

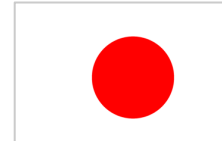
The Pacific Arctic Group (PAG): Status and Direction towards ICARPIII

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

Bill Williams and Jackie Grebmeier

Institute of Ocean Sciences, Department of Fisheries and Oceans
Sidney, B.C. Canada

PICES MONITOR Meeting
October 16, 2013
Nanaimo, Canada



Overview of PAG

- The Pacific Arctic Group (PAG) is a consortium of institutes and individuals having a Pacific perspective on Arctic science
- PAG serves as a Pacific Arctic regional partnership to plan, coordinate, and collaborate on science activities
- The four PAG principle science themes are climate, structure and function of Arctic ecosystems, contaminants and human dimensions
- The PAG membership is led by an Executive Committee consisting of a Chair, two Vice Chairs, and the leads of the approved project groups
- Members are chosen nationally to represent regional variety and breadth of scientific expertise required in PAG

Examples of current PAG activities

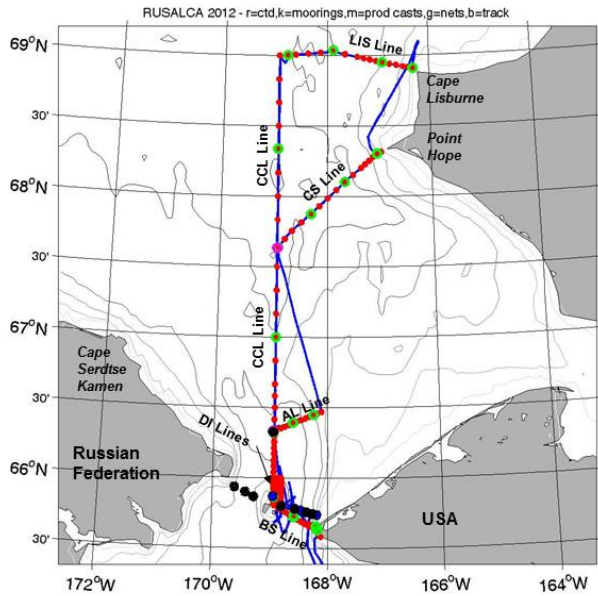
- Annual field activities in the Pacific Arctic region (2013 cruises and plans for 2014 at ASSW PAG meeting; available PAG website <http://pag.arcticportal.org/>)
- Development of a Distributed Biological Observatory (DBO) of environmental and biological sampling at stations on transect lines located along a latitudinal gradient extending from the northern Bering Sea to the Barrow Arch
- Undertake a Pacific Arctic regional, multidisciplinary synthesis of scientific findings in the marine region relevant to ongoing scientific objectives at the core of the PAG
- Project development and sampling in the Chukchi Borderland and Canada Basin region to investigate climate, oceanographic, air-sea ice interactions, physical oceanography, and modeling

