The Distributed Biological Observatory (DBO): Data Workshop Report Update

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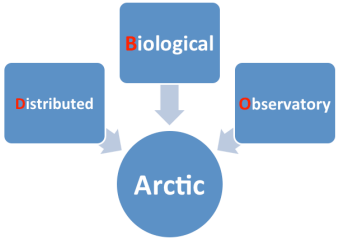
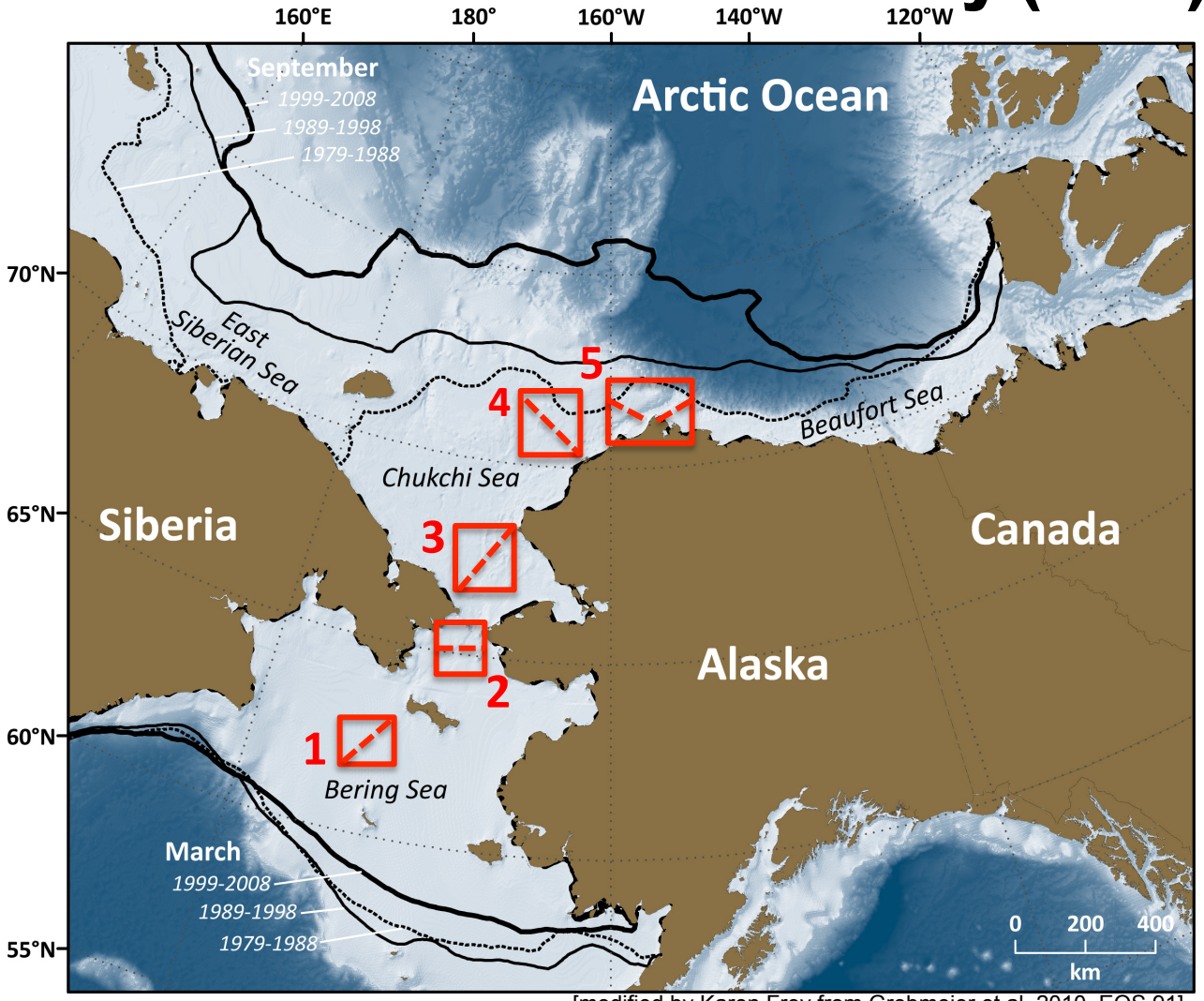
Marine Working Group/IASC
Arctic Science Summit Week
Krakow, Poland



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 occuppied by national and international entities with shared data plan

Distributed Biological Observatory: Linking Physics to Biology

Core standardized ship-based sampling:

- CTD and ADCP
- 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)

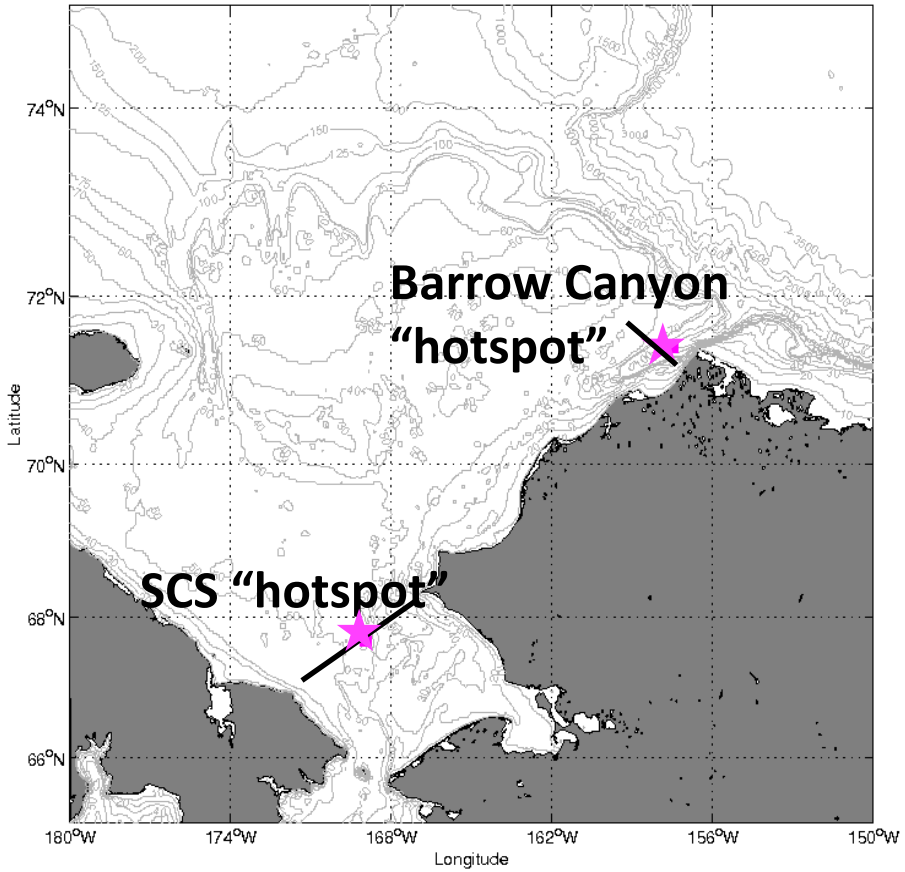
"Change detection array" – same measurements every year, process information in near real time <6 mos; detect regime shifts in rapid changes

