



Baltic Operational
Oceanographic System

Baltic Operational Oceanographic System - Vision 2015 -

Adopted by BOOS AM 2010-05-10

Introduction

The BOOS co-operation was formed in 1997 with the aim to promote and develop an operational oceanographic infrastructure including routine collection, interpretation and presentation of *in situ* and satellite data. This information is necessary in order to improve efficiency of marine operations, reduce risks for accidents, optimise monitoring of marine environment and climate, improve assessment of fish stocks and improve foundation of public marine management. BOOS MoU is published at www.boos.org and is the regional operational oceanographic system (ROOS) in EuroGOOS.

An operational service supporting these activities shall focus on observations and model predictions, analyses and scenarios. Products of high-quality which are timely delivered to users in a sustained manner are key factors to success of services.

The BOOS Vision 2015 intends to carry on existing concepts and ideas formulated in the BOOS Plan covering the period 1999 up to 2003 and in the BOOS Strategy Plan for 2004 – 2010 but in the same time guide and develop the BOOS daily work, taking into account the changes presently going on in Europe and in particular in the Baltic region.

The implementation of the EC GMES core services in several sectors and presently financed by EC (FP7) is the overarching change in the marine sector. The marine core service implementation plan is the guiding document, while the MyOcean R&D project is building the prototype marine infrastructure. In addition the Maritime Policy *in situ* data programme EMODNET is another important operational activity at European level to take into account for BOOS.

In the Baltic area the implementation of the Baltic Sea Regional Strategy and its environmental pillar the Marine Strategy Framework Directive is ongoing. Furthermore, marine spatial planning is a new concept introduced to support sustained and secure exploitation of marine resources. The Baltic Sea Action Plan is launched by the HELCOM member countries to combat eutrophication, ship emissions and oil spills to name a few of the actions planned. While, climate change and society adaptation to these changes is a future need, detailed basic information is wanted for decision making at local as well as at regional scales.

Not the least to be aware of is the ecosystem approach, becoming the overarching formula for activities and plans. The principle means that mankind and society activities play a key role in influencing the ecosystem and we need to incorporate these factors in the operational oceanographic system in the future.

Taking into account these ongoing circumstances, the BOOS Vision 2015 will therefore focus on particular areas to be addressed and developed in more detail to meet user needs by latest in 2015. The following seven priority areas are the guide for the BOOS activities up to 2015.

Summary of priority areas and visions

Priority 1: Services and Products for Users

Vision – BOOS is the key provider of services and information to European and regional users in Baltic Sea area. BOOS members provide the basic and necessary information according to needs and requests from national and local users.

Priority 2: Increased visibility of BOOS

Vision –Do you want to get information about the Baltic Sea? –Take a look at the BOOS homepage first!

Priority 3: In situ network and remote sensing data

Vision – Integrated Baltic wide network of near real time measurements, which meets the needs of BOOS production system (on-line information system, operational forecasts etc), is established and updated according to emerging needs, technological development and best practices.

Priority 4: BOOS Integrated Forecasting System

Vision – In the Baltic Sea a core service is providing basic forecasting products and analysed data for essential climate variables (ECV) and for ecosystem parameters.

Priority 5: Data dissemination

Vision – BOOS data dissemination are adapted to international standards and in line with the EU Inspire directive

Priority 6: Research and Development

Vision – The operational oceanographic system and its products are developed in close cooperation with scientists and are in line with mature and recognized concepts within the research community.

Priority 1: Services and Products for Users

Vision – BOOS is the key provider of services and information to European and regional users in Baltic Sea area. BOOS members provide the basic and necessary information according to needs and requests from national and local users.

- The Advisory Board is governing and guiding the work of BOOS
- Core users include also European agencies and the coastal GOOS
- The BOOS core products are well defined, integrated and based on requirements from users
- BOOS catalogue of products shall be adopted at BOOS annual meetings

BOOS holds a close contact with its user community but lacks a formal focal point where discussions and suggestions on user uptake can be made.

A BOOS Advisory Board holding cross-border and cross-sector members from core and downstream users should be established. The Board shall provide guidance and assistance to the BOOS STG and members to run and initiate new services and products based on user requests and demands. Further more guide BOOS members on matters of Baltic wide concern related to operational oceanography.

BOOS shall develop core services and products in close collaboration with users in the downstream industry and for key regional core users in the Baltic wide area.

