The yearly life meeting of WG140 took place after the Gordon Research Conference on Polar Marine Sciences in Lucca, Tuscany, Italy on March 20th 2015. 26 members of the BEPSII network, representing 12 countries, attended the meeting. The group consisted of 50:50 established versus early-career scientists and 50:50 female and male participants. A full report of the meeting is presented in Annex I.

Overview of activities

Task Group 1 on Methodologies and Intercomparisons (Leads: Lisa Miller and Lynn Russell) has three primary goals:
1. Methodological review;
2. Provide recommendations for intercomparisons and intercalibration projects; and

The activities of TG1 to meet these goals were:
1.1 A review on sea-ice methodologies has been published in Elementa: Science of the Anthropocene. Reference: Miller et al. (2015) Methods for biogeochemical studies of sea ice: The state of the art, caveats, and recommendations. (Annex II) This paper is the first of a Special Issue in Elementa on sea-ice biogeochemistry that is initiated by BEPSII (see below).
1.2 While it is not the aim of BEPSII to organize such a campaign within the current project period, it is the aim to stimulate discussion, design sampling strategies for method-intercalibration and intercomparison projects of various parameters and seek
opportunities to organize these projects on a reasonable time scale. Finding the resources to organize such a project is difficult; it is expensive (remote places; logistically difficult to get to) and concerns a multi-disciplinary and multi-national group of scientists. Several field stations are under discussion and will be further looked into. Currently, the best options seem to be: Saroma-Ko, Japan; Cambridge Bay, Canada; and Tvarminne, Finland.

1.3 One of the goals of the intercalibration campaign will be to obtain better insights into current methodologies, in order to go beyond the currently published methods review. Most urgently, intercomparisons are needed for primary production measurements in ice, melting procedures and their impact on biochemical components and gas flux measurements from ice.

In the mean time, method testing and improvement by individual members is being stimulated and is a continuing effort (Annex IV)

**Task Group 2 on Data (Leads: Klaus Meiners and Martin Vancoppenolle)** has two primary goals:

1. Produce new data inventories by collation of existing data;
2. Provide recommendations for standardized protocols and databases.

The activities of TG2 to meet these goals were:

2.1 The collection of chlorophyll-a data from the Arctic is taking shape under Canadian/German lead. The respective paper will be submitted to GRL, in which also the first chlorophyll-collation paper by Meiners et al. has been published. The Antarctic database will be further extended with data from land-fast ice.

Other parameters have been worked on over the past year and new ones have been proposed during the March meeting. These are: the inorganic carbon system, macronutrients, dissolved and particulate organic carbon, iron and algal biodiversity.

Since the amount of data for these quantities are much less than for chlorophyll-a, the data inventories will be combined with mechanistic reviews under task 2 of TG3 (see below).

2.2 The ASPeCt log-sheet – an excel file with a standardized protocol for ice-core meta data – is published on the BEPSII website. Scientists will be encouraged to consistently use the template, which will greatly help future data access and interpretation. Furthermore a MatLab toolbox to easily extract and analyse log-sheets is currently being developed.

**Task Group 3 on Modeling (Leads: Nadja Steiner and Clara Deal)** has four components:

1. Recommendations from modellers to observationalists,
2. Review papers on major biogeochemical processes
3. Intercomparison of 1D models and publication of a review,
4. Application in regional models with links to global & regional climate modelling.

The activities of TG3 to meet these goals were:

3.1 A paper on “What sea-ice biogeochemical modellers need from observationalists” has been submitted to *Elementa* as part of the BEPSII special issue.

3.2 The open-access journal *Elementa* – *Science of the Anthropocene* was chosen to publish a special feature on sea-ice biogeochemistry: [https://home.elementascience.org/special-features/biogeochemical-exchange-processes-at-sea-ice-interfaces-bepsii/](https://home.elementascience.org/special-features/biogeochemical-exchange-processes-at-sea-ice-interfaces-bepsii/). The editor-in-chief of the Ocean Sciences section, Jody Deming attended the Lucca meeting, in March. The BEPSII Special Feature will contain a collection of synthesis papers reviewing particular biogeochemical processes in sea ice and respective model applications, but also research papers are accepted. Currently, 22 contributions are planned (Annex III) of which 1 is published and 6 are submitted.
3.3 A 1-D model intercomparison of a seasonal cycle of ice algae is currently slowed down due to parental leave by the lead author, but will be picked up in November. There are 10 groups contributing. The goal is to evaluate outcomes on biomass and primary production over a seasonal cycle, both in the Arctic and the Antarctic.

