Learning outcomes from the CREAMS 30th anniversary workshop

SungHyun Nam

School of Earth and Environmental Sciences, College of Natural Sciences,
Seoul National University, Seoul, Republic of Korea


CREAMS 30th Anniversary
&
CSK-II
Joint Workshop
July 25–26, 2024 | SNU Hoam Faculty House Mugunghwa Hall

Background

- **Circulation Research of East Asian Marginal Seas (CREAMS)**

- Started in 1993 and now has celebrated its 30th anniversary
- First international program in this region promoting collaboration between marine scientists of border countries as well as their colleagues from other parts of the world
- Part of PICES activity (AP-CREAMS) since 2005
- Initially focused on research of its water circulation and ventilation
- Its biogeochemical and ecosystem research has been involved in more than before
- Now seeking a way to be more socio-economic oriented research on the region
- Heading for 'Creative' Research of the East Asian Marginal Seas (CREAMS) along with other international program 'Healthy, Productive and Sustainable Asian Marginal Seas' (AMS) of the IOC Sub-commission for the Western Pacific (WESTPAC)
- Targeting one of the most affected areas in the global ocean by climate change and anthropogenic impacts, neighboring the Kuroshio and Eurasia continent

Workshop program

Greetings, welcoming remarks, and background/introduction

Chaired by **SungHyun Nam** (09:00–09:30)

1) Greetings and messages from Korea, ***Kuh Kim***
2) Greetings and messages from Japan, ***Hong-Ryeol Shin/Tomoharu Senjyu***
3) Greetings and messages from Russia, ***Vyacheslav B. Lobanov***
4) Greetings and messages for CSK and CSK-2, ***Kentaro Ando***

Coffee break

(09:30–10:00)

Overview and history of scientific programs

Chaired by **Jeomshik Hwang** (10:00–11:40)

1) History and Overview of CREAMS, ***Kuh Kim*** 1
2) Cooperative Study of Kuroshio and its adjacent region (CSK) from 1964 to 1979 and the 2nd Cooperative Study of Kuroshio and its adjacent region (CSK-2) from 2021 to 2030, ***Kentaro Ando*** 2
3) Healthy, Productive and Sustainable Asian Marginal Seas: Understanding changes in the marine environment in response to global climate change, ***SungHyun Nam*** 3
4) Bridging over the troubled waters: Transnational cooperation in East Asian oceanography, 1990-2001, ***Sungeun Kim*** 4

Lunch

(11:40–13:30)

Scientific session 1 – CREAMS activities

Chaired by **Jae-Hak Lee** (13:30–15:10)

1) An overview of EAST-I project (East Asian Seas Time-series, the East Sea (Sea of Japan)), ***Kyung-Il Chang*** 5
2) The Kakuyo Maru and Nagasaki Maru cruises in the CREAMS activity, ***Tomoharu Senjyu*** 6
3) CREAMS Activities in Chemical Oceanography, ***Dong-Jin Kang*** 7
4) CREAMS studies on deep convection and ventilation of the Japan/East Sea, ***Vyacheslav B. Lobanov*** 8

Coffee break

(15:10–15:30)

Scientific session 2 – CREAMS/AMS and CSK-2 activities

Chaired by **Yang-Ki Cho** (15:30–17:10)

1) An overview of the fluxes and biogeochemistry of trace elements, organic matter, and nutrients in the East/Japan Sea, ***Guebuem Kim*** 9
2) CREAMS studies on acidification and deoxygenation of the Japan/East sea, ***Pavel Ya. Tishchenko*** 10
3) The connection between the Tsushima Warm Current and the winter rainfall along Japan, ***Shinichiro Kida*** 11
4) Recent CSK-2 activities, ***Xiaopei Lin*** 12

Flash talks (ECOPs; Early Career Ocean Professionals)

Chaired by **Jae-Hyoung Park** (17:10–18:30)

Scientific session 3 – Ongoing initiatives for Asian marginal seas

Chaired by **Guebuem Kim** (09:30–10:30)

