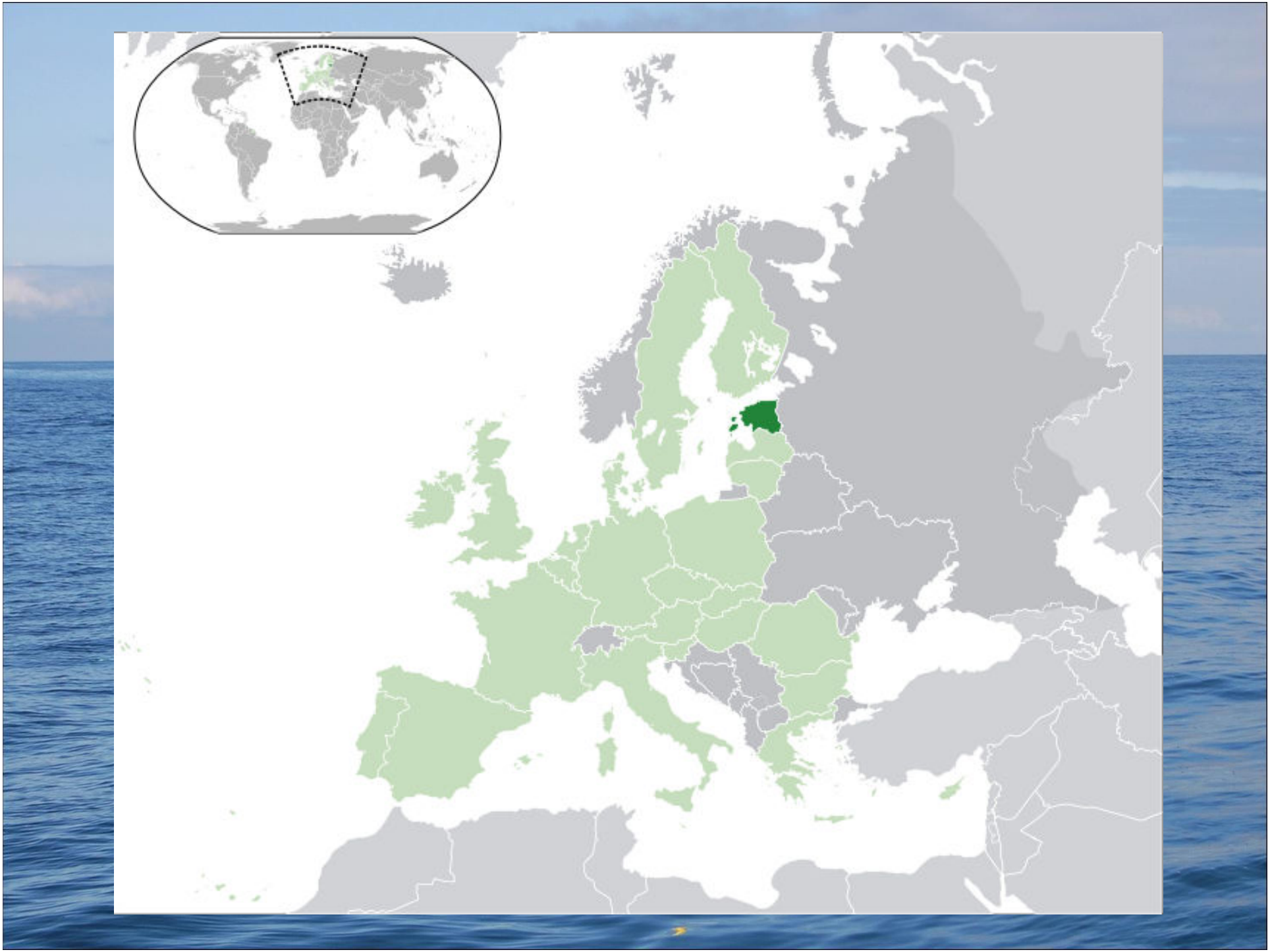
The operational oceanography of IOC

Report of Estonia

Inga Lips

Marine Systems Institute at

Tallinn University of Technology



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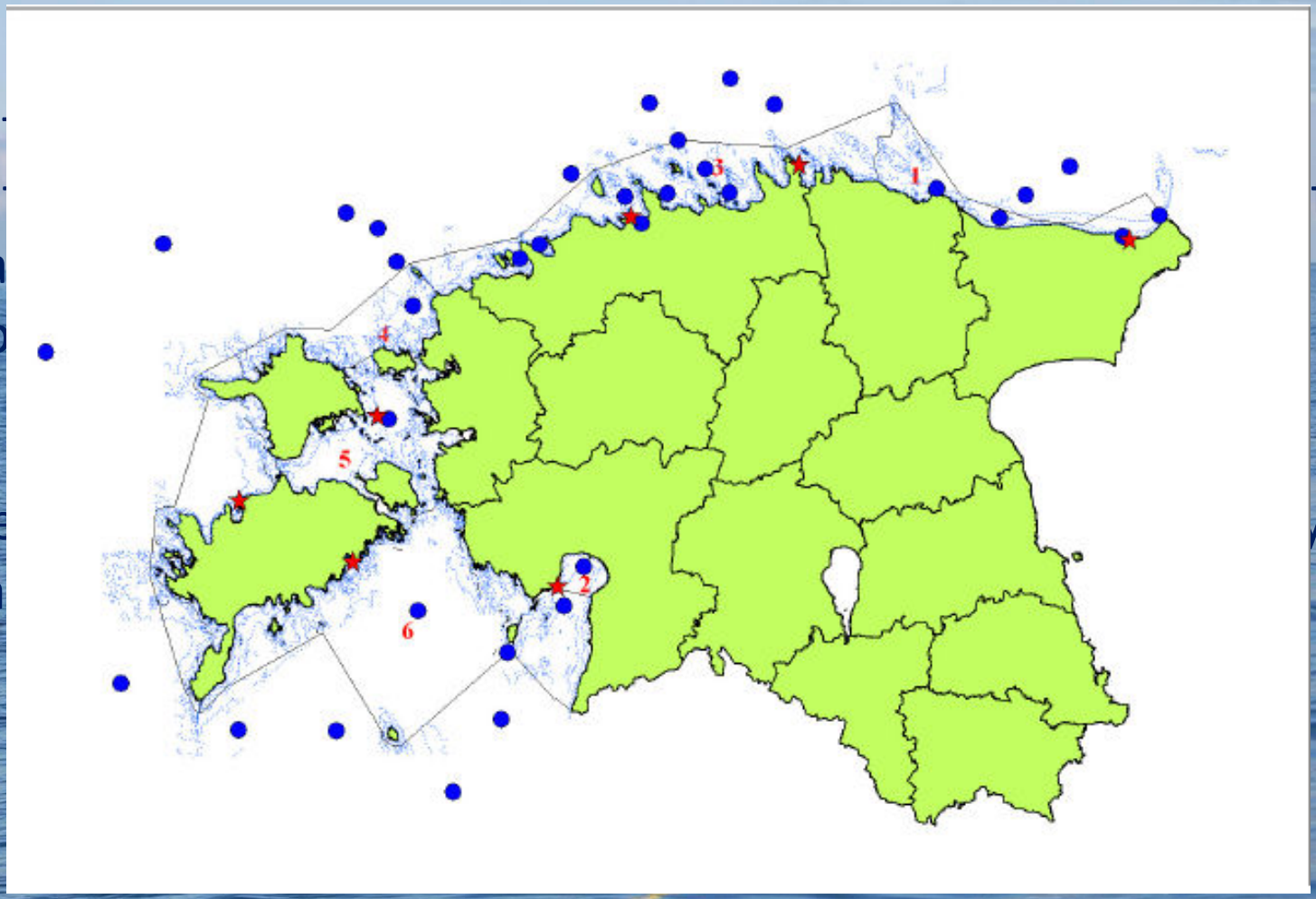


Background

- In 1997 the Ferrybox/SOOP (ship of opportunity) monitoring was established along the ferry line between Tallinn and Helsinki.
- In 2005 the remote sensing programme was established.
- There was a major revision of the monitoring programme in 2006 - 2007 to fulfil the EU Water Framework Directive (WFD) requirements.
- In 2010 the monitoring of non-indigineous species was added to the programme and the frequency of open sea monitoring has increased since 2011.

