Update (highlights) of 2013 field results and any plans 2014 field seasons

c. Japan

Takashi Kikuchi (JAMSTEC)
with inputs from other Japanese scientists

PAG related observational activities in 2013

1) Japanese Research vessel cruise

T/S Oshoro-maru cruise in June-July 2013

R/V Mirai Arctic cruise in September-October 2013

2) Participations in ice-breaker cruises

CCGS S. W. Laurier July cruse; *Mooring recoveries and deployments*

CCGS Louis S. St.- Laurant cruises;

Sea ice observation, hydrography & water sampling, and mooring recoveries & deployments

IBRV Araon Arctic cruise; Hydrography and mooring recovery

3) Others

Ice thickness monitoring off Barrow, Alaska

XCTD observation in the Arctic Ocean and so on. . .

Pacific Arctic Group Fall Meeting
09:00-18:00 on October 18, 2013
@ Korea Polar Research Institute
Incheon, Republic of Korea

Observational activities in the Arctic Ocean

T/S Oshoro-maru cruise in June-July 2013

Goal;

Using data from cruises in 1991, 1992, 2007, 2008 and this year,

1) To reveal relationship between biology at higher trophic levels and oceanographic condition (sea ice, physio-chemical, primary and secondary production).

2) To construct habitat model of biology under current condition to consider future reaction of fish and mammals.

- CTD/CMS (Normal and Clean Niskin)
- Air sampling (VOC gas)
- Sea ice sampling and incubation
- Optics
- ADCP
- Plankton net
- Grab type bottom sampler
- Bottom corer
- Dredge
- Bottom/midwater trawl
- ROV
- Eye observation
- Tagging to whale
- Fish finder

Observational activities in the Arctic Ocean

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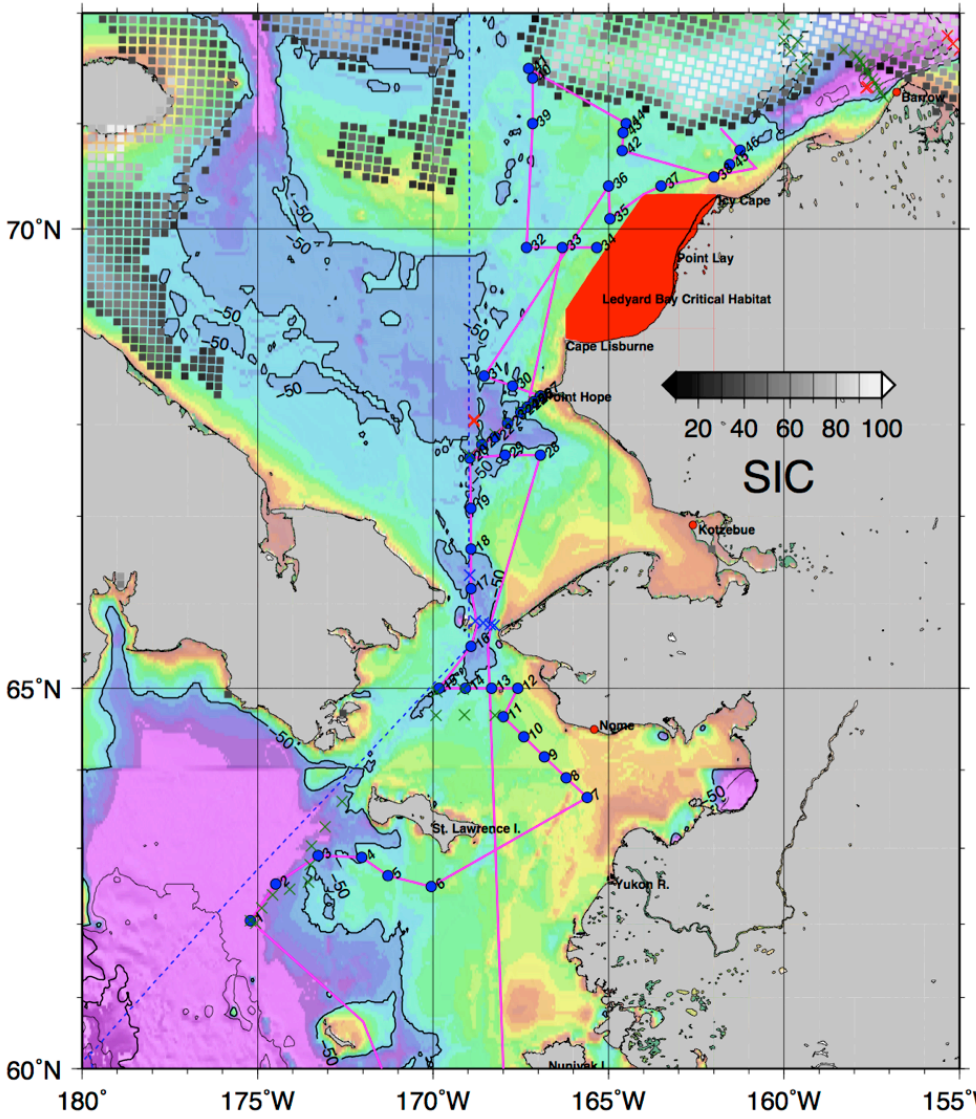
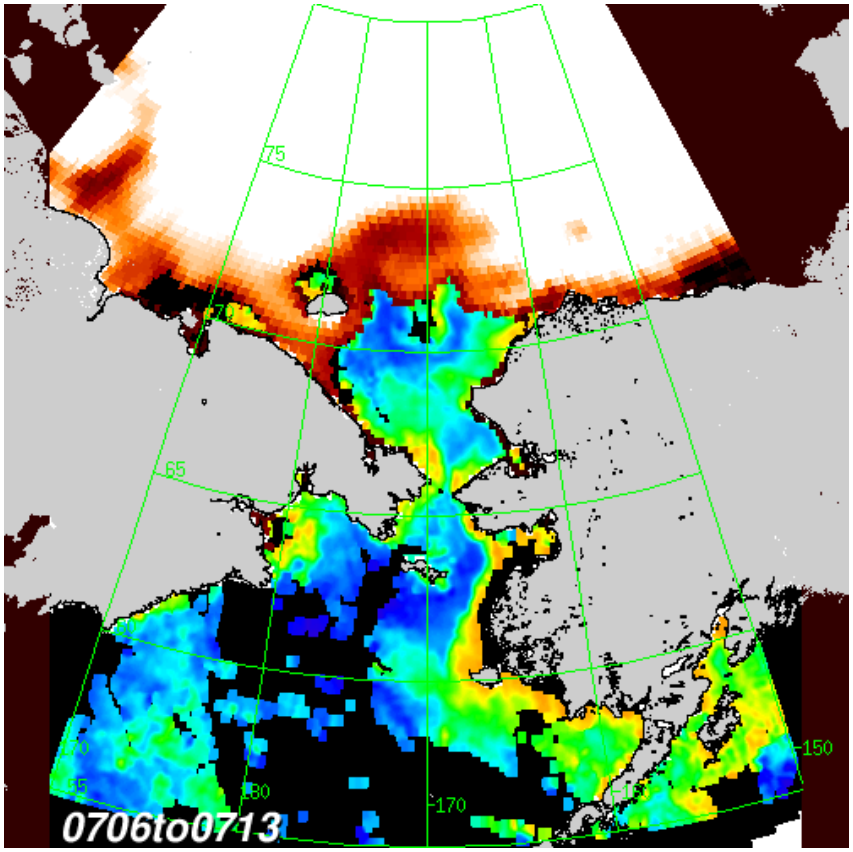
T/S Oshoro-maru cruise in June-July 2013





Courtesy from Dr. Hirawake (Faculty of Fisheries Sciences, Hokkaido University)

