Arctic ROOS

Arctic Regional Ocean Observing System

Statusreport for the EuroGOOS Annual meeting

20-22 May 2015

By

S. Sandven, NERSC

Members

No	Country	Organisation	Contact
1	Norway	Nansen Environmental and Remote Sensing Center	Stein Sandven
2	Norway	Norwegian Institute for Water Research	Kaj Sørensen
3	Norway	Norwegian Meteorological Institute	Lars Petter Røed
4	Norway	Institute of Marine Research	Rolf Gradinger
5	Sweden	Swedish Meteorological and Hydrological Institute	Irene Lake
6	Finland	Finnish Meteorological Institute	Jari Haapala
7	Russia	Nansen International Environmental and Remote Sensing Center, St. Petersburg	Vladimir Volkov
8	France	GIP Mercator Ocean	Pierre Bahurel
9	France	Institut français de recherche pour l'exploitation de la mer (IFREMER)	Fanny Girard-Ardhuin
10	Poland	Institute of Oceanology, Polish Academy of Sciences	Waldemar Walczowski
11	Germany	Alfred-Wegener-Institut für Polar- und Meeresforschung	Katrin Latarius
12	Germany	University of Bremen	Georg Heygster
13	Denmark	Danish Meteorological Institute	Leif T. Pedersen
14	UK	University of Cambridge	Peter Wadhams
15	Norway	Norwegian Polar Institute	Vladimir Pavlov
16	Norway	Geophysical Institute, University of Bergen	Svein Østerhus
17	Denmark	Defence Centre for Operational Oceanography	Niels Holt
		Planned new members	
18	Norway	UNIS	Frank Nilsen
19	Iceland	Marine Research Institute	Hedinn Valdimarsson
20	UK	British Antarctic Survey	Jeremy Wilkinson

Shaded: members of EuroGOOS: 10 of 20

Main components of Arctic ROOS

In situ observation systems: ship-borne systems, moorings, ice buoys, floats and drifters i.e. (MyOcean In Situ TAC)

Satellite remote sensing: polar orbiting satellites using active and passive microwave, optical and infrared instruments

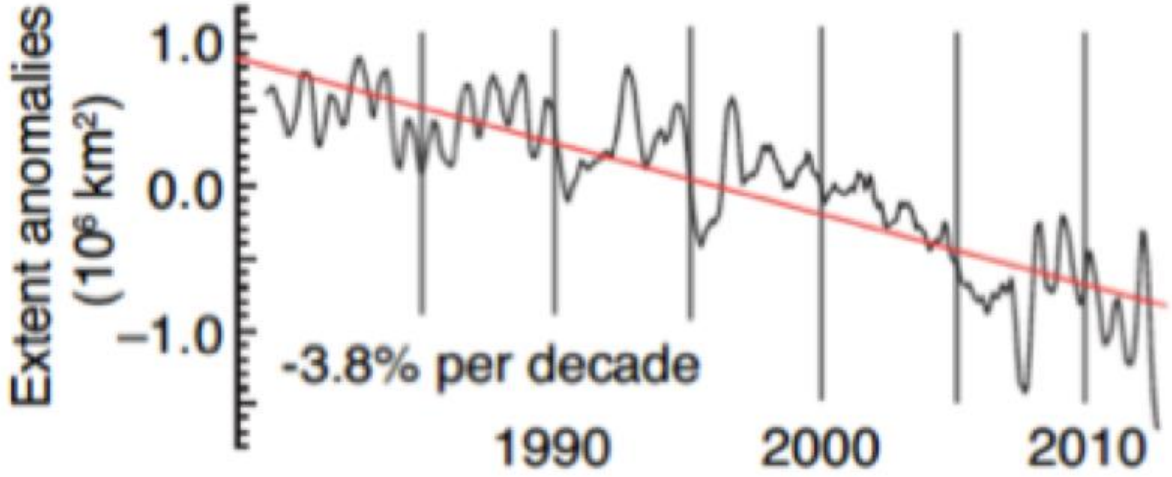
Modelling: data assimilation, nowcasting, short term forecasting, seasonal forecasting, model comparison and validation (e.g. TOPAZ + +)

Main activities in 2014-2015

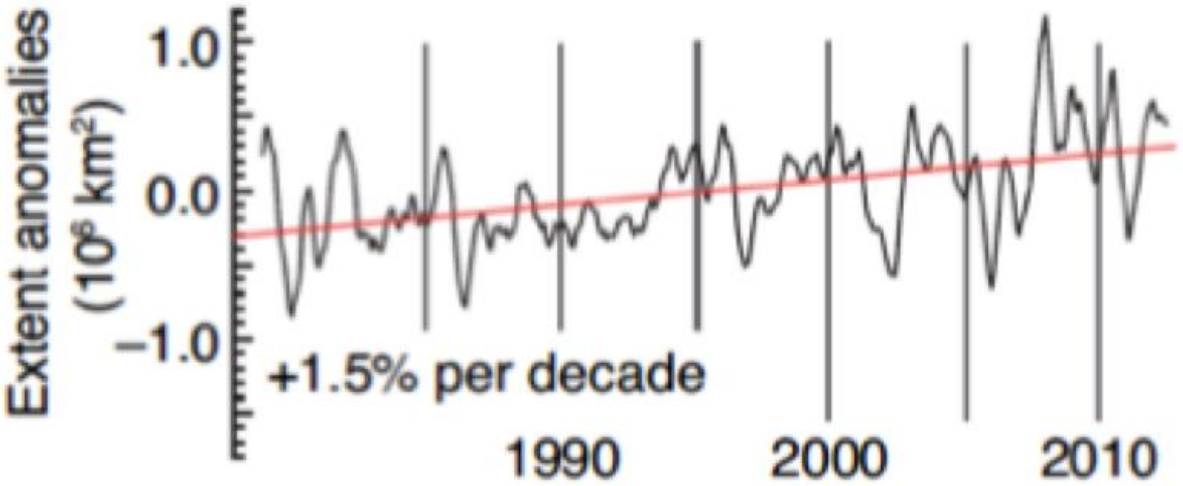
- Arctic Marine Forecasting Center, work under MyOcean, proposal for Copernicus marine services
- Sea ice monitoring for climate and operational services, promotion towards Arctic operators
- ESA CCI programme: Sea ice project: produce climate data sets for ice concentration, ice thickness and ice drift
- Cooperation with EMODnet Physics to increase in situ data
- Renewal/updating of the web site (http://arctic-roos.org), supported by a secretariat at NERSC (Morten Stette).
- New H2020 project (SPICES coordinated by FMI)
- New members of Arctic ROOS: DCOO has signed, MRI and UNIS in progress

