

## Pacific Arctic Group (PAG) 2024 Spring Meeting



### PAG Meeting Agenda

March 24, 2024

Edinburgh, Scotland

<http://pag.arcticportal.org/>

#### Sunday Meeting Local Time (GMT), Edinburgh, Scotland: March 24, 2024

Start 0830-1000

Coffee: 1000-1030

Continue 1030-1230

Lunch: 1230-1330

Restart 1330-1530

Coffee: 1530-1600

Continue: 1600-1730

Finish: 1730

#### St Leonard's Hall



#### Introduction:

The Pacific Arctic Group (PAG) is a group of institutes and individuals having a Pacific perspective on Arctic science. Organized under the International Arctic Science Committee (IASC), the PAG has as its mission to serve as a Pacific Arctic regional partnership to plan, coordinate, and collaborate on science activities of mutual interest. For the purpose, we have Spring and Fall meetings. The Spring PAG meeting is held during “Arctic Science Summit Week” and is focused on “business” issues and an update on research plans for the coming field season. The Fall PAG meeting is hosted at various locations in alternating PAG countries after the field season and is focused on review of accomplishments during the previous summer and outlooks for the future. The spring 2024 Business Meeting at ASSW24 will report on and discuss the planned 2024 and future field activities, joint research activities, interaction with other organizations/projects, PAG organizational issues and other business issues.





**ASSW24 Pacific Arctic Group Spring Meeting**  
<http://pag.arcticportal.org/>



- **March 24, 2024** (Sunday); 0830-1730 GMT
- **Meeting site:** Pollock Estate of the University of Edinburgh, Scotland
- **Room:** Pollock Room (St Leonards), 2<sup>nd</sup> level

**PAG Co-Chairs:** Jackie Grebmeier<sup>1</sup> and Christina Goethel<sup>1,2</sup>

<sup>1</sup>Chesapeake Biological Laboratory, University of Maryland Center for Environmental Science Solomons, Maryland USA  
<sup>2</sup>St. Mary's College of Maryland, St. Mary's, Maryland USA

1) Jackie welcomed the group and provided [logistic information](#) as well as the [meeting agenda](#).

## Country Reports:

### 2a) Canada (Bill Williams, Fisheries and Oceans Canada)



Canadian Arctic Marine Science 2024  
 Pacific Arctic Group Spring Meeting  
 Arctic Science Summit Week, Edinburgh, Scotland  
 24 March, 2024  
 Bill Williams, Fisheries and Oceans Canada

Bill provided updates on cruise activities through 2024, including Beaufort Gyre and noted this represents their 22<sup>nd</sup> year! They have monitored freshwater content in the gyre since 2003 and found that ocean freshwater relative to salinity = 34.8. A deepening of the halocline and increasing Pacific water heat content were found. Trends in bottom temperature, ice concentration, and ice draft were shown for a 30-year moored time series for the Canadian Beaufort Sea, as were maps of planned stations for 2024 that expand ecosystem time-series.

### 2b) China (Jianfeng He, Polar Research Institute of China)



ASSW2024  
 Edinburgh, Scotland, UK  
 March 21-25, 2024

**China's activities during the 2023 field season and plans for 2024**



**Jianfeng HE**  
 Polar Research Institute of China (PRIC)  
 March 24th, 2024

Jianfeng about China's general updates and the CHINARE 14 cruise plan for 2024. It was noted that the new R/V can be used in the light ice region of the Arctic Ocean. A new project called RecCAO: Recording the Environment and Ecosystem Changes in the Central Arctic Ocean was announced for 2024-2027. For 2024 activities, the Xuelong will run from July 11<sup>th</sup> – Sept. 29<sup>th</sup> (80 days) and Jidi will run in August to September with dates still to be determined. Missions will include: marine ecosystem investigation in the Pacific Arctic, biological observation in the central AO, and geophysical survey in Gakkel middle-ocean ridge.

