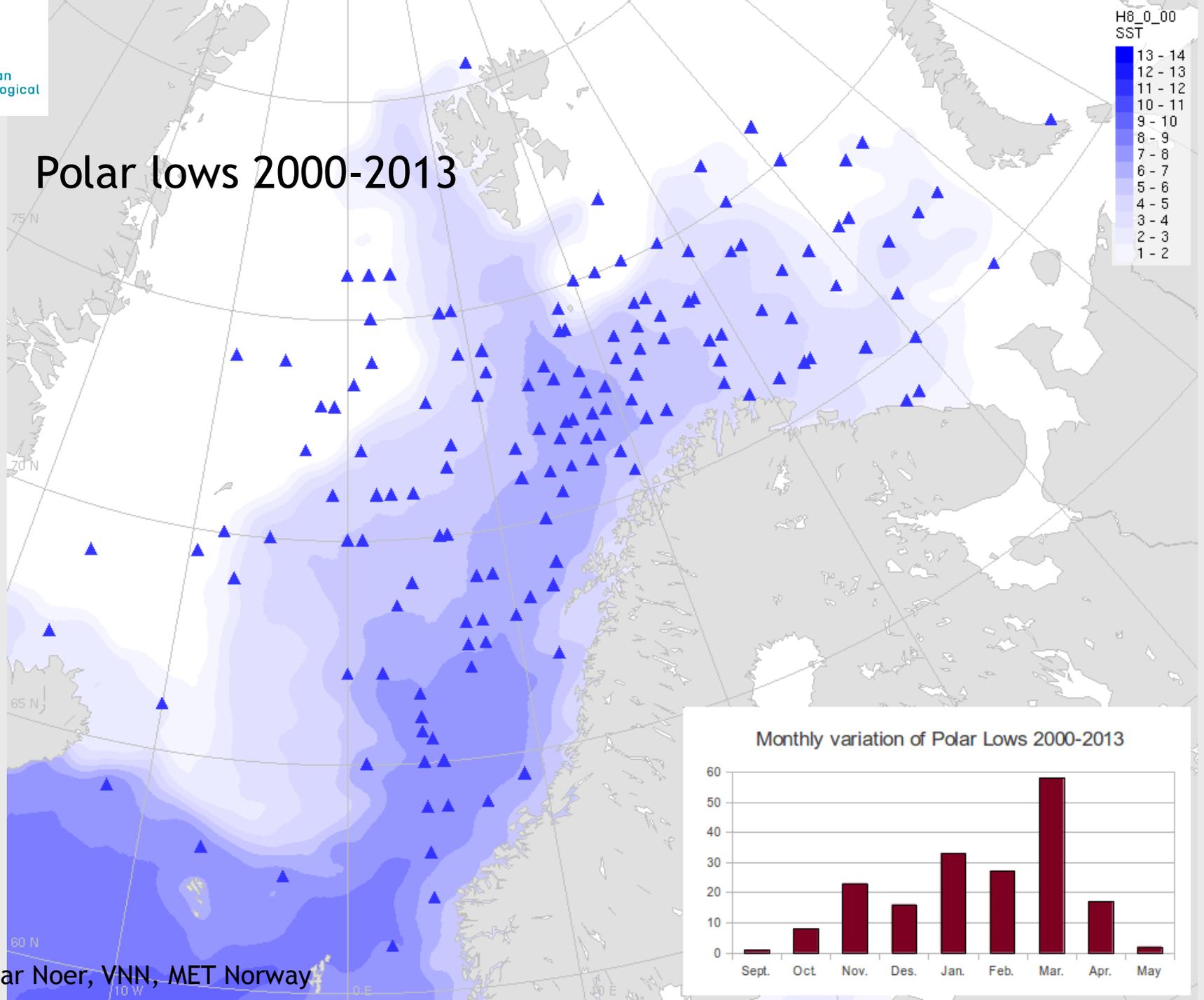
Sea Ice Service
Forecasting Division for Northern Norway

N-9293 Tromsø, Norway Tel: +47 77621462 Fax: +47 77621401 email: istjenesten@met.no