Arctic ice extent decreases, Antarctic ice extent increases

Arctic

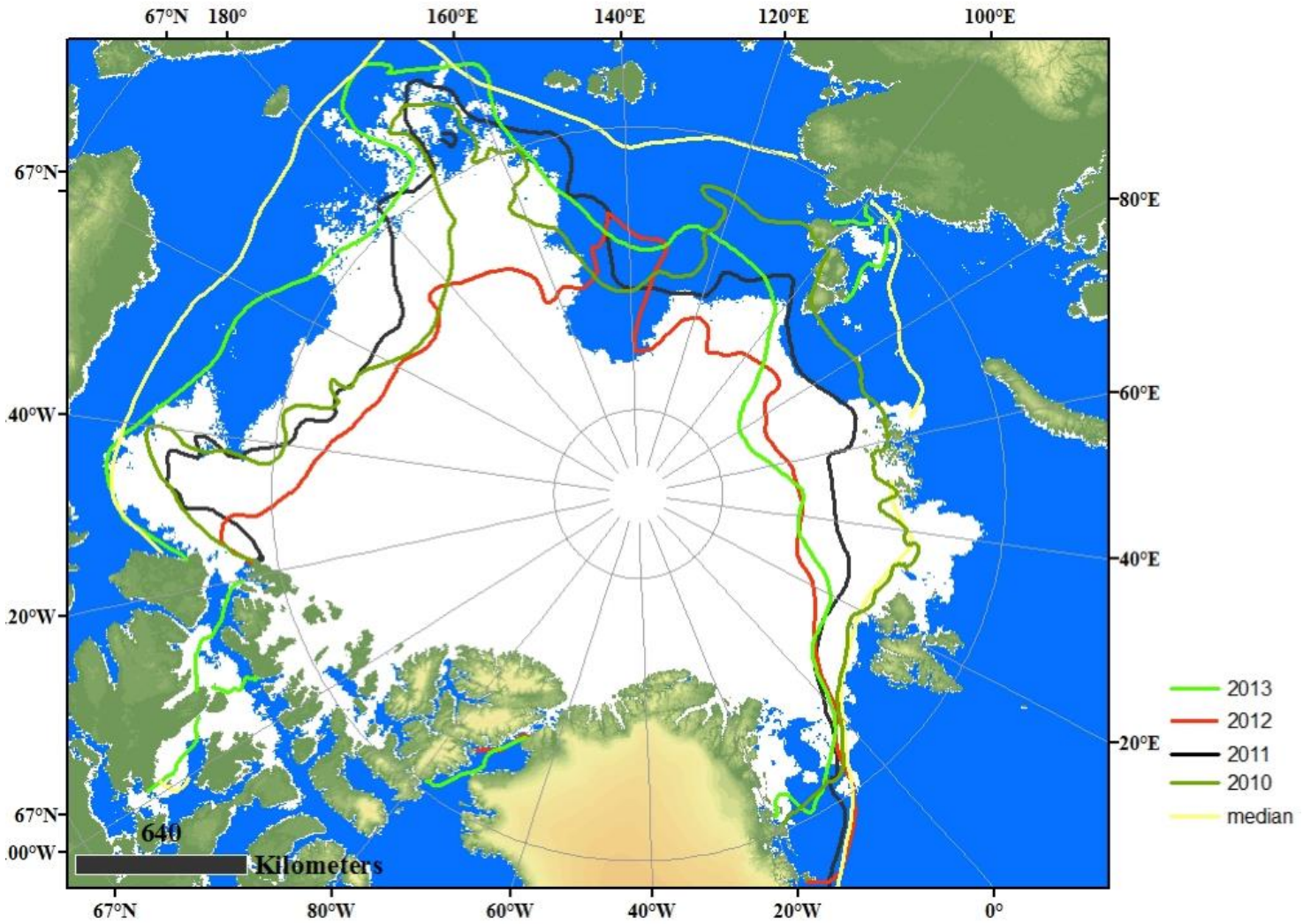


Antarctic

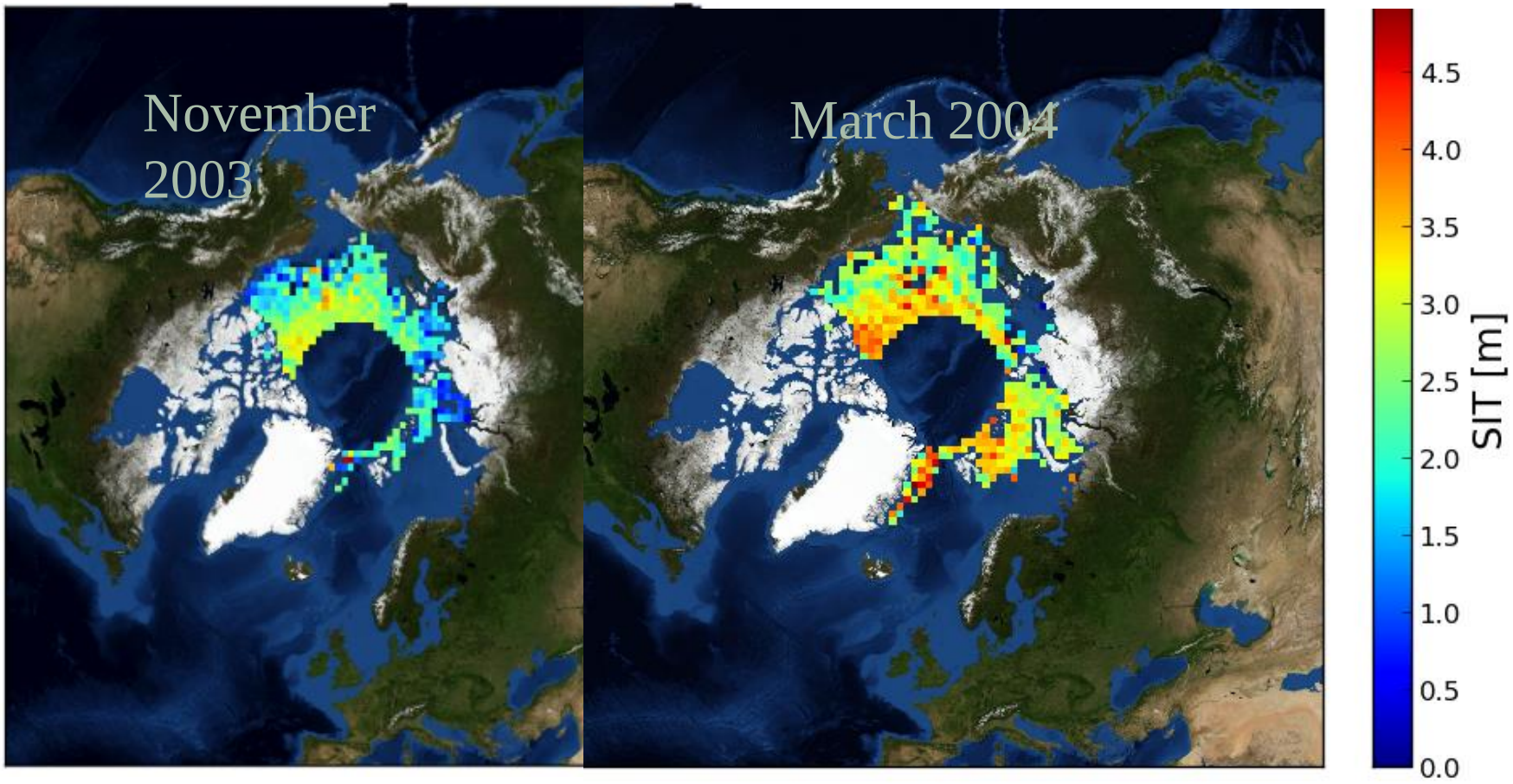


IPCC AR5, 2013

Arctic ice extent in September

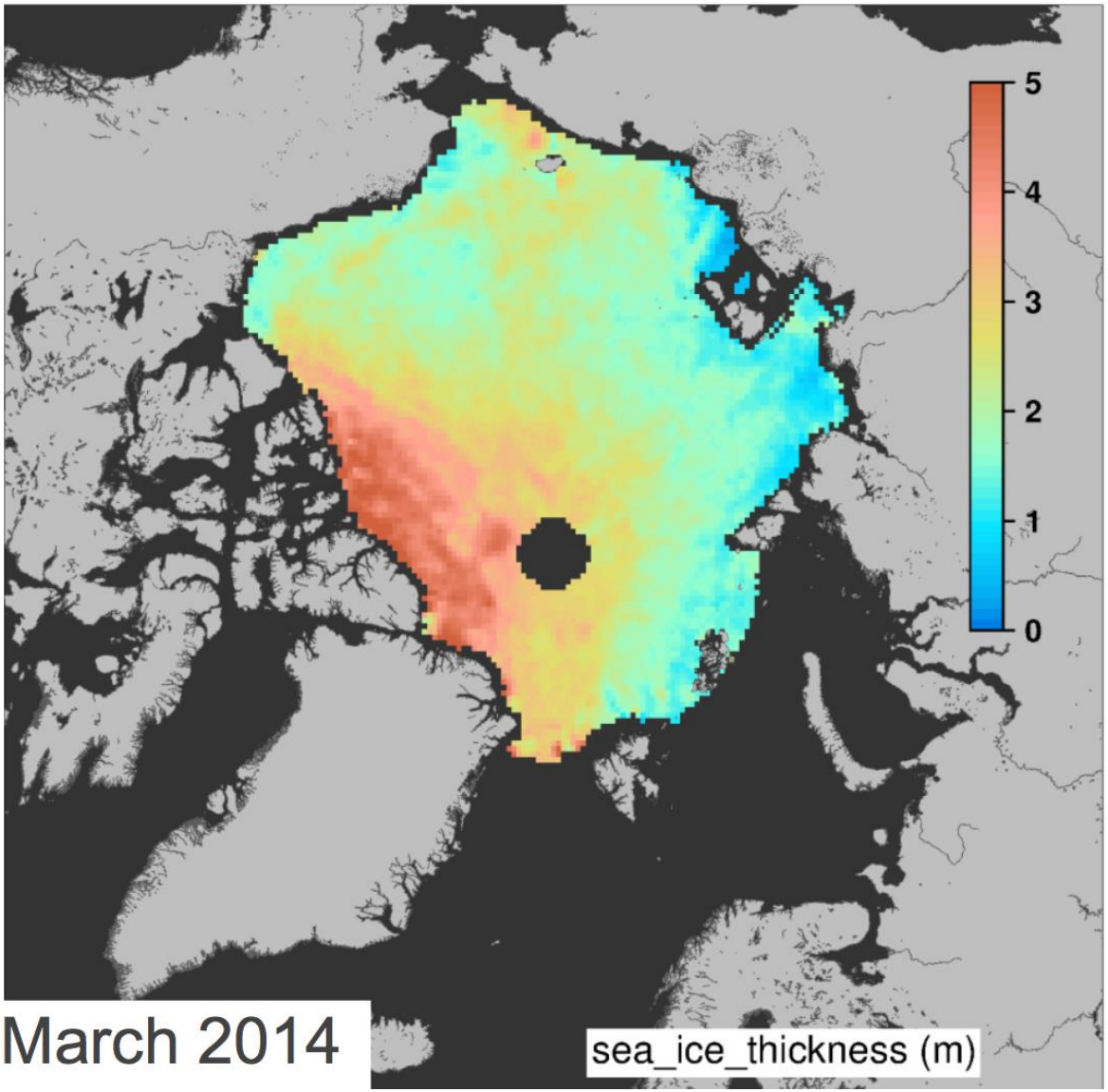


Ice thickness from ENVISAT radar altimeter



Monthly maps of FB and SIT (winter months), 100 km grid
Arctic coverage (< 82N due to satellite orbit)
Produced by FMI under the ESA CCI project