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

DBO 2010-2012 “Pilot Program”



Vessel	Country	PI
Moana Wave, Healy	USA	Grebmeier
Healy	USA	Arrigo
Xuelong	China	He
Mirai	Japan	Itoh (2010) Kikuchi (2012)
Laurier	Canada	Vagle
Araon	Korea	Chung
Khromov	Russia and USA	Woodgate
Alaskan Enterprise	USA	Napp
Annika Marie	USA	Ashjian
Healy	USA	Pickart
Westward Wind	USA	Day

http://www.arctic.noaa.gov/dbo/
http://pag.arcticportal.org

DBO Workshop 27 Feb. 27-1 Mar 1 2013, Seattle, Washington, USA

The DBO Data Workshop was focused on 4 objectives:

- Present results from the 2010-2012 pilot study and determine a basis for multidisciplinary paper(s) to showcase the DBO international effort
- Archive metadata with either link to data set in a national archive or submitting the DBO data to common data archive
- Discuss DBO site criteria and identify NE Chukchi Sea DBO4 line and other DBO lines, and
- Determine how to plan for full implementation for the DBO.

There were ~30 participants at the meeting from Canada, Korea, Japan, USA
Significant progress was made on all four objectives of the workshop.

Distributed Biological Observatory (DBO)

Linking Physics & Biology in the Arctic

DBO Data Meeting • February 27–March 1, 2013 • NOAA/PMEL

7600 Sand Point Way NE, Bldg. 3, Seattle, WA 98115in Seattle, WA, USA

Four Objectives for the DBO Data Meeting:

- Present results from the 2010-2012 pilot study and determine a basis for multidisciplinary paper(s) to showcase the DBO international effort;
- Archive metadata, either with a link to data set in a national archive or by submitting the DBO data to a common data archive;
- Discuss DBO site criteria and identify NE Chukchi Sea DBO4 line and other DBO lines; and
- Determine how to plan for full implementation for the DBO.

AGENDA

Wednesday-27 February

0630 Complimentary breakfast in hotel lobby area (each day)
0745 Meet in lobby for van shuttle to PMEL
0830 Welcome and Logistics: Chris Sabine & Sue Moore
0845 Meeting objectives and overview of the DBO: Jackie Grebmeier
0915 DBO pilot program results summaries by field collections (10 min max), plus discussion

a. Physical/chemical

- Robert Pickart
- James Overland
- Svein Vagle
- Takashi Kikuchi
- Shigeto Nishino
- Phyllis Stabeno
- Rebecca Woodgate
- Karen Frey (Thursday)
- Lee Cooper
- Terry Whitledge
- Jeremy Mathis

b. Biological

- Sang Lee
- Diana Varela
- John Nelson
- Koheii Matsuno
- Carin Ashjian (Friday)
- Jackie Grebmeier
- Catherine Berchok
- Sue Moore
- Bob Day
- Others?

1030 Coffee break
1050 Continuation of DBO pilot program data results and discussion
1200 Lunch in PMEL cafeteria
1330 Continuation of DBO pilot program data results and discussion
1500 Coffee break
1520 Continuation of DBO pilot program data results and discussion
1600 Open discussion on presentations and outline of Day 2 activities
1700 End Day 1 and shuttle back to hotel
1830 Dinner (self-pay) at local restaurant – Mamma Melina (5101 25th Ave NE; walking distance from Silver Cloud)

Distributed Biological Observatory (DBO)

Linking Physics & Biology in the Arctic

Thursday-28 February

0745 Meet in hotel lobby, van to PMEL
0830 Highlights of Day 1 and outline Day 2 activities
0845 Summary of DBO Questionnaire Results, EOL Mapserver, data policy and use issues: Steve Williams
1000 Break
1020 Breakout into two groups: Physical/hydrography (leads: Pickart/Cooper) and biology (leads: Grebmeier/Moore) for discussion of available data sets for physical/chemical data and biological data, with specific questions related to data collection, needs, standardization of data collection, gaps, etc.
1200 Lunch in PMEL cafeteria
1330 Meet as full group for discussion of breakout group activities - summary presentations and discussions
1430 Second breakout wave (cross-fertilization) to begin data exchange discussion, metadata and data submissions, publication plans
1530 Break
1550 Return to plenary session, summary presentations and discussions, possible high-level publication?
1700 Summary of day's activities and plans for Day 3
1700 End Day 2 and shuttle to hotel
1730 Dinner on your own

Friday-1 March

0745 Meet in hotel lobby, van to PMEL
0830 Highlights of Day 2 and objectives for morning session
0845 Discussion of criteria for DBO sites, location for DBO 4 in northern Chukchi Sea, and location of other DBO international lines
1000 Coffee break
1020 Plans for future DBO activities (5-10 min)
- US IARPC DBO Interagency Team milestones-Sue Moore
- US Industry activities
- Japan, Canada, Korea, other foreign activities
- Others?

