

INTERNATIONAL ARCTIC POLYNYA PROGRAM
SCIENTIFIC COORDINATING GROUP (IAPP-SCG)

Meeting of 9 September, 2001
Quebec City, Canada

MEETING ATTENDANTS

Jody Deming, chair
David Barber, member
Knud Falk, member
Louis Fortier, member
Martin Fortier, ad hoc member, IPS'01 Secretary
Hans-Juergen Hirche, member
Mark Johnson, member
Peter Minnett, member
Paul Wassmann, member
Andrew Willmott, member
Sara Bowden, secretary and AOSB liaison
Nick Biggs, visitor

MEETING AGENDA

- I. Introductory remarks (Chair)
 - A. Introductions, adjustments to agenda
 - B. Review of IAPP deliberations in Ventura, March 2001

- II. Update on AOSB Meeting in Iqaluit, April 2001 (Chair)
 - A. Reaction to the time-series concept
 - B. Entraining marine mammal expertise
 - C. Polynya textbook

- III. Update on Canadian-led Polynya research
 - A. NOW publications (Barber, Deming)
 - B. CASES and IMPACS (L. Fortier)

- IV. Future goals
 - A. Strategic plan for time-series Polynya research
 - B. Connections to ASOF and SEARCH (Johnson)
 - C. Other national/international opportunities

- V. Expectations for/from IPS'01

- VI. Next meeting

DISCUSSION

Review of IAPP deliberations in Ventura

The Chair opened the meeting by reviewing the deliberations of the last SCG meeting held in Ventura, CA on March 13, 2001. She noted that the meeting was productive in that it set in motion the concept of a multi-disciplinary long-term time series analysis. Meeting participants had agreed that the most suitable location for such analysis would be in the North Water Polynya, although participants in the meeting also discussed a second effort in the Cape Bathurst Polynya on the Mackenzie Shelf.

Update on the AOSB Meeting in Iqaluit

The Chair then noted that she had presented the results of the Ventura SCG meeting to the AOSB in April in Iqaluit, Canada during the time of the Arctic Science Summit Week. The AOSB embraced the long-time series analysis and suggested that for the effort to be effective, it should be no less than a 10-year study. She relayed the AOSB directive that the IAPP effort in the North Water should be linked to other long-term efforts such as Arctic Subarctic Ocean Fluxes (ASOF) in order to bring together physics and ecosystem communities and to maximize resources.

The AOSB approved the slate of members as presented by the Chair at the April AOSB meeting. However, the AOSB suggested that the IAPP identify a marine mammal expert and a chemist to serve as a full or corresponding member on the SCG. Deming asked the current members for suggestions. A short list of candidates for both fields emerged.

The marine mammal perspective might be represented by:

Eric Borne, Denmark/Greenland, recommended by Barber and Falk

Sue Cosens, Canada, recommended by Barber

Mads- Peter Heide-Jørgensen, Denmark/Greenland, recommended by Falk

Louwrens Hacquebord, The Netherlands, recommended by AOSB chair, Jean-Calude Gascard

Action Item: It was agreed that members would send their recommendation along with a justification to Deming who would then decide who to invite.

Chemists:

Kirk Cochran, USA

Chris Measures, USA

Leif Andersen or Swedish colleague

Action Item: It was decided that Deming would make contact with Andersen to discuss his interest in serving on the IAPP or if he had a colleague with whom he worked who might be willing to participate.

Deming indicated that the AOSB continues to have an interest in the concept of a graduate-level textbook on polynyas. However, since the idea was originally discussed several years ago, no un-sung hero has stepped forward to take the editorial leadership. The SCG agreed that there is a lot of material already available and that such a multidisciplinary textbook would fill a need, but agreed that without resources it would be a difficult task to accomplish. Wassmann expressed concern that a textbook on polynyas needs to be preceded by a textbook on the more general issue of polar ecology in order for it to be in context. Barber indicated using polynyas as a focus for showcasing interdisciplinary research to students would be extremely valuable and that he would be willing to take a leading role if others would also step forward, particularly a biologist. The SCG agreed that a small group would meet for lunch on Thursday following the symposium to discuss the concept further and that members would look during the week for other possible editors.