Ice thickness from CryoSat (from 2010)



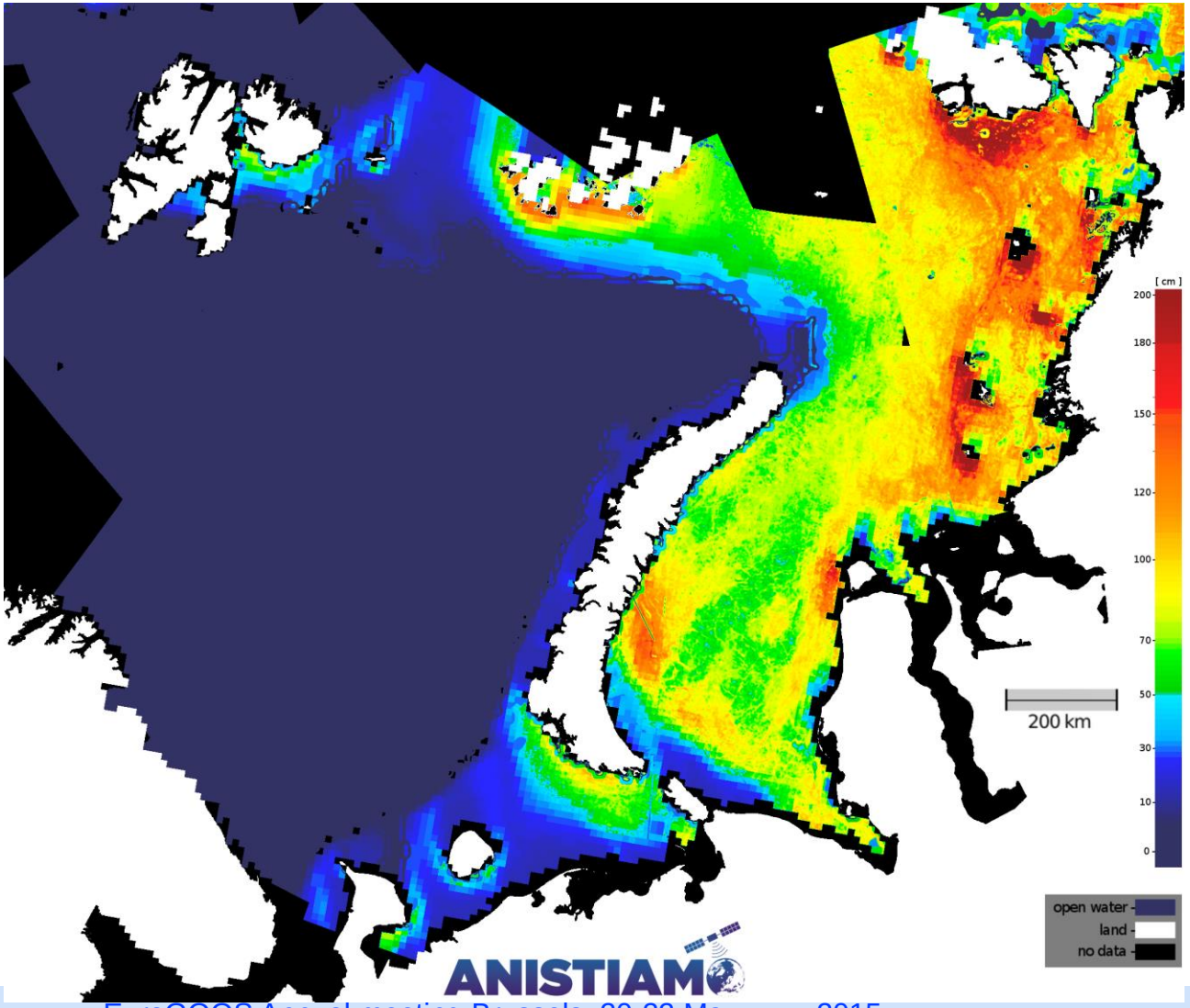
Courtesy: S Hendricks, AWI

BARENTS and KARA SEA ICE MONITORING by FMI

ESA ANISTIAMO sea ice thickness chart on 13 Feb 2014.

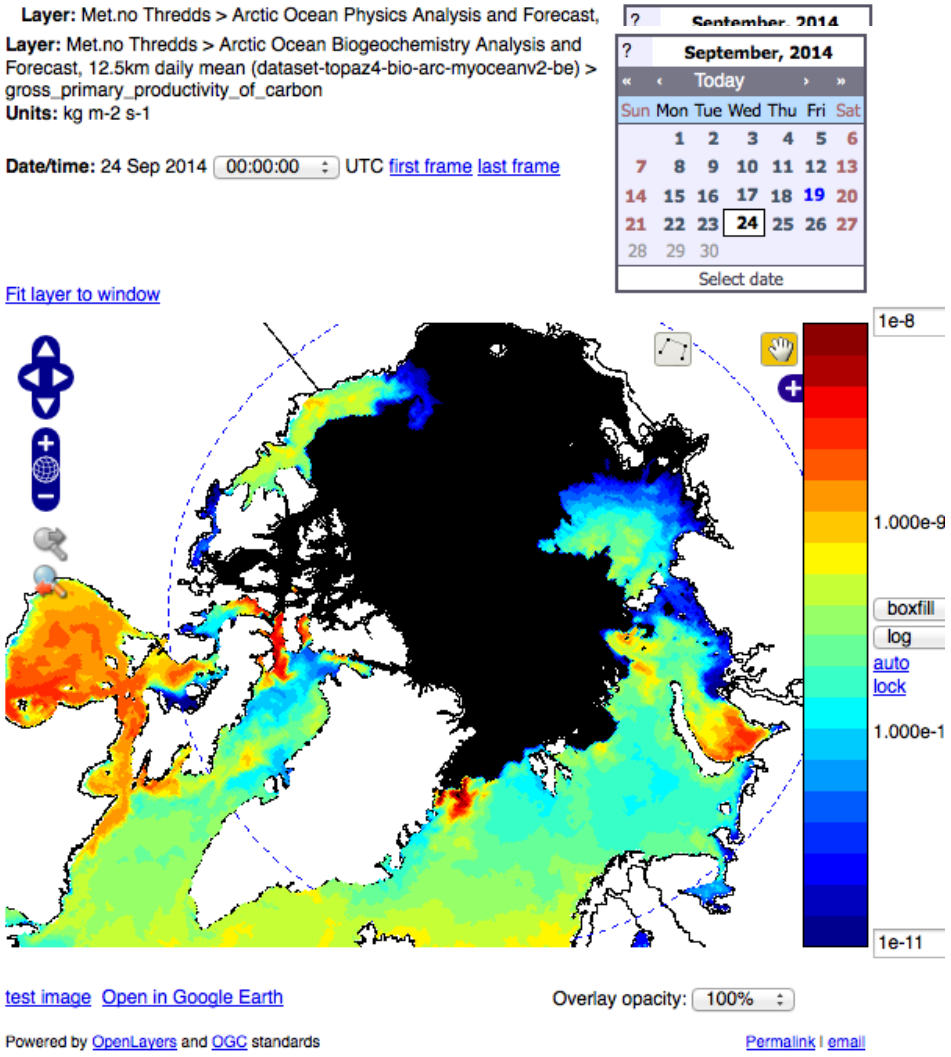
Work continues in 2014-2015 in FP7 POLAR ICE.

