BOOS
Baltic Operational
Oceanographic System

BOOS national activities in 2016

part2 – Observeration and services

BOOS STG

CMEMS Ocean State Report: Baltic Sea inflow
Eutrophication, hypoxia, low sea level event

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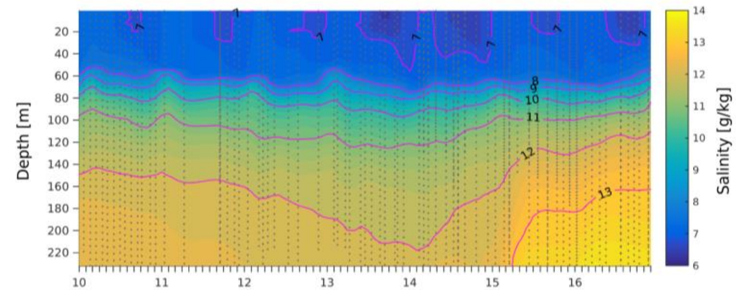
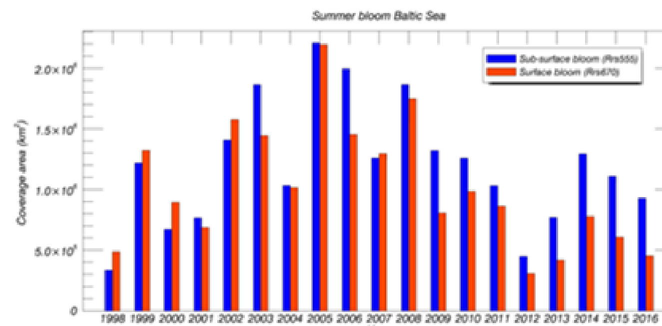
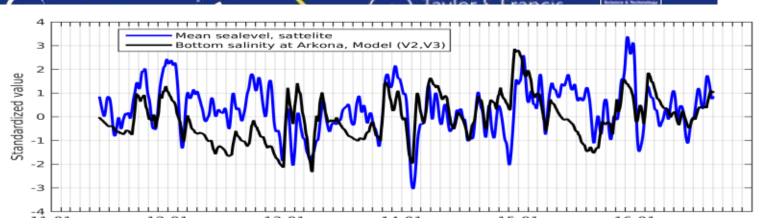
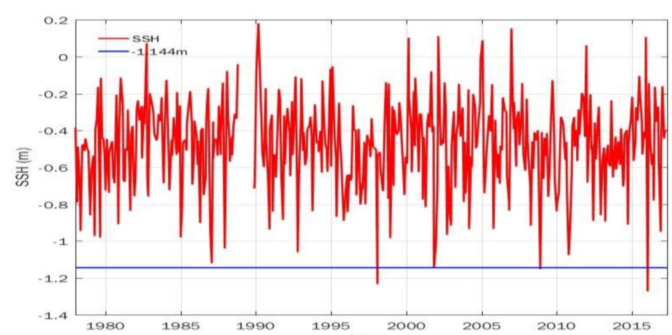
Baltic Operational Oceanographic System









Eutrophication: summer bloom over

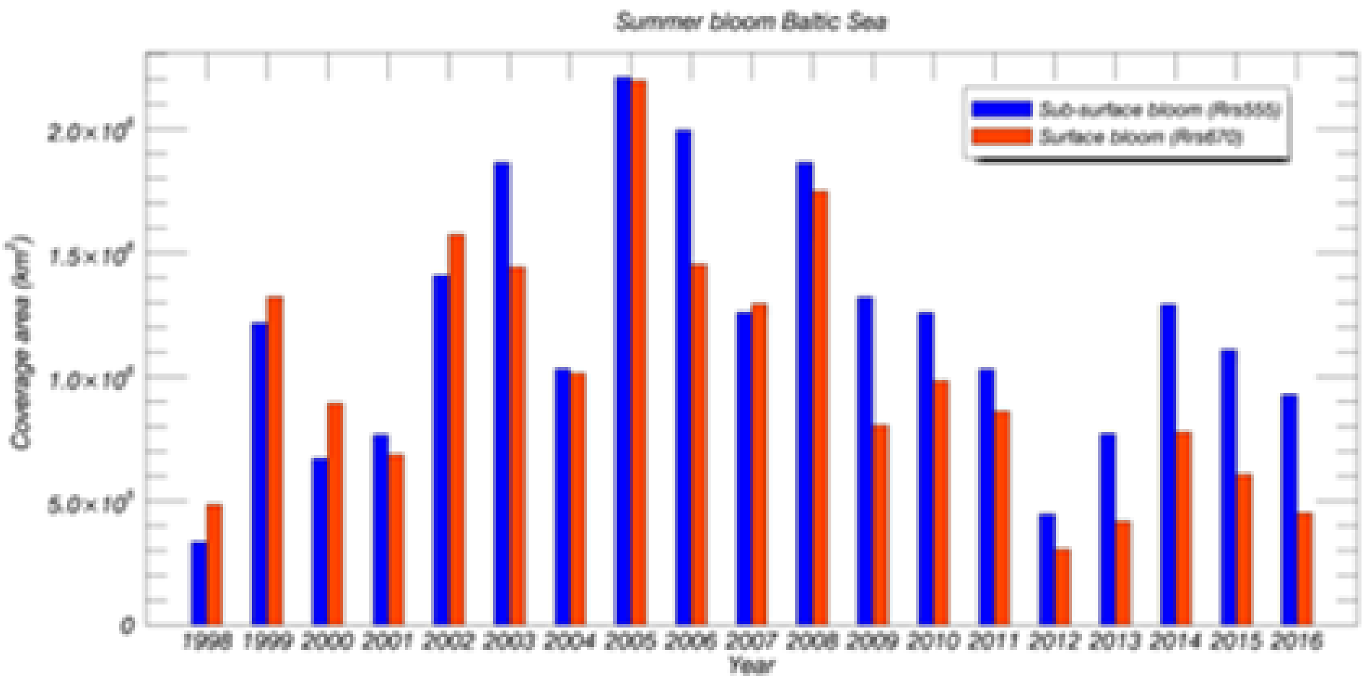


Figure 2. Time series of summer bloom spatiotemporal coverage (day·km2) (1998-2016)

Eutrophication: bottom oxygen

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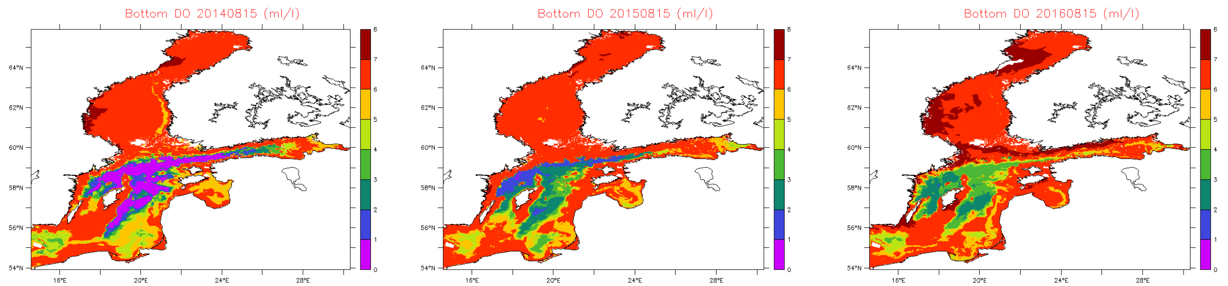
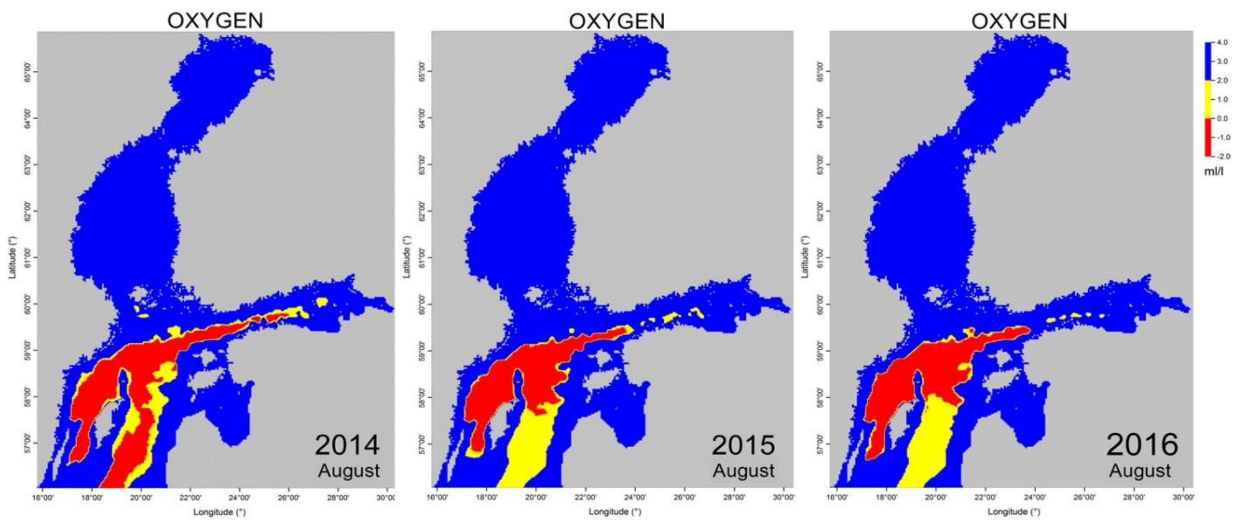
Oxygen situation near the seabed in the Baltic Sea in 15 August 2014, 2015 and 2016, BAL MFC



Oxygen situation near the seabed in the Baltic Sea in August 2014, 2015 and 2016 © SYKE



BOOS + INSTAC

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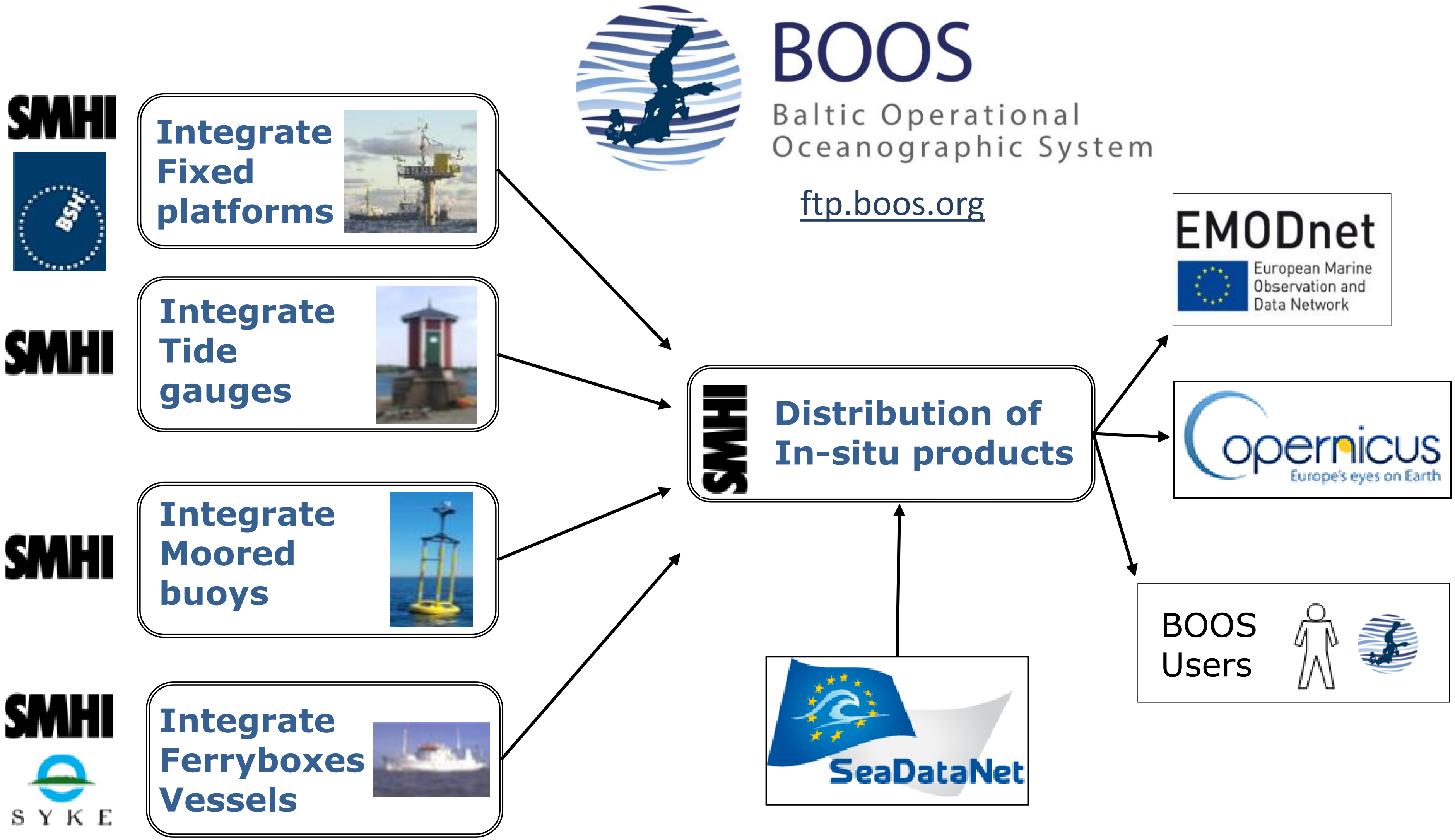