BOOS shall be a strong player in the upcoming GMES Marine Core Service concept and production system. A shared production is needed to deliver products of high quality and availability of services. In addition, the shared production is needed to create products such as ensemble forecasts and hindcasting data sets.

Applications can be found in sectors such as sea ice management and services, shipping, tourism, public domain, research and development, climate, environment, energy, marine spatial planning, coastal zone planning as well as in building and construction.

Users can be found among governmental, regional and local agencies, industry, marine conventions, the public, EC agencies, researchers and research programmes as BALTEX and BONUS.

BOOS Core services and products should be delivered as public good and with free access to data.

This priority area is linked to priorities 3, 4 & 6

Priority 2: Increased visibility of BOOS

Vision –Do you want to get information about the Baltic Sea? –Take a look at the BOOS homepage first!

1. Information about operational oceanography in the Baltic Sea area

- Boos.org provides an easy, on-line access to products and services.
- Boos.org is continually evaluated according to user needs and requirements.
- BOOS documentation is up to date and easy to understand.
- BOOS products holds high quality and are continually evaluated and updated.

2. BOOS products are well known and used

- BOOS is well known in relevant local and regional communities as well as for key stakeholders in the Baltic area.
- BOOS deliver products for Marine Strategy Framework Directive and BSAP
- BOOS provides data for the GMES Marine Core Service
- BOOS deliver indicators to support HELCOM assessments

3. BOOS provides high quality and integrated forecast information to stakeholders and for the public good

BOOS should provide basin-wide and integrated forecast products using ensemble forecasts with known quality.

4. Develop a BOOS News letter

A news letter should be developed to better reach out to users and get feedback for improvements, stimulate a dialogue about a coordinated and integrated system for operational oceanography.

5. www.boos.org

The BOOS homepage is developed using a content management system to allow all members to edit and maintain to content. The system is ready to include all BOOS relevant information i.e. own institutional products, and harmonised products of several institutions.

Jour fixe workshops have to be established regularly for using the content management system (TYPO3).

To monitor and edit the BOOS homepage from all members one person has to be responsible at least.

There is a need for more integrated products, e.g. a basin wide wave forecasts products should be included as a “BOOS product”.

This priority is linked to priorities 1, 3, 4 & 6

Priority 3: In situ network and remote sensing data

Vision – Integrated Baltic wide network of near real time measurements, which meets the needs of BOOS production system (on-line information system, operational forecasts etc), is established and updated according to emerging needs, technological development and best practices.

1. The in situ network is the BOOS key operational infrastructure. It is relying on national efforts, meeting the needs of BOOS users.

- **Ferrybox network**

The existing Ferrybox network should be expanded (Helsinki-Travemünde, Kemi-Gothenburg, Tallinn- Stockholm, Tallinn-Helsinki, Karlskrona-Gdynia; possible new routes – Riga-Stockholm, St Petersburg-...)

- **Fixed platforms in coastal and open sea waters (incl profilers)**

One platform in every basin of the Baltic with near real time measurements in the water column for temperature, salinity, waves, currents, oxygen, nutrients, fluorescence, etc. Meteorological parameters could be added (data quality question and suitable sensors?).

- **Near real time current measurements in the Belts and the Sound**

- **Stable long-time series bottom network for climate purposes**

Very stable sensors for temperature, salinity and possibly oxygen should be moored on the bottom. Positions could be the same as for fixed big platforms.

- **Water level measurements**

It is a need for more near real time measurements, especially in the Southern Baltic and Gotland (Visby). Cooperation with Baltic Sea Hydrographic Commission is needed to establish a common reference level system.

- **Real time data from research vessels**

BOOS should support that data are transmitted in near real time to the users.

2. Remote sensing data is an indispensable tool for operational oceanography

Satellite observations are by nature global and global satellite products are often available, covering the Baltic Sea. However, in many aspects, the Baltic Sea behaves like a lake with significant influence from the surrounding land and standard products do not attain the high quality as for open oceans.

The BOOS vision for 2015 in terms of remote sensing is therefore to validate the global satellite products for regional use and to support the development of regional and improved satellite products, to accommodate the special oceanic conditions present in the Baltic Sea. The improved regional products should be delivered in real time to the users.

