



SCAR Sub-Group

SG

SO-CPR

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Person
Responsible:

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SCAR Delegates Report

EG-Continuous Plankton Recorder and the SCAR Southern Ocean CPR Survey (SO-CPR) 2018-20 Report

Report Author(s)

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Summary of activities from 2018-20 and any other important issues or factors

Since the last report 2018, we have completed over 80 CPR tows during the 2018/19 and 2019/20 Antarctic field season from research vessels from several countries. Approximately 272,000 nautical miles have been sampled since the commencement of the SO-CPR Survey in 1991, representing some 55,000 samples for 293 zooplankton taxa coupled with environmental data.

Our important future task for maintaining high quality data is developing and enhancing the skills of current and new technicians. The “Southern Ocean Continuous Plankton Recorder (SO-CPR) Survey Standards Workshop” was held at the Australian Antarctic Division on 20–23 November 2018. This biennial workshop was last held in 2016. The participants were technicians from the three nations (Japan, Australia, and New Zealand) leading the project. The purpose of the workshop was to ensure that high standards of data quality were being maintained, in terms of species identification and methodology, among the main analysts of the SO-CPR survey, and to discuss future training methods and a future roadmap for the SO-CPR program. A range of topics was discussed including: taxonomic resolution issues (particularly for northern species of copepods and euphausiids), laboratory methods (setting of the CPR cassette, microplastic counting rules), training methods (SO-CPR processing manual and zooplankton counting rule book), data handling for database input, and future standards workshops, including comprehensive training workshops for emerging SO-CPR survey partners. We discussed and agreed on a future roadmap for making a SO-CPR processing manual and zooplankton counting rule book, for the purposes of current and new technician training.

As a last task of the EG SO-CPR of eight years, we are continuing to work on a special report to SCAR on the Status and Trends of Southern Ocean Zooplankton. This report will bring together all information from 25 years of the SO-CPR Survey into one report. This report will also identify any trends (seasonal or long-term) in relation to changes in abundance, shifts in distribution, timing of events, or changes in composition and community composition. In order to advance the writing task of the Status report, the final workshop on a special report of the “Status and Trends of

Southern Ocean Zooplankton” was conducted in May 2019 at National Institute of Polar Research Japan. We have completed the first draft.

Forthcoming Activities

The SO-CPR Survey involves several countries with shipping activity in the Southern Ocean. Issues that were identified through this workshop include inconsistencies in taxonomic skill and identification across different laboratories and the lack of technicians with high-quality standard techniques. One important future task for maintaining high-quality data is therefore developing and enhancing the skills of current and new technicians. We will plan a larger standardisation workshop to maintain the high standards for procedures and identification for quality control and assurance among the different laboratories around the world. However, due to the influence of COVID-19, the timing of the workshop has not been decided. Therefore, we will prepare for ways to improve future training, such as the making of a SO-CPR processing manual and zooplankton counting rule book. The new counting rules and taxonomic list will be further described in the new procedures manual.

Optional additional information

Outreach, communication and capacity-building activities

Kitchener J, Takahashi K, Robinson K (2019). "The SCAR SO-CPR survey". Verbal presentation at annual Global Alliance of CPR Surveys (GACS) workshop. Hobart, Tasmania. Dates: 25-27 November, 2019

Notable Papers

(Three most notable papers, if applicable – see the example below, which includes a brief statement (shaded) indicating the link to the group.)

1. Takahashi, K.T., Kitchener, J.A., Robinson, K., Hosie, G.W. (2019) Report on the Southern Ocean Continuous Plankton Recorder (SO-CPR) Standards Workshop 2016: SCAR SO-CPR Database Export Group. Nankyoku Shiryō (Antarctic Record) 63: 9-19

This work is the report of the newest workshop held in Australian Antarctic Division in December 2018. During the workshop we discussed a range of topics including: taxonomic resolution issues; laboratory method; training methods; data handling; and future workshops/conferences, including comprehensive training workshops for emerging SO-CPR survey partners. We agreed on a future roadmap for making a SO-CPR processing manual and zooplankton counting rule book, for the purposes of current and new technician training.

