



**SCAR Sub-Group**

**ASPeCt**

SG

PS

Person Responsible: Marilyn Raphael

## **SCAR Delegates Report 2020**

# **Antarctic Sea-Ice Processes and Climate (ASPeCt)** **2018-2020 Report**

## **Summary**

### **Report Author:**

Marilyn Raphael (USA)

### **Summary of activities from 2018-20**

ASPeCt wrote and had endorsed by YOPP a proposal to contribute underway sea ice observations to the YOPP effort in 2018 and 2019. This effort to have more cruises involved each year is being continued. SOOS has significantly updated its "Due South" system with direct ASPeCt assistance and we are using that to engage the cruises in making the observations. Already existing ASPeCt data are being formatted for easier access and analysis.

-ASPeCt scientists at AWI conducted a month-long Polarstern expedition into the northwestern Weddell Sea, conducting 15 ice stations, 10 EM bird flights and deploying 3 drift arrays.

-ASPeCt scientists on the Australian AFIN project completed a successful field campaign at Casey Station (East Antarctica), which coincided with the final deployment of NASA's Operation IceBridge

-ASPeCt continued to leverage members' attendance at regular science conferences to hold sub group meetings to ensure that progress is made on ASPeCt goals. In 2019 the ASPeCt held a side-meeting the day before the IGS Sea Ice Symposium began, and sponsored the sea ice session convened by Stefanie Arndt, ASPeCt's junior officer.

-ASPeCt will hold a Workshop online on July 31<sup>st</sup> 2020. This workshop was previously scheduled to be held in Hobart at the SCAR 2020 OSC. Parallel sessions convened by ASPeCt scientists will also be held online during this time.

-Major outcomes of the the 2017 PIPERS cruise, led by ASPeCt Immediate Past Chair Steve Ackley, on N. B. Palmer into the early winter Ross Sea, have been presented at scientific conferences and are in varying stages of publications.

### **Summary Budget 2019 to 2022**

	2019	2020	2021	2022
	Spent	Allocated	Request	Request
(US\$)	\$0.00	5000	3000	3000

## Progress to date

### Sub-group Outcomes Summary

Sub-group	Activity/Outcome/Benefit/Achievement
ASPeCt	ASPeCt's efforts to increase participation in its sea ice observation programme as its contribution to YOPP was very successful over the 2018-2019 season. Eight voyages have reported back to have collected ASPeCt data. These data will be quality controlled before being added to the ASPeCt database and YOPP archives.
ASPeCt	The Australian AFIN project completed a successful field campaign at Casey Station (East Antarctica), which coincided with the final deployment of NASA's Operation IceBridge [OIB] – with a coincident target area. The field project focussed on collecting <i>in situ</i> measurements on sea ice and the glacial ice sheet for the validation of ICESat-2 data.
ASPeCt	ASPeCt held a side-meeting the day before the IGS Symposium began (August 18 <sup>th</sup> , 2019), where we discussed progress on ASPeCt's goals since the meeting in Davos (2018) and planned for the SCAR 2020 meeting in Hobart.
ASPeCt	ASPeCt scientists at AWI conducted a month-long Polarstern expedition (in 2019) into the northwestern Weddell. The project involved 15 ice stations (snow structure, ice coring, snow and sea ice thickness transects), 10 EM bird flights for airborne ice thickness measurements and 3 drift arrays, consisting of 17 surface velocity profilers (SVP) were deployed. Sea ice observations made will be added to ASPeCt database.
ASPeCt	Led by ASPeCt Immediate Past Chair Steve Ackley, the PIPERS cruise on N. B. Palmer into the early winter Ross Sea took place between April 11 and June 14 2017. The keystone project was to investigate the Atmosphere-Ice-Ocean interaction in the Terra Nova Bay and Ross Ice Shelf coastal polynyas. Major outcomes of this cruise, have been presented at scientific conferences (including the IGS 2019) and are in varying stages of publications. Details of the cruise found here: <a href="http://www.utsa.edu/LRSG/PIPERS/index.htm">http://www.utsa.edu/LRSG/PIPERS/index.htm</a>
ASPeCt	ASPeCt will hold a Workshop online on July 31 <sup>st</sup> 2020. This workshop was previously scheduled to be held in Hobart at the SCAR 2020 OSC. Key agenda items will include updates to measurement protocol, database management, and joint meetings with other SCAR subgroups including SORP, to discuss common goals. Parallel sessions convened by ASPeCt scientists will also be held online during tthis time.

