Update on Pacific Arctic Group (PAG) activities

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FARO Meeting
April 1, 2017
Arctic Science Summit Week 2017
Prague, Czech Republic

http://pag.arcticportal.org/

Pacific Arctic Group (PAG)

The Pacific Arctic Group (PAG) is an international group of organizations 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 of mutual interest.

- PAG shares information on annual field activities in the Pacific Arctic region
- PAG continues to develop and implement long-term monitoring activities such as the Distributed Biological Observatory (DBO) and Pacific Arctic Climate Ecosystem Observatory (PACEO)
- PAG undertakes Pacific Arctic regional, multidisciplinary syntheses of scientific findings in the marine region relevant to ongoing scientific objectives at the core of the PAG
- PAG is engaged in project development and sampling in the Pacific Arctic region to investigate climate, oceanography, air-sea ice interactions, physical oceanography, and modeling

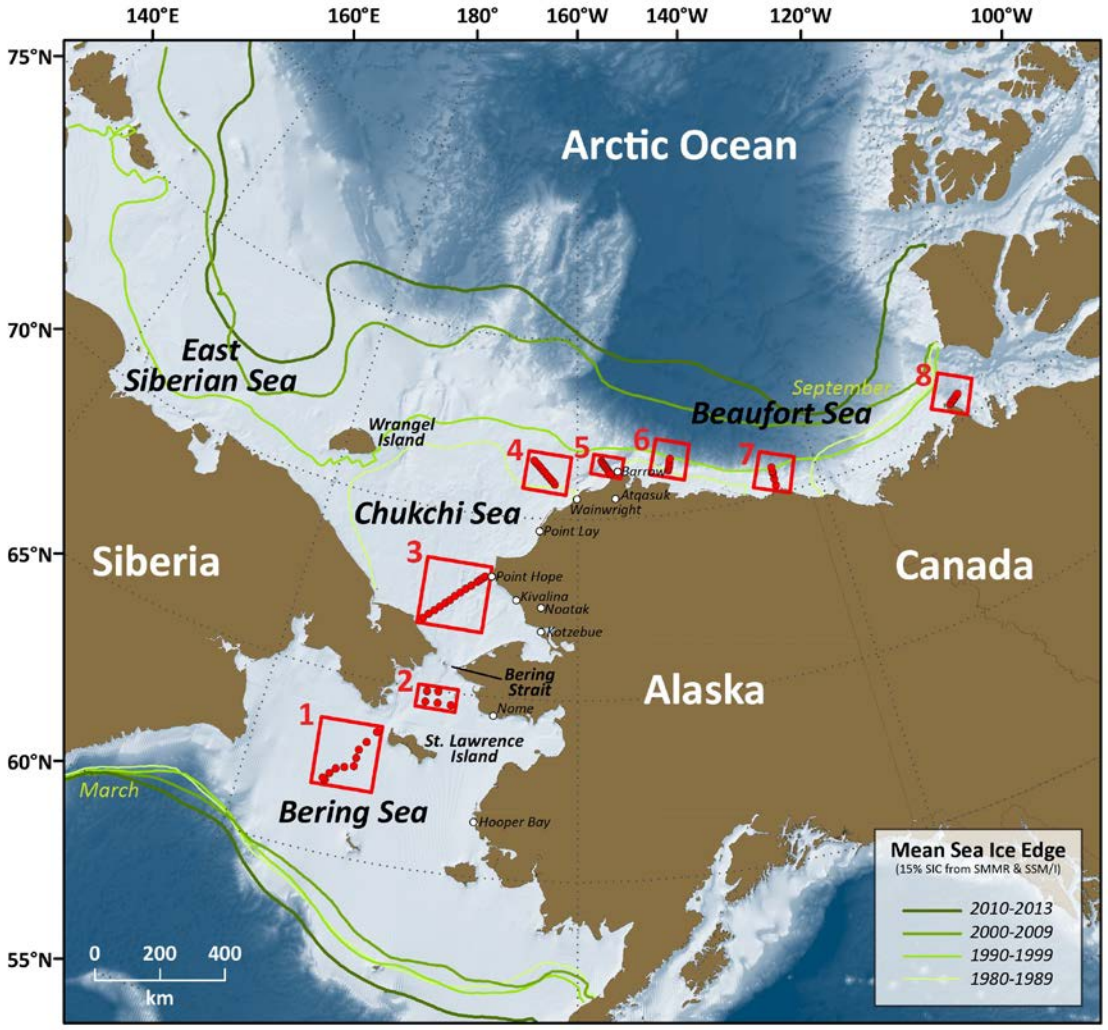
http://pag.arcticportal.org/

2017 PAG and DBO Field Plan-Draft 3/31/17

2017 PAG and DBO Field Season (version 02_28_17_v3): Sampling Contributors. Projects Key: AON=US Arctic Observing Network (National Science Foundation); ArCS=Arctic Challenge for Sustainability; ArcticEIS2=Arctic Ecosystem Integrated Survey, ASGARD=Arctic Shelf Growth, Advection, Respiration and Deposition Rate Experiment, C30=Canada's Three Oceans; CHINARE=Chinese Arctic Research Expedition; DBO=Distributed Biological Observatory, JAMSTEC= Japan Agency for Marine-Earth Science and Technology; KOPRI = Korea Polar Research Institute; NOAA=National Oceanic and Atmospheric Administration; Office of Naval Research (ONR) Marginal Ice Zone (MIZ) project; PMEL=Pacific Marine Environmental Laboratory; RUSALCA=Russian-American Long-term Census of the Arctic. **DBO Region Key**: DBO1=So. St. Lawrence Is., DBO2=Chirikov Basin, DBO3=So Chukchi Sea, DBO4=NE Chukchi Sea, DBO5=Barrow Canyon, DBO6=East Beaufort Sea, DBO7-Beaufort Sea Central, DBO8=Bathurst polynya region.

