

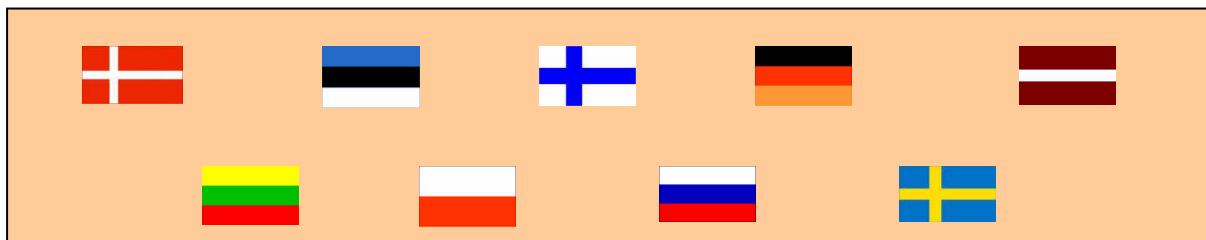


PAPA

**Capacity Building
Instrument upgrade**

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[www. boos.org/papa/papa.html](http://www.boos.org/papa/papa.html)



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WP4

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Institute

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Upgrade of instrumentation and data management capacity

The PAPA projects Capacity Building Work package was designed to:

- develop the basic technical and scientific expertise for all partners required to participate in the BOOS by performing the VISITOR SCIENTIST SCHEME allowing visits of scientists/technicians and representatives of end-users to the specialized ocean observing, modelling and forecasting sites with significant advanced experience;
- to increase instrumentation and data management capacity to the same level in all participating countries based on the results from evaluation of the present Baltic operational observing system (results from WP2), to establish by upgrading of existing observational capacities high-level automation of observations at coastal stations (sea level, SST, optional other parameters) and build up data transfer and management capacities to make the data operationally available Baltic-wide.

In this report the upgrade of the instrumentation and data management will be described.

Partners CMR, MSI, IMWM, LHMA, MIG, NWAHEM have been allocated a specific sum for upgrade of the instrumentation and the data management. The main criteria for instrumentation upgrade was to ensure that new operational data will be available on the BOOS home page.

Based on the present observing system status according to WP2 and WP3 and identification of "hot spots", instrumentation upgrade plans were made and proposals were accepted by CBB in the PAPA 2nd year. Within these negotiations, several short-living IT-based solutions were rejected by the CBB. Support was given to the hardware and software solutions that could be effective beyond the PAPA project period. That is, investing on pure computing and data storage capacity, where technology development is very fast, was ruled out. Technical implementations were partly delayed due to the late 2nd money transfer from EC.

In 3rd year, technical implementation of instrumentation upgrade was a success. Compared to the pre-PAPA period, altogether 10 water level stations have been upgraded to real-time data delivery and their data are automatically shown on the BOOS web page. Locations of the new stations are given in the Figure 1 on the "print screen" of the BOOS web page. Instrumentation upgrade reports were compiled by the partners. Summary of the reports is given in Appendix 1 and individual reports are given in Appendix 2.

The new on-line stations have been implemented by CMR (Lithuania), MSI (Estonia), LHMA (Latvia), IMWM and MIG (Poland), and NWAHEM (Russia).

