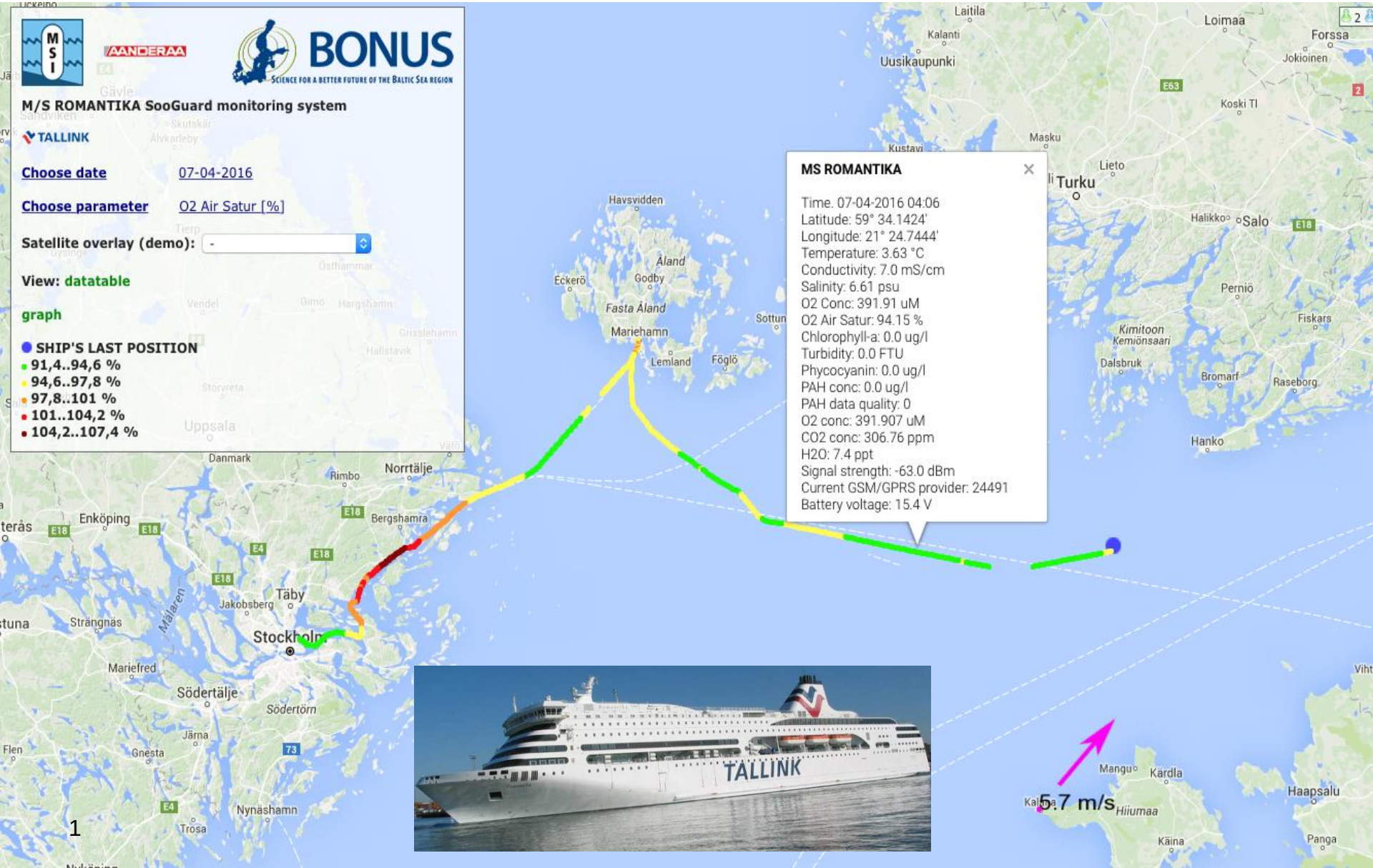
SOOGuard flow through system in the Baltic Sea: recent studies and technical development

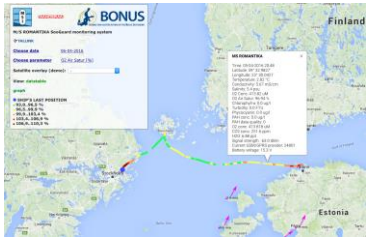
Anders Tengberg (1,4), Tarmo Kõuts (2), Ida-Maja Hasselöv (1), Kaimo Vahter (2) and Lars Arneborg (3)

1 Chalmers University of Technology, Gothenburg, Sweden, 2 Tallinn University of Technology, Estonia,
3 University of Gothenburg, Sweden, 4 Aanderaa/Xylem, Bergen, Norway



