SHEBA NEWS

// Dear Reader ...

Welcome to the 2nd SHEBA newsletter, which aims to inform project collaborators, stakeholders affected by Baltic shipping and interested scientists on the content and development of SHEBA.

SHEBA started in April 2015 and is now well on its way. The work packages concentrate their efforts on initialize and starting their research programmes. At the end of September, SHEBA conducted a stakeholder workshop to assure early in the project that stakeholder questions and interests are considered in our research plans. This newsletter therefore has the stakeholder meeting as a focal point. The featured topic this time is devoted to the impact of shipping on the marine environment.

We hope you enjoy reading this issue, and welcome any feedback via the contact information given on the last page,

Jana Moldanova (IVL) and Markus Quante (HZG)

// SHEBA's first Stakeholder Meeting

By Insa Puchert and Anna Backes, HZG

The interaction with maritime stakeholders from shipping, environment and related administration is of the upmost importance for SHEBA. The project aims to consult a wide group of stakeholders about various elements of the project's research, such as input of data,- and their expectation on the results of SHEBA. The first SHEBA stakeholder meeting was held in Hamburg, Germany, 29 and 30 of September, organised by HZG. Two keynote lectures facilitated the discussions by providing state-of-the-art information on international shipping and its regulations (Jörg Kaufmann, Federal Hydrographic Institute) and on antifouling practices (Burkhard Watermann, LimnoMar, Bonus project CHANGE).

Results from the World Cafés

The stakeholder consultation was carried out in a "World Café" format. World Café is a creative process facilitating collaborative dialogue and the sharing of knowledge and ideas to create a living network of conversation and action, and to access the group's collective wisdom. The following sections provide a brief insight to the discussions.

Air Pollution

Air pollution from ships is felt to be a problem in most of the participant's regions or cities. Many stakeholders, especially the harbour managers and authorities, experience nitrogen dioxide (NO_2) as the most problematic air pollutant, as the EU limit values for NO_2 are exceeded in many cities. Even though other sources contribute to the NO_2 levels in cities, contributions from harbour areas are important sources. Particulate matter (PM) was seen as the second main pollutant, here PM_{10} and $PM_{2.5}$ play a role, ultra-fine particles and polyaromatic hydrocarbons were mentioned as possibly important.

However, there are other regions where air pollution is not perceived as a problem at all. Concerning air pollution, stakeholders are interested in the modelling results to support good arguments from science when they are engaged in working towards cleaner air in ports and other coastal areas. Effects of air pollutants on health should be taken into account in cost benefit analysis of the shipping sector.

Water Pollution

Stakeholders regarded the relevance of research on water pollution (from shipping) as very high. According to the stakeholders from commercial shipping, one of the top-priorities for research is to answer what are the hidden adverse environmental effects from water pollution, and what is the potential of scrubbers? Together with the development of regulations regarding scrubbers, this will be crucial for correct scenario development.
The overall impression was that SHEBA's envisaged research programme covers most types of water pollution in the suggested assessment.

Underwater noise

Underwater noise was not a focal topic for most stakeholders. Noise is not regulated and is almost never considered as a design criterion when new ships are built. The key idea developed was that there is a cyclic dependency between noise impacts, regulation and mitigation options.

Photo: M. Quante

For the existing fleet, slow steaming could be tested to see how it affects noise emissions. Alternatively, Marine Spatial Planning (MSP) can be used to manage noise pollution in affected areas. For new vessels, ship design can be changed to decrease the level of noise emitted. These options have different geographical dimensions: operational changes and MSP are regional limited whereas changes in vessel design are automatically global.

A limitation for SHEBA is the fact that the science of underwater noise has not been publicly available due to its military relevance.

Photo: B. Goldberg

Scenario Development of Technical and Socio- economic Issues

According to stakeholders, increasing vessel sizes, shipping traffic (especially cruises), as well as the choice of fuel influence the scenario development. If there is no change to existing policies, the current increase in container ship size and traffic is expected to go on. For cruise shipping, more rapid development is anticipated than for the merchant fleet – globally and in the Baltic Sea. Input for scenarios regarding merchant shipping, therefore, depends on the expected growth in the container market compared to liquid and bulk carriers.