1) Time series observations of Kuroshio variability in the East China Sea: a CSK-2 endorsed project, ***Hanna Na*** 13
2) Revisit the upper portion of the Japan Sea Proper Water: Recent structural change and warming trends, ***Tomoharu Senjyu*** 14
3) Changes in the physical and biogeochemical environment in the Tsushima Warm Current system of Korean Waters, ***Jeomshik Hwang*** 15

Coffee break

(10:30–10:50)

Scientific session 4 – Ongoing initiatives for Kuroshio and its adjacent seas

Chaired by **Chanhyung Jeon** (10:50–11:50)

1) Ongoing initiatives for Kuroshio and its adjacent seas, ***Xiaopei Lin*** 16
2) Intraseasonal variability of ocean current northeast of Taiwan Island derived from mooring observations, ***Yuqi Yin*** 17
3) Impingement of subsurface anticyclonic eddies on the Kuroshio mainstream east of Taiwan, ***Ran Wang*** 18

Lunch

(11:50–13:30)

Future plan 1 – Data management

Chaired by **Vyacheslav B. Lobanov** (13:30–14:30)

1) Long-term gridded hydrographic data product shedding light on changes of the intermediate and deep waters in the East Sea, ***Young-Gyu Kim*** 19
2) Ocean Biogeochemistry Data Management: Insights on the Radiocarbon Database, ***Minkyoung Kim*** 21
3) Data Management Plan of the 2nd Cooperative Study of Kuroshio and its adjacent region (CSK-2), ***Kentaro Ando*** 22

Coffee break

(14:30–15:00)

Future plan 2 – Integrative/multidisciplinary science

Chaired by **Dong-Jin Kang** (15:00–16:20)

1) Beyond disciplinary borders: Proposals for interdisciplinary collaboration on East Asian ocean science, ***Sungeun Kim*** 23
2) Past and future collaboration between CREAMS and NOWPAP, ***Takafumi Yoshida*** 24
3) Internal waves impact on biogeochemical processes in East Asian Marginal Seas?, ***Jae-Hun Park*** 25
4) Pursuing records of phytoplankton biogeography and dominant species in the East/Japan Sea linked to integrated multidisciplinary quality data, ***Wonho Yih*** 26

Panel discussions for better international collaboration with CREAMS/AMS and CSK-II (and other international initiatives like UNDOS)

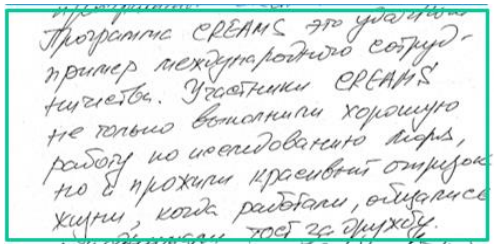
Chaired by **SungHyun Nam** (16:30–18:00)

Panel members: **Hanna Na, Xiaopei Lin, Kentaro Ando, Vyacheslav B. Lobanov**

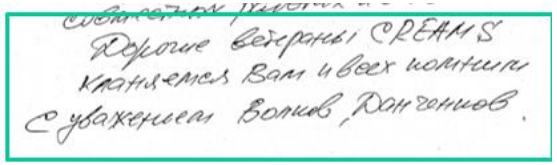
Greetings

Greetings from Drs. Yury VOLKOV and Mikhail DANCHENKOV, FERHRI

Dear colleagues!
From Russian oceanographers we send you our best regards and especially to the participants of CREAMS program.



CREAMS is a good example of collaboration.
CREAMS members not only did a good research of the sea, but they have lived a beautiful period of life, when they worked together, communicated and raised toasts for friendship.



We hope that young generation will repeat our way of joined cruises and will know the joy of joined research and communication.