3.4 Global & regional model intercomparisons are still mostly focusing on pelagic production and acidification. However, regional modeling of sea ice algae is currently expanding. An intercomparison is likely beyond the time frame of the current WG140.

**Status of fulfilling terms of reference**

The Terms of Reference of BEPSII are as follows:
2. Summarizing existing knowledge in order to prioritise processes and model parameterizations.
3. Upscaling of processes from 1D to earth system models.
4. Analysing the role of sea ice biogeochemistry in climate simulations.

**ToR1** is covered by the activities of TG1 and part of TG2. It has been fulfilled with the publication of the review paper on methodologies in *Elementa* (activity 1.1). Also activities 1.2, 1.3 and 2.2 contribute to this ToR. Given the substantial difficulty to work on and with sea ice, both from an organizational and financial perspective, progress in method standardization is slow and the ambition to finalize this goal within the timeframe of WG140 is not realistic. A continued effort for testing and intercalibrating sea-ice methods is needed. As the BEPSII community is still young and constantly growing, there is a strong wish to continue this collaboration and to develop international projects to fulfill these goals.

**ToR2** is well underway with activities 2.1 and 3.2. The *Elementa* Special Feature will be a major end product of BEPSII.

**ToR3** is currently being implemented in the 1-D exercise described under activity 3.3. A fully integrated sea-ice biogeochemistry module in global climate models cannot be expected within the life span of WG140. However, up scaling of individual parameters, such as the inorganic carbon cycle are currently underway. Based on results from activity 3.2, 3.3 and 3.4, we expect to make recommendations indicating which processes and variables might need to be considered in global climate models.

**ToR4** is the most ambitious goal of WG140 and can only be achieved in collaboration with the modeling community at large. Analysis on the role of sea ice biogeochemistry in climate simulations is expected to be performed as a regional downscaling effort (regional models with sea-ice biogeochemistry will be forced with output from global CMIP5 models). This is one of the last activities to be undertaken and will extend past the current BEPSII period in close collaboration with FAMOS (Forum for Arctic Modeling and Observational Synthesis). Significant progress has been made with respect to the implementation and application of sea ice algae models on regional scales. Publicly accessible sea-ice algae codes are now available as part of the Biogeochemical Flux Model (BFM, http://www.bfm-community.eu) and the Los Alamos CICE model and will be made available as part of the General Ocean Turbulence Model-Framework for Aquatic Biogeochemical Models (GOTM-FABM). All models are developed and maintained by BEPSII full and associate members.

**Plans for the coming year in relation to the terms of reference and capacity building**

1. The major activity in the coming year will be the continued submission of papers to the *Elementa* Special Feature (Annex III). Since both mechanistic review papers and
modeling applications will be published in this Feature, it is regarded as the main product of WG140.

2. The planned 1-D model intercomparison will take place in the coming year. The instructions for model runs are being finalized and datasets to run the models for both the Arctic and Antarctic are currently collated. Timeline: Runs in December; discussion at next BEPSII meeting in March 2016. Paper writing afterwards. (L. Tedesco, M Vancoppenolle et al.).


4. The SCOR WG140 platform has been extremely helpful in setting up this new network of observationalists and modelers on sea ice biogeochemistry. There is a strong need and wish to continue this successful network, explore new ways to collaborate and further develop our understanding of the sea-ice system. In order to discuss options and opinions to continue BEPSII, a discussion session is being held during the SOLAS Open Science Conference in September, in Kiel, Germany (leads: Lisa Miller and Martin Vancoppenolle). The format of a working group or forum under the mutual umbrellas of SOLAS and CLiC will be investigated. CLiC is a co-sponsor of the discussion session.

5. The next and last BEPSII meeting under the umbrella of SCOR-WG140 is planned for March 2016 in Paris, France. This time a dedicated meeting with science presentations and (parallel) discussion sessions to plan the future is planned.

**Special requests for extra funding for outreach and/or capacity building activities**

The costs for publication of a Special Feature in *Elementa* is expected to be around €1000 per article. A contribution from SCOR will be more than welcome.

**Challenges or opportunities the group will experience in the coming year**

The major task for the coming year will be the finalization of all papers within the *Elementa* Special Feature.