Possible changes in shipping routes will change traffic patterns, the use of feeder vessels in the Baltic Sea and the need for infrastructure in ports. Ports in the Baltic possibly need to cope with new developments, since they are not equipped nor financed to handle larger ships. Potential changes in demand for freight in the Baltic depend on global economic growth, freight rates, oil prices and a possibly increasing demand for liquefied natural gas (LNG). Long-term solutions addressing multiple problems, such as a shift towards hybrid or electric propulsion systems, the use of alternative fuel, LNG, methanol and hydrogen were discussed related to the conditions they require. Operational changes, such as slow steaming and future ship design, were discussed at the table as well and seen as suitable ways to reduce emissions. Slow steaming is presumed to be a cost efficient best-practice example.

Scenario development is very much dependent on policies and economic drivers, as well as political will and public concern. Pollution and health are issues to create political will and momentum for policy changes.

The Current Policy Mix

A modal shift in policies could lead to shifts in transportation away from or towards shipping (e.g. potential development of short sea shipping due to subsidies and improved logistics). Transposing IMO regulations into national legislation is perceived as challenging and leads to issues in implementation, interpretation or enforcement. The EU is considered to be motivated to implement stronger regulations than suggested by the IMO and can be a driving force for international legislation. The new EU Directive on MSP may impact shipping in regard to sharing space with other maritime activities (e.g. wind farms, fishing). On the national level, port infrastructure is often subsidised, providing opportunities for improved environmental performance of the sector.

Voluntary approaches such as indices offer co-benefits, as they increase knowledge sharing in the sector, inform policy-makers and provide links to green solutions within the industry.

Photo: M. Quante

The Future of Shipping in the Baltic

According to stakeholders greenhouse gas emissions (GHG) of CO_2 and possibly CH_4 might be included in an international GHG trading system. The implementation of a nitrogen emission control area (NECA) in the Baltic Sea was seen as a likely development. Restriction for NO_X, SO_X and PM are global targets, likely coming into force before 2040, which could be managed by UNFCCC and IMO. Other important issues discussed include the disposal of shipping waste and discharge of black and grey water.

Looking at the timeline, one need to keep in mind that half of the ships operating in 2050 will not be built before 2030 and alternative propulsion systems might have been established by then. Still, a strong shift in public opinion and urgency is necessary to force the issue of shipping emissions and focus measures towards mitigation and not only adaptation.

Final Remark

The results of the stakeholder consultation are indispensable for adjusting the research agendas of the different work packages of SHEBA and the overarching success of the project. We would like to thank all stakeholders for their cooperation, time and input.

Photo: M. Quante

// “Featured Topic“

Impact from shipping on the marine environment

By Ida-Maja Hassellöv and Martin Eriksson, Chalmers

Shipping impacts the marine environment in many different ways. Chemical pollution, such as toxic acidifying and eutrophying substances enter the marine environment either through direct discharges or leakage from the ship to the sea, or indirectly though deposition of substances emitted to air (Fig 1). The polluting substances originate from different activities onboard ships during operation. Also the total load of one substance may originate from several onboard activities. For example the total load of eutrophying nitrogen may originate from exhausts that are deposited to the seawater from air, nitrogen in discharged wash water and ballast water.

Some specific pollutants are used and discharged in high amounts by ships, such as the antifouling compound copper used in the paint on hulls. Other pollutants are discharged as a formulation or as a mixture, such as oil, which is a mixture of several chemical compounds. Furthermore, tank washing, where cargo residuals and cleaning agents are washed out into the marine environment, is also a discharge that is composed of several different stressors and might affect the marine environment. The list of potential chemical pollutants from ships may be very long and it is the aim of BONUS SHEBA to investigate which of these pollutants contribute to adverse effects in the marine ecosystem.