Summary of PAR Synthesis Activities

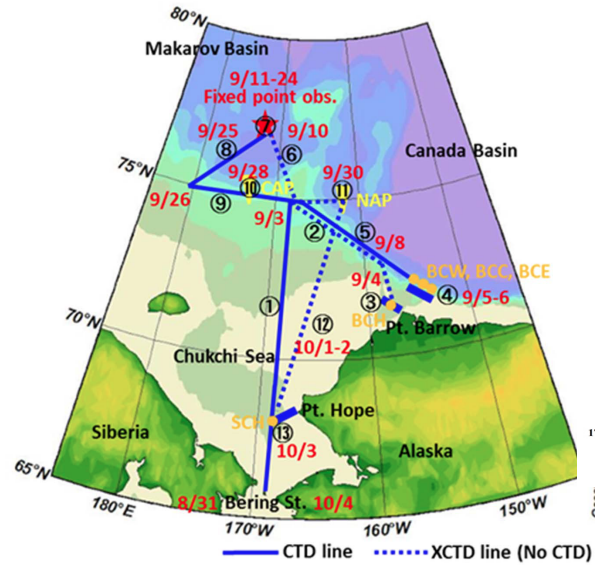
- **Jan. 2008:** PAR Modeling Workshop #1, Sanya, China; resulted in special issue of **Chinese Journal of Polar Science, Vol. 9, 2008**; 13 papers
- **May 2009:** PAR Biology Workshop #2, Seattle, WA, USA; **Feature article in EOS (May 2010)**; producing chapters for book in progress
- **June 2009:** 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: PAG session; also June OSLO IPY Conference, Oslo, Norway AG session)
- **June 2010:** PAR Synthesis Lead author meeting, OSLO IPY Conference, Oslo, Norway
- **Fall 2011-Summer 2013:** submission, review, revisions of chapter manuscripts; final book to Springer Fall 2013, **publication date end 2013/early 2014**
- **Sept 2012:** PAG presentation and poster at PICES meeting, Hiroshima, Japan and ISAR3 Tokyo, Japan
- **Dec 2012:** DBO Arctic Report Card article-**Grebmeier et al. 2012**
- **Oct 2013:** : PAG presentation at PICESMONITOR meeting, Nanaimo, BC Canada
- **2013-2014:** **Special issue Deep Sea-Research II, in progress**, RV Aaron cruise results, Lead editors: Sang Lee, Sung-Ho Kang, Jacqueline Grebmeier

