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Report

Workshop EU Seabasin Checkpoint Arctic: The Svalbard Case

Workshop Report

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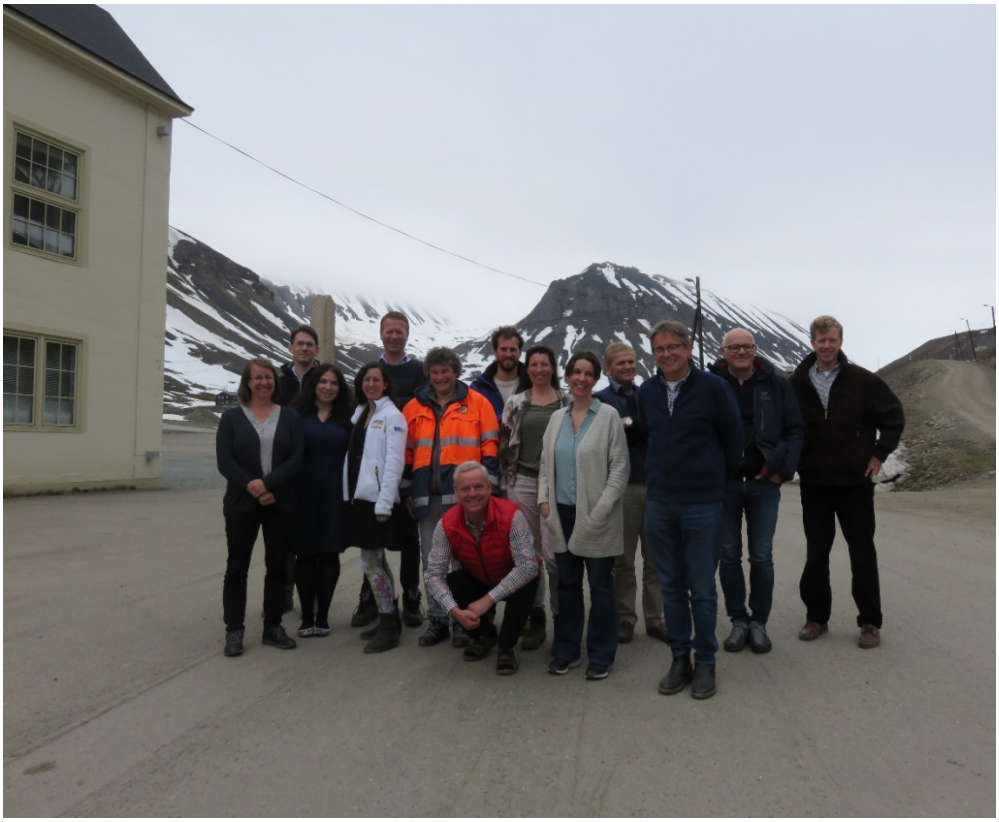

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ABSTRACT
On 14 June 2017 an international workshop was held on Svalbard about Arctic marine data and monitoring programs. Initial results of the European project 'Sea Basin Checkpoint – Arctic' were presented to the Svalbard research community. Discussions lead to the identification of knowledge gaps and recommendations for future research for the following topics: Windfarm Siting, Marine Protected Areas, Oil Platform Leaks, Climate Change, Coastal Protection, Fishery Management, Fishing Impacts, Riverine Inputs, Bathymetry, and Alien Species.

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1 Introduction and Purpose of the Workshop

In 2015 the EC funded a 3-year project (2015-2018) called 'Sea Basin Checkpoints – lot Arctic' (SBC Arctic) that is executed by a consortium led by Arcadis and consisting of Wageningen Marine Research, SINTEF Ocean and MARIS. This project examines the current data collection and data assembly programmes in the Arctic sea basin, and analyses how these can be optimised. The project is organised in ten challenges, in which specific questions concerning the marine environment are answered, using existing monitoring and research data. The challenges are:

1. Windfarm Siting
2. Marine Protected Areas
3. Oil Platform Leaks
4. Climate change
5. Coastal protection
6. Fishery Management
7. Fishing Impacts
8. Riverine Inputs
9. Bathymetry
10. Alien Species

The answers to the specific questions in each of the challenges are not the main outcome of the project. They are only meant to highlight what data is available and what is still missing. The project places a high emphasis on the value of open sharing of data. Data sharing and identification of knowledge gaps is the backbone of the project. A sound understanding of the Arctic marine system will lead to a better protection of the system through mitigation measures reducing the environmental impact of human activities. At the end of the project, all findings are presented on a website (http://www.emodnet-arctic.eu). This includes per challenge: links to data sources and/or datasets, data gaps and recommendations for the future.