Beyond chemical pollution, biological pollution or spreading of non-indigenous invasive species is also threatening the marine environment. Invasive species are spread either as fouling on the ship hulls and sea chests or through ballast water operations where ballast tanks are filled with water while off-loading cargo in one port and then discharged when loading cargo in the next port.

Energy pollution, including noise is a third type of impact on the marine environment. In BONUS SHEBA this is handled in a separate work package, WP4, which will be presented in the next Newsletter.

The emissions and discharges are often regulated with respect to the different types of activities onboard individual ships. This means that the limitations are defined as the maximum allowed concentration of discharge (e.g. IMO Marpol). Since it is the concentration of the pollutant in the discharge that is regulated, and not the total amount of pollutant, high pollutant loads can reach the marine environment. Furthermore, if many ships are operating in the same area, the pollutant load to the environment can be higher. In such a scenario the use of concentration based limits from individual ships needs to be complemented with a regional, site-specific risk assessment as well.

The marine environment will respond to the entire load of stressors both from shipping and from all other sources, such as agricultural run-off, over-fishing, global warming etc.

During the last decades, increased attention has been paid to the deterioration of marine ecosystem health (e.g. Halpern 2008) and the European Commission has started an ambitious program within the Marine Strategy Framework Directive (MSFD) to strive to achieve Good Environmental Status (GES) in European waters by the year2020 (Ref MSFD). In order to evaluate environmental status, eleven qualitative descriptors have been defined and will be used to describe the environmental status of marine ecosystems. For example, when achieving GES, “Biodiversity will be maintained” (Descriptor 1) and “Non-indigenous species do not adversely alter the ecosystem” (Descriptor 2).

Each descriptor is broken down into indicators and criteria that allow for long term monitoring of the environmental status of the marine environment. The MSFD is an excellent framework for evaluating the impact of shipping on the marine environment, as it categorises the environmental impacts from different shipping activities into well-known descriptors of GES (Table 1).

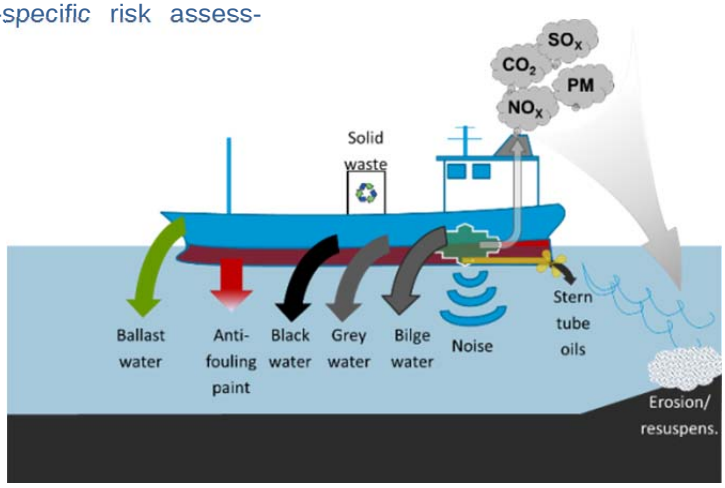

Figure 1. Operational discharges from ships on the marine environment. The different activities onboard give rise to pollutants, acidifying- and eutrophying substances that enter the marine environment. The ballast water and hull fouling also contain biological pollution as non indigenous species may pose a risk to receiving ports‘ native flora and fauna. The terms black and grey water refer to sewage and wash water respectively. Bilge water originates from the engine room and is a mixture of condense water, oil, detergents and other cleaning agents.

In BONUS SHEBA WP3 - Water pollution, the entire impact from shipping on the marine environment of the Baltic Sea will be assessed. For the first time the concept of emission factors, otherwise used for air emissions, is applied to discharges to water. This enables linking of ship activities and discharges to AIS-data (AIS: Automatic Identification System), which in turn can be coupled to a hydrographical ocean circulation model to allow for regional impact assessment (Fig 2).