Dear veterans of CREAMS, we bow to you and remember everyone.
With respect,
Volkov, Danchenkov

The start of CREAMS

2024년 7월 25일

큐슈대학 명예교수 다케마츠 마사키

Jonghwan Yoon
Professor Emeritus of Kyushu University

2024년 4월 제주에서 2024년 5월 도쿄에서

九州大学 名誉教授 竹松 正樹 (Masaki Takematsu)

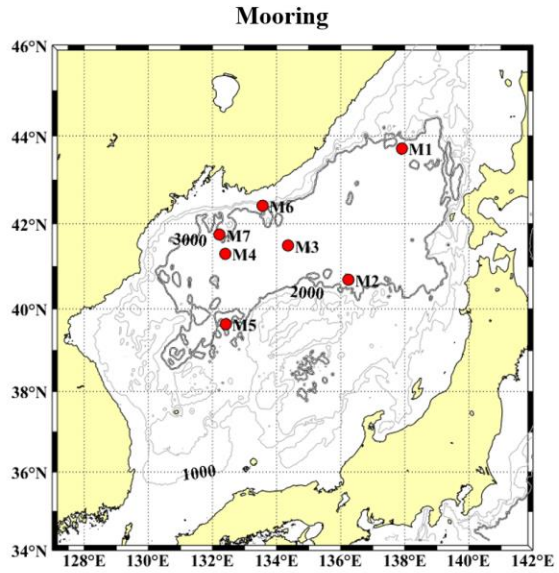
(번역) 공주대학교 명예교수 신홍렬

From K Kim's presentation

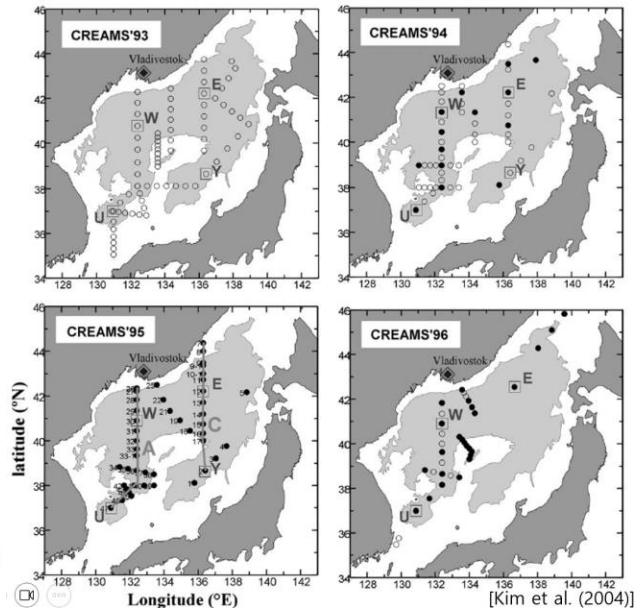
Overview and History

Circulation Research of the East Asian Marginal Seas (CREAMS) 1993-1997

Japan	Korea	Russia
• M. Takematsu (Kyushu Univ.) Current Mooring • J.H. Yoon Modelling/ADCP (shipboard)	• K. Kim (Seoul Nat'l Univ.) CTD/Float/Cable • K.R. Kim Chemistry	• Y. Volkov (Far Eastern Regional Hydrometeorological Research Inst.) • M. Danchenkov

