

6th ASOF SSG Meeting

Halifax, Nova Scotia, Canada, 12-14 November 2008

REPORT (8 February 2009)

Introduction

Tom Haine, the new ISSG chairman, opened the 6th ASOF ISSG meeting by welcoming the participants (see Appendix A). Simon Prinsenberg, the hosting member of ISSG, also welcomed the participants on behalf of the Bedford Institute of Oceanography (BIO).

The purpose of this meeting was to plan the next phase of the ASOF program by identifying new scientific priorities, potential collaborations and deliverables. It also provided an update on the status of the efforts to maintain and synthesize Arctic/Subarctic flux measurements (see agenda in Appendix B).

Meeting Format

The 1st day was planned an open workshop with science talks on Arctic/Subarctic circulation, ecosystems and modeling. The 2nd day consisted mainly of status reports on fluxes at ASOF gateway sections, storage and production anomalies seen downstream in the subpolar receiving volume, and a news-exchange on other relevant projects. The 3rd day was restricted to the ISSG members and was devoted to discussions on how to move the project forward.

Meeting Overview

The meeting was a big success in providing an update on all the relevant recent activities in the ASOF domain of interest. ASOF science is clearly just as exciting as ever it was, and the coherent large-scale view that ASOF provides is still sorely needed, and very, very hard to achieve in isolation.

Biological Oceanography: The presentations on biological oceanography in the Arctic/sub-Arctic seas indicated potential areas of collaboration. The presentations on ESSAS (Ecosystem studies of Sub-Arctic Seas) provided a potential framework to promote a genuine two-way interaction with scientists studying Arctic and sub-Arctic marine biology and biological oceanography.

ACTION: Propose to hold an ASOF-ESSAS special session at the next ESSAS annual meeting (June 2009 in Seattle). *Ken Drinkwater and Tom Haine.*

It was suggested to add biological measurements to ASOF instruments, where feasible. Simon Prinsenberg is already working on developing a BIOcyclor which is a version of the ICYCLER instrument developed at BIO to measure surface-layer water properties under mobile ice, which includes biochemistry sensors. ADCP returns can be reprocessed to give information on zooplankton, for example. Optical sensors (for chlorophyll and/or water clarity) could also be added to instruments targeting physical properties. Svein Oesterhus informed the meeting that EuroSITES (<http://www.eurosites.info/index.php>) will write a proposal for 9 deep ocean sites to measure physics and biogeochemistry together.

There was some indication on ways that biological parameters can be used to gain insights on the Arctic SubArctic oceanic fluxes system. It is clear that ASOF strength lies in physical oceanography (and should remain there), but ASOF could more directly address the study of the marine ecosystem. For example, abundant physical data from ecosystem surveys of the Labrador shelf are collected each year, but are not exploited in a wider context of sub-polar physical oceanography.

Modeling Community: Greater engagement with modellers was also clearly indicated by several presentations on developments of circulation and biophysical models of the Arctic and subArctic oceans. It was suggested to directly engage AOMIP (Arctic Ocean Model Intercomparison Project, http://efd1.cims.nyu.edu/project_aomip/overview.html). One point of collaboration would be for ASOF to produce and maintain a public-access "ASOF database" to provide a benchmark for modelers. A synthesis of the ASOF flux products and an Arctic/sub-Arctic physical budget would be included, plus other fields of use to modelers. Exactly how this would be achieved is unclear. One possible idea would be for ASOF to produce regular (annual?) synthesis reports. Another idea is to use the production of the "ASOF database" and synthesis report to identify the gaps in ASOF coverage, the priorities for modelers, and to aid the transition from intensive initial occupation, to long-term, scaled-back, monitoring of a section. It seems clear,

though, that funding will have to be raised to set up such a system.

ACTION: Contact the AOMIP community and inform on the willingness to provide the ASOF data for comparison with models. Identify a list of ASOF data products of greatest use to modelers, and a mechanism for optimal dissemination of an "ASOF database". *Michael Karcher and Tom Haine.*

Direct engagement with data assimilation projects was also mentioned as a way to synthesize Arctic and sub-Arctic observations and models. This activity paves the way to discussion of future prospects for the northern high-latitude marine environment. Data assimilation (and forecasting) of this type is still in its infancy, but it will assume a greater role in the future. The meeting agreed that direct collaboration with assimilation projects should be deferred at present, but that ASOF should monitor this field.