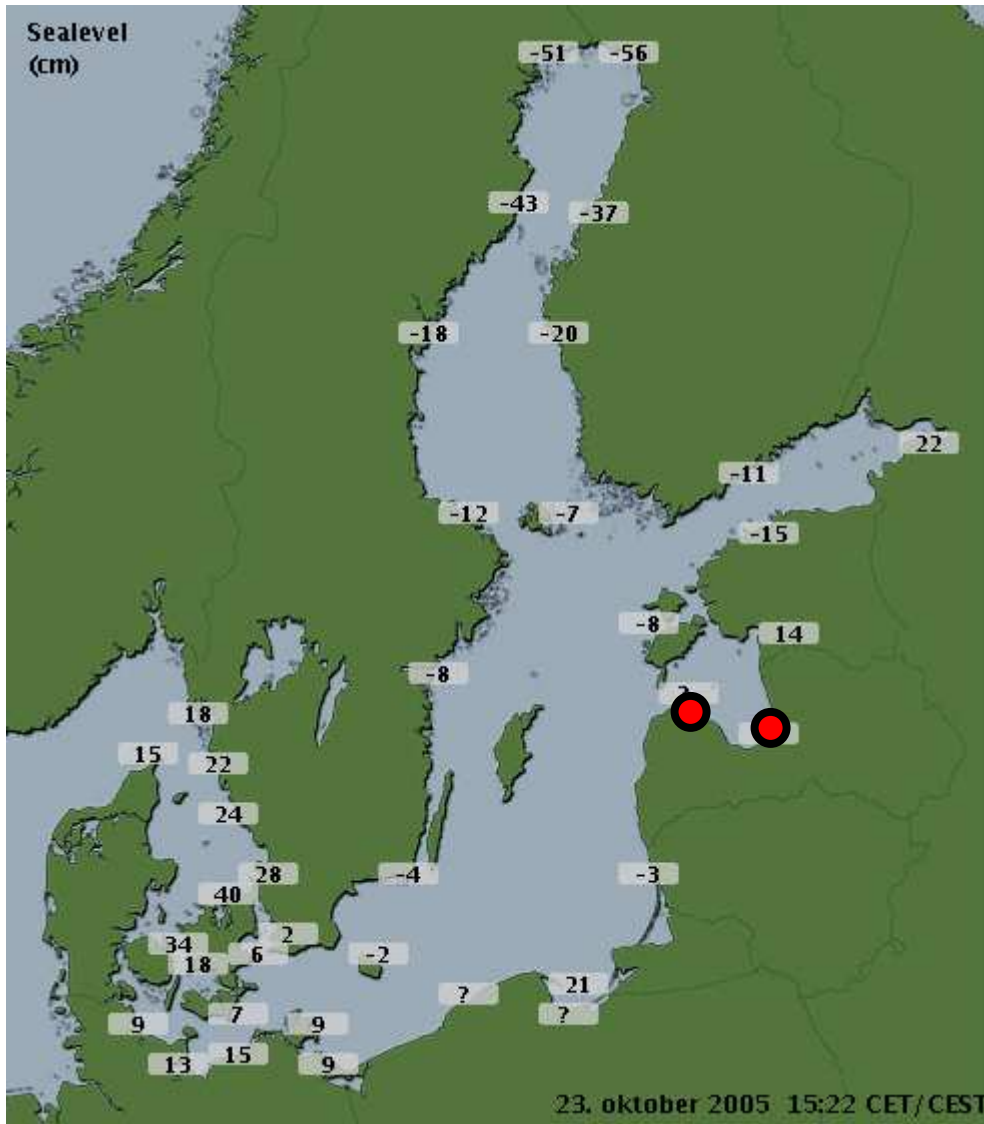
Appendix 1
Summary table for instrumentation upgrade

Partner	Stations upgraded	Parameters	Upgrade status	Number of WL stations on BOOS web page
MSI Estonia	3 coastal stations: <ul style="list-style-type: none"> • Pärnu • Tallinn, Gulf of Finland • Sõru, Hiiumaa, Moonsund entrance 	WL, T	All stations implemented, available on BOOS web page	3
MIG Poland	1 coastal station: <ul style="list-style-type: none"> • Hel 1 buoy station: <ul style="list-style-type: none"> • Gdansk Bay 	WL, T, S	Hel: implemented, available on BOOS web page Coastal sea buoy station: test phase	1
CMR Lithuania	1 coastal station: <ul style="list-style-type: none"> • Klaipeda 	WL, T, S	Implemented, available on BOOS web page	1
LHMA Latvia	2 coastal stations <ul style="list-style-type: none"> • Kolka, Irbe Strait • Daugavgriva, mouth of Daugava 	WL, T	All stations implemented, available on BOOS web page	2
IMWM Poland	2 coastal stations: <ul style="list-style-type: none"> • Gdansk Northern Harbor • Ustka 	WL	All stations implemented, available on BOOS web page	2
NWAHEM Russia	4 coastal stations: <ul style="list-style-type: none"> • Gornyi (Neva) • Kronshtadt • Pionerskij (Kaliningrad) • Baltijsk (Kaliningrad) 	WL	Gornyi: implemented, available on BOOS web page Kronshtadt: installation done, data delivery ready by late autumn 2005 Kaliningrad region stations Pionerskij and Baltijsk considered optional, data delivery ready by late autumn 2005	1

Appendix 2

Instrumentation upgrade reports

Organization: Latvian Environment, Geology and Meteorology Agency, LEGMA



1. Observation stations upgraded to real-time data delivery

Station name: **Daugavgriva**

Station coordinates: 57°03'24"
024°01'39"

Observed parameters: sea level

Parameter	Method/Sensor	Resolution and accuracy	Recording interval	Delivery interval
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Sea level	Stilling well station OTT-OWK16 with float type sensor	Resol. 1 Acc. 1	- Hourly (for FTP server and data base) - Every 10-15 min in case of operational need (to provide storm surge forecast)	Real time mode
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Station name: **Kolka**