1200 Lunch in PMEL cafeteria
1330 DBO data issues, central data link at EOL and links to international data portals for direct access for DBO data products (Steve Williams, others)
1500 Break
1520 Open discussion of workshop action items, plans for publications, field plan, future activities
1700 Close of workshop and shuttle to hotel
1830 Meeting reception at local restaurant, then dinner as group or on own (TBD)

Some Meeting Results

- Short presentations were provided by workshop participants on the physical and chemical aspects of the Pacific Arctic region (11 presentations) and the biological components of the system (9 presentations). All presentations will be available on the DBO website http://www.arctic.noaa.gov/dbo/workshop_products.html and on the CBL Arctic website http://arctic.cbl.umces.edu/DBO/

- Examples of time series products are available on the DBO NOAA website, including sea ice extent, surface sea water temperatures, shifts in sea ice persistence and chlorophyll-*a* concentrations

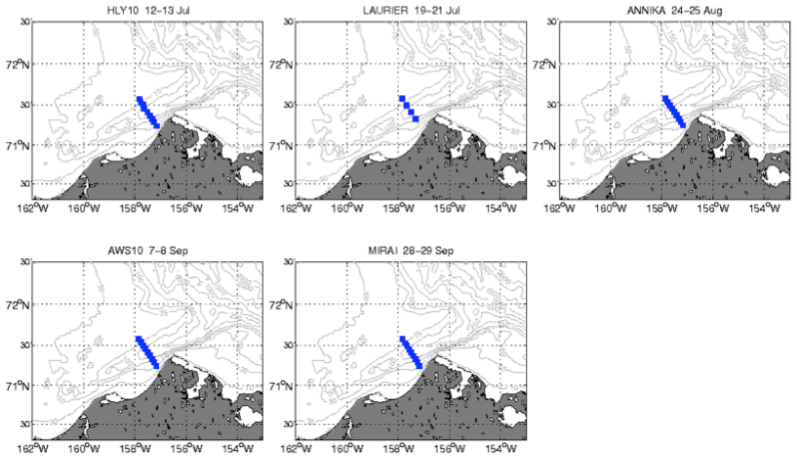
- DBO metadata should be standardized and in a usable format. Metadata files, at a minimum, need to be archived and searchable. Arctic data archives are housed at the Earth Observing Lab (EOL)

- Anticipate final report completed by mid-May 2013 and will inform MWG/ IASC Secretariat of that location

DBO data sets from pilot program

		DBO 3-SCS			DBO 5-BC		
		2010	2011	2012	2010	2011	2012
	Physics	C30, CHAOZ, Chinare	C3O, CHAOZ	C3O, CHINARE, Rusalca, Mirai, CHAOZ	C30, CHAOZ, Mirai, Anaka Marie, HLY01,03	C30, CHAOZ	Comida HS, Mirai, Chaoz, AON, (pickart, ashjian)
T/S	CTD	C30, CHAOZ, Chinare	C3O, CHAOZ	C3O, CHINARE, Rusalca, Mirai, CHAOZ	C30, CHAOZ, Mirai	C30, CHAOZ	Comida HS, Mirai, Chaoz, AON, (Pickart, Ashjian)
Currents	ADCP	C30, CHAOZ, Chinare?	C3O, CHAOZ	C3O, CHINARE?, Rusalca, Mirai, CHAOZ	C30, CHAOZ, Mirai, Anaka Marie, HLY01,03	C30, CHAOZ	Comida HS, Mirai, Chaoz, AON, (Pickart, Ashjian)
Nutrients	Nutrients	C3O, CHAOZ, CHINAIRE	C3O, CHAOZ, CHINAIRE	C3O, CHAOZ, CHINAIRE	C3O, AON-Ashjian, CHAOZ	C3O, AON-CA, CHAOZ	Comida, HS, CHAOZ
Primary production	Satellite Primary Prod	K.Frey	K.Frey, C3O(1stn)	K.Frey, Sang Lee 2, Diana 1	K.Frey	K.Frey	K.Frey
Phytoplankton	chl	C3O	C3O	C3O	C3O	C3O	C3O
	species		C30	RUSALCA, C3O		C30	COMIDA HS
Intermediate	microzoooplankton						
Zooplankton	standing stock	C3O, CHAOZ	C3O, CHAOZ	C3O July, CHAOZ Aug, Greene Sept, Acoustic	C3O, CHAOZ	C3O, CHAOZ	COMIDA HS, Ashjian, CHAOZ, Greene
	species	C3O, CHAOZ	C30	C3O July, CHAOZ Aug, Greene Sept, Acoustic	C3O, CHAOZ	C3O, CHAOZ	COMIDA HS, Ashjian, CHAOZ, Greene
Benthos	standing stock	C3O, infauna, CHINARE	C3O	C3O, RUSALCA epi-benthos, CHINARE	C3O	C3O	COMIDA HS, AKM, Jouett/Dasher
	species	C30	C30	C30	C30	C30	C3O
Marine mammals	survey	CHAOZ, AOOS/transist	CHAOZ	CHAOZ	CHAOZ	CHAOZ	CHAOZ
	watch	RUSALCA mooring	C3O, RUSALCA mooring	RUSALCA mooring, Greene, Acoustic	BOWFEST	BOWFEST, Akmap-Day	COMIDA, Greene
Seabirds	survey	Kuletz, C3O-Bentley?, AOOS/transist, Greene	Kuletz, C3O-Bentley?, AOOS/transist, Greene	Kuletz, C3O-Bentley?, AOOS/transist, Greene	Kuletz	Kuletz, AKMAP-Day	Kuletz, Greene