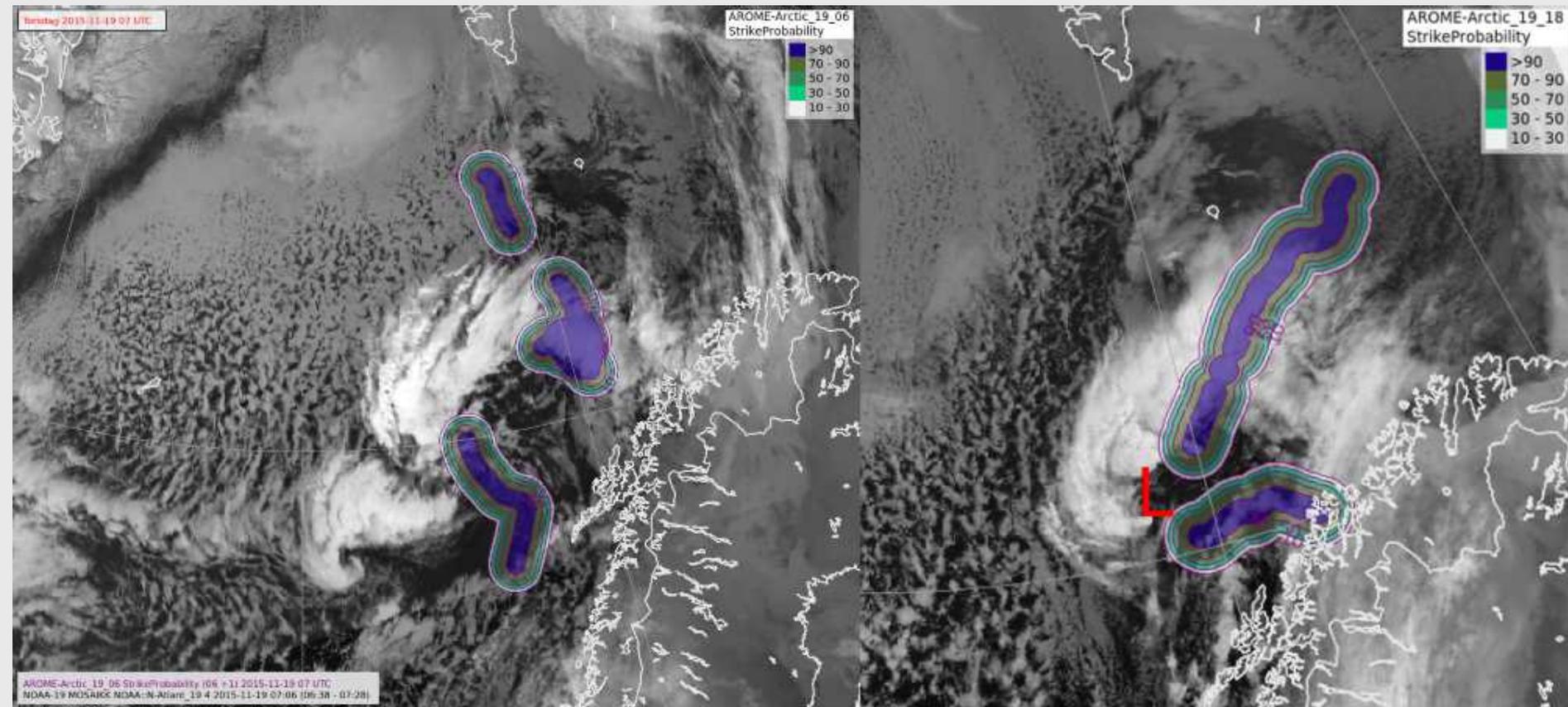




Polar lows 2000-2013



Polar low tracking with AROME-Arctic



2.5km, 66hrs 4*daily (3hr cycling)
Potential of Polar Low track within 42 hours

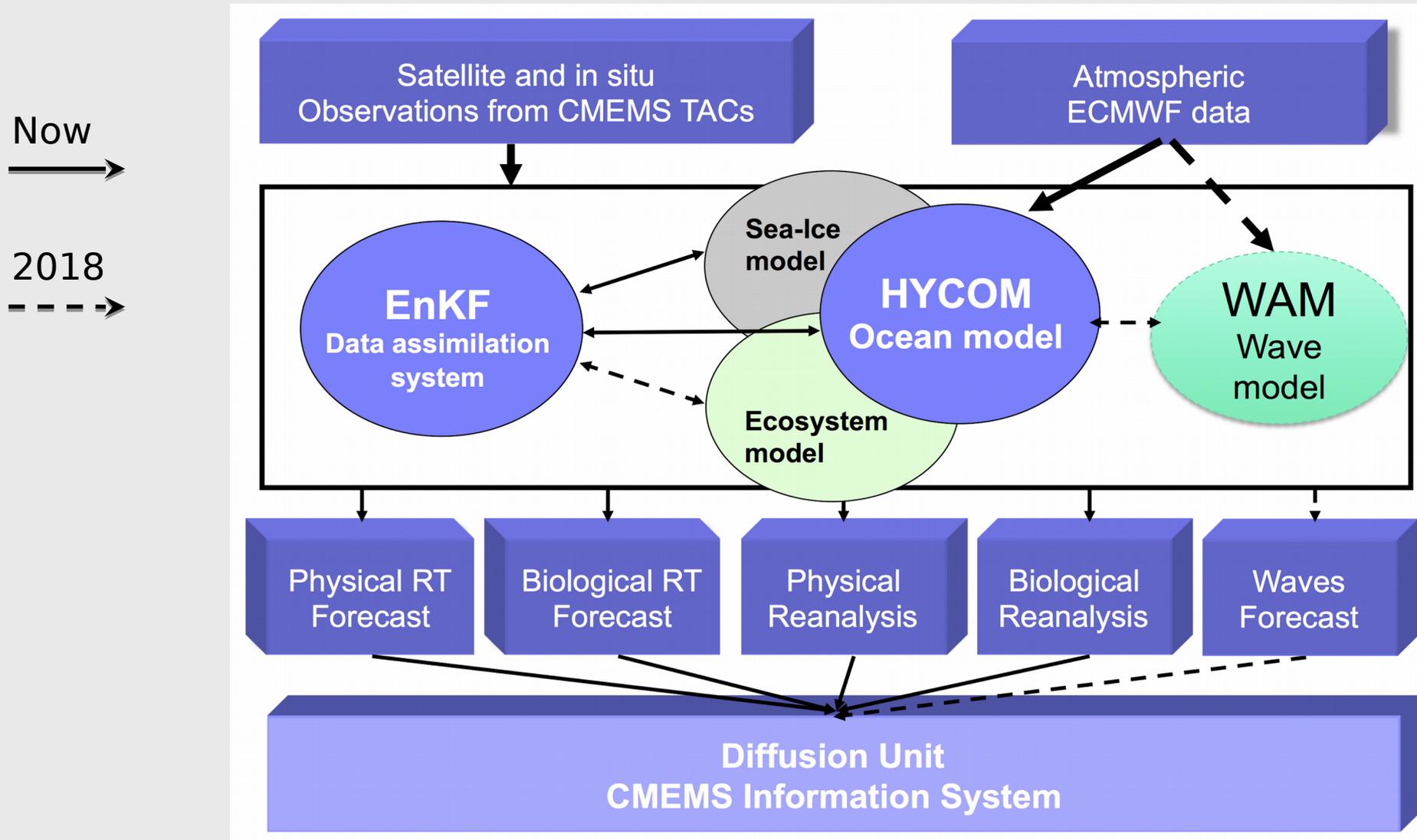
The Copernicus Marine Services

- **CMEMS uniqueness:**
 - Operate ocean forecast and reanalysis (physics & bio)
 - Open & Free data distribution
 - 24/7 service
 - Added value to Copernicus satellites (data assimilation)