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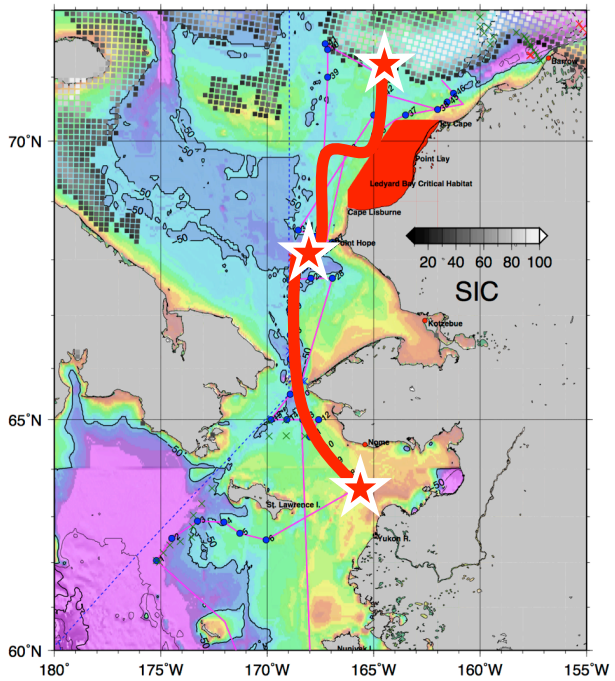
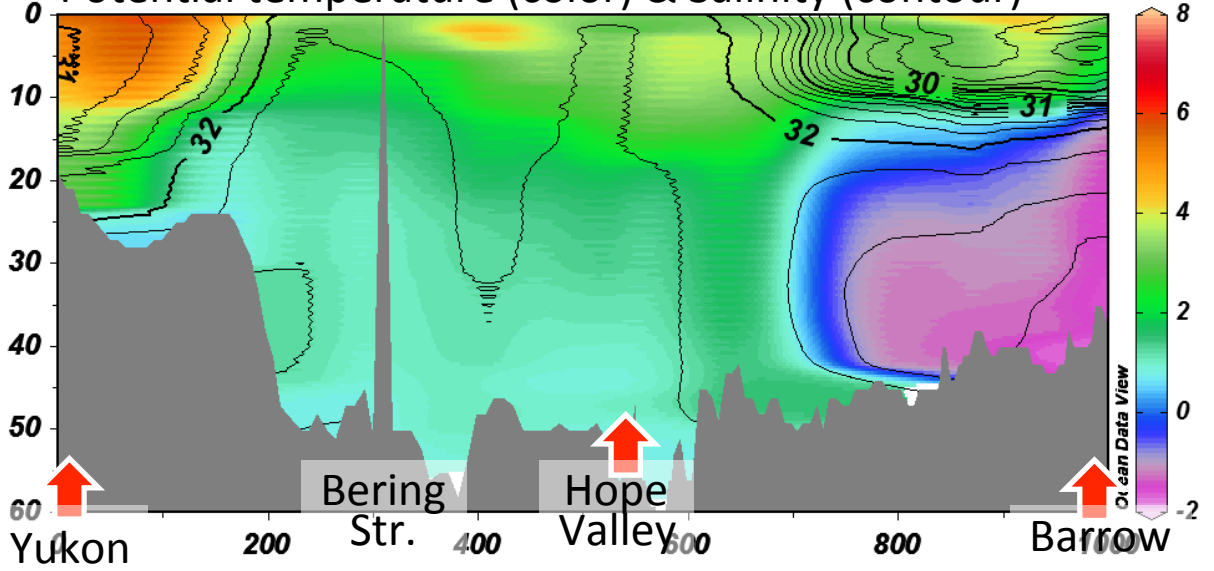
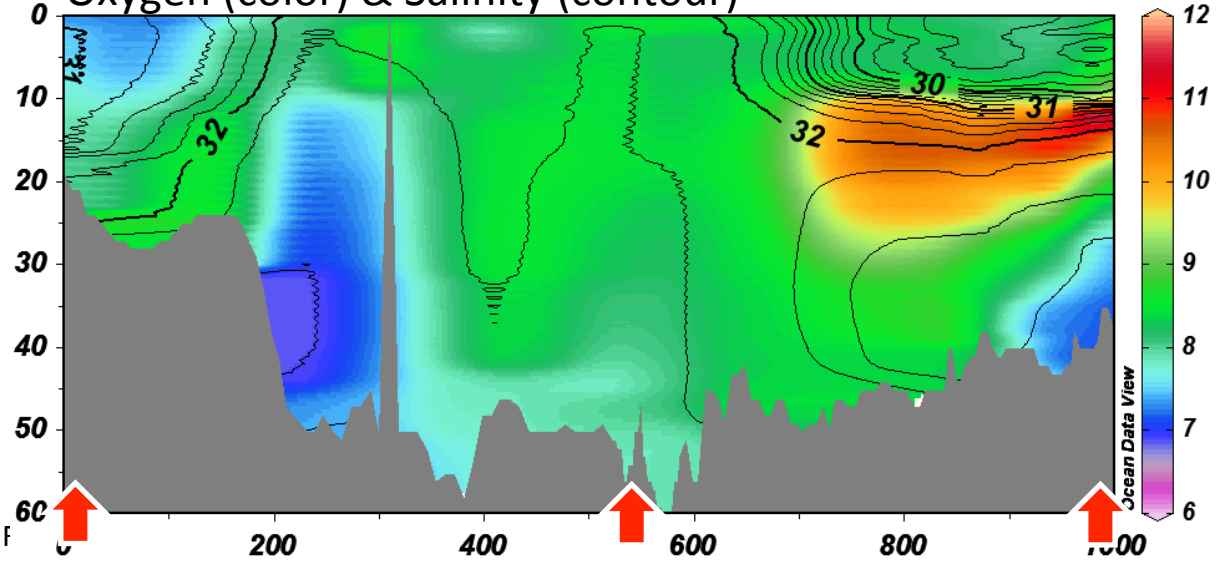


Potential temperature (color) & Salinity (contour)



Oxygen (color) & Salinity (contour)



Courtesy from Dr. Hirawake (Faculty of F

Station near Yukon river mouth

Capelin
(カラフトシシャモ)

Photos: Dr. T. Abe

Courtesy from Dr. Hirawake (Faculty of Fisheries Sciences, Hokkaido University)

Biological hotspot station

Arctic staghorn sculpin (カジカ)

Snow Crab (ズワイガニ)

Courtesy from Dr. Hirawake (Faculty of Fisheries Sciences, Hokkaido University)

Photos: Dr. T. Abe

Ice edge station

Arctic cod and saffron cod (コマイ)

Arctic staghorn sculpin

Anti freeze protein is required to survive

Photos: Dr. T. Abe

Courtesy from Dr. Hirawake (Faculty of Fisheries Sciences, Hokkaido University)

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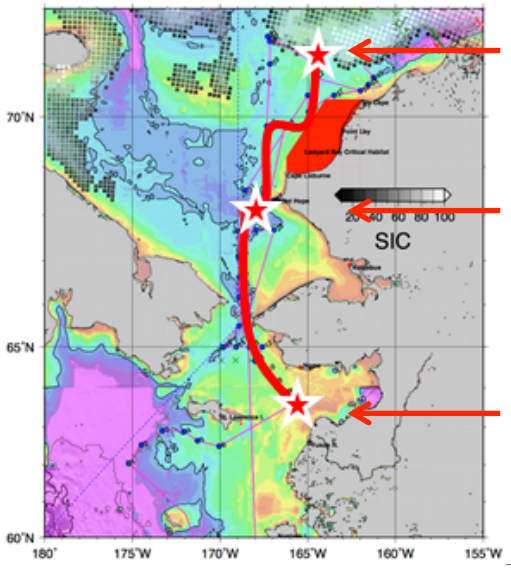

Ice edge

Biological hotspot

Yukon river mouth

Biological hotspot station

Arctic staghorn sculpin (カジカ)

Snow Crab (ズワイガニ)

Station near Yukon river mouth

Capelin
(カラフトシシャモ)

Walleye pollock (スケソウタラ)

Arctic Cod
(北極タラ)

Photos: Dr. T. Abe

Courtesy from Dr. Hirawake (Faculty of Fisheries Sciences, Hokkaido University)

Ice edge station

Arctic cod and saffron cod (コマイ)

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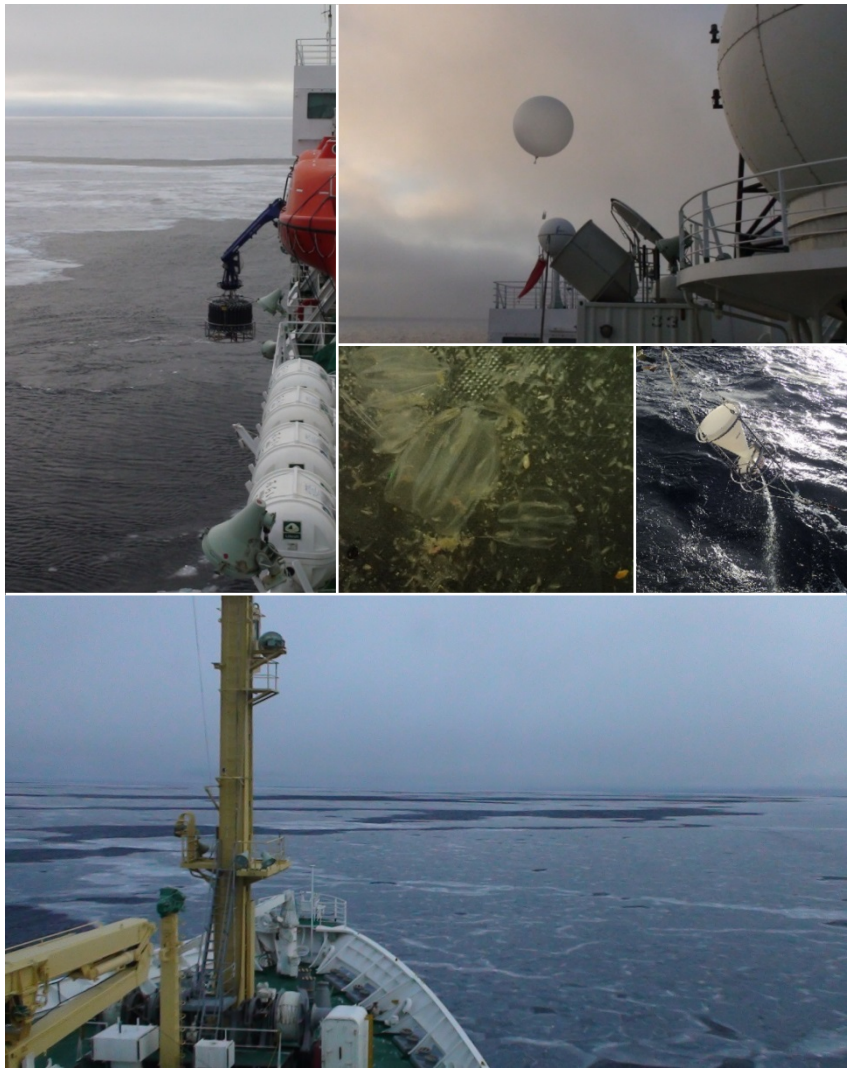
PAG related observational activities in 2013