Platforms

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Baltic Operational ...em

SMHI acquires data from

~300 fixed oceanographic stations

~10 ferryboxes + 5 icebreakers

~800 CT stations

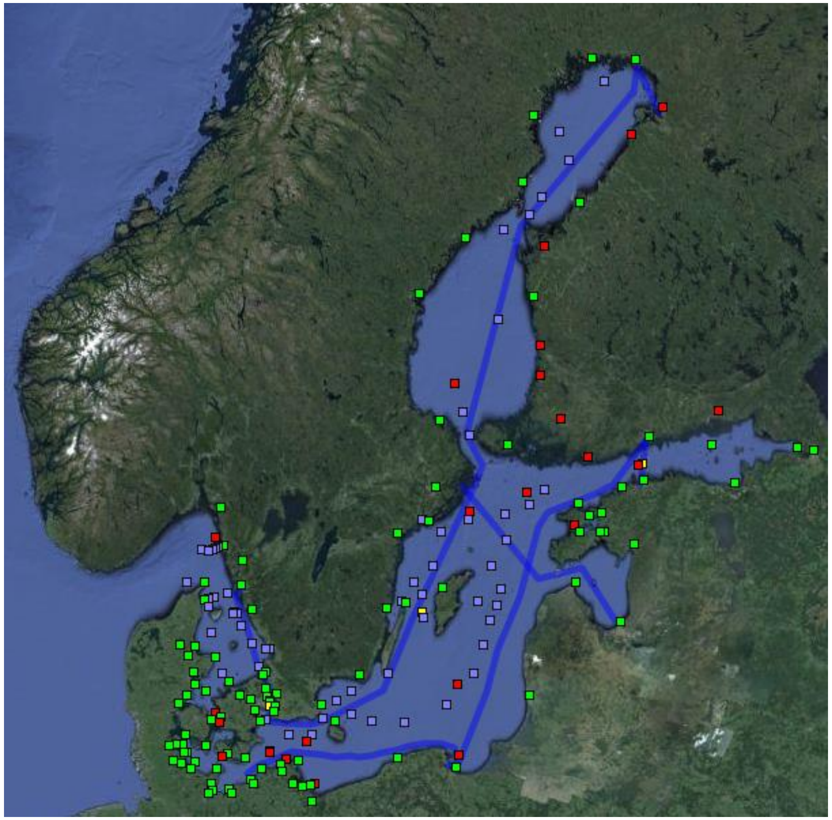
in the Baltic Sea

Fixed platforms (FP)

Tide gauges (TG)

Moored buoys (MB)

Ferrybox-lines (FB)
Ice-breakers (FB)
Monitoring stations (CT)



Coloured dissolved organic matter , CDOM

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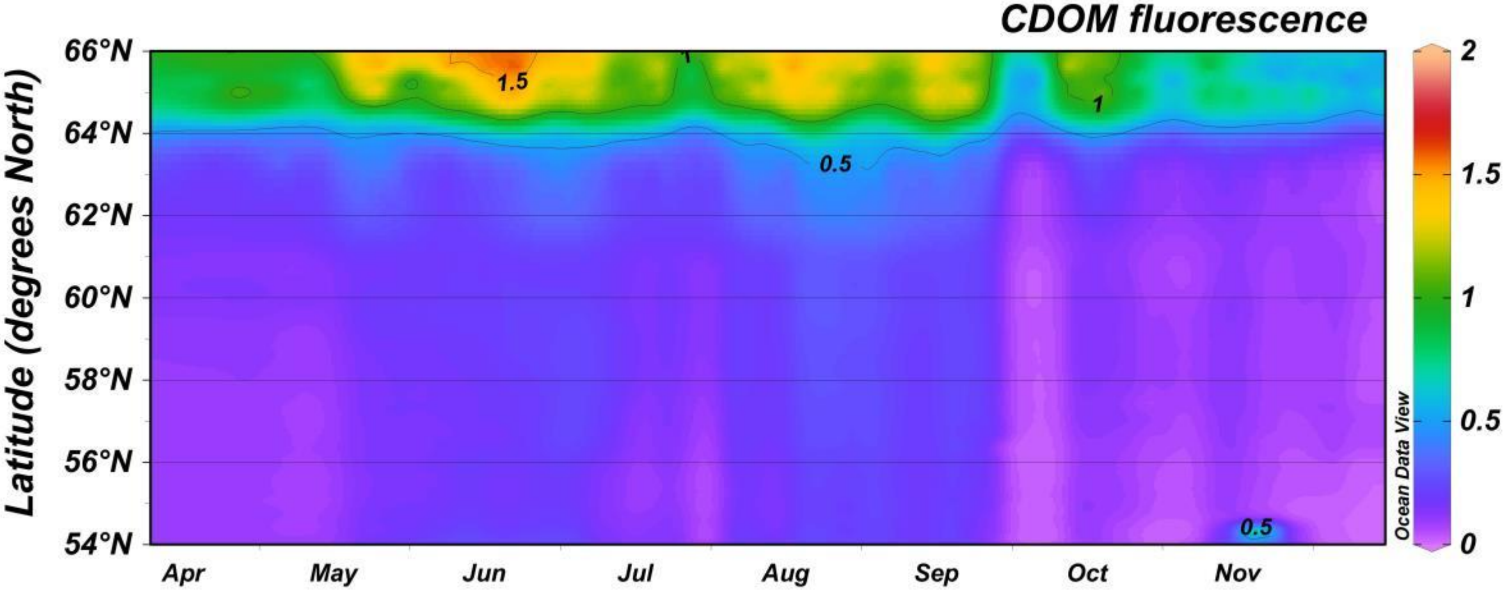
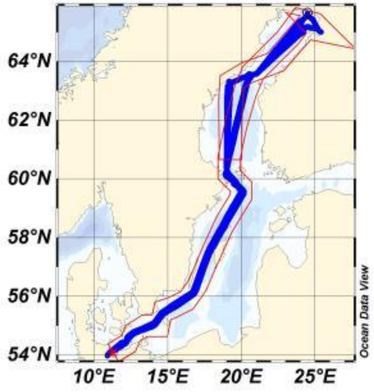
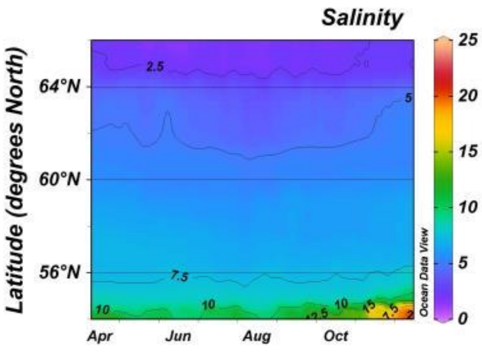
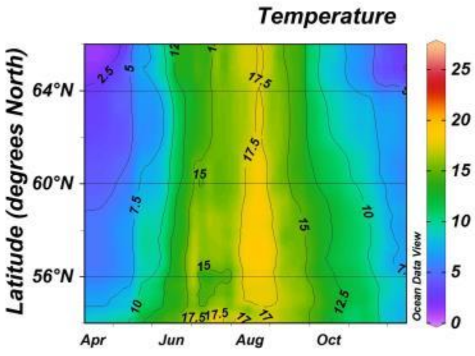
- fDOM measurements in several Alg@line ferries since 2011, in Utö since 2015
- Huge increase of CDOM from Bothnian Sea to Bothnian Bay. Late summer increase.
- Closer evaluation needed to fine-tune Baltic C-budget









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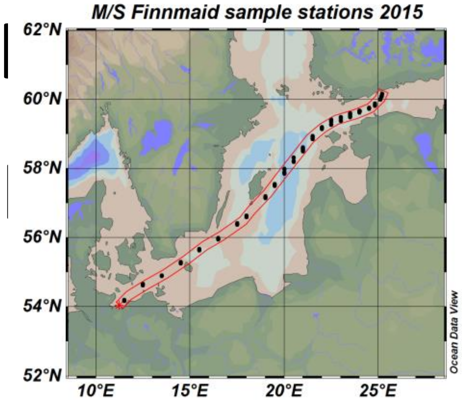
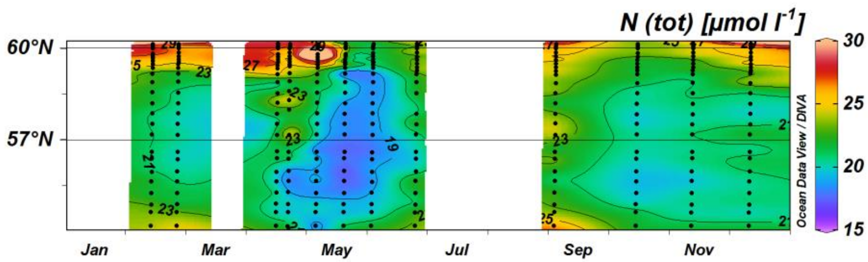
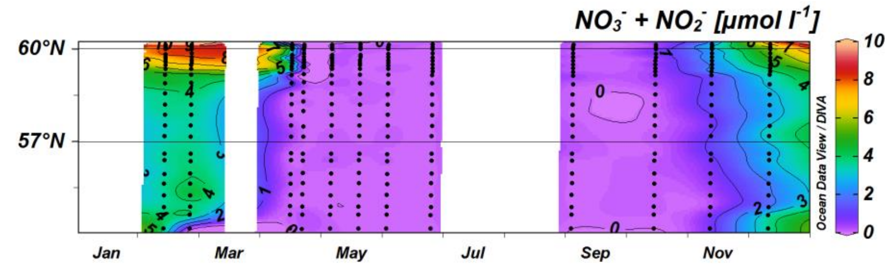
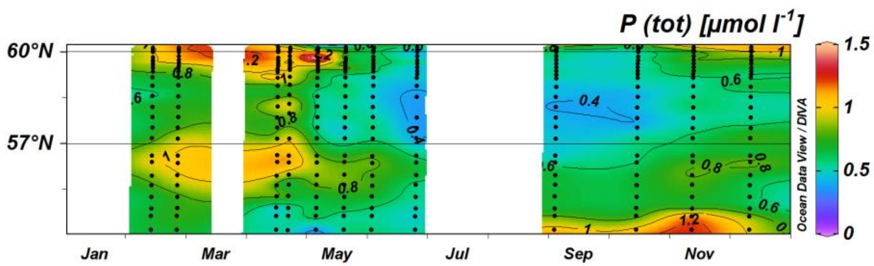
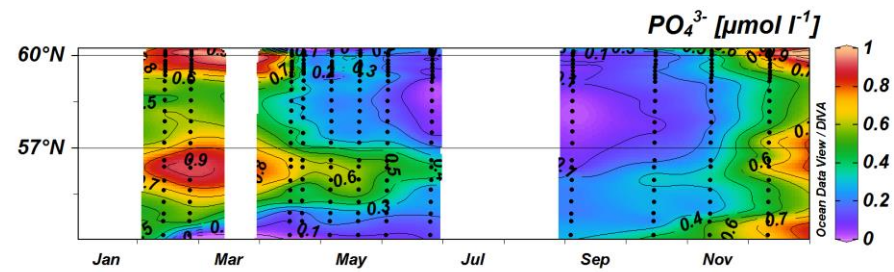