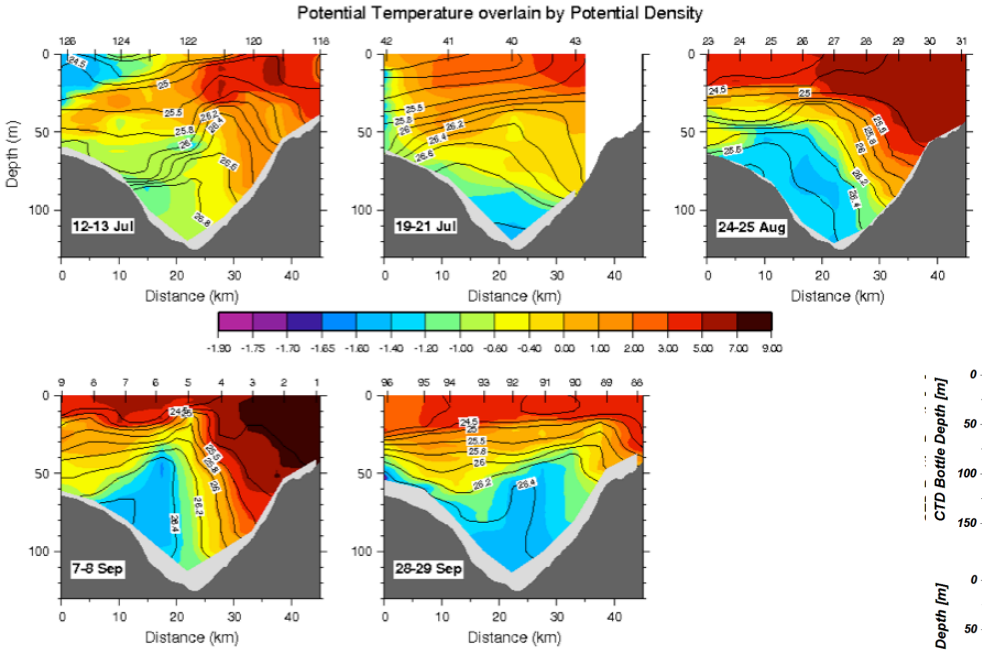
DBO 5: Barrow Canyon Section



-5 reoccupation of sections by international partners from June-October 2010

-observed seasonal warming of Alaska Coastal Water (ACW)

-high nitrate and silicate in the western Bering Sea water compared to eastern ACW



[R. Pickart]

[see Grebmeier et al. 2012, Arctic Report Card 2012, available at http://www.arctic.noaa.gov/reportcard/barrow_canyon.html]

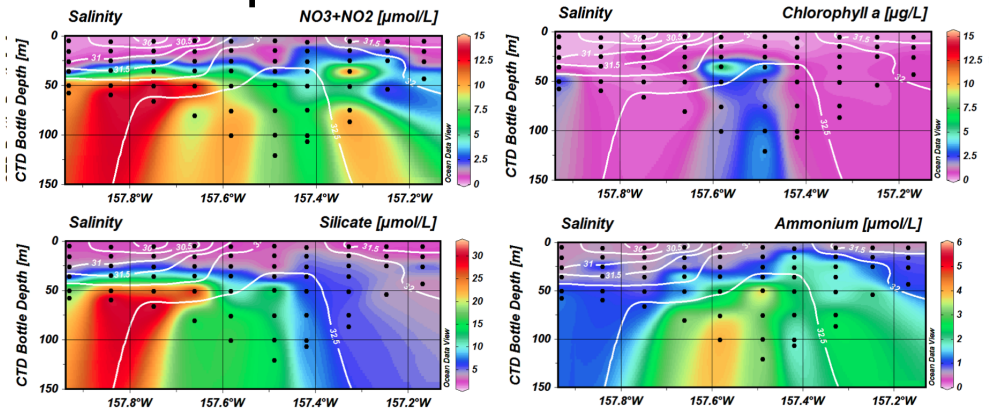
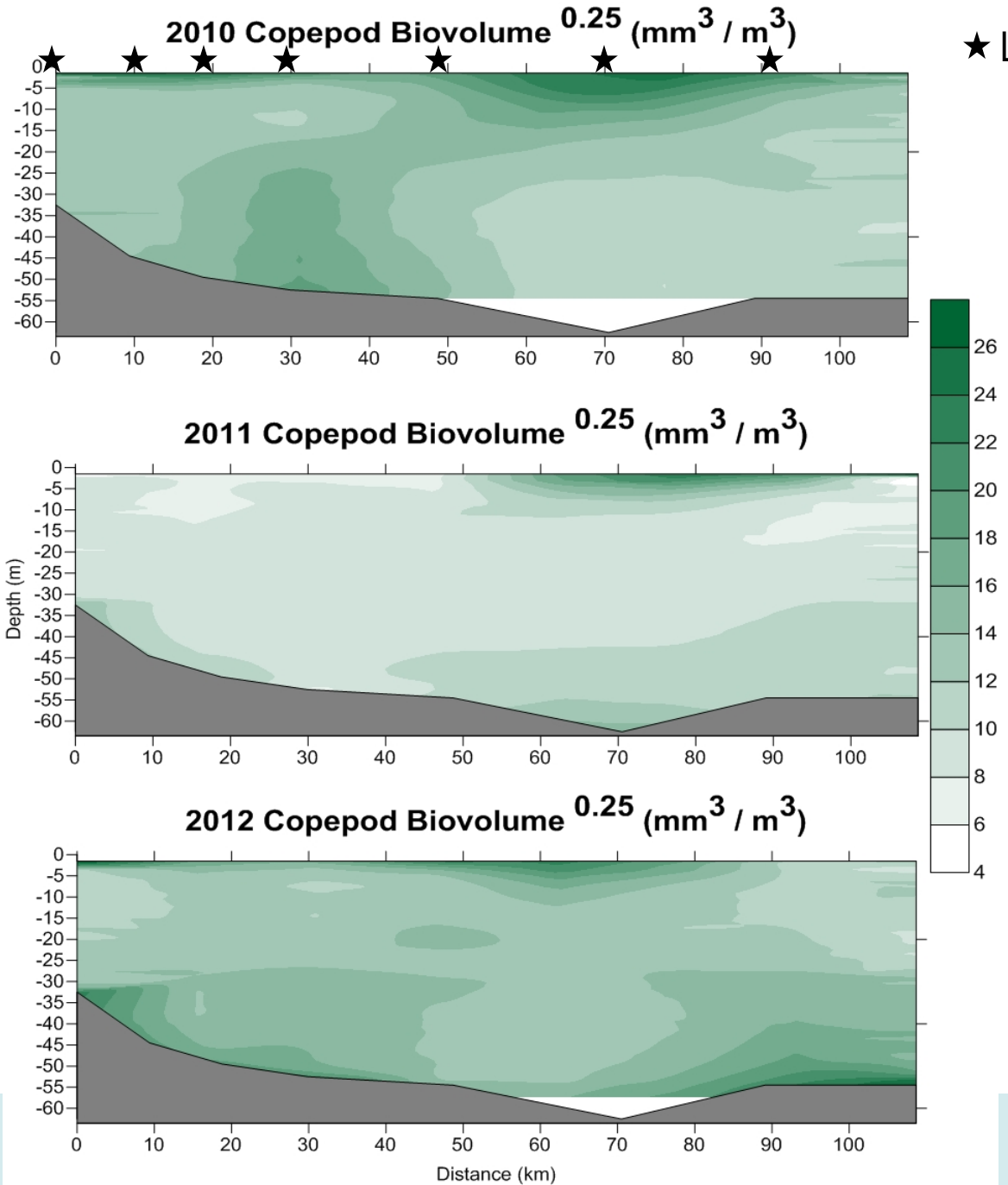