Background

- Sea level measurements have been carried out since 1842 in Tallinn (with 1 hour interval since 1888), regular observations of ice conditions started even earlier. The first automatic sea level station (measurements interval 5 min) was established in Muuga Bay in 1993, an on-line station started in Tallinn in 1998.
- The operational sea level forecast system, based on HIROMB model (high resolution operational model of the Baltic Sea) and operational measurements, was developed in co-operation with the Baltic Operational Oceanographic System (BOOS, established officially in 2001) and is in operation since 2005.

National policy and regulations

- Environmental monitoring is a responsibility of the Ministry of the Environment of Estonia.
- Monitoring law and related legal acts define the sub-programmes of the national monitoring and, if applicable, the responsible institutions.
- Development of the monitoring system, including operational oceanographic observations and forecasts, and related R&D is a responsibility of research institutes belonging to the Universities and governmental agencies/laboratories.
- Ministry of the Environment is responsible in fulfilling obligations and working in the frames of international conventions/

  organizations related to oceanographic observations and monitoring, such as IOC, EU WFD, EU Marine Strategy Framework Directive (MSFD), Helsinki Convention, etc.

Financial & organizational frameworks

- The responsible organization for marine weather forecasts (including sea level, waves etc) is the Estonian Meteorological and Hydrological Institute (EMHI, under Ministry of the Environment of Estonia).
- The forecasts systems are developed and updated by the Marine Systems Institute (MSI) at Tallinn University of Technology in co-operation with the regional system HIROMB-BOOS.
- MSI is member of the EuroGOOS from Estonia and since 2011, a representative from MSI is BOOS chair.

Financial & organizational frameworks

- The operational system and its development are funded by the Ministry of the Environment (including Environmental Investment Centre), Ministry of Education and Research (including Estonian Research Council) and international R&D projects (e.g. FP7 project MyOcean etc.).

Implementation of R&D and monitoring programmes

- National marine monitoring programme is implemented according to the approved programme and the data are reported to the authorities at a yearly basis.
- The reports and data are available at Estonian Environmental Information Centre.
- The data are reported also to HELCOM, European and international organizations according to the valid regulations and agreements.

Implementation of R&D and monitoring programmes

- Operational data (on-line or near real time)

- delivered to the BOOS ftp-box from where the data are available for all members of BOOS for operational products and forecasts

- information is available via:

  BOOS web-site (ww.boos.org)

  Estonian Maritime Administration (maintained by MSI, on-line.msi.ttu.ee/metoc)

  EMHI (www.emhi.ee)

  MSI (e.g. http://on-line.msi.ttu.ee/kaart.php)

24/7 operational services

- **Sea level, temperature, salinity**

  Online observations and forecast

- **Offshore meteorology, waves and currents**

  Online observations at navigational buoys, lighthouses and islands; Drifters

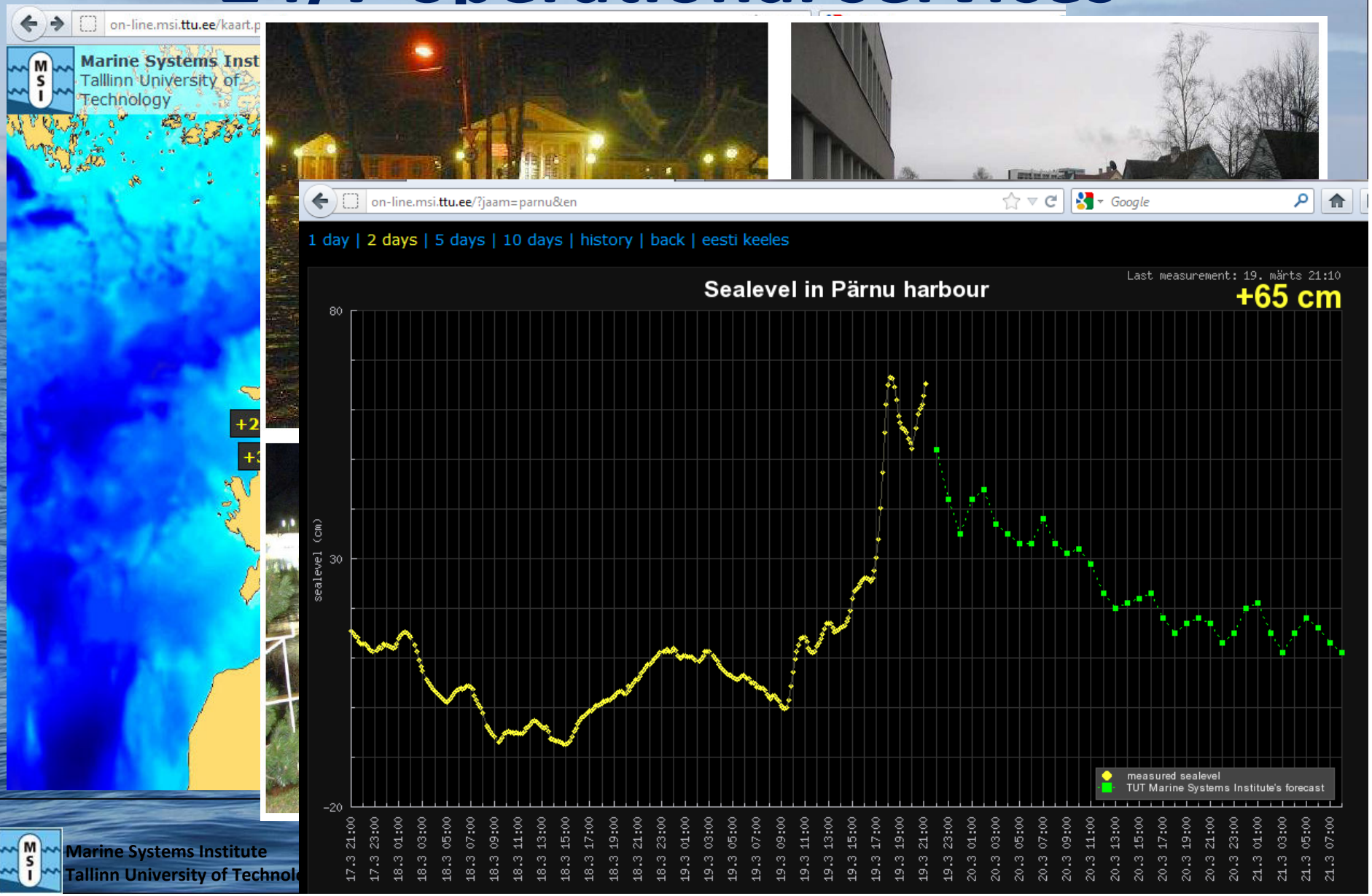
- **FerryBox T,S, Chl *a*, pCO_2, sampling for nutrient and phytoplankton**