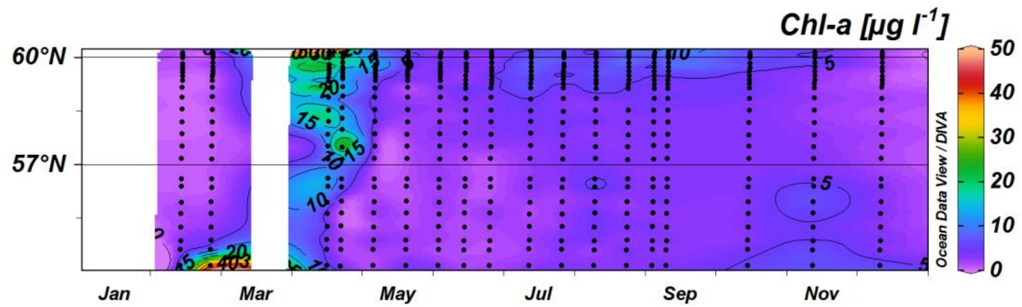
- Water samples in 2015











SHIP - Implementation project at SMA-SMHI

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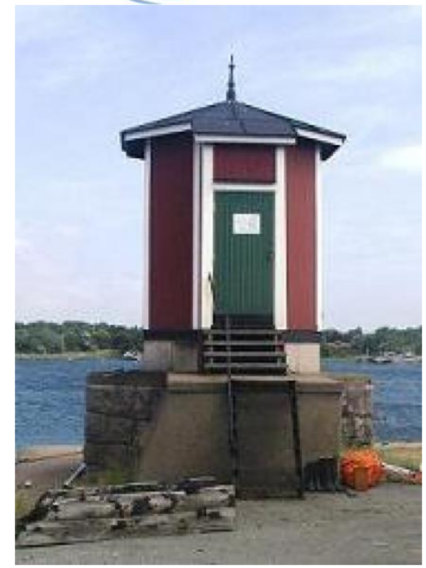

Targets in the SHIP project directive:

- One common and harmonised Swedish tide gauge network
- Sea level data of better accuracy, continuous time series
- Open and faster access to quality controlled real-time and archive data
- Leads to that the objectives of the FAMOS Odin is achieved:

safer and more cost effective shipping routes

Present Swedish tide gauge networks

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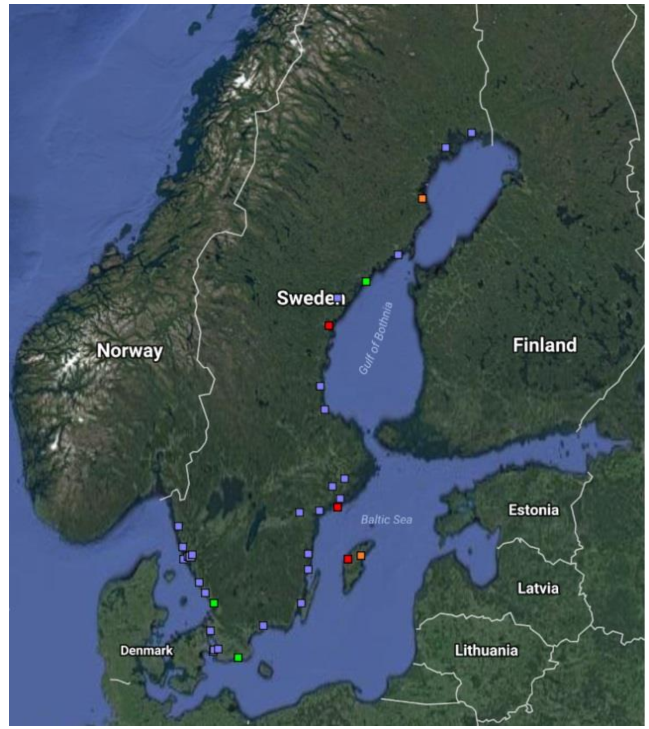
SMHI

SWEDISH MARITIME ADMINISTRATION



■	Class I	Upgrade with logger	26 stations (23 SMHI + 3 SMA)
■	Class II	Upgrade without logger	27 stations (27 SMA)
■	Class III	Unchanged, temporary	5 stations (3 SMHI + 2 SMA)
■	Class IV	Will be phased out	5 stations (1 SMHI + 4 SMA)

Future Swedish tide gauge network

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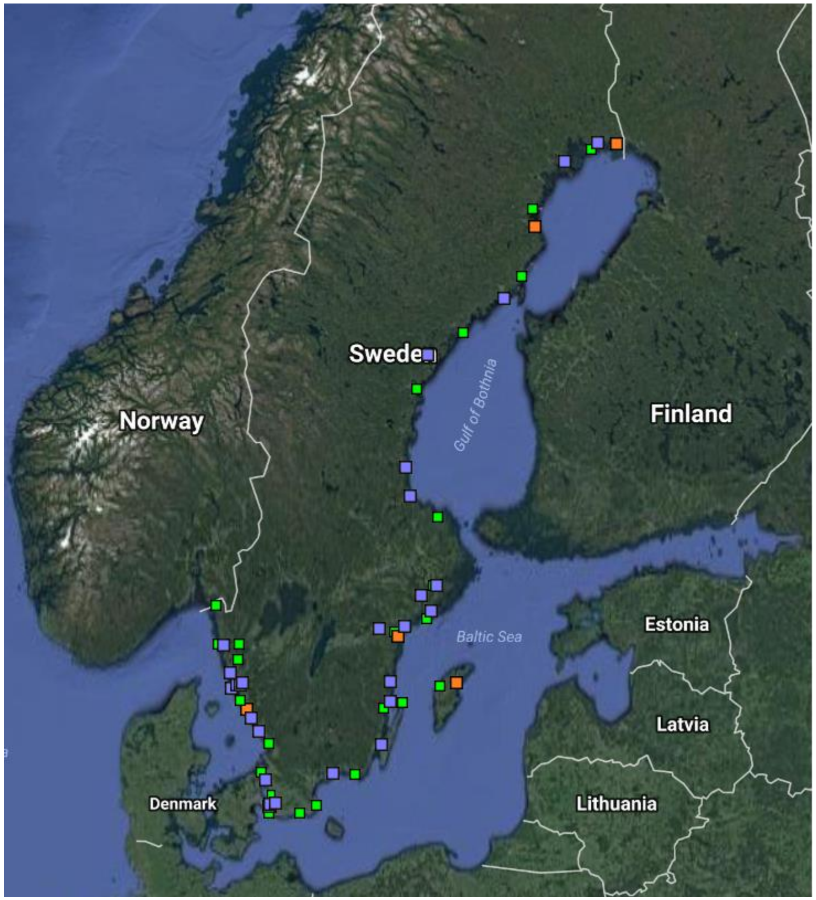

Real-time data in RH2000 from 53 stations
1-min values with 1 cm accuracy
Real-time QC + Archive MQC




Class I	Upgrade with logger	26 stations (23 SMHI + 3 SMA)
Class II	Upgrade without logger	27 stations (27 SMA)
Class III	Unchanged, temporary	5 stations (3 SMHI + 2 SMA)

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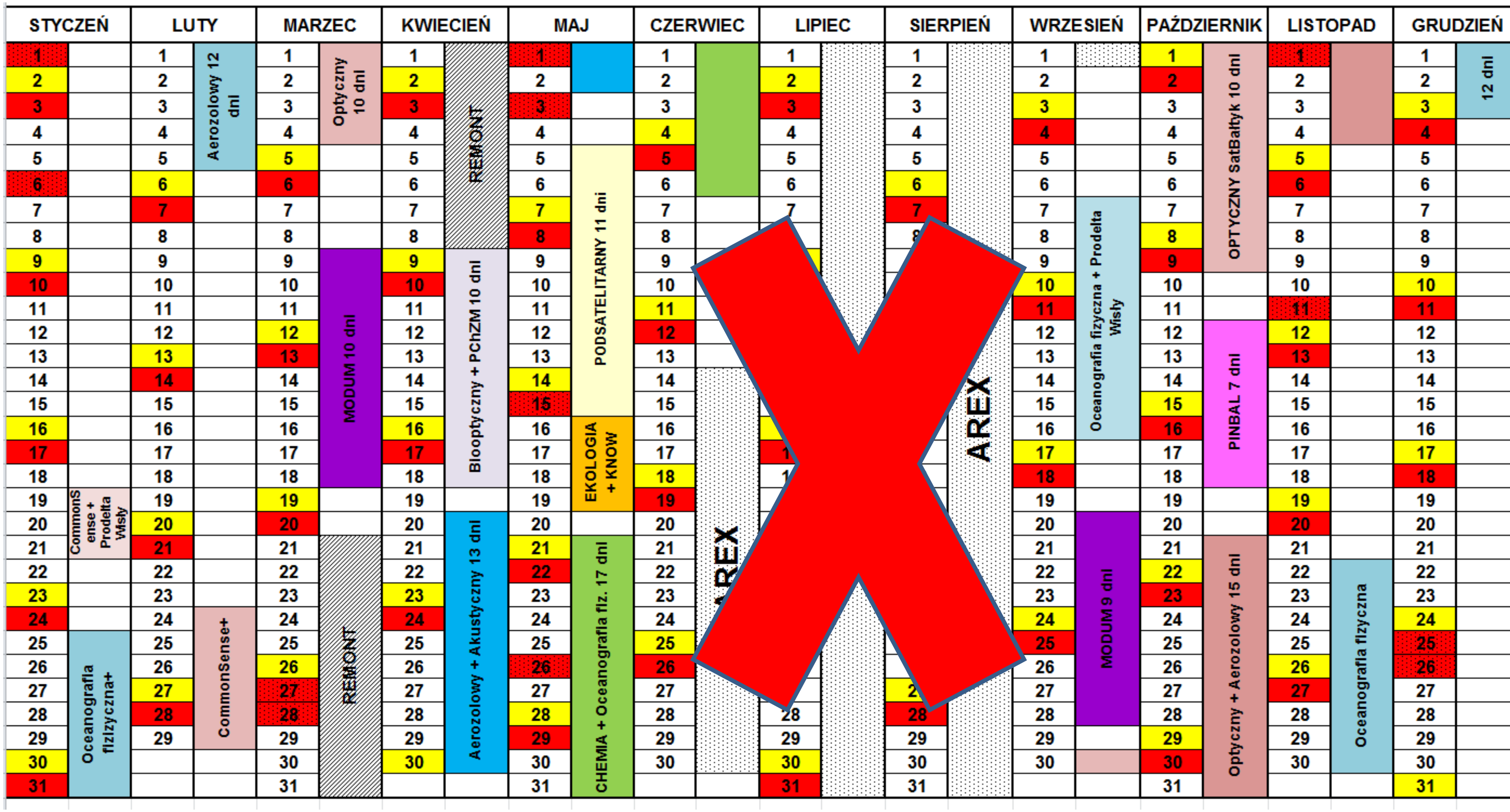
Present work

- Specification for a procurement of two different sensor are finalized
- All stations will be connected to RH2000 (BSCD2000) in 2017
- Joint service organisation SMA-SMHI: levelling, maintenance, service personel etc.
- Inventory of stations and test of equipment will continue
- Implementation of RTQC-routines to all data