The other challenge will be to explore new avenues for continued support of the activities and collaborations started within WG140. For both the planning and organization of intercalibration field campaigns and the upscaling of model intercomparisons a BEPSII 2.0 is needed. There is much support from the community for the continuation of this new and highly successful collaboration between modelers and experimentalists. The network is a very good mix between junior and senior scientists from all over the world. The group now consists of approximately 85 scientists from 16 countries. Avenues for continuing the network are through the current SOLAS and CLiC programs, but this will not provide funding for actual field campaigns. Other institutions, like the EU funding schemes, need to be explored, but this is likely a longer-term effort.
ANNEX I

Minutes SCOR-WG 140 (BEPSII) Meeting
Lucca, Italy Friday March 20th 2015

Present: Steve Ackley (USA), Jeff Bowman (USA), Bruno Delille (B), Agneta Fransson (NO), Francois Fripiat (B), Klaus Meiners (AUS), Lisa Miller (CAN), Sebastian Moreau (B), Janne-Markus Rintala (FIN), Lynn Russell (USA), Jacqueline Stefels (NL), Nadja Steiner (CAN), Letizia Tedesco (FIN), Jean-Louis Tison (B), Martin Vancoppenolle (FR), Maria van Leeuwe (NL).

New to the group: Melissa Chierici (NO), Jody Deming (USA), Hakase Hayashida (CAN), Nicolas-Xavier Geilfus (DEN), Jennifer Jackson (CAN), Ollie Legge (UK), Eva Leu (NO), Eric Mortenson (CAN), Christiane Uhlig (GER), Pat Wongpan (NZ).

Welcome & Goal
Aim of the meeting was to recap where we are and to discuss what is still missing, what are the next steps, and what is our future.

1. Update on crosslinks (related projects)
OASIS (mail info McNeill): not too much on-going; there is currently no official structure. OASIS members have taken the initiative to prepare a Future Earth call for proposals: lead is Faye McNeill. Their pre-proposal was grouped by FE with two other Arctic-related proposals (one of which was social science related to governance, the other very solution-oriented coastal geography). FE gave the three groups a little bit of money and an assignment to come up with a proposal for how Future Earth should engage in a broad sense with ongoing Arctic-related activities. The new proposal is now called ArcticSTAR, and focuses on Arctic research founded in Future Earth principles of transdisciplinarity and stakeholder engagement. It seems likely that FE will approve this, however FE does not really have the funding at this time to make the value of such a designation go beyond the abstract power of the FE stamp of approval. Among the goals of ArcticSTAR is the one to build a "community of practice" (i.e. research coordination network) and bring researchers from multiple disciplines together in workshops, hold summer schools to promote working across disciplines, etc. including social scientists and stakeholders. McNeill: "The tough thing is we are kind of back at the drawing board in terms of finding funding for those activities - becoming an official FE initiative, if and when it happens, will be a "hunting license" for us to go to other agencies to raise funds for the workshops and other activities. Maybe down the road we would be in a position to serve as a parent organization for other groups the way that IGAC is, but we would not be able to do much in terms of passing along funding to them for at least a few years I think."

PICES (Lisa Miller): would be supportive of an intercalibration in Japan, but is not able to provide money for it.

ASPeCT (Steve Ackley): Has recently been accepted as a SCAR expert group, but they still need to write the terms of reference. There is a wish to include more ecology in the ASPeCT aims. The ASPeCT icecore database, and its extension towards more biological and chemical parameters, is an important connection with BEPSII. Also the shipbased observation database contains a wealth of information on sea-ice coverage.
2. Summary presentations of task groups

TG1 (Lisa Miller/Lynn Russell)
Progress on Terms of reference for TG1:
Methods review: Published, January 2015 in *Elementa*.

Intercalibration experiments:
Many ideas are still gestating, but no concrete progress has been achieved. The issue is primarily one of resources; the community is talking, generating ideas, and willing to work together, but ‘seed’ funding to get it all rolling is proving elusive.

Summary of report from Daiki:
For the intercalibration experiment, so far (after IGS Hobart), Daiki and Jun sought funds for the experiment, but, there is no appropriate fund (appropriate meaning that travel money is provided for joining scientists and for shipping equipment between abroad and Japan, etc). Maybe we ask too much. If joining scientists can find the money for coming over and shipping equipment to Saroma themselves, it can be arranged. Accommodation prices etc will be cheap in Saroma, so, money for staying will not be an important issue.
The design of a gas flux intercalibration experiment is still under discussion. The idea is to compare tower and chamber measurements, as was recently tried-out during a campaign with people from the Norwegian Polar Institute, measuring CO2 and CH4 in both set-ups.