Table 1. Sources and pathways of shipping induced pollution to the marine aquatic environment. XX = well known and quantified, X = well recognized, x = hypothesized significant

		Type of stressor				
Shipping Activity (Source/pathway)		Invasive species MSFD D2	Nutrients MSFD D5	Contaminants MSFD D8	Acidifying subst.	Litter/particulates MSFD D10
Exhaust emissions via atmospheric deposition	SO_x				X	
	NO_x		XX		X	
	PAH			X		
	PM			X	x	X
Bilge water			X	X		X
Ballast water		X	X	x		
Sewage			X	X		x
Stern tube oil				X		
Bio-fouling vs Anti-fouling paint		X		X		
Food waste (solid)			X			X

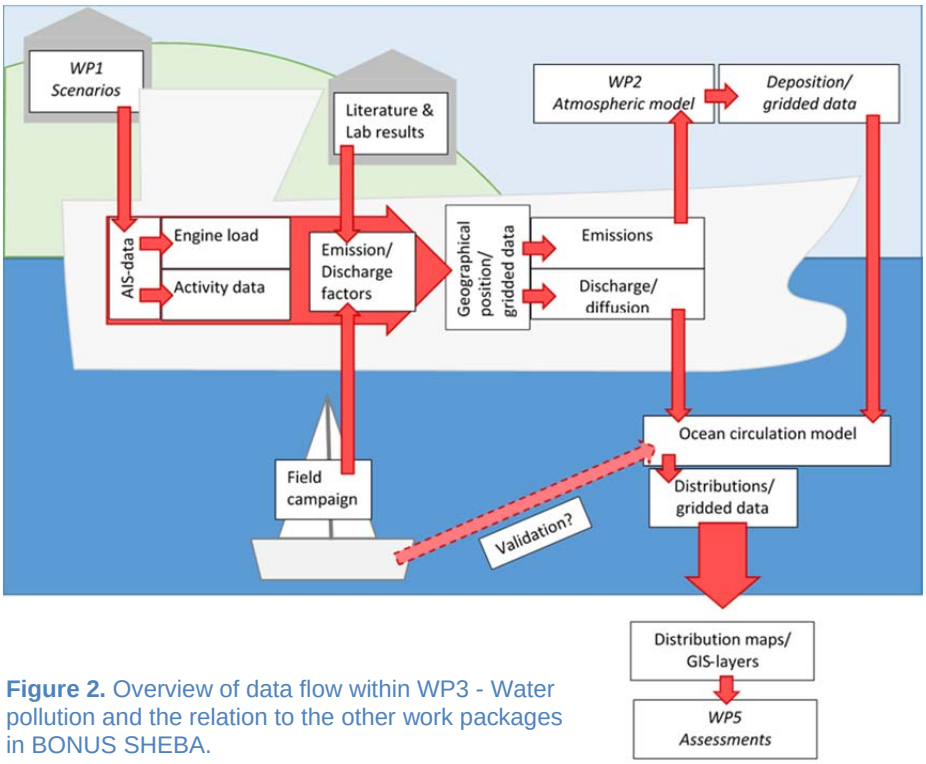

Figure 2. Overview of data flow within WP3 - Water pollution and the relation to the other work packages in BONUS SHEBA.

Cited references

Halpern B.S., Walbridge, S., Selkoe, K.A. et al. 2008. A global map of human impact on marine ecosystems. Science vol 319 issue 5865 pp 948-952. DOI 10.1126/science.1149345

EC Marine Strategy Framework Directive. http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm

International Maritime Organization: International Convention for the Prevention of Pollution from Ships (MARPOL). http://www.imo.org/en/OurWork/Environment/Pages/Default.aspx

Suggested further reading

Shipping and the Environment - Improving Environmental Performance in Marine Transportation. 2016. Andersson, K., Brynolf, S., Lindgren, J.F., Wilewska-Bien, M. (Eds.). ISBN 978-3-662-49043-3

// “Inside SHEBA”

This rubric will briefly introduce over the set of newsletters the partner of SHEBA as well as key personnel. Last time we introduced IVL and our coordinator Jana Moldanova – now we continue with Chalmers University of Technology and Helmholtz Centre Geesthacht.