Dates (Port calls)	Ship	DBO Region	Projects	PAG contact	Chief Scientist
June 9-28 (Nome-Nome)	Sikuliaq	2, 3	ASGARD	Seth Danielson sldanielson@alaska.edu	Seth Danielson sldanielson@alaska.edu
July (Nome-Nome)	**Norseman II**	**3**	**Bering Strait Mooring Project/AON**	**Rebecca Woodgate woodgate@apl.washington.edu**	**Rebecca Woodgate woodgate@apl.washington.edu**
July 6-14 (Dutch Harbor-Nome); July 16-Aug 2 (Nome-Japan)	Oshoro-maru	-	Hokkaido University	Toru Hirawake hirawake@salmon.fish.hokudai.ac.jp	Atsushi Ooki ooki@fish.hokudai.ac.jp
July 10-22 (Dutch-Barrow)	**Sir Wilfrid Laurier**	**1,2,3,4,5**	**C30/DBO (AON)**	**Jackie Grebmeier jgrebmei@umces.edu**	**Svein Vagle Svein.Vagle@dfo-mpo.gc.ca**
Aug 7-27 (Nome-Barrow	Araon	3+Chukchi Borderland+ East Siberian Sea	Korean Expedition (KOPRI) ocean and Sea-ice researches	Sung-Ho Kang shkang@kopri.re.kr	Sung-Ho Kang shkang@kopri.re.kr
July 31-Aug 24 (Dutch-Nome-Dutch)	TBD	**3,5,6**	**ArcticEIS2**	**Ed. Farley@noaa.gov**	**Multiple legs: Farley, Cieciela, Voillenwieder (all NOAA)**
Aug 4-27 (Nome-Nome)	Norseman II	3,4	AMBON	Jackie Grebmeier jgrebmei@umces.edu	Katrin Iken kbiken@alaska.edu
Aug 9-23	**Sikuliaq**	**3,4,6**	**Arctic Productivity** **Arctic Nitrogen Fixation**	**Renee Crain rcrain@nsf.gov** -same as above	**Laura Juranek ljuranek@coas.oregonstate.edu** **Rachel Sipler sipler@vims.edu**
Aug 23-Sept 24 (Dutch-Nome)	Mirai	3,5+Arctic Basin	Japanese ArCS	Takashi Kikuchi takashik@jamstec.go.jp	Shigeto Nishino nishinos@jamstec.go.jp
Aug 26-Sept 14 (Dutch-Nome)	**Healy**	**3,4,5**	**DBO-NCIS**	**Jackie Grebmeier jgrebmei@umces.edu**	**Robert Pickart rpickart@whoi.edu**
Aug 27-Sept 10	Sikuliaq	-	Shelf Break Ecology	Renee Crain rcrain@nsf.gov	Carin Ashjian cashjian@whoi.edu
Sept 18-Oct 16	**Healy**	-	**Navy**	**Renee Crain rcrain@nsf.gov**	**Navy**
Oct 3-11	Sir Wilfrid Laurier	4,8	C30	Bill.Williams@dfo-mpo.gc.ca	Humfrey.Melling@dfo-mpo.gc.ca