 - Ambitious development plans
 - Distributed European body
- **The Arctic is present**
 - As a regional Monitoring and Forecasting Center **Arctic MFC**
 - North of 62N
 - 3 Norwegian partners
 - NERSC, MET Norway, IMR
 - In the **Global MFC**
 - Mercator Océan
 - In all observation **Thematic Assembly Centers**



- ① Global
- ② Arctic
- ③ Baltic
- ④ NWS
- ⑤ IBI
- ⑥ Med Sea
- ⑦ Black Sea

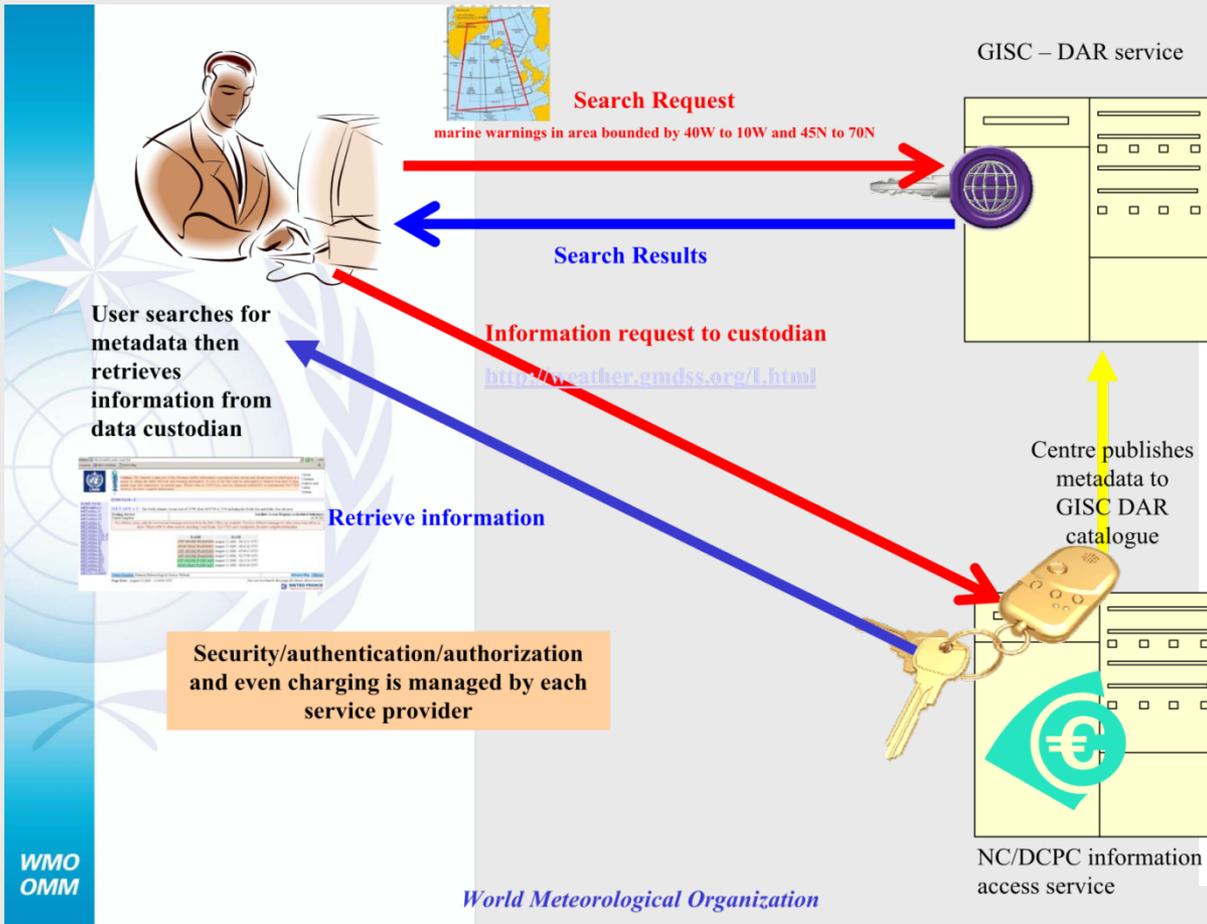
The ARC MFC (TOPAZ system)