Using also SMOS and MODIS thin ice thickness charts, and Sentinel-1 SAR.

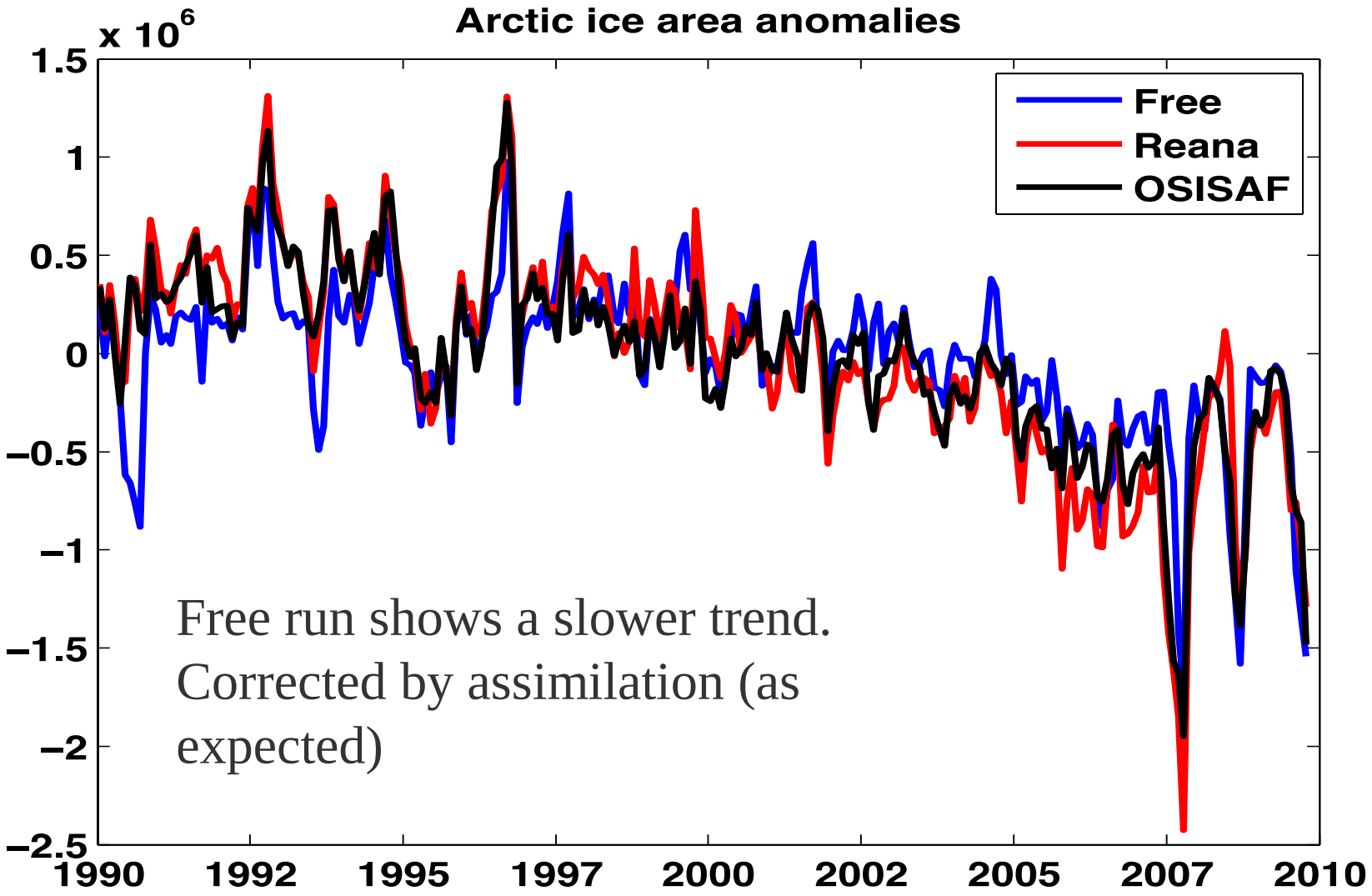


The TOPAZ system

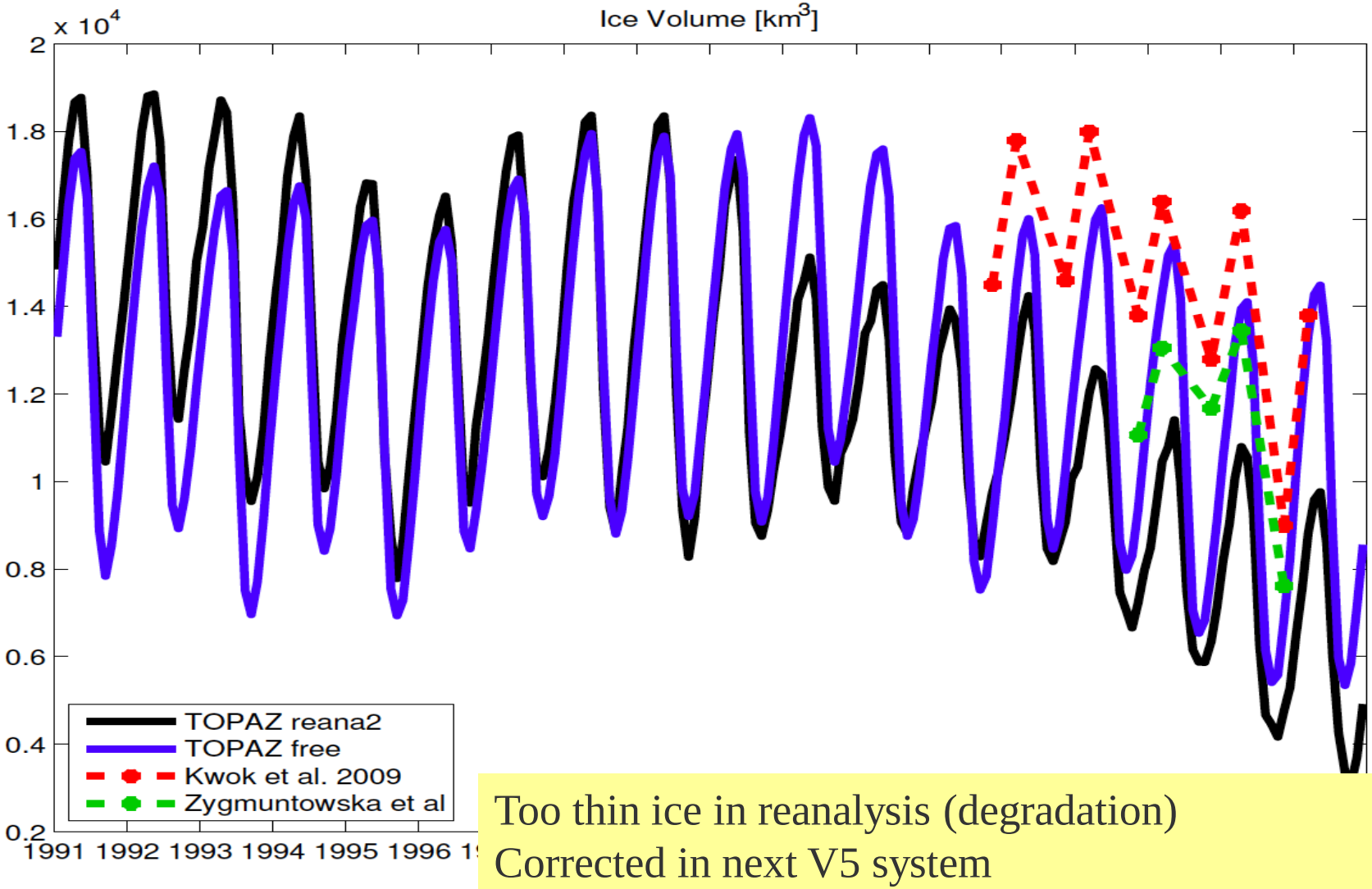
- Run operationally at MET Norway
  - Since 2008
  - Ecosystem coupled online in Jan. 2012
- 20 years reanalysis at NERSC
  - Took 2 years to produce
  - ~ 4 million CPU hours
- 3-years ecosystem reanalysis
  - Assimilation of both physical and ocean colour data
- MyOcean (Arctic MFC from 2015)
  - Free distribution of data
  - Dynamical viewing (Godiva2)
- RT Data used by ECMWF wave forecast model
  - Surface currents



Reanalysis: validation of sea ice area



Reanalysis: Ice thickness validation



Too thin ice in reanalysis (degradation)
Corrected in next V5 system
IceSAT indicates smaller seasonal cycle of thickness

Analysis and forecasting systems

From 2015 the Arctic Marine Forecasting System, based on TOPAZ and developed under MyOcean, will be transferred into the Copernicus Marine Services coordinated by Mercator Ocean. It is develop by NERSC and run operationally by met.no.