Chalmers University of Technology

Chalmers University of Technology is a full-scale technical university where research, education and innovation are conducted for a sustainable future. The university started out as an industrial school nearly 200 years ago, through the legacy of William Chalmers (1748-1811), who created a great fortune for himself through his trade with the Swedish East India Company during the latter part of the 18th century. Today research and education at Chalmers span a wide range of disciplines from Architecture, Mechanical engineering and Biotechnology.

The Department of Shipping and Marine Technology is one out of 18 institutions. The department has about 100 employees that teach at the five maritime educational programs [1] and carry out maritime research related to shipping, off-shore activities and such activities’ impact on the marine environment. The three bachelor programs are:
Master Mariner; Marine Engineer; Shipping and Logistics. The two master programs are: Naval architecture; Maritime Management

The persons from Chalmers involved in the BONUS SHEBA project are:

Professor, Rickard Bensow, Hydrodynamics, WP4

Adjunct professor Mattias Liefvendahl, Hydrodynamics, WP4

Dr Martin Eriksson, Marine ecotoxicology, WP3

Senior lecturer Kent Salo, Atmospheric chemistry, WP3

Dr Andreas Feymark, Hydrodynamics, WP4

Assistant professor Erik Ytreberg, Marine ecotoxicology, WP3

Associate professor Lena Granhag, Marine ecology, WP3

PhD student Magda Wilewska-Bien, Environmental systems analysis

Associate professor Ida-Maja Hassellöv, Marine chemistry, WP3

Helmholtz Zentrum Geesthacht

The Helmholtz-Zentrum Geesthacht Zentrum für Material- und Küstenforschung GmbH (HZG) is one of 18 members of the Helmholtz Association of German Research Centres, Germany's largest science organisation. HZG is located in Geesthacht near Hamburg with branches in Teltow near Berlin and in Hamburg, with a total staff of approximately 900 employees, including about 650 scientists, engineers and technicians.

The main HZG research areas cover materials science with foci on advanced engineering materials, research with neutrons and synchrotron radiation and regenerative medicine, as well as environmental research focussing on marine, coastal and polar systems; all these are closely embedded in research fields of the Helmholtz Association. Major HZG research platforms include the German Engineering Materials Science Centre (GEMS), the Magnesium Innovation Centre (MagIC), the HZG Centre for Biomaterial Development, and COSYNA, the Coastal Observing System for Northern and Arctic Seas. These platforms are complemented by extensive experimental and testing facilities, pilot plants, mainframe computers, a research vessel and environmental monitoring facilities.

HZG comprises four research institutes and the Climate Service Centre Germany (GERICS), the latter being a development centre which offers products, advisory services and decision-relevant knowledge based on sound scientific knowledge in order to support government, administration and business in their efforts to adapt to climate change.

HZG is one share-holder of the German Climate Computing Centre (DKRZ), one of the leading computing centres worldwide exclusively dedicated to climate modelling. The DKRZ data bank is one node of the climate simulations of the Intergovernmental Panel on Climate Change (IPCC).

HZG: Institute of Coastal Research

Founded in 2001 the Institute of Coastal Research has three main divisions: "Biogeochemistry in Coastal Seas", "Operational Systems" and "System Analysis and Modelling". Research is focused on coastal processes including interaction between land, sea and human being. The common aim of the scientists is the assessment for current and future changes in coastal areas. Thus creating a scientific basis for a sustainable and forward-looking coastal management.

In SHEBA HZG contributes mainly by atmospheric chemistry transport modelling, dissemination activities, stakeholder interaction and data handling. Apart from SHEBA HZG contributes to the BONUS project BALTSPACE.