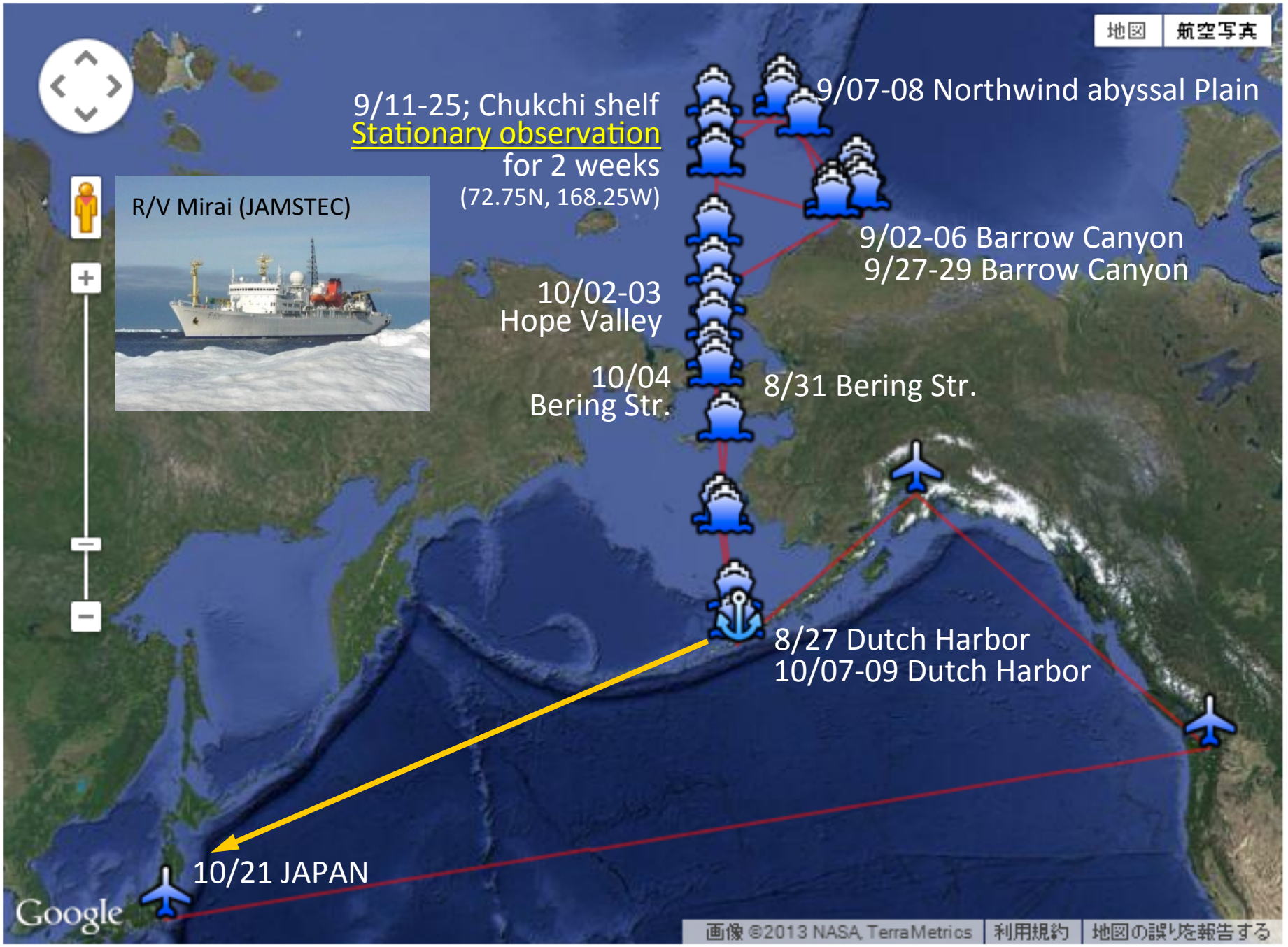
R/V Mirai Arctic cruise in September-October 2013



Objectives;

- Understanding the impact of atmospheric events on the ocean stratification and ecosystem in the sea ice reduction region of the Arctic Ocean
- Leading to a better understanding of the uncertainty of the Arctic atmospheric circulation.

  → Fixed point observation for 2 weeks
- Estimating the changes in biological production caused by the enhancement of ocean circulation due to the sea ice loss
- Monitoring the Arctic ecosystem
- Capturing the Arctic ocean environmental changes with the seasonal prevalence of sea ice (Joint cruise with T/S Oshoro-maru and others)



http://ebcrpa.jamstec.go.jp/rigc/j/ebcrp/paleo/kimopynews/

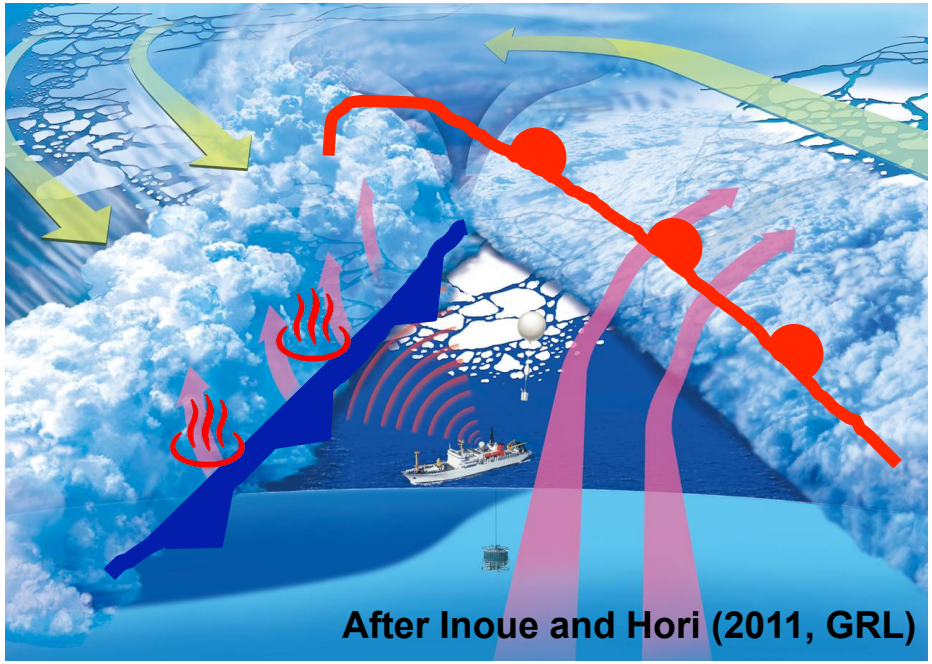
Pacific Arctic Group Meeting
09:00-18:00 on April 14, 2013
@ Polonia House
Krakow, Poland

PAG related observational activities in 2013

R/V Mirai Arctic cruise in September-October 2013

Leading to a better understanding of the uncertainty of the Arctic atmospheric circulation

Schematic of meteorological observation



Heat flux from the ocean to the atmosphere behind the cold front could produce polar cyclones

Intensive observation of radiosonde under international collaborations

Arctic **R**esearch **C**ollaboration for **R**adiosonde **O**bserving **S**ystem **E**xperiment (ARCROSE)

Assimilation of radiosonde data from polar regions could improve the reconstruction of atmospheric circulation in the mid-latitudes.

Courtesy from Dr. Inoue (NIPR/JAMSTEC)

PAG related observational activities in 2013

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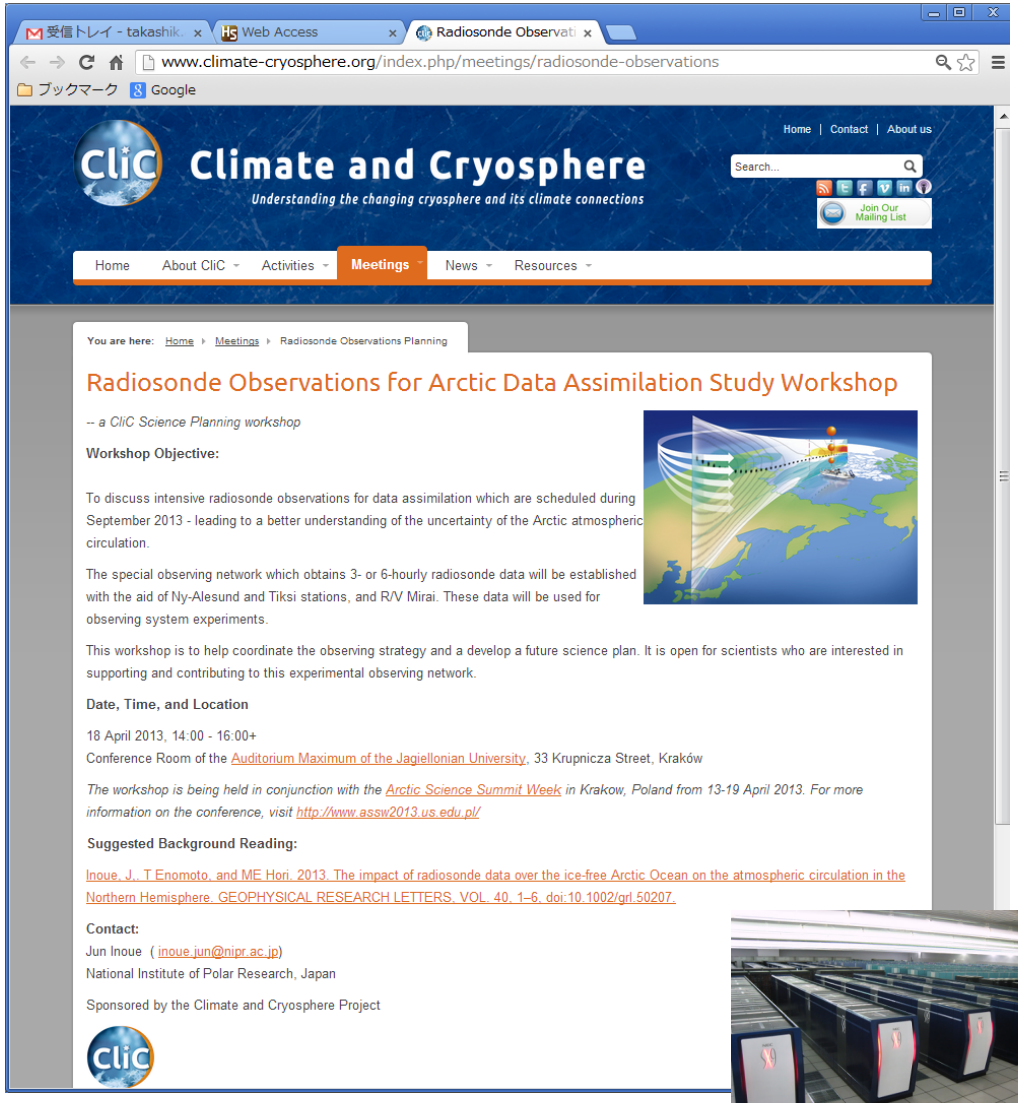
R/V Mirai Arctic cruise in September-October 2013