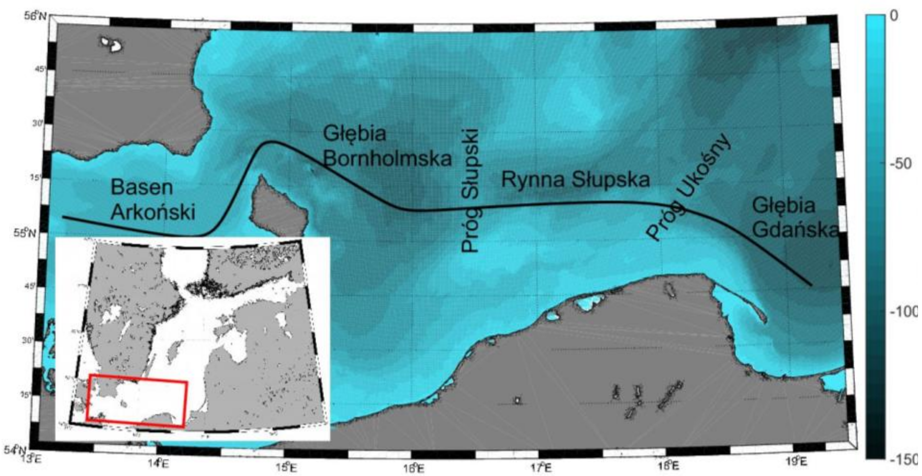
Institute of Oceanology PAS

Typical r/v Oceania schedule

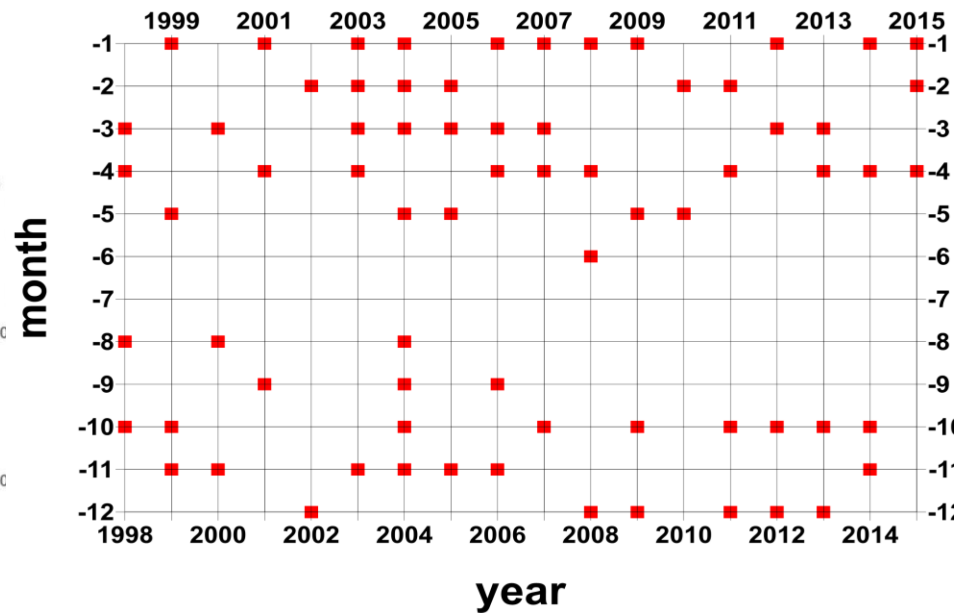


IOPAN

Physical oceanography 4 cruises per /year - route along the NS water inflow



Localizations of the main high resolution CTD/O_2 transect



Previously cruises (available data)

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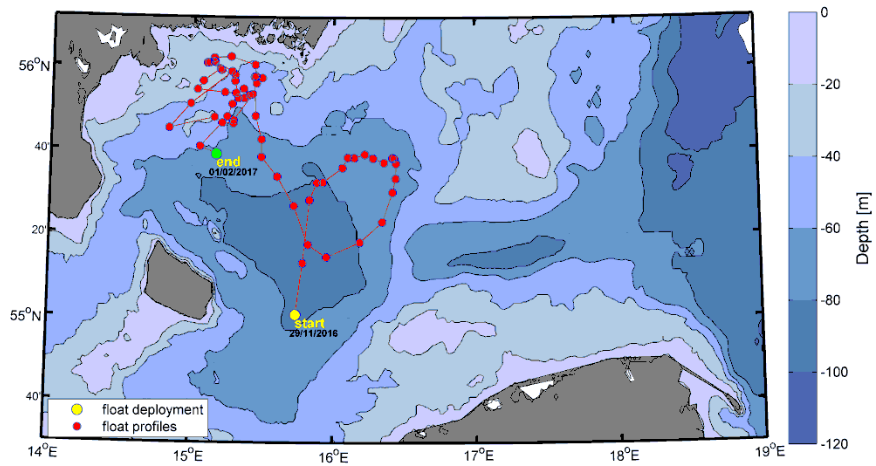
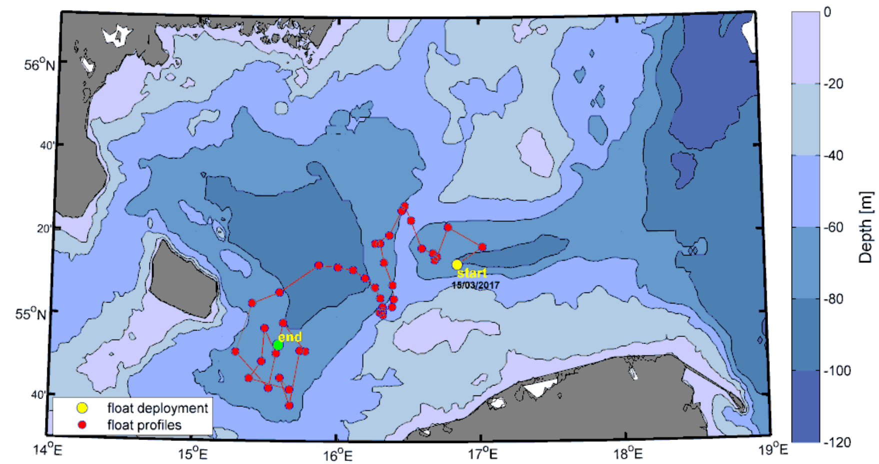
IOPAN: Argo floats

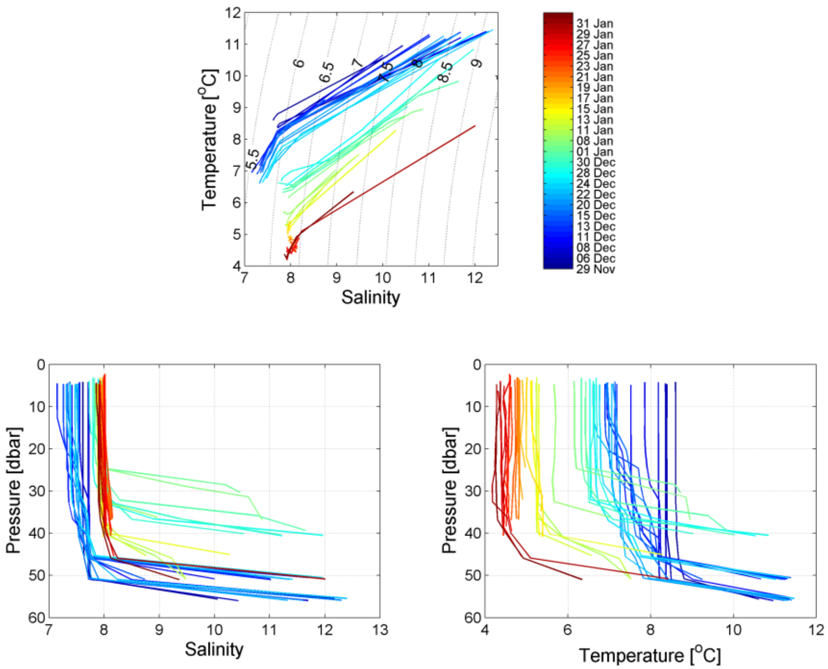


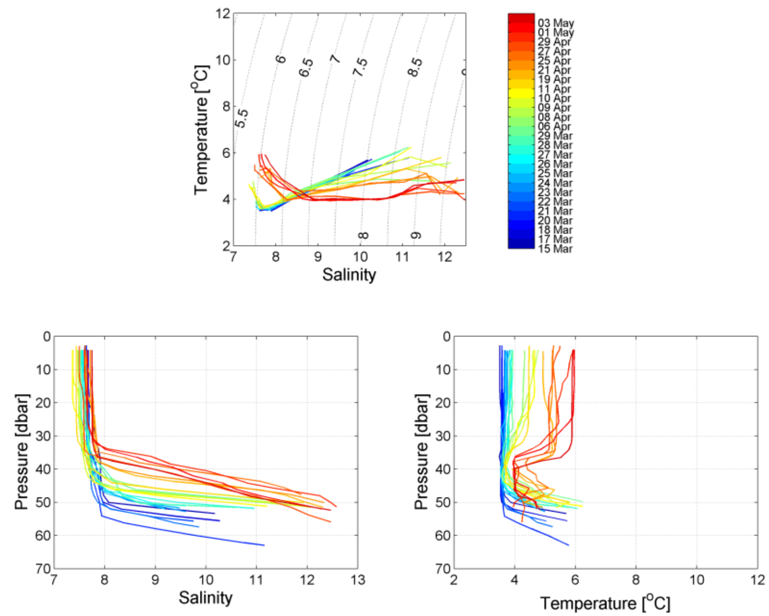


Trajectory of the first Argo float at the Southern Baltic. WMO 6902036, 29 November 2016- 01 February 2017

Trajectory of the second Argo float at the Southern Baltic. WMO 3902100, 18 March 2017 - 11 May 2017

Argo floats
TS diagram, salinity and temperature profiles



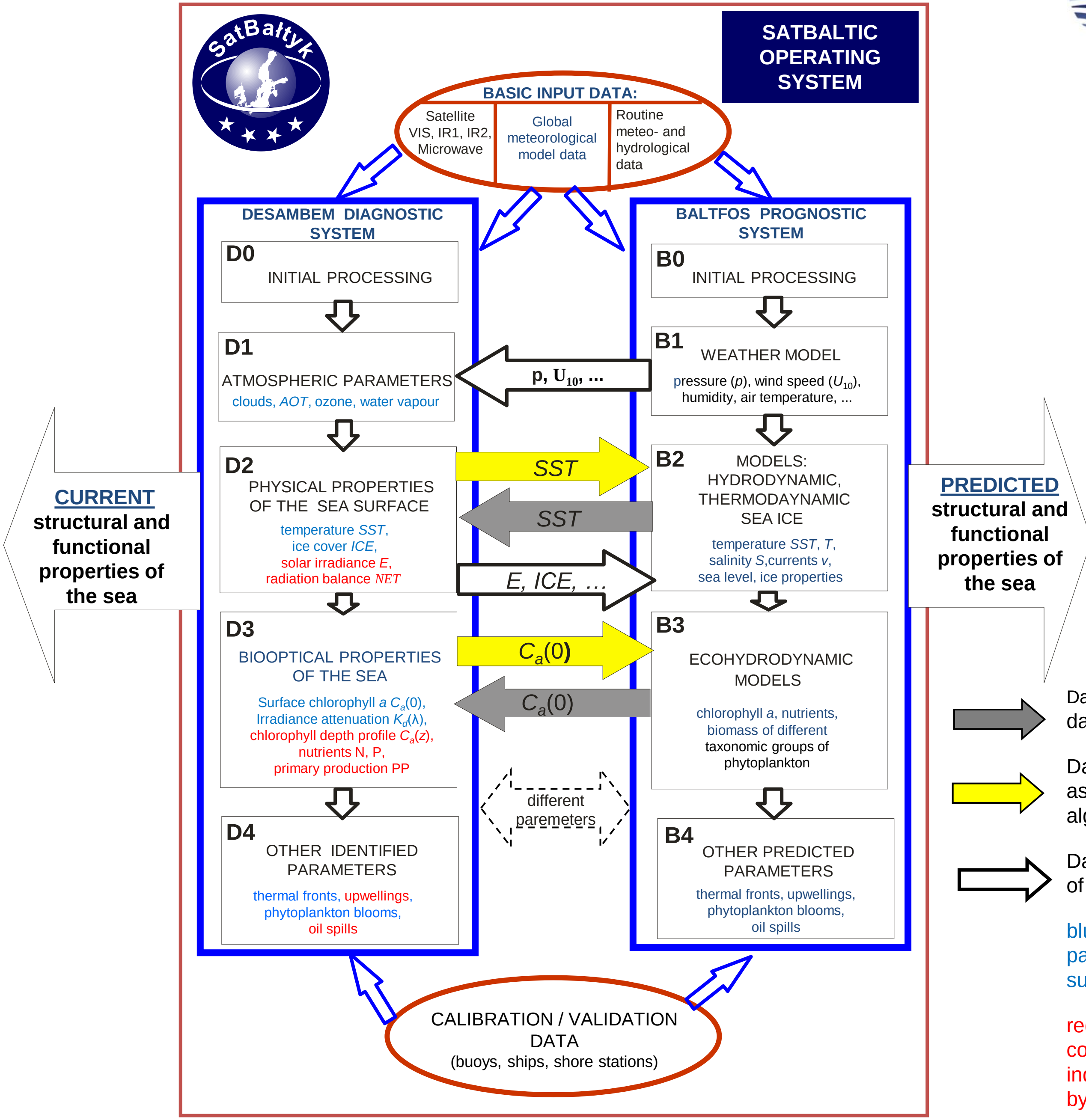


WMO 6902036

WMO 3902100,

Block diagram of the SatBaltic Operating System

Baltic Operational Oceanographic System



Data transfer for an overcast sky (lack of satellite data for the DESAMBEM algorithm)