  Daily Tallinn-Helsinki

- **Autonomous buoy profiler in the Gulf of Finland**

  Profiles of T,S, Chla *a* 2-50 m, time resolution 3 hours

24/7 operational services



24/7 operational services

www.emhi.ee/?ide=14,194,195

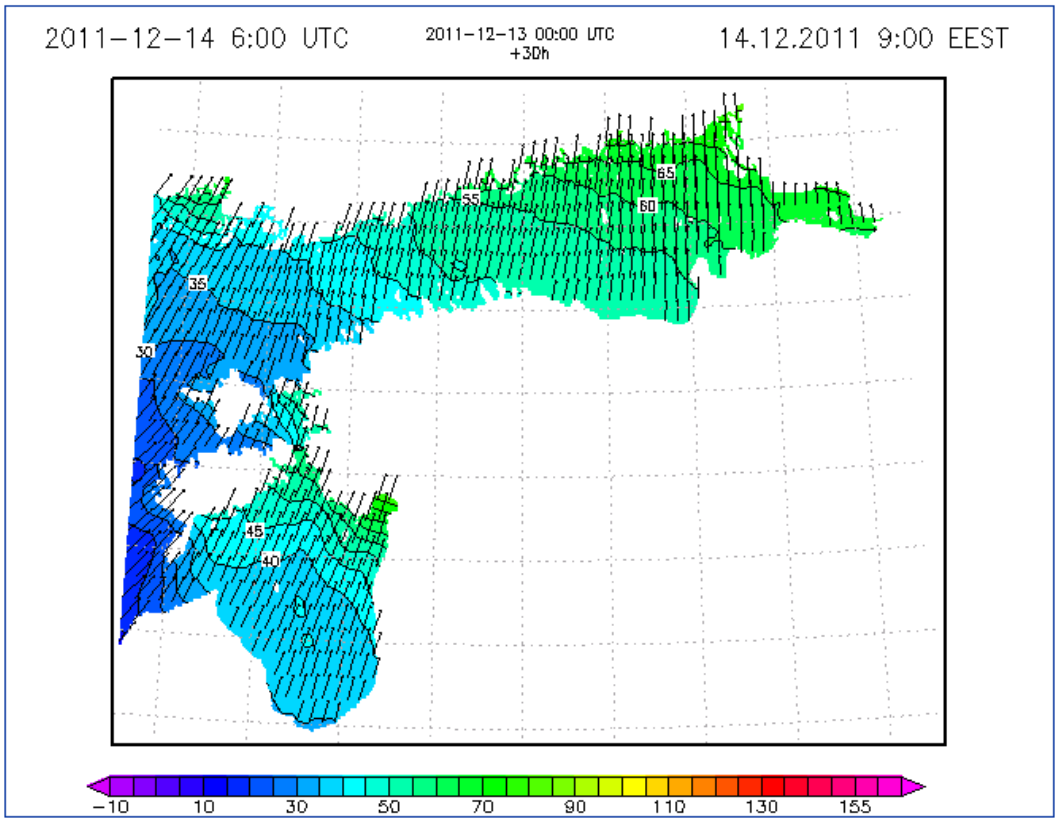
EMHI

Weather observations | Weather forecast | World weather | Snowmap | Weathermap | www.meteoalarm.ee

- Home
- General information
- Weather forecasts
  - Warnings
  - Fire hazard
  - Weathermap
  - HIRLAM model
  - HIROMB model
    - Sea level and wind
    - Seawater temperature and currents
    - Salinity
    - Ice thickness
    - Ice consentration
    - Level ice thickness
    - Ridged ice thickness
  - ECMWF forecasts
  - Legend
- Weather observations
- Aviation weather
- Climate
- News
- Solar radiation
- Professional know-how

Filled colours and contour lines show the sealevel (cm) from the 0-level. Vectors show the direction and volume of the 10m height wind (m/s).