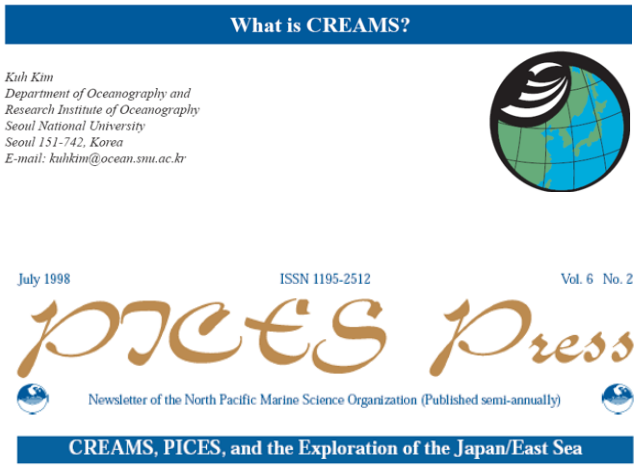


Takematsu et al., (1999) J. Oceanography

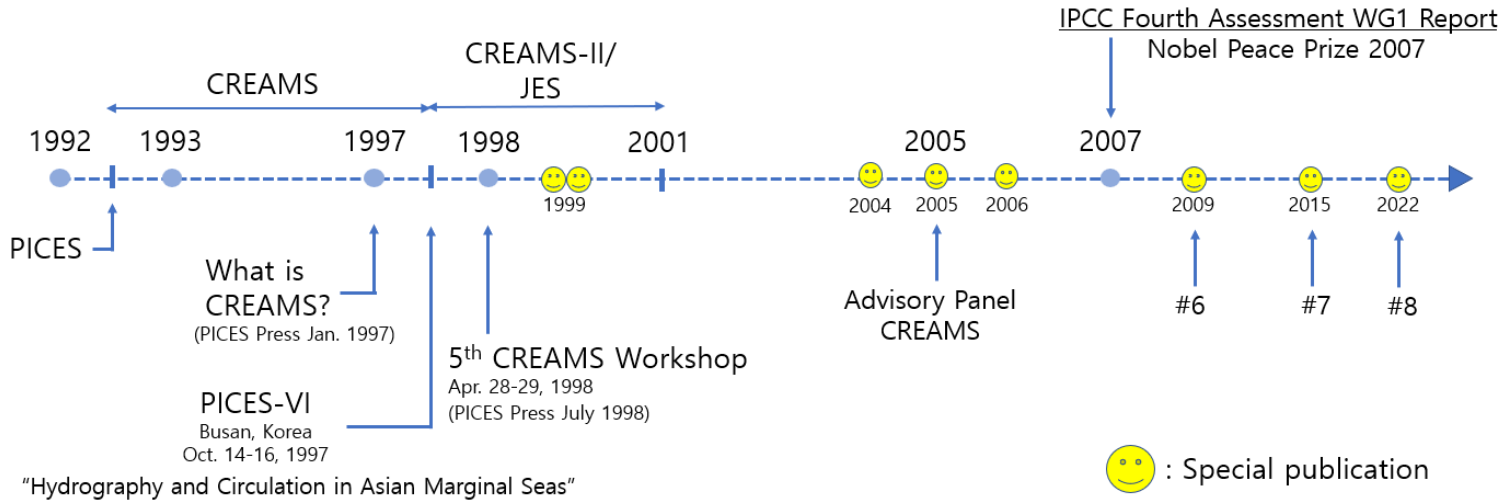


[Kim et al. (2004)]

PICES Press Vol.5 No.1 January 1997



Ground-breaking observations



"Hydrography and Circulation in Asian Marginal Seas"

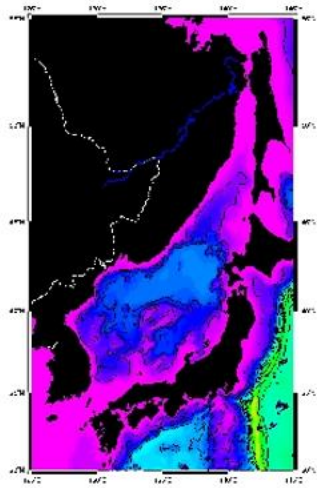
Overview and History

Overview

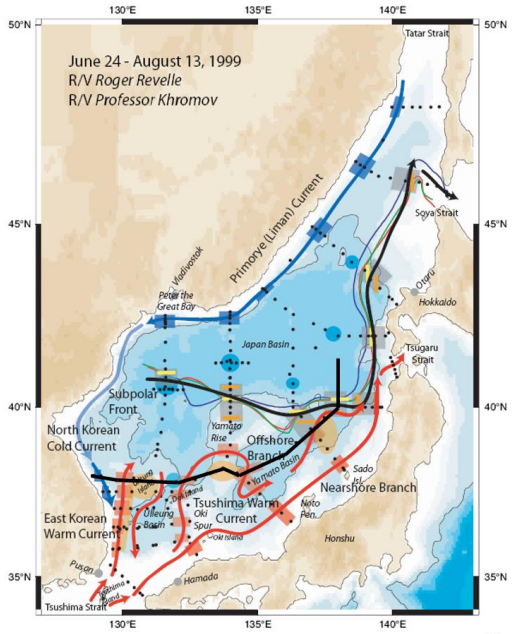
Japan/East Sea DRI
Office of Naval Research
1998-2001

The Office of Naval Research is supporting research in the Japan/East Sea during 1998-2000. Field observations include studies of the subpolar front, the Tsushima Current, the Ulleung basin and eddy structures, meteorological forcing, large-scale circulation, and current, optical and hydrographic properties. Modeling includes coupled ocean-atmosphere/physical-biological modeling, oceanic and atmospheric mesoscale circulation, and very high resolution circulation modeling.