Additional sites have been proposed:
Cambridge Bay:
Contact/lead: Brent Else (belse@ucalgary.ca).
Central Canadian Arctic Archipelago
Pros: Confidence in sea-ice formation
Location of new Canadian High Arctic Research Station (CHARS)
Easy access by commercial transportation, with several passenger flights daily and cargo flights several times each week.
Ample housing (houses for rent, hotel rooms)
Cons: Research station is not yet built (expected to be ‘functional’ in 2017)
For now, the only ‘lab’ is a trailer with a sink that could maybe be borrowed
Level of logistical support (skidoos, etc.) still uncertain

Station Nord:
Contact/lead: Nix Geilfus (geilfus@bios.au.dk)
Northeast Greenland
Pros: Lots of ice, both land-fast and pack
Ample lab facilities and lodging (about $300/day w/board)
Cons: Travel is expensive (approx. $3000 round trip from Longyearbyen)

Jeff Bowman: Ideas for the genomics portion of the intercalibration experiment. From his own data analysis on bacterial genomes (16sRNA), Jeff started to recognize specific metabolic pathways. This opens the possibility to distinguish between bacterial functional types. Hence, emphasis needed on:
- Ecosystem functions
- Diversity of the sea ice microbial community
- Metabolic processes not yet picked up in either biogeochemical or molecular studies

Francois Fripiat will pursue on his previous outline of a field-campaign and will write a first draft of a proposal (for the next BESPII meeting). This proposal will be dedicated to an intercalibration of methods in sea ice biogeochemistry (e.g., primary production, gas content and exchanges, …) and the elaboration of a best sampling scheme (parameters, resolution,
(...) for modeling purposes. This proposal can form the basis of an application for a new SCOR working group.

Updated list of potential intercalibration sites/facilities:
Prices in approximate 2013 US dollar equivalents.

<table>
<thead>
<tr>
<th>Site</th>
<th>Transport (roundtrip)</th>
<th>Lodging/Food</th>
<th>Capacity</th>
<th>Lab/Other Facilities (most charge fees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert</td>
<td>3000 from Trenton</td>
<td>100</td>
<td>100</td>
<td>Various (labs, trucks, no wireless)</td>
</tr>
<tr>
<td>Ny Alesund (Svalbard)</td>
<td>1700 from Tromso</td>
<td>190</td>
<td>50?</td>
<td>Various</td>
</tr>
<tr>
<td>Longyearbyen</td>
<td>800 from Tromso</td>
<td>250</td>
<td>50?</td>
<td>Various</td>
</tr>
<tr>
<td>Station Nord (Villum)</td>
<td>3000 from Longyearbyen</td>
<td>??</td>
<td>50+</td>
<td>Various (labs, boats, 5 snowmobiles)</td>
</tr>
<tr>
<td>Cambridge Bay</td>
<td>Several flights/day</td>
<td>250</td>
<td>?High?</td>
<td>Labs being built; trailers w/sinks for rent</td>
</tr>
<tr>
<td>Saroma-ko Lagoon</td>
<td>40 from Memanbetsu</td>
<td>30</td>
<td>200</td>
<td>Various (labs, jetskis, hot springs)</td>
</tr>
<tr>
<td>SERF @ Manitoba</td>
<td>100 from Winnipeg</td>
<td>100-200</td>
<td>Unlimited</td>
<td>Ice pool (artificial SW) for $100/Pl/d</td>
</tr>
<tr>
<td>IOS @ Victoria</td>
<td>200 from Vancouver</td>
<td>100-200</td>
<td>Unlimited</td>
<td>Clean rooms, etc.</td>
</tr>
<tr>
<td>Tvarminne</td>
<td>100 from Helsinki</td>
<td>50-100</td>
<td>90</td>
<td>Various (labs, tanks, boats, saunas)</td>
</tr>
<tr>
<td>McMurdo</td>
<td>NSF-only/infrequent</td>
<td>NSF funded</td>
<td>?</td>
<td>Various</td>
</tr>
<tr>
<td>Barrow</td>
<td>800 from Seattle</td>
<td>100-200</td>
<td>100+town</td>
<td>Various (labs, transport, guards)</td>
</tr>
<tr>
<td>CRREL @ Hanover, NH</td>
<td>200 from Boston</td>
<td>200</td>
<td>Unlimited</td>
<td>Wave tank</td>
</tr>
</tbody>
</table>

Manual of best practice:
First we need an intercalibration to be able to go beyond the currently published methods review. The idea is to do this through a growing document and/or videos on the website.