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

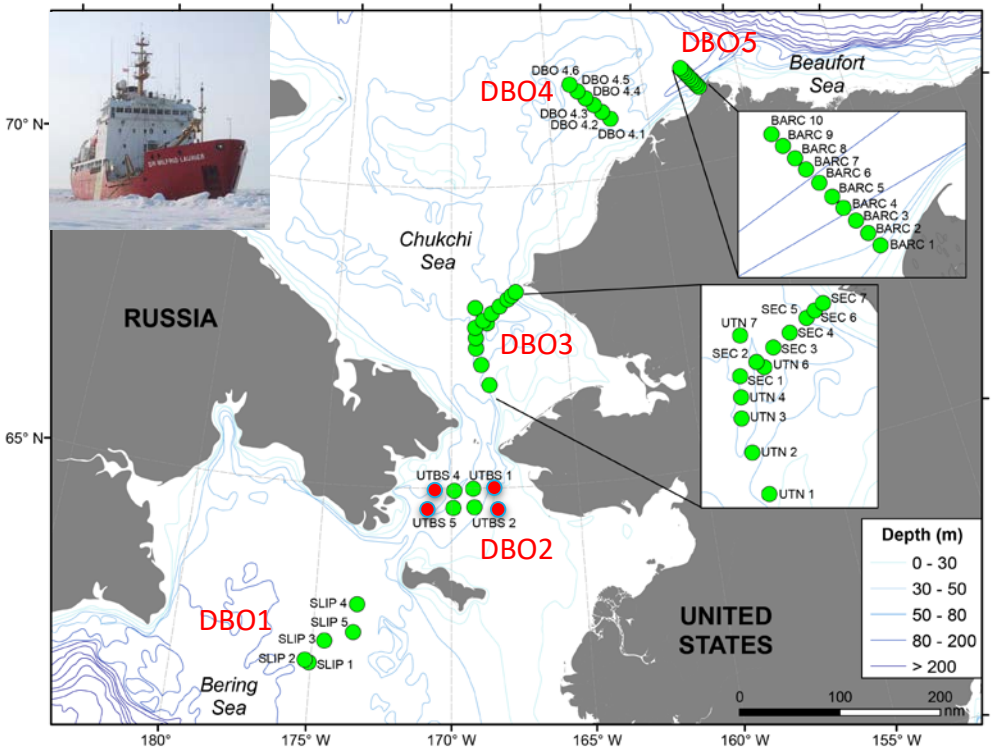


[updated by Karen Frey from Grebmeier et al. 2010, EOS 91]

- **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 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**

Canada's Three Oceans (C30) and the Distributed Biological Observatory (DBO): *CCGS Sir Wilfrid Laurier*, July 10-22, 2017

Focus: sampling along latitudinal transect lines developed as a "change detection array" for consistent monitoring of biophysical responses to changing environmental conditions



Estimated Timeline:

- July 14-south St. Lawrence Island (DBO1) (5 process, 4 CTD only)
- July 15-Chirikov Basin (DBO2)-8 stations (all CTD, but only 4 with full sampling)
- July 17: SE Chukchi Sea (DBO3)-closest station 5 nm from coast, estimate time within 12 nm to be 2 hrs
- July 19: NE Chukchi Sea off Wainwright (DBO4)-closest station 30 nm offshore
- July 20: off Barrow (DBO5)-closest station 5 nm from coast, estimate time within 12 nm to be 2 hrs

DBO data collections

- Seawater temperature and salinity; velocity measurements
- Nutrients, chlorophyll, carbon products, CDOM
- Phytoplankton, zooplankton and macrobenthic abundance, biomass, community structure
- Marine mammal and seabird surveys

Contact: Dr. Svein Vagle, Canadian Chief Scientist, Jackie Grebmeier, UMCES and PAG, jgrebmei@umces.edu

Japan Oshoro-maru Bering Sea 2017 Cruise
18 June-2 Aug 2017: Tokyo-Dutch Harbor-Nome- Hakodate