Station coordinates: 57°44'15"
022°35'23"

Observed parameters: sea level, water temperature

Parameter	Method/Sensor	Resolution and accuracy	Recording interval	Delivery interval
Sea level	Station OTT- ODS4-k with pressure type sensor	Resol. 1 Acc. 1	Hourly (for FTP server and data base)	Real time mode
Water temperature	Sensor PT100	Resol. 0,01 Acc. 0,01	Hourly	Real time mode

2. Technical solutions implemented

Daugavgriva station was equipped with old-fashioned level recorder and staff gauge previously. The station has been upgraded for the PAPA allocated fund with the new OTT Messtecnik water level station with float type sensor OWK16 (already existing stilling well has been used), datalogger and terminal modem for real time data transmission via GSM.

Kolka station had staff gauge before, there was no level recorder at all. The new OTT Messtecnik water level station with pressure type sensor ODS4-k and water temperature sensor PT100 has been purchased for PAPA fund and installed in Kolka. The system consists of water level pressure sensor and water temperature sensor, the datalogger and terminal modem for data transmission via GSM. Data are transmitted to the data base using OTT communication software HYDRAS. Real time water level data from both stations are provided to the BOOS homepage from the LEGMA's FTP-box. The system works quite stable.

3. Future plans

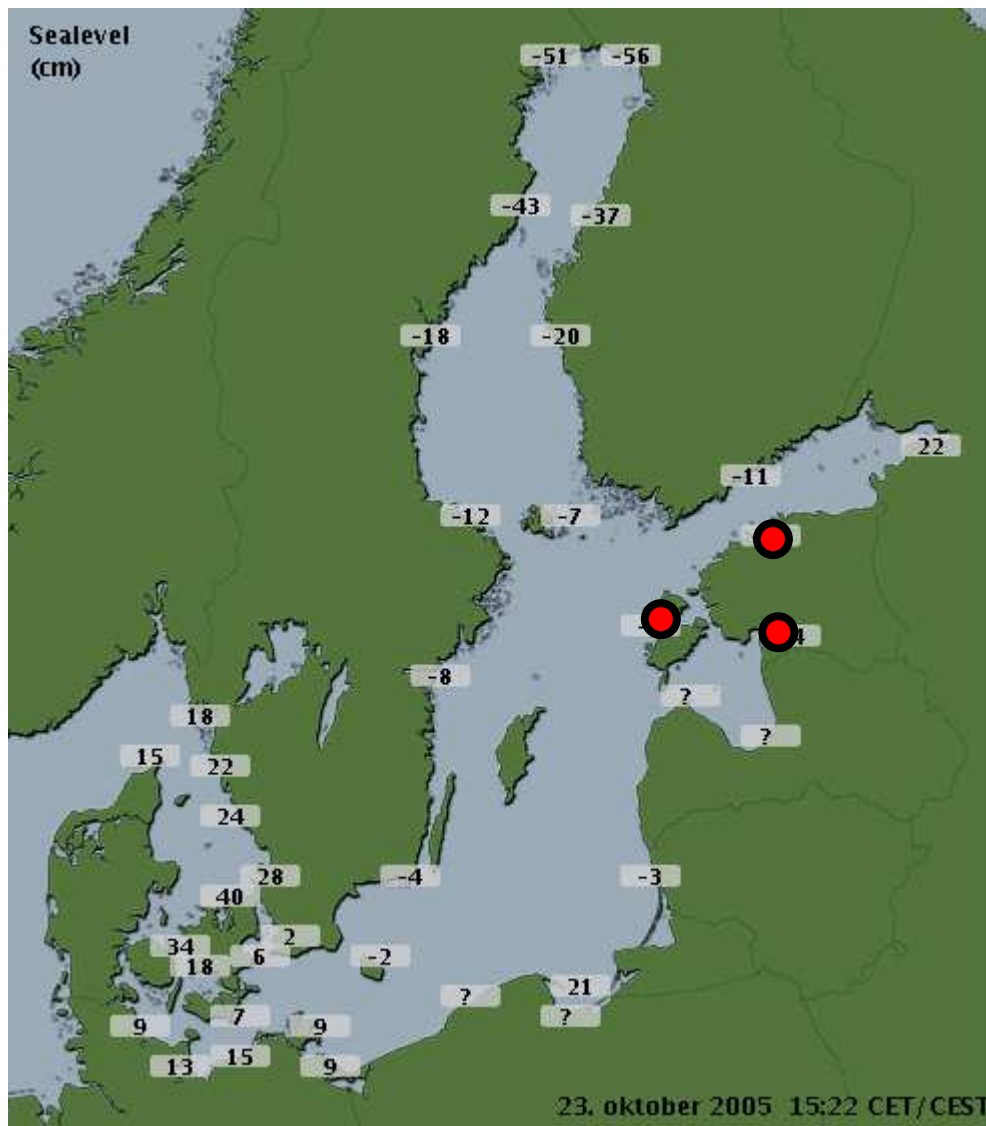
There are preliminary plans to equip the rest 2 coastal stations with water level automatic recorder at least (7 of 9 coastal stations are already automatic).