+6h
+12h
+18h
+24h
+30h
+36h
+42h
+48h



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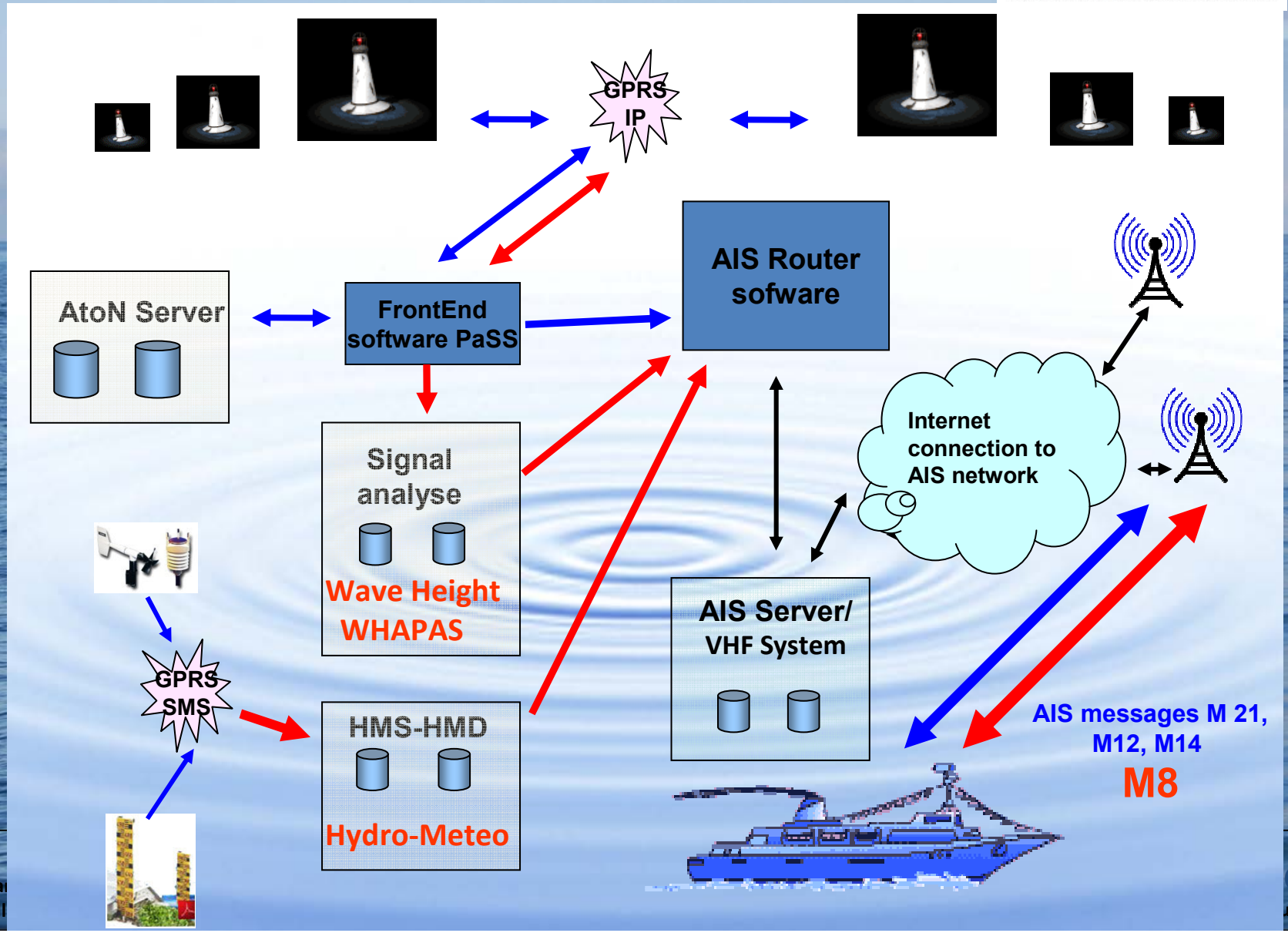
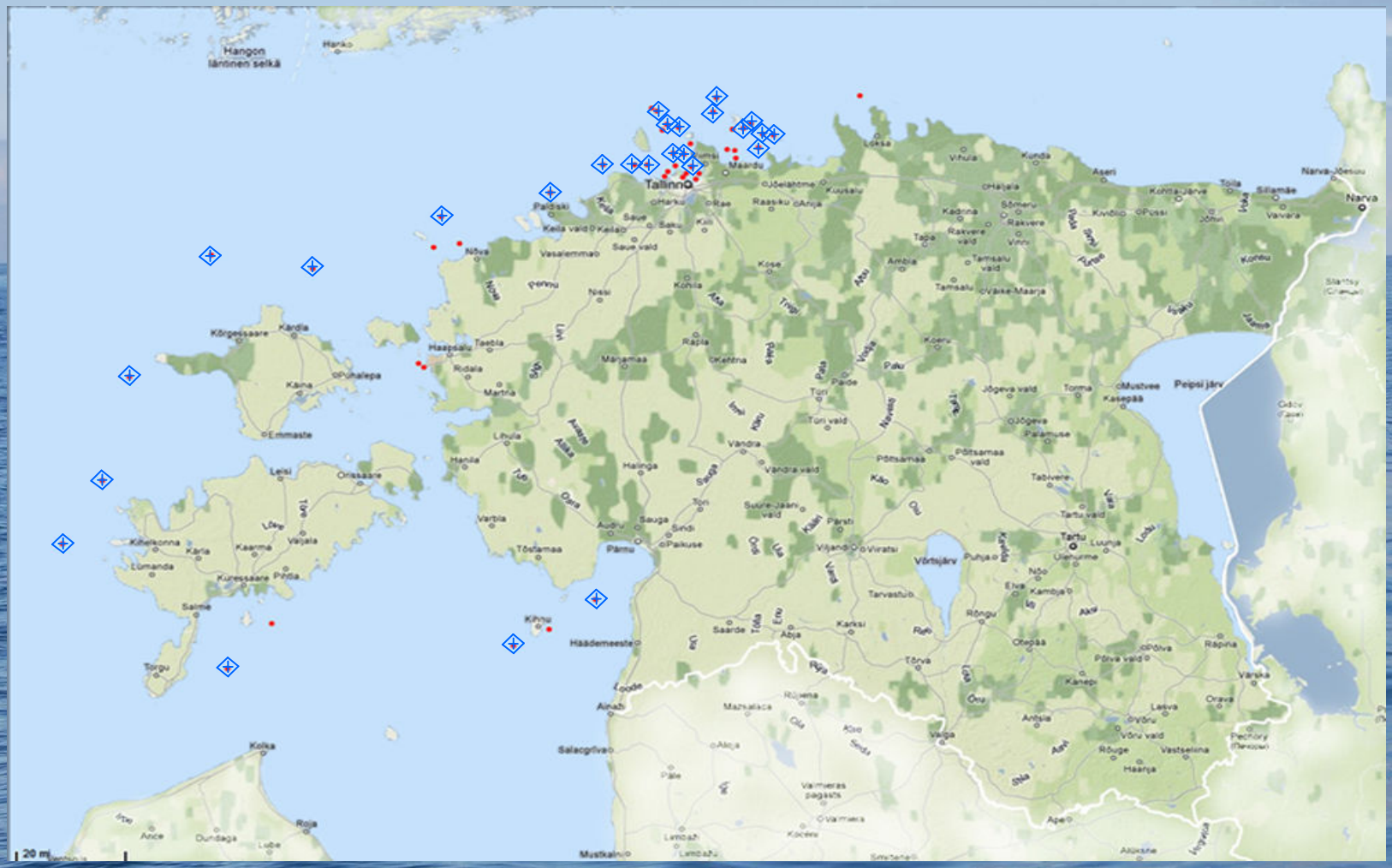
Integration of marine metoc data into AIS system + additional wave data



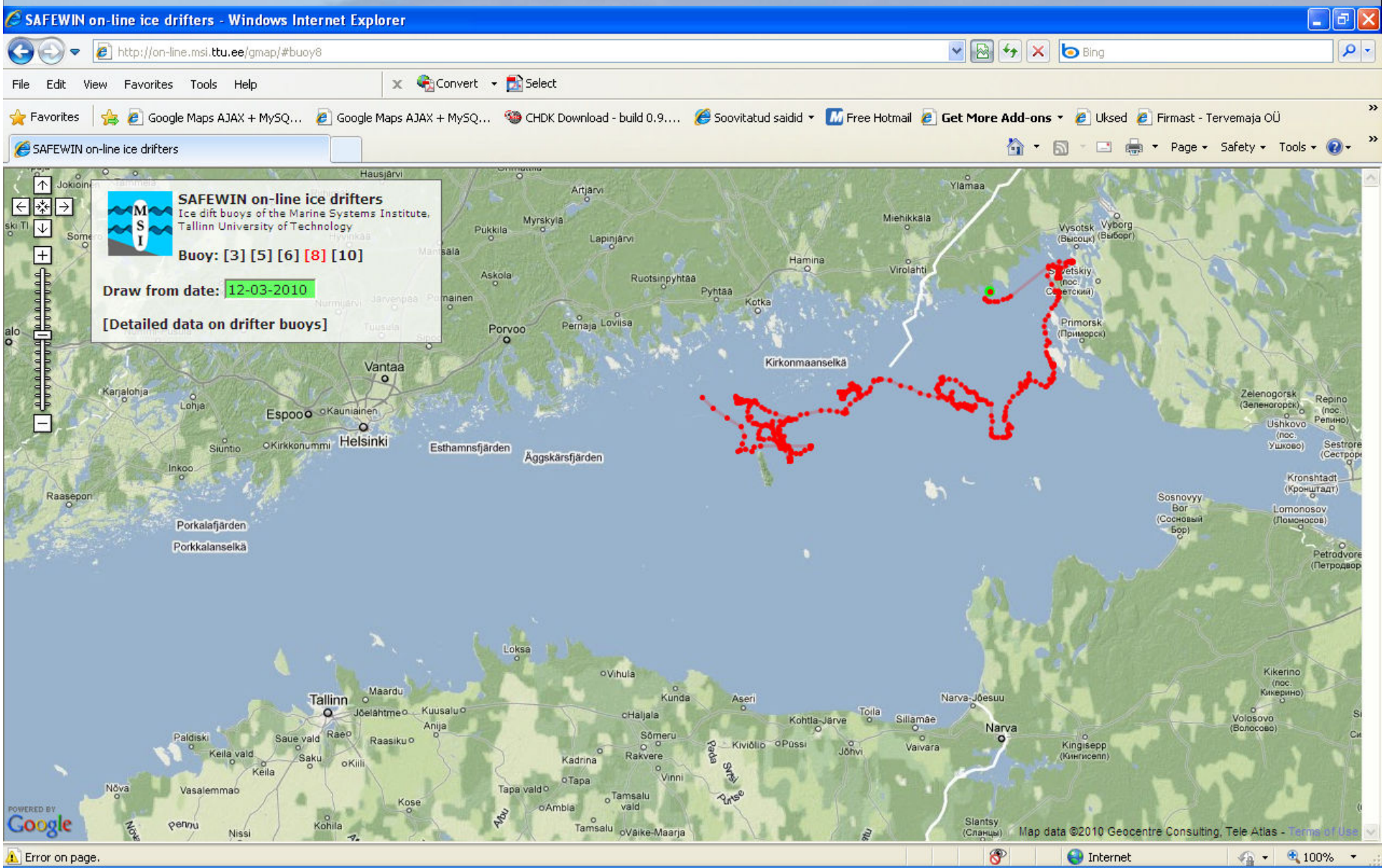
Navigation buoys equipped with acceleration sensors in Estonian waters