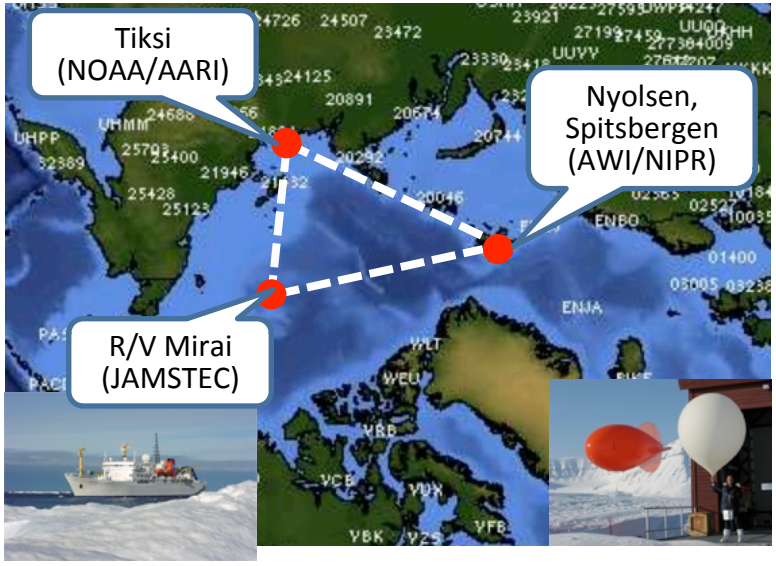


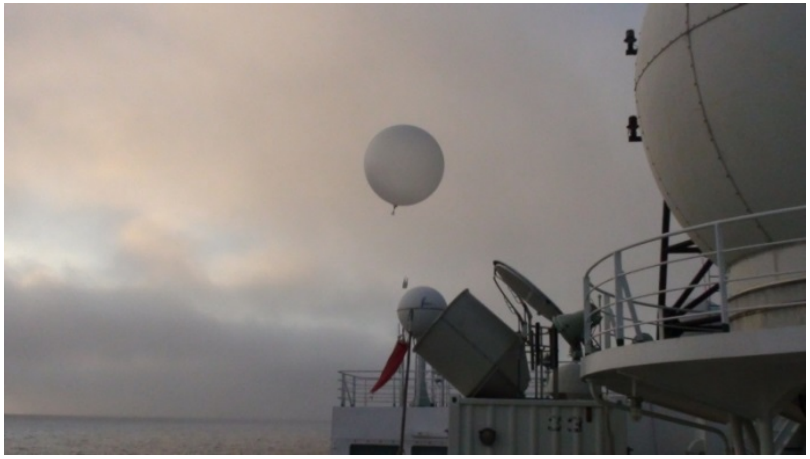
Courtesy from Dr. Inoue (NIPR/JAMSTEC)

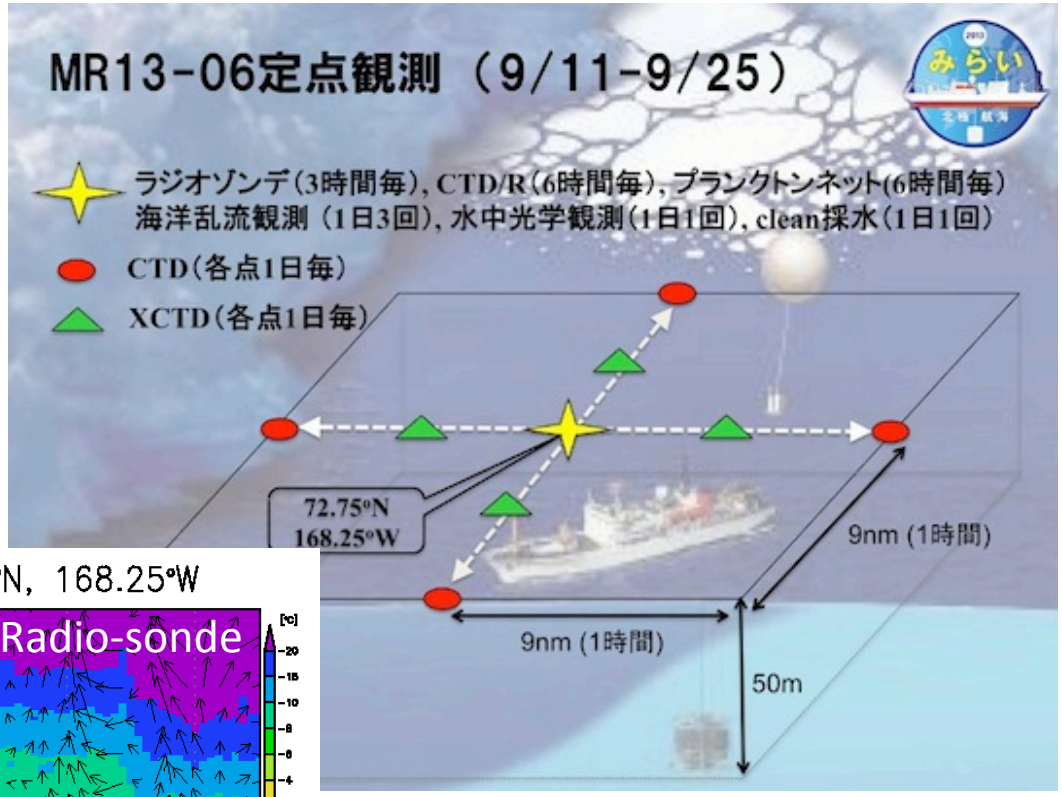
WS on intensified met. observation

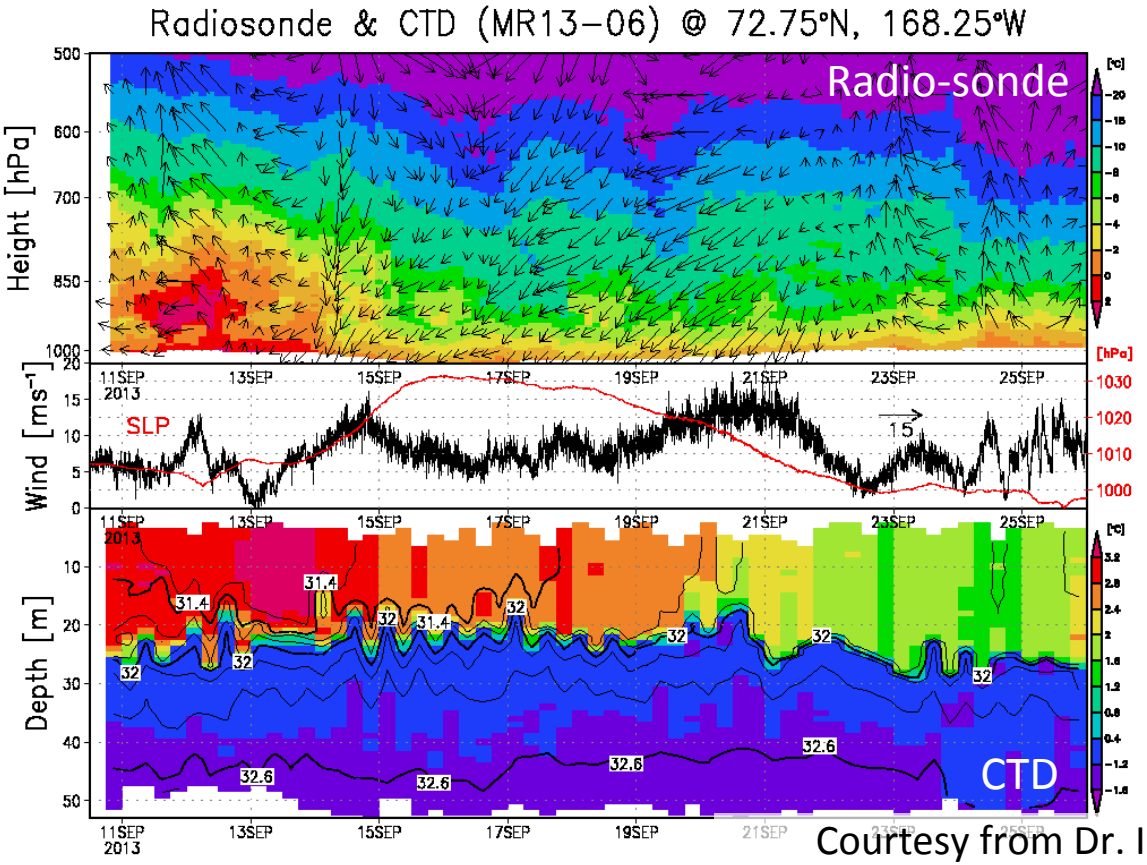
led by Dr. J. Inoue (NIPR/JAMSTEC)