Met.no runs the Norwegian Ocean Weather Prediction (NOWP) system.

DMI runs an ice-ocean forecasting for the Greenland waters..

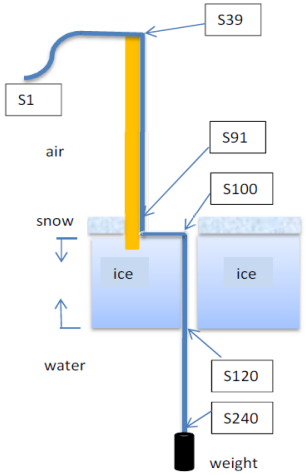
FMI is developing NEMO-LIM3 based operational model for the Kara Sea

+ +

In situ data

- Near-real-time data: In the Arctic-ROOS area, near-real time data includes CTD data from vessels, Argo floats, gliders, and ice-tethered profilers. Dissemination of these data is mainly based on the In Situ TAC under MyOcean and coordinated with the EMODnet Physics dissemination system.
- Delayed mode data: Current meter moorings providing time series of data are operated in several areas: Fram Strait, around Svalbard, in the Barents Sea and Norwegian Sea. Sea ice data and other oceanographical data are provided from ship expeditions

In Situ systems: BUOY MEASUREMENTS

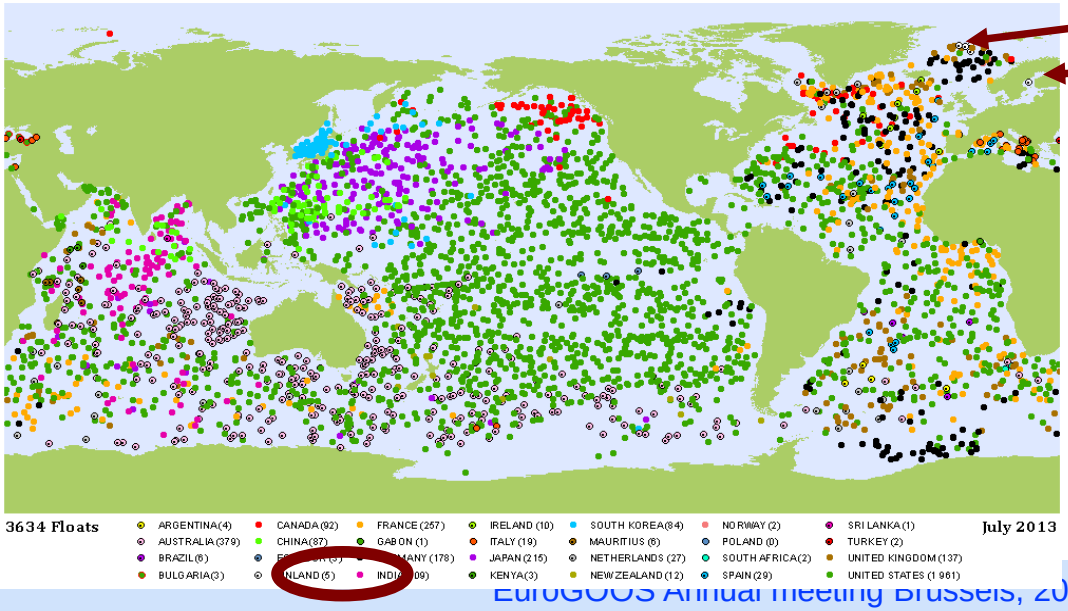


Ice mass balance buoys

- Utilization of SAMS ice mass balance buoy (“cheap IMB”) for ice monitoring, measurements in the Baltic, Arctic lakes and Arctic Ocean
- Two buoys were measured during 2012-2013 in the Arctic Ocean