Some 2013 PAG research cruises in Pacific Arctic Region

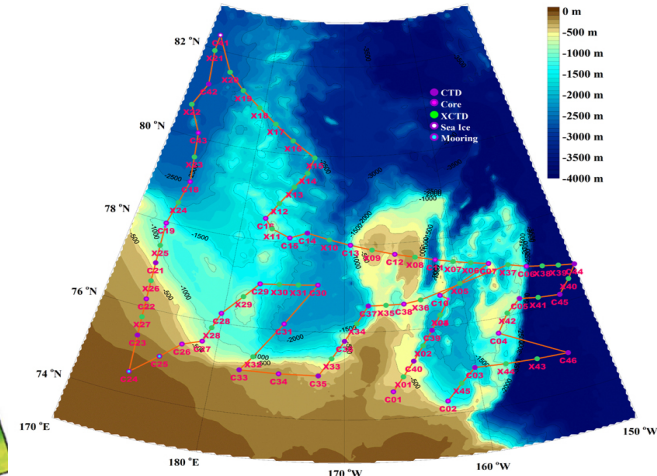
Russia-USA: RV Khromov



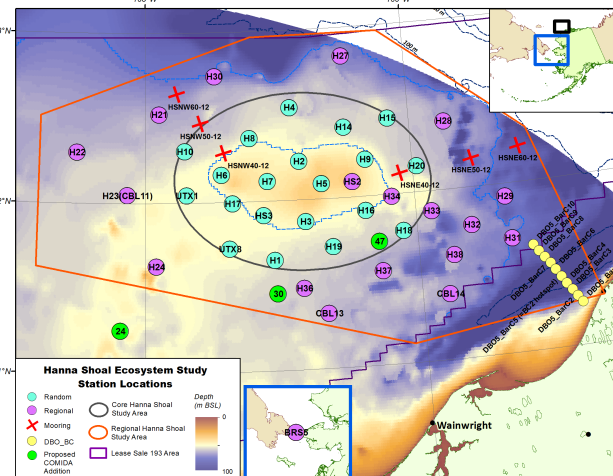
Japan: RV Mirai



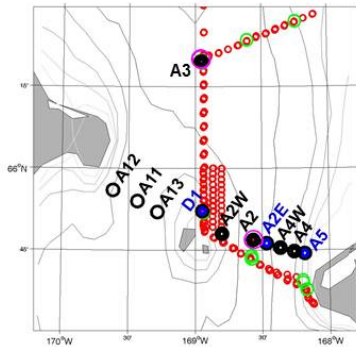
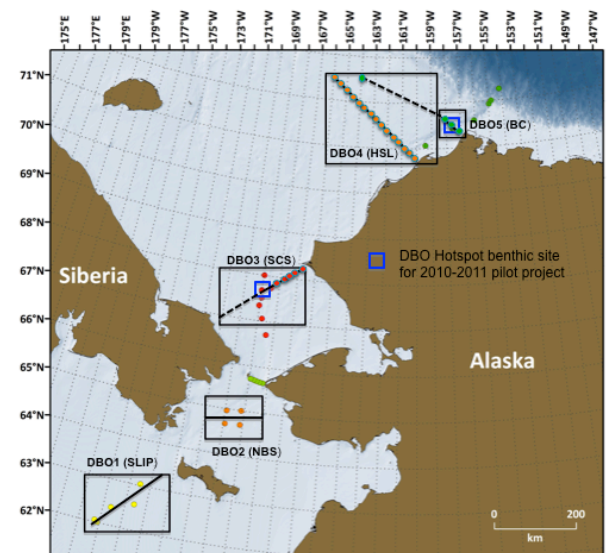
Korea: IBRV Araon



US-USCGC Healy



Canada-USA: CCGS Sir Wilfrid Laurier (DBO 1-5)



PAG 2013 List of National Cruises (UPDATE)

Dates (2013) /Port calls	Ship	Project	PAG contact	Chief Scientist
June-July (Dutch-Dutch)	Oshura-Maru			
July 11-15 (Victoria, BC-Barrow)	Sir Wilfrid Laurier	C30	Bill Williams Bill.Williams@dfo-mpo.gc.ca	Svein Vagle Svein.Vagle@dfo-mpo.gc.ca
July –August (Dutch Harbor)	Araon	Korean Expedition (KOPRI)	Sung-Ho Khang shkang@kopri.re.kr	TBD
July 5-15 ±5 days (Nome-Nome)	Norseman II	RUSALCA	Kathy.Crane@noaa.gov	Rebecca Woodgate woodgate@apl.washington.edu
July 29-25 Aug (Dutch Harbor-Barrow)	Healy	COMIDA Hanna Shoal	Jackie Grebmeier jgrebmei@ucmes.edu	Lee Cooper cooper@umces.edu
August 20 –Sept 12 ±5 days (Nome-Nome)	TBD	Arctic Whaling Ecology Study (ARCWEST) (NOAA)	Jeff.Napp@noaa.gov Sue.Moore@noaa.gov	Catherine.Berchok@noaa.gov Phyllis.Stabeno@noaa.gov
August 15-Sept ? (Barrow-Prudhoe Bay)	Annika Marie	AON	Carin Ashjian cashjian@whoi.edu	Carin Ashjian cashjian@whoi.edu
August-October	Westward Wind	Shell-Conoco Phillips Environmental Program	Tom Weingartner weingart@ims.uaf.edu	Bob Day bday@abrinc.com ; John Burns jburnssr@gci.net
Sept-Oct	RV Mirai	GRENE Arctic Climate Research Project, ECOARCS	Dr. Takashi Kikuchi, takashik@jamstec.go.jp	Shigeto Nishino nishinos@jamstec.go.jp
Sept 27-Oct 23 (Dutch-Dutch)	Healy (BC)	AON	Robert Pickart rpickart@whoi.edu	Robert Pickart rpickart@whoi.edu

2013: Laurier, Healy, Westward Wind, Mirai, Healy, Araon

2014: Laurier, Xuelong

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

Volumes 81–84, 2012

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(Continued on inside back cover)

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CHINARE

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Volumes 81–84

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DEEP-SEA RESEARCH PART II

Editor:

John D. Milliman

Guest Editors

Wei-Jun Cai
Laodong Guo
Liqi Chen
Jacqueline M. Grebmeier
Haisheng Zhang

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



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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