Discovery Access and Retrieval Services in WIS

Management of all data types – not only NRT data streams

Global Information System Centres (GISCs)



ISO compliant Meta Data format and contents

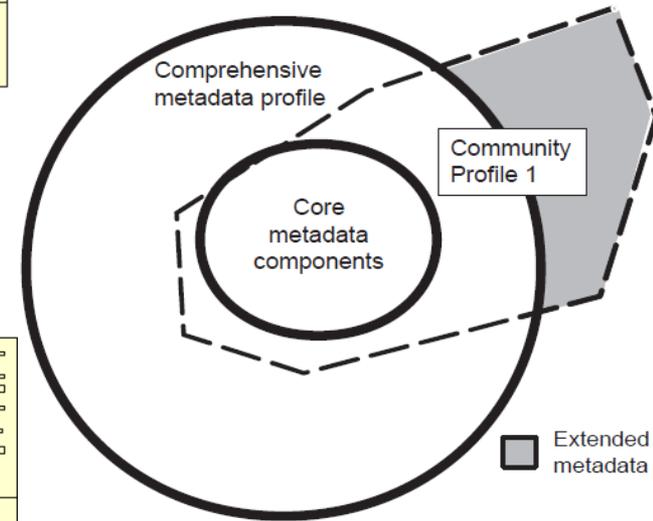


Figure C.1 — Metadata community profile

**MET Norway runs data management systems/portals for:
GCW, NORDMAP, NMDC, NorDataNet, SIOS, AeN, GeoAccess,
Data Collection or Production Centres (DCPCs)**



Metadata – two basic flavors



- What data?
- Where to find them?
- How to get them?
- Any strings attached?

→ **Discovery metadata**



- Method of observation?
- Quality control applied?
- Data processing applied?
- Uncertainty of data?
- ...

→ **Interpretation metadata**

Example services

GCW Website

- The GCW website contains programme information, up-to-date news, state of the cryosphere graphics and assessments, CryoNet station information, observational requirements, dataset intercomparisons, a multi-source glossary, and outreach material.
- It links to the GCW Data Portal.
- For more information see the demo at the WMO booth.

globalcryospherewatch.org

The screenshot shows the Global Cryosphere Watch website homepage. At the top, there is a blue header with the WMO logo and the text "Global Cryosphere Watch". Below the header is a navigation menu with links for Home, About, News, Cryosphere Now, CryoNet, Data, Activities, Outreach, Reference, and a search box. The main content area is divided into several sections:

