



ECV-Ice:

Measuring Essential Climate Variables in Sea Ice

SCOR WG152 since 2016

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Aim of ECV-Ice for sea ice biogeochemistry

- Publish synthetic reviews
- Design inter-comparison experiments
- Create a guide of best practices





Annual ECV-Ice update_2022-2023

Highlight

- Final ECV-Ice annual meeting in USA
- Creating a guide of best practices for sea ice research



Final ECV-Ice annual meeting in USA

Scripps Institute of Oceanography, La Jolla, California, USA, 12 March 2023 with BEPSII



Photo: Daiki Nomura



Intercomparison experiments during ECV-Ice

#1: March 2016 Saroma-ko Lagoon, Hokkaido, Japan

The effect of melting treatments on the assessment of biomass and nutrients in sea ice

#2: March 2018 Saroma-ko Lagoon, Hokkaido, Japan

Sea ice primary production

#3: February 2019 Saroma-ko Lagoon, Hokkaido, Japan

Under/over ice light measurements

#4: January 2020 Roland von Glasgow sea ice chamber in Univ. of East Anglia, UK

Gases in sea ice and sea ice-air gas flux

#5: February 2020 Tsukuba, Japan

Eddy covariance (EC) drying air comparison for air-sea ice CO₂ flux measurement

#6: February 2021 Saroma-ko, Lagoon, Hokkaido, Japan

Eddy covariance (EC) drying air comparison for air-sea ice CO₂ flux measurement

#7: May 2022 CHARs, Cambridge Bay, Canada

Primary production and air-sea ice CO₂ flux measurement



#2: March 2018 Saroma-ko Lagoon, Hokkaido, Japan

Sea ice primary production



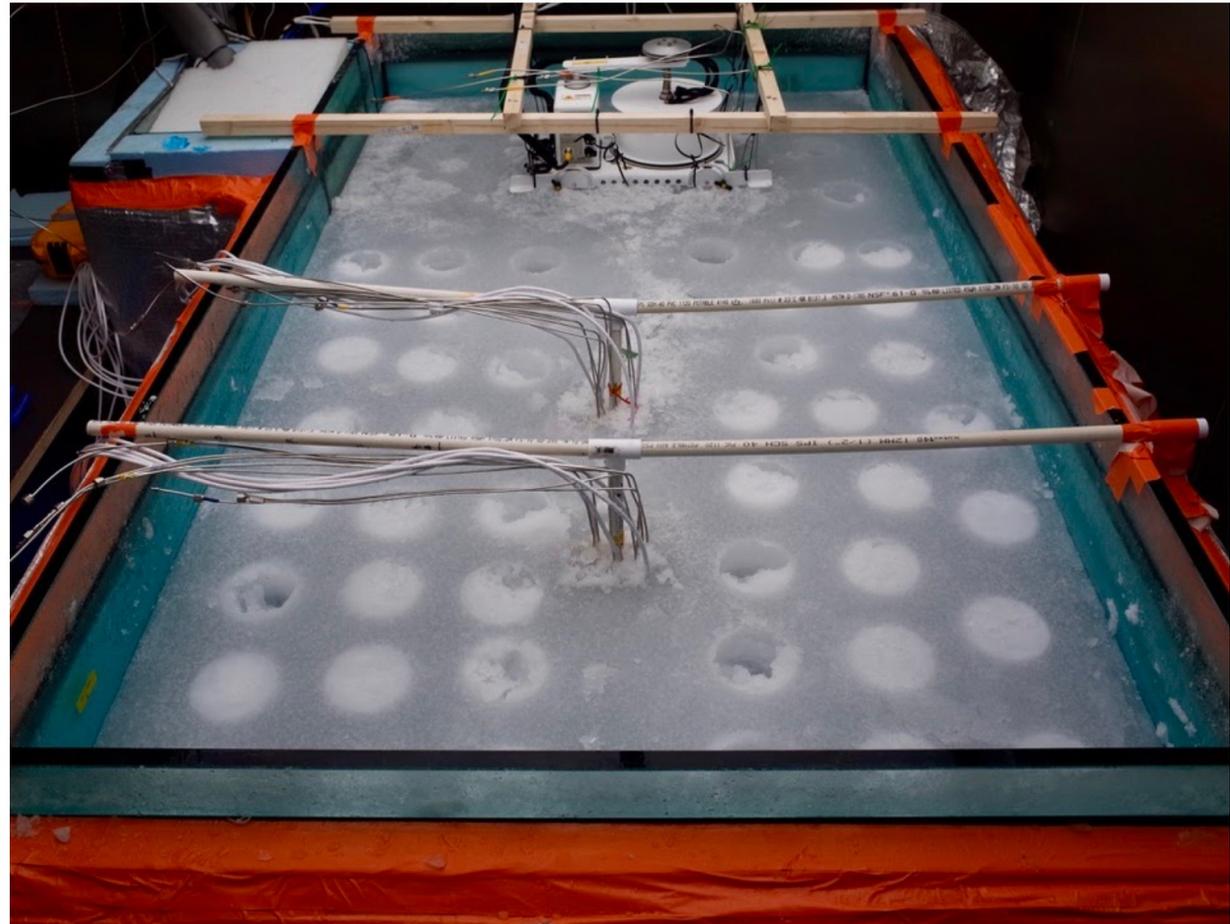
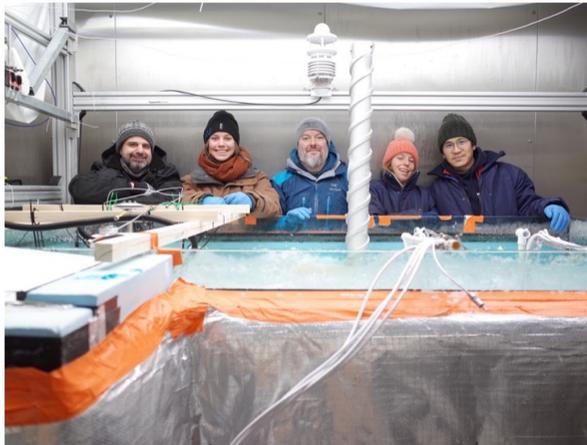
Photos: Daiki Nomura



#4: January 2020

Roland von Glasgow sea ice chamber in Univ. of East Anglia, UK

Gases in sea ice and sea ice-air gas flux



Photos: Daiki Nomura

#7: May 2022 CHARS, Cambridge Bay, Canada

Primary production and air-sea ice CO₂ flux measurement

Inter-comparison experiment for gas in sea ice, flux, and primary production in Cambridge Bay, Canada, Spring 2022

Participant from ECV-Ice:

B. Else, D. Nomura, B. Delille, K. Campbell

Odile, Jo, Rosalie, Manami etc

(Total: 17 scientists including 10 students and 3 ECS)



Photo: D. Nomura

Intercomparison papers during ECV-Ice

#1: Butterworth, B. J. and Else, B. G. T.: Dried, closed-path eddy covariance method for measuring carbon dioxide flux over sea ice, *Atmos. Meas. Tech.*, 11, 6075-6090, <https://doi.org/10.5194/amt-11-6075-2018>, 2018.

#2: Roukaerts, A., Nomura, D., Deman, F., Hattori, H., Dehairs, F., Fripiat, F.: 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, 2019.

#3: 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.: Melt Procedure Affects the Photosynthetic Response of Sea Ice Algae. *Front. Earth Sci.* 7:21. doi: 10.3389/feart.2019.00021, 2019.

#4: 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*, 38, 1–12, doi:10.5331/bgr.19R02, 2020.

#5: Nomura, D., Ikawa, H., Kawaguchi, Y., Kanna, N., Kawakami, T., Nosaka, Y., Umezawa, S., Tozawa, M., Horikawa, T., Sahashi, R., Noshiro, T., Kaba, I., Ozaki, M., Kondo, F., Ono, K., Yabe, I. S., Son, E. Y., Toyoda, T., Kameyama, S., Wang, C., Obata, H., Ooki, A., Ueno, H., Kasai, A. (2022). Atmosphere–sea ice–ocean interaction study in Saroma-ko Lagoon, Hokkaido, Japan. *Bulletin of Glaciological Research*, 40, 1–17, doi:10.5331/bgr.21R02.

#6: Else, B. G. T., Cranch, A., Sims, R. P., Jones, S., Dalman, L. A., Mundy, C. J., Segal, R. A., Scharien, R. K., Guha, T. (2022). Variability in sea ice carbonate chemistry: A case study comparing the importance of ikaite precipitation, bottom ice algae, and currents across an invisible polynya. *The Cryosphere*, 16, 3685–3701, 2022 <https://doi.org/10.5194/tc-16-3685-2022>.

Discussion for creating a guide of best practices for sea ice research based on our previous intercomparison experiments



Photo: Daiki Nomura

Scripps Institute of Oceanography, La Jolla, California, USA, 12 March 2023 with BEPSII





ECV-Ice_2016-2023



Acknowledgements



Photo: D. Nomura