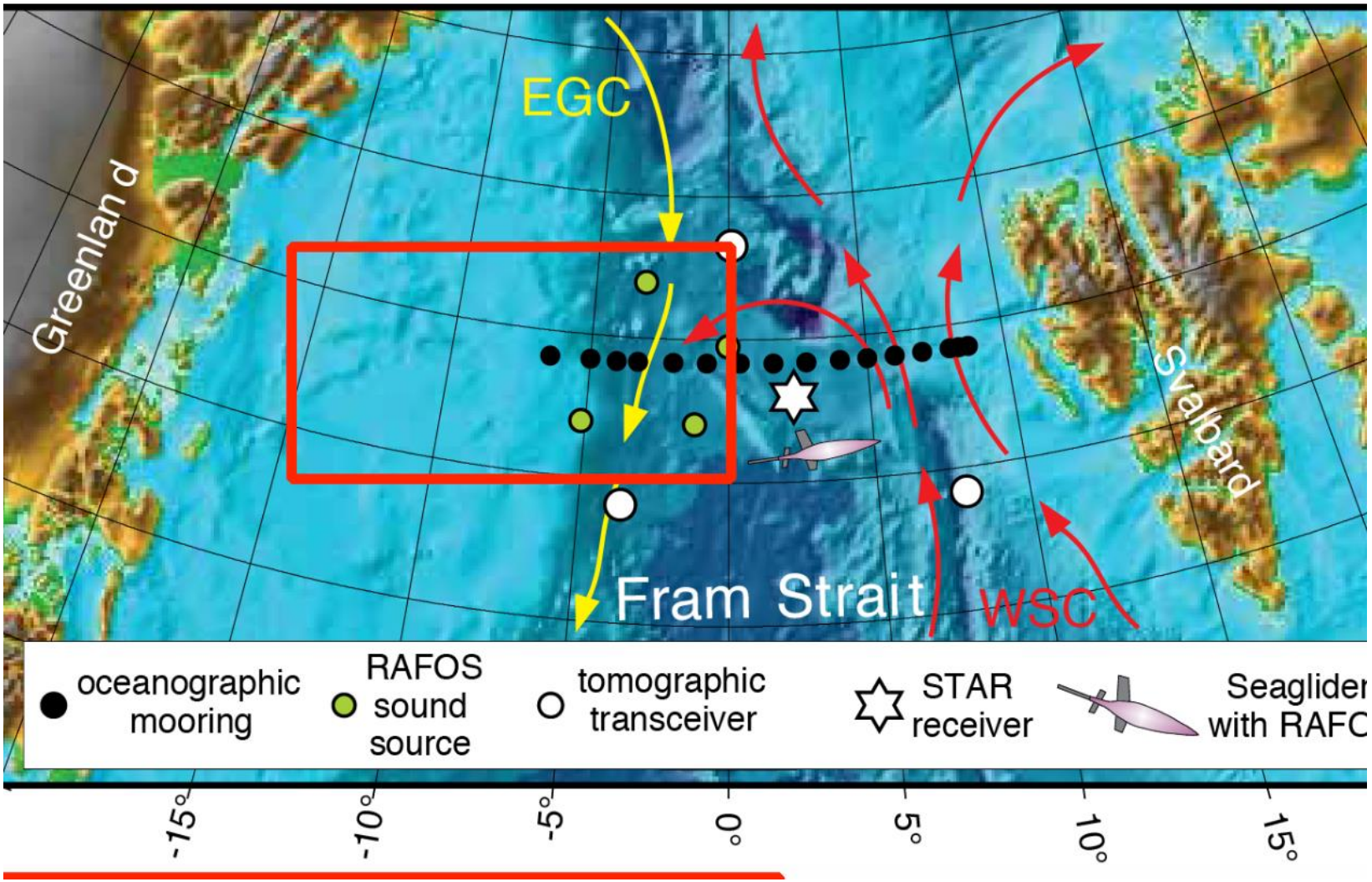
Argo floats

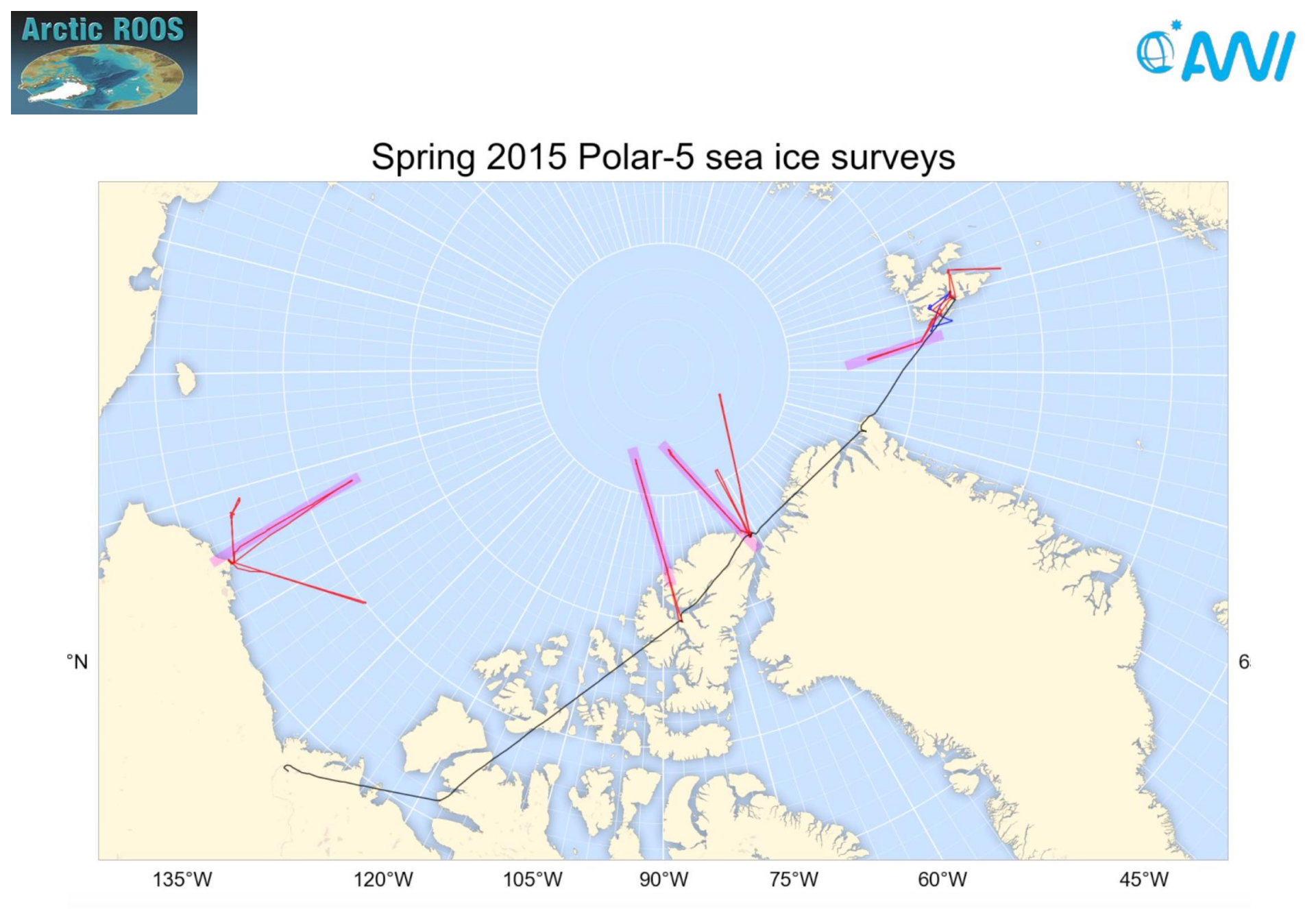
- Deployment to Greenland Sea
- Development of using Argo in shallow seas



FMI ARGO floats

Multiple systems in the Fram Strait




Spring 2015 Polar-5 sea ice surveys
°N
135°W
120°W
105°W
90°W
75°W
60°W
45°W

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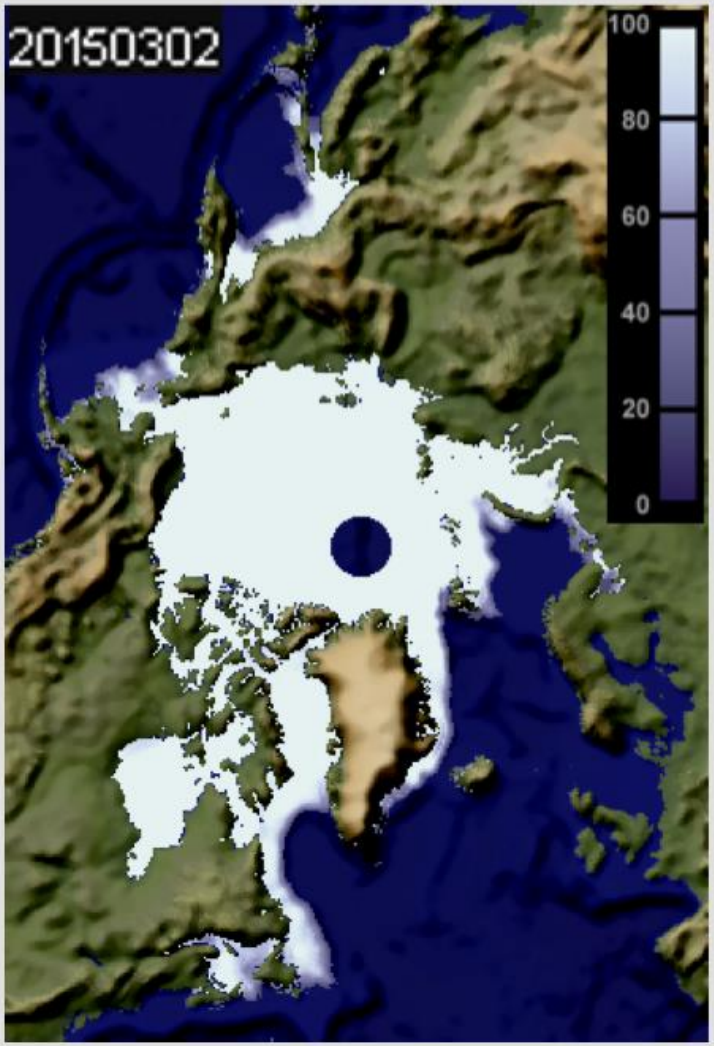
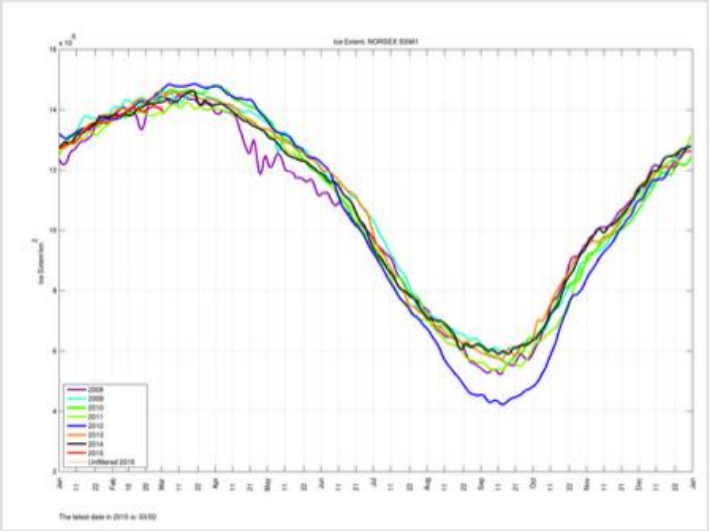
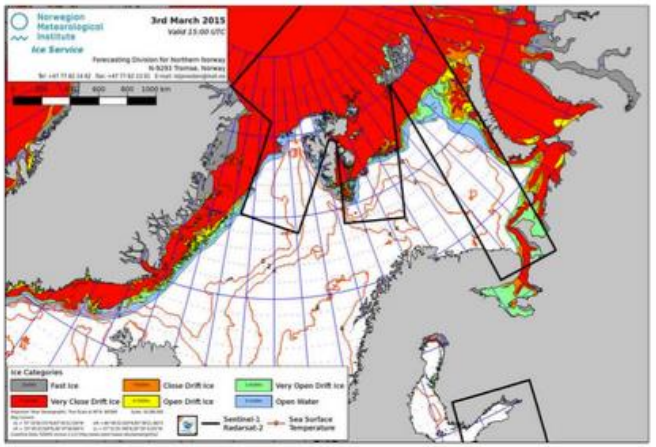
Arctic Regional Ocean Observing System