### 2c) Japan (Shigeto Nishino, JAMSTEC)



**Japan Country Report:**  
**Activities during the 2023 field season and plans for 2024**

Chief Scientist: Hironichi Ueno (Hokkaido Univ.) for T/S Oshoro maru  
 Chief Scientists: Amane Fujiwara and Motoyo Itoh (JAMSTEC) for R/V Mirai  
 Presenter: Shigeto Nishino (JAMSTEC)



Arctic Challenge for Sustainability II  
<https://www.jamstec.ei.ac.jp/ohm/24824/>

Shigeto provided updates 2023 cruises, including the T/S Oshoro maru (June-August 2023) and the R/V Mirai (both completed) as well as plans for the 2024 Mirai cruise. Research on the Oshoro maru 2023 cruise included hydrographic surveys to seabirds/marine mammal observations. On the Mirai 2023, they conducted various types of observations from the atmosphere to the seafloor, including investigation of marine plastic pollution. They found that the Chukchi shelf was anomalously less saline and that the Chukchi Shelf and Canada Basin were anomalously warm. The cruise on the Mirai 2024 will run from August 27<sup>th</sup> – September 30<sup>th</sup>.

## 2d) Korea (Eun-Jin Yang, KOPRI)



Eun-Jin provided updates on the 1<sup>st</sup> – 3<sup>rd</sup> legs of the July-October 2024 cruise plans through the Northern Pacific Ocean and Bering Sea. Research to be conducted during these legs include: an air-sea surface interaction study, an ocean research project, and a sub-bottom research project.

## 2e) Jackie Grebmeier, UMCES CBL



Jackie provided updates for the U.S.A., including the 2024 PAG/DBO Cruise Plan Table. The Sir Wilfrid Laurier cruise is scheduled from August 1-13, 2024 and the Sikuliaq DBO-EcoFOCI-AMBON-CEO is scheduled from August 6-27, 2024. She also provided graphics of trends for time-series sea ice persistence for the DBO regions. There will also be a cruise on the NorsemanII from September 8-18, 2024 (which is also planned for 2025). She also provided highlights for the research by Ashjian et al. on bio-physical drivers of bowhead whale distribution on the Alaskan Beaufort Shelf during a period of rapid environmental change which ends 2024 as well as Craig Lee's work on the Arctic Mobile Observing System (AMOS, 2019-2025) and the Arctic Argo Pilot study.

## PAG-related joint research activities – summaries, results, plans for 2024 & onwards:

### A) Distributed Biological Observatory (DBO):

#### 3.a.i) Jackie Grebmeier, UMCES CBL



Jackie provided updates of recent collaborative Pacific DBO activities, including a summary of the DBO – Linking physics to biology and serving as a change detection array, where standard sampling in the ecosystem was established in 2010. She showed a schematic from Koch, et al.'s 2023 paper suggesting that future conditions in the Arctic shelf will include an extended open-water period, ice-free summers, decreased sea-ice algal production, and delayed open water phytoplankton blooms. ODV graphics of parameters such as temperature and salinity were shown for DBO1 and DBO3, as well as the time-series of benthic biomass patterns from 1970s – 2019 indicating significant declining trends. She also highlighted increased potential ship strikes for Baleen whales in the Bering Strait Region. Stewart et al. 2023, show a decline in gray whales with increasing open water and decline in benthic crustacean prey quality in DBO1-3 regions. She also mentioned ongoing DBO-relevant synthesis and modeling projects.

### 3.a.ii) Igor Polyakov, UAF



Igor provided an update on the Siberian DBO science and planning, including U.S. and Korean teams. He showed a map of Arctic Ocean circulation and locations of NABOS/KOPRI moorings. It was shown that the effects of Atlantification are traceable all the way to the Fram Strait (Belter et al. 2021). There are plans for a 2025 cruise (as well as for 2027, 2029, and 2031).

### 3.a.iii) Anna Nikolopoulos, Norwegian Polar Institute [No PPT]

Anna presented the latest from the Pan-Arctic DBO network meeting, and suggestions for the way forward.