Jody: Elementa has a new feature: “practice bridge” which supports videos of practices, which might be usefull.

**TG2 (Klaus Meiners/Martin Vancoppenolle)**
Progress on data compilations and analyses:
1. Collation of DIC and TA started and is in progress (lead Delille et al.) The CO2 dataset consists currently of 172 stations. The main issue is to discuss the TA:DIC anomaly as the result of degassing. There are still many datasets that need to be added. For the collation of data, the ASPeCT-BIO format and algorithms of Meiners et al. are used.
2. Antarctic database (ASPeCT-Bio) is currently being further analysed to identify drivers of integrated biomass and vertical Chla distribution in particular ice thickness, the influence of snow, snow-ice thickness ratios, on-shelf versus off-shelf location
   >>> potential paper on relationship between ice thickness (snow thickness) versus integrated Chla planned (lead: Vancoppenolle)
3. Collation of Arctic pack ice chlorophyll-a data has progressed. Ilka Peeken (AWI) has collated European data and has send these on to Christine Michel, who is compiling Canadian data and will be leading the write-up
4. Collation of Arctic and Antarctic iron data has progressed well, paper planned (lead Lannuzel).
   Data from approximately 100 ice cores are available; which is the total from both Poles + Baltic. Preliminary conclusions: in remote areas, Fe is coming from the water; in the Baltic from the atmosphere. Melting sea ice is seeding surface waters with Fe.
5. Collation of Antarctic macro-nutrient data is progressing well; only a few datasets are still missing (lead: Francois Fripiat). FF will start to interpret the data in summer 2015 (comparison between datasets, ice types and properties, methodological biases, …). Intriguing is the very high concentrations of PO4 observed.
6. Collation of POC/DOC planned (lead: Fripiat with PhD student Arnout Roukaert). AR is a Ph.D. student working on primary production and N-uptake in sea ice at the Vrije Universiteit Brussel.
7. We have also started collation of Antarctic fast-ice chlorophyll-a data (lead: Meiners)
   >>>> follow the ideas/layout of Leu et al. paper on ice algal phenology in Pan Arctic fast ice (Progress in Oceanography, in press)

Additional points to consider:
Jackson: There might be loads of data from industry available, although mostly physical data. If there is an interest for it, she can look into it.
Info from Rysgaard: A new Danish datacenter, the Isaaffik Arctic Gateway, will be launched soon: http://www.isaaffik.org. For the moment it is only metadata, but it should ultimately also include biogeochemical sea-ice data.

**TG3 (Nadja Steiner/Clara Deal)**

**Task 1:** Publication: What sea-ice biogeochemical modelers need from observationalists, will be submitted right after this meeting as part of the Elementa special feature for BEPSII.

**Task 2:** Review papers on major bgc processes in Special feature of Elementa (Editor-in-Chief: Jody Deming, present at the meeting)
A collection of synthesis papers reviewing particular biogeochemical processes in sea ice and respective model applications is in full swing. A minimum of 4 papers submitted to *Elementa* is needed by the end of May; after this we can extend the deadline until whatever date we need. Not only reviews can be submitted, but also research papers. All information on planned papers should be sent to Nadja. A list of papers in preparation is below. We expect around 20 papers to be published in the special feature:

0. Miller et al Methods paper – published....

**Submission before end of May:**
1. Title: What sea-ice biogeochemical modellers need from observationalists
   Authors: N. Steiner, C. Deal, D. Lannuzel et al..... - submitted
2. Title: Closing the O2 (and CO2) budget under a growing ice sheet
3. Title : Measurements of air-ice CO2 fluxes over artificial sea ice emphasize the role of bubbles in gas transport - submitted
   Authors : Marie Kotovitch1,2, Sébastien Moreau3, Jiayun Zhou1,2, Jean-Louis Tison2, Gerhard Dieckmann4, David Thomas5, and Bruno Delille1
4. Title: The structure and activity of sea ice bacterial communities: Biogeochemical implications and known unknowns – submitted
   Author: Jeff Bowman
5. C:N ratios in Arctic sea ice
   Authors: A. Niemi et al.