Figure 3. Nutrient data (nitrate, silicate and ammonium) and chlorophyll a (ug/L) over salinity in Barrow Canyon during the CCGS Sir Wilfrid Laurier cruise July 2011.

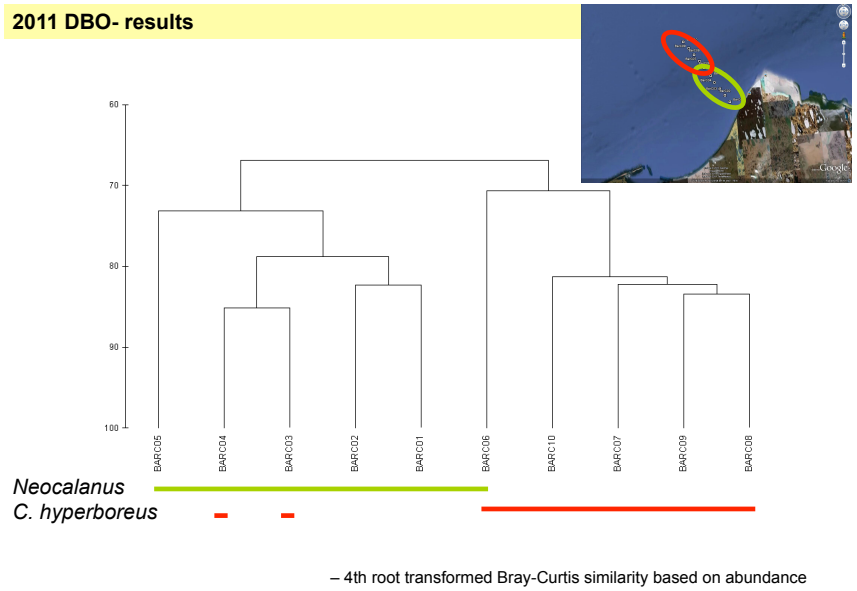
Point Hope



★ Location of casts

[Jeff Napp/ NOAA]

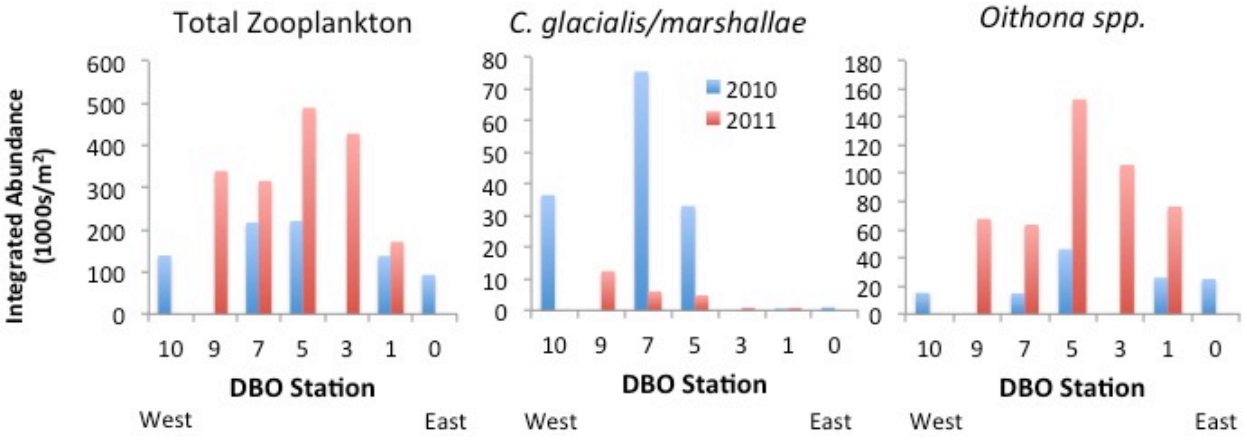
Cluster analysis of zooplankton communities on DBO BC line-July and Aug/Sept 2011



[John Nelson]