¹University of Maryland Center for Environmental Science, Solomons, MD, USA

²Woods Hole Oceanographic Institution, Woods Hole, MA, USA

³Graduate School of Geography, Clark University, Worcester, MA, USA

⁴Polar Research Institute of China, Shanghai, People's Republic of China

⁵Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Yokosuka, Japan

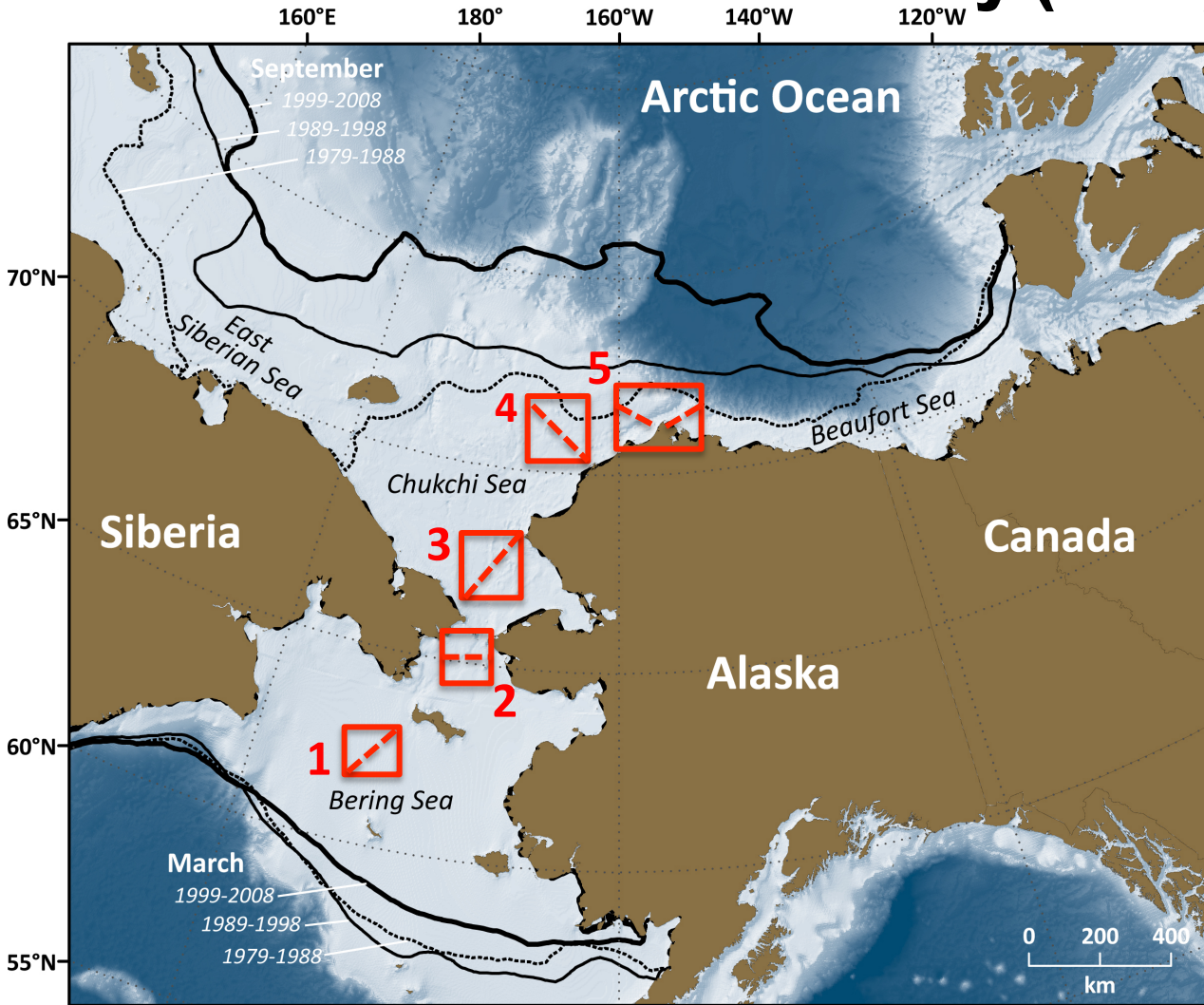
⁶NOAA/Fisheries, Office of Science & Technology, Seattle, WA, USA

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.