On-line difter experiments 2010-2011

MODIS 16.03.2010

On-line difter experiments 2010-2011



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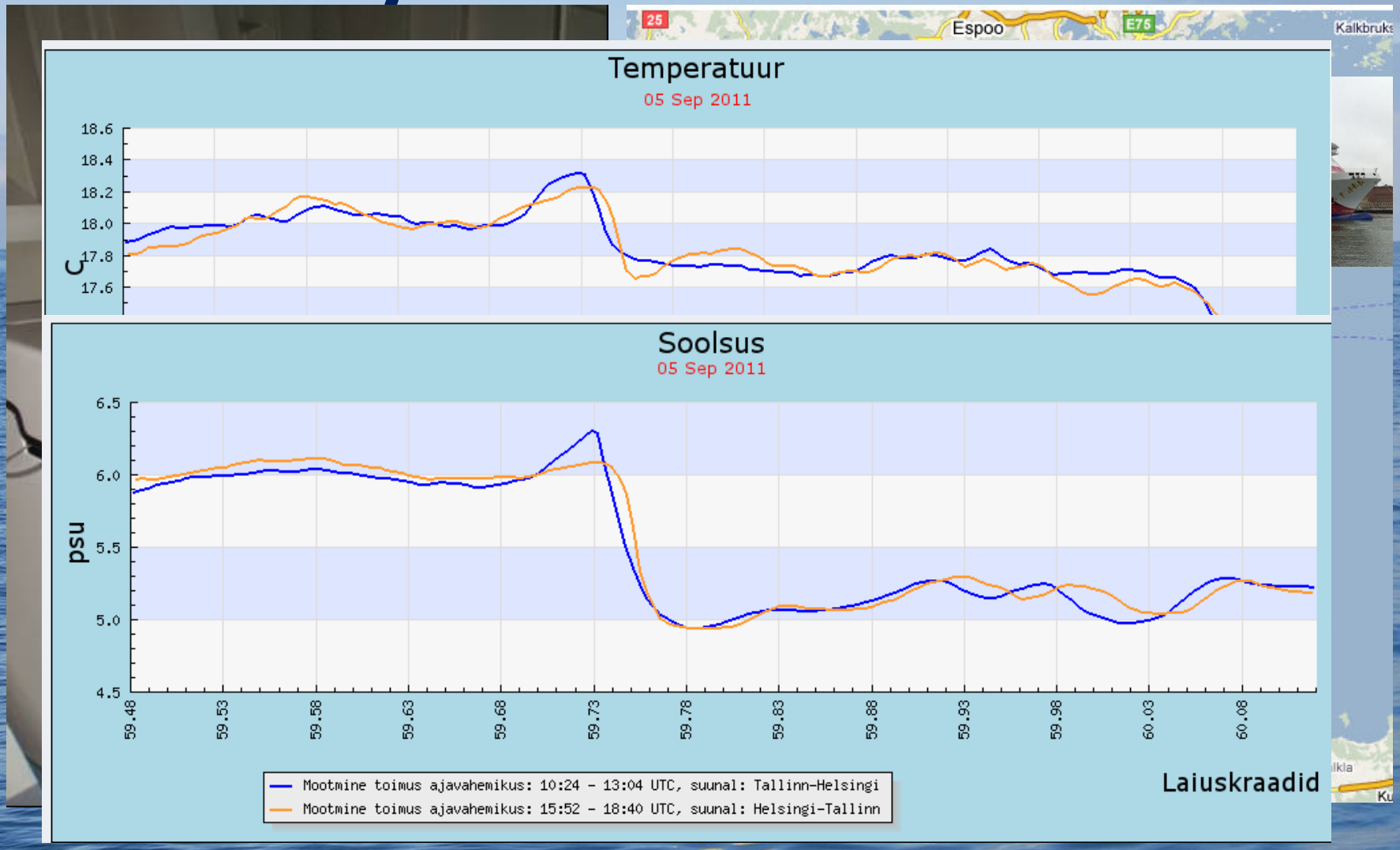
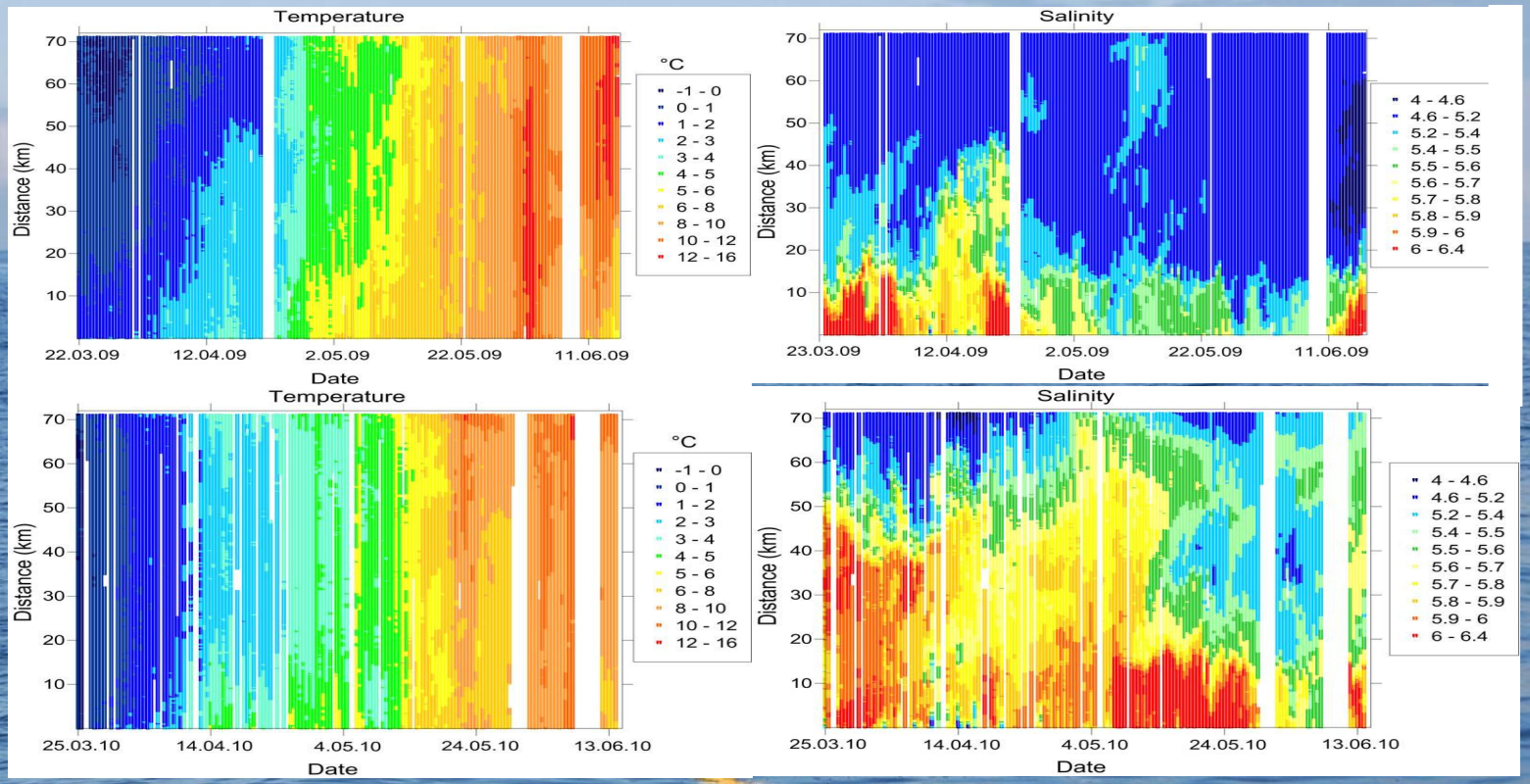
Ferrybox measurements