### 3.a.iv) Jackie Grebmeier, UMCES CBL/ Arild Sundfjord, Norwegian Polar Institute

#### Status Pan-Arctic Distributed Biological Observatory (DBO) and UN Decade of Ocean Science endorsement

Jackie Grebmeier<sup>1</sup> and Arild Sundfjord<sup>2</sup>  
<sup>1</sup>University of Maryland Center for Environmental Science, Solomons, Maryland, USA  
<sup>2</sup>Norwegian Polar Institute, Tromsø, Norway

Pacific Arctic Group Business Meeting  
Arctic Science Summit Week 2024  
24 March 2024 | 08:30 - 17:30 (UK)  
Room (Building): Pollock (St Leonard's Hall)  
Edinburgh, Scotland

Jackie and Arild provided details on the status of the Pan-Arctic DBO and UN Decade of Ocean Science endorsement. They discussed the Arctic PASSION development, coordination, and specific goals. It was noted that an application for endorsement from the UN Decade of Ocean Science for Sustainable Development has been submitted and a decision is pending. It would include multiple international partners and include the Pacific DBO, Atlantic DBO, Baffin Bay/Davis Strait DBO, and the Siberian DBO.

### 3.a.v) Jackie Grebmeier, UMCES CBL



Jackie mentioned other future relevant meetings including the PAG Fall Meeting 2024 planned for late October or mid-November in Baltimore, Maryland, USA. This would include both PAG and the 7<sup>th</sup> DBO Data Workshop. The change-over of the new chair to PAG: Dr. Eun Jin Yang of KOPRI was acknowledged and the end of the meeting. Also, the Ocean Sciences meeting will be held in Glasgow, Scotland in February 2026. The possibility of having a Pan-Arctic DBO session was discussed.

## B) Pacific Arctic Climate Ecosystem Observatory (PACEO):

### 3b) Kyoung-Ho Cho, KOPRI



Kyoung-Ho provided activity plans in 2024 for PACEO-Korea. This will include ongoing works exploring physical parameters such as spatial patterns in water masses and circulation, changes in heat and freshwater content, and variations in temperature and salinity. The Araon 2<sup>nd</sup> leg of the Arctic cruise is planned for August 1<sup>st</sup> – August 23<sup>rd</sup>, 2024.

## C) Central Arctic Ocean (CAO):

### 3.c.i) Lis Lindal Jørgensen, Institute of Marine Research



Lis provided updates on the Central Arctic Ocean Integrated Ecosystem Assessment (WGICA). The three step plans include: gathering background information on the systems, activities, vulnerabilities, etc.; scoring of overlapping human-ecosystem activities and vulnerability by interdisciplinary groups; and, analyzing the data with the questions “who are the receivers” and “how to write the message.”

### 3.c.ii) Jackie Grebmeier, UMCES CBL

Summary of SAS science session and Town Hall at OSM24



Jackie provided a summary of the Synoptic Arctic Survey session and Town Hall at OSM24, noting that it was a successful cruise that collected key data from a chronically under-sampled region. She explained the five phases of the cruise, what was measured and how, and noted that there were many leads and the ice was not all that thick. The Canadian (eastern) and Makarov (western) basins differed hydrographically. Net community production differed temporally and between ice-covered and ice-free waters. Seabirds and marine mammals seen primarily where sea ice was absent and whales were seen in three characteristic locations.

### 3.c.iii) Shigeto Nishino, JAMSTEC

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Edinburgh, Scotland, UK  
and online

Brief update of recent activities  
and results for CAO:

Japan CAO results



Shigeto Nishino

Shigeto provided a brief updated on recent activities and results for the CAO from Japan. He highlighted a few recent papers, including from Kawaguchi et al. 2022 discussing turbulent mixing during late summer in the ice-ocean boundary layer in CAO; Nomura et al. 2023 discussing meltwater layer dynamics in the CAO; Murata et al. 2022 investigating early wintertime CO<sub>2</sub> uptake in the western Arctic Ocean; Yasunaka et al.'s 2023 assessment of CO<sub>2</sub> uptake in the Arctic Ocean from 1985-2018; Ikenoue et al. 2023 research into floating microplastic inventories in the southern Beaufort Sea; as well as, Alabia et al. 2023 discussing Pan-Arctic marine biodiversity and species co-occurrence patterns under recent climate

### 4a) Shigeto Nishino, JAMSTEC

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and online

International SAS Program 2025–2026  
and beyond

Shigeto Nishino and Mariko Hatta  
(JAMSTEC):  
New Chairs for SAS Scientific Steering Committee