18 April 2013, 1400~1600



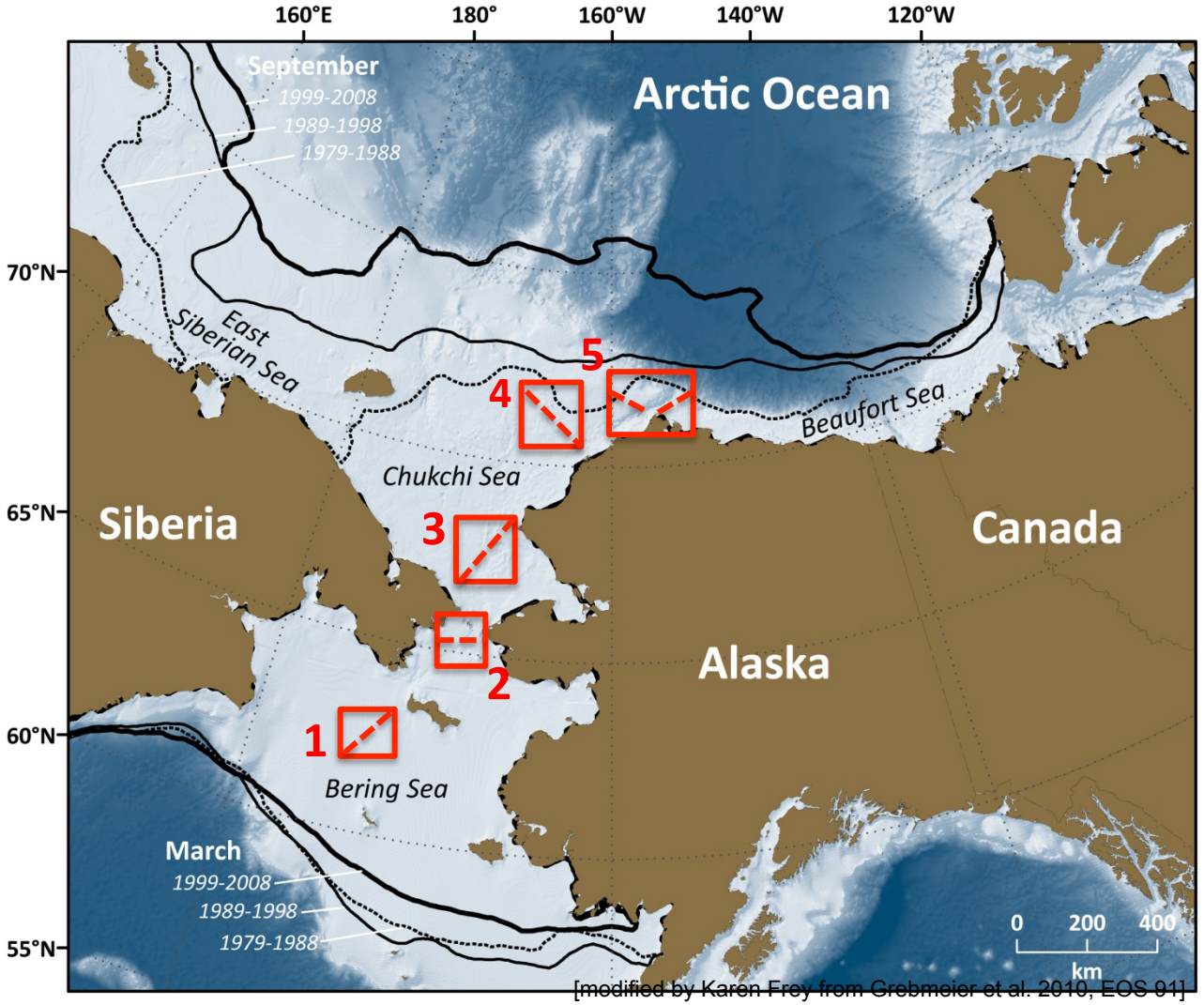






Courtesy from Dr. Inoue (JAMSTEC/NIPR) now onboard R/V Mirai

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

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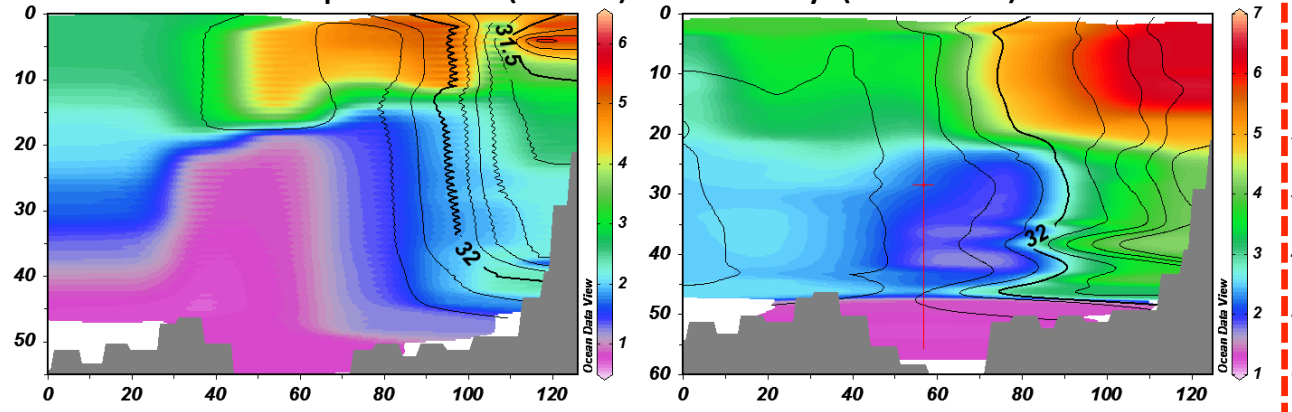
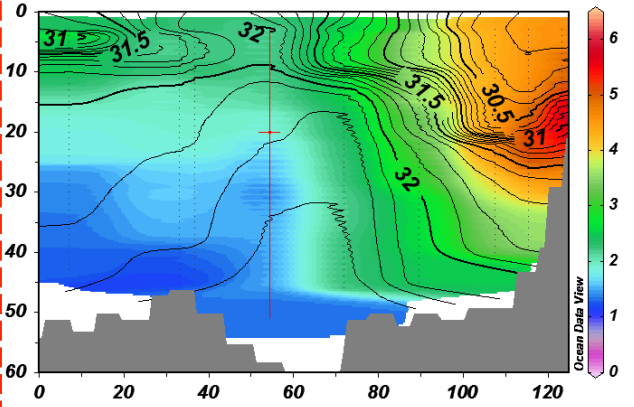
PAG related observational activities in 2013

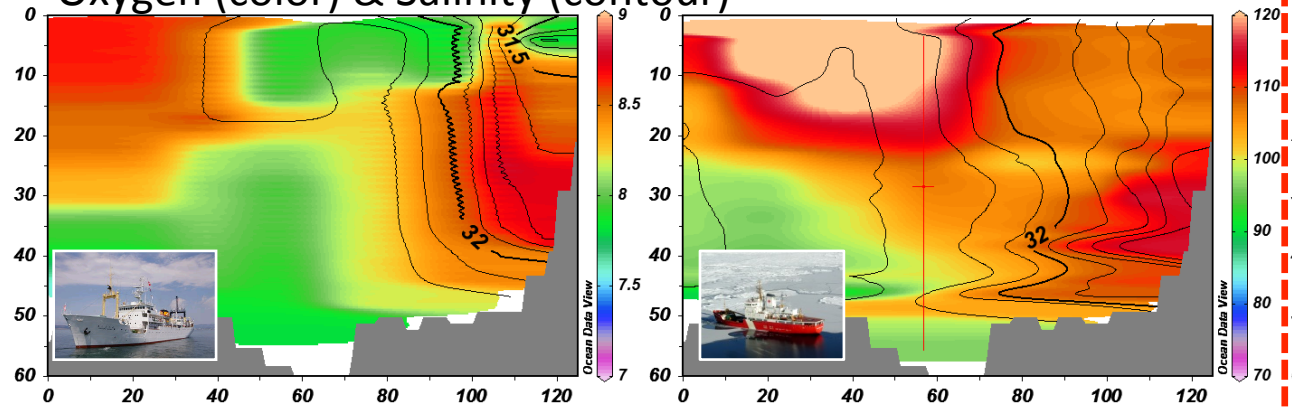
Comparison of CTD data on the DBO-3 line among Oshoro-maru (Jul.16), SWL (Jul.19-20), & Mirai (Oct.2-3)

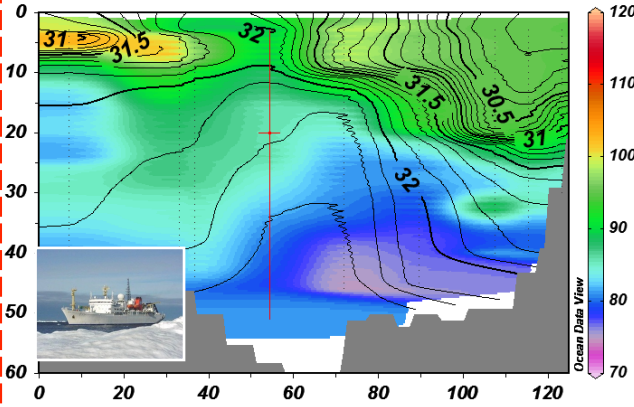
Potential temperature (color) & Salinity (contour)





Oxygen (color) & Salinity (contour)





TS Oshoro-Maru (Jul.16)

CCGS S. W. Laurier (Jul.19-20)

RV Mirai (Oct.2-3)

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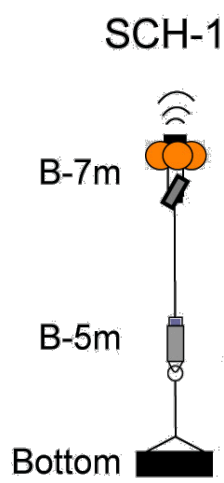
   - CCGS Louis S. St.- Laurant cruises;
     Sea ice observation, hydrography & water sampling, and mooring recoveries & deployments
   - IBRV Araon Arctic cruise; Hydrography and mooring deployments

3) Others
   - Ice thickness monitoring off Barrow, Alaska
   - XCTD observation in the Arctic Ocean and so on. . .