On Wednesday 14 June, 2017 an international workshop 'Arctic sea basin data – the Svalbard case' took place at Huset, Longyearbyen, Svalbard. The purpose of the workshop was to join forces between the SBC Arctic project and local experts of the Svalbard science community.

The goal of the workshop was to:

1. Present the initial results of the SBC Arctic project on Arctic sea basin data
2. Evaluate current Arctic marine monitoring programmes and datasets
3. Connect existing activities in Arctic marine data utilisation
4. Identify joined knowledge gaps in marine data in the entire Arctic area and specifically the Svalbard area (relevant for Ny-Ålesund flagship programmes)

2 Participants and Schedule

2.1 Workshop 'Arctic sea basin data – the Svalbard case'

The workshop took place on Wednesday 14 June 2017 and consisted of the following workshop participants:

1. Belinda Kater, Arcadis NL, Netherlands
2. Martine van den Heuvel-Greve, Wageningen Marine Research, the Netherlands
3. CJ Beegle-Krause, SINTEF, Trondheim, Norway
4. Eline van Onselen, Arcadis NL, Netherlands
5. Arjan Tuijnder, Arcadis NL, Netherlands

6. Nathanaël Geleynse, Arcadis NL, Netherlands
7. Jan Tjalling van der Wal, Wageningen Marine Research, the Netherlands
8. Ruben Verkempynck, Wageningen Marine Research, the Netherlands
9. Peter Thijsse, MARIS, the Netherlands
10. Elisabet Forsgren, NINA, Trondheim, Norway
11. Anders Jelmert, IMR, Bergen, Norway
12. Jan Sundet, IMR, Bergen, Norway
13. Geir Wing Gabrielsen, UNIS / Norwegian Polar Institute, Svalbard / Norway
14. Anna Maria Trofaier, UNIS / SIOS, Svalbard
15. Maria Jensen, UNIS, Svalbard

Relevant local experts at Svalbard were directly approached to participate in the workshop. Additionally a poster was published at the University Centre in Svalbard in Longyearbyen to attract potential other interested guests (see appendix B).

The workshop consisted of an active work format with brief presentations and ample time for discussion. A specific item on the agenda consisted of identifying main research recommendations and action points for the Svalbard research community.

The agenda of the workshop consisted of:

10:00 – 10:15	Welcome and introduction (Belinda Kater)
10:15 – 11:00	Challenges 6 & 7: Fisheries management & fisheries impacts (Ruben Verkempynck)
11:00 – 11:30	Challenge 10: Alien species (Martine van den Heuvel-Greve)
11:30 – 12:00	Challenge 5: Coastal protection (Nathanaël Geleynse)
12:00 – 13:00	Lunch
13:00 – 13:15	Presentation SIOS (Anna Maria)
13:15 – 13:45	Challenge 8: Riverine inputs (Arjan Tuijnder and Eline van Onselen)
13:45 – 14:10	Challenge 2: Marine Protected Areas (MPAs) (Jan Tjalling van der Wal)
14:10 – 14:55	Challenge 4: Climate change (Eline van Onselen)
14:55 – 15:15	Challenge 1: Windfarm siting (Jan Tjalling van der Wal)
15:15 – 15:35	Challenge 9: Bathymetry (Nathanaël Geleynse)
15:35 – 15:55	Challenge 3: Oil platform leaks (Jan Tjalling van der Wal)
15:55 – 17:00	Identification of most relevant scientific recommendations and action points
17:00	Closure

Figure 1. Discussions during the SBC Arctic workshop at Huset, Longyearbyen, Svalbard (14 June 2017).

2.2 SIOS – SBC Arctic meeting

One day prior to the workshop, on Tuesday 13 June 2017, a separate two-hour meeting was held between members of Svalbard Integrated Arctic Earth Observing System (SIOS) and members of the SBC Arctic project to get acquainted and identify potential joined topics.

