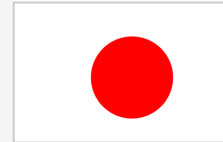
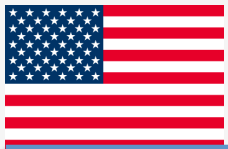


The Pacific Arctic Group (PAG) Synthesis Activities

Jackie M. Grebmeier

Chesapeake Biological Laboratory, University of Maryland Center for Environmental
Science, Solomons, Maryland, 20688, USA

November 5-6, 2012
Suzhou
P. R. China



Summary of PAR Synthesis Activities

- **Fall 2007:** PAG created PAR synthesis group
- **Jan. 2008:** PAR Modeling Workshop #1, Sanya, China; resulted in special issue of **Chinese Journal of Polar Science, Vol. 9, 2008**; 13 papers
- **May 2009:** PAR Biology Workshop #2, Seattle, WA, USA; **Feature article in EOS (May 2010)**; producing chapters for book in progress
- **June 2009:** PAR Marine Carbon Cycling Workshop #3, Xiamen, China; Special issue Deep Sea-Research in progress, Lead editor: Wei-Jun Cai et al.-**special issue DSR Sept 2012**
- **Feb. 2010:** AGU/ALSO/TOS Ocean Sciences Meeting, Portland, Oregon, USA: Ecosystem Change in the Pacific Arctic in Relation to the Pan-Arctic System (Leads: Grebmeier, Moore, Maslowski, Zhao), orals and posters; also June OSLO IPY Conference, Oslo, Norway AG session (Leads: Grebmeier, Zhao, Mathis)
- **June 2010:** PAR Synthesis Lead author meeting, OSLO IPY Conference, Oslo, Norway
- **Fall 2011-Fall 2012:** submission, review, revisions of chapter manuscripts; final book to Springer Dec 2012, **publication date 2013**
- **Sept 2012:** PAG presentation and poster at PICES meeting, Hiroshima, Japan
- **Nov 2012:** DBO Arctic Report Card article

DEEP-SEA RESEARCH PART II

Topical Studies in Oceanography

Special Issue: Biogeochemical Studies from the Chinese National Arctic Research Expeditions (CHINAREs)

Guest Editors: Wei-Jun Cai (Managing Editor), Laodong Guo, Liqi Chen, Jacqueline M. Grebmeier, and Haisheng Zhang

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Biogeochemical studies from the Chinese National Arctic Research Expeditions (CHINAREs)



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Cover Image: MV Xuelong over Sea Ice. Photo taken by Liqi Chen during the Chinese National Arctic Research Expedition.

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ARCTIC REPORT CARD 2012, 3.6 - Ecosystem Observations in Barrow Canyon: A Focus for the International Distributed Biological Observatory

Jacqueline Grebmeier¹, Robert Pickart², Carin Ashjian², Lee Cooper¹, Karen Frey³, Jianfeng He⁴, Motoyo Itoh⁵, Monika Kedra¹, Takashi Kikuchi⁵, Sue Moore⁶, John Nelson⁷, Svein Vagle⁷