Met sensor: e.g. Gill Maximet: Wind, Temp, Hum, Pres, Prec, GPS, RS233

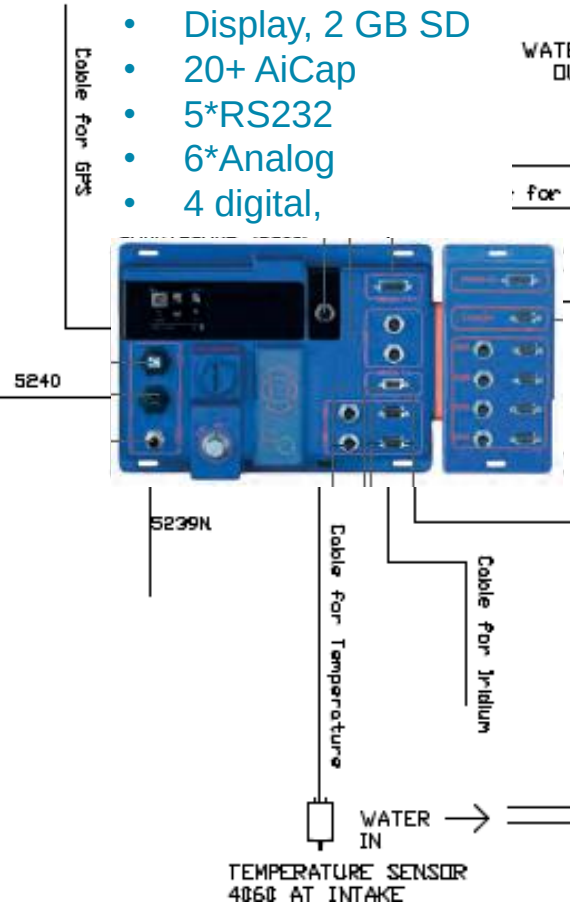
Modem:
GSM or Irridium



Real-Time display software in Google Maps

SmartGuard 5300

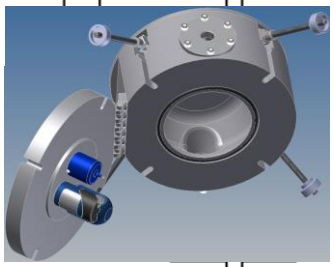
- Display, 2 GB SD
- 20+ AiCap
- 5*RS232
- 6*Analog
- 4 digital,



Cond/Sal/Temp (4319B) 120 p calib automatic change from low/high Sal

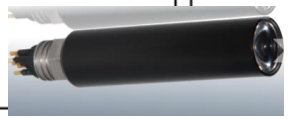
O_2/Temp (4330) 40 p calib + preburned foil

Turb (4112) 8 p calib, user changeable range



SooGuard Flow Chamber, Basic 4 sensors up to 7 parameters

- O_2/Temp
- Cond/Sal
- Turb
- Turner/Trilux

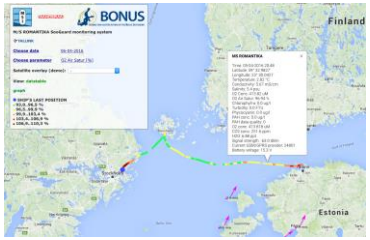


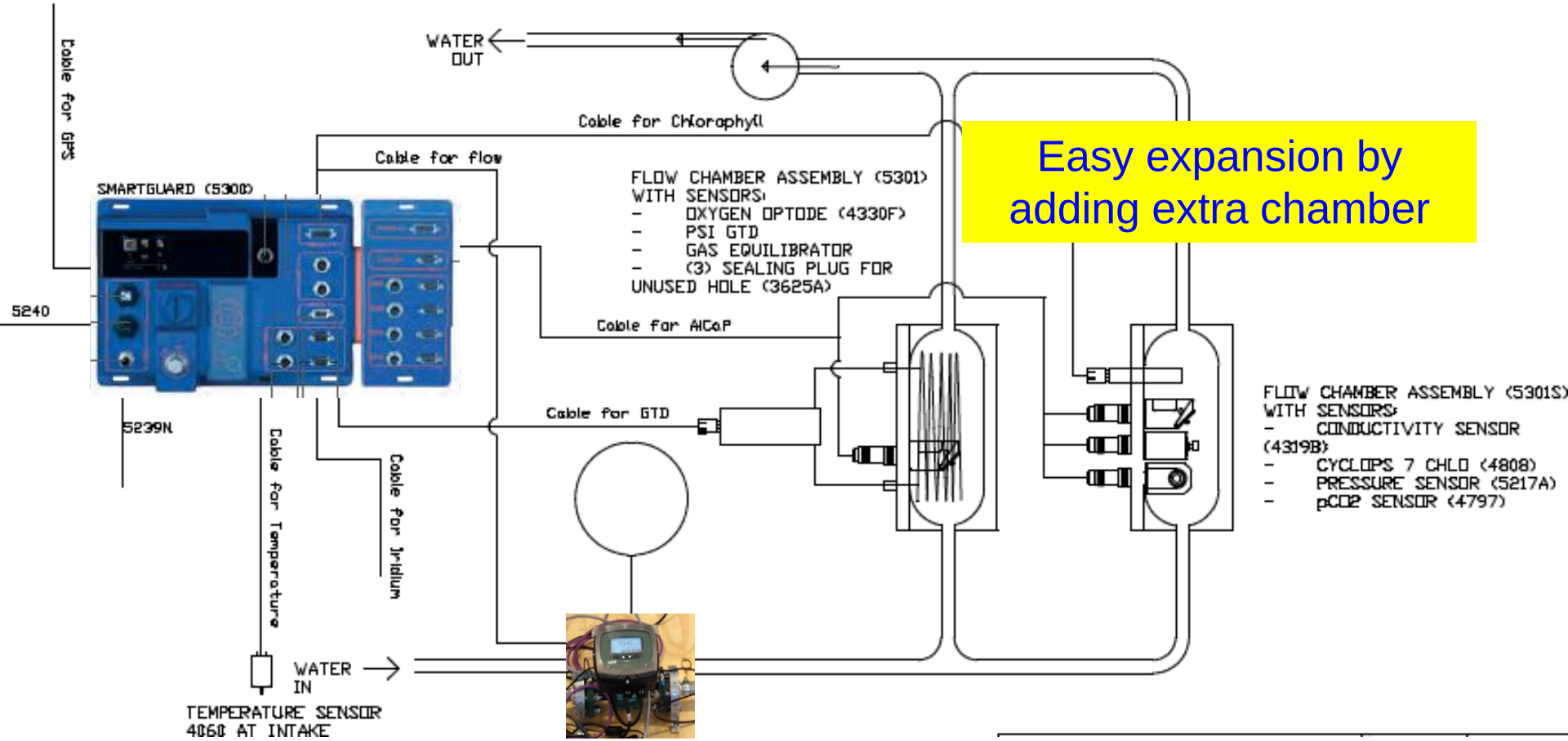
Turner Cyclops 7: e.g. ChlA/CDOM/Oil, Analog

