



SCAR Sub-Group

SG

Person
Responsible:

BEPSII

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SCAR Delegates Report 2020

BEPSII Expert Group **2018-2020 Report**

Summary

Report Author(s)

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Summary of activities from 2018-20

Summary Budget 2019 to 2022

We would like to ask SCAR to make a reservation of the non-spend \$4000 for 2020 for activities in 2021.

Progress to date

Activities:

1. Under the auspices of ECV-Ice (SCOR WG 152), Task Group 1 performed a field experiment on sea ice optics inter-comparison in Saroma-ko Lagoon, (Hokkaido, Japan) in February 2019 (Nomura et al. accepted). ECV-Ice also coordinated publications on essential sea-ice methodologies (e.g. Campbell et al. 2019; Roukaerts et a. 2019)
2. A 3-day workshop sponsored by SCAR has been held in Paris (France) in May 2019 with part of the squad for the intercomparison of 1-D sea-ice biogeochemical-models project (8 scientists present). Much progress has been made: Model runs under completion, paper in preparation.
3. The annual BEPSII and ECV-Ice meetings was held in Winnipeg, Canada (3 days), in August 2019 in conjunction with the IGS Symposium on Sea Ice. The meeting including a 1-day workshop focusing on sea-ice ecosystem services.
4. Model advancements on DMS and carbon cycling in sea ice systems (Hayashida et al.)
5. A new eddy-covariance technique for CO₂ fluxes over sea ice has been developed (Butterworth & Else, AMT 2019)
6. A revised sea ice phase composition diagram has been produced (M. Vancoppenolle et al., JGR 2019)
7. Preparation in the fall of a joint proposal responding to the BIODIVERSA - Belmont EU call, focusing on ice algae diversity. Currently passed to second stage. Preparations ongoing.
8. Some of the BEPSII member contributed to review the IPCC Special Report on Changing Oceans and Cryosphere.
9. An article on sea ice biogeochemistry has been prepared by some of the BEPSII members for "Frontiers for Young Minds". Under review by kids.
10. A position analysis on Arctic sea ice ecosystems "The future of Arctic sea-ice biogeochemistry and ice-associated ecosystems" by Delphine Lannuzel and several other BEPSII members, which resulted from the BEPSII annual meeting during POLAR2018, has been submitted to Nature Climate Change and is under review (Lannuzel et al. NCC).

Future plans

Plans for 2020/21

- Continue developments supporting tasks outlined in BEPSII's 5-year planning (published on BEPSII website)
- ECV-Ice SCOR WG 152 (also BEPSII TG1) is going into its final year with final experiments and summary papers
- Key efforts for 2020:
 - Preparations of the field school in May 2021 at CHARS Station (Cambridge Bay, Canada).
 - Start with Position Analysis for **Antarctic** Sea ice systems and near-future changes.

- Journal article on sea-ice **ecosystem services**.
- Journal article on large-scale Antarctic sea-ice primary productivity based on a compilation of particulate and dissolved organic carbon concentrations
- Journal article on the biogeochemical role of a microbial biofilm in sea ice
- Review on the role of sea ice biogeochemistry in the carbon cycle
- Journal article on the intercomparison of 1-D sea ice biogeochemical models.
- Journal article on primary production as represented in CMIP6 models.
- Annual meeting in Hobart, August 2020, linked to the SCAR science conference (*this was changed into an online meeting of 5 days*)
- Sea ice inter-comparison laboratory experiments on gas exchange (Roland von Glasow ice chamber, University of East Anglia)
- Contribution to MOSAiC field campaign and results
- Planning of the inter-comparison field experiments of primary production in May 2021 (CHARS Station, Cambridge Bay, Canada)
- Continue model inter-comparisons

Update Nov. 2020:

Due to the COVID-19 pandemic, all life meetings and activities in 2020 have been cancelled, so no funds from SCAR were used.

In 2021 we hope to be able to organize a life meeting again in conjunction with the Gordon Research Conference in California, May 2021.

Due to the ongoing uncertainties with regards the use of the CHARS station for the field school, this activity has been postponed until further notice.

We would like to ask SCAR to make a reservation of the non-spend \$4000 for 2020 for activities in 2021.

Additional information (optional)

Please add any more detail here that you wish, on your subgroup activities, papers published, etc.

Notable Papers

Scientific publications 2019:

Vancoppenolle, M., Madec, G., Thomas, M., & McDougall, T. J. (2019). Thermodynamics of sea ice phase composition revisited. *Journal of Geophysical Research: Oceans*, 124. <https://doi.org/10.1029/2018JC014611>

Nomura, D., Wongpan, P., Toyota, T., Tanikawa, T., Kawaguchi, Y., Ono, T., Ishino, T., Tozawa, M., Tamura, T. P., Yabe, I. S., Son, E. Y., Vivier, F., Lourenco, A., Lebrun, M., Nosaka, Y., Hirawake, T., Ooki, A., Aoki, S., Else, B., Fripiat, F., Inoue, J., Vancoppenolle, M. Saroma-ko Lagoon

- Observations for sea ice Physico-chemistry and Ecosystems 2019 (SLOPE2019). *Bulletin of Glaciological Research* (Accepted).
- Roukaerts, A., Nomura, D., Demand, F., Hattori, H., Dehairs, F., and Fripiat, F., 2019. The effect of melting treatments on the assessment of biomass and nutrients in sea ice (Saroma-ko lagoon, Hokkaido, Japan), *Polar Biology*, 42, 347-356
- Campbell, K., Mundy, C.J., Juhl, A.R., Dalman, L.A., Michel, C., Galley, R.J., Else, B.E., Geilfus, N.X., and Rysgaard, S., 2019. Melt procedure affects the photosynthetic response of sea ice algae, *Front. Earth Sci.*, <https://doi.org/10.3389/feart.2019.00021>
- Tedesco, L., Vichi, M., Scoccimarro, E., 2019. Sea-ice algal phenology in a warmer Arctic, *Science Advances*, 5, eaav4830, doi: 10.1126/sciadv.aav4830.
- Hayashida et al. 2019. CSIB v1: a sea-ice biogeochemical model for the NEMO community ocean modelling framework *Geosci. Model Dev. Discuss.*, <https://doi.org/10.5194/gmd-2018-191>