The research involves substantial collaboration with Japan, South Korea, and Russia. These countries have been cooperating since 1993 in a research program, Circulation Research of the East Asian Marginal Seas (CREAMS), to understand the water mass structure and circulation in the Japan/East Sea. The ONR JES Program and CREAMS, while separate programs, have a number of common objectives. Hence, the exchange of information between these two projects is expected to enhance
ng of the phenomena of the Japan/East Sea.

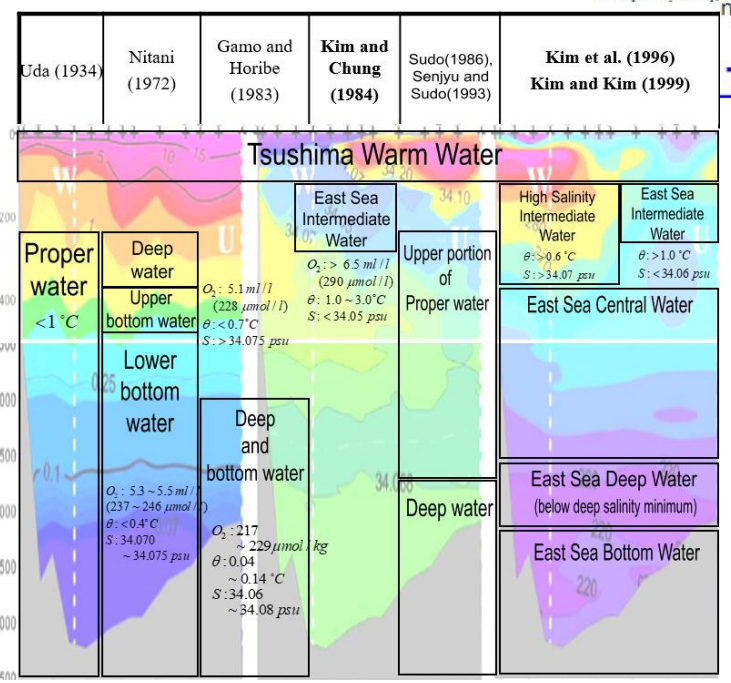


From K Kim's presentation



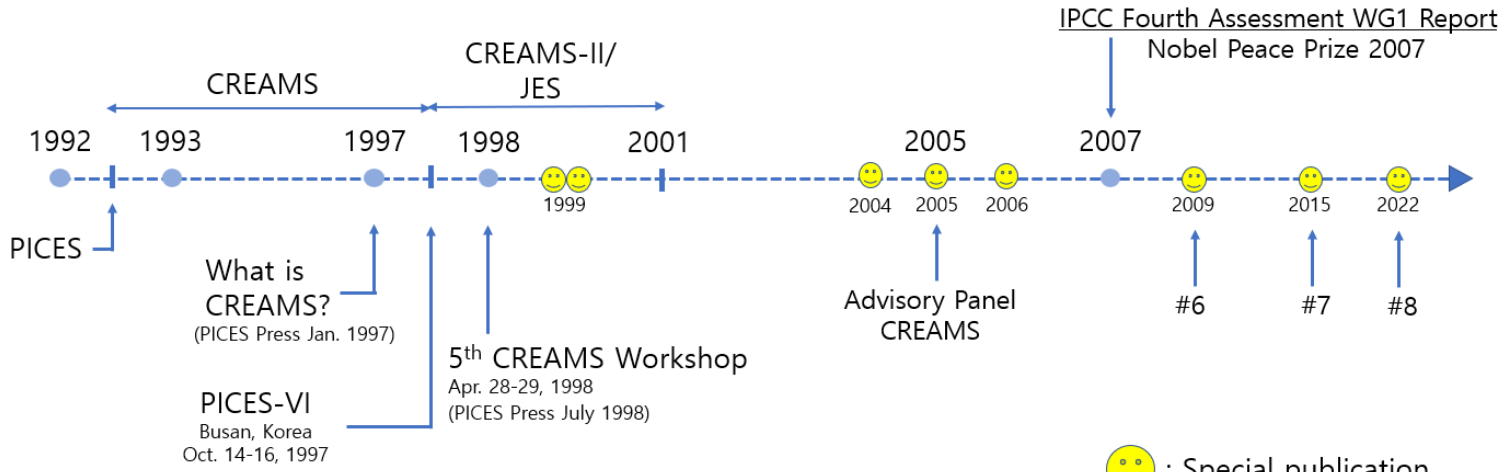
Water Mass
Tsushima Warm Water
East Sea Intermediate Water
Upper Japan Sea Proper Water
High-Salinity Intermediate Water (Upper Japan Sea Proper Water)
Central Water
Low Japan Sea Proper Water
Deep Salinity Minimum (Lower Japan Sea Proper Water)
Oxygen Minimum (Lower Japan Sea Proper Water)
Deep Water (Lower Japan Sea Proper Water)