The typical satellite observations available to the users in the Baltic Sea are

- Sea surface temperatures
- Sea surface height
- Sea ice cover
- Water quality monitoring
- Surface wave heights
- Surface wind
- Surface cyanobacterial accumulations

- **Coastal radars for surface current and wave measurements**

Three areas are suggested: in the mouth area to the Gulf of Finland; South-West Baltic Sea between Germany, Denmark and Sweden and the Skagerrak-Kattegat area.

- **Integrate available data into BOOS products and services**

- **Promote the BOOS needs and requirements towards European and other satellite data providers**

This priority is linked to priorities 4, 5 & 6

Priority 4: BOOS Integrated Forecasting System

Vision – In the Baltic Sea a core service is providing basic forecasting products and analysed data for essential climate variables (ECV) and for ecosystem parameters.

1. The integrated forecasting system means a coordinated development and use of BOOS-HIROMB model code or a similar model concept. Areas to be developed during the period should be:

- Ensemble forecasts as the core BOOS integrated product
- Coordinated validation of forecast and hindcast products
- A system for operational model quality assurance
- Development of a system for re-analysis

2. Other important products to be developed are:

- Operational forecasts of ecosystem parameters
- Operational Baltic wide wave forecasts
- Assimilation of ecological parameters
- Further improvement of data assimilation

This priority is linked to priorities 1, 3 & 6

Priority 5: Data dissemination

Vision – BOOS data dissemination are adapted to international standards and in line with the EU Inspire directive

- Integrate BOOS and R&D data where possible
- Education
- More active in local areas
- Monitor web pages (Kai)
- Awareness

The INSPIRE-directive is a typical top-down process, and therefore theory. It predefines the general rules of an infrastructure for spatial information in Europe. The EU-member states have to build up and operate infrastructures for spatial information following the INSPIRE rules. Therefore a distributed system will come up which is based on member states infrastructures.

The BOOS data exchange is a bottom-up process. Starting from a system that uses formats of all kinds to exchange data, the 4 regional BOOS data centres are establishing data management systems to distribute and exchange data in a way proposed used by EU-projects like MERSEA, ECOOP, MyOcean. In fact, these systems are not INSPIRE-compatible. They are based on “traditional” oceanographic formats netCDF, ODV. For the exchange of in-situ data DAPPER¹ (the OceanSITES-netCDF-version) and ODV (Ocean Data View-format) will be used.

It will be one aim of the BOOS-regional centres to follow the

- INSPIRE Metadata Regulation 03.12.2008,
- Commission Decision regarding INSPIRE monitoring and reporting 05.06.2009
- Regulation on INSPIRE Network Services 19.10.2009, and

the upcoming regulations describing the interoperability of spatial data sets and services and the download services and transformation services. These regulations should be included in a pragmatic way for the data distribution services.

This priority is linked to priorities 2, 3 & 4

¹ (Dapper - An OPeNDAP Server for in-situ and gridded data)

Priority 6: Research and Development

Vision – The operational oceanographic system and its products are developed in close cooperation with scientists and are in line with mature and recognized concepts within the research community.

BOOS research and development is driven by the needs of continual service improvements

Drivers of development are:

- A consolidated request system for change
- BOOS partners receive requests for changes (RFC) in the service. Where these require or benefit from changes in the service configuration on a BOOS level, the RFCs are discussed
- Novel research results
- BOOS needs to have a certain level of agility in adopting new, RTD driven improvements in the BOOS service configuration. These might include any aspect of the service, in the observing system, in the underlying ICT, the forecasting system, or the service delivery mechanism. The BOOS annual meeting, the EuroGOOS conference and mechanisms such as OceanObs are used for gathering emerging service improvements. The RTD driven improvement possibilities are consolidated by BOOS working groups, their chairs in particular.
- Strategic outlook
Members of the [BOOS StG] [system WG] are responsible for maintaining a strategy outlook, which is available for members to feed back to

The consolidation of RFCs is a key driver to be communicated to research funding agencies and mechanisms (such as BONUS) for the shaping of future research calls.

Areas of special interest to develop from research to be in compliance with operational oceanography are:

- Ocean colour satellite data adapted to Baltic Sea waters
- Ensemble forecast be it multi-model or multi-run models
- Satellite data for surface waves, winds and surface currents
- Satellite data for sea levels
- One common height system for sea levels
- Hydrological runoff forecasts including transports of nutrients
- Forecasting relevant ecosystem parameters
- Better use of data in the forecasting systems

This priority is linked to priorities 2, 3, 4, & 5