Oshoro-maru

Chief Scientist: Atsushi Ooki

Faculty of Fisheries Sciences, Hokkaido University

3-1-1 Minato-cho, Hakodate, Hokkaido, 041-8611 Japan

Tel. +81-138-40-8870; Email: ooki@fish.hokudai.ac.jp

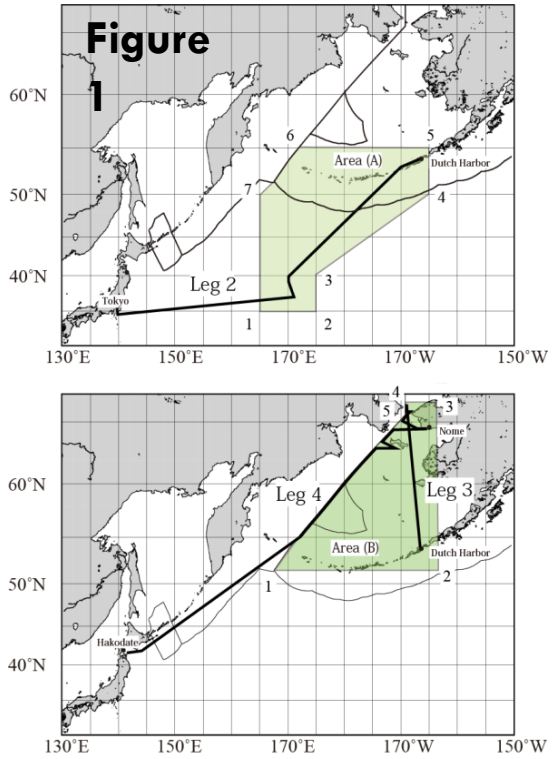
The training Vessel Oshoro-maru belonging to Faculty of Fisheries Sciences, Hokkaido University, Japan will conduct hydrographic, marine biogeochemical, marine biological, and meteorological surveys in the Bering Sea during June – August, 2017 (Table 1 and Figure 1). The objective of this cruise is to quantify on-going changes in marine ecosystem and the ocean environment, which are related to the recent global warming and sea ice reduction.

The observational activities consist of CTD, optical measurements, water samplings, plankton net samplings, sediment samplings, visual observation of marine animals by binoculars, ship-board ocean current and surface water monitoring, meteorological measurements, radiosondes (Tokyo – Dutch Harbor), and mooring and sediment trap recoveries and deployments, trawl nets (bottom trawl, midwater trawl, MOHT), ring nets (Neuston net and Larva net), and fishing rod and hooks.

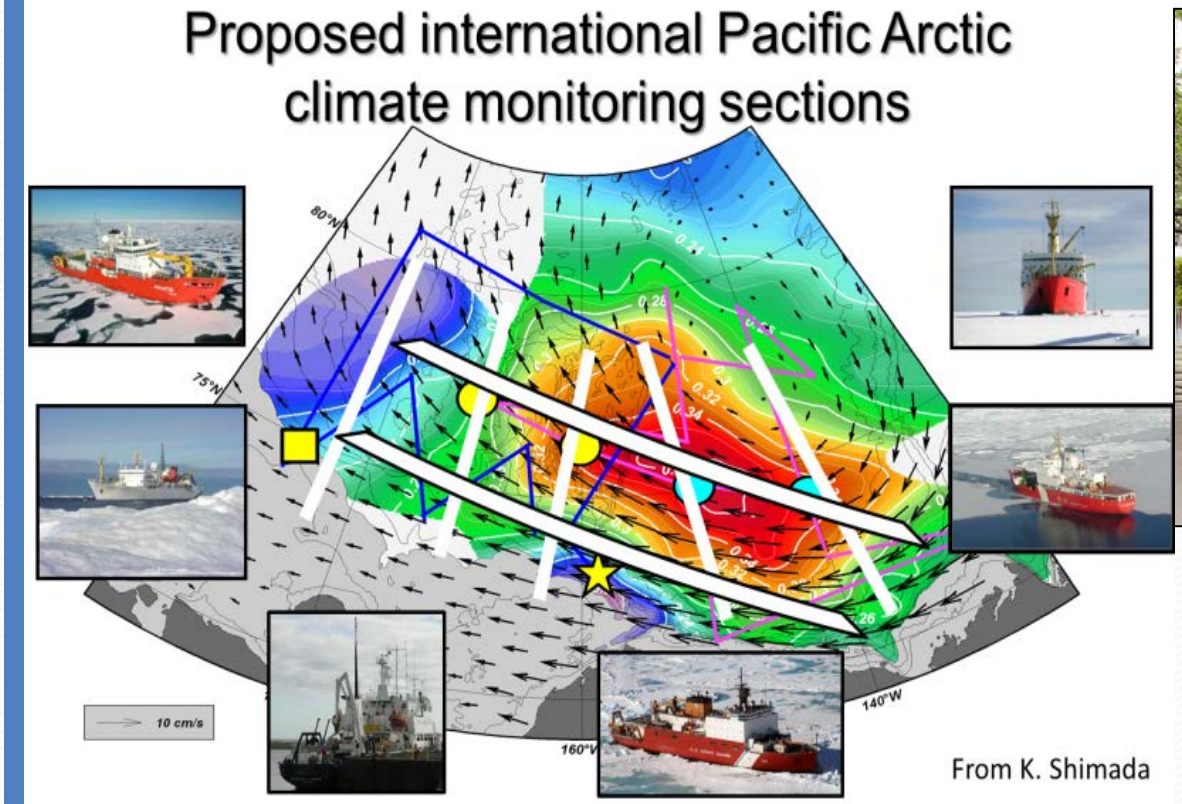
Table 1

Date	Port	In/Out of Port	Leg #
June 18,	Tokyo, Japan	Out	2
July 3	Dutch Harbor	In	2
July 6	Dutch Harbor,	Out	3
July 14	Nome, AK	In	3
July 16	Nome, AK	Out	4
August 2	Hakodate, Japan	In	4