Bottom Water (Lower Japan Sea Proper Water)
Bottom Adiabatic Layer (Lower Japan Sea Proper Water)

Talley et al., 2006, Oceanography



Themes

Ground-breaking observations



"Hydrography and Circulation in Asian Marginal Seas"

Overview and History

From K Kim's presentation

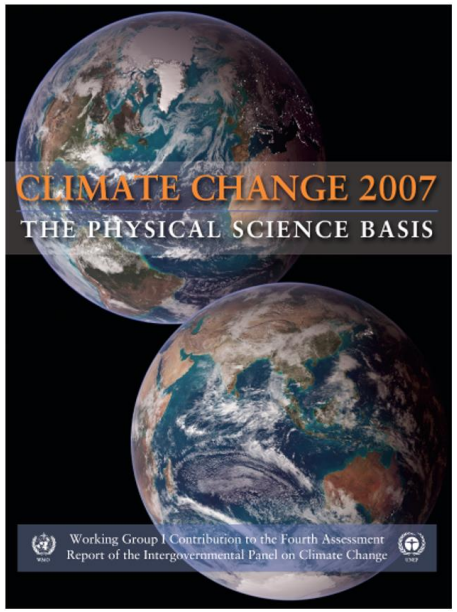
IPCC Fourth Assessment WG1 Report

2007 Nobel Peace Prize

Intergovernmental Panel on Climate Change (IPCC)

Albert Arnold (Al) Gore Jr.

" for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change"



Chapter 5

Observations:
Oceanic Climate Change and Sea Level

Coordinating Lead Authors:
Nathaniel L. Bindoff (Australia), Jürgen Willebrand (Germany)

Lead Authors:
Vincenzo Artale (Italy), Anny Cazenave (France), Jonathan M. Gregory (UK), Sergey Gulev (Russian Federation), Kimio Hanawa (Japan), Corrine Le Quéré (UK, France, Canada), Sydney Levitus (USA), Yukihiro Nojiri (Japan), C.K. Shum (USA), Lynne D. Talley (USA), Alakkat S. Unnikrishnan (India)