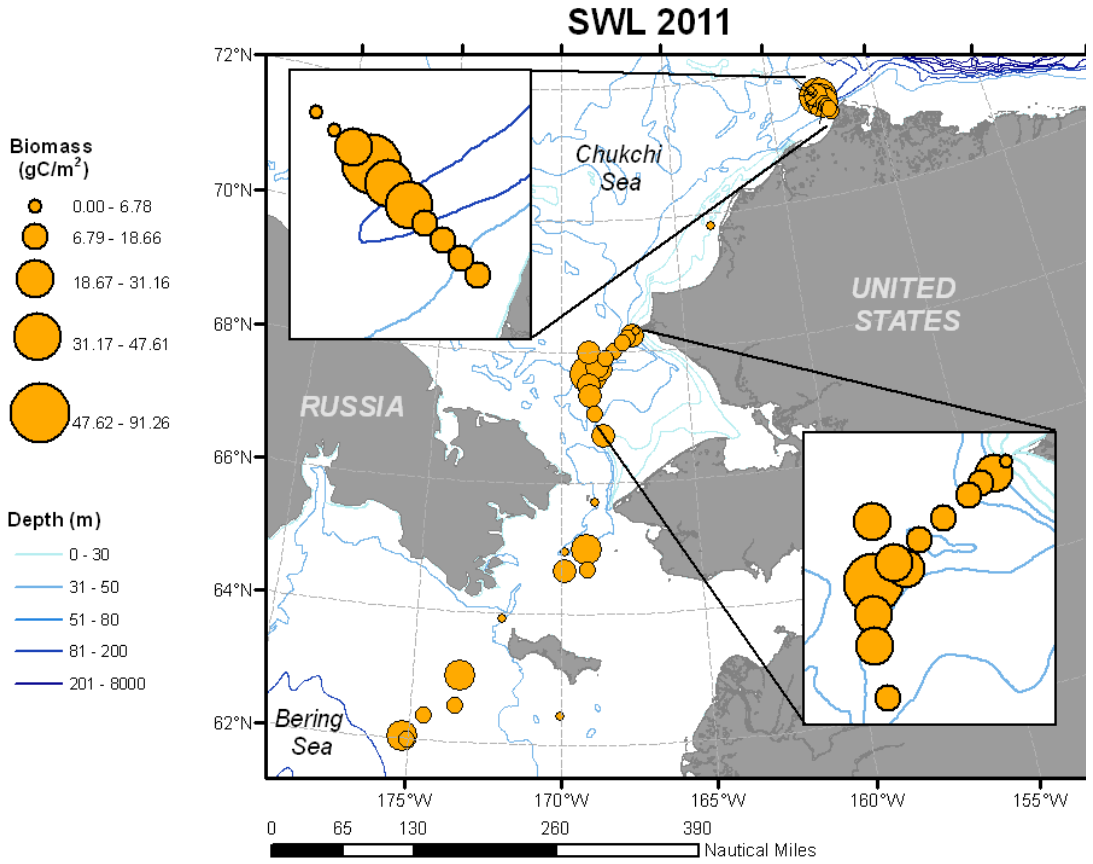
- Heavy colored bars indicate stations characterized by copepods *Neocalanus sp* (Pacific) and *Calanus hyperboreous* (Arctic) in July 2011. Inset shows this species distribution overlaid on a chart of the stations

- Integrated water column abundances of total zooplankton, *C. glacialis/marshallae*, and *Oithona* spp. from across the BC transect in August/September 2010 and 2011

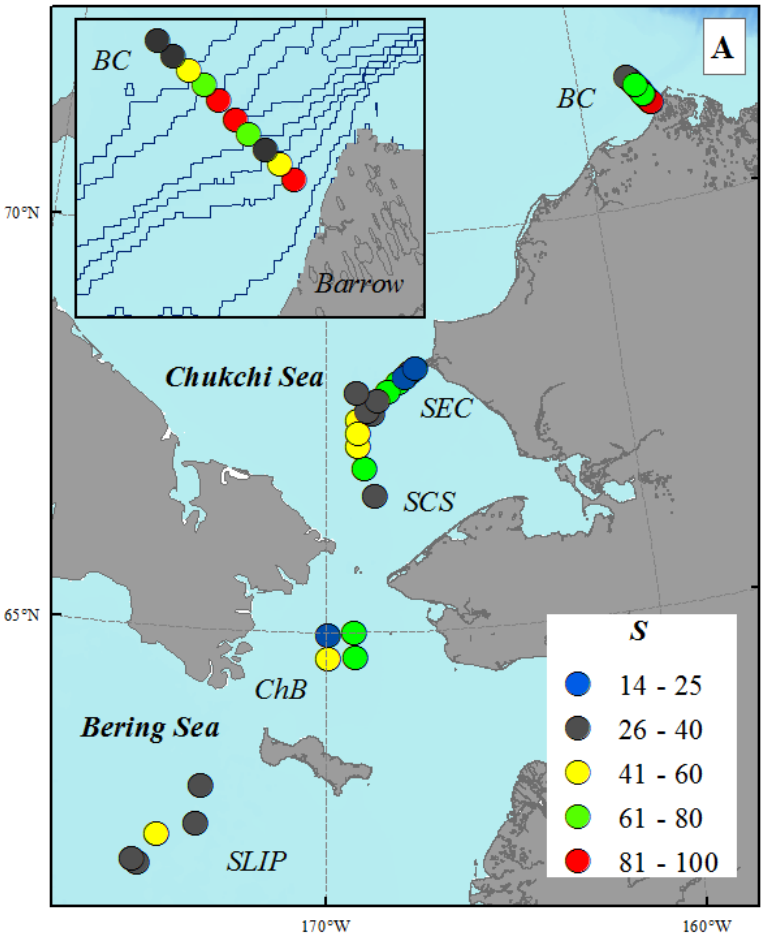


[Ashjian and Campbell]