Figure 1



New development and of long-term monitoring activity in the higher Pacific Arctic - the Pacific Arctic Climate Ecosystem Observatory (PACEO)



Background color: dynamic height at 100dbar relative to 800dbar from Mirai and Louis S. St-Laurent 2008 cruises (Oceanic Beaufort Gyre)
Black vectors: average sea ice motion vectors for Nov. 2007- Apr. 2008 (Sea Ice Beaufort Gyre)
Symbols: Mooring array in 2012-2013 (TUMSAT/KOPRI/NIPR & WHOI)

Multidisciplinary ocean survey in the western Arctic Ocean
ARAON, Aug 7 - Aug 27, 2017: Nome to Barrow, Alaska

Chief Scientist: Sung-Ho Kang, Division of Polar Ocean Sciences, Korea Polar Research Institute (KOPRI), 26, Songdomirae-ro, Yeonsu-gu, Incheon, 21990, Republic of Korea; Tel: 82-32-760-5332; Email: shkang@kopri.re.kr

The icebreaker ARAON will be sampling north of the Bering Sea, Chukchi Sea and East Siberian Sea from August 7 to 27, 2017 to carry on KOPRI Arctic Ocean research program (K-AOOS, Korea-Arctic Ocean Observing System). The objectives of K-AOOS are to identify key environmental parameters (physical and biogeochemical) in rapid transition due to the sea-ice decrease in the western Arctic Ocean (Chukchi and East Siberian Seas) and predict environmental change patterns. The K-AOOS program (PM16040) funded by the Ministry of Oceans and Fisheries (MOF) will be undertaken by a team of scientists from KOPRI, the Korea Institute of Ocean Science and Technology, Busan National University, Inha University, Incheon National University, Hanyang university, SAMS, BAS, University of Seattle, Ocean University of China and Tokyo University of Marine Science and Technology.

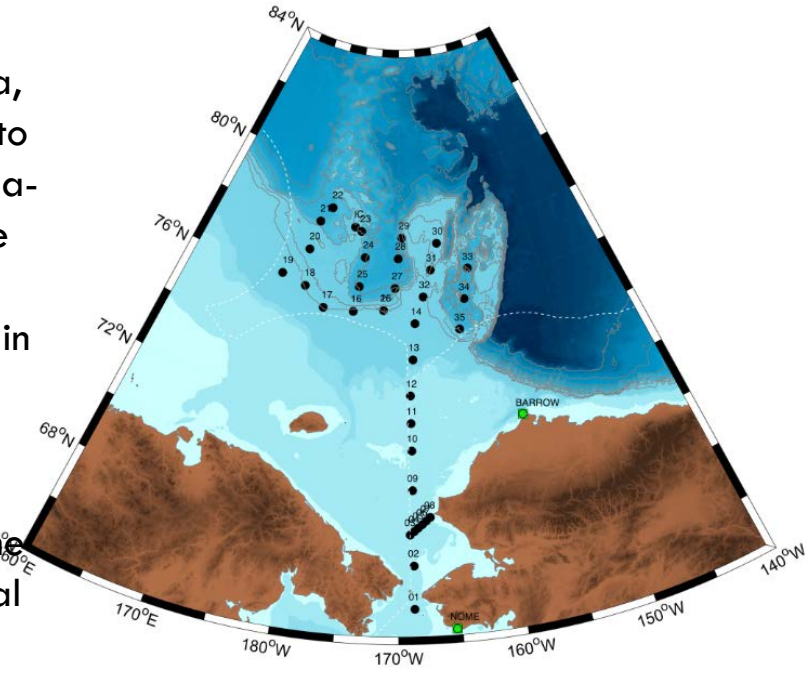


Figure 1. Map of our proposed sampling sites.