Chelsea Trilux: e.g. Turb/ChlA/Phyco, RS232

Flow (MJK, DN-20) Electromag, Analog

Modular system based off the shelf standard components

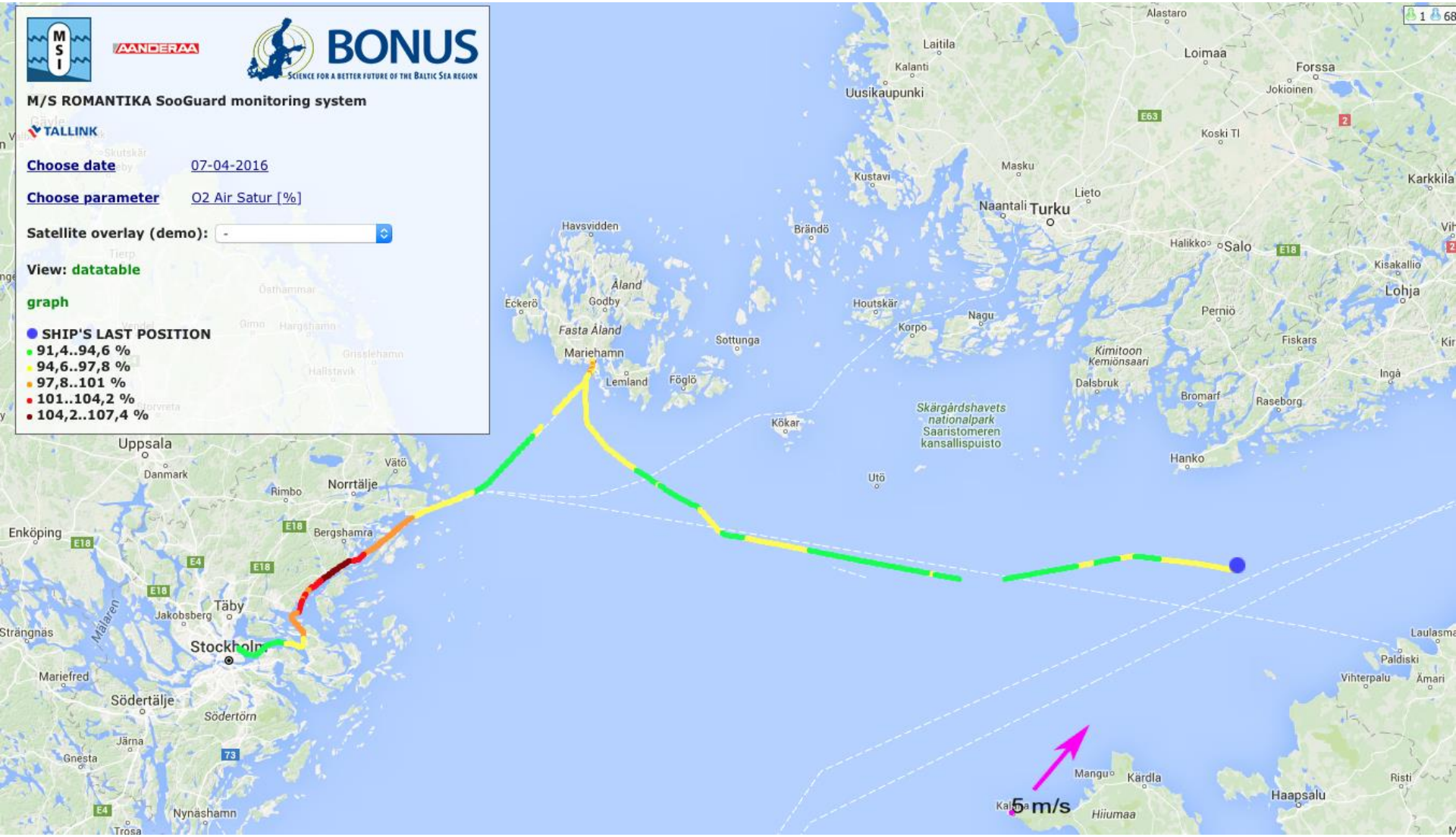




Easy expansion by adding extra chamber

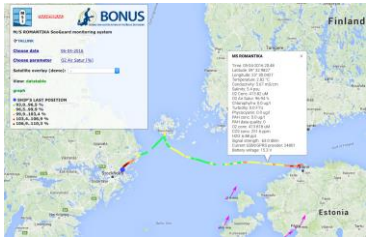
Modular system based off the shelf standard components