Ferrybox measurements

2009

2010



Temperature and salinity variations along the ferry route Tallinn-Helsinki in 2009 and 2010

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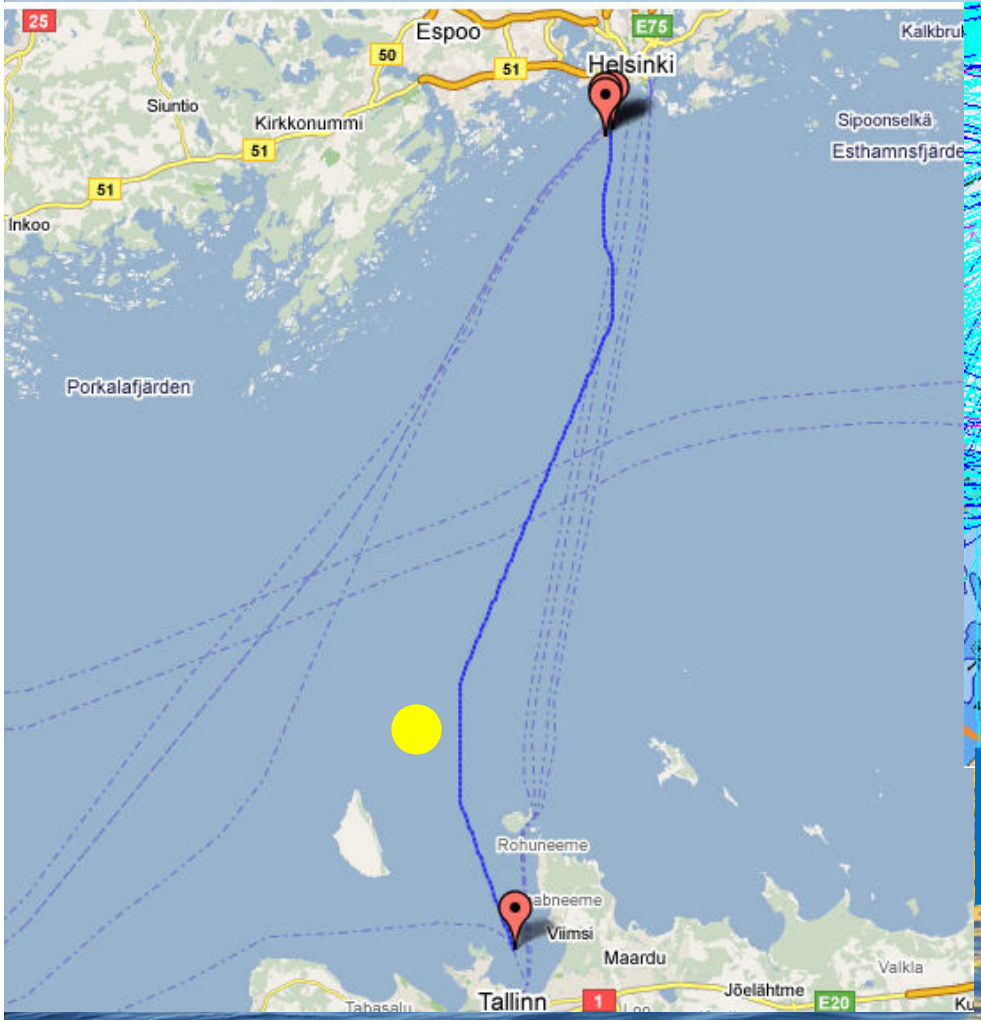
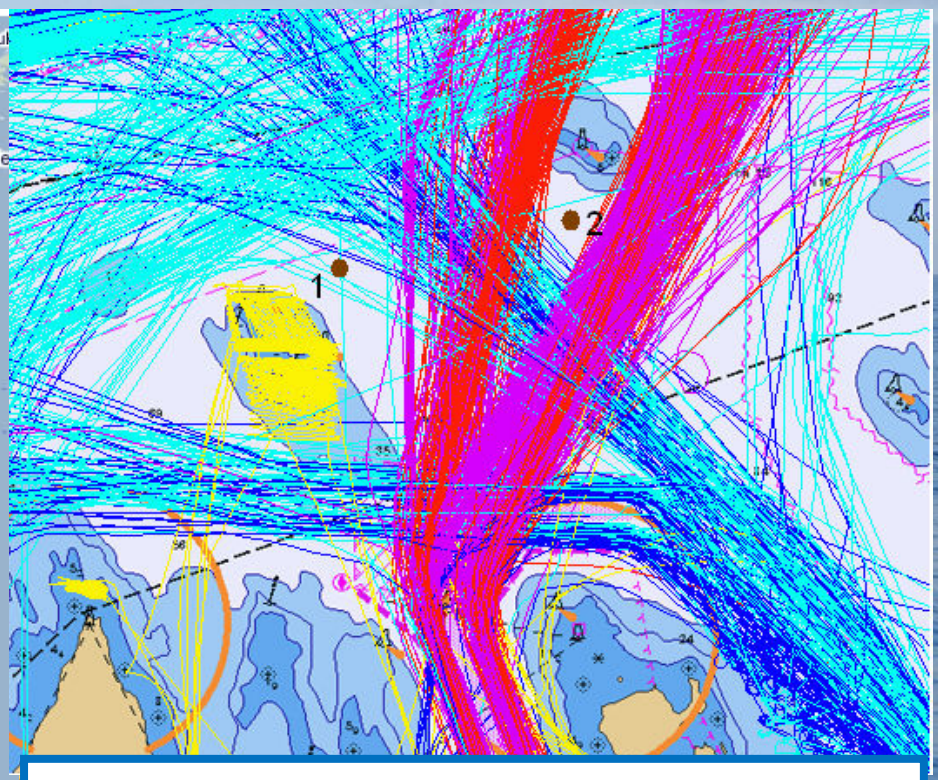
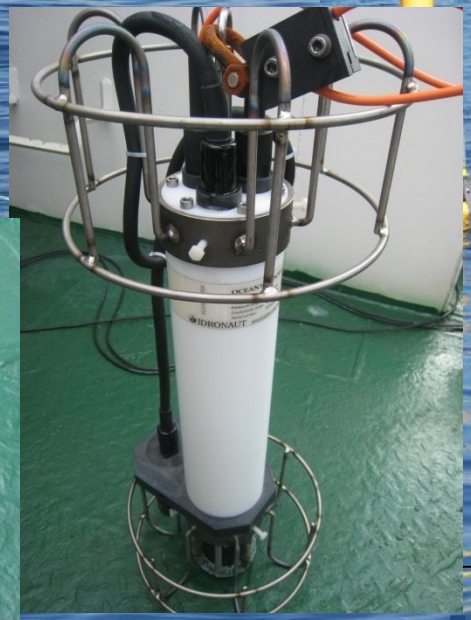
Autonomous buoy profiler