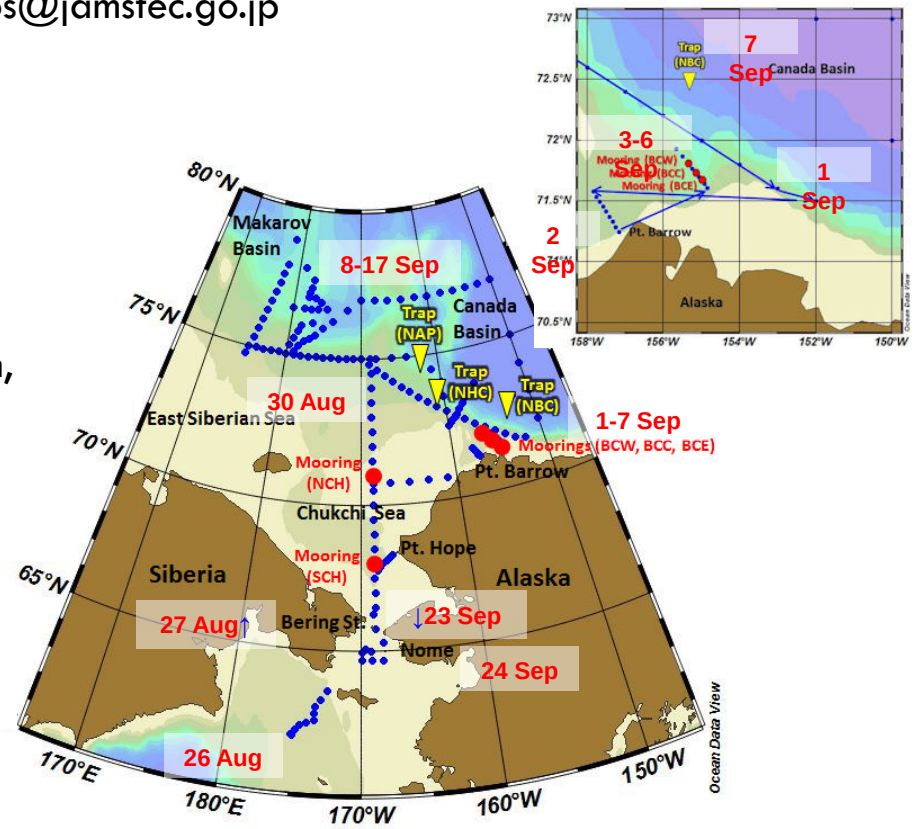
We will study the plankton (bacteria, phytoplankton and zooplankton), phytoplankton physiology and pigments, primary production, nutrients, DOC, POC, PON, DON, pCO_2, DIC, Amino acid, N_2O gas, black carbon, interaction between water column and atmosphere, as well as physical oceanographic studies of the currents and ice conditions. The map below (Figure 1) shows about 35 stations that we will sample during summer 2017 that are similar to our 2016 effort. Particularly, we are going to take samples at 6 stations in DBO line 3 between 8 and 9 August .

R/V Mirai Arctic Ocean cruise
23 Aug – 24 Sep, 2017: Dutch Harbor to Nome

Chief Scientist: Shigeto Nishino
Japan Agency for Marine-Earth Science and Technology (JAMSTEC), 2-15 Natsushima, Yokosuka, Kanagawa 237-0061, Japan, Tel. +81-46-867-9487; Email: nishinos@jamstec.go.jp