**Anticipated submission summer/autumn 2015:**
6. Title: Thermally-forced cycling of DMS, DMSP, and DMSO in Antarctic spring sea ice
   Authors: Brabant, F., Carnat, G., Dumont, I., Becquevort, S., Vancoppenolle, M., Ackley, S.F., Fritsen, C., Delille, B., and Tison, J.-L.
   Authors: Müller, S., Uusikivi, J., Vähätalo, A., Majaneva, M., Majaneva, S., Autio, R., Rintala, J.-M.
8. Title: Seasonal and vertical variability of DMS and DMSP in Arctic first-year sea ice
   Authors: Carnat, G., Tison, J.-L., Gilson, G., Delille, B., Brabant, F., Levasseur, M., Geilfus, N.-X., and Papakyriakou, T.
9. Title: Coupling between inorganic and biological parameters in melting AA sea-ice
   Authors: Fransson, Chierici, Torstensson, Wulff
10. Title: Iron in sea ice: a review
Authors: D. Lannuzel, M. Vancoppenolle, P. van der Merwe, V. Schoemann, M. Grotti, J. Nishioka and K.M. Meiners

11. Title: Temporal changes in biogeochemical properties of Antarctic sea-ice during spring in the western Weddell Sea with emphasis on DMS(P).
Authors: Jacqueline Stefels, Matthias Steffens, David Thomas, John Dacey, Stathys Papadimitriou, Gerhard Dieckmann, .... (probably a few more)

12. The role of the sea-ice carbon pump for the marine carbon budget.
Authors: Grimm, R., Notz, D. Rysgaard, S., Glud, R.N.

13. Modelling DMS in sea ice
Authors: H. Hayashida, E. Mortenson, N. Steiner, A. Monahan

14. Modelling the carbon cycle in sea ice areas
Authors: E. Mortenson, H. Hayashida, N. Steiner, A. Monahan

15. The role of sea ice DIC and TA boundary conditions on the sea ice carbon pump in a global blue-white-green ocean modeling system
Authors: Moreau S., Vancoppenolle M., Goosse H., et al.

16. Arctic sea ice Chl review Authors: Michel, Niemi, Peeken, Gosselin et al.:

Anticipated submission spring 2016:

17. Title: Antarctic sea ice nutrients compilation
Authors: Francois Fripiat et al.

Information on ice-algal seeding needs more input from experimentalists: contributions before August.

19. Letizia Tedesco et al. 1D Model intercomparison

20. Title: Algal species composition in sea ice: functional groups for modelers.
Authors: van Leeuwe, M.A., Rintala, J.M., Assmy, P., and J. Stefels

Other issues discussed:
- A previously anticipated review on halogens is not needed. A new review just came out.
- Jen Jackson will investigate the option to link with work of Elena on mixed layer parameterisations.
- Jodie Deming: Can contributions directly submitted to Elementa be part of the BEPSII issue?
  In principle they can, if complimentary to the other papers, but the request should go through the BEPSII coordinators who can then decide.
- Elementa offers the option to do a video introduction of the group & BEPSII goals.
- Nice pictures of fieldwork to brighten-up the BEPSII Feature can be send to Nadja.

Task 3: Intercomparison of 1D models
1-D model inter comparison of ice algae seasonal cycle is currently slowed down due to maternity leave by lead author, however will be picked up in September.
Data sets are not chosen yet, but it is anticipated to have one for each Pole: Resolute Bay for the Arctic? and Terre d'Adelie (1997) for the Antarctic. 10 models are involved. Timeline: Runs in December; discussion at next BEPSII meeting. Paper afterwards.

Other potential model analyses were discussed separately in connection with Task 2.

Task 4 - Application in regional models with links to global & regional climate modeling:
Global & regional model intercomparisons are still mostly focusing on pelagic production and acidification. However, regional modelling of sea ice algae is currently expanding. An intercomparison is likely beyond the time frame of the current BEPSII.
3. BEPSII’s future

Next year will be the last opportunity to meet under the SCOR umbrella. And although we are well on our way to fulfill the ToR, we have the feeling that this community just started and that many of the topics BEPSII has touched upon can benefit from an additional in-depth and interdisciplinary approach. Given the fact that the community consists of many young scientists, there is scope for a strong continuation. Therefore it is time to develop new ideas and strategies to continue on.

The obvious topic for a BEPSII 2.0 initiative could be to organise a sea-ice intercalibration campaign, for which we are already discussing its potential layout under the current Task Group 1. The funding of the field campaign itself will need to come from science foundations, but support for the network (including modelers) will benefit from additional sources.