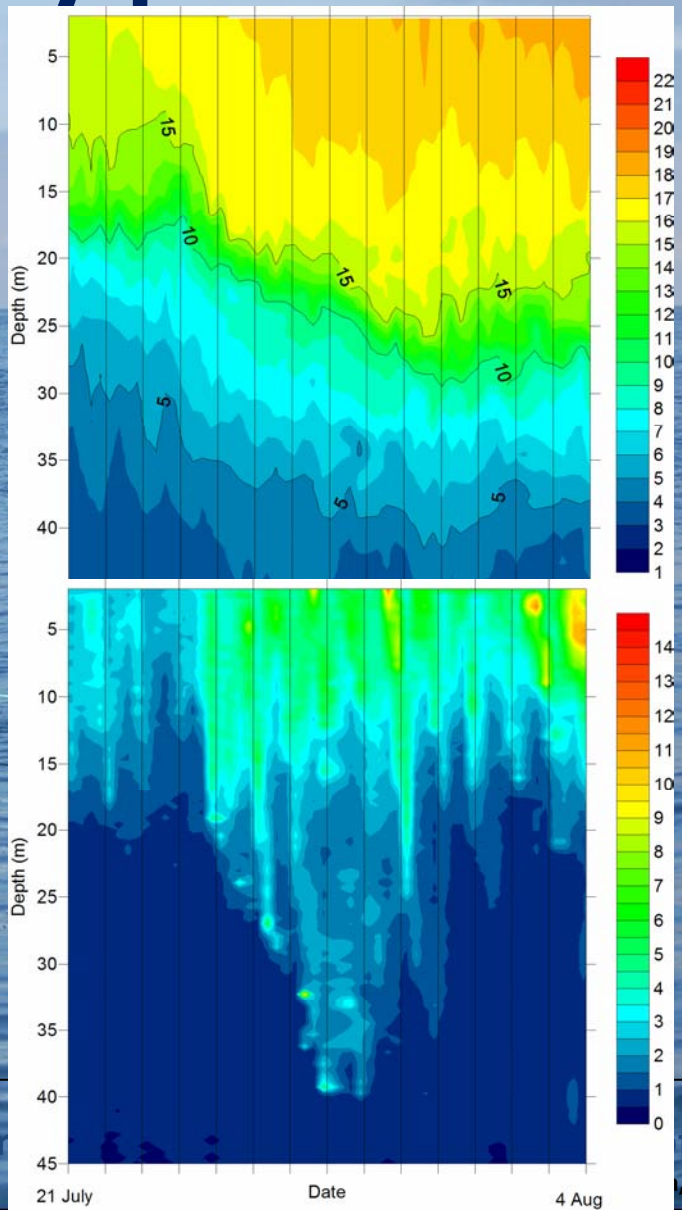




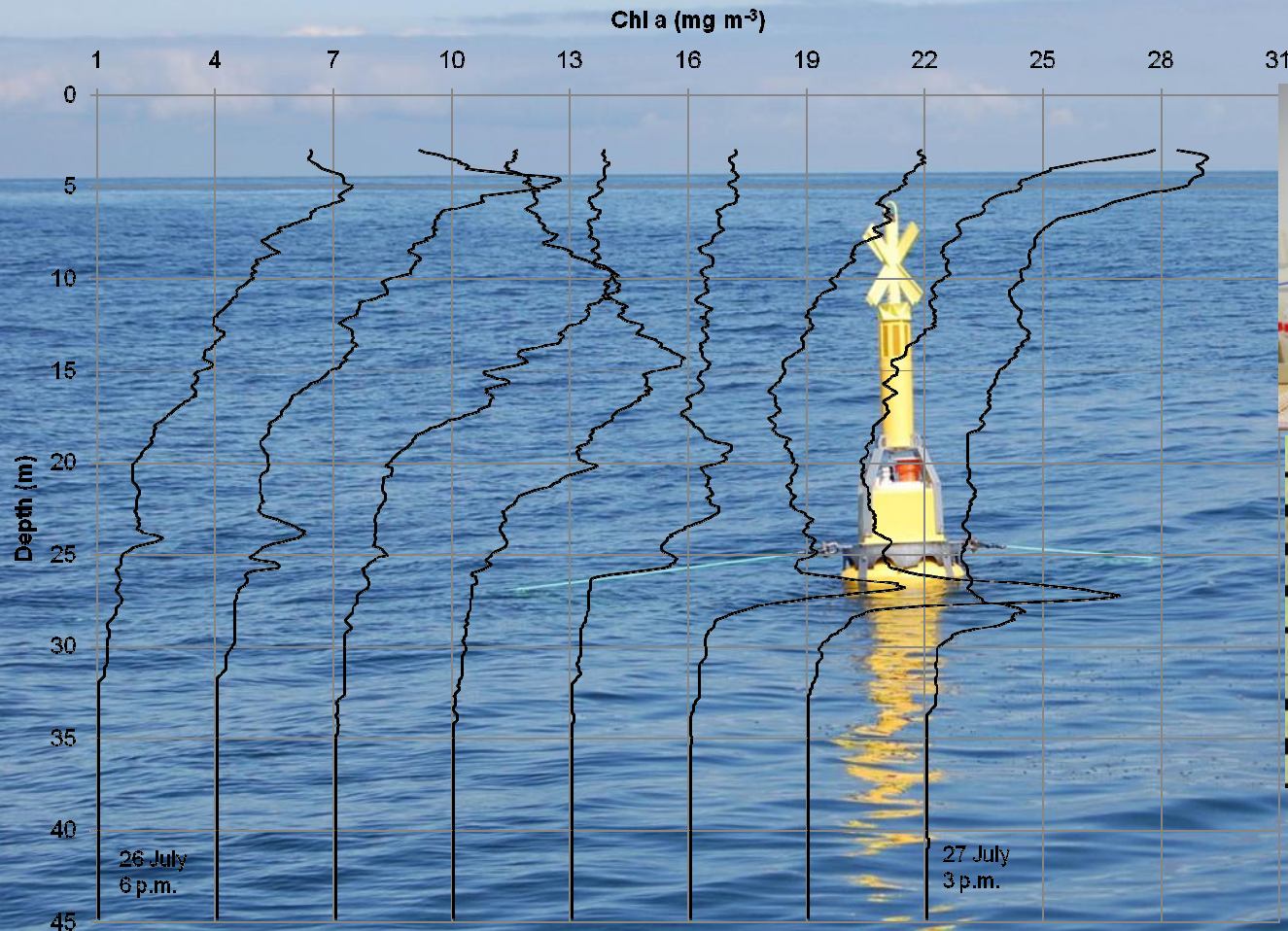
Deployed in the Gulf of Finland near the Tallinn –Helsinki Ferrybox route