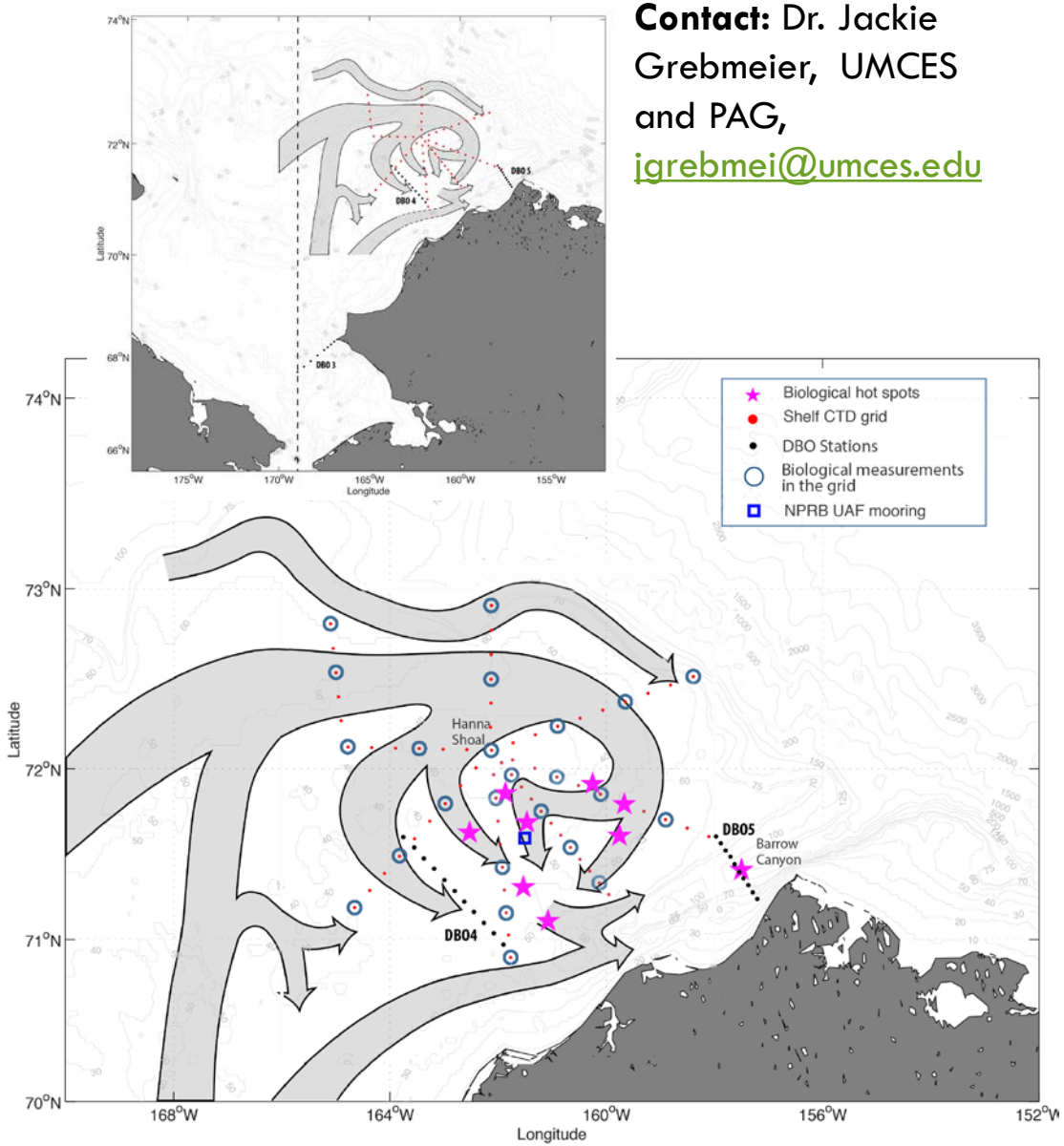
The Research Vessel Mirai (R/V Mirai) belonging to Japan Agency for Marine-Earth Science and Technology (JAMSTEC) will conduct hydrographic, marine biogeochemical, and meteorological surveys in the Arctic Ocean during August – September 2017. The objective of this cruise is to quantify on-going changes in the ocean, atmosphere, and ecosystem, which are related to the recent Arctic warming and sea ice reduction.

The observational activities consist of CTD/XCTD/UCTD, drifting buoy deployments, mobile float observation with camera and sensors, optical measurements, water samplings, plankton net samplings, sediment samplings, visual observation of marine animals by binoculars, ship-board ocean current and surface water monitorings, meteorological measurements and samplings, radiosondes, Doppler radar, sea bottom topography, gravity, and magnetic field measurements, and mooring and sediment trap recoveries and deployments.



Planned schedule is as follows.
23 Aug: Depart from Dutch Harbor
26 Aug: Northern Bering Sea
27 Aug: Bering Strait
30 Aug: Northern Chukchi Sea
1-7 Sep: Near Pt. Barrow
8-17 Sep: Canada and Makarov Basins
23 Sep: Bering Strait
24 Sep: Nome

2017 DBO-NCIS (Northern Chukchi Sea Integrated Study)
NOAA Arctic Research Program (WHOI, UMCES and NOAA PMEL)
Aug 28 Aug-Sept 13, 2017 (Dutch-Dutch, Alaska)



Contact: Dr. Jackie Grebmeier, UMCES and PAG, jgrebmei@umces.edu

Field Measurements:

Standard DBO measurements and process studies (DBO 3,4, and 5) and focused process stuy NE Chukchi Sea

- Physical: CTD and lowered ADCP
- Chemical: nutrients, oxygen-18, chlorophyll-a (Chl a), carbon components
- Biological: Zooplankton abundance and biomass
- Benthos: macrobenthos abundance, biomass and population structure,
- Sediment: organic carbon/nitrogen content, chl a content, grain size, radioisotopes
- Benthic oxygen uptake and nutrient exchange
- Upper trophic levels: marine mammal shipboard surveys