JAMSTEC mooring array in the Chukchi Sea and Canada Basin



CCGS S. W. Laurier

NAP-12t
(Sed.Trap)

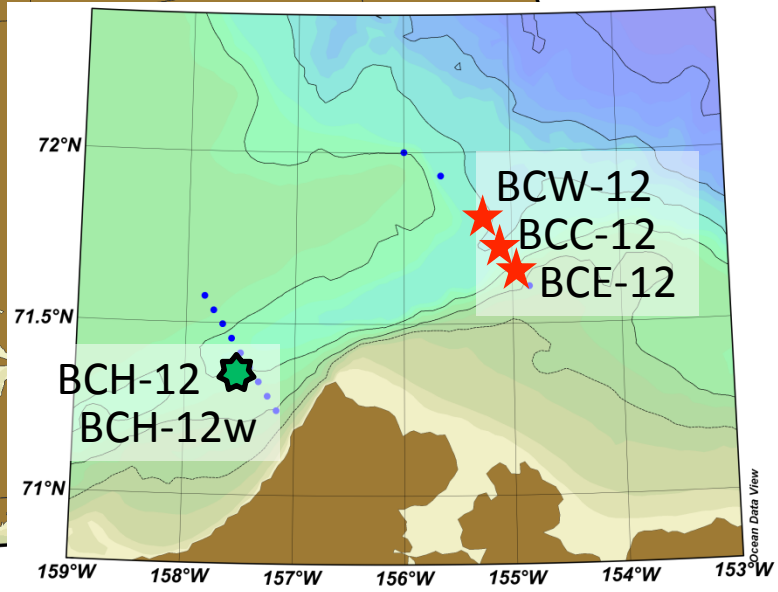
CAP-12t
(Sed.Trap)

70°N

SCH-12
SCH-12w

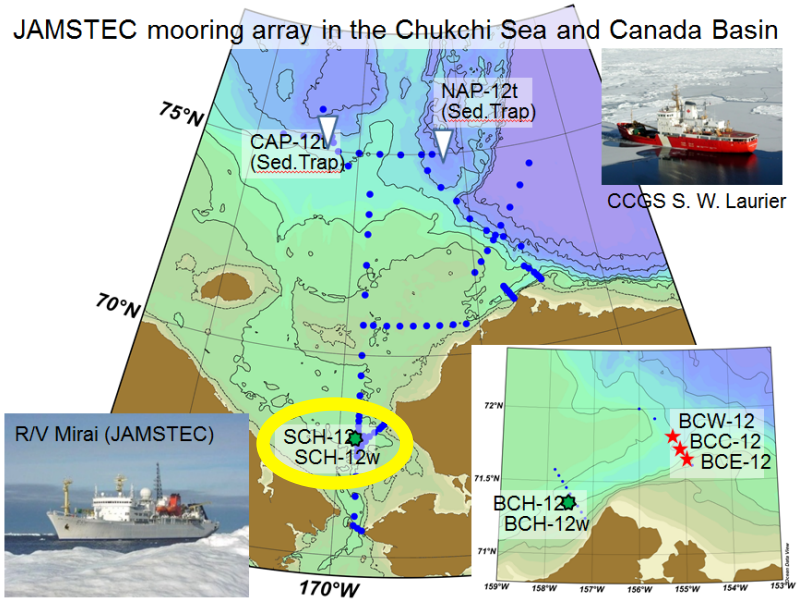
170°W

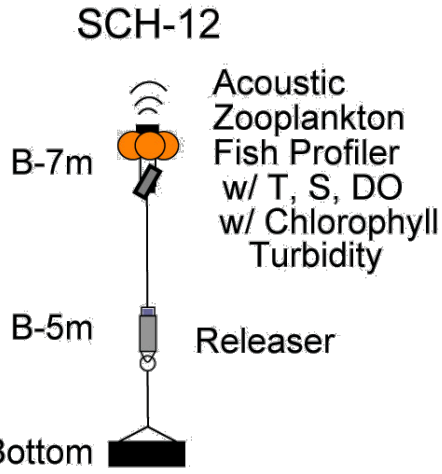
R/V Mirai (JAMSTEC)

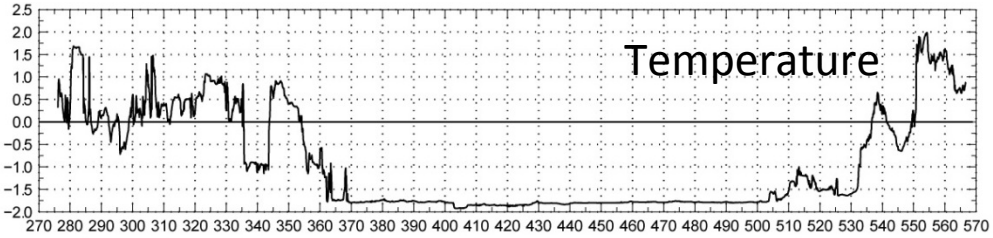


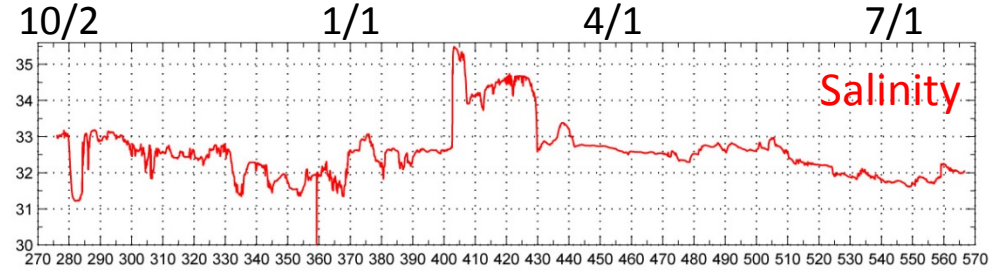
SCH mooring

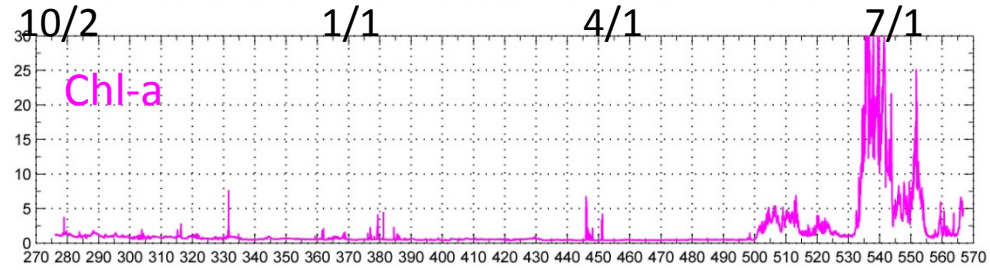
Time series of T, S, Chl-a, Turbidity, and Oxygen Saturation (Oct. 2, 2012 to Jul.20, 2013)