Budget and Synthesis: The large-scale synthesis of flux observation has been the central theme to ASOF till now and will continue to be a primary concern. The meeting provided an update on efforts to measure key component fluxes. Interesting discussions addressed the shape of the future observing network, identified gaps, prioritized different components, and supported efforts to maintain and expand the network.

The ASOF ISSG members also addressed the prospects for a large-scale synthesis of freshwater, mass, and heat fluxes in the Arctic and sub-Arctic seas. This task includes determining how accurately freshwater, heat, and mass budgets can be closed (including storage), and asking if component flux timeseries display coherence (and why).

Future Priorities and Initiatives

The meeting discussions agreed that ASOF should enter a second phase ("ASOF II"?). Continued monitoring of the fluxes between the Arctic and North Atlantic will remain the primary activity. However, progressively more emphasis shall be given to the synthesis and applications activities to directly support:

- 1) physical modeling activities,
- 2) biological oceanography and ecosystem modeling activities,
- 3) observational and modeling efforts to better understand and anticipate decadal climate variability.

It was suggested to produce a strawman document with a clear strategy for the ASOF synthesis that would encourage both biology and modeling communities to make use of the ASOF data. The document should define a limited scope of ASOF products that can be available to both research communities.

ACTION: Write a whitepaper on science and implementation plan for ASOF II. *Tom Haine, Bogi Hansen, Michael Karcher, Peter Rhines*

To succeed, ASOF II must achieve its aims at lower cost and with greater external benefit than the first ASOF phase. It must also clearly identify predictability in the Arctic/sub-Arctic physical system, and lay the foundations for an open-ended monitoring network.

Interfacing ASOF with relevant International Projects and Funding Agencies

We discussed the links that ASOF should establish with existing International activities as a basic step to raise support for ASOF. From the US perspective, ASOF is seen as contributing to SEARCH (Study of the Environmental Arctic Change, <http://www.arcus.org/SEARCH/index.php>), is this still the case?.

ACTION: find out how ASOF can contribute to AON (Arctic Observing Network) project of SEARCH. *Craig Lee*

The other US project to connect to is AMOC (Atlantic Meridional Overturning Circulation, <http://www.atlanticmoc.org/>). Ruth Curry in her role of CLIVAR Atlantic Panel co-chair will keep ASOF informed on the progress and activities of US AMOC and its international links.

Bob Dickson informed the meeting that one of the legacies of IPY is SAON (Sustained Arctic Observing Networks <http://www.arcticobserving.org/>), However it was not clear how SAON will develop in the future.

The meeting recognized the importance to continue supporting the secretariat activities that Roberta Boscolo is providing to ASOF. This includes: organization of meetings, writing reports, editing documents and newsletters and maintaining the web pages. Acquiring support from several agencies simultaneously, both in North America and Europe was seen as the best way to proceed.

ACTION explore the possibility to get funding to support from NSF, NOAA and international projects like SEARCH, SAON and DAMOCLES. *Tom Haine*

Membership

The following members asked to rotate off the ISSG panel:

Bob Dickson

Jens Meincke

Eberhard Fahrback

Mark Serreze

Peter Haugan

Cecilia Mauritzen

Peter Haugan

Ukita Jinro

Toshi Takizawa

ACTION: Find a replacement to the ISSG members stepping down. *Tom Haine*

Next ISSG Meeting

The SSG agreed to meet again in Fall of 2009, probably in Bergen, Norway.

ACTION: Plan and coordinate 7th ASOF ISSG meeting in Fall 2009. *Svein Oesterhus and Roberta Boscolo*

APPENDIX A. LIST OF PARTICIPANTS

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APPENDIX B. AGENDA

WEDNESDAY 12TH NOVEMBER 2008

8:30 Van Pick-up at Radisson Suit Hotel

8:45 Registration: 50CAD will be collected from the participants for Transportation and dinner

Open-Invitation Science Day: Arctic/Subarctic Ocean Circulation, Ecosystems, and Modelling

9:00 Introduction:

- Welcome by *Simon Prinseberg (BIO)*
- Introduction and Goals of meeting (*T. Haine*)