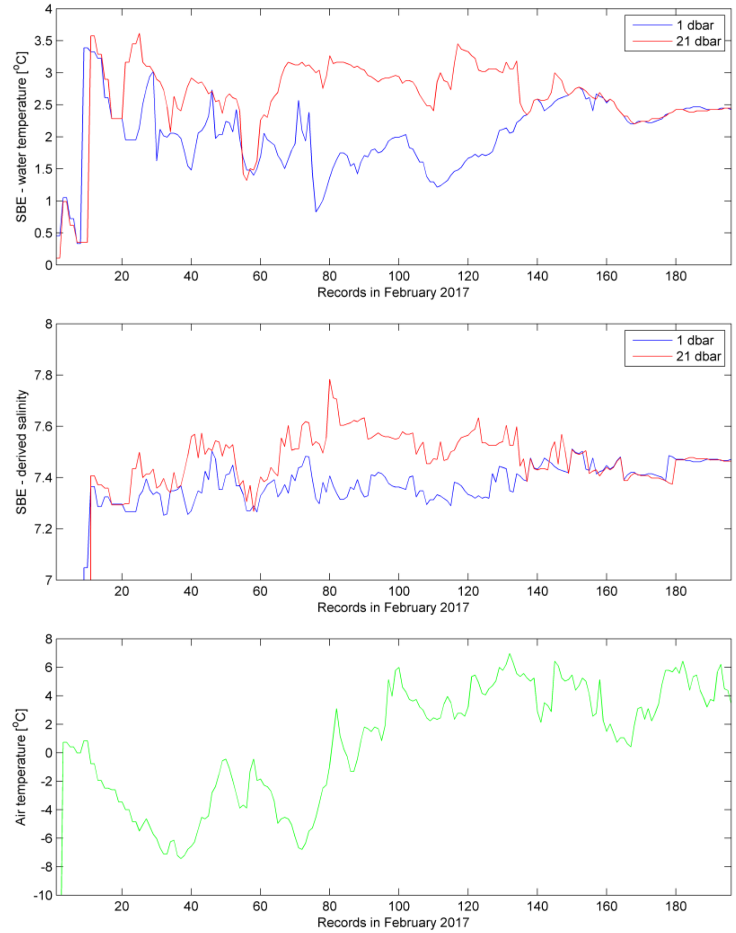
Data transfer for a cloudless sky (data assimilation to improved the ECOSAT algorithm)

Data transfer always required to make the most of the DESAMBEM and ECOSAT algorithms

blue letters in the description denote parameters computed directly from data supplied by one satellite

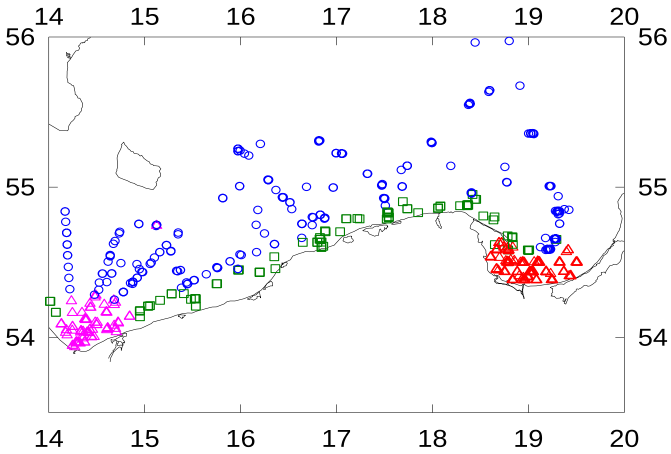
red letters in the description denote parameters computed from data supplied directly or indirectly by several satellite sources, and / or by the SatBaltic System

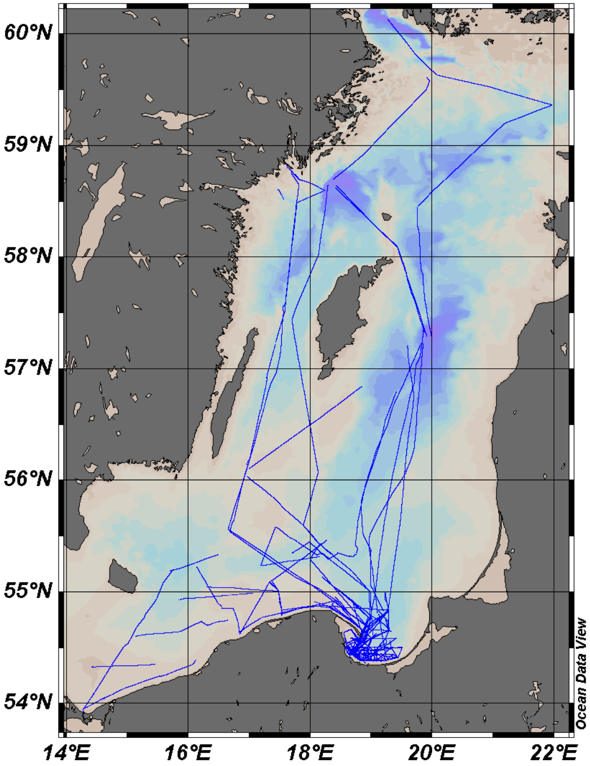
First testing deployment of the Stolpe Channel Buoy



Example of results from February

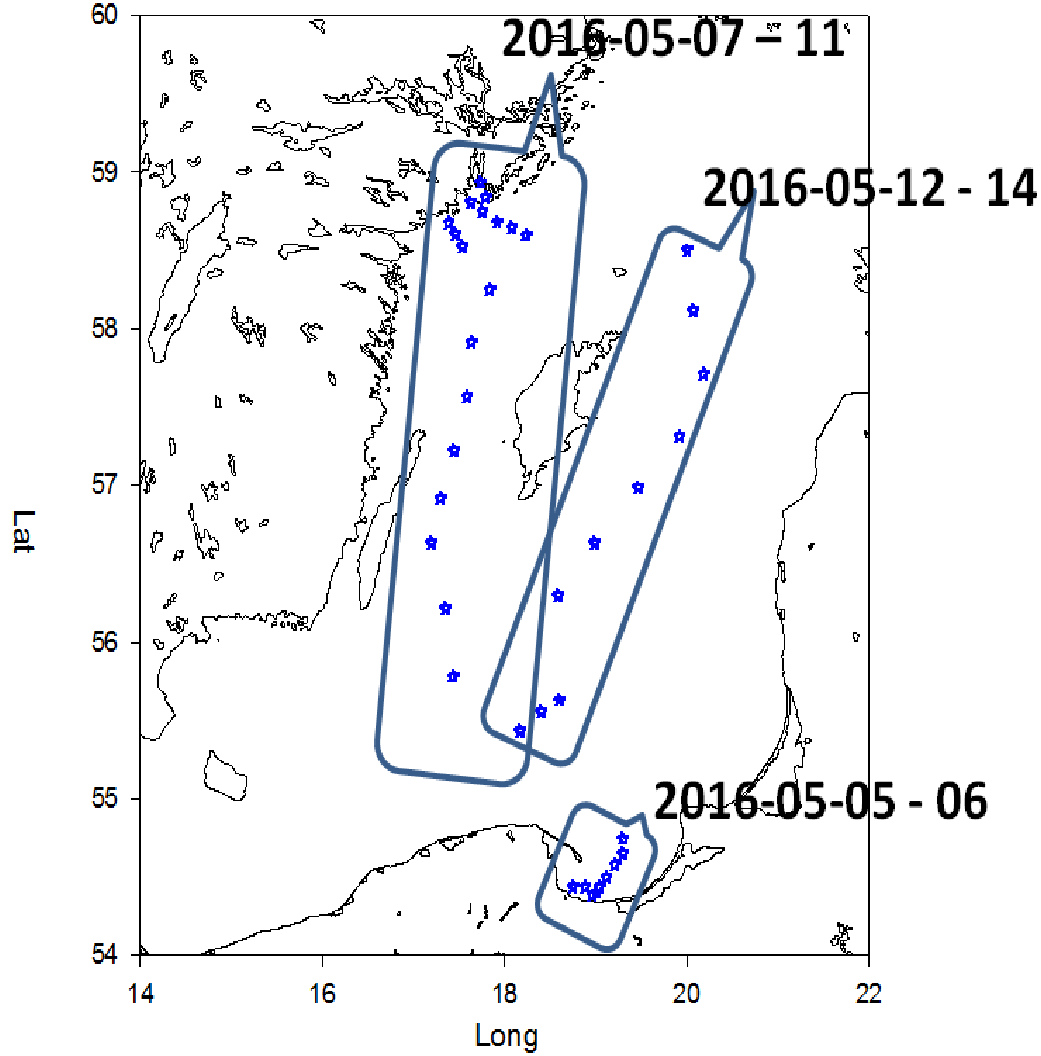
IOPAN bio-optical activity on the Baltic





- about 4-5 bio-optical cruises each year
- 20-80 stations on the each cruise
- one of the goals - calibration and validation of satellite data

Bio-optical cruise May 2016



SatBałtyk buoy

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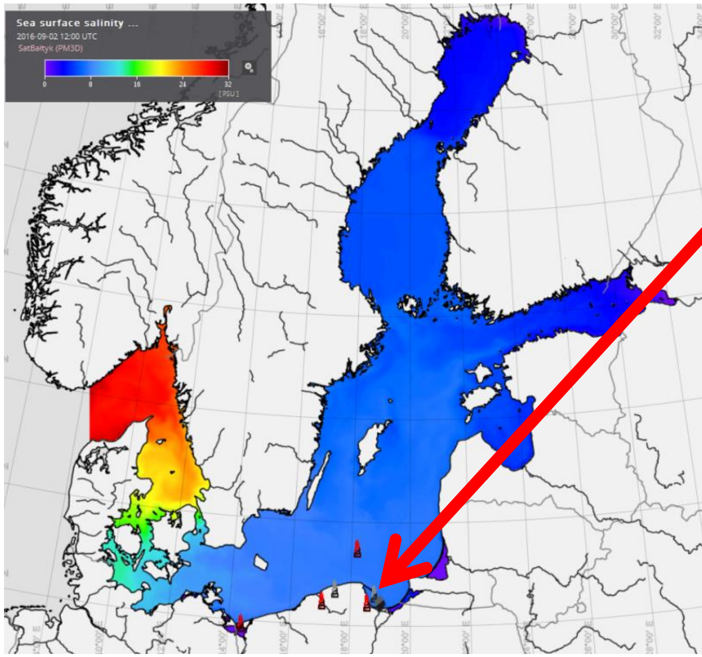

Measuring buoy SatBałtyk (Gulf of Gdańsk)
19°01.00'E, 54°26.30' N

Atmospheric parameters

- Downward shortwave irradiance (range 285-2800 nm)
- Air temperature
- Wind speed and direction
- Atmospheric pressure
- Relative humidity

Underwater parameters on 0, 1 and 5 m

- Water temperature
- Salinity
- Dissolved oxygen
- chlorophyll a
- CDOM fluorescence
- Light absorption and attenuation
- Downward and upward irradiance