Software and presentation: Color coded, real time & historical



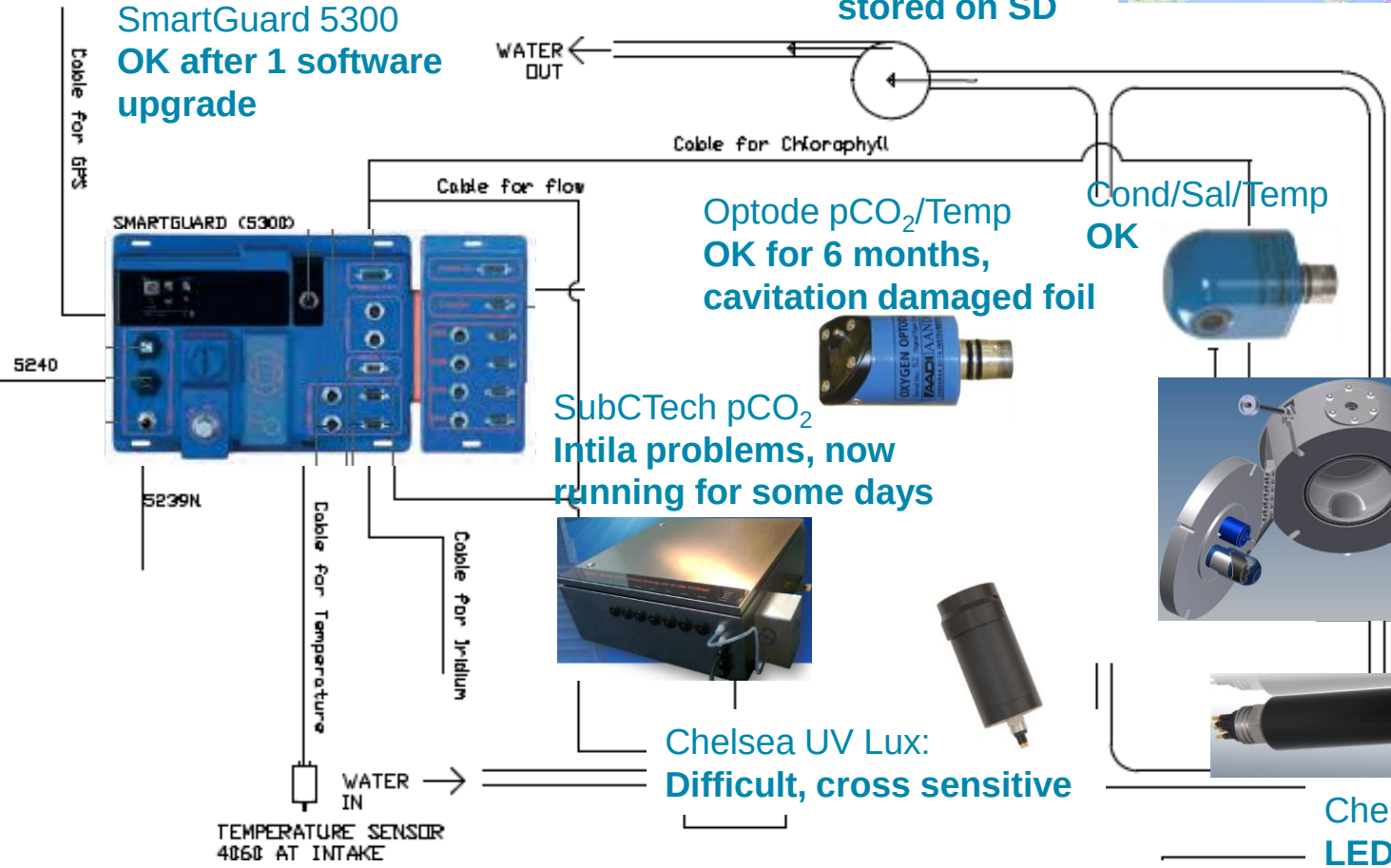
Real-time: http://on-line.msi.ttu.ee/eeferry/