Linking Physics to Biology: the Distributed Biological Observatory (DBO)



[modified by Karen Frey from Grebmeier et al. 2010, EOS 91]

- DBO sites (red boxes) are regional “hotspot” transect lines and stations located along a latitudinal gradient
- DBO sites are considered to exhibit high productivity, biodiversity, and overall rates of change
- DBO sites will serve as a change detection array for the identification and consistent monitoring of biophysical responses
- Sites occupied by national and international entities with shared data plan



Distributed Biological Observatory: Linking Physics to Biology

(see Grebmeier et al. 2012 Arctic Report Card)

Core standardized ship-based sampling:

- CTD
- Chlorophyll
- Nutrients
- Ice algae/Phytoplankton (size, biomass and composition)
- Zooplankton (size, biomass and composition)
- Benthos (size, biomass and composition)
- Seabird (standard transects, no additional shiptime)
- Marine mammal observations (no additional ship time)

“Change detection array” – same measurements every year, process information in near real time <6 mos; detect regime shifts in rapid changes

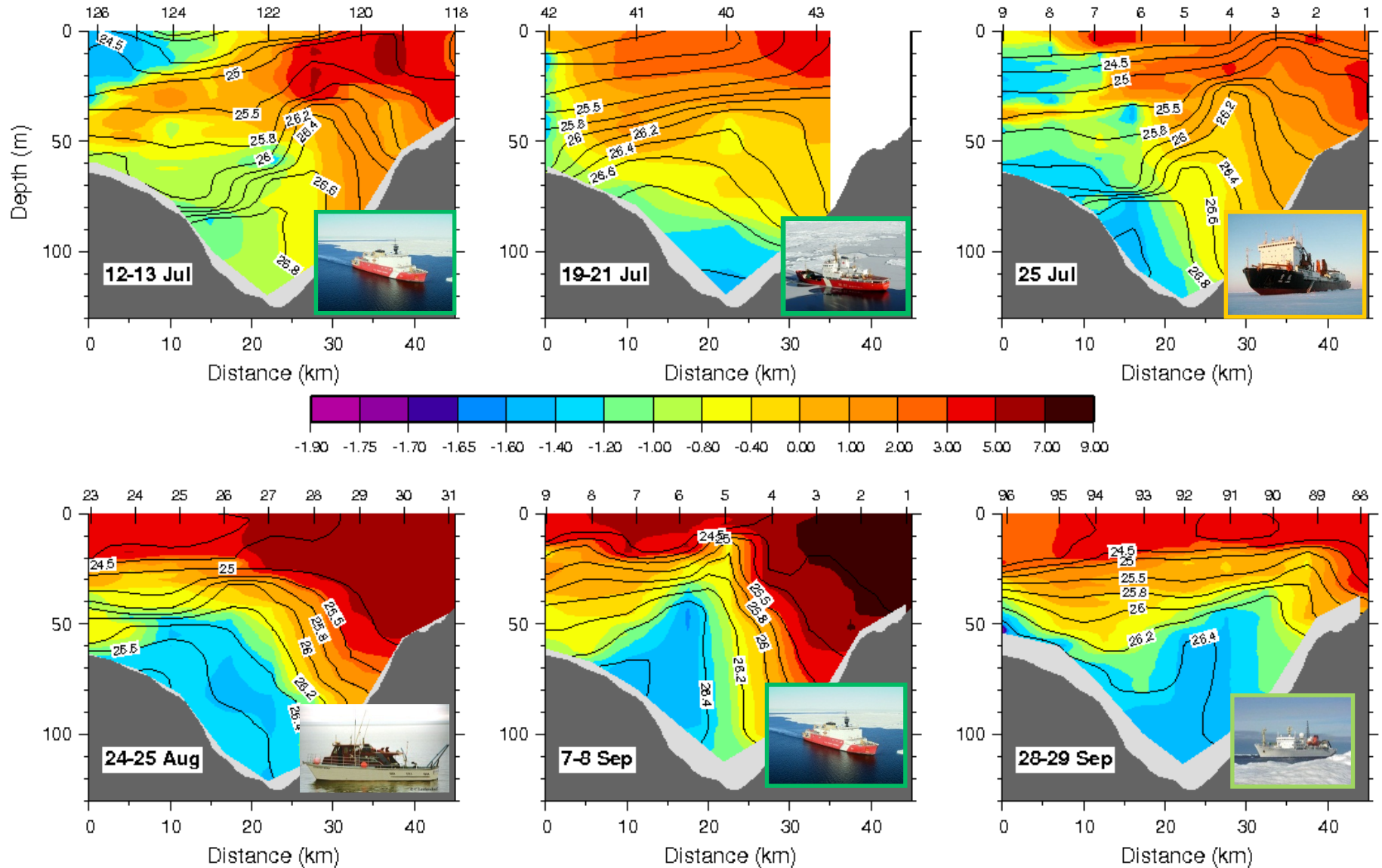
Second tier ship-based sampling:

- Fishery acoustics (less effort than standardized bottom trawling)
- Bottom trawling (every 3-5 years)

DBO occupations by national and international science programs

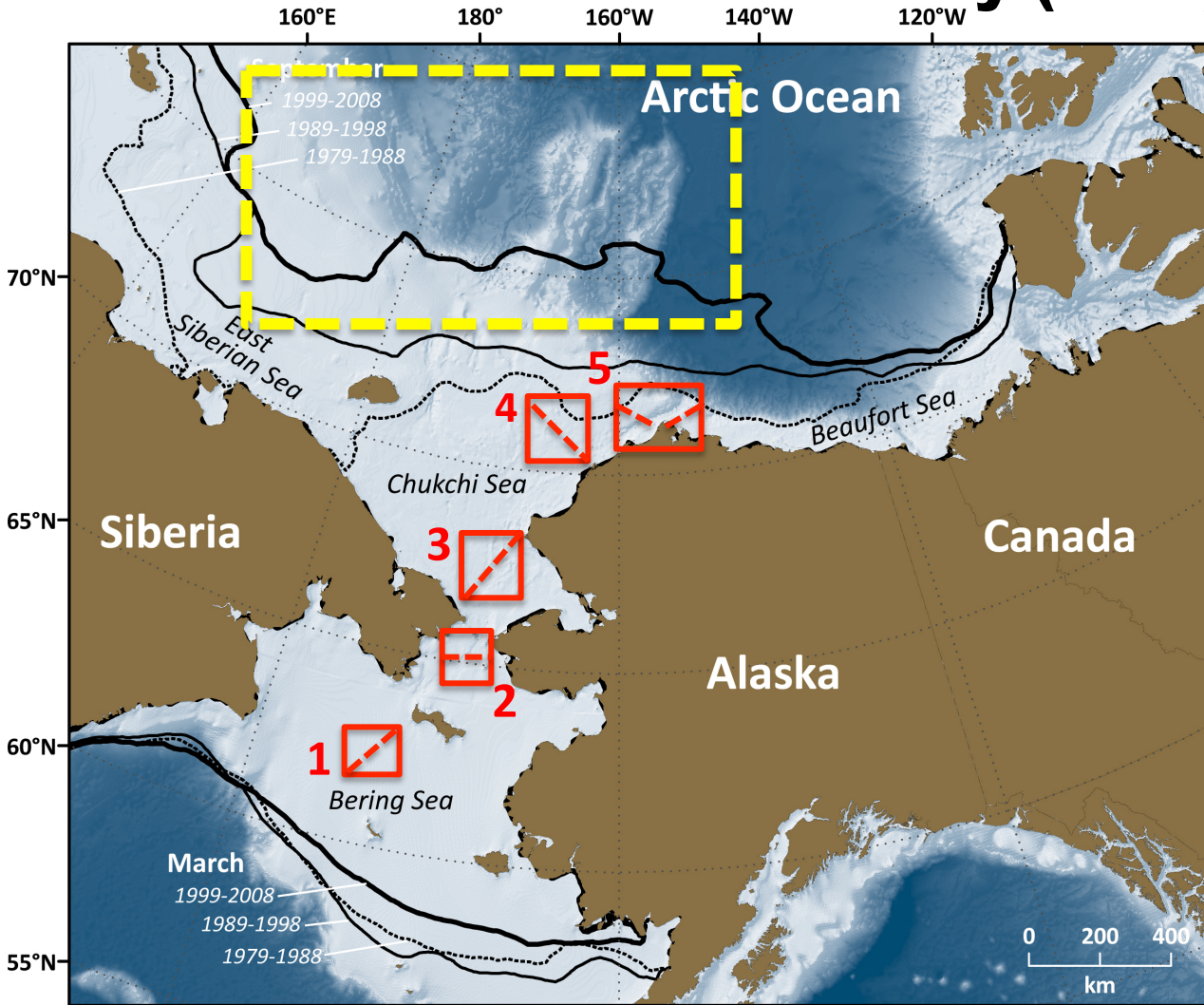
Linking Physics to Biology: the Distributed Biological Observatory (DBO)