Monthly averages of daily primary production in 2010 -2015 In Gdansk Bay

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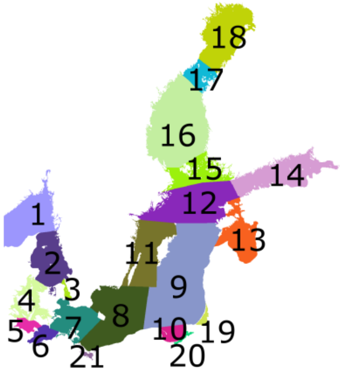
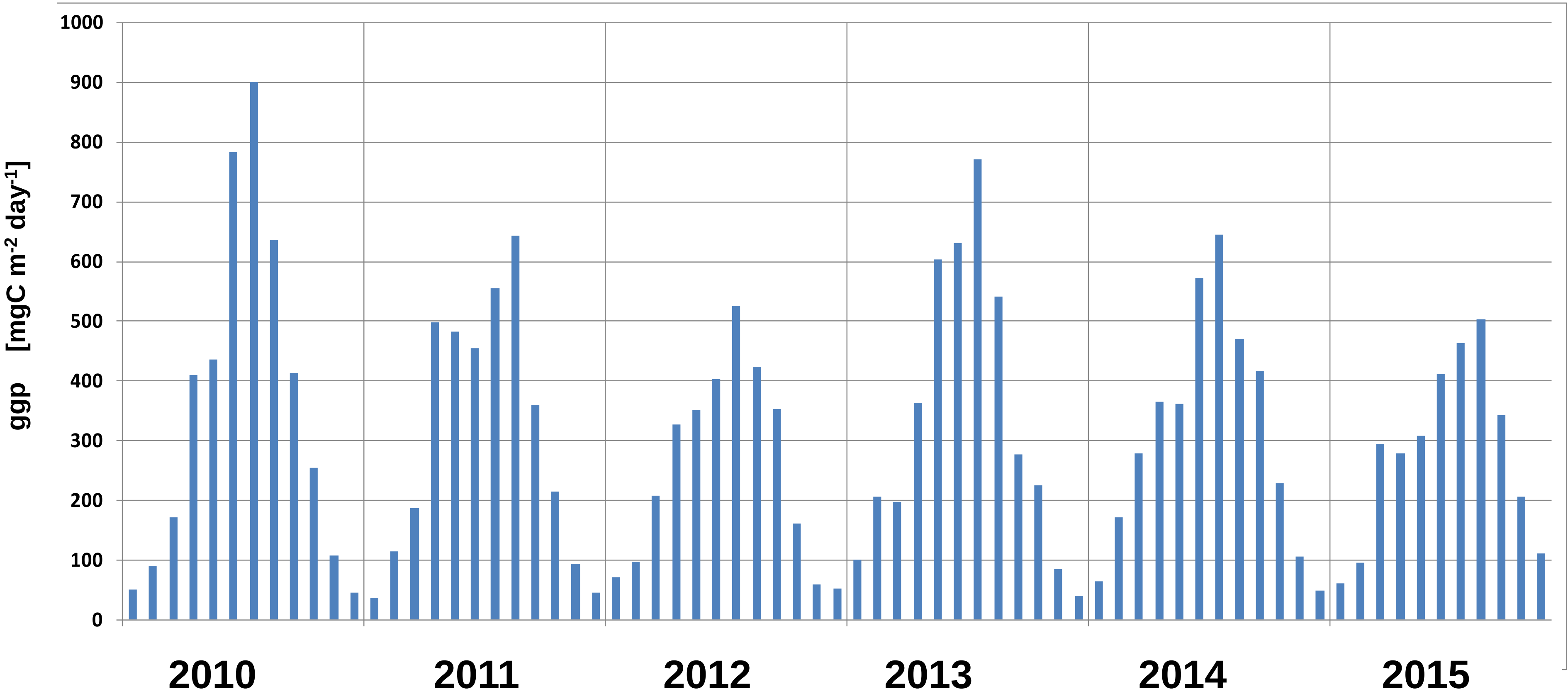
1. PP in March increased from 2010 to 2015 by 30%
2. PP annual max in summer has two lows in in 2012 and 2106





IOPAN other activities on the Baltic

Acoustics:

- ....
- underwater noise

Marine Chemistry and Biochemistry

- ....

CHEMSEA -Chemical Munitions Search & Assessment
MODUM - Towards the Monitoring of Dumped Munitions Threat
DAIMON Decision Aid for Marine Munitions :
how to proceed with the identified and mapped warfare objects

Finnish Meteorological Institute

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FMIs Argo history – ARGO_FIN

- 2010 July, Atlantic Ocean since then
- 2011 first short tests in the Baltic Sea
- 2012 May –December first long deployment in Bothnian Sea
- 2013-2014 August, first long deployment in Gotland Deep
- Now, 21 Argo missions, 5 active in May 2017
    - 10 missions in the Atlantic/North Sea, 3 active in May 2017
    - 11 missions in the Baltic, 2 active in May 2017
- Baltic Sea floats reused
- Data from the 21 floats is available in Coriolis Argo data center
- Finland is a partner in Euro-Argo (FMI is representing unit)

Challenges in Baltic Sea

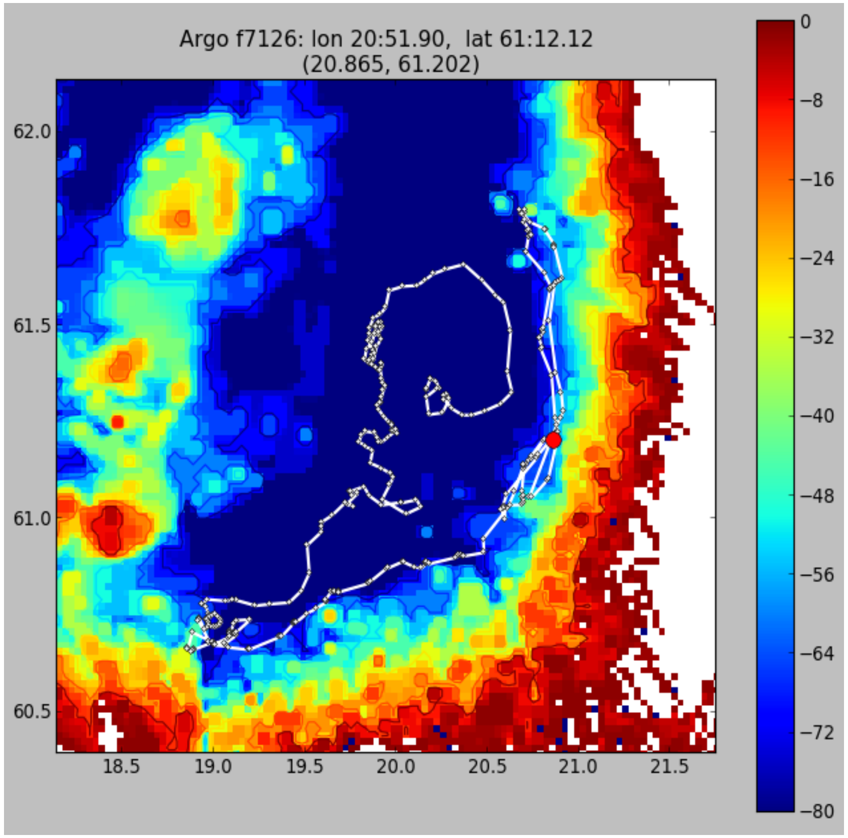
- Brackish water and large variations in density → Floats need to be balanced for a certain area
- Heavy marine traffic → risk of collision
- Seasonal ice cover → ice avoidance algorithms
- Shallow depths → constant monitoring needed, buoyancy accuracy ±10-30 m

NOTE! It has turned out that standard floats work in the Baltic Sea.

photograph by Petra Roiha, FMI

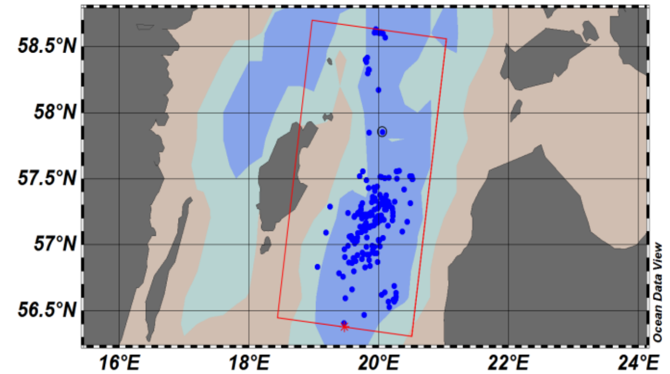
First experiments in the Bothnian Sea in 2012

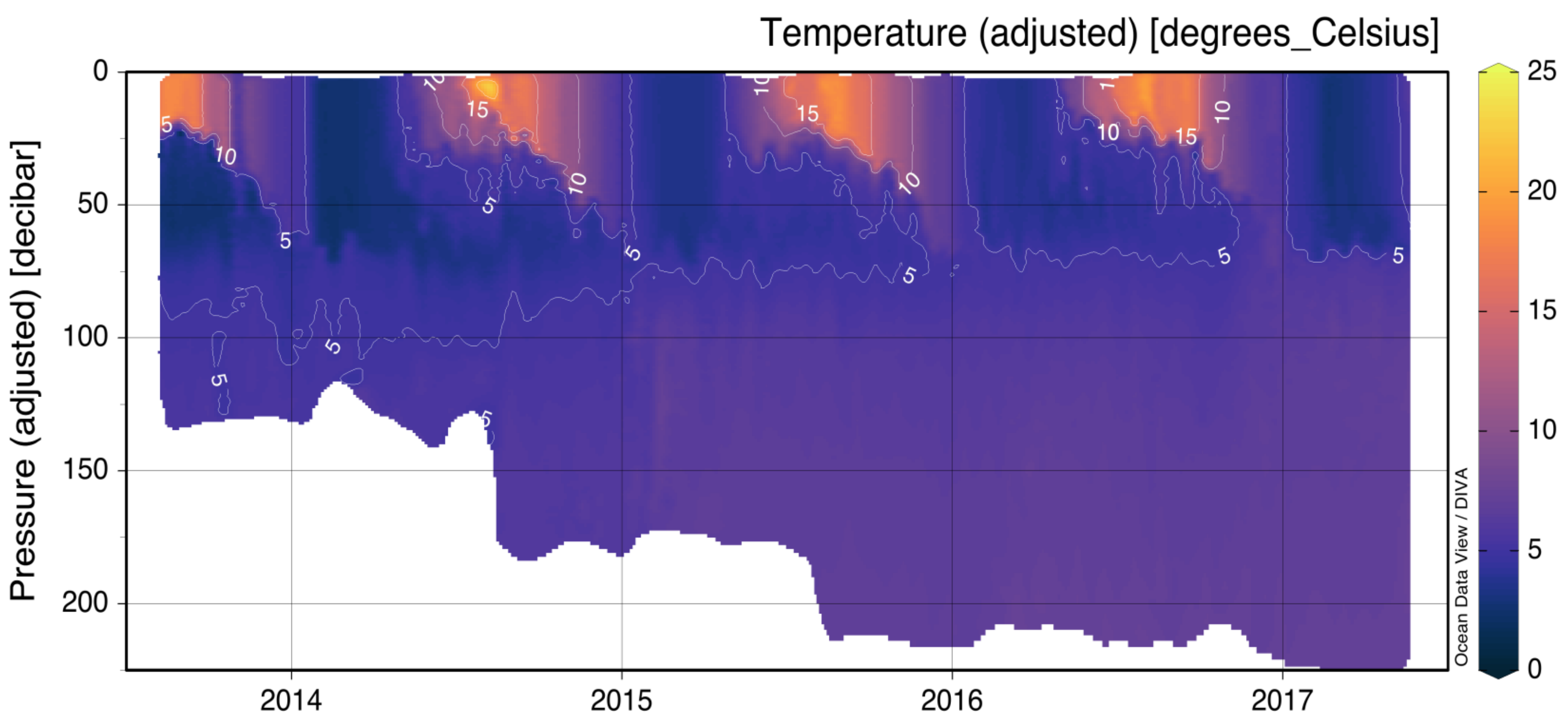
- Half a year mission
  May 17 -> Dec 5, 2012
- Over 200 profiles acquired
- Managed to stay all the time away from shores
- Required constant modifying of the diving instructions to avoid bottom contact