Update on Thursday luncheon discussion

The Symposium talks and discussion convinced members (including Wassmann) that a Polynya textbook could in fact be used not only to showcase interdisciplinary research but also to fill the broader need for a polar ecology textbook, since basic concepts would be addressed and elaborated in the course of developing the polynya chapters. Dave Barber and Walker Smith agreed to develop a provisional outline for the book and explore possible publication venues, information that will then be circulated amongst the IAPP membership. Actual leaders/editors for the project remain to be identified, but are expected to emerge with the availability of a more concrete set of goals, publication venues, and time.

Update on Canadian-led Polynya research

Barber informed the SCG that a special issue on the NOW Polynya in the journal *Atmosphere-Ocean* would be published in three weeks. It contains 13 papers mostly dealing with sea-ice-atmospheric issues and mechanisms which maintain the polynya. Barber agreed to mail copies to everyone on the committee via Bowden, and Minnett agreed to provide Bowden with the website address containing a .pdf version of all the papers. (The web site is: <http://www.meds-sdmm.dfo-mpo.gc.ca/cmso/Ao/chronoinde.htm>). Bowden will post the website as a link to the ASOB website and in an upcoming AOSB newsletter.

Deming informed the SCG that a second special issue on the NOW Polynya is almost ready for publication in *Deep-Sea Research*. Deming, L. Fortier, and Mitsuo Fukuchi have put the issue together. It will contain an expected 23 papers dealing mostly with biology and biogeochemical fluxes. It is, however, very interdisciplinary and includes opening papers on physical aspects of the polynya.

L. Fortier provided information on a Canadian coordinated science plan for the study of the Canadian sector of the Arctic Ocean over the next ten years. The first element of the

plan is CASES (Canadian Arctic Shelf Exchange Study), which is fully funded at \$10 million Canadian for five years (2002-2007). CASES, which has already been endorsed by the IAPP at the Ventura meeting, will begin in 2002 if a request to retrofit the Canadian icebreaker *Sir John Franklin* is accepted by the Canada Foundation for Innovation. A decision on the next step towards the retrofit will be made on September 25, 2001. The central objective of CASES is to understand and model the response of the Mackenzie Shelf ecosystem to atmospheric, oceanic and continental forcing of sea-ice cover variability. Nine countries are expected to participate in the program.

A second Canadian-led project, which also has been endorsed by the IAPP, is being called IMPACS (International Monitoring Program of Arctic Canadian Seas), which is scheduled to begin in 2004. The goal of IMPACS is to accumulate long-term time series of physical, biological and biogeochemical variables in the North Water and on the Mackenzie Shelf. L. Fortier also mentioned CATS (Canadian Archipelago Through-flow Study), which is scheduled to begin in 2004.

In the discussion that followed, two themes reoccurred. First, the SCG expressed its frustration at the difficulty of obtaining access to Russian Arctic waters. Without access to Russian waters, it will be impossible to gain a pan-Arctic view of the role of polynyas in the climate system. It was agreed that easy access to Russian waters would alter our research in the Arctic. A second frustration repeatedly voiced is the difficulty of obtaining research funds for work on the European side of the Arctic. The EU and European countries lack the long-term perspective that is critical to doing research. They need to embrace long-term work in the Arctic.

Action Item: The Chair will convey to the AOSB the frustration of the SCG in obtaining Russian clearance for work in the Arctic which inhibits its ability to take a pan-Arctic perspective. The Chair will also relay to the AOSB the desire of the SCG to have European funding agencies, including the EU, embrace long-term research projects in the Arctic.

ASOF (Arctic-Subarctic Ocean Fluxes)

Johnson, who serves as a liaison between ASOF and the IAPP-SCG, provided information about the ASOF program. He showed an Arctic map indicating all of the monitoring sites for ASOF. ASOF is still in the planning stages and is not yet funded but the AOSB strongly encouraged the Chair to work closely with ASOF steering groups as the IAPP develops its long-term time series work in the North Water, which is one of the monitoring point of ASOF. Many of the proposed ASOF mooring sites encompass locations of prime interest to interdisciplinary time-series goals in the NOW Polynya. Johnson will continue to serve as a liaison between the two groups.

Future Goals

The AOSB charged the SCG with developing further the concept of a multi-disciplinary long-term time series analysis of the NOW Polynya as had been agreed at the Ventura SCG meeting. A lengthy discussion of the justification for such a project and how it is to be accomplished ensued.