Another plans - introduce a digital sea ice mapping system into the daily operational practice for a better ice service.

When PAPA has finished, the usual problem will remain – to find additional financial sources to maintain already existing monitoring network and to improve operational marine forecasting system as well.

Hopefully, personal contacts with PAPA colleagues will continue further.

Organization: Marine Systems Institute at Tallinn University of Technology (MSI)



1. Observation stations upgraded to real-time data delivery

Station name: **Sõru**

Station coordinates: 58° 23.0'N 24° 28.8'E

Observed parameters: sea level, water temperature

Parameter	Method/Sensor	Resolution and accuracy	Recording interval	Delivery interval
Sea level	pressure	+ - 1 cm	10 minutes	10 minutes
Water temperature	resistance	+ - 0.1 deg	10 minutes	10 minutes

Station name: **Tallinn**

Station coordinates: 59° 26.8'N 24° 46.1'E

Observed parameters: sea level, water temperature, wind

Parameter	Method/Sensor	Resolution and accuracy	Recording interval	Delivery interval
Sea level	pressure	+ - 1cm	5 minutes	5 minutes
Water temperature	resistance	+ - 0.1 cm	5 minutes	5 minutes
Wind	anemometer	+ - 0.1 m/s	5 minutes	5 minutes

Station name: **Pärnu**

Station coordinates: 58° 41.5'N 22° 31.3'E

Observed parameters: sea level, water temperature, wind

Parameter	Method/Sensor	Resolution and accuracy	Recording interval	Delivery interval
Sea level	pressure	+ - 1cm	5 minutes	1 hour
Water temperature	resistance	+ - 0.1 cm	5 minutes	1 hour
Wind	anemometer	+ - 0.1 m/s	5 minutes	1 hour

The station planned in Lehtma (Hiiumaa island) could not be implemented due to the damages of basement during the very strong storm in January 2005. Instead, a station in Tallinn was upgraded to real-time data delivery.