The following participants joined this meeting:

1. Christiane Hübner, UNIS / SIOS, Svalbard
2. Anna Maria Trofaier, UNIS / SIOS, Svalbard
3. Belinda Kater, Arcadis NL, Netherlands
4. Martine van den Heuvel-Greve, Wageningen Marine Research, the Netherlands
5. CJ Beegle-Krause, SINTEF, Trondheim, Norway
6. Eline van Onselen, Arcadis NL, Netherlands
7. Arjan Tuijnder, Arcadis NL, Netherlands
8. Nathanaël Geleynse, Arcadis NL, Netherlands
9. Jan Tjalling van der Wal, Wageningen Marine Research, the Netherlands
10. Ruben Verkempynck, Wageningen Marine Research, the Netherlands
11. Peter Thijsse, MARIS, the Netherlands

For further details on the full agenda of the project week at Svalbard, see Appendix A.

3 Key Topics and Discussion

3.1 Workshop 'Arctic sea basin data – the Svalbard case'

The workshop was focused on discussing the available marine data and monitoring in the Arctic Ocean. Each of the ten challenges was discussed, resulting in "take home messages" as well as recommendations and action points specifically for Svalbard. The outcomes of the projects, including the input derived from the Svalbard workshop, are reported on http://www.emodnet-arctic.eu.

"Take home messages":

- Information on **fisheries** and impacts of these fisheries in the Arctic is poor. Monitoring and standardised reporting of landings, bycatch and effort is therefore urgently needed. Habitat impacts due to bottom trawling fisheries can be assessed by combining fisheries effort and habitat characteristics. Besides monitoring current and future stocks and impacts, a baseline habitat survey (location and quality) should be developed for areas that are opening up due to sea ice retreat. Fisheries monitoring should cover both fisheries on fish species and on invertebrate species. Fisheries on crab, shrimp and shell fish is an important type of benthic fisheries in the Arctic that is currently not covered in the SBC Arctic project.
- Key Questions
    - Which species are protected by current Marine Protected Areas (**MPAs)** in the Arctic?
    - How effective are the MPAs to protect these species?
    - Are additional MPAs needed to better protect typical habitats and species in the Arctic?
    - How to develop and implement quantitative targets for MPAs needed for relevant habitats and species?
- Knowledge on potential establishment and impacts of **alien species** in the Arctic is poor. Current information on established alien species in/near Svalbard is only available for the snow crab (*Chionoecetes opilio*), red king crab (*Paralitodes camtschaticus*, South-eastern Barents Sea), the Japanese skeleton shrimp (*Caprella mutica*) and the red macroalgae *Bonnemaisonia* sp. A better understanding of the (potential) impacts of alien species can be obtained by conducting dedicated experiments.
- Arctic **coastal dynamics** database information is poor for Svalbard.
    - In general, coastal research in Arctic is (1) poorly coordinated until recently (or still is), (2) local and (3) not directly presented in databases.
    - Permafrost data are missing or coming from different sources or disciplines. Some are collected from an engineering task.
    - There are different types of coastal drivers.

  The advice is to start with existing databases and fill these in a public standard format. General guidelines are useful (units, etc) for building a sound data and knowledge database. For instance, don't talk about mean sea level rise but about relative sea level rise, and standardise coastal change units from levels (meters/year) to volumetric changes per year (m^3/m/year). Coasts are extremely dynamic systems, changing from year to year. Fjord sea ice is lost in the last five years at Svalbard, having enormous effects such as speeding up erosion. Access to these data in digital form (e.g. netCDF CF compliant data[1]) for modelling is important for synthesis, understanding and prediction.
- **Climate change** is happening in the Arctic at a much faster rate than anywhere else on the planet. Information on CO_2,salinity, and pH (acidity) should be incorporated in this challenge. Long time series are needed to follow and predict changes. Assess energy flow in the system and effects of changes of this (by modelling). Larger or functional phytoplankton groups are a good proxy to assess shifts in phytoplankton communities due to climate change. More knowledge is needed on

[1] Network Common Data Format, Climate and Forecast data standard.