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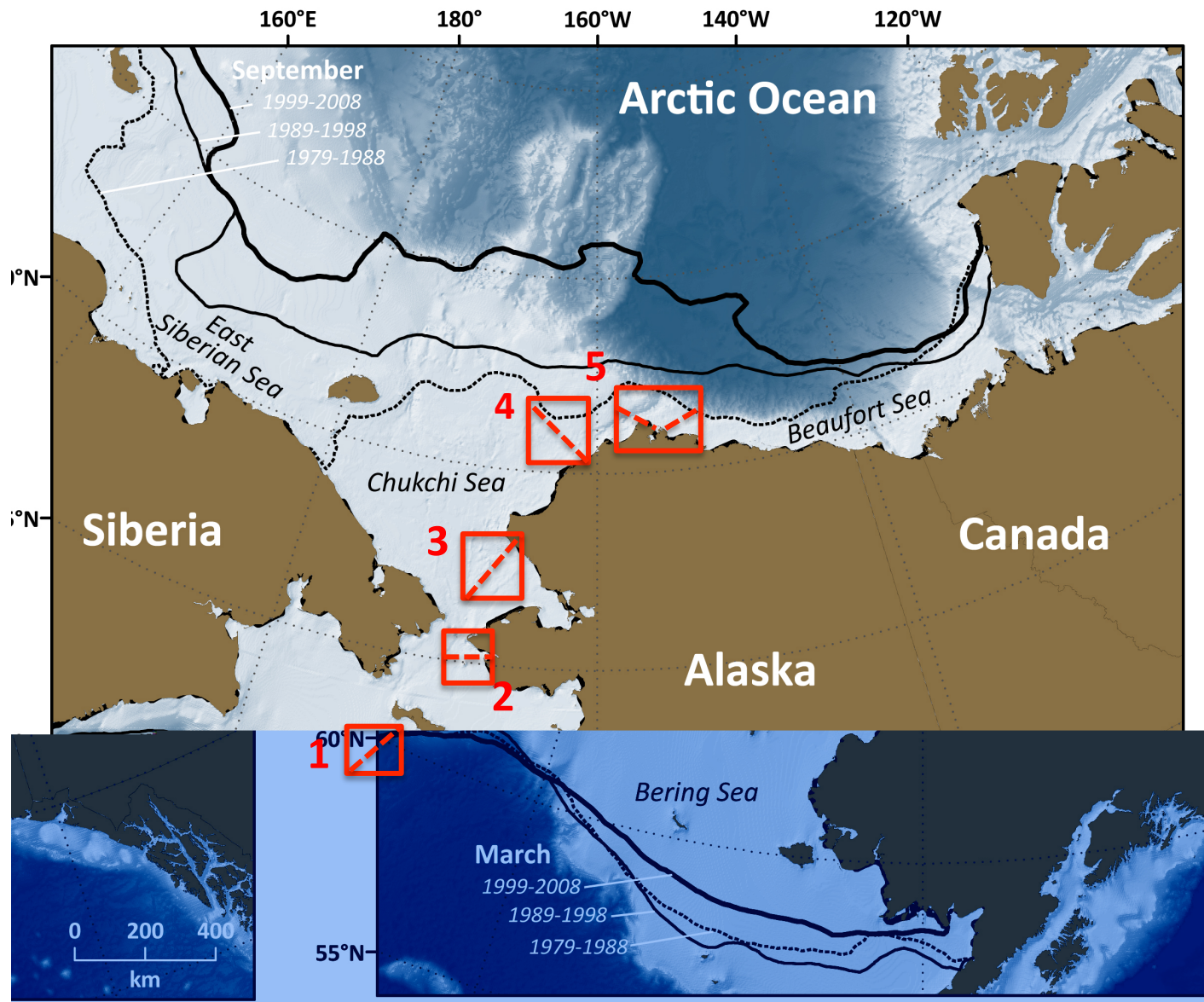
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⁷Institute of Ocean Sciences, Dept. Fisheries and Oceans, Sidney, BC, Canada

Highlights

- Since 1980, sea ice persistence in the Barrow Canyon (BC, DBO5) region of the **Distributed Biological Observatory** (DBO) has declined by ~3 days per year.
- Heat flux during the 2010 DBO BC section was 3 times higher compared to that in 1993; higher heat flux was particularly high in the Alaska Coastal Water. The ACW was warmer in July 2011 than July 2010, suggesting a continued warming trend.
- Zooplankton and benthic species composition vary by water mass type in BC; total zooplankton abundance was greater in 2011 than in 2010.

Map of the Pacific Arctic Region showing Distributed Biological Observatory (DBO) sampling regions (numbered red boxes) and transects (broken red lines). Barrow Canyon is in box 5. Map is modified after Grebmeier et al. 2010.