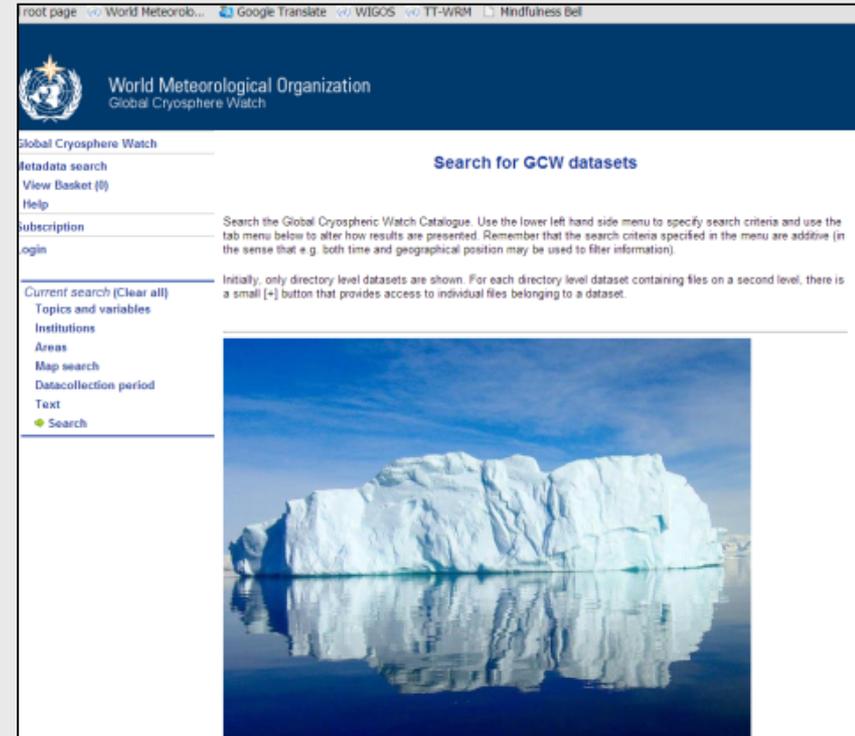
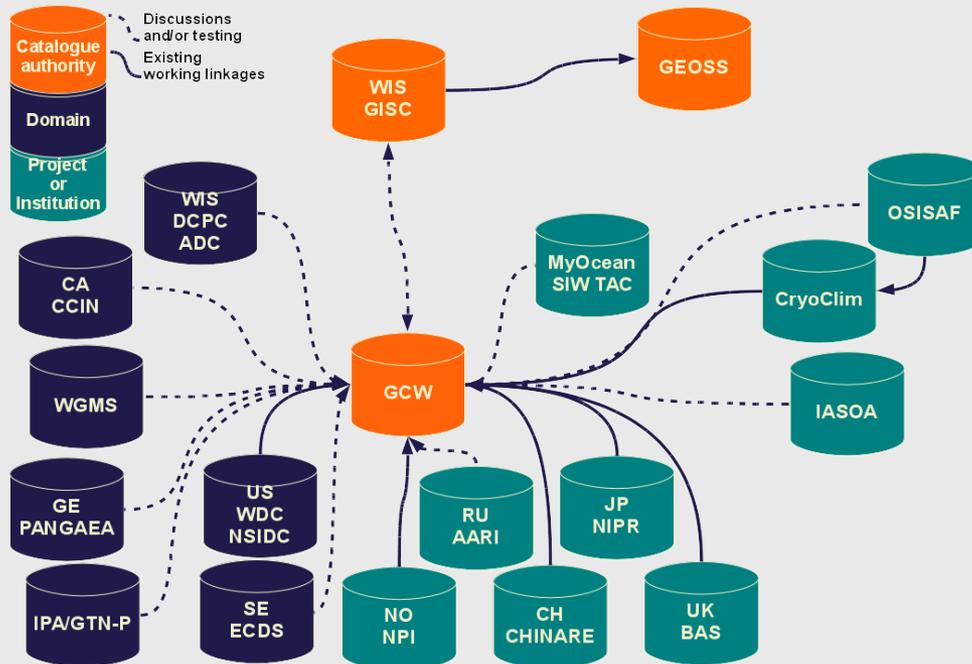
- Highlights:** Features the GCW logo and a welcome message: "Welcome to the Global Cryosphere Watch website! GCW is evolving, so please check back periodically for additional information on GCW projects, CryoNet stations, and the Cryosphere Now." Below this is a banner that says "GCW website is now live!" with a small thumbnail of the website.
- The Cryosphere Now:** A central section featuring a polar projection map of Antarctica. The map is color-coded by ice concentration, with a legend at the bottom indicating percentages from 0 to 100. The date "Aug 25, 2013" and "Antarctic ASI (from AMSR2) ver. 5.2, Grid 6.25 km" are displayed. To the left of the map is a vertical menu with links: "Sea and Freshwater Ice", "Snow and Solid Precip", "Glaciers & Ice Caps", "Ice Sheets", "Permafrost", "Atmosphere", and "Satellite Products".
- Cryosphere in the News:** A sidebar on the right containing several news snippets with dates and source links, such as "Study finds earlier peak for Spain's glaciers" and "Earlier peak for Spain's glaciers".
- GCW News and Highlights:** Another sidebar on the right with news items like "Barry Goodison awarded the 2012 Patterson Distinguished Service Medal" and "WGMS Summer School on Mass Balance Measurements and Analysis 2013, 2-7 September".

At the bottom of the page, there is a footer with contact information: "Problem with website? Contact the webmaster", social media icons for Facebook and Twitter, and a statement: "This website is operated on behalf of WMO by SSEC. It is not an official WMO website." The SSEC logo is also present.

