

A novel automated marine monitoring system in the Baltic Sea, the Gothenburg-Uleåborg-Kemi-Lübeck FerryBox

contacts at SMHI:

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Introduction

Ferries and other merchant vessels are used for marine monitoring purposes in e.g. the Baltic Sea. Instrumentation is often called a FerryBox and consists of a water intake at ca 3-5 m depth and a system for pumping seawater through sensors as well as a refrigerated water sampling unit. In addition in air sensors may also be included. The sensor data is transmitted in near real time to shore while water samples are collected in harbour and analyzed at a laboratory nearby.

During the autumn of 2008 an automated measurement and water sampling system is installed on the merchant vessel TransPaper owned by TransAtlantic AB. The ship operates the route Gothenburg-Uleåborg-Kemi-Lübeck-Gothenburg at a weekly interval. The system is installed and will be operated in co-operation between the Finnish Institute of Marine Research (FIMR), the Swedish Meteorological and Hydrological Institute and Transatlantic AB. The system is expected to be fully operational in 2009.

The advantages with FerryBox systems include a large spatial coverage, in this case from the Northern Bothnian Bay to the Northern Kattegat, and a high sampling frequency. They are also very cost effective since the ships are made available to marine research without cost by the ship owners. The main disadvantage is that only near surface water is sampled. FerryBox systems are very useful supplements to traditional sampling from research vessels with low, e.g. monthly, sampling frequency.

Planned parameters

Flow through (every 20 seconds)

Salinity
Temperature
Chlorophyll a fluorescence
Phycocyanin fluorescence
Turbidity
Oxygen
etc.

In air (every 20 seconds)

Temperature
Air pressure
Irradiation (PAR = Photosynthetic Active Radiation)
etc.

Water samples

(weekly or biweekly at selected stations)
Salinity
Nitrate
Nitrite
Ammonium
Phosphate
Silicate
Chlorophyll a
Phytoplankton composition
Phytoplankton biomass
etc.

Future development

Flow through sensors
petroleum products
pCO₂
pH
New optical sensors for automated identification of harmful algae
etc.

In air
Optical sensors for skin temperature
Optical sensors for surface accumulations of harmful algae
Reference sensors for satellites



Fig. 1. M/S TRANSPAPER in Lübeck 18/4-2007, photo TransAtlantic AB/Dirk Jankowsky.

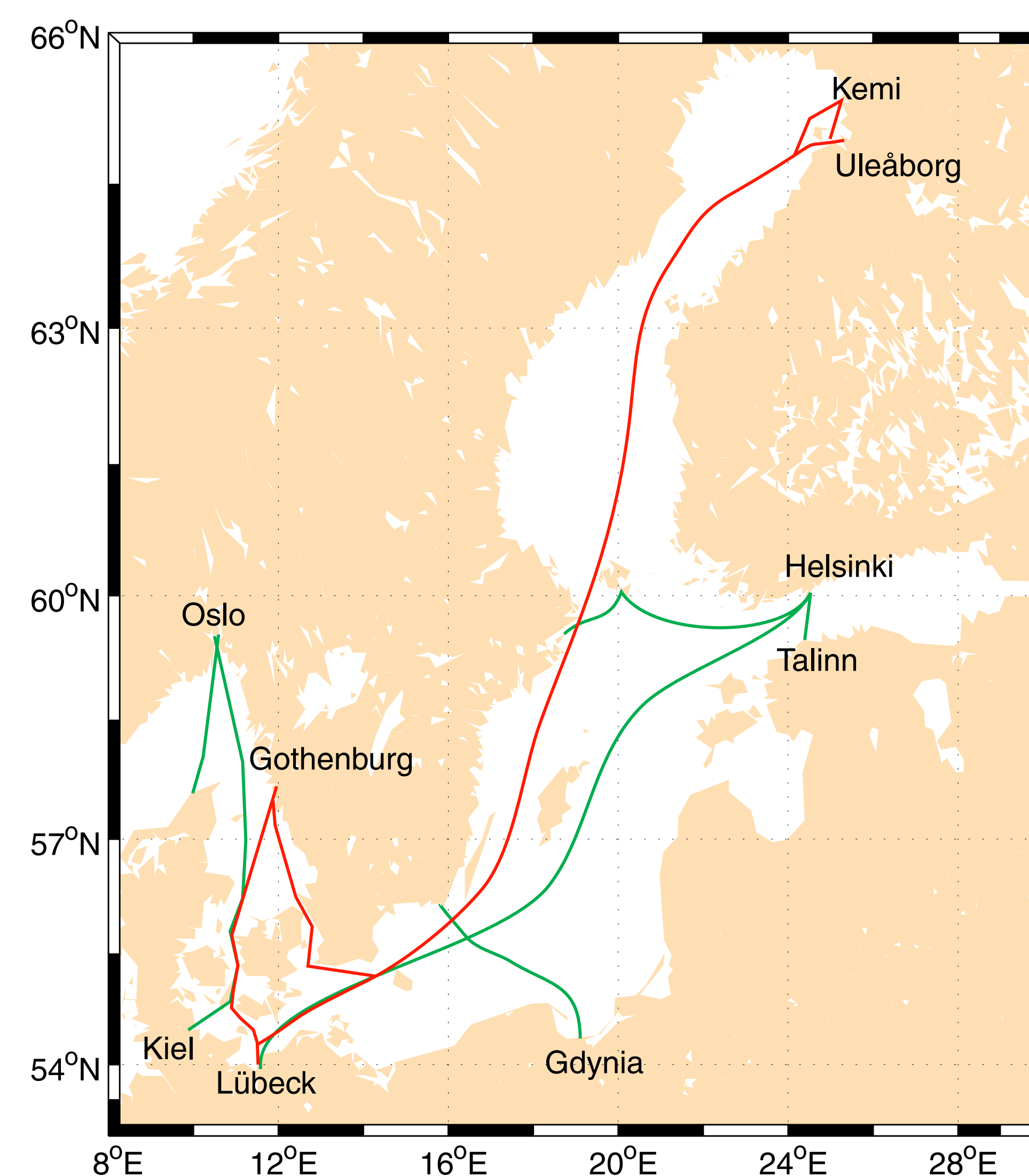


Fig. 2. The major FerryBox routes in the Baltic Sea and the Skagerrak-Kattegat. The new line is indicated with red colour.