9:20 Arctic/sub-Arctic Ocean Circulation:

9:20 Introductory Overview of BIO Ocean Climate Program (*J. Loder*)

9:30 Water Mass Variability and circulation in the Northern North Atlantic (*Y. Yashayev*)

9:50 Ocean Acidification and Potential Impacts (*K. Azetsu-Scott and D. Slauenwhite*)

10:05 Trends in Environmental conditions and Plankton abundance and composition in the NW Atlantic (*E. Head*)

10:20 Coffee/Tea Break

11:10 ¹²⁹I Transit Time Distributions in the Arctic and North Atlantic Oceans (*J. Smith*)

11:30 Fresh water in the northern East Greenland Current from 1982 through 2005 (*P. Jones*)

12:00 Oceanographic and pack ice Instrumentation development at BIO (*J. Hamilton*)

12:30 Lunch

13:30 Historical Perspectives on Davis Strait Oceanography and downstream effects (*B. Petrie*)

14:00 TransAtlantic Linkages via the subpolar gyre (*H. Hatun*)

14:30 Arctic/sub-Arctic Ecosystems:

14:30 Ecosystem Studies of Subarctic Seas (ESSAS): Objectives, Past Activities and Future Plans (*K. Drinkwater*)

15:00 A Decade of Ecosystem Monitoring in the Northwest Atlantic (*G. Harrison*)

15:30 Coffee/Tea Break

16:00 Arctic/sub-Arctic Ocean Modelling:

16:00 North Atlantic and Arctic Ocean modelling (*D. Wright*)

16:30 Have the overflows weakened during the past 50 years? (*S. Olsen*)

17:00 Overview on status and prospects of AOMIP (*M. Karcher and A. Proshutinsky*)

17:30 Adjourn

THURSDAY 13TH NOVEMBER 2008

SSG Reports and Updates

8:30 Van Pick-up at Radisson Suit Hotel

Reports on Recent Progress and Future Plans: Towards an Ongoing Synthesis of Fluxes and Storage Anomalies.

9:00 Fluxes at Gateway Sections:

9:00 Iceland Scotland Seaglider Experiment (*P. Rhines/C. Eriksen*)

9:20 Overflows East of Iceland (*B. Hansen*)

9:40 Nordic Seas and Barents Sea Inflow (*S. Oesterhus*)

10:00 Bering Strait: Pacific Gateway to the Arctic (*R. Woodgate*)

10:20 Fram Strait Update (*M. Karcher on behalf of E. Fahrback*)

10:40 Coffee/Tea Break

- 11:10 East Greenland shelf/basin exchange (*B. Pickart*)
- 11:30 Lancaster Sound update and Atmospheric Forcing of Observed Flux Variability (*S. Prinsenber*)
- 11:50 Kennedy Channel Update (*H. Melling*)
- 12:10 Davis Strait Throughflow (*C. Lee*)

12:30 Lunch

13:30 Downstream Storage Anomalies:

- 13:30 Enhanced Production of Labrador Sea Water in 2008 (*I. Yashayaev*)
- 13:50 Return of deep convection to the western North Atlantic (*K. Vage*)
- 14:10 Changes in North Atlantic heat and freshwater storage: the view from a Norwegian ice breaker (*R. Curry*)

14:30 Updates from other Programs and Initiatives

- 14:30 Nordic Sea Exchanges (NSE) (*S. Oesterhus*)
- 14:50 DAMOCLES: observations and modeling (*B. Dickson and M. Karcher*)

15:10 Coffee/Tea Break

- 15:40 Arctic Observing Network (AON) (*C. Lee inputs from P. Schlosser*)
- 16:00 US AMOC (*R. Curry*)

16:20 Discussion

Fluxes at Denmark Strait and Hudson Strait
What is missing before a large-scale synthesis is possible? What can be done now?
How can ASOF interface with ESSAS and AOMIP?

18:00 Meeting Dinner

FRIDAY 14TH NOVEMBER 2008

SSG Business and Planning

8:30 Van Pick-up at Radisson Suit Hotel

9:00 SSG Business:

Roberta funding update and planning
Web page
Newsletter
Task Group structure
SSG Membership
Next meeting

12:00 Meeting ends

12:00 Lunch