Modem, GSM:
OK, not full coverage In Baltic, data stored on SD



Real-Time display software in Google Maps
OK

SmartGuard 5300
OK after 1 software upgrade

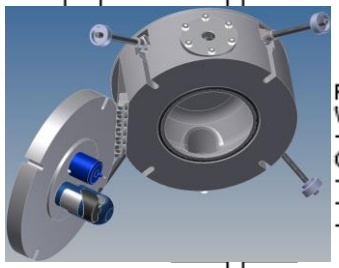


Optode pCO_2/Temp
OK for 6 months, cavitation damaged foil

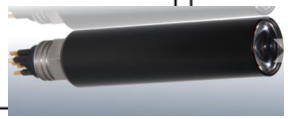
Cond/Sal/Temp
OK

O_2/Temp (4330)
OK

SubCTech pCO_2
Intila problems, now running for some days



Chelsea UV Lux:
Difficult, cross sensitive



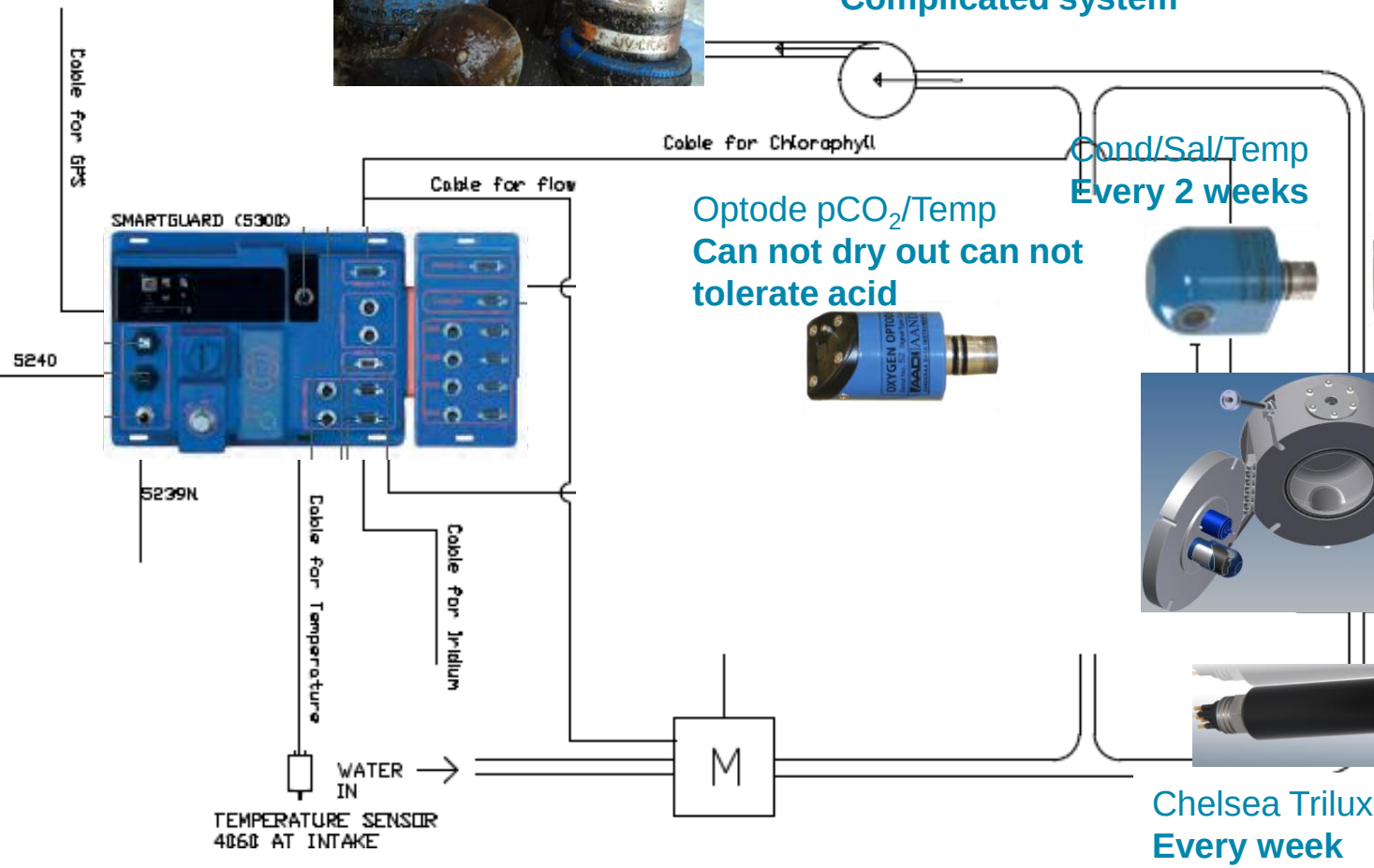
Chelsea Trilux:
LEDs needs exchange after 0.6 M measurements

Sensor experience from Romantika, installed June 2013, running at 1 minute interval, about 1.1 Million measurements

4. Next step to combine UV light with Turn off pump and empty

3. Acid rincing no sinificant change, not desirable with chemicals. Complicated system

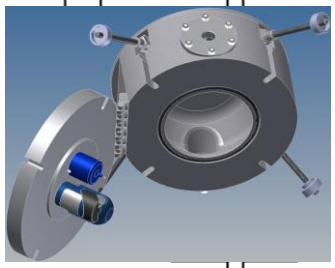
2. Turn off pump and empty chamber in harbor, doubbles cleaning interval