Potential umbrella’s for a BEPSII 2.0:
- the AntERA program of SCAR (contact Julian Gutt), but this will be mainly Antarctic science. Jacq will join their meeting in Sept. 2015 and will probe this avenue.
- the ArcticSTAR initiative as described under agenda item 1.
- Another SCOR proposal: This is an option but will need to be very specific, with distinctively different terms of reference from WG 140 (BEPSII 1.0). This would have some chance of success, although would probably be hindered a bit if reviewed as a continuation of WG 140.
- A Task Group under SOLAS. There is a good spirit about continuation of SOLAS; sea ice is an explicit part in the new science plan. We will ask for endorsement. To start with, a discussion session at the SOLAS OSC in Kiel has been proposed, Sept. 7-11; abstract deadline: 27 May. There we can probe the interest from SOLAS and discuss new avenues (action Lisa).
- Associated with being a SOLAS TG, BEPSII could form a bridge between SOLAS and CLIC. ASPeCT is also connected to CLIC. CLIC has no biogeochemistry yet, but would like to. Good source for meeting support. Is bipolar. Approach Jenny Baesemann, who is coordinator of CLIC (JS: Not any more! She is now executive director of SCAR) (action Lisa).
- Become a project under the umbrella of IASC?? (ask Marit??)
- Applying for a COST action? (only European, but international collaboration is encouraged): 2x/yr, continuous submission. JS sends around guidelines to EU partners.

For all these organizations it will be important to have (new) Terms of References. Brainstorming of such new ToR resulted in the following list of ongoing and new deliverables:
1. Develop and conduct intercalibration campaigns.
2. Guide of best Practice
3. Develop guidelines and encourage technology innovations for sea-ice biogeochemical monitoring and observing systems
4. Review papers on major biochemical processes (special issue)
5. Inventory of available data
6. Recommendations for database improvements and quality control
7. Intercomparison of sea-ice biogeochemical models on multiple scales
8. Analysing the role of sea ice biogeochemistry in climate simulations.

4. Any Other Business

- 2016 meeting: Instead of a fringe meeting we need this final meeting to be a dedicated BEPSII meeting of 3 days.
  Suggested dates: March 14-18 or mid April 2016
Where: Groningen/Amsterdam? Paris? Lamont? Liege?
Needed: Large room + 2 break-out rooms for approximately 40p.

- Outreach (webpage, Facebook): website on google is easy to upload & manage (https://sites.google.com/site/bepsiwg140/home). Jayun will maintain the site. Facebook: Francois will send an email to everybody to update the facebook page (together with Jiayun): with a special emphasis on educational contents.
  Please visit the sites and give input!
- Julian Gutt has invited us to provide a “Scientific Highlight” for the SCAR-AntERA website. (action Jacq)
- SCOR reimbursement form: Nadja sent around.
- SCOR report (due end of August).
- Bruno for Roland von G.: RvG has a new project funded by the ERC: it will involve sea ice-snow interaction experiments in new chambers, focusing on CO2, CH4, DMS, NOx, OC & Halogens. The experiments should lead to improved modeling of the atmosphere and aerosols. Collaboration is welcome.

17:00 End of meeting
ANNEX II

Methods for biogeochemical studies of sea ice: The state of the art, caveats, and recommendations

Lisa A. Miller1* • Francois Fripiat2,3 • Brent G.T. Else4,25 • Jeff S. Bowman5 • Kristina A. Brown6 • R. Eric Collins7 • Marcela Ewert5 • Agneta Fransson8 • Michel Gosselin9 • Delphine Lannuzel10 • Klaus M. Meiners11,12 • Christine Michel13 • Jun Nishioka14 • Daiki Nomura14 • Stathys Papadimitriou15 • Lynn M. Russell16 • Lise Lotte Sørensen17,18 • David N. Thomas15,18,19 • Jean-Louis Tison2 • Maria A. van Leeuwe20 • Martin Vancoppenolle21 • Eric W. Wolff22 • Jiayun Zhou2
ANNEX III

List of Elementa papers

1. Miller et al Methods paper – already published....

Submitted:

2. Title: What sea-ice biogeochemical modellers need from observationalists
Authors: N. Steiner, C. Deal, D. Lannuzel et al.....