Benthic macroinfaunal biomass (gC/m2) and species richness (S) at DBO sites in 2011

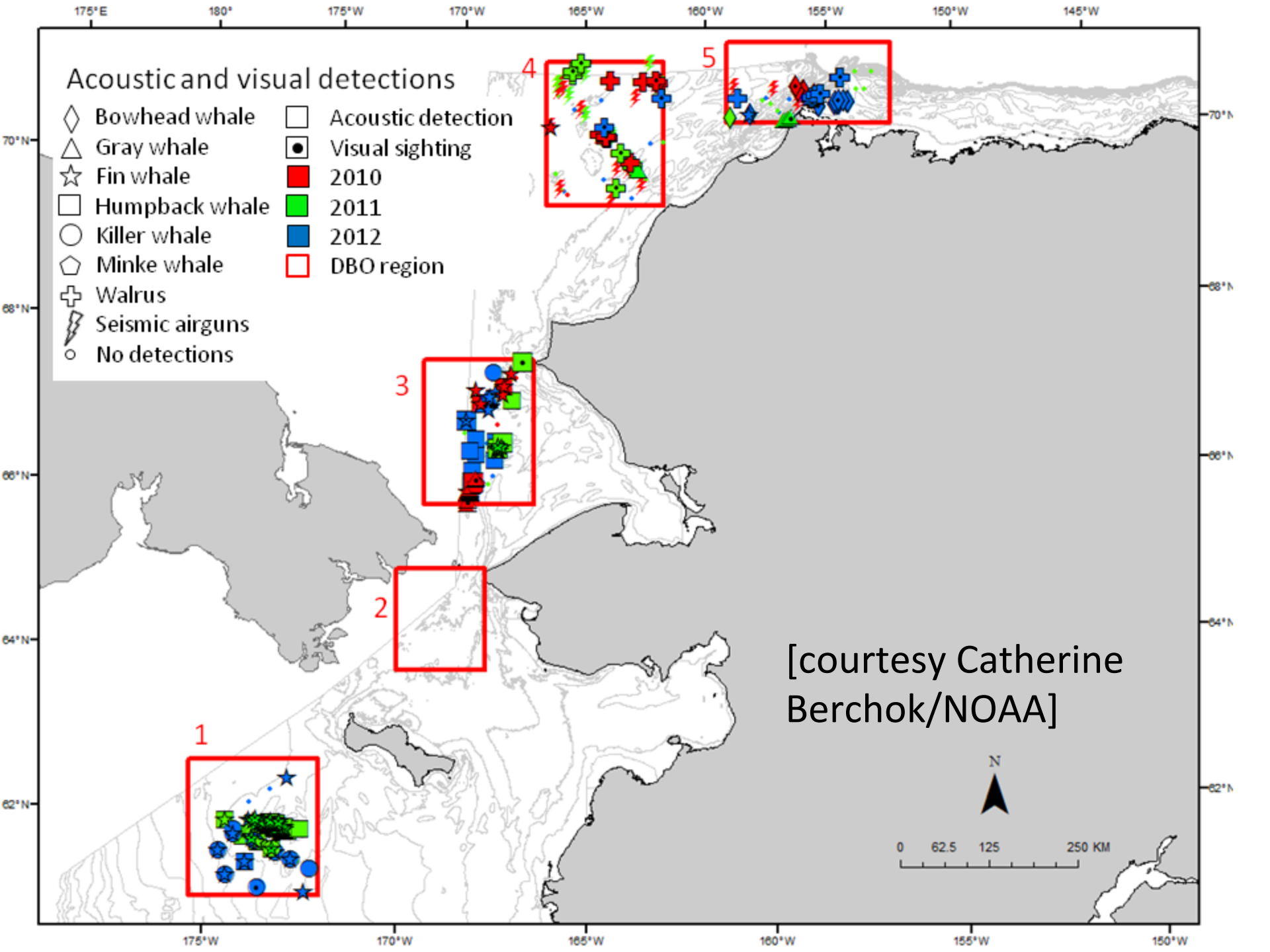


[J. Grebmeier]



[M. Kedra]

- Highest biomass in nutrient and carbon rich Anadyr water to the west
- Highest species richness in BC (center canyon & ACW)


Acoustic and visual detections
Bowhead whale
Gray whale
Fin whale
Humpback whale
Killer whale
Minke whale
Walrus
Seismic airguns
No detections
Acoustic detection
Visual sighting
2010
2011
2012
DBO region
1
2
3
4
5
[courtesy Catherine Berchok/NOAA]
N
0 62.5 125 250 KM
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
70°N
68°N
66°N
64°N
62°N

Objectives of the break out group sessions

- The groups discussed available data sets with specific evaluation of current data types, needs, gaps, standardization of data collections, networking needs, data exchange, metadata and data submissions, publication plans and any issues or concerns

- Two breakout groups were formed: physical oceanography including chemistry, and biological oceanography. Groups returned to plenary session for summary presentations of results and discussion.

- A plan is needed for inter-calibration and standardization of biological data. It is important to rule out lab variability. One way to do this is to have people from different labs take the same samples back to their home labs and compare results. Readme files could provide some structure for metadata.