Ch. 1 Introduction (Guest editors: Grebmeier, J.M. and W. Maslowski); dedication to Marty Bergmann

Ch. 2 Recent and Future Change in the Meteorology of the Pacific Arctic (Overland, J.E., J. Wang, R.S. Pickart, and M. Wang)

Ch. 3 Recent Variability in Sea Ice Cover, Age, and Thickness in the Pacific Arctic Region (Karen E. Frey, James A. Maslanik, Jaclyn Clement Kinney, Wieslaw Maslowski)

Ch. 4 Model-Data Fusion Studies of Pacific Arctic Climate and Ice-Ocean Processes (Wang, J., H. Eicken, Y. Yu, X. Bai, J. Zhang, H. Hu, D-R Wang, M. Ikeda, K. Mizobata, and J. Overland)

Ch. 5 Physical oceanography, hydrography, and shelf-basin exchange processes (Williams, B. et al.)

Ch. 6 The large scale ocean circulation and physical processes controlling Pacific-Arctic interaction (W. Maslowski, W., J. Clement Kinney, S.R. Okkonen, R. Osinski, G. Panteleev)

Ch. 7 On the Flow Through Bering Strait: A Synthesis of Model Results and Observations (Clement Kinney, J., W. Maslowski, Y. Aksenov, B. de Cuevas, J. Jakacki A. Nguyen, R. Osinski, M. Steele, R.A. Woodgate, and J. Zhang)

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Ch. 11 Marine Fishes, Birds and Mammals as Sentinels of Ecosystem Variability and Reorganization in the Pacific Arctic Region (Moore, S.E., E. Logerwell, L. Eisner, E. Farley, L. Harwood, K. Kuletz, J. Lovvorn, J. Murphy, L. Quakenbush)

Ch. 12 Progress and Challenges In Biogeochemical Modeling Of The Pacific Arctic Region (Deal, C.J., N. Steiner, J. Christian, J. Clement Kinney, K. Denman, S. Elliott, G. Gibson, M. Jin, D. Lavoie, S. Lee, W. Lee, W. Maslowski, J. Wang, E. Watanabe)

Ch. 13 Paleooceanography over the last 10,000 yrs in the Pacific Arctic (Caissie, B. and J. Brigham Grette)

Ch. 14 The Distributed Biological Observatory (DBO): A Change Detection Array in the Pacific Arctic (Grebmeier et al.)

Ch. 15 Summary and future direction (Grebmeier and Maslowski)

The Pacific Arctic Group (PAG): A Pacific perspective on Arctic science

Jacqueline M. Grebmeier¹ and Takashi Kikuchi²

¹Chesapeake Biological Laboratory, University of Maryland, Center for Environmental Science, Solomons, Maryland USA

²Arctic Ocean Climate System Research Team, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Yokosuka, Japan



Overview

The Pacific Arctic Group (PAG) is a group of institutes and individuals having a Pacific perspective on Arctic science. Organized originally 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. The four PAG principle science themes are climate, contaminants, human dimensions and structure and function of Arctic ecosystems.

The PAG membership is led by an Executive Committee consisting of a Chair, two Vice-Chairs, and the Project Coordinator. The general membership of the PAG may form project groups to address specific issues linked to the PAG objectives. The Project Coordinator is responsible for coordinating the efforts of the project groups and represents the project groups on the Executive Committee. The general membership consists of at least one member of each country or institution with interest in the PAG zone of interest.

The Executive Committee, Project Coordinator and project groups are supported by a small Secretariat which is located on a rotating basis between member countries. The Secretariat provides administrative support for the functioning of the PAG, provides technical science support, organizes PAG meetings, records decisions of the PAG. It also undertakes a professional communications function for the PAG, providing a central point for communications to and from the PAG, and undertakes other matters as required.

Field Activities

The PAG membership undertakes both national and international science projects in the Pacific Arctic (Figure 1). Research on many national ships, including the Canadian CGS Sir Wilfrid Laurier, Chinese RV Xuelong, Japanese RV Mirai, Korean IBRV Araon, Russian RV Khromov, and USCGC Healy, along with other national and industry vessels sampling in the Pacific sector. Table 1 provides a summary of the PAG network of ship activities in 2012:



Fig. 1. PAG defines the "Pacific sector" of the Arctic as the marine area from the Northern Bering Sea into the Chukchi Sea and adjacent Seas, and extending into the deep basins of the Arctic Ocean, with model boundaries from Aleutian Island and deep Bering Sea northward to Arctic Basin.