2. Technical solutions implemented

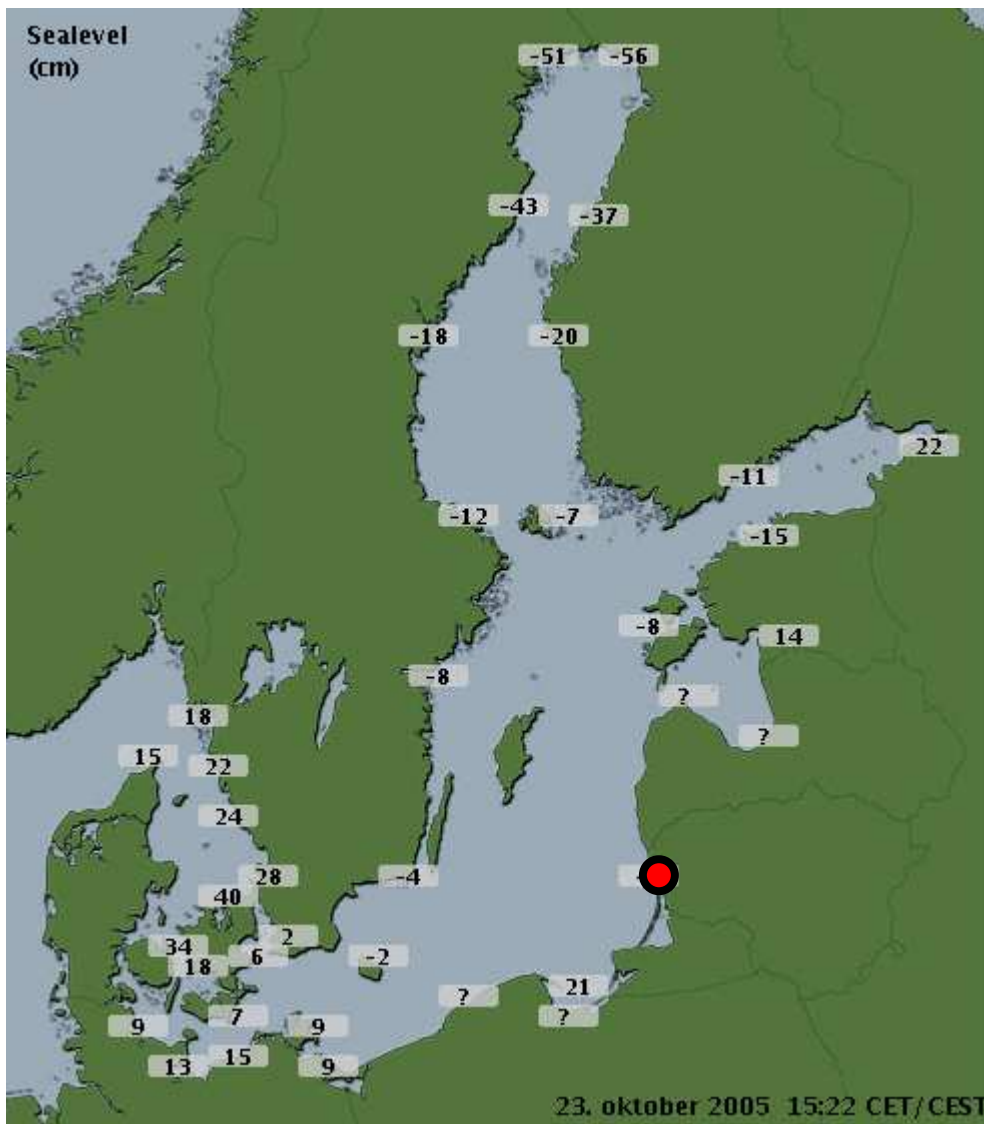
Technical solution is based on the commercially available automatic measurement stations, which have sensors and datalogger parts. Usually also output is made from datalogger RS232 or similar interface. Output is used for real time data transfer. The output block contains GPRS modem and communication controller, which handle data transfer protocols. GPRS gateway program is installed on the so-called server computer, which receives messages from GPRS modem. The data are sent further to computer equipped with special program forming the needed data string from the output of datalogger and then adds last data to the operational file in FTP server.

3. Future plans

The system will operate much in same regime as during PAPA project and send data to the BOOS systems. There are planned to install some more sea level stations of same construction on Estonian coast during coming year, which are planned to implement as BOOS on-line stations as well. Plans are also to visualize water temperature, which now is recorded in raw data files but not displayed on-line. There is also interest to use on-line water temperature data from HIROMB model verification. Delivery of data from Estonian stations should be arranged. Of course sensors and

stations need maintenance and calibration, which is planned at least once for each station during coming year. To conclude, build up of on-line systems of sea level stations will continue and develop further after the end of the PAPA project.

Organization: Center of Marine Research (CMR)



1. Observation stations upgraded to real-time data delivery

Station name: **Klaipeda Strait**

Station coordinates: 55° 42.48 / 21° 07.18

Observed parameters: water level, temperature, salinity

Parameter	Method/Sensor	Resolution and accuracy	Recording interval	Delivery interval	Delivery interval to Ftp-Box (BOOS)
Water level	Sutron Shaft encoder	0,01 mm 0,1 mm	Measuring every 10 s	1min	1 hour

Water temperature	Sensor 3919B (Aanderaa)	0,01 °C ±0,1 °C	Measuring every 10 s	1 min	1 hour
Water salinity	Conductivity sensor 3919B (Aanderaa)	0,002S/m (0,002mS/cm) ±0,0018S/m ±(0,018mS/cm)	Measuring every 10 s	1 min	1 hour

Station name: **Palanga**

Station coordinates: 55° 55.1 / 21° 03.0

Observed parameters: sea level

Parameter	Method/Sensor	Resolution and accuracy	Recording interval	Delivery interval
Water level	E-Sea Tide Gauge	1 cm 1 cm	1 min	10 min