HZG people involved in SHEBA:

Dr. Volker Matthias, Chemistry transport modelling, WP 2)

Prof. Dr. Markus Quante, Stakeholder interaction, WP 6)

Dr. Gisbert Breitbach, Data scientist

Dr. Matthias Karl, Chemistry transport modelling

Vivian Fischer, BSc candidate, Insa Puchert & Anna Backes, Scientific assistants (from left to right)

Dr. Armin Aulinger, Ship emissions, validation statistics

Dr. Johannes Bieser, Land based emission modeling

Barbe Goldberg, SHEBA homepage

Summary of the World Café Sessions of the Consortium

By Insa Puchert, HZG

While the first SHEBA stakeholder meeting was held in Hamburg, September 2015, the SHEBA consortium members parallel discussed topics related to the different working packages of the project. In the following the main results of the internal discussion from the World Café tables are summarised.

Air quality modelling

According to the discussion on air quality models, models can establish the link between emissions from shipping and the effects on environment and health. These models can predict the future situation of air quality but their forecasting capability is often limited. Main limitations are seen in the inaccuracy of the meteorological forecast and the emission inventories, e.g. the temporal variability of emissions. More simple models may often be adequate as the uncertainties of input variables and the expected environmental effects are rather large. Many atmospheric models today are based on the same algorithms and computer codes, therefore more innovation in model development is needed to diversify the range of available models. Diversification of models are expected to result in a more realistic ensemble average of model responses. The main discussion was about how to choose a suitable model and model parameters. The model should simulate realistic scenarios that are representative for future developments instead of simulating special cases. In the discussion with stakeholders the plausibility of simulation cases could be evaluated.

Air quality measures for the shipping industry are expected to influence other domains of human life, for example economic aspects, mobility or the shift of transport of goods from waterways to ground transport. These side effects should be considered, when measures are evaluated.

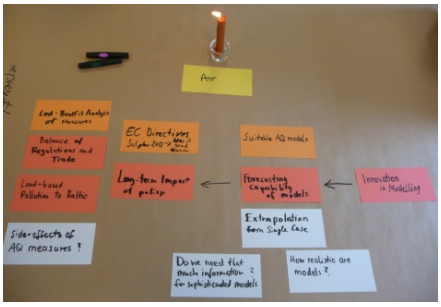

Photo: B. Goldberg

The consortium members agreed that the functionality of the models and their results must be explained to the public, as well as the link between changeable model input and model results.

Cost-benefit analysis is seen as a valuable tool for finding appropriate and cost-effective solutions to improve air quality. Model applications could assist in finding a balance between air quality regulations and economic interests by providing spatial maps of the sources of air pollution, i.e. source-receptor maps, which help to identify the polluters that have the highest impact on environment and human health in a certain geographical region.

Shipping emissions

Models need specific information regarding shipping behaviour regulated by policy. Through policies shipping emissions in harbours could be reduced (e.g. by onshore power supply (OPS)) when ships are detained or during discharging. Another emission reduction approach is the implementation of sulphur emission control areas (SECA). From 1st of January 2015 the Baltic Sea is declared as a SECA allowing vessels operating in this area a maximum sulphur content in their fuel of 0.1%. Declaring the Baltic a nitrogen emission control area (NECA) or a particularly sensitive sea area (PSSA) are other possible future regulations also discussed at the table.

A collaboration between modellers and policy analysts regarding specifications for the models was found to be desirable to work together in an interdisciplinary way.

Working together with stakeholders has been seen as an opportunity concerning the future of shipbuilding (e.g. equipping ships with facilities to receive OPS?) and regulations impacting shipping behaviour (e.g. speed of ships).

Marine ecosystem modelling

The main discussion in the session on ecological modelling of the Baltic Sea focused on the approach on modelling the basic level of the food chain, how different variables represent natural processes, describing limits of the model and possible inputs from shipping in the form of nutrient loads.