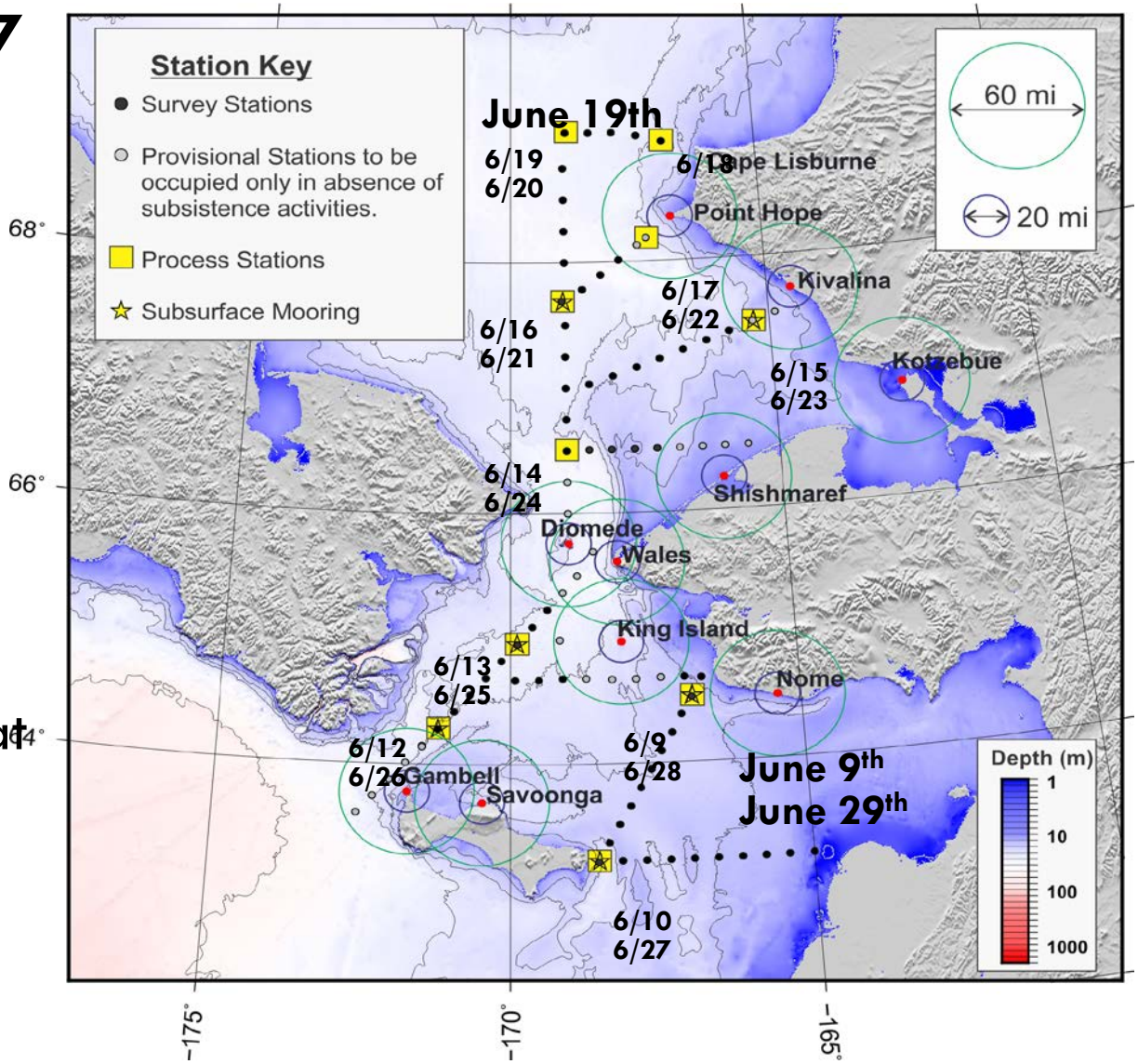
ASGARD Project 2017

1st: Process Studies

Set up experiments that require multi-day incubations. Deploy moorings. Epibenthic fish sampling.

2nd: Synoptic Surveys

Multi-station transects that cross biogeographical domains. More fishing.



- June 2017 & 2018 on R/V Sikuliaq
- 2017/18 and 2018/19 moorings

[Seth Danielson, UAF]

Thank you for your attention.

Questions and comments?

Financial support from the international partners within the Pacific Arctic Group and US NSF, NOAA, BOEM, and USFWS

http://www.arctic.noaa.gov/dbo/