6 occupations of Barrow Canyon transect in 2010



[Itoh et al., submitted]

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Title Book: THE PACIFIC ARCTIC REGION: ECOSYSTEM STATUS AND TRENDS IN A RAPIDLY CHANGING ENVIRONMENT

Publisher: Submission to Springer October 2013

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)

Ch. 8 Carbon Fluxes Across Boundaries in the Pacific Sector of the Arctic Ocean in a Changing Environment (Cai, W.J., N.R. Bates, L. Guo, L.G. Anderson, J.T. Mathis, R. Wanninkhof, D.A. Hansell, L. Chen, I.P. Semiletov)

Ch. 9 Carbon Biogeochemistry of the Western Arctic: Primary Production, Carbon Export and the Controls on Ocean Acidification (Mathis, J.T., J.M. Grebmeier, D.A. Hansell, R.R. Hopcroft, D.L. Kirchman, S.H. Lee, S.B. Moran, N.R. Bates, S. VanLaningham, J.N. Cross, W-J. Cai)

Ch. 10 Biodiversity & Biogeography of Lower Trophic Systems in the Pacific Sector (Nelson, R.J., C. Ashjian, B. Bluhm, K. Conlan, R. Gradinger, J. Grebmeier, V. Hill, R. Hopcroft, B. Hunt, H. Joo, D. Kirchman, K. Kosobokova, S. Lee, W. Li, C. Lovejoy, M. Poulin, E. Sherr, K. Young)

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)

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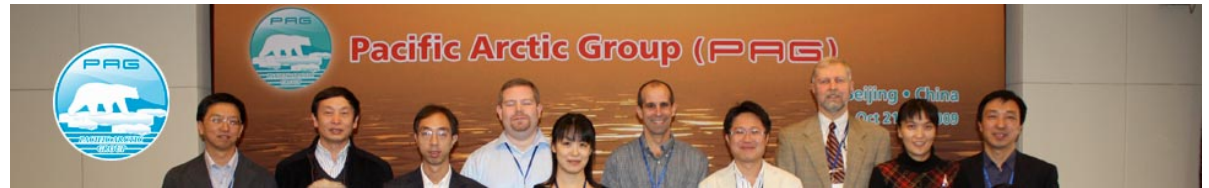
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PAG activities and topics that are high priority to highlight in the ICARPIII planning process include:

- Data sharing and publications from international results of the DBO activities of the 2010-2012 pilot studies at the DBO3 and 5 sites and continued development for full implementation of the 5 DBO sites and identification of new sites in the East Siberian Sea, Beaufort Sea and Canada Basin
- Highlight studies in the western Chukchi/Canada Basin of physical oceanographic research programs, including continued development of a Chukchi Borderland/Arctic Basin Environmental Observing system
- Development of a coordinated sea ice/atmospheric sampling effort within the PAG
- Physical and ecosystem modeling of oceanographic and atmospheric data collected in the Pacific sector
- Highlights of the PAG synthesis activities (e.g., the Pacific Arctic region Springer synthesis volume, Deep-Sea Research II special issues from CHINARE, ARAON cruises, other publications and products)

All the ppts and documents associated with the PAG meetings available at the PAG website: <http://pag.arcticportal.org/>, under "documents".

<http://pag.arcticportal.org>



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What is PAG?

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. The four PAG principle science themes are climate, contaminants, human dimensions and structure and function of Arctic ecosystems.

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