2. Technical solutions implemented

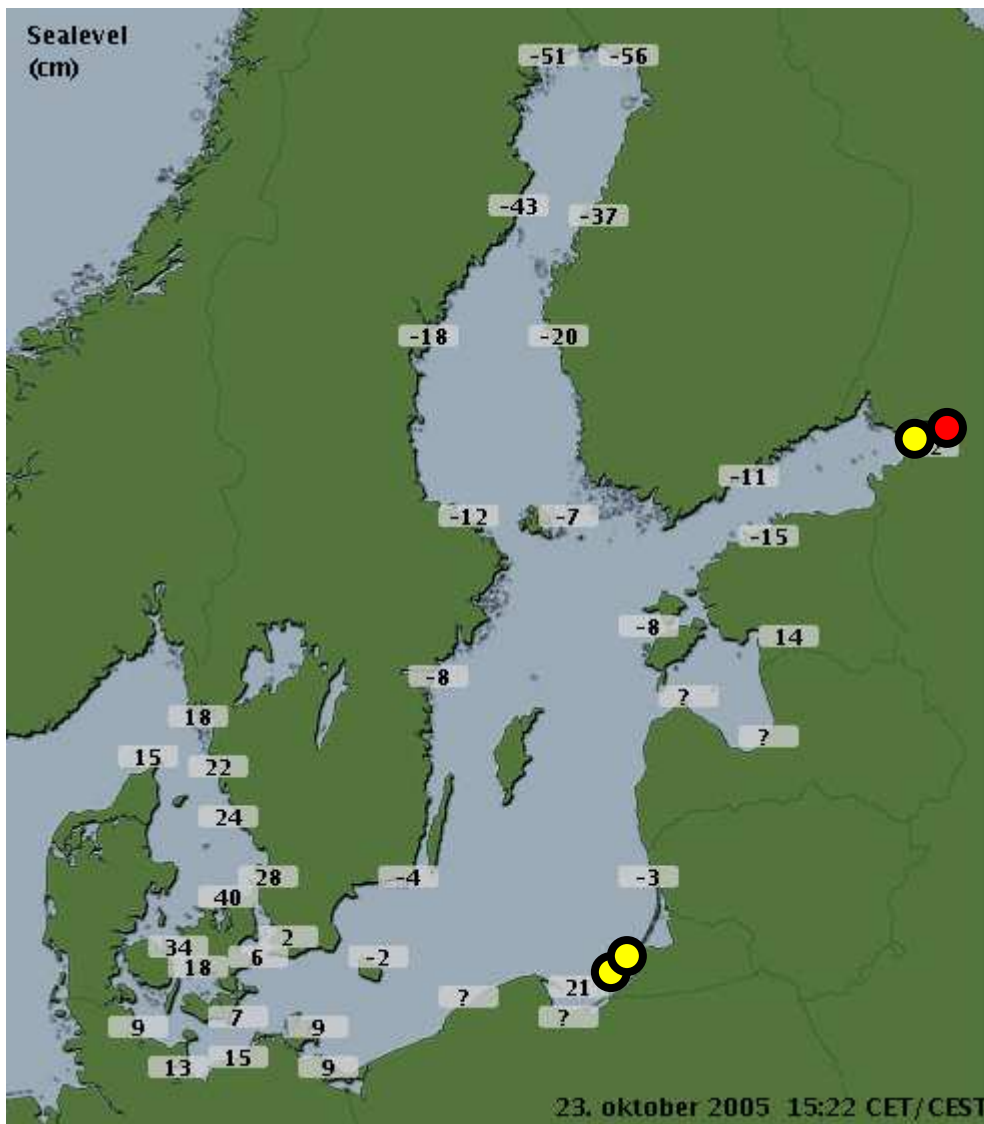
Standard technical solutions have been implemented.

3. Future plans

There are plans to store water level data from Palanga station in database and transmit it to ftp box of CMR in order data would be submitted to the BOOS page.

Financial support could be one of problems for maintaining operative data transmission system when the project PAPA is finished.

Organization: North-West Regional Administration for Hydrometeorology and Environmental Monitoring (NWAHEM)



The upgrade plan included 4 water level stations.

Gornyi (Neva) is delivering data regularly to the BOOS page.

Kronshtadt gives test data to the BOOS ftp-box but is not yet displayed on the web page.