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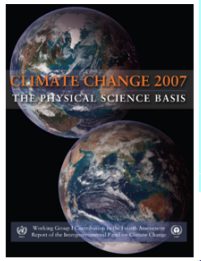
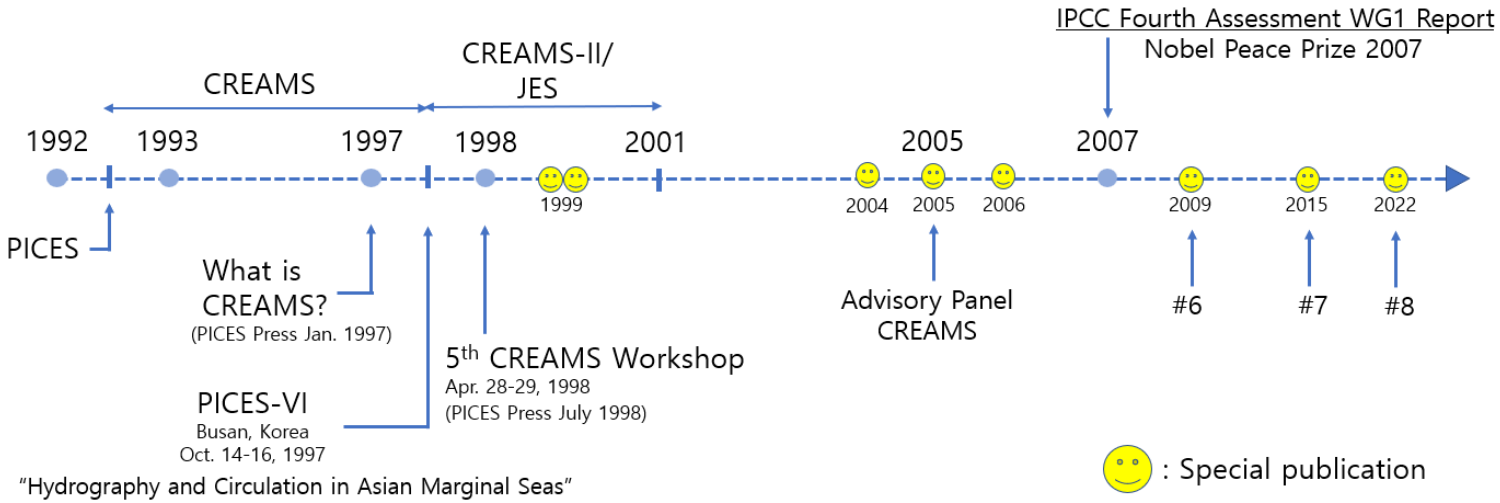
pp. 399-400



The marginal seas of the Pacific Ocean are also subject to climate variability and change. Like the Mediterranean in the North Atlantic, the Japan (or East) Sea is nearly completely isolated from the adjacent ocean basin, and forms all of its own waters beneath the shallow pycnocline. Because of this sea's limited size, it responds quickly through its entire depth to surface forcing changes. The warming evident through the global ocean is clearly apparent in this isolated basin, which warmed by 0.1°C at 1,000 m and 0.05°C below 2,500 m since the 1960s. Salinity at these depths also changed, by 0.06 psu per century for depths of 300 to 1,000 m and by –0.02 psu per century below 1,500 m (Kwon et al., 2004). These changes have been attributed to reduced surface heat loss and increased surface salinity, which have changed the mode of ventilation (Kim et al., 2004). Deep water production in the Japan (East) Sea slowed for many decades with a marked decrease in dissolved oxygen from the 1930s to 2000 at a rate of about 0.8 μmol kg^{-1} yr^{-1} (Gamo et al., 1986; Minami et al., 1998). However, possibly because of weakened vertical stratification at mid-depths associated with the decades-long warming, deep-water production reappeared after the 2000–2001 severe winter (e.g., Kim et al., 2002; Senjyu et al., 2002; Talley et al., 2003b). Nevertheless, the overall trend has continued with lower deep-water production in subsequent years.

North Atlantic, the Japan (or East) Sea is nearly completely isolated from the adjacent ocean basin, and forms all of its own waters beneath the shallow pycnocline. Because of this sea's limited size, it responds quickly through its entire depth to surface forcing changes. The warming evident through the global ocean is clearly apparent in this isolated basin, which warmed by 0.1°C at 1,000 m and 0.05°C below 2,500 m since the 1960s. Salinity at these depths also changed, by 0.06 psu per century for depths of 300 to 1,000 m and by –0.02 psu per century below 1,500 m (Kwon et al., 2004). These changes have been attributed to reduced surface heat loss and increased surface salinity, which have changed the mode of ventilation (Kim et al., 2004).