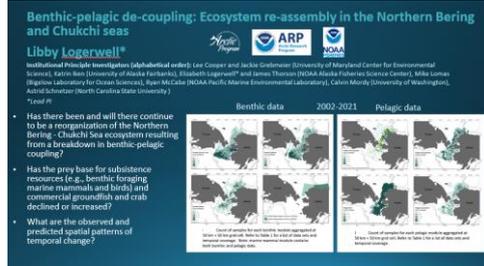
Shigeto discussed the international SAS program for 2025-2026 and beyond. JAMSTEC is interested in SAS chairmanship during 2025-2026 and beyond, but cannot currently due to projects ending in March 2025. He suggested some new topics for the SAS II Science Plan, including 3 major foci on physical oceanography, marine ecosystems, and chemical oceanography and 9 research questions about such things as water masses and circulation patterns to northward range expansion of subarctic species, and ocean acidification among others.

4b) Clare Gaffey, Clark University



Clare provided a summary of who IASC FOX is, explaining that it is early to mid-career researchers who were (or are current) IASC fellows and want to continue to collaborate with, participate in, and nurture IASC activities. Future activities include: developing potential collaborative/cross-cutting research projects, addition of “current research projects” section within bi-annual meeting to highlight fellows’ research and open discussion of future research directions, and continue to support WGs and current fellow.

5a) Jackie Grebmeier, UMCES CBL (for Libby Logerwell, NOAA)



Jackie presented for Libby about benthic-pelagic de-coupling and ecosystem re-assembly in the Northern Bering and Chukchi seas. She provided conceptual models comparing past benthic-pelagic interactions and a future scenario where pelagic patterns are more dominant. Examples of SLIP nutrient dynamics, warm period influences on juvenile chum salmon, and boom-bust cycles in grey whale feeding were given as research projects investigating these dynamics.

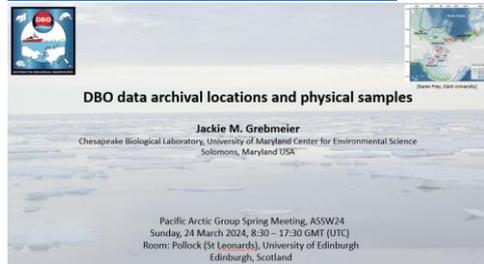
5b) Jackie Grebmeier, UMCES CBL

PLOS One DBO Special Collection-finalized 2024, plus SAS JGR Oceans special issue and webinars



Jackie provided a summary that the PLOS One DBO special collection will be finalized in 2024, plus there will be a SAS JGR Ocean special issue and webinars. She provided a table of papers with authors and titles as of March 2024. Synthesis papers planned for the SAS JGR Oceans special issue were also provided. Webinar #2 for Arctic Science Snapshots – Early Career Scientists was held April 22<sup>nd</sup>, 2024 and #3 will be Monday, June 17<sup>th</sup>, 2024.

6) Jackie Grebmeier, UMCES CBL



Jackie provided a summary of DBO data archival locations and physical samples. She noted that DBO data in the US can be found at the Arctic Data Center via the DBO portal: <https://arcticdata.io/catalog/portals/DBO/Data> as well as the NOAA DBO Project portal: <https://globalocean.noaa.gov/distributed-biological-observatory/>. Korea and Japan also have data access at the following respectively: <http://kaos.kopri.re.kr> and <http://www.godac.jamstec.go.jp/darwin/e>. She also provided examples of our DBO parameter file as a means to collect information about where, what, and when data have been collected noting that we are planning to make this a more automated option. Jackie also advocated for folks to start inventorying what physical samples they use in research and where they are stored.

7a) Jackie Grebmeier, UMCES CBL

Other PAG relevant meetings ASSW2024 (also see talk ppt 3a DBO Future meetings)

- Pan-Arctic DBO Community meeting-March 21, 2024
- PAG presentations to FARO-March 21, 2024
- MWG (DBO and UNDOS, plus SAS update)-March 22, 2024
- AOS24 Observing panel-March 28, 2024



Jackie provided other PAG relevant meetings whose dates and titles can be seen in the slide to the left.

## 7b) Shigeto Nishino, JAMSTEC

### Arctic Research Vessel "Mirai II"

December 2020 A construction of Japan's new research icebreaker was decided.