Table 1. Summary of 2012 PAG Activities

Country	Vessel	PI
Korea: IBRV Araon	Arzon	Kang
Canada: CGS Sir Wilfrid Laurier (DBO 1-3, 5), plus USA RV Westward Wind (DBO 4), USCGC Healy, RV Arctika Marie and RV Mystery Bay (DBOS), RV Fairweather (DBO 1 and 5)	Arzon	Kang
China: RV Xuelong	Xuelong (Aug-Sept)	He
Russia: RV Khromov	Khromov-Lag 2 (Aug-Sept)	Crane
USA: NOAA	Napier	Napier
USA: DOD	Westward Wind	DOD
USA: Aukjaan	Arctika Marie (Sept)	Aukjaan
Japan: Kikuchi	Mori (Sept-Oct)	Kikuchi
USA: Pickett	Healy (Oct)	Pickett

Examples of current PAG activities include: 1) undertaking a Pacific Arctic region multidisciplinary synthesis of scientific findings in the marine region relevant to ongoing scientific objectives at the core of the PAG, 2) development of a Distributed Biological Observatory (DBO) consisting of environmental and biological sampling at stations on transect lines located along a latitudinal gradient extending from the northern Bering Sea to the Barrow Arch, and 3) sampling in the Chukchi Borderland and western Canada Basin region to investigate climate, oceanographic and sea ice interactions in a developing time series format. All aspects of PAG are undertaken via international and national collaborations and project coordination.

Synthesis Activities

PAG has also undertaken synthesis activities in order to present results from research, observation and modeling activities within the PAG area, to share information on current modeling activities, to identify status trends, and major new findings and understanding of state and processes in the PAG region.

Some examples of PAG synthesis activities include:

- **Jan. 2008:** PAR Modeling Workshop #1, Sanya, China; special issue of Chinese Journal of Polar Science, Vol. 9, 2008; 13 papers
- **May 2009:** PAR Biology Workshop #2, Seattle, WA, USA; Feature article in EOS (May 2010); chapters for book in progress
- **June 2009:** PAR Marine Carbon Cycling Workshop #3, Xiamen, China; Special issue Deep Sea-Research, Lead editor: Wei-Jun Cai
- **Feb. 2010:** AGU/ALSO/TOS Ocean Sciences Meeting, Portland, Oregon, USA
- **June 2010:** OSLO IPY Conference, Oslo, Norway; Special PAG Session
- **March and November 2011:** PAG Distributed Biological Observatory workshops in Seoul, Korea and Sydney, BC, Canada
- **February 2012:** Open PAG DBO workshop, ASLO, USA
- **December 2012:** Completion of Springer PAG synthesis book titled "The Pacific Arctic Region: Ecosystem Status and Trends in a Rapidly Changing Environment"

Future Activities

PAG members are working together to further develop the DBO, initiate a an ocean and ice observing system in the Arctic Basin, and investigate shelf/slope physical oceanographic processes in the Pacific sector. Further synthesis activities, as needed, will be undertaken as well as development of a data sharing policy for joint studies in the Pacific Arctic region.

Affiliations and Acknowledgements

We thank the national membership of the PAG and their associated institutions for continued collaborative efforts. Support for the PAG Secretariat is currently via the US NOAA Arctic Program Office. PAG is an affiliated effort in association with the IASC Marine Working Group.

What does PAG want to move forward for synthesis activities, if any?

Options:

- DBO data synthesis activities and individual publications?
- Coordinated data archives/connectivity for PAG ship activities, links to national data archives
- For DBO, have offer initiate a web-based data archive at EOL, Boulder, CO as contribution to Grebmeier et al NSF DBO project: either DBO data submission or links to national sites for specific DBO data for observational analyses
- Joint papers on 2012 storm impacts to PAR region?
- Other ideas?

A background image of an Arctic landscape. The foreground and middle ground are filled with numerous white ice floes of various sizes floating on a dark, calm body of water. The horizon is visible in the distance under a pale, overcast sky.

Thank you for your attention.

Comments or questions?

<http://pag.arcticportal.org>