the combined effects of stressors, such as the combined effects of temperature and CO_2 on marine Arctic species. Relevant website is the monitoring system of Svalbard & Jan Mayen (MOSJ): http://www.mosj.no/en/

- Get a better understanding of **bathymetry** in the Arctic Ocean. Currently only 11% of the Arctic Sea bottom has been mapped by multibeam, which is less than the mapped topography of the moon or even Mars. First action would be to indicate which parts of the Arctic Ocean are important for bathymetric surveys and why. Examples are shipping lanes, harbour vicinities, and places for development. Information on shipping and fishing is collected for Svalbard in 2016 and the working group PAME of the Arctic Council compiles this data for the northern sea route. To obtain more detailed information it might be an idea to combine bathymetric research with other types of research when going in the field, such as vertical water temperature distribution, geophysics, benthic ecology, alien species, etc., and focus on technology which gives a higher resolution for greater detail.
- Get a better understanding on the distribution of sensitive species to better assess and potentially mitigate impacts of **oil spills** around Svalbard / in the Arctic area. Identify and update sensitive areas for birds and mammals for management purposes, incl. seasonality. An example is the sensitivity mapping that was conducted in south Svalbard (Weslawski et al. 1997[2]). In case of an oil spill there are species which are likely to be affected, map the most sensitive species and their distribution in online Environmental Sensitivity Index (ESI) maps. Additionally, expand the knowledge on the behaviour of oil to colder climates. There are extensive general studies in the public domain – general because oil chemistry is proprietary. SINTEF has an Oil Weathering Model and detailed database by subscription. Focus on prevention is very important in the Arctic.

The challenge on **offshore wind farms** in the Norwegian Sea should address both perils & benefits of these farms. Offshore windfarms will also construct a kind of MPA by removing fisheries in this area. Other perils to add are noise from wind farms and wind mills as stepping stones for alien species. Impact of mooring of floating wind turbines on seabed is a knowledge gap.

3.2 SIOS – SBC Arctic meeting

The goal of this meeting was to get acquainted and discuss potential for collaboration. Members of SIOS and the SBC Arctic project identified the following joined perspectives:

- The mutual goal is to identify observations and observation systems and to assess if they are filling our needs. Where are gaps in data collection or availability at a European level?
- Both SIOS and the SBC Arctic project use data that are collected by others. Some of the data is processed to enable easier access. A web based data portal for all relevant datasets is important for Users.
- There is a need to improve use of satellite data for monitoring marine systems.
- The Climate Change challenge of the SBC Arctic project is the core element for SIOS. What is the Svalbard area coverage? SBC Arctic will check SAON to see if information that is in there is applicable. Most public data in the SBC Arctic project currently comes from U.S. NOAA.
- SIOS is aiming to improve data collection on Svalbard, whereas the SBC Arctic project advises the EC how to improve data collection in the EC.

[2] Weslawski, J. M., Wiktor, J., Zajaczkowski, M., Futsaeter, G., & Moe, K. A. (1997). Vulnerability assessment of Svalbard intertidal zone for oil spills. Estuarine, Coastal and Shelf Science, 44, 33-41. http://water.iopan.gda.pl/ekologia/pub/pdfpapersekologia/tidalbeach/Weslawski_etal_Vulnerability_1997.pdf

Figure 2. Workshop Outing.

4 Scientific recommendations

Throughout the workshop recommendations were made for each of the challenges (see "take home messages" in 3.1). These were further discussed to obtain the main five recommendations for Svalbard science:

1. Better links between physical and biological parameters in marine monitoring

Assessing direct impacts of climate change is often hard due to the complexity of systems and presence of multiple stressors. Therefore, it is crucial that better links are formed between physical and biological parameters in marine monitoring programmes. This is needed when you want to establish cause-effect relationships while assessing impacts of climate change. Consistent and long-term monitoring programmes are needed for this.

2. Assess the applicability of satellite data for marine monitoring

Assess the use of satellite data for marine monitoring of parameters such as coast line, water levels, sea ice extent, river water and turbidity levels. Which satellite imaginary is useful and which products of these can be used for this purpose? Which products can be used to process these data and where can you find best online data? There is a need for land-based validation at e.g. Ny-Ålesund. Get an overview of Svalbard/Arctic coastal systems using satellite images. Mathematical techniques on morphology can be applied. This is complex, but doable with freely available data. NASA satellite data are essential for (Arctic) coastal information.