Argo's in Gotland basin

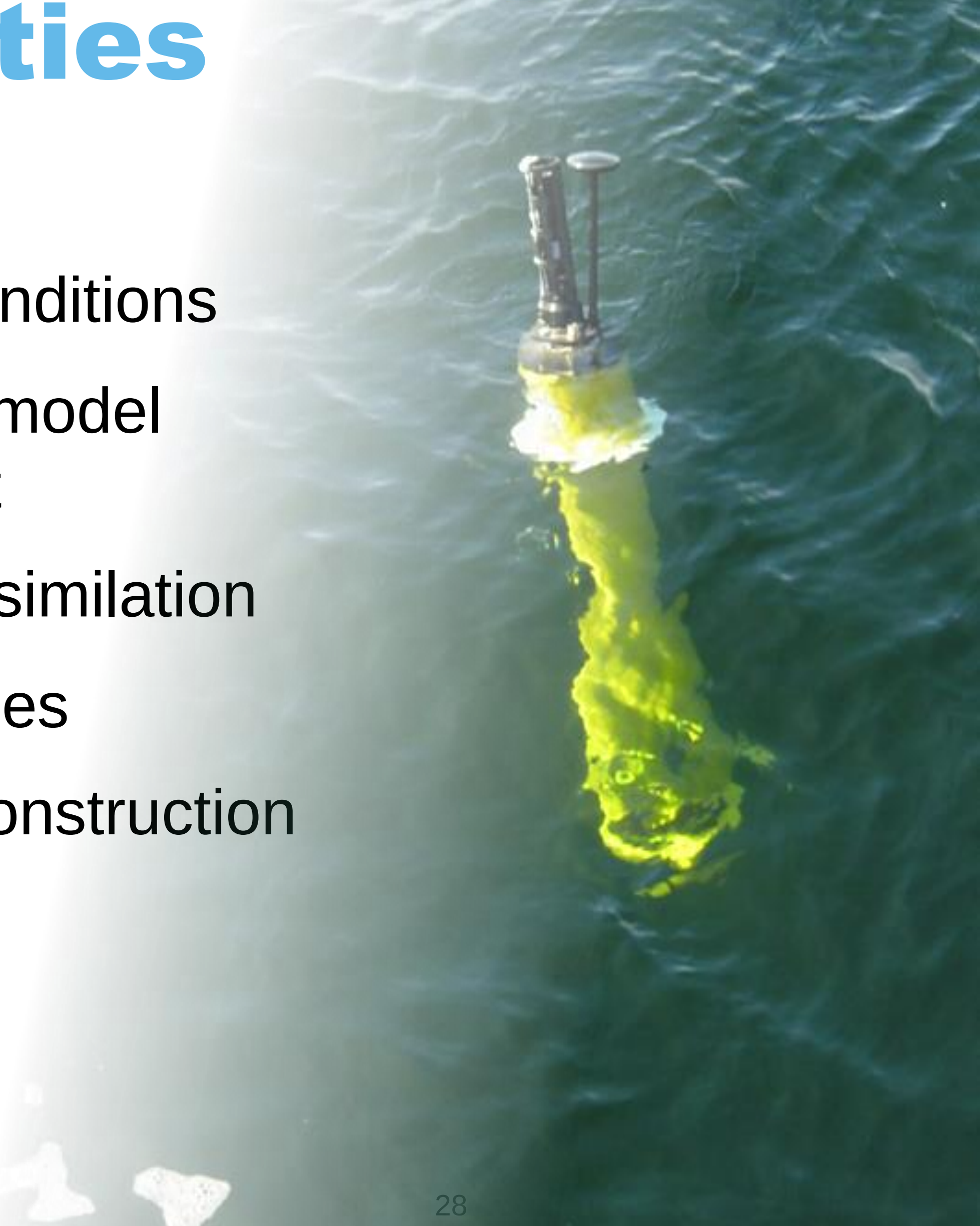
- Fine-tuned programming
- ”Deep” profile testing
- bio sensors testing
- deployed at Aug 14, 2014
- Managed to stay all the time away from shores





Current activities

- Testing Argo floats in ice conditions
- Continue applying data for model validation and development
- Experimenting with data assimilation
- Application to process studies
- Some manuscripts under construction



photograph by Petra Roiha, FMI

Argo data available in Coriolis

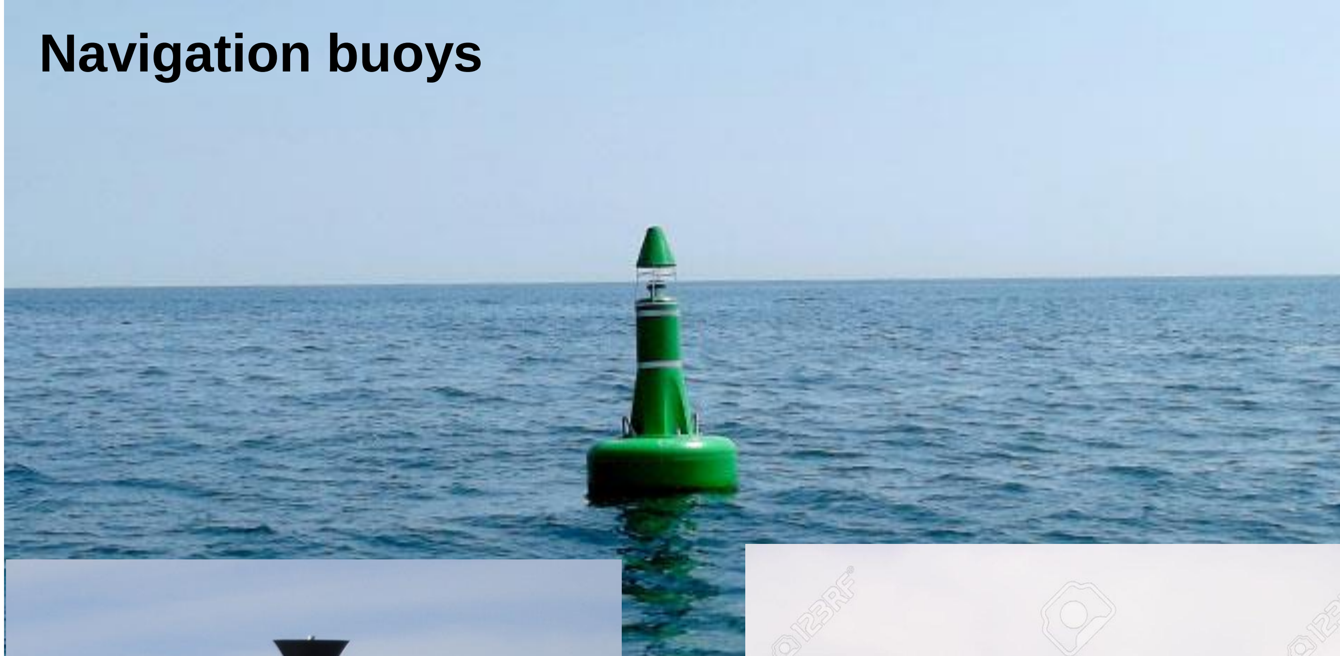
- Coriolis Argo-page: http://www.coriolis.eu.org/Data-Products/Data-Delivery
- All floats in a list: http://www.ifremer.fr/co-argoFloats
- One float by number (e.g. 6902024):

  http://www.ifremer.fr/co-argoFloats/float?detail=true&ptfCode=6902024&lang=en
- As netCDF via ftp: ftp://ftp.ifremer.fr/ifremer/argo/dac/coriolis/
- Also via MyOcean data selection:

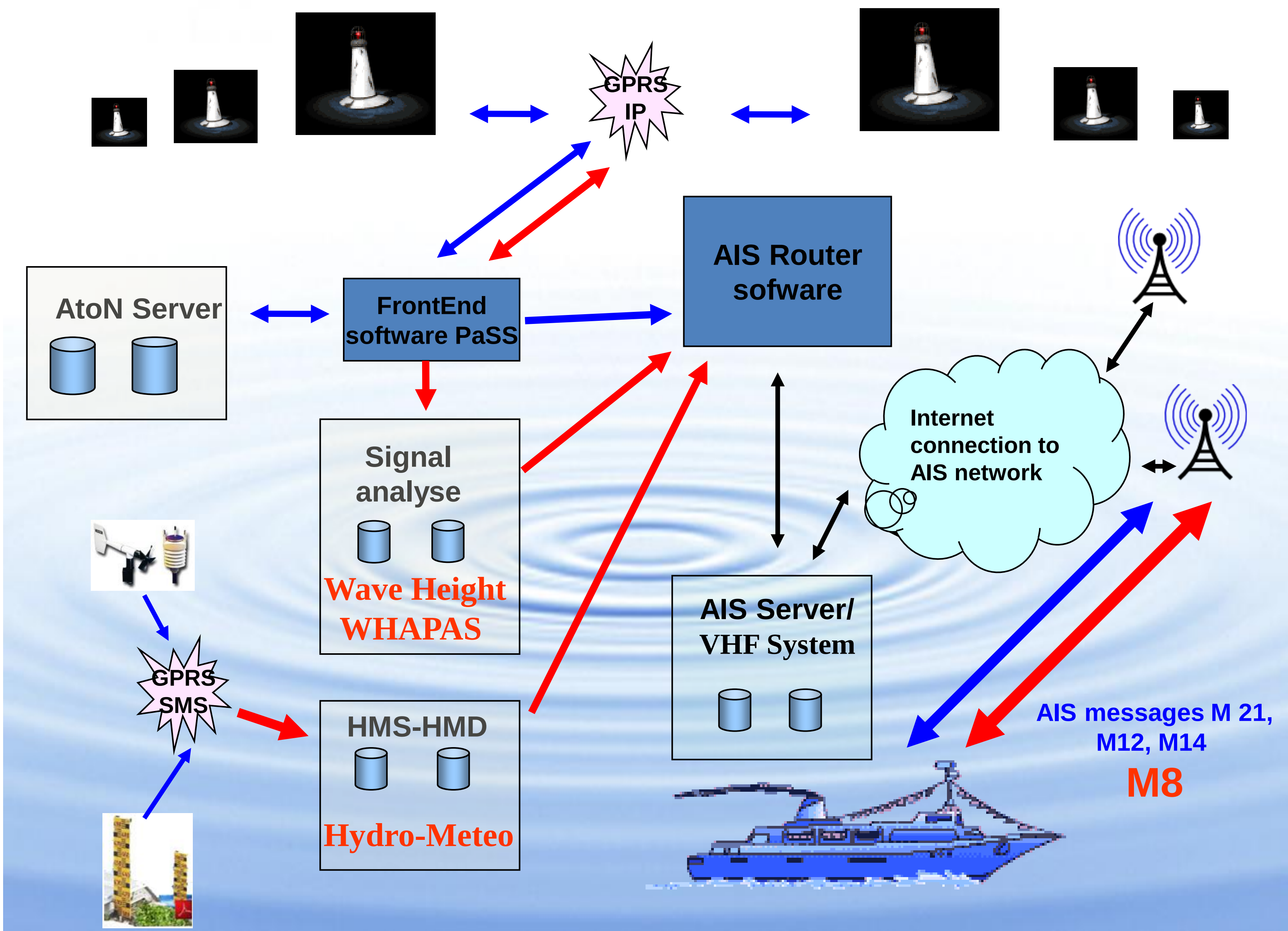
  http://www.ifremer.fr/co-dataSelection/?theme=myocean

NOTE! In Coriolis data is available both as ASCII (csv) and netCDF (nc)

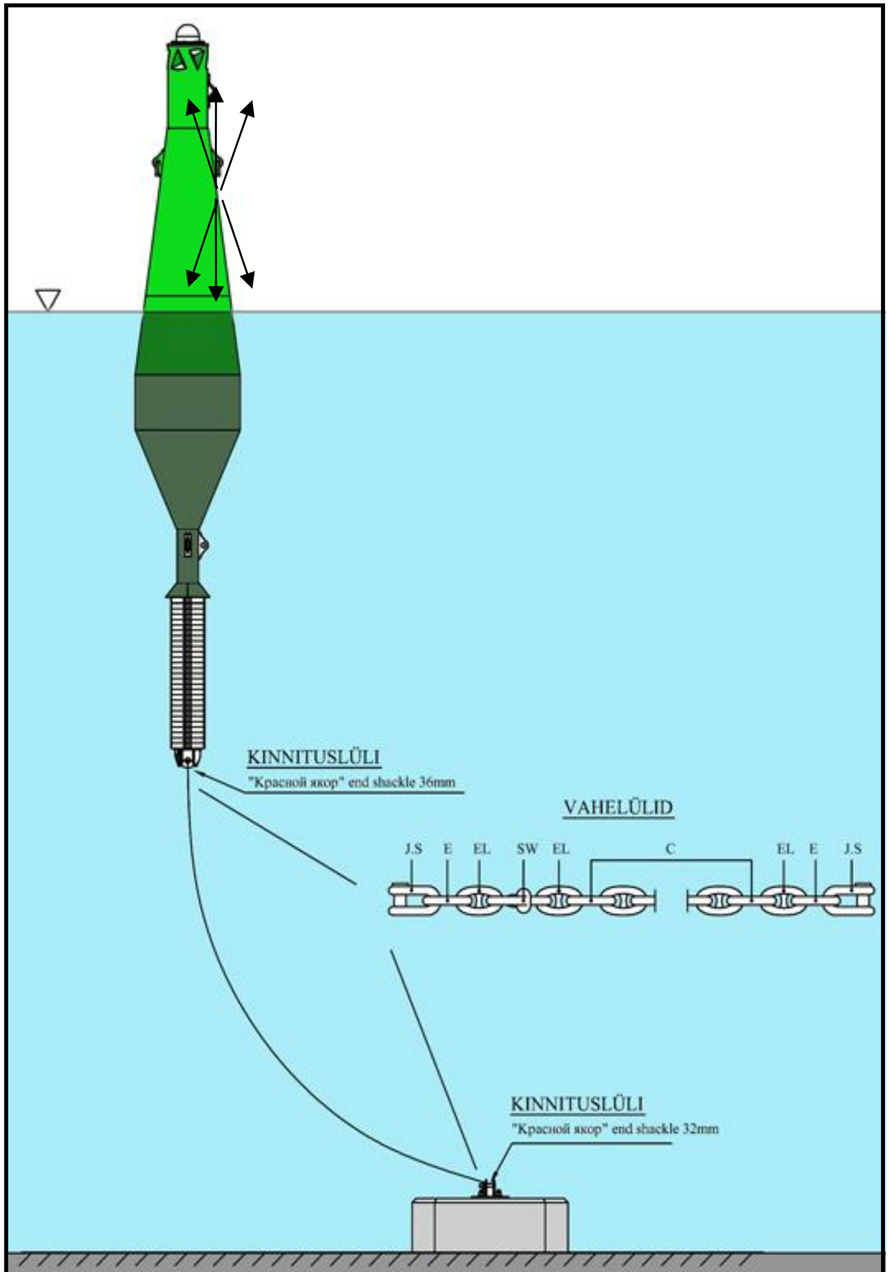
Navigation buoys



Integration of marine metoc data into AIS system
+ additional wave data



Use of buoy motion data for wave estimate



<u>3D motion data acquisition</u>:
5 samples in 1 second (3x2B binary)
150 second registration time
15 minute/ 4 times in hour – interval
Continuous registration