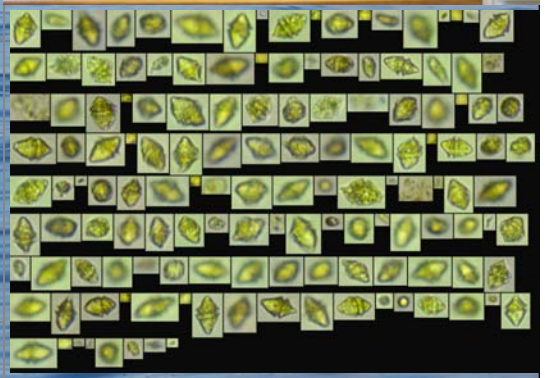
Autonomous buoy profiler

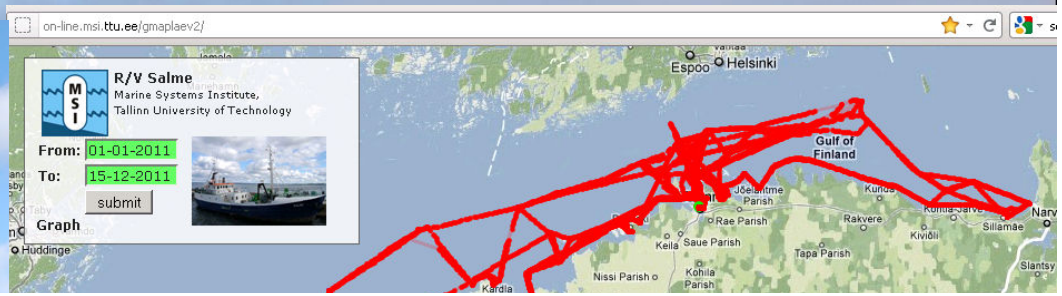


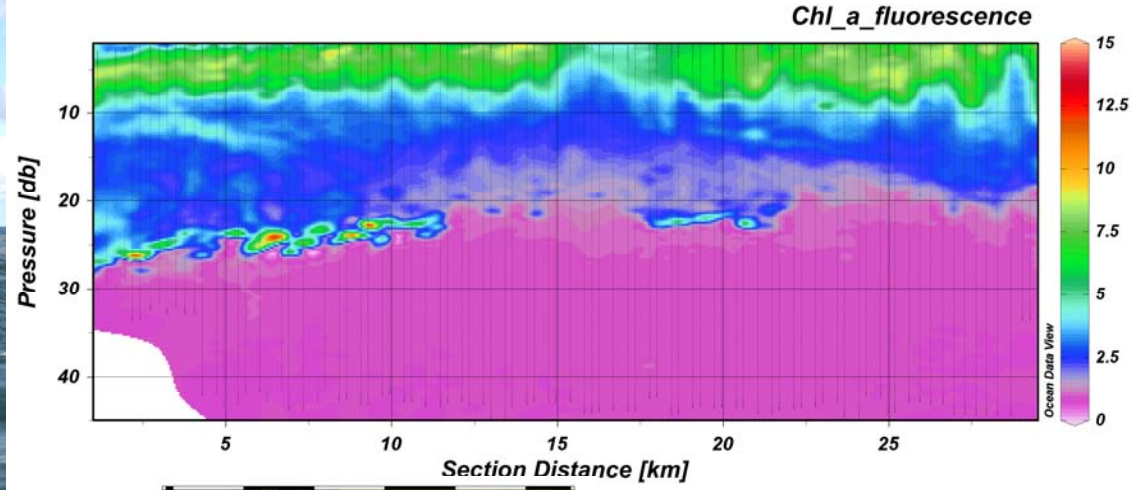


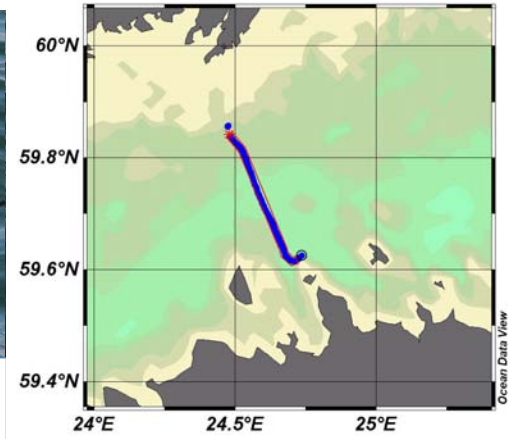
Autonomous buoy profiler

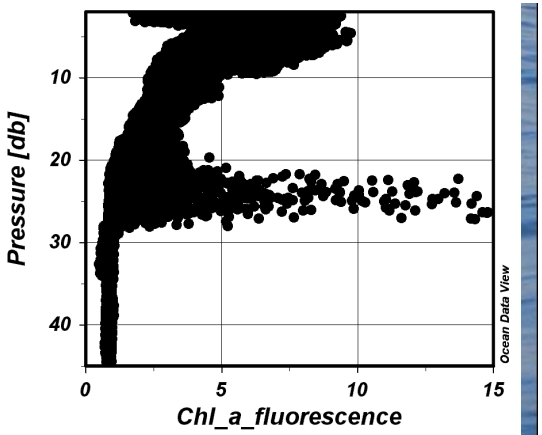












Towed undulating system measuring T, S, Chl *a* and phycocyanin

Future perspectives

- Ministry of the Environment has decided to include operational oceanographic measurements into the future **open sea environmental monitoring program** – new Ferrybox system and autonomous profiler will be installed in 2012
- The institute is one of the partner institutions in the project "Estonian Environmental Observatory" (2011-2014) in the frames of the Estonian Research Infrastructure Roadmap program where the institute's responsibility is to develop and maintain **a deep sea cabled observatory in the Gulf of Finland**

Thank you for your attention!

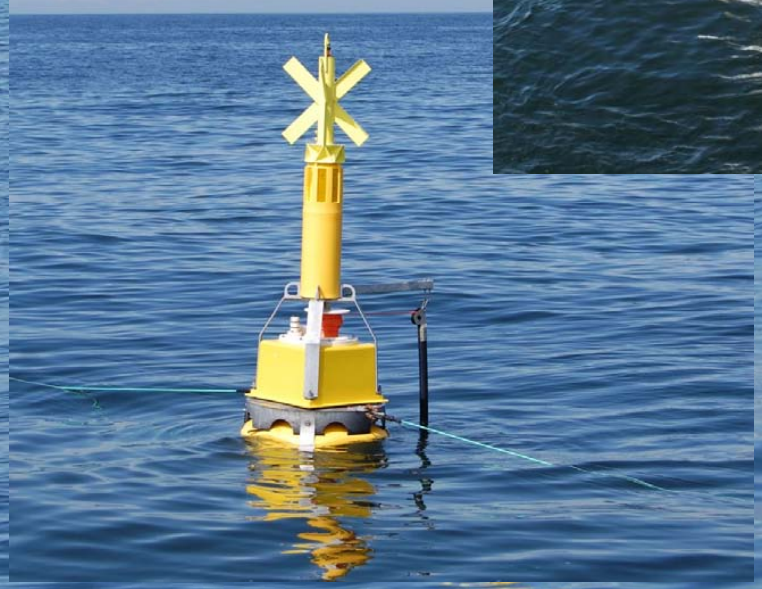



Photo: Kaimo Vahter