March 2023 Steel cutting ceremony

November 2023 "The first international workshop on Arctic Ocean observation: Future Collaboration by Research Vessels and Icebreakers"

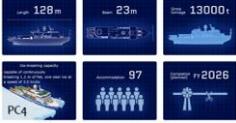
March 2025 Launching

November 2026 Delivery

Summer 2027 First Arctic cruise



One of the concepts of the new research icebreaker is "international platform for Arctic science" and should be operated by Japanese research initiative and under the international collaboration.



18 participants from 13 countries attended. (31 for day 1, 84 for day 2) (CAN, CHN, DNK, FRA, DEU, IND, NOR, NOR, PRK, GBR, USA, and JPN)

Shigeto provided an update on the new icebreaker Arctic Research Vessel, "Mirai II". The first Arctic cruise is scheduled for summer 2027 and will be an "international platform for Arctic science".

## 7c) Karen Frey, Clark University



Karen provided information on NASA's Arctic COLORS (Arctic – Coastal Land Ocean Interactions) project Arctic COLORS which aims to quantify the coupled biogeochemical/biological and ecological response of the Arctic nearshore system to rapidly changing terrestrial and ice conditions, in the context of environmental (short-term) and climate (long-term) change.

## 7d) Hajo Eicken, UAF

**SAON's Roadmap for Arctic Observing & Data Systems (ROADS): Opportunities for PAG engagement**

Hajo Eicken, International Arctic Research Center, University of Alaska Fairbanks, USA

**SAON**  
Sustaining Arctic Observing Networks (SAON) joint initiative of Arctic Council & International Arctic Science Committee (IASC)  
→ Committee on Observations & Networks & Arctic Data Committee

**ROADS**  
SAON Roadmap for Arctic Observing and Data Systems as new effort to develop partnerships & well-defined plans for improving observing & data systems to provide societal benefits

Contributions from RNA CoObs team members  
A. Bradley, C. Chythlook, E. Lescaak, M. Rudolf, S. Starkweather, H. Wayner

Research Networking Activities for Sustained Coordinated Observations of Arctic Change

Hajo discussed opportunities for PAG engagement through SAON's Roadmap for Arctic observing and data systems (ROADS). Through shared arctic variables, such as regionally-identified science and decision-making needs, Indigenous-led benefit identification and system implementation, and essential variables global networks in efforts to, for example, examine marine ecosystems and food security. The project timeline runs from Spring 2024 to Spring 2026.

# AGENDA

Sunday, March 24, 2024

## [0830] 1. Welcome and Introduction (*Jackie Grebmeier and Christina Goethel*)

- Overview of PAG
- Agenda Review
- Introduction of participants

## [0900] 2. Country reports: Activities and Updated Field Plans for 2024

- Canada: *Bill Williams*
- China: *Jianfeng He*
- Japan: *Shige Nishino*
- Korea: *Eun Jin Yang*
- United States: *Jackie Grebmeier*

[1000 - 1030] Coffee break

## [1030-1100] 2. Continuation of Country reports

## [1100] 3. PAG-related joint research activities: summaries, results, plans for 2024 & onwards

- **3a. Distributed Biological Observatory (DBO):**
  - Summary of Recent Collaborative Pacific DBO activities (*Jackie Grebmeier*)
  - Update on the Siberian DBO science themes and planning activities (*Igor Polyakov*); *virtual*
  - The latest from the Pan-Arctic DBO network meeting, and the way forward (*Anna Nikolopoulos*)
  - Status Pan-Arctic DBO and UNDOS endorsement (*Jackie Grebmeier and Arild Sundfjord*)
  - DBO Meetings (*Jackie Grebmeier*)
    - 7<sup>th</sup> Pacific DBO Data Meeting, late Oct or mid Nov 2024, Baltimore, Maryland, USA after fall PAG meeting, date TBD
    - OSM2026 Pan-Arctic DBO session in Glasgow, Scotland (*Jackie Grebmeier*)
- **3b. Pacific Arctic Climate Ecosystem Observatory (PACEO):**
  - PACEO activities (*Kyoung-Ho Cho*); *virtual*

[1230 - 1330] Lunch

## [1330] 3c. Central Arctic Ocean (CAO):

- Central Arctic Ocean Integrated Ecosystem Assessment (WGICA) (*Lis Lindal Jørgensen et al.*); *virtual*
- Summary of SAS science session and Town Hall at OSM24 (*Jackie Grebmeier*)
- Brief update of recent activities and results for CAO efforts: Japan CAO results; Note presentation will include the topic of a SAS session in the 2024 Arctic Circle Assembly (*Shige Nishino*)

