

Report for the year 2016 and future activities

SOLAS Denmark

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This report has two parts:

- **Part 1:** reporting of activities in the period of January 2016 – Jan-Feb 2017
- **Part 2:** reporting on planned activities for 2017/2018 and 2019.

The information provided will be used for reporting, fundraising, networking, strategic development and updating of the live web-based implementation plan.

IMPORTANT: May we remind you that this report should reflect the efforts of the SOLAS community in the entire country you are representing (all universities, institutes, lab, units, groups, cities)!

PART 1 - Activities from January 2016 to Jan/Feb 2017
<p>1. Scientific highlight</p> <p><i>Describe one scientific highlight with a title, text (max. 200 words), a figure with legend and full references. Please focus on a result that would not have happened without SOLAS, and we are most interested in international collaboration. (If you wish to put more than one, feel free to do so).</i></p>
<p>No strong international SOLAS collaboration in 2016</p>
<p>2. Activities/main accomplishments in 2016 (projects, field campaigns, events, model and data intercomparisons, capacity building, international collaborations, contributions to int. assessments such as IPCC, interactions with policy makers or socio-economics circles, etc.)</p>
<p>In spring 2016 Aarhus University (Arctic Research Centre including Dep. Bioscience, Dep. Chemistry and Dep. Environmental Science) carried out field work in Nuuk fjord. The specific objective of the field campaign were to investigate to which extent surface fluxes of GHG's in the coastal marine system are influenced by sea spray. The original plan was to carry out measurement of CO₂ and water vapor fluxes as well as fluxes of sea spray over Nuuk Fjord, but due to instrument failure, we did not measure CO₂ fluxes over the Nuuk Fjord. Only sea spray fluxes were measured which gave us experience in sea spray flux measurements and some insight in sea spray flux processes at coastal sites. Both upward and downward sea spray fluxes were found. At a low measurement height (here 3.5 meter) and in an area with ship traffic (the site is close to Nuuk) it is likely we find downward fluxes of locally produced anthropogenic particles. Furthermore, we might see the effect from downward flux of larger sea spray particles at this low height. However, it is not possible to determine from the field experiment in Nuuk Fjord, if a connection between sea spray fluxes and CO₂ fluxes is present in Arctic environments. Thus we also participated in a cruise on Amundsen in Baffin Bay where both CO₂ and sea spray fluxes were measured. We are still analyzing the data form Baffin Bay. The field and laboratory work in 2015/16 resulted in two master thesis:</p> <p>1) Ida Alexandra Rosendahl, 60 ECTS, "FIELD STUDIES OF SEA SPRAY PARTICLE FLUXES - Testing the Cospectral Peak method Defense November 7 2016, grade 10. Supervisors: Merete</p>

Bilde and Lise Lotte Sørensen.

2) Berit Brøndum Rasmussen, 60 ECTS, "Surfactants in Seawater and Sea Spray Aerosols. Lab and field studies of physico-chemical properties. Defense January 8 2016, grade 12. Supervisor: Merete Bilde

3. Top 5 publications in 2016 (only PUBLISHED articles) and if any, weblinks to models, datasets, products, etc.

Mørk, E T, Sejr; M K, Stæhr; P A, and Sørensen, L L, 2016, Variability of air-sea CO₂ exchange in a low-emission estuary. *Estuarine, Coastal and Shelf Science*, 176, 1-11. doi:10.1016/j.ecss.2016.03.022

Grimm R, Notz D, Glud R N, Rysgaard S, Six, K D, 2016, Assessment of the sea-ice carbon pump: Insights from a three-dimensional ocean-sea-ice-biogeochemical model (MPIOM /HAMOCC). *Elementa*, 4:000136, doi:10.12952/journal.elementa.00136.

Crabeck C, Galley R, Delille B, Geilfus N-X, Lemes M, Else B, Tison J-L, Francus P, Rysgaard S, 2016, Imaging air volume fraction in sea ice using non-destructive x-ray tomography. *The Cryosphere*. 10, 1125–1145, doi:10.5194/tc-10-1125-2016.

For journal articles please follow the proposed format:

Author list (surname and initials, one space but no full stops between initials), year of publication, article title, full title of journal (italics), volume, page numbers, DOI.

4. Did you engage any stakeholders/societal partners/external research users in order to co-produce knowledge in 2016? If yes, who? How did you engage?

PART 2 - Planned activities from 2017/2018 and 2019

1. Planned major field studies and collaborative laboratory and modelling studies, national and international (incl. all information possible, dates, locations, teams, work, etc.)

A coastal Danish ICOS atmospheric station measuring CO₂ and CH₄ will be established At Station Nord in 2017 and an associate CO₂ air-sea flux site will be established in Daneborg (Northeast Greenland in summer 2017).

A field study involving Aarhus University (PI: Lise Lotte Sørensen) and Greenland Institute of Natural Resources (PI: Dorte Sjøgaard) is planned to take place in July 2017 at Young Sound, Daneborg. The aim of the study is to enhance the understanding of the local and regional processes controlling the climate changes in the Arctic, and to contribute to a qualified assessment of future climate changes and consequences. We will focus on the distribution of the sea ice and the project goal is to contribute to the knowledge of the interaction between variation in greenhouse gases and the sea ice distribution in the Arctic. As a part of this project, we aim to answer following questions: To which extent is the distribution of the sea ice affecting the development of the greenhouse gas concentration in the Arctic and how large is the present uptake of CO₂ in an Arctic ice covered fjord?

Furthermore, a cruise on the Danish research Vessel Dana will take place in August 2017 in Fram strait. During the cruise surface pCO₂ will be measured using a Contros by Mikael Sejr (Aarhus

University).

2. Events like conferences, workshops, meetings, schools, capacity building etc. (incl. all information possible)

3. Funded national and international projects / activities underway (if possible please list in order of importance and indicate to which part(s) of the SOLAS 2015-2025 Science Plan and Organisation (downloadable from the SOLAS website) the activity topics relate – including the core themes and the cross cutting ones)

4. Plans / ideas for future projects, programmes, proposals national or international etc. (please precise to which funding agencies and a timing for submission is any)

SOLAS-DK is submitting a proposal to the NordForsk together with the Nordic SOLAS partners to establish a Nordic SOLAS network. The proposal is coordinated by Anna Rutgersson from SOLAS-Sweden.

5. Engagements with other international projects, organisations, programmes etc.

Comments