Fig. 3. The sensors on the ferry Finnmaid on the Helsinki-Lübeck route operated by FIMR. The system on TransPaper will be similar.

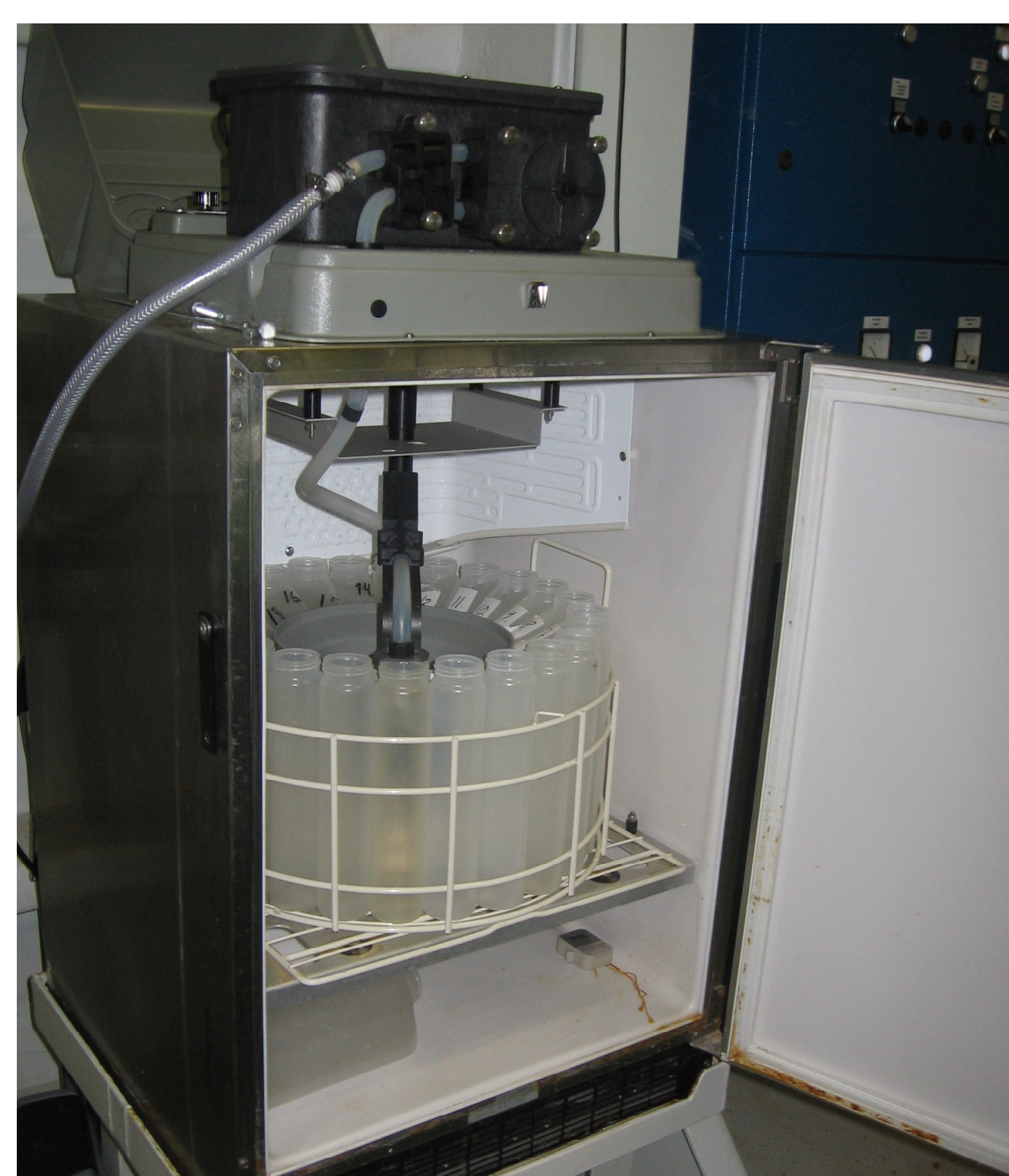


Fig. 4. Water sampling unit on Finnmaid. The sampler on TransPaper will be similar.

Use of FerryBox data

The high resolution results will be used as part of the near real time observation system of the area that also includes sensors on buoys and remote sensing as well as sampling from research vessels. Data will be used for data assimilation into physical and biogeochemical ocean models. Results are also used by managers to issue e.g. warnings about harmful algae blooms. In addition results will be used in the long term monitoring of the Baltic Sea and the Skagerrak/Kattegat area and contribute to the coordinated international efforts to save the seas surrounding Sweden.

Examples of end users

National environmental protection agencies
HELCOM
OSPAR
EEA European Environmental Agency
Fishermen
Yacht owners
Tourists

Availability of data

Results will be presented graphically in near real time at the web sites of SMHI and FIMR:
www.smhi.se
www.fimr.fi (e.g. Alg@line)

In addition quality controlled data will be made available from the Swedish National Oceanographic Data Centre at SMHI and the Finnish counterpart.

Acknowledgement

TransAtlantic AB in general and the crew of TransPaper in particular are thanked for good cooperation and their interest in the project and in marine environmental issues.