3. What is the current presence, abundance and distribution of marine alien species in Svalbard?

Get a better understanding of the presence, abundance and distribution of marine alien species in Svalbard. Which alien species are currently present in Svalbard waters? Are they established and do they pose a risk for endemic species? Can they impact ecosystem functioning and services? Which new species are likely to arrive in Svalbard waters as they warm and how can they be mitigated? Develop a coordinated regular monitoring programme for marine alien species in Svalbard. Methodology, reporting etc. should be coordinated between countries. How can they be monitored in a cost-effective way? eDNA techniques may be an asset to monitoring the presence of marine alien species in Svalbard.

4. What is the effect of glacial melt and rivers on sea ice formation around Svalbard?

Rivers and glacier melt are contributors to sea ice formation.

- What are the trends?
- Are there signals in data on this?

A next step is to couple data of rivers with sea ice formation timing and thickness. Sea surface temperature (SST) affects sea ice formation as well as local weather conditions. Warmer water from the Atlantic Ocean is currently affecting sea ice formation on the western part of Svalbard. Now there are also effects on eastern part of Svalbard. What are the sea ice effects of (1) glacier melt and (2) increased storms besides earlier melting?

5. How do coastal erosion, permafrost thawing and glacier melt affect rivers and melt streams on Svalbard?

Get a better understanding of effects of coastal erosion and permafrost thawing on river / melt stream parameters. Coastal erosion due to permafrost thawing and glacier melt is an important issue for Svalbard. Increased permafrost thawing and collapses of valley sides as well as increased glacier melts produce lot of new sediments that are easily erodible. Sediment transport increases into the basin due to these processes. There are currently no measures to show this.

5 Action points

The following action points were identified during the workshop:

1. Establish a long term and coherent marine monitoring programme along the Svalbard coast

There is an urgent need to develop and maintain a long term marine monitoring programme to better assess changes occurring in the environment and to identify impacts of changes on marine ecosystem functioning and services. Monitoring should cover both physical and biological parameters and should be coordinated to obtain coherence in the produced data, standardized metadata and online availability.

2. Assess the presence and impacts of marine alien species in Svalbard

Conduct an organised monitoring programme on invasive species in a selection of main ports around the Arctic, using traditional and innovative tools (such as eDNA). Conduct a combined field and modelling experiment to get a better understanding of the (potential) impacts of alien species to the ecosystem. For scientists: put the observations on the presence of marine alien species in relevant databases, such as the Global Invasive Species Database[3] and the Island Biodiversity and Invasive Species database[4].

3. Open up data on fisheries and impacts of these fisheries in the Arctic and on Svalbard

Allow public access to data on fisheries in Svalbard and Arctic Ocean for scientific and management use. Improve access to existing data. Update international databases with information from national databases. International databases are often lagging three years behind and present data in a format that does not provide access to more details via metadata. How well do these large international databases perform? ICES data base should be up-to-date, although not all data are readily available from ICES. An overview of fisheries should include pelagic/benthic finned-fish fisheries and on invertebrate species (shell fish, crab, shrimp). Assess the impacts of benthic fisheries (both fish and invertebrates) on seafloor habitats and pelagic food webs (e.g. capelin as food source of fish-eating birds). Assess the impacts of climate change on benthic fisheries, including Atlantification of the waters of coastal Svalbard and the role of kelp (used to be disturbed by sea ice, but not anymore now that sea ice is disappearing).

[3] http://www.iucngisd.org/gisd/howto.php
[4] http://ibis.fos.auckland.ac.nz/

6 Suggested further research

The workshop proved an effective tool to present the data from the SBC Arctic project to the Svalbard science community and obtain valuable input to further improve the results of the project. The workshop assisted in identifying relevant data and monitoring gaps for Svalbard such as:

- A coherent monitoring programme for both physical and biological parameters to assess impacts of climate change and other stressors;
- The need for data and a monitoring programme focused on both presence and impacts of marine alien species;
- Easy access to standardised data and monitoring information on fisheries;
- An opportunity for using satellite data in marine Arctic monitoring;
- The need for data and monitoring to assess effects of permafrost thawing and glacier melt on coastal dynamics and sedimentation processes.