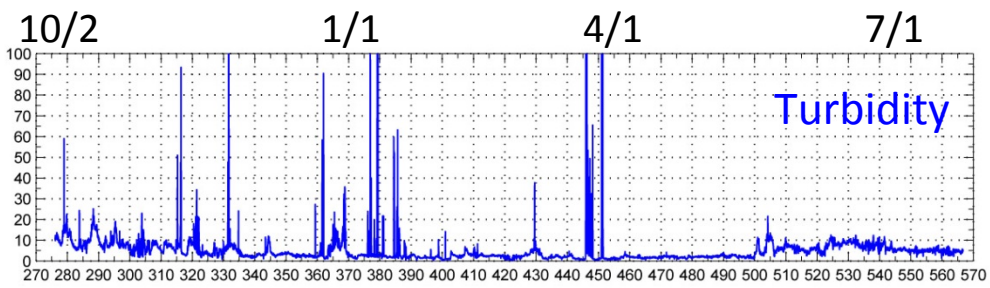


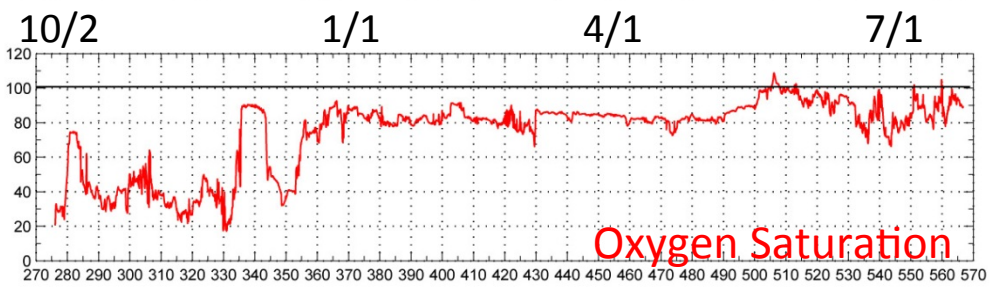












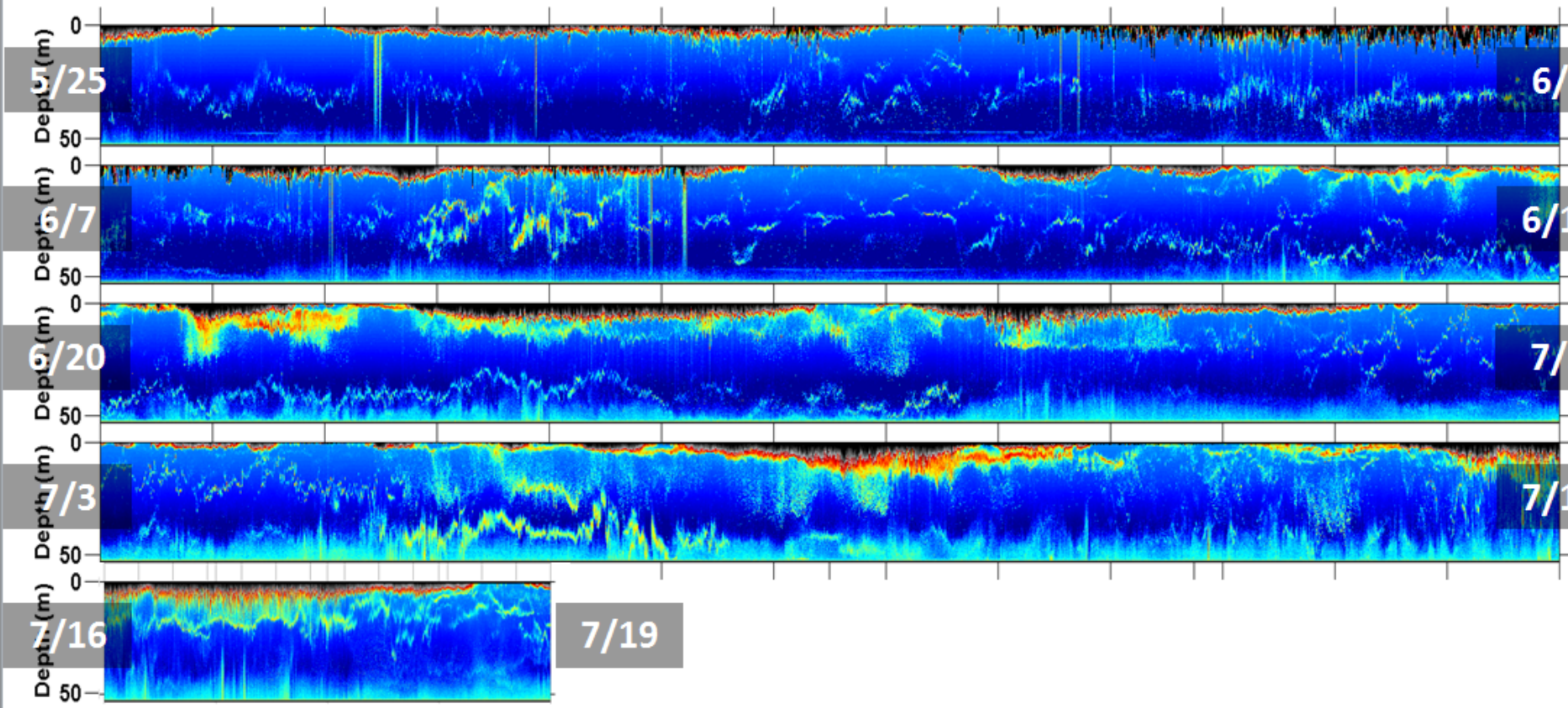
SCH mooring

5/25～7/19

13 日間

AZFP Echogram

(Jul. 17, 2012 to Jul.19, 2013)



Courtesy from Dr. Amakasu (Tokyo University of Marine Science and Technology)

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PAG related observational plan in 2014

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PAG related observational activities in 2014

R/V Mirai Arctic cruise in September-October 2014

Leading to a better understanding of the uncertainty of the Arctic atmospheric circulation

→ **Fixed point observation for 3 weeks**

Intensive observation of radiosonde under international collaborations

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2) Understanding the impact of atmospheric events on the ocean stratification and ecosystem in the sea ice reduction region of the Arctic Ocean

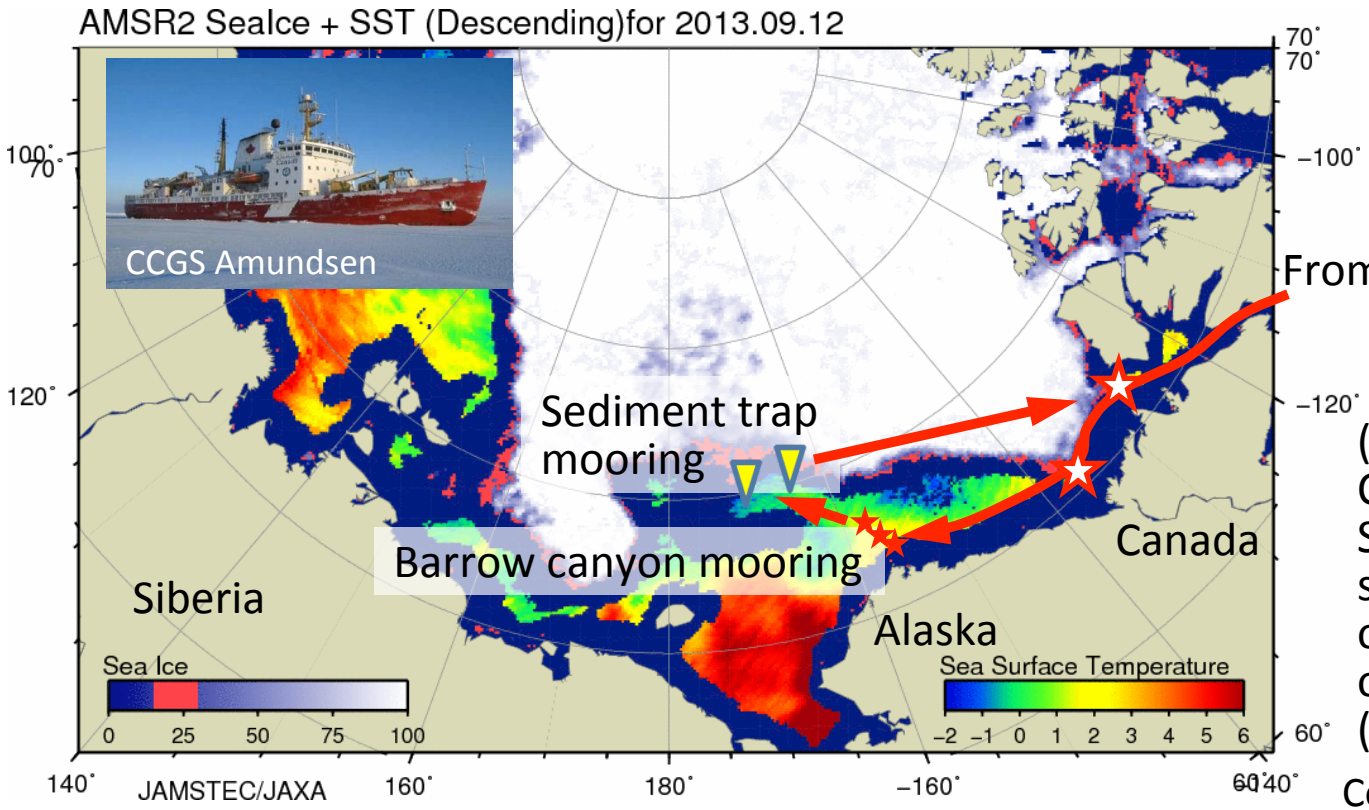
Courtesy from Dr. Inoue (NIPR/JAMSTEC)

PAG related observational activities in 2014

CCGS Amundsen cruise in 2014 (under discussion with Arctic Net)

January 2013; Japan-Canada Arctic Research Workshop (Tokyo, JAPAN)
Japan-Canada Joint Committee on S&T Cooperation (Tokyo, JAPAN)
* At that time, we first had a discussion with "Arctic Net".

October 2013; Discussion on JAMSTEC & Arctic Net collaboration plan on the Arctic Ocean Research in 2014 and future @ Quebec, CANADA



(Left)
CCGS Amundsen and Sea ice concentration & sea surface temperature on September 12, 2013, observed by satellite (AMSR-2)

Courtesy from Dr. Hori (JAMSTEC)

Pacific Arctic Group Meeting
09:00-18:00 on October 18, 2013
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Arctic Report Card

www.arctic.noaa.gov/reportcard

ブックマーク

Arctic Report Card: *Update*

Tracking recent environmental change

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Waders (Shorebirds)
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Arctic Fox
Caribou & Reindeer
TERRESTRIAL CRYOSPHERE
Snow
Glaciers & Ice Caps
Greenland Ice Sheet
Permafrost

What's new in

New records se
extent, sea ice
sheet surface m
air temperatures
melting - being u
relative to the las

Multiple observat
strong evidence
sustained change
environmental sy
state.

Highlights

Record low sr
sea ice extent
and September

Growing seas
increasing alo
greenness and
biomass. Below
high permafro
occurred in nor

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

Arctic Report Card ...

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

ファイル(F) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)

Arctic Report Card: *Update for 2012*

Tracking recent environmental changes

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Waders (Shorebirds)
Vegetation
Lemmings
Arctic Fox
Caribou & Reindeer
TERRESTRIAL CRYOSPHERE
Snow
Glaciers & Ice Caps
Greenland Ice Sheet
Permafrost

Ecosystem Observations in Barrow Canyon: A Focus for the International Distributed Biological Observatory (DBO)

J. Grebmeier[1], R. Pickart[2], C. Ashjian[2], L. Cooper[1], K. Frey[3], J. He[4], M. Itoh[5], M. Kedra[1], T. Kikuchi[5], S. Moore[6], J. Nelson[7], S. Vagle[7]

[1]University of Maryland Center for Environmental Science, Solomons, MD, USA
[2]Woods Hole Oceanographic Institution, Woods Hole, MA, USA
[3]Graduate School of Geography. Clark University, Worchester, MA, USA
[4]Polar Research Institute of China, Shanghai, People's Republic of China
[5]Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Yokosuka, Japan
[6]NOAA/Fisheries, Office of Science & Technology, Seattle, WA, USA
[7]Institute of Ocean Sciences, Dept. Fisheries and Oceans, Sidney, BC, Canada

November 11, 2012

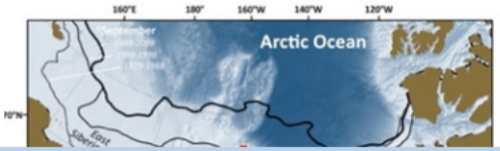
Highlights

- Since 1980, sea ice persistence in the Barrow Canyon (BC) 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; 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.