**[1430] 4. Proposals for new research activities:**

- International SAS Program 2025-2026 and beyond (*Shige Nishino: new Chair for International SAS Advisory Board*)
- IASC FOX (Fellows' Ongoing X-change) (*Christina Goethel*)

**[1500] 5. Synthesis and Modeling Activities:**

- Benthic-pelagic de-coupling: Ecosystem re-assembly in the Northern Bering and Chukchi seas (*Libby Logerwell, NOAA/USA, presented by Jackie Grebmeier*)
- PLOS Once Special issue-finalized, SAS JGR Oceans special issue-opening in summer 2024 for submissions (*Jackie Grebmeier*)

**[1530-1600] Coffee break**

**[1600] 6. Data Access and Physical Sample Discussions**

- DBO data archival locations and physical samples (*Jackie Grebmeier*); Open discussion

**[1630] 7. Interaction with other Organizations, Updates**

- Other relevant meetings ASSW2024 (March 21-29, 2024), PAG and DBO presentations to FARO, MWG, AOS24 Observing panel for developing Arctic Global Regional Alliance (GRA) (*Jackie Grebmeier and Christina Goethel*)
- Japan's new research ice-breaker for the Arctic Ocean (*Takashi Kikuchi or Shige Nishino*)
- Arctic COLORS: Arctic Coastal Land Ocean Interactions (*Karen Frey*)
- SAON Roadmap for Arctic Observing and Data Systems (ROADS): Opportunities to engage for PAG (*Hajo Eicken*)

**[1715] 8. Updates on PAG Structure, Chair Rotation, and PAG Meetings**

**a. Chair and Secretariat rotates every 2 years at the end of the Fall Meeting:**

- 2012-2014 – USA (*Jackie Grebmeier, UMCES*)
- 2014-2016 - Korea (*Sung-Ho Kang, KOPRI*)
- 2016-2018 - Japan (*Takashi Kikuchi, JAMSTEC*)
- 2018-2020 - China (*Jianfeng He, PRIC*)
- 2020-2022 - Canada (*Bill Williams, DFO*)
- **2022-2024- USA**
  - 2022-2023 (*Jessica Cross, NOAA, then rotated off*)
  - **Fall 2023-2024 (*Jackie Grebmeier and Christina Goethel*)**
- **2024-2026 - Korea (Eun Jin Yang, KOPRI)-confirmed**
- 2026-2028 - ?

**b. Executive committee composed of:**

- PAG Chair(s): *Jackie Grebmeier and Christina Goethel*
- Vice-Chairs (one representative from each PAG member nation):
  - *Bill Williams (Canada)*
  - *Shigeto Nishino (Japan)*
  - *Eun-Jin Yang (Korea)*
  - *Jianfeng He (China)*

- Leads from each of PAG activities:
  - DBO: *Jackie Grebmeier*
  - PACEO: *Kyoung-Ho Cho*
  - CAO: *Shigeto Nishino*

**c. . Past and Future PAG meetings:**

|  |   |
|--|---|
| <p><b>Fall meetings:</b></p> <ul style="list-style-type: none"> <li>• 2010: Tokyo, Japan</li> <li>• 2011: Victoria, Canada</li> <li>• 2012: Suzhou, China</li> <li>• 2013: Incheon, Korea</li> <li>• 2014: Seattle, USA,</li> <li>• 2015: Korea, Incheon</li> <li>• 2016: China, Qingdao</li> <li>• 2017: USA, Seattle</li> <li>• 2018: Japan, Hakodate</li> <li>• 2019: China, Hangzhou</li> <li>• 2020: Online</li> <li>• 2021: Online</li> <li>• 2022: Victoria, Canada (hybrid)</li> <li>• 2023: Tokyo, Japan (hybrid)</li> <li>• <b>2024: Baltimore, Maryland, USA</b></li> <li>• 2025: ??</li> </ul> | <p><b>Spring meetings at ASSW:</b></p> <ul style="list-style-type: none"> <li>• 2012: Montreal, Canada (IPY)</li> <li>• 2013: Krakow, Poland</li> <li>• 2014: Helsinki, Finland</li> <li>• 2015: Toyama, Japan</li> <li>• 2016: Fairbanks, Alaska</li> <li>• 2017: Prague, Czech Republic</li> <li>• 2018: Davos, Switzerland</li> <li>• 2019: Arkhangelsk, Russia</li> <li>• 2020: Akureyri, Iceland (online)</li> <li>• 2021: Lisbon, Portugal (online)</li> <li>• 2022: Tromsø, Norway (hybrid)</li> <li>• 2023: Vienna, Austria (hybrid)</li> <li>• 2024: Edinburgh, UK (hybrid)</li> <li>• <b>2025: Boulder, Colorado, USA</b></li> <li>• 2026:??</li> </ul> |
|--|---|