Different options on how the modelling approach allows to assess the impact of different factors were discussed. The supposed nutrient input is represented in the Ship Traffic Emission Assessment Model (STEAM). Regulations affecting legal deposition of sewage and food waste are included in STEAM. The impact of the physical environment onto the ecology model was of interest, too. Nutrient input to the ecology model depends on shipping activity, which should be linked to different discharges (e.g. food waste, sewage, scrubber etc.). A gap has been identified between output of the ecosystem model and input desired in WP 5 since higher trophic levels of the food chain modelling is not included in the model.

Concerning stakeholder interaction it would be helpful to know what kind of model output stakeholders would most benefit from. Are there any specific interests in hotspots, statistics or ecological parameters that would interest stakeholders?

Photo: M. Quante

Data portals

The SHEBA project has a data portal maintained by HZG. In the session the netcdf visualisation tool was discussed, as well as the difference between a data portal and an information portal. What are data and when are they seen as information? This depends on the user's viewpoint. Also the needed disk space for SHEBA data was discussed.

Effects of scrubbers

During the session on seawater scrubbing (SWS) the characteristics of SWS were discussed. SWS is an abatement technique for exhaust gas cleaning by washing the exhausts through a fine spray/mist of seawater. The use of SWS allows continued use of cheaper heavy fuel oil (HFO) also in SECAs; i.e. there is an economic incitement to use scrubbers. Primarily sulphur oxides (SO_X) are removed as they dissolve easily in seawater. NO_X and contaminants such as PAHs and heavy metals can also be washed out. Large volumes of acidic seawater are produced; typically 500 m^3/h for a medium sized tanker. From a marine environment perspective, SWS implies a discharge of acidic substances, eutrophying substances and contaminants. If released to the atmosphere, the deposition of these substances will take place over a much larger area.

Potential adverse synergistic effects are possible e.g. between acidification and released metals. Acidification will cause a shift in speciation towards the free ionic form of e.g. copper, and metals are in general more toxic in their free ionic form.

Photo: M. Quante

Photo: M. Quante

Inter- & Transdisciplinarity

Multidisciplinary is when more than one existing academic discipline or profession are working parallel on a topic, e.g. the members of the SHEBA consortium prior to the writing of the SHEBA proposal. Interdisciplinarity refers to more than one academic discipline or profession working together, interactively on a topic, e.g. as the members of the SHEBA consortium started to do during the proposal writing and what they continue to do during the actual work in the project. Transdisciplinarity refers to interaction between academic research and stakeholders; i.e. what SHEBA aims to achieve during the entire project through stakeholder interaction.

Regarding the topics and synergies within the SHEBA consortium a start could be the reflection upon the consortium member's disciplinary context and the identification and analysis of already existing interdisciplinary workflows.

A further discussion on transdisciplinary work including possibilities for collaboration with stakeholders is needed. One potential way forward could be to educate the SHEBA consortium in an expert elicitation technique (e.g. SHELF, SHeffield ELicitation Framework) allowing for semi quantitative analyses of stakeholder opinions, which could improve the handling of uncertainties in the scenario construction.

// "Meetings/Events"

Travel report for the International Workshop of Nautical Traffic Model (IWNTM)

By Jukka-Pekka Jalkanen. FMI

27 & 28 August 2015, Aalto University, Espoo, Finland

The world has witnessed an enormous growth of the traffic intensity in ports and the dramatic increase of capacity of merchant and passenger ships. These bring great challenges related to the safety of maritime transportation, requiring continued research efforts in ship design and operation, transportation planning and related issues. Research directed at the operational, strategic and policy-related levels is needed. The IWNTM aims to establish a venue where the international research community can meet, present and discuss advances in modelling and simulation of maritime transportation flows on different geographical scales, risk assessment and management for maritime transportation (environmental and societal), design and evaluation of countermeasures to enhance the safety of maritime transport, as well as accident analysis in maritime operations.