Optode pCO_2/Temp
Can not dry out can not tolerate acid

Cond/Sal/Temp
Every 2 weeks

O_2/Temp (4330)
Every 4 weeks



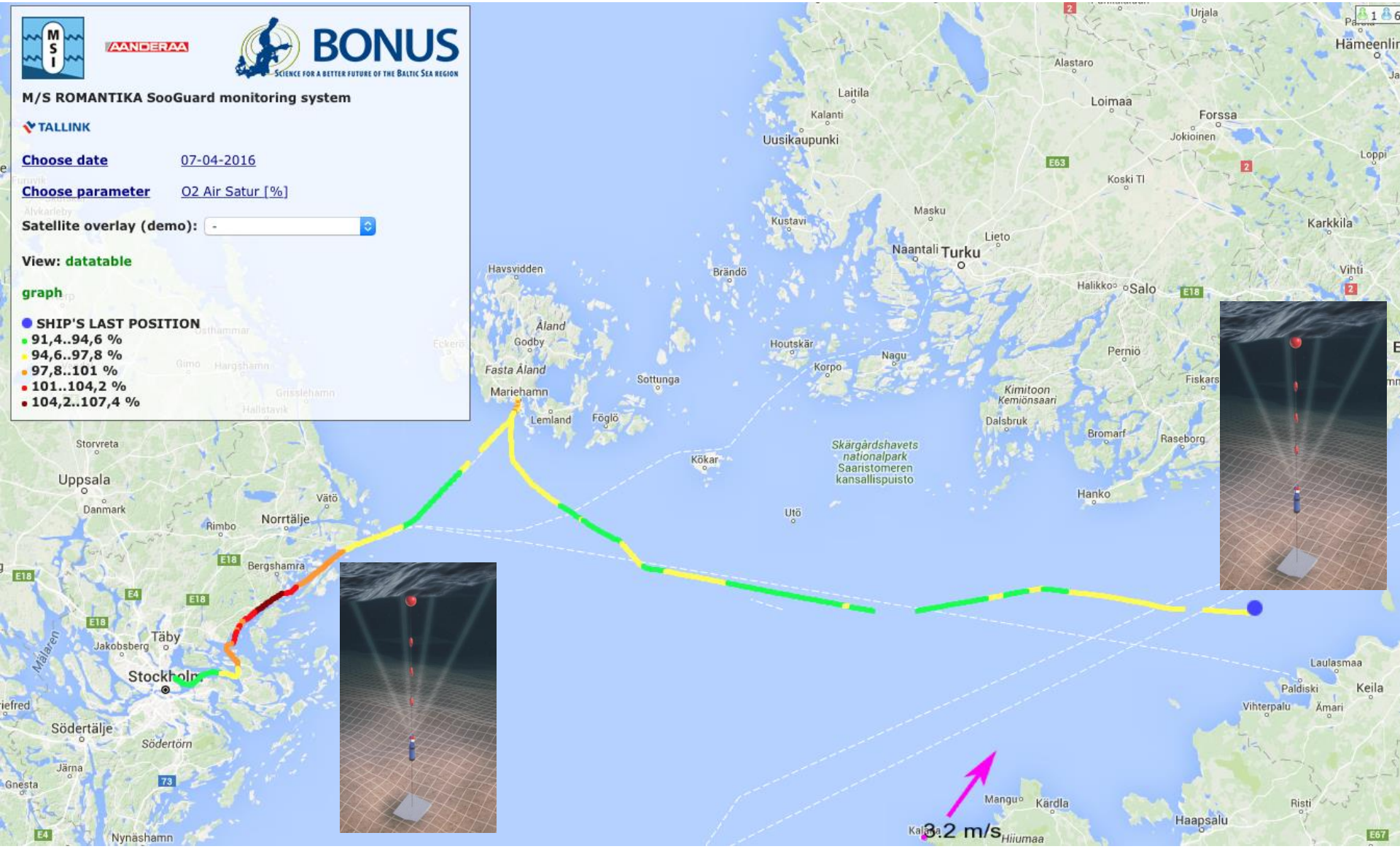
1. Opening and Cleaning:

- Takes 5 min
- Every week in summer
- Every month in winter

Chelsea Trilux:
Every week

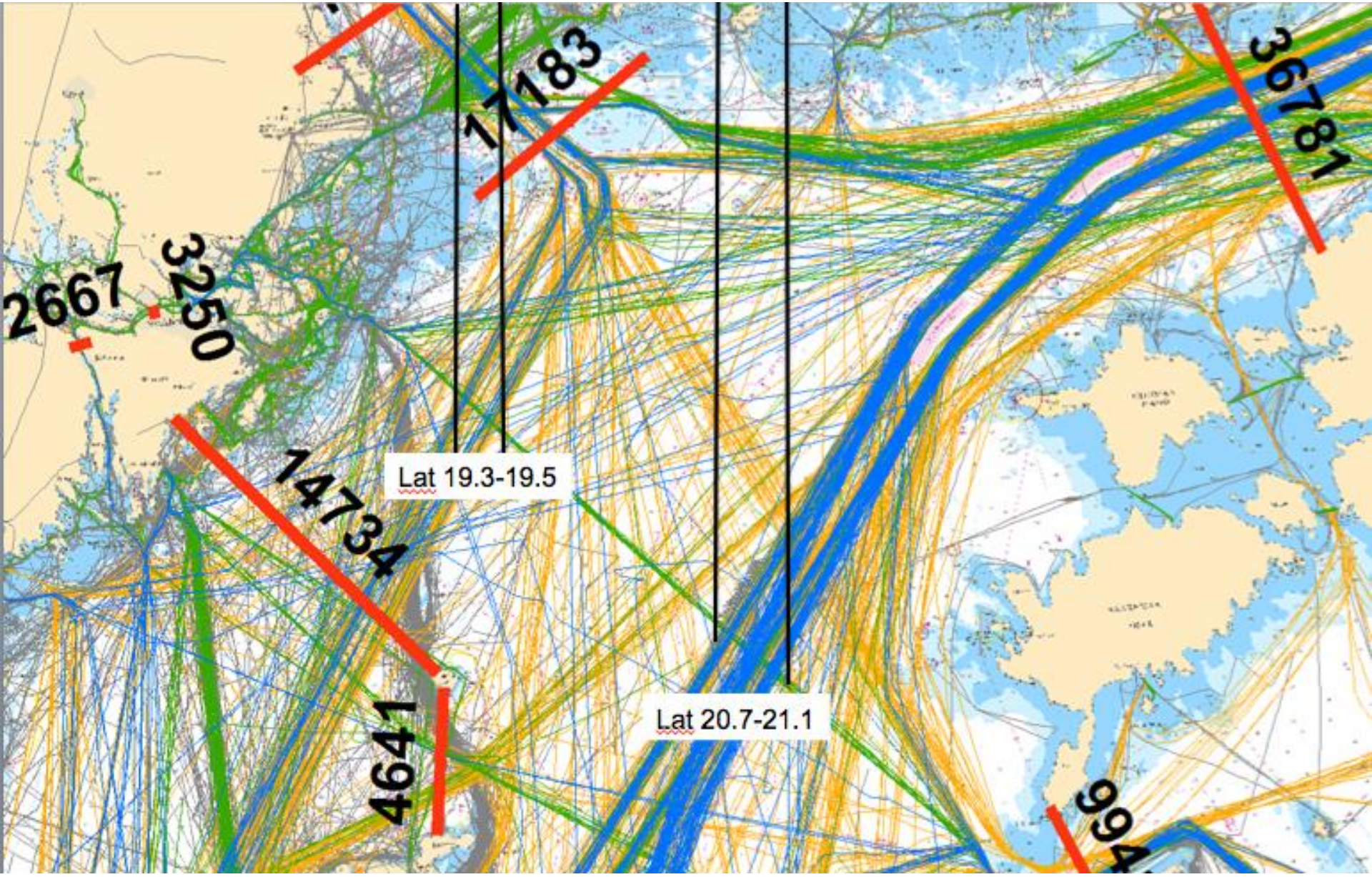
Antifoling trials on Romantika, the goal is to run system unattended for 1 month in active season and 2 months in winter