**[1730] End of PAG Meeting.**

## Meeting Participants:

| First Name   | Last Name           | Affiliation   | Email Address                  |
|--------------|---------------------|---|--------------------------------|
| David        | Allen               | NOAA, GOMO/Arctic Research Program  | david.allen@noaa.gov           |
| Mikayla      | Basanese            | NOAA Research International Activities  | mikayla.basanese@noaa.gov      |
| Alyne        | Bayard              | CBL/UMCES   | bayard@umces.edu               |
| Kyoung-Ho    | Cho                 | Korea Polar Research Institute (KOPRI)  | kcho@kopri.re.kr               |
| Eric         | Collins             | University of Manitoba  | eric.collins@umanitoba.ca      |
| Lee          | Cooper              | CBL/UMCES   | cooper@umces.edu               |
| Roberto      | Delgado             | U.S. National Science Foundation  | robdelga@nsf.gov               |
| Karen        | Frey                | Graduate School of Geography, Clark University  | kfrey@clarku.edu               |
| Clare        | Gaffey              | Clark University  | Cgaffey@clarku.edu             |
| Hannah-Marie | Garcia              | Tribal Government of St. Paul Island  | hgarcia@aleut.com              |
| Christina    | Goethel             | UMCES/ St. Mary's College of Maryland   | cgoethel@umces.edu             |
| Jackie       | Grebmeier           | CBL/UMCES   | jgrebmei@umces.edu             |
| Jun          | Inoue               | National Institute of Polar Research  | inoue.jun@nipr.ac.jp           |
| Haiyan       | Jin                 | Second Institute of Oceanography, MNR   | jinhaiyan@sio.org.cn           |
| Lis Lils     | Joregenson          | Institute of Marine Research  | lislin@hi.no                   |
| Jinyoung     | Jung                | Korea Polar Research Institute  | jinyoungjung@kopri.re.kr       |
| Laurie       | Juranek             | Oregon State University   | laurie.juranek@oregonstate.edu |
| Sung-Ho      | Kang                | Korea Polar Research Institute (KOPRI)  | shkang@kopri.re.kr             |
| Takashi      | KIKUCHI             | JAMSTEC   | takashik@jamstec.go.jp         |
| Chelsea      | Koch                | American University   | ckoch@american.edu             |
| Marta        | Konik               | University of Victoria  | martakonik@uvic.ca             |
| Tao          | Li                  | Ocean University of China   | litaoocean@ouc.edu.cn          |
| Eva          | Lopes               | Faculty of Sciences of University of Porto; Interdisciplinary Centre of Marine and Environmental Research | elopes@ciimar.up.pt            |
| Sandy        | Lucas               | NOAA - GOMO ARP   | Sandy.lucas@noaa.gov           |
| Anna         | Nikolopoulos        | Norwegian Polar Institute   | anna.nikolopoulos@npolar.no    |
| Shigeto      | Nishino             | JAMSTEC   | nishinos@jamstec.go.jp         |
| Igor         | Polyakov            | UAF   | ivpolyakov@alaska.edu          |
| Frank        | Rack                | National Science Foundation, Office of Polar Programs   | frack@nsf.gov                  |
| Hyoung Chul  | Shin                | Korea Polar Research Institute  | hcshin@kopri.re.kr             |
| Lisa         | Winberg von Friesen | University of Copenhagen/IVL Swedish Research Institute   | lisa.vonfriesen@bio.ku.dk      |
| Eun Jin      | Yang                | Korea Polar Research Institute  | ejyang@kopri.re.kr             |