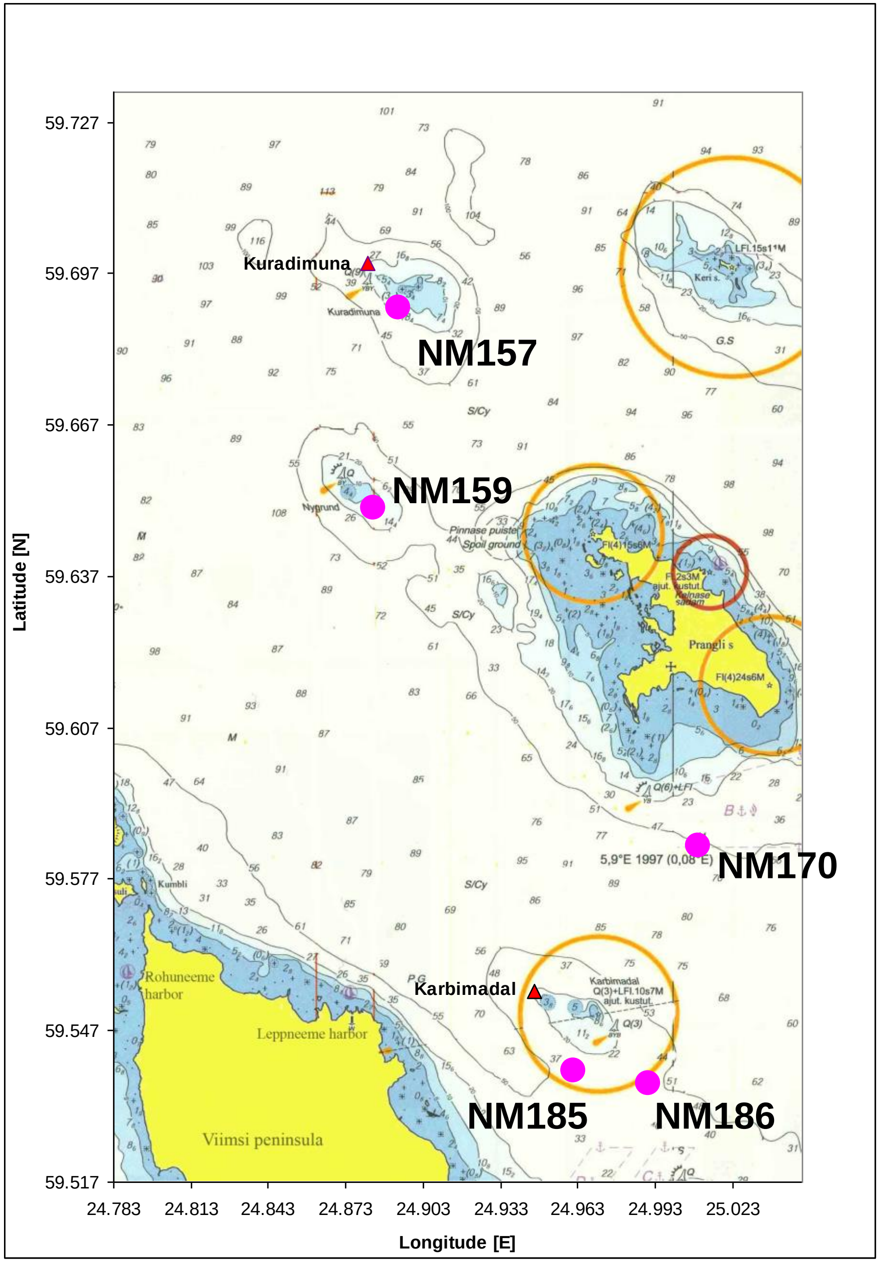
<u>Motion data transmission</u>:
TCP/IP over GPRS, AtoN monitoring
15 min interval (3kB binary, 12kB/hour)
Continuous – 72kB/hour

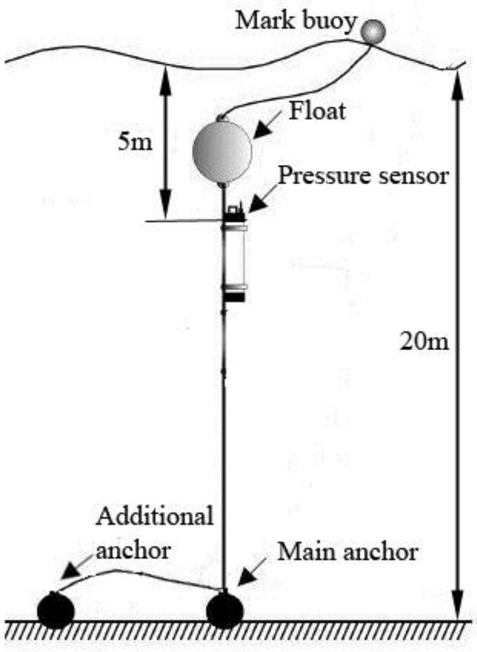
<u>Motion data analysis</u>:
Timely filtering
Mathematical analysis
Calibration with reference data

<u>Wave data output</u>:
Record to data base
Save special text file
Broadcast via AIS Router

Validation of wave data obtained from the buoys

EfficienSea
Efficient, Safe and Sustainable Traffic at Sea
Oceanographic System





- Pressure sensor based wave gauge
- 2 measurement periods
  3 weeks each
- September and November
  2010

Web-based user interface:

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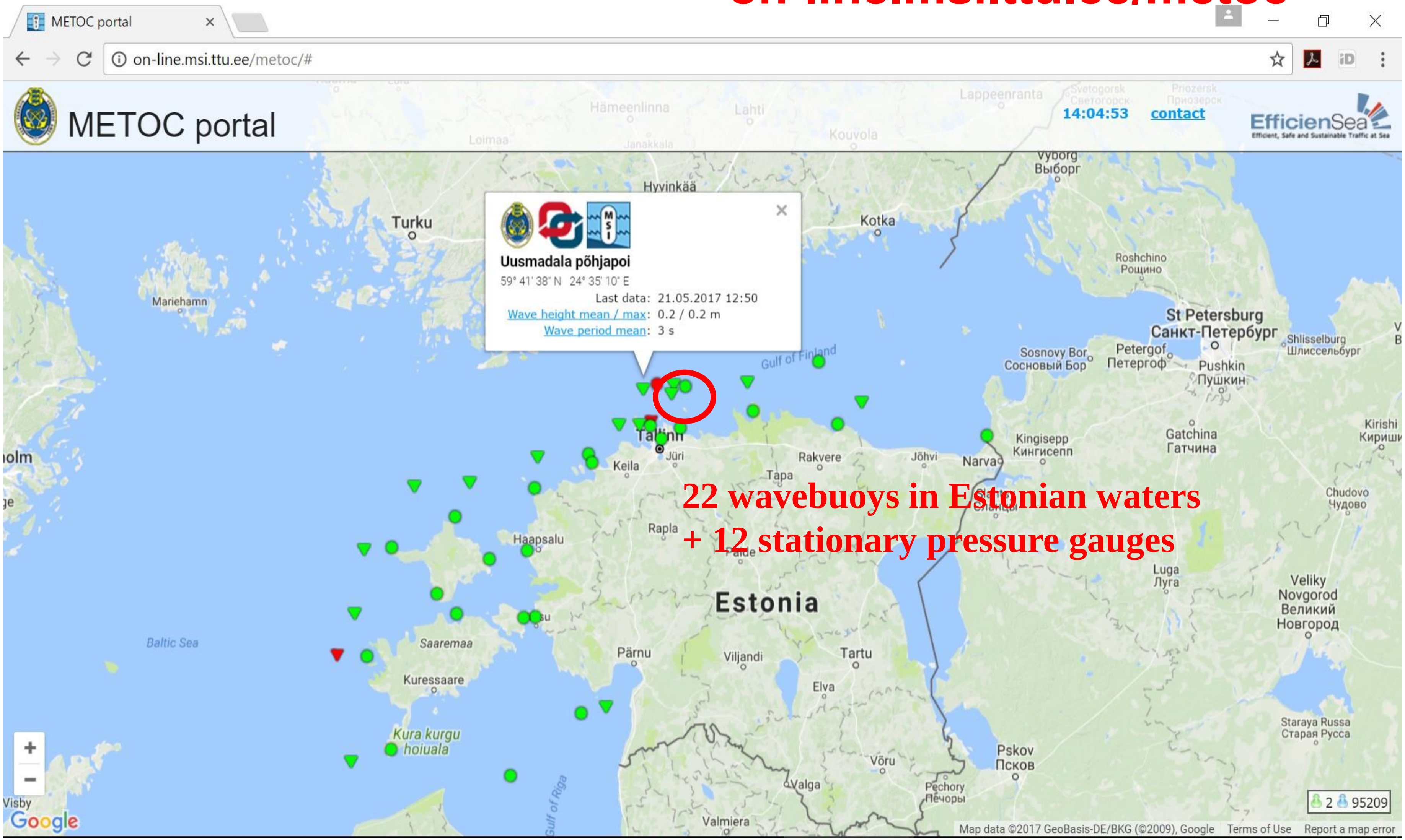
on-line.msi.ttu.ee/metoc



22 wavebuoys in Estonian waters
+ 12 stationary pressure gauges

M/S BALTIC QUEEN Ferry | Grace

http://www.grace-oil-project.eu/en-US

syke.fi Give feedback Sitemap

GRACE

INTEGRATED OIL SPILL RESPONSE ACTIONS AND ENVIRONMENTAL EFFECTS

ABOUT WORK PACKAGES PARTNERS

GRACE PROJECT

Start year: 2016

End year: 2019

Coordinator: Kirsten Jørgensen, Finnish Environment Institute (SYKE)

WP leaders: Tarmo Kõuts TUT, Jaak Truu UTARTU, Thomas-Benjamin Seiler RWTH, Kim Gustavson AU, Susse Wegeberg AU, Kirsten Jørgensen, SYKE

Financier: EU Horizon 2020 grant No 679266

Partners: 13 participants Read more

ABOUT GRACE

The project focuses on developing, comparing and evaluating the effectiveness and environmental effects of different oil spill response methods in a cold climate. The results of

Outline of PAH concentration measurements

- Analysed 55 ship voyages (16.02 – 11.04.2017), 960 datapoints each, 52 800 in all e.g. very good ensemble for statistical analysis
- Max PAH concentration 0,36 µg/l
- Remarkable variability of PAH concentrations near the coasts and open sea
- General pattern of PAH concentration spatial distribution seems to be stable
- No sudden concentration rises which directly would indicate the oil spills, have been detected during the observation period, all PAH comcentrations stay far below those defining the oil spill
- Some anomalies of PAH concentrations were noticed and could be investigated further – although amplitude of such anomalies were in same order with UviLux sensor signal/noise level

Summary

- Asset for in-situ oil detection and monitoring is developed based on FerryBox technology and equipped with on-line data management
- Test of the system on board M/S BALTIC QUEEN performed and 2 month of data 52 800 single measurement points statistically analyzed, further analysis foreseen
- Measured PAH concentrations are not absolute values, but rather than relative, but still variability patterns could be estimated
- Fouling problem should lessen, when new cleaning system (more frequent) will be operational
- Validation of UviLux sensor against lab analysis is foreseen in May 2017, report in August 2017

Estonian Marine areas Information System – EMIS

Operational model HCM-EST, http://emis.msi.ttu.ee