3. Title: Closing the O2 (and CO2) budget under a growing ice sheet
Authors: Moreau, S., Kaartokallio H., Zhou J., Kotovitch M., H. Kuosa, Goosse H.,
Dieckmann G. S., Thomas D., Tison J.-L., Delille. B

4. Title: Measurements of air-ice CO2 fluxes over artificial sea ice emphasize the role of bubbles in gas transport
Authors: Marie Kotovitch1,2, Sébastien Moreau3, Jiayun Zhou1,2, Jean-Louis Tison2,
Gerhard Dieckmann4, David Thomas5, and Bruno Delille1

5. Title: The structure and activity of sea ice bacterial communities: Biogeochemical implications and known unknowns
Author: Jeff Bowman

6. C:N ratios in Arctic sea ice
Authors: A. Niemi et al.

Authors: Müller, S., Uusikivi, J., Vähätalo, A., Majaneva, M., Majaneva, S., Autio, R., Rintala,
J.-M.

To Be Submitted:

8. Title: Thermally-forced cycling of DMS, DMSP, and DMSO in Antarctic spring sea ice
Authors: Brabant, F., Carnat, G., Dumont, I., Becquevort, S., Vancoppenolle, M., Ackley, S.F.,
Fritsen, C., Delille, B., and Tison, J.-L.
Anticipated submission: Fall 2015

9. Title: Seasonal and vertical variability of DMS and DMSP in Arctic first-year sea ice
Authors: Carnat, G., Tison, J.-L., Gilson, G., Delille, B., Brabant, F., Levasseur, M., Geilfus,
N.-X., and Papakyriakou, T.
Anticipated submission: Fall 2015

10. Title: First long-term large-scale estimates of primary production in Baltic sea ice
Authors: Tedesco, L., Miettunen, E., An, B.Y., Haapala, J., Kaartokallio, H. and H. Kuosa

11. Title: Coupling between inorganic carbon and biological parameters in melting AA sea-ice
Authors: Fransson, Chierici, Torstensson, Wulff
Anticipated submission: December 2015
12. Title: Iron in sea ice: a review
Authors: D. Lannuzel, M. Vancoppenolle, P. van der Merwe, V. Schoemann, M. Grotti, J. Nishioka and K.M. Meiners
Anticipated submission: Fall 2015

13. Title: Temporal changes in biogeochemical properties of Antarctic sea-ice during spring in the western Weddell Sea with emphasis on DMS(P).
Authors: Jacqueline Stefels, Matthias Steffens, David Thomas, John Dacey, Stathys Papadimitriou, Gerhard Dieckmann, ....
Anticipated submission: January-February 2016

Authors: Grimm, R., Notz, D. Rysgaard, S., Giud, R.N.
Anticipated submission: September 2015

15. The role of sea ice DIC and TA boundary conditions on the sea ice carbon pump in a global blue-white-green ocean modeling system
Authors: Moreau S., Vancoppenolle M., Goosse H., et al.
Anticipated submission: September 2015

16. Modelling DMS in sea ice
Authors: H. Hayashida, E. Mortenson, N. Steiner, A. Monahan
Anticipated submission: November 2015

17. Modelling the carbon cycle in sea ice areas
Authors: E. Mortenson, H. Hayashida, N. Steiner, A. Monahan
Anticipated submission: November 2015

18. Title: Antarctic sea ice nutrients compilation
Authors: Francois Fripiat et al.
Anticipated submission: January-February 2016.

19. 1D sea ice algae model intercomparison
Authors: Letizia Tedesco et al.
Anticipated submission: March 2016

20. Sea ice - pelagic coupling
Authors: Letizia Tedesco et al.
Anticipated submission: February-March 2016

Authors: van Leeuwe, M.A., Rintala, J.M., Assmy, P., and J. Stefels
Anticipated submission: February-March 2016

22. Title: Incorporation of iron and organic matter into young Antarctic sea ice and during its initial growth stages.
Authors: Julie Janssens, Klaus M. Meiners, Jean-Louis Tison, Gerhard Dieckmann, Bruno Delille and Delphine Lannuzel
ANNEX IV

List of papers contributing to BEPSII

Publications in prep:

Arctic sea ice chlorophyll review
Authors: C. Michel, A. Niemi, M. Gosselin ...
To be submitted to GRL.

The Future of the Subsurface Chlorophyll-a Maximum in the Canada Basin - A Model Intercomparison N. S. Steiner, W. Williams, T. Sou, C. Deal, J. M. Jackson, M. Jin, E. Popova, A, Yool
To be submitted to JGR Oceans, FAMOS special issue.

Published contributions:
