

includes the Indian Ocean Observing System (IndOOS) Decadal Review, Tropical Atlantic Observing System Review, as well as contribution to the design of TPOS2020, Southern Ocean Observation System (SOOS) and integrated Atlantic Ocean Observation System. Six Community White Papers for OceanObs'19 have been led and/or participated by members of the CLIVAR SSG, Panels and RFs.

## **CLIVAR/CliC/SCAR Southern Ocean Region Panel SORP**

### **National activities report**

Country Finland

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Date \_\_\_\_\_

*Receipt of material prior to 1 February 2019 will ensure inclusion discussions at the first SORP video conference for 2019. The reports contribute to future SORP discussions, as well as input to the SOOS and other CLIVAR/CliC/SCAR activities. All reports will be posted on the SORP website.*

- Purpose of material gathered for the SORP:

To build an overview of observational, modeling, national projects and initiatives, ocean reanalysis and state estimation initiatives relevant to the SORP

(This can be detailed as a list of activities; maps showing where instruments have been or will be deployed; examples of modeling developments, experiments and set-ups; major national and international project involvement; etc.)

- Please refer to SORP's terms of reference (also given at the end of this template) for guidance on scope: <http://www.clivar.org/clivar-panels/southern>

Note: Biological topics such as marine ecology research, for example, are not within the scope of SORP's terms of reference and are therefore not required in these reports. However, SOOS has an interest in such research, so National Representatives are encouraged to include summaries of such research as separate sections.

Note: The Southern Ocean is not explicitly defined in SORP's terms of reference, so please note what the limit used for your national report is (e.g., research on regions only beyond an oceanographic boundary like "south of the Polar Front", or research contained within latitudinal limits like "south of 50 °S").

## **Summary of National Activities**

*(Half page max. This section should include a succinct list of the main annual activities and breakthroughs as well as future plans (including any possible future opportunities for international collaboration))*

In 2018 two studies on the ocean reanalysis performance in the Southern Ocean were published with Finns as co-authors. In the first study, associations between the Southern Annular Mode and multiple variables were explored. In the second study ten ocean reanalysis products were diagnosed in terms of their hydrography, ocean transports and sea ice. Other main activity is the study of the Antarctic fast-ice zone with deployment of instruments and modelling.

## **A. Recent and ongoing activities**

*If your country has a national committee tasked with oversight of Southern Ocean climate science (e.g., like US CLIVAR), please give the name of the committee here:*

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*Describe which major activities have been carried out in the last year or are in progress now. For each activity/project, provide a contact information (e.g., Principal Investigators and Associate Investigators), a website if available and a list of relevant publications.*

### 1. Observational Activities

A sea ice mass-balance buoy has been deployed on the land-fast sea ice off the Dronning Maud Land.

### 2. Modeling Activities

Uotila is a member of the Ocean Working Group of the EC-Earth climate model preparing the global CMIP6 simulations. The group analyses the ocean model output including the Southern Ocean transports, hydrography and sea ice, and advises the EC-Earth tuning group to optimise the model.

Cheng and Vihma have contributed to modelling of sea ice thermodynamics in the Antarctic land-fast ice zone in collaboration with the Polar Research Institute of China. One paper is published [Zhao, J., B. Cheng, Q. Yang, T. Vihma, and L. Zhang (2017). Observations and modelling of first-year ice growth and simultaneous second-year ice ablation in the Prydz Bay, East Antarctica. *Ann. Glaciol.*, 1-9, doi: 10.1017/aog.2017.33] and another one submitted [Zhao, J., B. Cheng, Q. Yang, F. Hui, T. Vihma, B. Zhao, G. Hao, H. Shen, and L. Zhang. Observation and thermodynamic modeling of snow cover influence on landfast sea ice thickness in Prydz Bay, East Antarctica, submitted to *Cold Reg. Sci Techn.*].

### 3. Ocean reanalysis and state estimation Activities

A study on the Seasonal southern hemisphere multi-variable reflection of the southern annular mode in atmosphere and ocean reanalyses was published [Zhang, Z., Uotila, P., Stössel, A., Vihma T. et al. *Clim Dyn* (2018) 50: 1451. doi:10.1007/s00382-017-3698-6]. Another study assessing the performance of ten ocean reanalysis products also in the Southern Ocean was published [Uotila, P., Goosse, H., Haines, K. et al. *Clim Dyn* (2018). doi:10.1007/s00382-018-4242-z].

### 4. National and International Projects/Initiatives

National project “Antarctic Meteorology and Snow Research: from Process Understanding to Improved Predictions” (ASPIRE) addresses also the ocean and sea ice.

**B. Planned activities**

*List which major activities are planned or likely to occur during the next several years, together with a contact information (e.g., Principal Investigators and Associate Investigators).*

1. Observational

FMI has SIMBA buoys deployed by NMEFC on landfast ice in Prydz Bay, East Antarctic (in collaboration with NMEFC) and few SIMBAs deployed by AWI Polarstern in the Weddell Sea (PI Cheng Bin).

2. Modeling

PI Uotila is a member of the Ocean Working Group of the EC-Earth climate model preparing the global CMIP6 simulations. The group will continue analysing the ocean model output including the Southern Ocean transports, hydrography and sea ice as a part of Finnish CMIP6 activities.

Modelling of sea ice thermodynamics will be continued.

3. Ocean reanalysis and state estimation

The published ocean reanalyses paper had a focus on the mean states of the products. A continuation study where the variability and trends of several variables related to Southern Ocean hydrography is on-going and coordinated by PI Uotila.

4. National and International Projects/Initiatives

The ASPIRE project will continue until the end of 2020 (PI Vihma).

5. Opportunities for future international collaborations

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## CLIVAR/CliC/SCAR SORP terms of reference

(<http://www.clivar.org/clivar-panels/southern>)

*"To serve as a forum for the discussion and communication of scientific advances in the understanding of climate variability and change in the Southern Ocean. To advise CLIVAR, [CliC](#), and [SCAR](#) on progress, achievements, new opportunities and impediments in internationally-coordinated Southern Ocean research."*

### **Specific Activities:**

1. Facilitate progress in the development of tools and methods required to assess climate variability, climate change and climate predictability of the ocean-atmosphere-ice system in the Southern Ocean.
2. Identify opportunities and coordinated strategies to implement these methods, spanning observations, models, experiments, and process studies.
3. Provide scientific and technical input into international research coordination, collaborating as required with other relevant programs, including the [Southern Ocean Observing System \(SOOS\)](#).
4. Monitor and evaluate progress in Southern Ocean research, and identify gaps.
5. Enhance interaction between the meteorology, oceanography, cryosphere, geology, biogeochemistry and paleoclimate communities with an interest in the climate of the Southern Ocean.
6. Work with relevant agencies on the standardization, distribution and archiving of Southern Ocean observations.