Services

GCW Data Portal

The **GCW Data Portal** is part of **WIS**, a data Collection and Production Centre (under development), and is interoperable with data centres.



gcw.met.no

Example – use of WMO Arctic Data Centre

Arctic Data Search x

arcticdata.met.no/metamod/search/page/1/result?active_criteria=&freetext_13=roms&bk_id_1_1601=on

Arctic Data Centre

Hosted by the Norwegian Meteorological Institute

WMO Information System (WIS) - Data Collection and Production Centre

Browse data repository

ISO23950/SRU Search

Metadata search

View basket (0)
Help

Subscription

Login

Current search (Clear All)

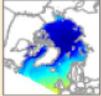
- Topics and variables
- Activity types
 - Model run
- Institutions
- Areas
- Map search
- Datacollection period
- Text
 - roms
- Search

Metadata Catalogue Search

Search the METAMOD Catalogue. Use the links on the left hand side to access pages for setting search conditions and initiate the search. Initially, only directory level datasets are shown. For each directory level dataset containing files on a second level, there is a small [+]
button that may be used to show metadata about the files.

Buttons beneath the dataset names: Show xml: Show all metadata for the dataset
Subscribe: E-mail notification when files are added/changed (needs user account)
Visualize: Display map representation of the data
Add to basket: Add the file(s) to the collection basket. (More than 100 files in the basket needs user account)

Search options Pivot table

Dataset name	Institutions	Areas	Activity types	Abstract
ROMS-Arctic20km-analysis <input type="button" value="Show metadata"/> <input type="button" value="Transform"/> <input type="button" value="Add to basket"/> <input type="button" value="Visualize"/> 	Norwegian Meteorological Institute (met.no)	Nordic Seas	Model run	This ocean model is operated at 20km resolution covering the Nordic Seas and the Arctic Ocean. This specific dataset provides the daily analysis from the operational model. Only the analysis is provided for historical periods, the daily forecast with 1 hour resolution is provided as a separate dataset. Currently the WMS presentation of this dataset is not supporting the 3D nature. A numerical model is applied to describe the dynamics of the oceans, such as sea level variations (tides and storm surge), movements in the water column (currents) and the salinity and temperature. To simulate the ocean, a 3-D grid is applied with different sizes, i.e., small grids for fine scale or detailed calculations, and larger or coarser grids to cover larger areas (and depth). The model runs on a supercomputer, and provides forecasts of sea level, currents, salinity and temperature for a time-range between 66 (2.75 days) and 240 hours (10 days). The model is run operationally, i.e. in a "24/7/365" environment to provide a 99.5% stability on a yearly basis. Currents from the model is further applied in emergency-models that simulates pathways of oil slicks and drifting objects (Search And Rescue). The ocean model used is the Regional Ocean Modeling System (ROMS). This is a three-dimensional, free-surface, terrain-following numerical model that solve the Reynolds-averaged Navier-Stokes equations using the hydrostatic and Boussinesq assumptions (Haidvogel et al., 2008). Haidvogel, D. B., H. Arango, W. P. Budgell, B. D. Cornuelle, E. Curchitser, E. Di Lorenzo, K. Fennel, W. R. Geyer, A. J. Hermann, L. Lanerolle, J. Levin, J. C. McWilliams, A. J. Miller, A. M. Moore, T. M. Powell, A. F. Shchepetkin, C. R. Sherwood, R. P. Signell, J. C. Warner, and J. Wilkin, Ocean forecasting in terrain-following coordinates: Formulation and skill assessment of the Regional Ocean Modeling System, JOURNAL OF COMPUTATIONAL PHYSICS, 227, 3595–3624, 2008.
ROMS-Arctic20km-forecast	Norwegian Meteorological	Nordic Seas	Model run	This ocean model is operated at 20km resolution covering the Nordic Seas and the Arctic Ocean. This specific dataset provides the hourly forecast