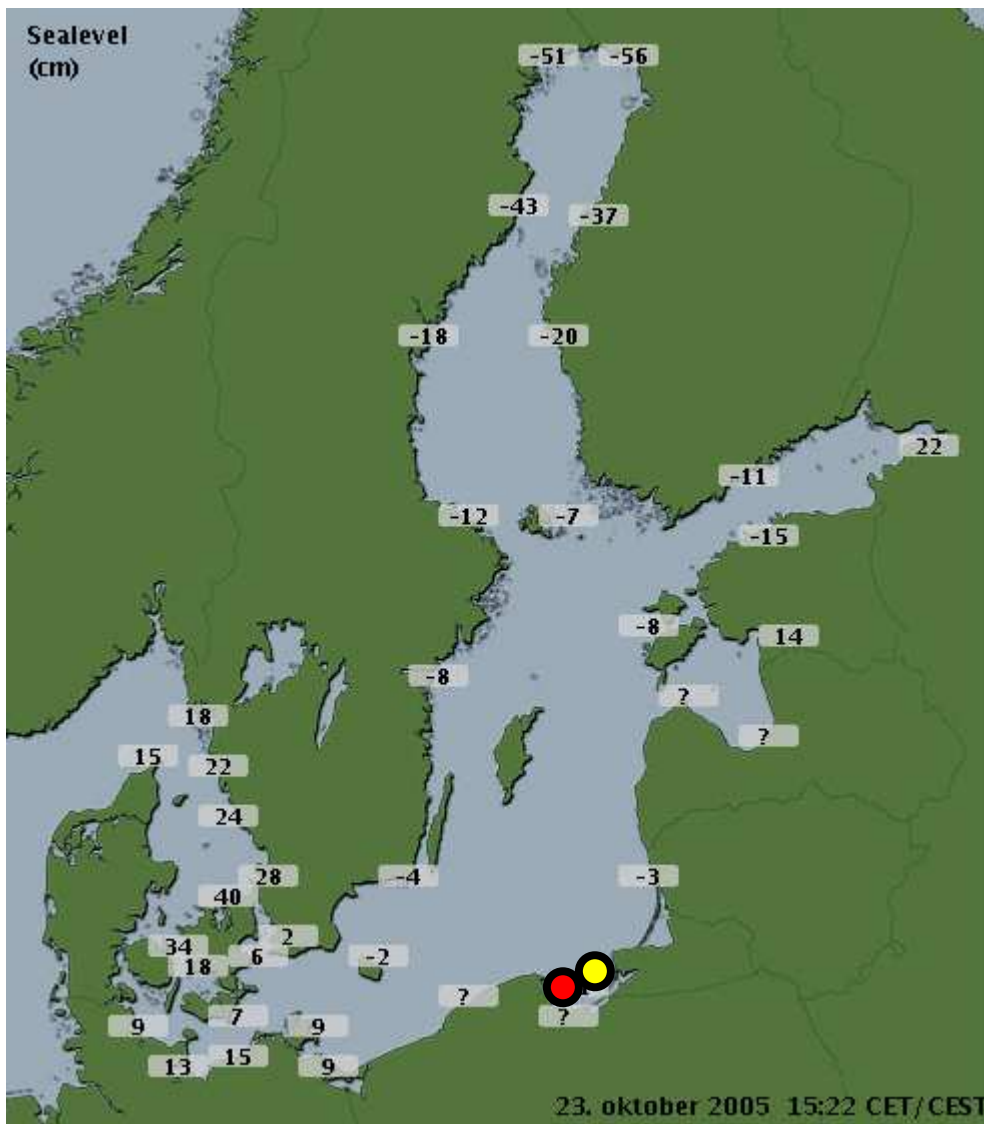
Two Russian stations in the Kaliningrad region - **Pionerskij** and **Baltiysk** (shown by yellow dots) are in the stage of implementation as post-PAPA BOOS activities.

The work done included:

- Connection of stations and posts to INTERNET;
- setting at "Kronshtadt" of the high-speed modem for initial processing and level data; transfer through INTERNET transmission channels on the specialized server in NWAHEM;
- purchase high-speed (100 Mbit/sek) modem and network cards for modernization low-speed NWAHEM local net in high-speed network;

- transmission, receiving and processing in NWAHEM real time level data from this stations and posts using high speed INTERNET connections and local net;
- test the process of operational level data delivery from above mentioned stations and posts;
- make available new operational level data from "Kronshtadt" station (in ftp-box).