It was agreed that one of the central questions asked at the formation of the IAPP over ten years ago remains unanswered. That is: are polynyas reflectors of climate change? Can they be used that way? One argument given is that polynyas have internal and external characteristics, and how we extrapolate knowledge gained from the study on one polynya to another or to the Arctic as a whole, may depend on whether it is related to internal or external characteristics. Progress toward answering the fundamental IAPP question may be enhanced by embracing this perspective (as was later evidenced during several talks at the Symposium and further recognized during the post-Symposium IAPP luncheon discussion). An additional longstanding question is the effect of changes to the polynyas on the Inuit people. This is a concern perceived to be even more immediate than the global change issues, though the two may be linked.

In order to address these questions, it was agreed that a long-term time series analysis, not just the snapshots that NEW and NOW have provided, is needed. Thus, many members argued that there is a need to do the long-term time-series analysis in more than just one place. Perhaps the NOW can be the primary location, but databased models and conclusions developed around NOW should be tested in other locations. The Cape Bathurst Polynya, which will be included in the CASES study, could serve as one validation point. Others might be found in the Russian waters if access were available. And, despite the fact that it has been difficult in the past, perhaps work on the Greenland side of NOW would be easier in the future, especially if the local communities were included in the measurement work (as proposed below), and they were involved early in the planning phase. The discussions also included the different types of data that would need to be collected such as water column structure and stability, nutrients, light, penetration, fluorescence, and plankton (via pumps) and fluxes (via sediment traps). Further discussions are going to be necessary to decide where and when to conduct the time-series work. Additional discussions will be needed to decide on the type of models that are needed in order to make predictions and validate results. Wassmann noted that two laboratories in Norway have had good success with a 3-D meteorologically forced, biological/physical model of 3-4 km grid size.

Based on these discussions, the Chair developed a list of questions/hypotheses and a tentative approach as follows:

Question/Hypotheses:

- Decadal time series work in the NOW can inform us of the internal and external behavior of the Polynya.
- How do internal mechanisms respond to climate change?

- How do external mechanisms extend to more global climate/carbon-flux issues?
- Comparative behaviors between NOW and CASES provides the check or validation of extending NOW findings. (IMPACS may address this).

Approach:

- Set up a series of long-term, annually serviced moorings accommodating available physical, chemical, and biological parameter measurements at key input points to the NOW
- Establish a series of ice camps on the West coast to extend mooring results and add ice-meteorological-biological early season data. Include on the East coast Greenland/Denmark involvement and on both coasts Inuit participation.
- Set up a series of ice-breaking cruises not only to service moorings but also to add process-oriented biological, chemical, physical measurements.
- Simultaneously develop and validate coupled physical-biological models.
- Use remote sensing in time-series mode of all polynyas.

Connections:

- ASOF/SEARCH
- NOAA-Ocean exploration initiative (cruises of opportunity)
- SIRRO (Siberian River Run-off Program under APARD)
- Ecosystems West-Greenland (Initiative of Greenland Institute of Natural Resources)
- SBI (Shelf Basin Interactions)
- ARKTØK: Nor-Arctic Ecosystems and Climate Change
- UK NERC thematic programmes “Autosub under ice” and “Abrupt climate change”

It was agreed by the membership that NOW should be the primary focus but that marginal ice zones (Kola transect) of the Barents or Kara Sea and the Cape Bathurst polynya would serve as validation sites for comparative studies.

Action Item: The Chair agreed to take responsibility to prepare a white paper for email review and comment by the SCG membership. The paper will be presented to the AOSB as well as at the November NSF-sponsored OAI All Hands Meeting in Salt Lake City. SCG members are to provide suggestions and participate in the development of the paper.

Action Item: Members who provided items to the list of connections, should provide the Chair with a definition of the connection and the relevance of the connection to the time-series study.

Expectations for/from IPS'01

The primary goal of the meeting is to bring together for the first time a multi-disciplinary bi-polar group to meet and compare data. A secondary goal will be to decide whether the

time is right for a textbook on polynyas and whether or not editors can be found. (As noted earlier, it was agreed at the post-Symposium luncheon meeting, that the field is mature enough to merit a senior undergraduate/graduate-level textbook and steps are being taken to develop the concept further.)

Next meeting

A decision on the date of the next SCG meeting will be made after the AOSB meeting in April 2002.

The Chair thanked everyone for their participation in the meeting and asked for their continued support in the development of the white paper on the long-term time series work.