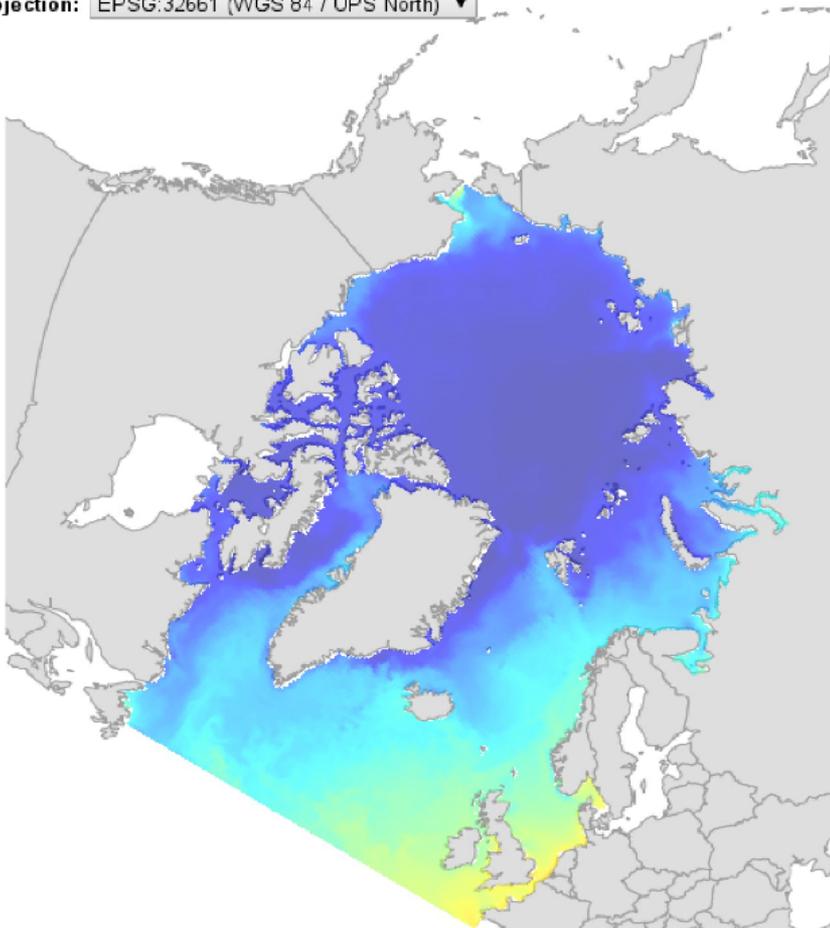
Example – use of WMO Arctic Data Centre

Arctic Data Search x

arcticdata.met.no/metamod/search/page/1/result?active_criteria=&freetext_13=roms&bk_id_1_1601=on

Arctic Data Centre

Projection: EPSG:32661 (WGS 84 / UPS North)



sea_water_potential_temperature

potential temperature

stay visible

Timeseries points: 970

Style: boxfill/rainbow

28
20.5
13

sea_water_potential_t

- sea_floor_depth_below_sea_level
- area_type
- latitude
- longitude
- sea_water_salinity
- x_sea_water_velocity
- y_sea_water_velocity
- sea_ice_area_fraction
- sea_ice_thickness
- barotropic_sea_water_x_velocity
- barotropic_sea_water_y_velocity
- sea_surface_elevation

Slideshow Stop Previous Next 2015-07-11 12:00:00.000Z

ROMS-Arctic20km-forecast	Norwegian Meteorological	Nordic Seas	Model run	Formulation and skill assessment of the Regional Ocean Modeling System, JOURNAL OF COMPUTATIONAL PHYSICS, 227, 3595–3624, 2008.
				This ocean model is operated at 20km resolution covering the Nordic Seas and the Arctic Ocean. This specific dataset provides the hourly forecast

Example – use of WMO Arctic Data Centre

Arctic Data Search x

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Arctic Data Centre

Hosted by the Norwegian Meteorological Institute

WMO Information System (WIS) - Data Collection and Production Centre

[Browse data repository](#)

[ISO23950/SRU Search](#)

[Metadata search](#)

[Subscription](#)

[Login](#)

Log in to METAMOD to get access to more functions. When logged in you can do the following:

- Setup automatic subscriptions to get notified about new data files.
- Upload new datafiles and add meta data
- Administrate your own account.

[Login](#)

Username

Password [Forgotten your password?](#)

[Request new user](#)

If you do not already have a username and password you can send a request for one. Be aware that it can take some time to process your request as it has to be manually approved.

Username

Email address

Access rights

Name

Name of institution

Other (please specify)

Formulation and skill assessment of the Regional Ocean Modeling System, COMPUTATIONAL PHYSICS, 227, 3595–3624, 2008.

Extract subsets, reproject and download data (requires login)

ROMS-Arctic20km-forecast Norwegian Meteorological Nordic Seas Model run This ocean model is operated at 20km resolution covering the Nordic Seas and the Arctic Ocean. This specific dataset provides the hourly forecast

Example – use of WMO Arctic Data Centre

Arctic Data Search x

arcticdata.met.no/metamod/search/page/1/result?active_criteria=&freetext_13=roms&bk_id_1_1601=on

Arctic Data Centre

Transform dataset

ADC/ROMS-Arctic20km-analysis

ROMS model results

Area

Specify geographical area of desired output data (in degrees, relative to zero meridian/equator):

Select region: N: 90
W: -180 E: 180
S: 45.116

Variables

Download	Name	Description	Standard name	Long name	Units
<input checked="" type="checkbox"/>	depth		depth	depth	meters
<input checked="" type="checkbox"/>	h		sea_floor_depth_below_sea_level	model bathymetry	meters
<input checked="" type="checkbox"/>	latitude		latitude	latitude	degrees_north
<input checked="" type="checkbox"/>	longitude		longitude	longitude	degrees_east
<input checked="" type="checkbox"/>	mask		area_type	land mask	
<input checked="" type="checkbox"/>	aice		sea_ice_area_fraction	fraction of cell covered by ice	
<input checked="" type="checkbox"/>	hice		sea_ice_thickness	average ice thickness in cell	meter

Formulation and skill assessment of the Regional Ocean Modeling System, COMPUTATIONAL PHYSICS, 227, 3595–3624, 2008.