Cross Referencing with similar sensors along the route will give mutual Quality Control, Delay in system and Time coverage

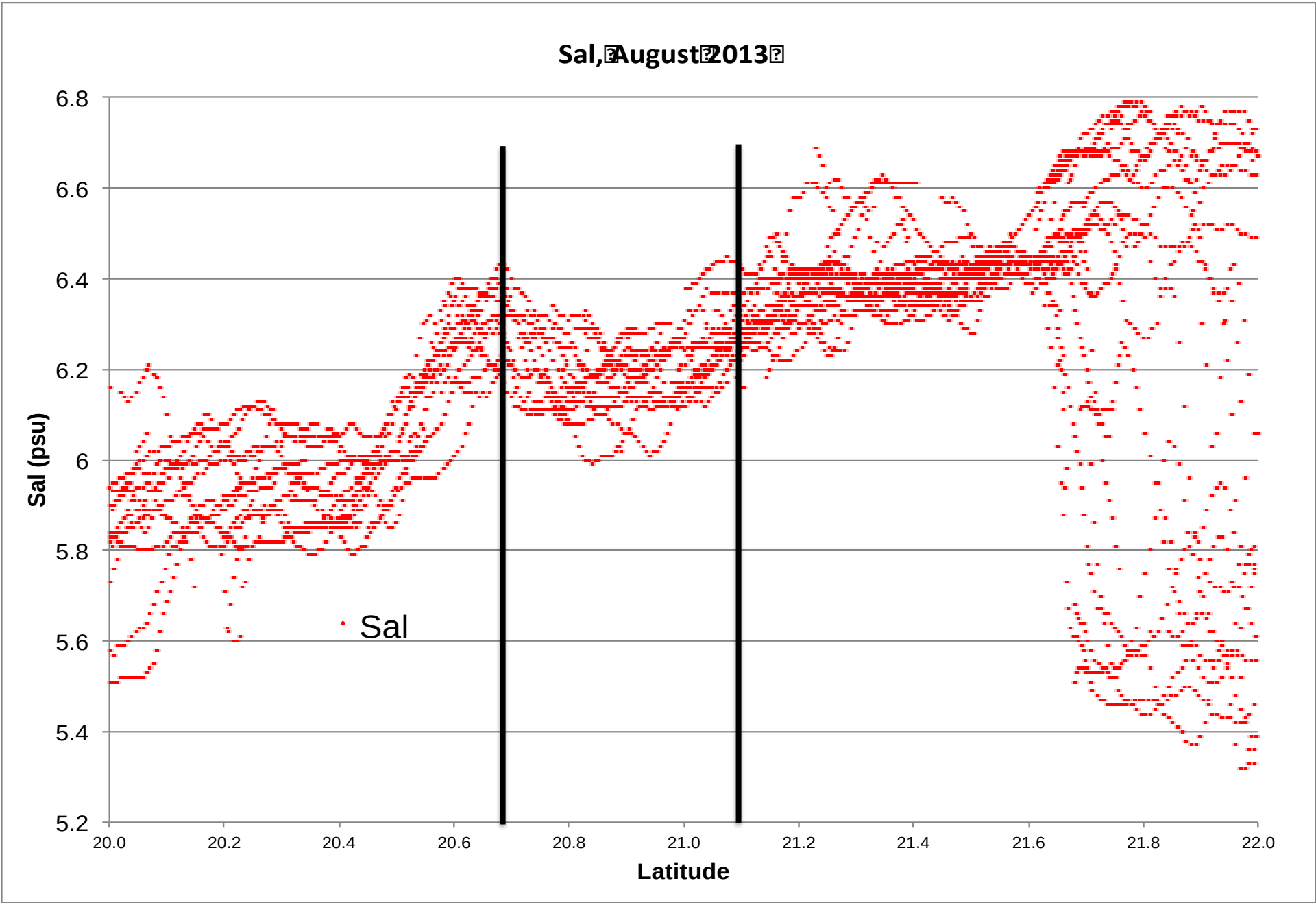


Real-time: http://on-line.msi.ttu.ee/eeferry/

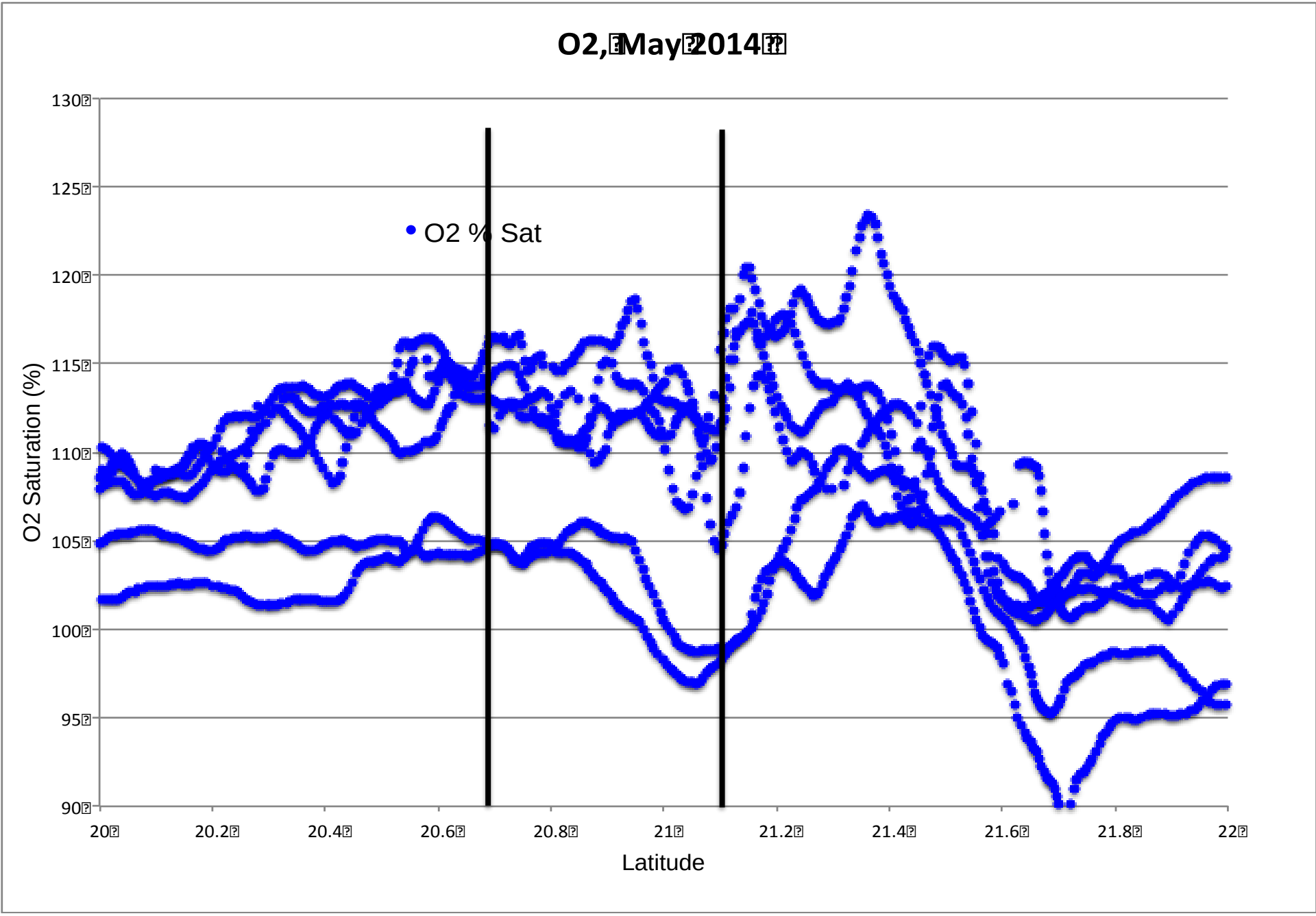
Influence of shipping on Hydrographic Conditions in the Baltic Sea: Background



Influence of shipping on Hydrographic Conditions in the Baltic Sea: Salinity



Influence of shipping on Hydrographic Conditions in the Baltic Sea: Oxygen



Thank You!

AANDERAA
BONUS
SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION
M/S ROMANTIKA SooGuard monitoring system
TALLINK
Choose date 07-04-2016
Choose parameter O2 Air Satur [%]
Satellite overlay (demo): -
View: datatable
graph
SHIP'S LAST POSITION
91,4..94,6 %
94,6..97,8 %
97,8..101 %
101..104,2 %
104,2..107,4 %
TALLINK
Hämeenlinna
Alastaro
Laitila
Kalanti
Uusikaupunki
Loimaa
Forssa
Jokioinen
Riihimäki
Loppi
Koski Tl
Hyvinkää
Masku
Kustavi
Lieto
Naantali
Turku
Karkkila
Järvenpää
Kerava
Brändö
Halikko
Salo
Vihti
Kisakallio
Lohja
Vantaa
Espoo
Helsinki
Houtskär
Nagu
Korpo
Perniö
Kirkkonummi
Sottunga
Fiskars
Kimitoon
Kemiönsaari
Dalsbruk
Ingå
Bromarf
Raseborg
Föglö
Skärgårdshavets nationalpark
Saaristomeren kansallispuisto
Kökar
Hanko
Utö
Vätö
Norrtälje
Rimbo
Bergshamra
Täby
Stockholm
Södertörn
Tallinn
Laulasmaa
Paldiski
Keila
Saku
Jüri
Vihterpalu
Ämari
Risti
Rapla
Haapsalu