Introduction

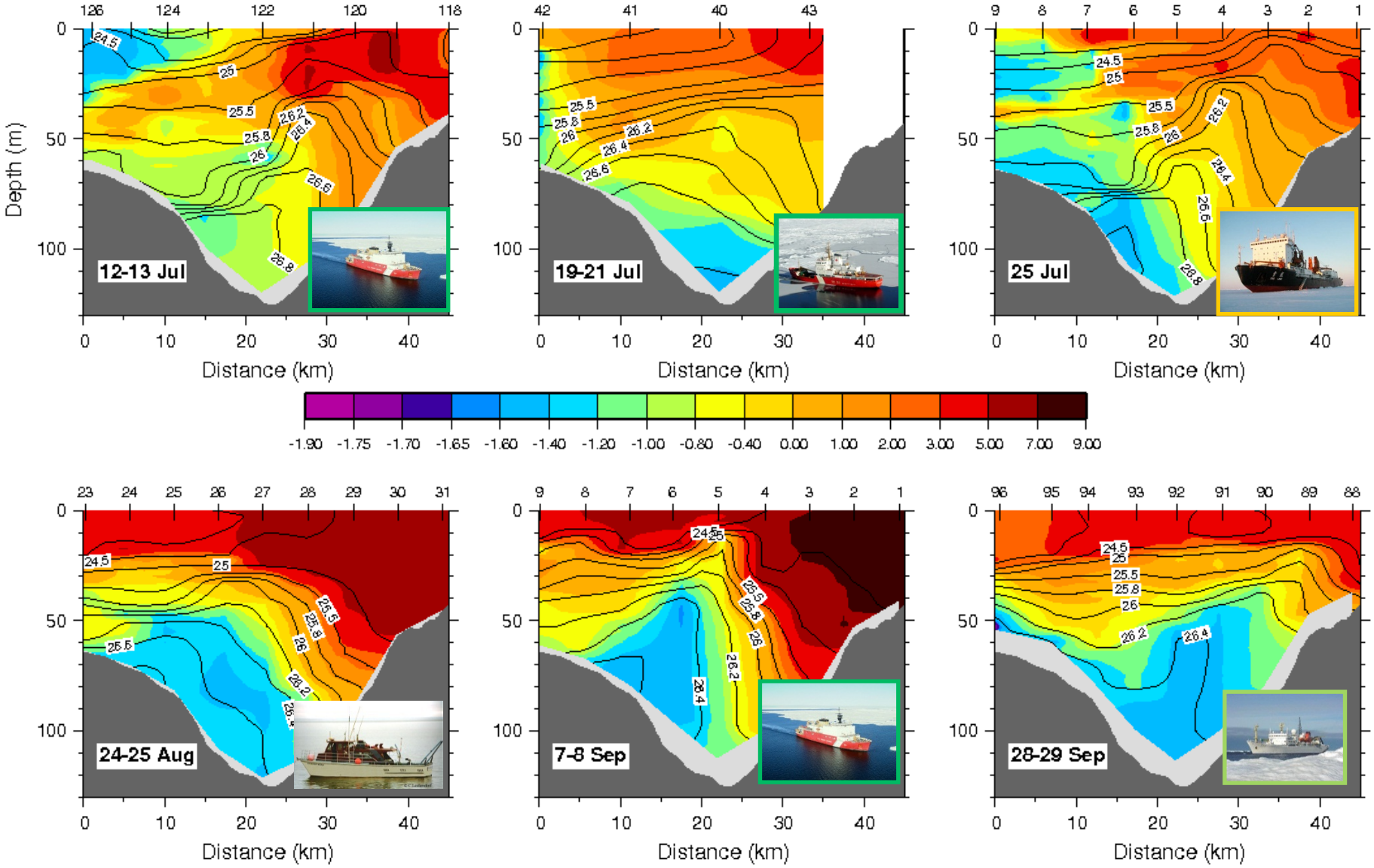
The Chukchi Sea continental shelf in the Pacific Arctic region (**Fig 3.5**) is influenced by the northward transport of nutrient-rich Pacific water via the Bering Strait (see the *Ocean* essay for more information about Pacific Water flow through the Bering Strait), which supports areas of high water column and benthic production on the southeast and northeast portions of the shelf (citations in Grebmeier, 2012). Dramatic, broad temporal and spatial variation in chlorophyll biomass in the Chukchi Sea has coincided with seasonal sea ice retreat and increases in seawater temperatures. One of the key uncertainties in this region is how the marine ecosystem will respond to seasonal shifts in the timing of sea ice retreat and/or delays in fall sea ice formation.

The Distributed Biological Observatory (DBO; **Fig. 3.5**) is being developed by an international consortium of scientists in the Pacific Arctic as a change detection array to systematically track the broad biological response to sea ice retreat and associated environmental change that is occurring (Grebmeier et al., 2010). The DBO relies on coordinated, international sampling by a network of ships from Canada, China, Korea, Japan, Russia and the United States. Specific high productivity locations in the Bering and Chukchi seas are sampled on a repeated basis as research vessels transit the Pacific sector of the Arctic. Additional measurements by satellite and moorings at the designated sites are providing important time series data to develop an early detection system for biological and ecosystem response to climate warming. The following report highlights specific findings at the DBO Barrow Canyon site (**Fig. 3.5**).



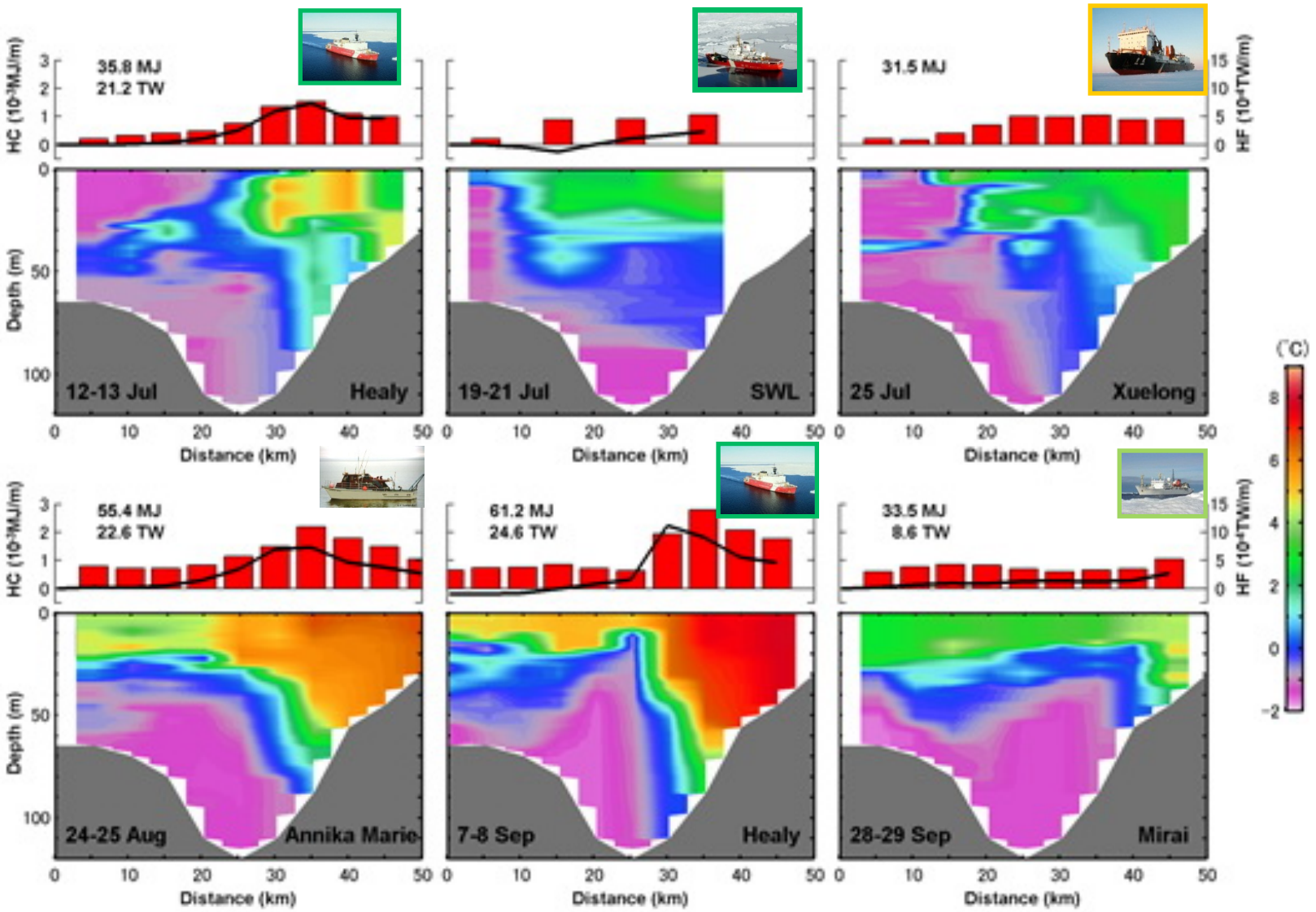
DBO paper (physical oceanography) [Itoh et al., in preparation]

6 occupations of Barrow Canyon transect in 2010



DBO paper (physical oceanography) [Itoh et al., in preparation]

6 occupations of Barrow Canyon transect in 2010



Arctic Report card: Update for 2012 (Itoh et al, to be submitted)