**Sub-group Cash Flow**

*(From previous Delegates meeting to date)*

Sub-group	Allocation	Amount spent		
		2018	2019	2020
ASPeCt	8000	5290	--*	--*

*\*We intended to use these funds for the Workshop but those plans have been overturned by the responses to the pandemic.*

**Future plans**

**Planned activities in 2020 to 2022**

Sub-group	Planned activity
ASPeCt	Online Workshop on July 31 <sup>st</sup> 2020. Formerly planned to be a part of SCAR 2020 in Hobart, Australia. Workshop will highlight the work that ASPeCt has been doing over the last 2 – 4 years and finalize future plans. During this time, ASPeCt may also meet with online other groups including SOOS and SORP to discuss mutual interests and plan for collaborative projects. The outcomes of the workshop and joint meetings will dictate ASPeCt activities for the next 4 – 5 years.
ASPeCt	Online Oral Presentation Sessions organised by ASPeCt scientists will be held in July/August 2020. Originally planned to be part of SCAR 2020 in Hobart, Australia.
ASPeCt	Active enlistment of cruises going into the sea ice zone using DUE SOUTH as a tool to access information on upcoming cruises
ASPeCt	Continuing development of the ASPeCt ship-based observation system and database for sea ice measurements taken by remote vessels (airborne and under ice), ship-based instruments and surface-based instruments and sampling.
ASPeCt	Visualization of database in order to increase accessibility of the data and to publicize its existence. This process has begun.

**Planned use of funds for 2020 to 2022**

Year (YYYY)	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
2020	Fund travel and participation in ASPeCt- related meetings; fund database management needs	\$5000	Marilyn Raphael	raphael@geog.ucla.edu
2021	Fund travel and participation in ASPeCt- related meetings	\$3000	Marilyn Raphael	raphael@geog.ucla.edu
2022	Fund travel and participation in ASPeCt- related meetings	\$3000	Marilyn Raphael	raphael@geog.ucla.edu
<b>Total</b>		<b>\$11000</b>		

### Any additional detail on funds usage and desired results/outcomes

ASPeCt members convene sessions at regular science conferences and ASPeCt leverages members' attendance to hold sub group meetings to ensure that progress is made on ASPeCt goals. ASPeCt members also attend meetings of groups with which it would like to form closer ties. To that end ASPeCt requests support in each of years 2020 to 2022 to support ASPeCt-related travel to science conferences and to coordinate with other groups. The requested funds will be targeted primarily to support the travel of early career scientists.

Anticipating an in person meeting in 2022, ASPeCt plans to hold a full Workshop at the SCAR 2022 meeting. This is a meeting we hope draw many ASPeCt members and will showcase the work that ASPeCt has completed as well as discuss progress on continuing work. The requested funds will be targeted primarily to support the travel of early career scientists to attend and participate in the Workshop.

*An overall benefit of these meetings is the fostering of community and alignment of common ASPeCt-related goals which together ensure scientific progress.*

### Percentage of the budget to be used for support of early-career researchers

2020: Here we expect at least 50% of the budget to go towards funding ECSs.

2021: Here we expect at least 50% of the budget to go towards funding ECSs.

2022: Here we expect at least 50% of the budget to go towards funding ECSs.

### Percentage of the budget to be used for support of scientists from countries with developing Antarctic programmes

2020: This is not known but we expect to prioritize ECSs from such countries.

2021: This is not known but we expect to prioritize ECSs from such countries.

2022: This is not known but we expect to prioritize ECSs from such countries.

## Membership

### Leadership

Role	First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
<b>Chair</b>	Marilyn	Raphael	UCLA	USA	raphael@geog.ucla.edu	2017	Indefinite
<b>Immediate Past Chair</b>	Stephen	Ackley	UTSA	USA	Stephen.Ackley@utsa.edu	2017	Indefinite
<b>Data and Communications Officer</b>	Petra	Heil	AAPP/AA	Australia	Petra.heil@utas.edu	2017	Indefinite
<b>*Junior Officer</b>	Stefanie	Arndt	AWI	Germany	Stefanie.Arndt@awi.de	2017	Indefinite