- a regional node under EuroGOOS - the european Global Ocean Observing System

Daily Ice map







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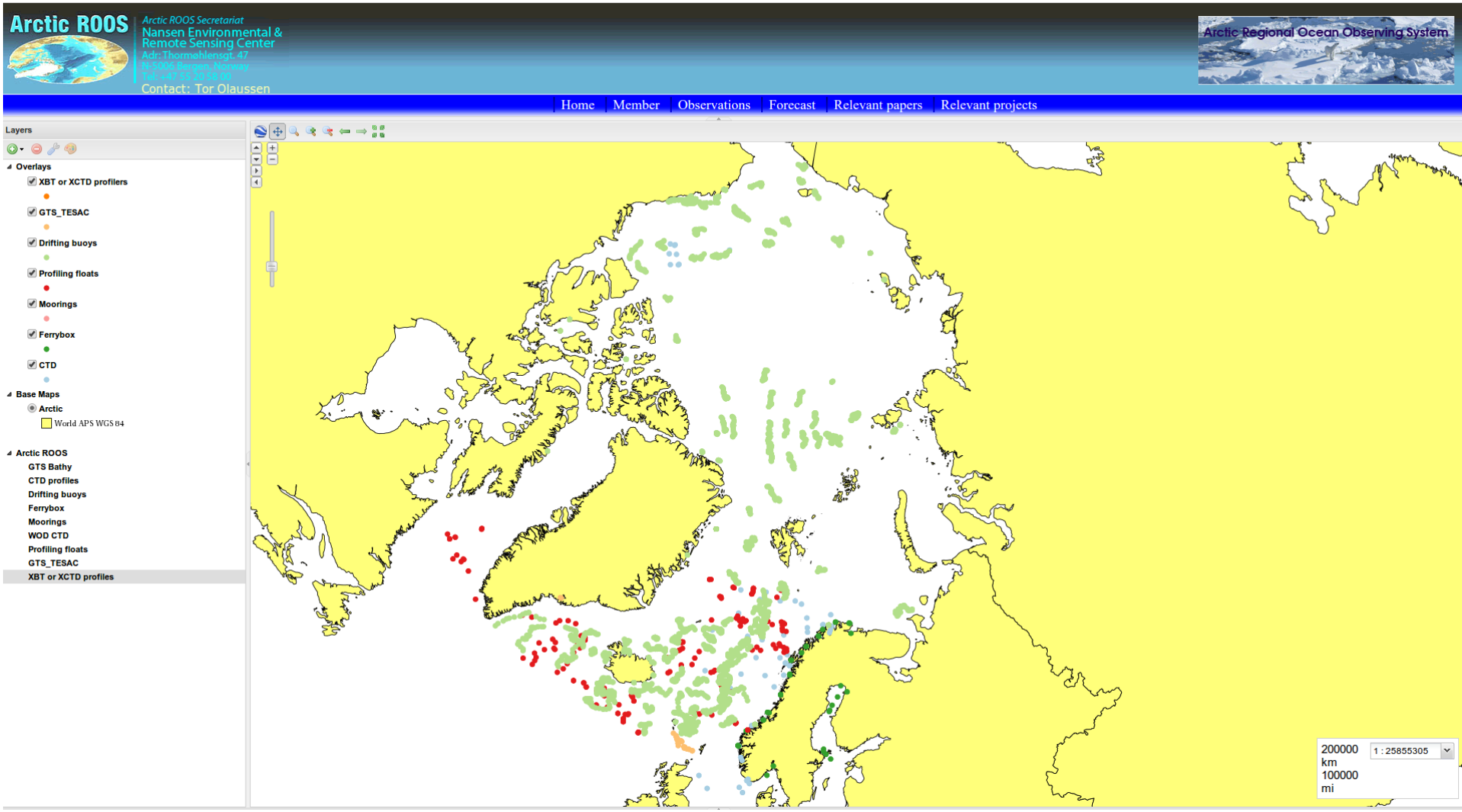
Satellite Observation system

Daily Observations	Seasonal and Long-term Observations
• Arctic ice concentration maps from SSMI and AMSR-E (NERSC)	• Total sea ice area and extent from 1978 to present (NERSC)
• Arctic ice area and extent from SSMI (NERSC)	• Regional sea ice area and extent from 1978 to present (NERSC)
• Global and Regional Ice concentration from AMSR2 (UB-IUP) • Arctic and Antarctic thickness of sea ice (< 50 cm) • Browsing system for all maps from UB • Comparison of sea ice algorithms (NERSC)	• Climatology Sea Ice Concentration in Arctic (NERSC)
• Global Ice Maps, Sea ice concentration, Ice edge, and MY-FY ice type (Eumetsat-OSI SAF)	• Temperature, salinity and volume fluxes in the Fram Strait (AWI)
• Global Ice Drift, based on Merged ASCAT and SSM/I and AMSR2 • Sea ice concentration from SSM/I available at CERSAT • Time series available for the last 20 years, daily updated (Ifremer)	• Shelf-basin exchange process around Svalbard (IOPAS)
• Regional Ice Charts (Met.no)	
• Ocean Color and SST (NERSC)	
• SST and ice charts for Greenland and Arctic (DMI)	

Arctic ROOS data portal

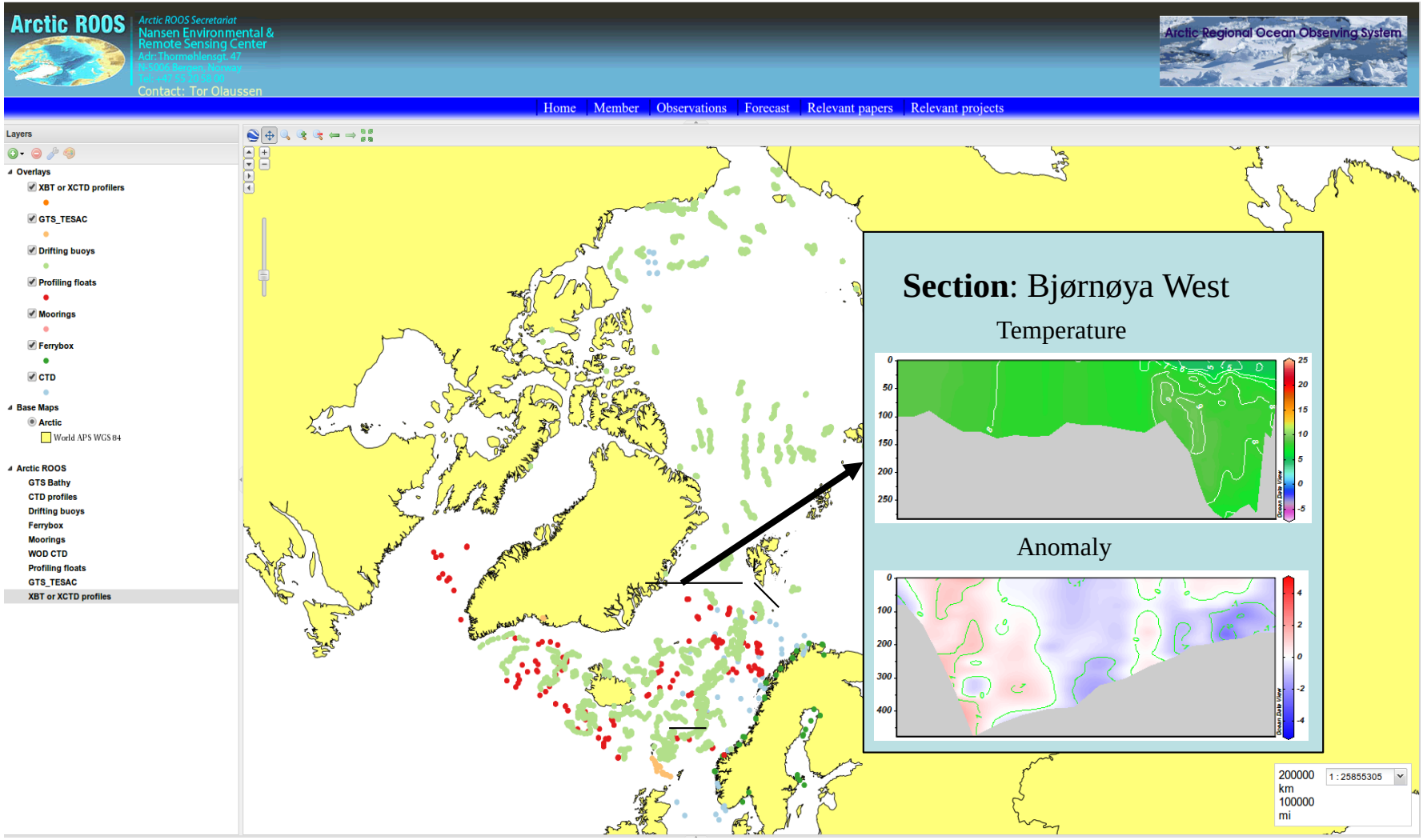
(under development by IMR)