Extract subsets, reproject and download data (requires login)

ROMS-Arctic20km-forecast Norwegian Meteorological Nordic Seas Model run This ocean model is operated at 20km resolution covering the Nordic Seas and the Arctic Ocean. This specific dataset provides the hourly forecast

Example – use of WMO Arctic Data Centre

Arctic Data Search x

arcticdata.met.no/metamod/search/page/1/result?active_criteria=&freetext_13=roms&bk_id_1_1601=on

Arctic Data Centre

<input checked="" type="checkbox"/>	mask	area_type	land mask	
<input checked="" type="checkbox"/>	aice	sea_ice_area_fraction	fraction of cell covered by ice	
<input checked="" type="checkbox"/>	hice	sea_ice_thickness	average ice thickness in cell	meter
<input checked="" type="checkbox"/>	salinity	sea_water_salinity	salinity	1e-3
<input checked="" type="checkbox"/>	temperature	sea_water_potential_temperature	potential temperature	Celsius
<input checked="" type="checkbox"/>	u	x_sea_water_velocity	u-momentum component	meter second-1
<input checked="" type="checkbox"/>	ubar	barotropic_sea_water_x_velocity	vertically integrated u-momentum component	meter second-1
<input checked="" type="checkbox"/>	v	y_sea_water_velocity	v-momentum component	meter second-1
<input checked="" type="checkbox"/>	vbar	barotropic_sea_water_y_velocity	vertically integrated v-momentum component	meter second-1
<input checked="" type="checkbox"/>	zeta	sea_surface_elevation	Sea Surface height	meters

Dimensions

Name	Description	Standard name	Long name	Units
X		projection_x_coordinate	km	
Y		projection_y_coordinate	km	
time		time	time since initialization	seconds since 1970-01-01 00:00:00

Reprojection

Transform data from current projection to:

projection: (original) interpolation: nearestneighbor

x axis min: [] x axis max: [] x axis increment: []

y axis min: [] y axis max: [] y axis increment: []

Reprojection and transformation performed by FIMEX. For more information on parameters, see the [documentation](#).

Formulation and skill assessment of the Regional Ocean Modeling System, JOURNAL OF CLIMATE, 2008, VOLUME 21, PART 1, PAGES 1-15. © 2008 AMERICAN METEOROLOGICAL SOCIETY

Extract subsets, reproject and download data (requires login)

ROMS-Arctic20km-forecast	Norwegian Meteorological	Nordic Seas	Model run	This ocean model is operated at 20km resolution covering the Nordic Seas and the Arctic Ocean. This specific dataset provides the hourly forecast
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In logical

THREDDS: Thematic Real-time Environmental Distributed Data Services. Middleware to bridge the gap between data providers and data users. Simplifies the discovery and use of scientific data and allows usage to reference scientific data. Catalogs are the core of THREDDS. They are XML-documents that describe the on-line datasets and can contain arbitrary or standard metadata. The THREDDS Data Server (TDS) is a web server that provides catalog, metadata and data access services for scientific datasets.

The screenshot displays the Thredds website interface. At the top, the title "Thredds.met.no" is prominently displayed. Below the title, a navigation bar includes the Norwegian Meteorological Institute logo and a "Catalog" link with the URL <http://thredds.met.no/thredds/catalog.html>. A "Dataset" section on the left lists various categories, with an arrow pointing to the "met.no/" entry. The main content area shows a detailed directory listing of datasets, including folders for "MET Arone MetCoOp", "Arone 2.5 files/", "Arone 2.5 VC files/", "Arone 0.5 files/", "MET Arone Arctic Svalbard (Testing)", "Arone Arctic Svalbard files/", "MET Arone Arctic (Testing)", "RAW MODEL DATA (TEST)/", "POST PROCESSED MODEL DATA (TEST)/", "SURFACE DATA SURFEX (TEST)/", "VERTICAL PROFILES AND CROSS SECTIONS (TEST)/", "Arone Arctic old files/", "MET Arone MetCoOp Forecast Archive", "Arone MetCoOp Forecast Archive files/", "MET Arone MetCoOp Gridding (MIST2)", and "Arone MetCoOp Gridding files/". A footer at the bottom left provides information about the Thredds server version (4.3.21) and a link to documentation. The Norwegian Meteorological Institute logo is visible in the bottom right corner.



Meteorologisk
institutt

150 år

Thank you for your attention