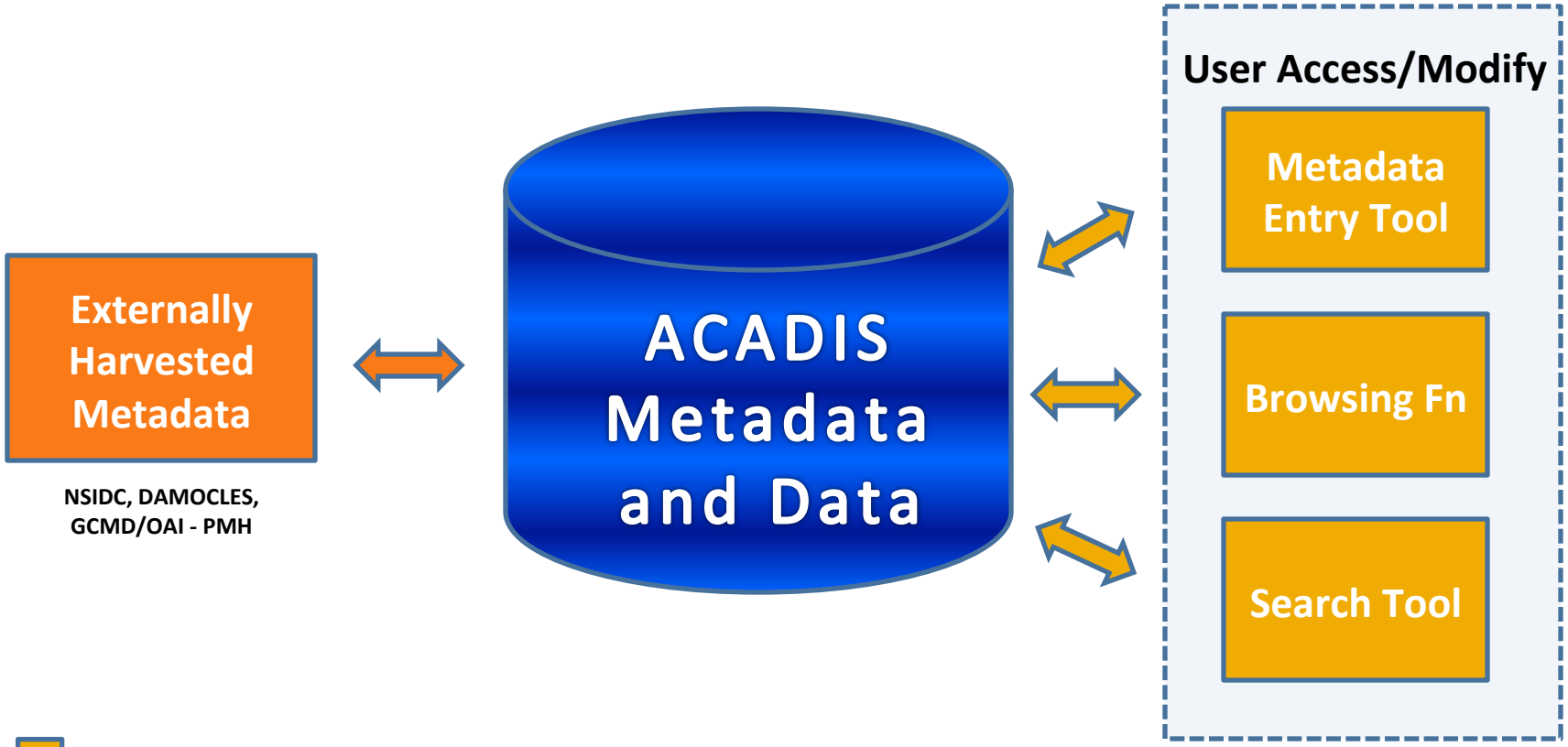
- Discuss placement of new DBO 4 and other lines The group decided on a 6-station line, focused on the 'walrus hotspot' on the SE flank of Hanna Shoal. Additional DBO transects and regions were discussed for the US and Canadian Beaufort Sea.

DBO Data Management Considerations (as part of UCAR/EOL/ACADIS-AON effort)

- Develop an International DBO data policy and exchange protocol (including priority measurements) to facilitate:
  - Dataset exchange and access
  - Preparation of datasets for data integration, inter-comparison and modeling studies
- Encourage broad access to data and metadata beyond national restrictions through scientific collaboration/cooperation
- Coordinate with other National and International Projects
- Consider data format and documentation guidelines to enhance international data exchange and analysis
- Document and standardize (if possible) data collection protocols (time, sensors, processing, parameters, units)

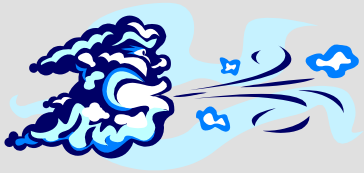
ACADIS Gateway Access and Flow

http://aoncadis.ucar.edu



DBO Publication Effort

- 3 manuscripts
  - Physics (JGR)
  - Interdisciplinary paper (JGR, water transformations, biological processes)
  - Newsy (front page EOS) about the DBO



- "Timetable"
  - Physics paper (summer 2013)
  - Interdisciplinary JGR (winter 2014)
  - Newsy paper (Jackie and Sue?); quick turn around
    - Oceanography
    - International authorship

- Other products/outlets (longer time table)
  - Ocean Sciences special DBO session
  - Special journal issue (DSR2, Progress in Oceanography)

- How to pay for analysis and publication efforts?

Meeting Attendees

Meeting attendees, affiliations and email addresses.

Last Name	First Name	Affiliation (see table below for abbreviations)	Email
Ashjian	Carin	WHOI	cashjian@whoi.edu
Bailey	Eva	CBL/UMCES	bailey@umces.edu
Berchok	Catherine	NOAA/AFSC/NMML	Catherine.Berchok@noaa.gov
Bosch	Jennifer	NOAA/UMCES	jbosch@umces.edu
Cooper	Lee	CBL/UMCES	cooper@umces.edu
Crane	Kathy	NOAA Arctic Research Program	kathy.crane@noaa.gov
Day	Robert	ABR, Inc.--Environmental Research & Services	bday@abrinc.com
Frey	Karen	Clark University	kfrey@clarku.edu
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Stabeno	Phyllis	NOAA/PMEL	phyllis.stabeno@noaa.gov
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Whitledge	Terry	University of Alaska Fairbanks	terry@ims.uaf.edu
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Woodgate	Rebecca	University of Washington	woodgate@apl.washington.edu

Thank you for your attention.

Questions and comments?

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Further information at http://www.arctic.noaa.gov/dbo/ and http://pag.arcticportal.org