At the 4th IWNTM in Finland the SHEBA consortium was represented by Jukka-Pekka Jalkanen (FMI) introducing the SHEBA project and its goals to an audience of scientists and professionals coming from fields of maritime risk and safety, maritime traffic simulation technologies, maritime traffic engineering, human factors specialists and related fields. Several participants were interested in ship emissions and both the features and the opportunities provided by SHEBA. Good contacts were made regarding information exchange and future cooperation.

BONUS SHEBA represented at the 6th EUSBSR Annual Forum and Baltic Sea Science Congress 2015

By Jana Moldanova, IVL

BONUS participated in the 6th Annual Forum for the EU Strategy for the Baltic Sea Region in Jurmala, Latvia on 15-16 June 2015. The Annual Forum was a great opportunity for networking with many stakeholders from policy makers to industry and other key actors, and communicating about science and knowledge in support of blue growth agenda. A revised Action Plan of the EUSBSR was presented during the Annual Forum and now consists of 13 policy areas and 4 horizontal actions, in total 17 thematic areas of macro-regional significance. It also includes a new chapter on the role of regional organisations/networks, including BONUS, and their added-value within the EUSBSR.

During the Annual Forum BONUS organised workshop session titled "Niches matter more, borders less" considered further the relationship between science and knowledge. The session used sustainable blue growth as an example to illustrate how the challenge of true integration of science and society's knowledge can be achieved, not just within the usual policy horizon, but in a long-term in 25, 50, 100 years and more given the necessity to transit to 'ecosystem-based management' beyond national boundaries. On the Annual Forum BONUS project SHEBA established contact with coordinator of the EUSBSR Policy Area on Clean Shipping (PA Ship) which resulted in application of SHEBA to become a Flagship Project of the PA Ship. The application is currently under consideration of the steering board of the PA ship.

The 10th Baltic Sea Science Congress was hosted by Latvia in Riga and it was an official event of Latvian Presidency of the Council of European Union.

During five days of the Congress 302 participants have reported and discussed findings, problems and solutions related to the ecosystem functioning of the Baltic Sea. All together 115 oral presentations and 150 poster presentations were given in the Congress. Jana Moldanová presented BONUS SHEBA project during a poster session. Valuable contacts were made both with other BONUS projects and with other networks in the Baltic-sea region.

BONUS BALTICAPP

By Jana Moldanova, IVL

The BONUS Secretariat will sponsor in early April 2016 a pilot 'Scenarios' workshop' initiated by BONUS BALTICAPP and supported by many other ongoing BONUS projects. The objective of this workshop is to take the first steps to explore and develop harmonised storylines for future developments of multiple regional drivers and pressures that affect the Baltic Sea and that can be associated with readily available global climate and socioeconomic scenarios. As SHEBA is developing scenarios for shipping, the consortium aims to participate in this initiative.

SHEBA assigned affiliated project of Baltic Earth

By Markus Quante, HZG

Baltic Earth is a science network devoted to achieve an improved Earth system understanding of the Baltic Sea region. Research components of Baltic Earth have a holistic focus on processes in the atmosphere, on land and in the sea and include impacts related to the anthroposphere.

Baltic Earth is the successor to BALTEX that was terminated in June 2013 after 20 successful years. "Grand Challenges" are currently: Salinity dynamics in the Baltic Sea, Land-Sea biogeochemical feedbacks in the Baltic Sea region, Natural hazards and extreme events in the Baltic Sea region, Understanding sea level dynamics in the Baltic Sea, Understanding regional variability of water and energy exchanges. Dedicated working groups have been established on "Outreach and Communication" and "Education". Starting with December 2015 SHEBA has been assigned to be a Baltic Earth affiliated project. As such SHEBA with its commitment for sustainable shipping intends to contribute to some of the research question with focus on biogeochemical questions in relation to air and water pollution and their impacts on the marine ecosystem and socio-economic sectors.

1st Baltic Earth Conference

Nida, Curonian Spit, Lithuania

13-17 June 2016

Multiple drivers for Earth system changes in the Baltic Sea region

http://www.baltic-earth.eu/nida2016/index.html

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