*Please identify early-career researchers with \* in first column*

**Other members – ADVISORY GROUP**

First Name	Last Name	Affiliation	Country	Email
<b>Kay</b>	Ohshima		Japan	
<b>Rob</b>	Massom	AAD	Australia	Rob.Massom@aad.gov.au
<b>Ted</b>	Maksym	WHOI	USA	tmaksym@whoi.edu
<b>Pat</b>	Langhorne		New Zealand	pat.langhorne@otago.ac.nz
<b>Elizabeth</b>	Hunke	LANL	USA	eclare@lanl.gov
<b>Klaus</b>	Meiners	AAPP	Australia	Klaus.Meiners@awe.gov.au
<b>Sharon</b>	Stammerjohn	INSTAAR	USA	sharon.stammerjohn@colorado.edu
<b>Jean Louis</b>	Tison		Belgium	jtison@ulb.ac.be
<b>Gunther</b>	Heinemann	University of Trier	Germany	heinemann@uni-trier.de
<b>Ron</b>	Kwok	JPL	USA	Ronald.Kwok@jpl.nasa.gov

Please identify early-career researchers with \* in first column

**\*ASPeCt has more than 50 members, many of whom are early career researchers. Here we include only the members on our Advisory Group We can send a full list of the membership by email if necessary.**

**Additional information (optional)**

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

**Notable Papers**

1. Kern, S.; Ozsoy, B. **An Attempt to Improve Snow Depth Retrieval Using Satellite Microwave Radiometry for Rough Antarctic Sea Ice.** *Remote Sens.* **2019**, *11*, 2323.

This study, led by two ASPeCt scientists, successfully develops a method to compute the snow depths on sea ice from the AMSR-E and AMSR2 data. Their aim is to optimize their approach so that the snow depths retrieved for the combined AMSR-E/AMSR2 period could serve as a data set for sea-ice thickness retrieval based on satellite altimetry.

2. Newman L., **Heil P.**, Trebilco R., Katsumata K., Constable A., van Wijk E., Assmann K., Beja J., Bricher P., Colemans R., Costa D., Diggs S., Farneti R., Fawcett S., Gille ST, Hendry K.R, Henley S., Hofmann E., **Maksym T.**, Mazloff M., Meijers A., Meredith M.M, Moreau S., **Ozsoy B.**, Robertson R., Schloss I., Schofield O., Shi J.X, Sikes E., Smith I.J, Swart S., Wahlin A., **Williams G.**, Williams M.JM, Herraiz-Borreguero L., **Kern S.**, **Liesers J.**, **Massom R.A.**, Melbourne-Thomas J., Miloslavich P., **Spreen G.** (2019) **Delivering Sustained, Coordinated, and Integrated Observations of the Southern Ocean for Global Impact.** *Front. Mar. Sci.*, 08 August 2019 | <https://doi.org/10.3389/fmars.2019.00433>

Led by Southern Ocean Observing System (SOOS) and contributed to by a number of ASPeCt scientists, “This paper presents a community statement on the major scientific and observational progress of the last decade, and importantly, an assessment of key priorities for the coming decade, toward

achieving the SOOS vision and delivering essential data to all end-users” *note this is a direct quote.*

3. Zhao, J., B. Cheng, T. Vihma, Q. Yang, F. Hui, B. Zhao, G. Hao, H. Shen, and L. Zhang (2019). **Observation and thermodynamic modeling of the influence of snow cover on landfast sea ice thickness in Prydz Bay, East Antarctica**, Cold Regions Science and Technology, 168, 102869, <https://doi.org/10.1016/j.coldregions.2019.102869>.

This paper analysed observed snow depth and ice thickness on landfast sea ice in Prydz Bay, East Antarctica, to determine the role of snow in the annual cycle of sea ice thickness.

4. Arndt, S., and Haas, C.: **Spatiotemporal variability and decadal trends of snowmelt processes on Antarctic sea ice observed by satellite scatterometers**, The Cryosphere, 13, 1943-1958, 10.5194/tc-13-1943-2019, 2019.

This paper examines the timing and intensity of snowmelt processes on sea ice using satellite data and developed a conceptual model to suggest that future multi-frequency active and passive microwave satellite missions could be used to examine melt processes throughout the vertical snow column of thick snow on perennial Antarctic sea ice.

5. De Pace L., Madison Smith, Jim Thomson, Sharon Stammerjohn, Steve Ackley, and Brice Loose (2019) **Frazil ice growth and production during katabatic wind events in the Ross Sea, Antarctica**, The Cryosphere Discussions, <https://doi.org/10.5194/tc-2019-213>

This paper used data collected during the PIPERS expedition in 2017 to estimate the intensity of short-term ice production events during windy episodes in Terra Nova Bay Polynya

### **ASPeCt Goals-Relevant Grants led by ASPeCt Scientists (bold)**

2019- 2022: Antarctic Research. The project is called “Snow contrasts controlling the fate of sea ice” (SnowCast). project funded by the German Research Association’s (DFG) program on Antarctic Research. **Stefanie Arndt**