These gaps in data and monitoring are highly relevant for future research programmes on Svalbard and research programmes for the Arctic commissioned by the EC.

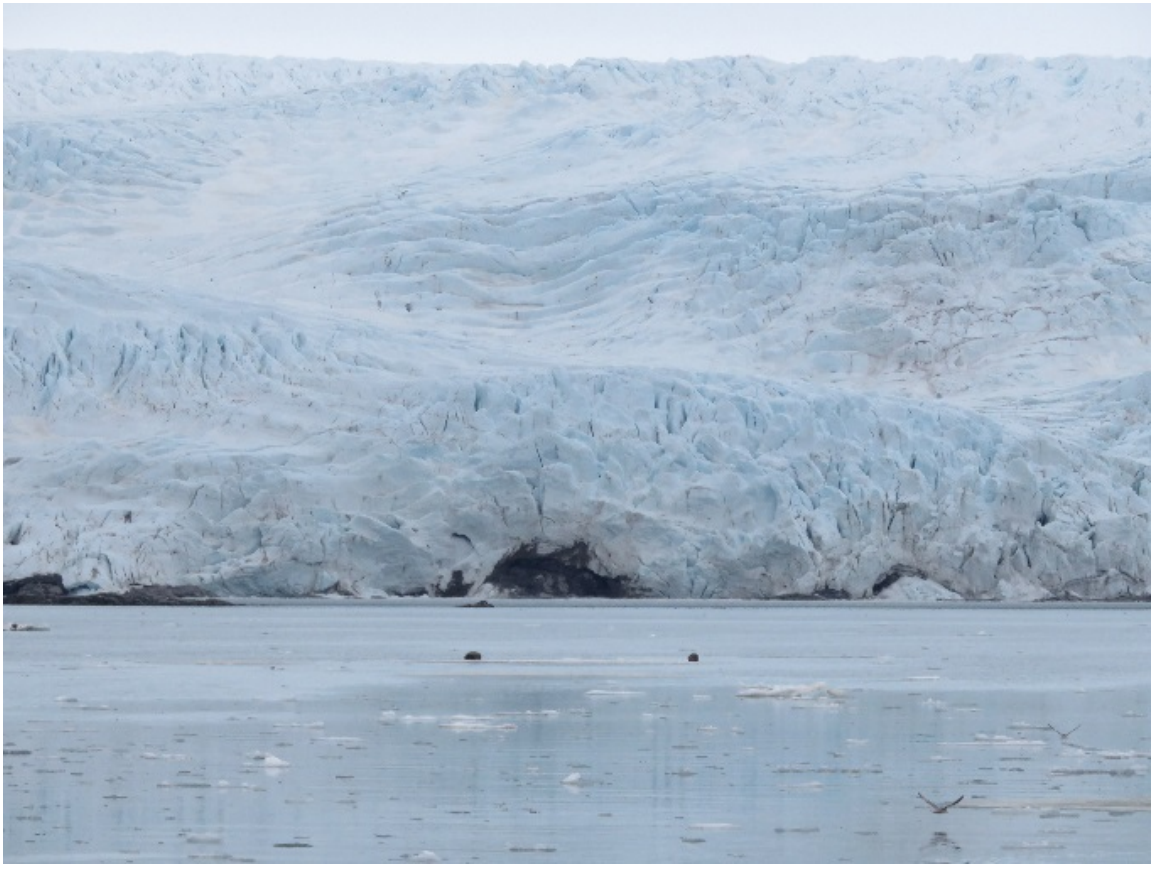

Figure 3. Workshop outing.