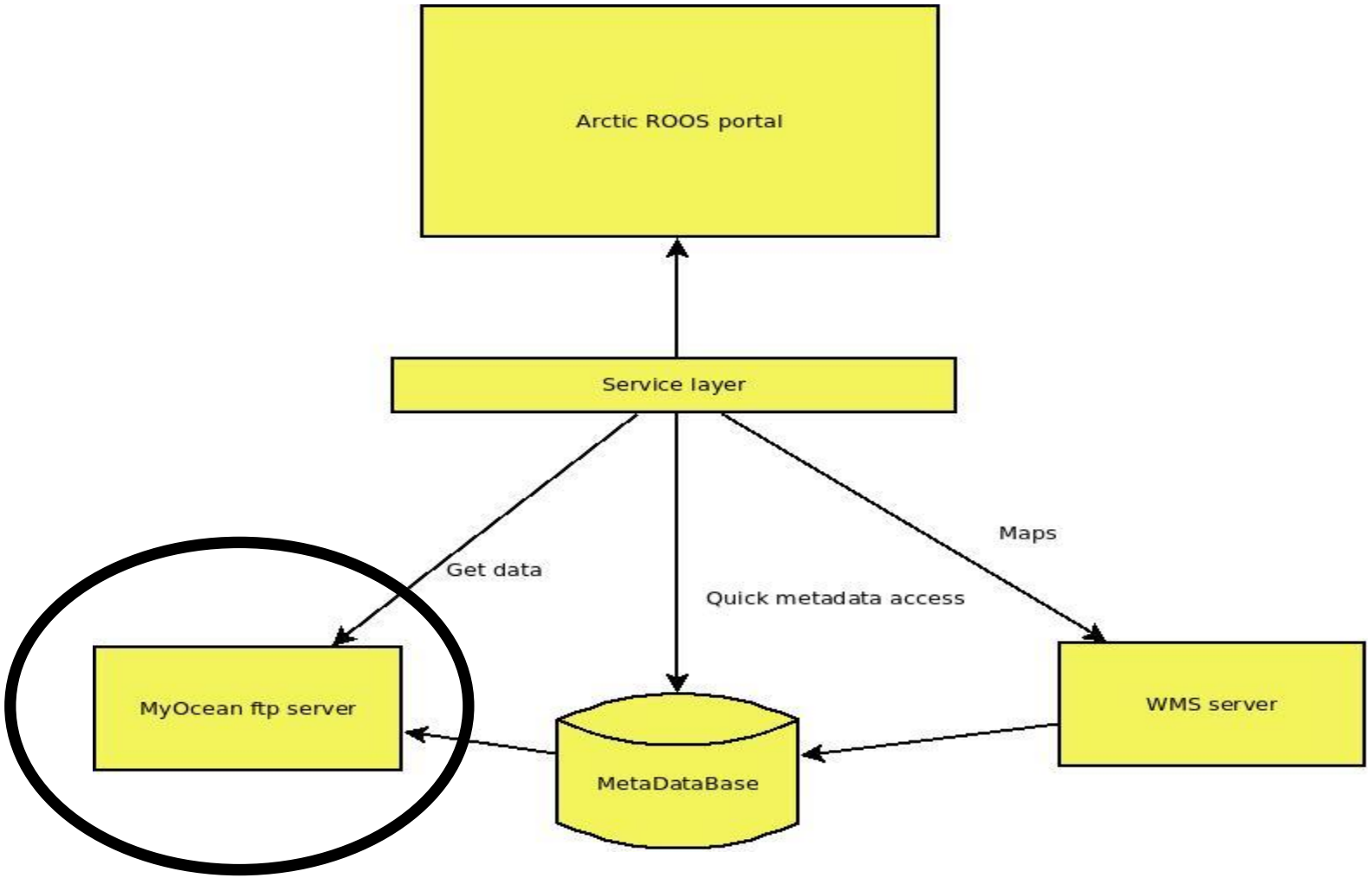
Data description

Retrieval of CTD data sections

(under development by IMR)



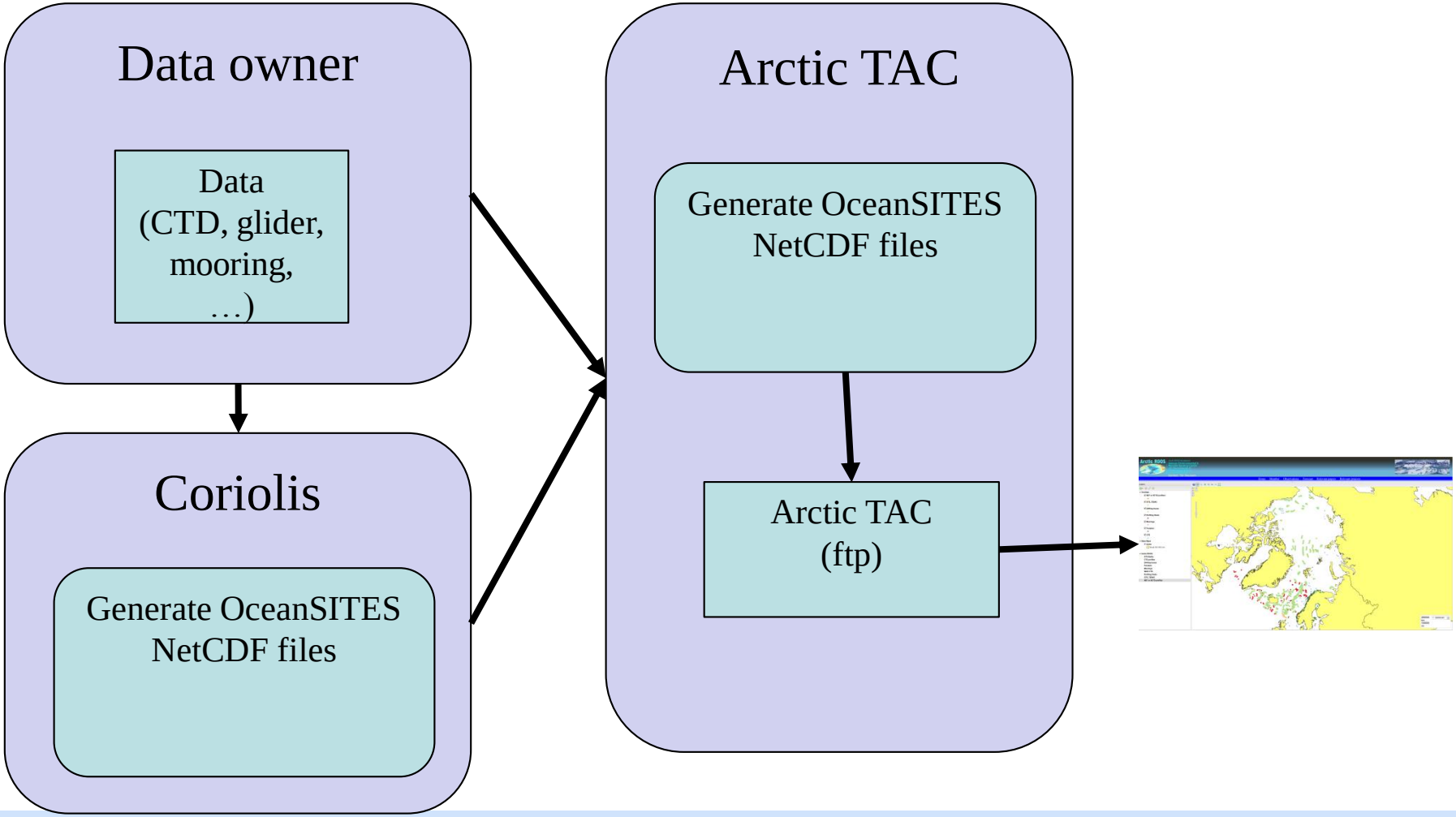
Arctic ROOS portal structure



Dataformats and quality

- Currently only NetCDF
  - Possibly other formats in the future
    - any requests for default available formats can be sent to datahjelp@imr.no
- Real time quality control
  - Following EuroGOOS DataMEQ RTQC guidelines
  - All data flagged (good, bad, no quality control)

Making data available through Arctic ROOS In-Situ



Arctic ROOS portal

Arctic ROOS

http://arctic-roos.org

Arctic ROOS data portal

http://webprod1.nodc.no/arctic-roos/arctic-roos.html

Arctic TAC

datahjelp@imr.no

Actions for 2015

Action	Deadline	Responsible
Arctic component of Copernicus Marine Services: proposal to Mercator	30 April	NERSC+Met.no+IMR
Launch new web page	30 March	Chair
Arctic ROOS data Portal	30 March	IMR
Planning Sentinel-1 SAR ice products for operational use, follow-up of MyOcean SIW TAC	30 June	Met.no, NERSC, DMI, FMI
Start H2020 sea ice project led by FMI	30 June	FMI
Initiate cooperation with institutions in US, Canada and Russia	31 Oct	chair
Initiate a process with IOC on a Arctic GOOS	28 feb	EG chair