2017-2020: Circum-Antarctic sea-ice lead frequencies and regional characteristics from satellite imagery. Grants HE 2740/22 and WI 3314/3 of the German Research Foundation (DFG) in the priority programme SPP1158 “Antarctic Research. **Gunther Heinemann**

2017-2020: Antarctic Meteorology and Snow Research: from Process Understanding to Improved Predictions (ASPIRE). Funded by the Academy of Finland. **Timo Vihma**

2019 – 2039: Observatory of East Antarctic near-surface atmosphere and cryosphere, Australian Antarctic Science Programme, **Petra Heil, Marilyn Raphael**, Ding, Minghu, Scott Carpentier, Jiechen Zhao

2018 – 2021: Collaborative Research: Understanding Contemporary Variability in Antarctic Sea Ice: Ensemble Reconstruction of Sea Ice Extent and Concentration for the 20th Century, National Science Foundation, **Marilyn Raphael, Will Hobbs**, Ryan Fogt, Julie Jones, Mark Handcock.

**Direct support from outside organisations received for your activities**

*(Numbered list with values indicated if direct cash support. Please restrict in-kind support to substantive in-kind support only)*

**Climate and Cryosphere (CliC)** – support for attendance at the IGS Side Meeting – approx. \$3000.

**Major collaborations your Science Group has with other SCAR groups and with organisations/groups beyond SCAR**

*(Numbered list of substantive collaborations)*

**Within SCAR**

1. ASPeCt Chair Marilyn Raphael is a member of the AntClim21 SSG. AntClim21 and along with other ASPeCt scientists is an author on a significant scientific paper in *Geosciences*.
2. ASPeCt Chair Marilyn Raphael is a member of AntClimNow, and worked on the Science and Implementation Plan that is to be presented to SCAR in 2020.
3. Inga Smith a member of ASPeCt, is also Co-Chair of the CLIVAR/CliC/SCAR Southern Ocean Region Panel (SORP). She coordinates activities of interest to both groups for example ASPeCt interest in working more closely with SORP on Ocean Observations Panel for Climate (OOPC). Two other ASPeCt members serve on the Panel.

**Outside SCAR**

1. Continued representation on the World Climate Research Programme (WCRP) and SPARC's Polar Climate Predictability Initiative (PCPI) as co-Lead of the Initiative (Marilyn Raphael).
2. Participation in the Year of Polar Prediction, an international research effort sponsored by World Meteorological Organization's (WMO) World Weather Research Programme (WWRP).
3. Southern Ocean Observing System (SOOS) – ASPeCt member Burcu Ozsoy (Turkey), is a Scientific Member on the SOOS Scientific Steering Committee.
4. Continuing contribution to the annual BAMS/NOAA State of the Climate assessment reports, re Antarctic sea ice extent and seasonality <http://www.ncdc.noaa.gov/bams-state-of-the-climate/>.

\*\*\*\* Numerous ASPeCt scientists are also individually involved with (i.e leading) their national programs focused on the Antarctic and sea ice observation. For example, Dr. Burcu Orszoy leads the fledgling Turkish Antarctic project, Dr. Petra Heil and Dr. Rob Massom lead AAD efforts.

### **Outreach, communication and capacity-building activities**

*Brief highlights of any activities undertaken since the SCAR Delegates meeting in 2018.*

ASPeCt has a mailing list of more than 50 members. This mailing list is housed at the Los Alamos Lab and administered by Elizabeth Hunke as well as the ASPeCt leadership. The mailing list is used frequently to inform the group, to foster discussion about ASPeCt activities and to collect information about the results of ASPeCt-related activities. The mailing list is quite diverse in terms of gender and nationality.

ASPeCt is also in the process of improving/upgrading its website.

Since 2018 ASPeCt has established a Twitter presence, actively informing about ASPeCt efforts at meetings, conferences and in the field. This effort (and the improvement of the website) is led by Stefanie Arndt, our Junior Officer.

### **SCAR fellowship reviewers**

*Please list one or more people (name and email address) from your group who would be willing to serve as reviewers for the next few years, along with 1-3 keywords on their principal expertise.*

<b>First Name</b>	<b>Last Name</b>	<b>Email</b>	<b>Principal Expertise</b>
<b>Marilyn</b>	Raphael	raphael@geog.ucla.edu	Sea-ice atmosphere interactions
<b>Sharon</b>	Stammerjohn	sharon.stammerjohn@colorado.edu	Sea ice
<b>Rob</b>	Massom	Rob.Massom@aad.gov.au	Sea ice
<b>Will</b>	Hobbs	whobbs@utas.edu	Southern Ocean