2. Sonia D. Batten, Rana Abu-Alhaija, Sanae Chiba, Martin Edwards, George Graham, R. Jiyothibabu, John A. Kitchener, Philippe Koubbi, Abigail McQuatters-Gollop, Erik Muxagata, Clare Ostle, Anthony J. Richardson, Karen V. Robinson, Kunio T. Takahashi, Hans M. Verheye and Willie Wilson (2019) A Global Plankton Diversity Monitoring Program. *Frontiers in Marine Science* 6: 321. Doi: 10.3389/fmars.2019.00321

CPR have been sampling plankton throughout much of the global oceans for multiple decades. The globalization of an integrated network of regional CPR surveys was envisaged and in 2011 the existing surveys formed the Global Alliance of CPR Surveys (GACS). This paper identifies the progress of GACS towards a global plankton observing program that delivers the data and research required to better

understand global ocean dynamics and change to inform sustainable marine decision-making.

3. Pinkerton, M.H.; M. Decima; J. Kitchener; K. Takahashi; K. Robinson; R. Stewart; G.W. Hosie (2020). Zooplankton in the Southern Ocean from the Continuous Plankton Recorder: distributions and long-term change. *Deep Sea Research I*, Doi: 10.1016/j.dsr.2020.103303

This is the newest scientific paper that used our dataset. Based on the Boosted Regression Tree models, this paper presented predictions of the spatial and seasonal (October–March) environmental suitability for six key taxonomic groups of zooplankton in the Southern Ocean. Trend analysis suggests that between 1997 and 2018 the environmental suitability for copepods, Foraminifera, and Fritillaria spp. has increased by 0.72% per year average, and at higher rates in frontal regions especially in the Indian sector of the Southern Ocean. In contrast, for pteropods in some areas the environmental suitability has significantly worsened over the last 20 years.

Publications

Takahashi, K.T., Kitchener, J.A., Robinson, K., Hosie, G.W. (2019) Report on the Southern Ocean Continuous Plankton Recorder (SO-CPR) Standards Workshop 2016: SCAR SO-CPR Database Export Group. *Nankyo Shiryô (Antarctic Record)* 63: 9-19

Sonia D. Batten, Rana Abu-Alhaija, Sanae Chiba, Martin Edwards, George Graham, R. Jiyothibabu, John A. Kitchener, Philippe Koubbi, Abigail McQuatters-Gollop, Erik Muxagata, Clare Ostle, Anthony J. Richardson, Karen V. Robinson, Kunio T. Takahashi, Hans M. Verheye and Willie Wilson (2019) A Global Plankton Diversity Monitoring Program. *Frontiers in Marine Science* 6: 321. Doi: 10.3389/fmars.2019.00321

Pinkerton, M.H.; M. Decima; J. Kitchener; K. Takahashi; K. Robinson; R. Stewart; G.W. Hosie (2019). Long-term change in zooplankton communities of the Southern Ocean between 1997 and 2018: implications for fisheries and ecosystems. Paper for CCAMLR WG-EMM-19/66.

Pinkerton, M.H.; M. Decima; J. Kitchener; K. Takahashi; K. Robinson; R. Stewart; G.W. Hosie (2019). Patterns and trends in environmental and ecological (zooplankton) properties of the Southern Ocean between 1997 and 2018. Poster at 10th International Penguin Conference, Dunedin 24-28 August 2019.

Pinkerton, M.H.; M. Decima; J. Kitchener; K. Takahashi; K. Robinson; R. Stewart; G.W. Hosie (2020). Zooplankton in the Southern Ocean from the Continuous Plankton Recorder: distributions and long-term change. *Deep Sea Research I*, DOI: 10.1016/j.dsr.2020.103303

Suter, L., Polanowski, A.M., Clarke, L.J., Kitchener, J.A., Deagle, B.E. (in press). Capturing open ocean biodiversity: comparing environmental DNA metabarcoding to the continuous plankton recorder. *Molecular Ecology*.