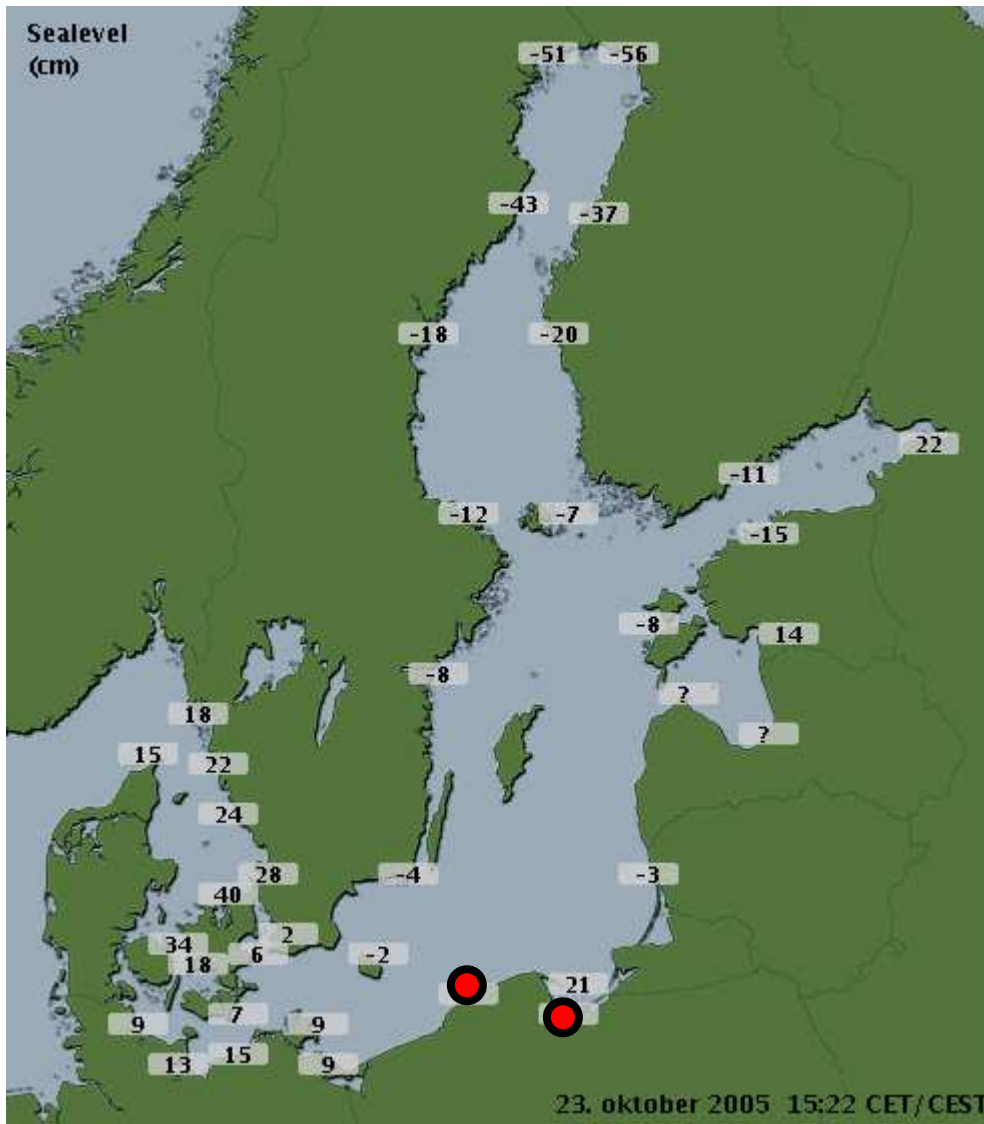
Organization: Maritime Institute of Gdansk (MIG)



Operational water level station with real-time data delivery was installed on **Hel** peninsula. These data are displayed on the BOOS web page. Coastal buoy station, to be installed for offshore measurements in Gdansk Bay, is in the test phase and it will be finalized as post-PAPA activity of BOOS.

From the technical side, data transmission was organized by GPRS modems. One modem is used for the Hel water level station and the second one on coastal buoy.

Organization: Institute of Meteorology and Water Management (IMWM)



Operational water level stations with real-time data delivery were installed on **Gdansk Harbor** and **Ustka**. Both data are displayed on the BOOS web page.

Data are stored in a digital data logger LogoSens2® OTT Messtechnik with data display, data interface and data transmitter. Data are hourly (measurement every 10 minutes) automatically transmitted to a PC where visualization is done. Next it is sent to a server where data are available. Storage and transmission system and data visualization was added using PAPA funds. Communication is made through GPRS and optionally GSM system. Data are transmitted through GPRS using Wavecom GPRS Fastrack.

In case of power supply failure accumulator (12V, gel, VRLA – Valve Regulated Lead Acid) supports measurements, data storage and transmission. When voltage is less than 10.5V data transmission stops but data are still measured and stored in logger up to 7.5V. After restoration of power supply, all the canceled processes are recovered.

Visualization is done using Hydras3® software. Data from a station are transmitted to a computer with Hydras3® and from it to a server where data are available. For all users (including non-authorized) a 24 hours graph with sea level data is available. Numerical data are made available for PAPA and BOOS community via ftp-box.