A. Appendix – Overview project week activities

Day	Place	Activity	Involved
Sunday 11 June 2017		Travel and arrival (after midnight)	SBC Arctic project members
Monday 12 June 2017	Svalbard Hotell	2 PM – 10 PM: project activities (including dinner)	SBC Arctic project members
Tuesday 13 June 2017	Svalbard Hotell	9 AM – 1 PM: project activities (including lunch)	SBC Arctic project members
	UNIS	1 PM – 3 PM: visit to UNIS/SIOS	SBC Arctic project members SIOS members
	Svalbard Hotell	3 PM – 6:30 PM: project activities	SBC Arctic project members
	Svalbard Hotell	evening: arrival of invited Norwegian guests from Norway	Invited guests
	Svalbar	7 PM – 8:30 PM: dinner with invited guests	SBC Arctic project members
	Svalbard Hotell	8:30 PM – 10 PM: project activities	SBC Arctic project members
Wednesday 14 June 2017	Huset	9 AM – 10 AM: workshop preparations	SBC Arctic project members
	Huset	10 AM – 5 PM: workshop 'SBC Arctic: the Svalbard case'	SBC Arctic project members Invited guests Other interested parties
	Kroa's restaurant	7 PM – 9 PM: workshop dinner	SBC Arctic project members Invited guests
Thursday 15 June 2017	Svalbard Hotell	9 AM – 4 PM: project activities and closure (including lunch)	SBC Arctic project members
	Svalbard Hotell	AM: departure of invited guests	Invited guests
	Other	5 PM – 10 PM: Svalbard excursion (Pyramiden)	SBC Arctic project members
Friday 16 June 2017		Departure and travel (early AM)	SBC Arctic project members

B. Appendix – Poster – invitation to interested audience

ARCTIC SEA BASIN DATA
THE SVALBARD CASE

Workshop on Arctic monitoring and knowledge gaps

WEDNESDAY 14 JUNE 2017

HUSET CONFERENCE, LONGYEARBYEN, SVALBARD

We hereby cordially invite you for the international workshop 'Arctic sea basin data – the Svalbard case', that will take place on Wednesday 14 June 2017 at Huset Conference in Longyearbyen, Svalbard.

The goal of the workshop is to:

1. Present the initial results of the SBC Arctic project on Arctic sea basin data (challenges A-J, see below for further details)
2. Evaluate current Arctic marine monitoring programmes and datasets
3. Connect existing activities in Arctic marine data utilisation
4. Identify joined knowledge gaps in Arctic marine data (relevant for Ny-Ålesund flagship programs)

EMODnet Sea Basin Checkpoints (SBCs) of the European Commission (EC) assess the quality of the current observation monitoring data at the level of regional sea basins. The EC funded project 'SBC – Arctic' (2015-2018) examines data collection and data assembly programmes in the Arctic sea basin, analyses how these can be optimised and delivers the findings through an internet portal (www.emodnet-arctic.eu).

The project is organised in ten data challenges:

A. analysis of the existing network of marine protected areas (MPAs) and their coherence;
B. trends in climate change (e.g. water temperature, ice coverage, migration of animals);
C. fisheries management (trends in e.g. fishing landings and bycatch);
D. fisheries impact (trends in e.g. fishing capacity, fishing effort);
E. input of water, sediment, nutrients and fish migration from rivers discharging into the Arctic Sea;
F. effects of sea level rise on stretches of coast and on sedimentation;
G. determination of suitable sites for wind farms;
H. bathymetry of the Arctic Sea and save navigation routes;
I. response on an unexpected oil leak from a platform (simulating an unexpected accident);
J. pathways and impacts of alien species.

EMODnet

In 2007 the European Marine Observation and Data Network (EMODnet) was developed to centralise European marine data. There are six EMODnet Sea Basin Checkpoints: North Sea, Mediterranean Sea, Black Sea, Balthic Sea, Atlantic Ocean and Arctic Ocean.

How to register?

Please register by sending an email to martine.vandenheuvel-greve@wur.nl before 6 June 2017 providing the following information:

1. Name and institute
2. Field of expertise
3. Main data challenges you may contribute to (A-J)

After registration you will receive additional workshop information.

We will be happy to have you on-board

Please register for participation. The workshop is free and includes workshop registration, lunch and beverages.

A Svalbard Strategic Grant of the Svalbard Science Forum has been awarded to fund this workshop.

WAGENINGEN UNIVERSITY & RESEARCH

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EMODnet Arctic

To find out more about the Arctic Sea Basin Checkpoint, visit the portal:
www.emodnet-arctic.eu

Or e-mail us for more information
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