Ground-breaking observations



Overview and History

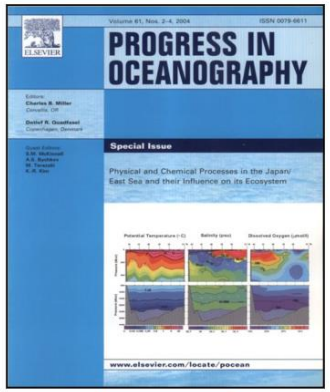
From K Kim's & SE Kim's presentations

Bridging Over the Troubled Waters

Transnational Cooperation in East Asian Oceanography, 1985-2005

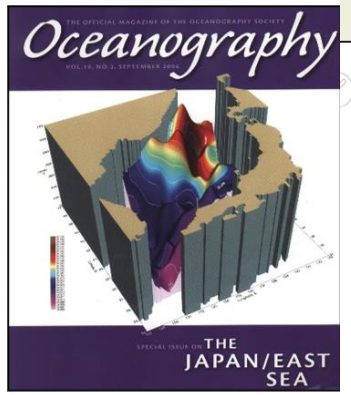
1999

1999



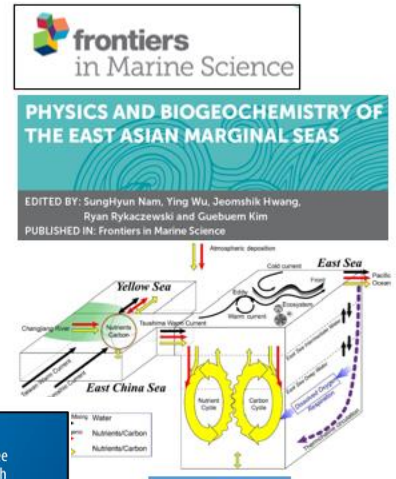
2004

2005

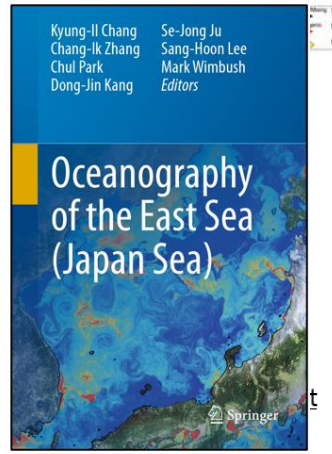


2006

2009



2022



2015

CREAMS

CREAMS-II/ JES

1992 1993 1997 1998 2001 2005 2007

1999 2004 2005 2006 2009 2015 2022

IPCC Four

Nc

PICES

What is AMS? (ress Jan. 1997)

5th CREAMS Workshop

Advisory Panel CREAMS

#6 #7 #8

S-VI

Busan, Korea
Oct. 14-16, 1997

"Hydrography and Circulation in Asian Marginal Seas"

CREAMS as an important historical case

Geoscience and Geopolitics of East Sea

Utilizing two ships to chart the shattered sea

: Special publication

Scientific sessions 1–4

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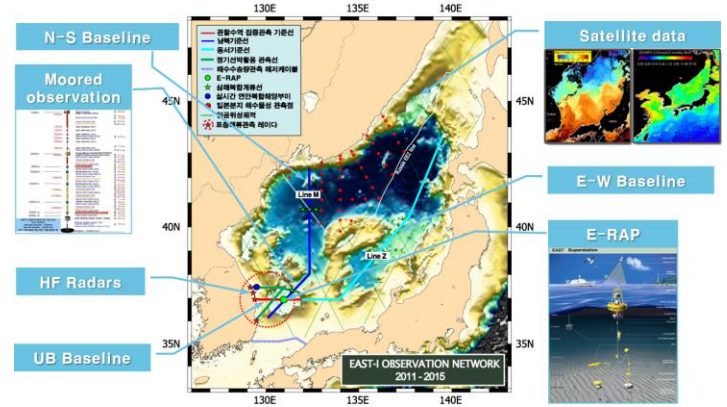
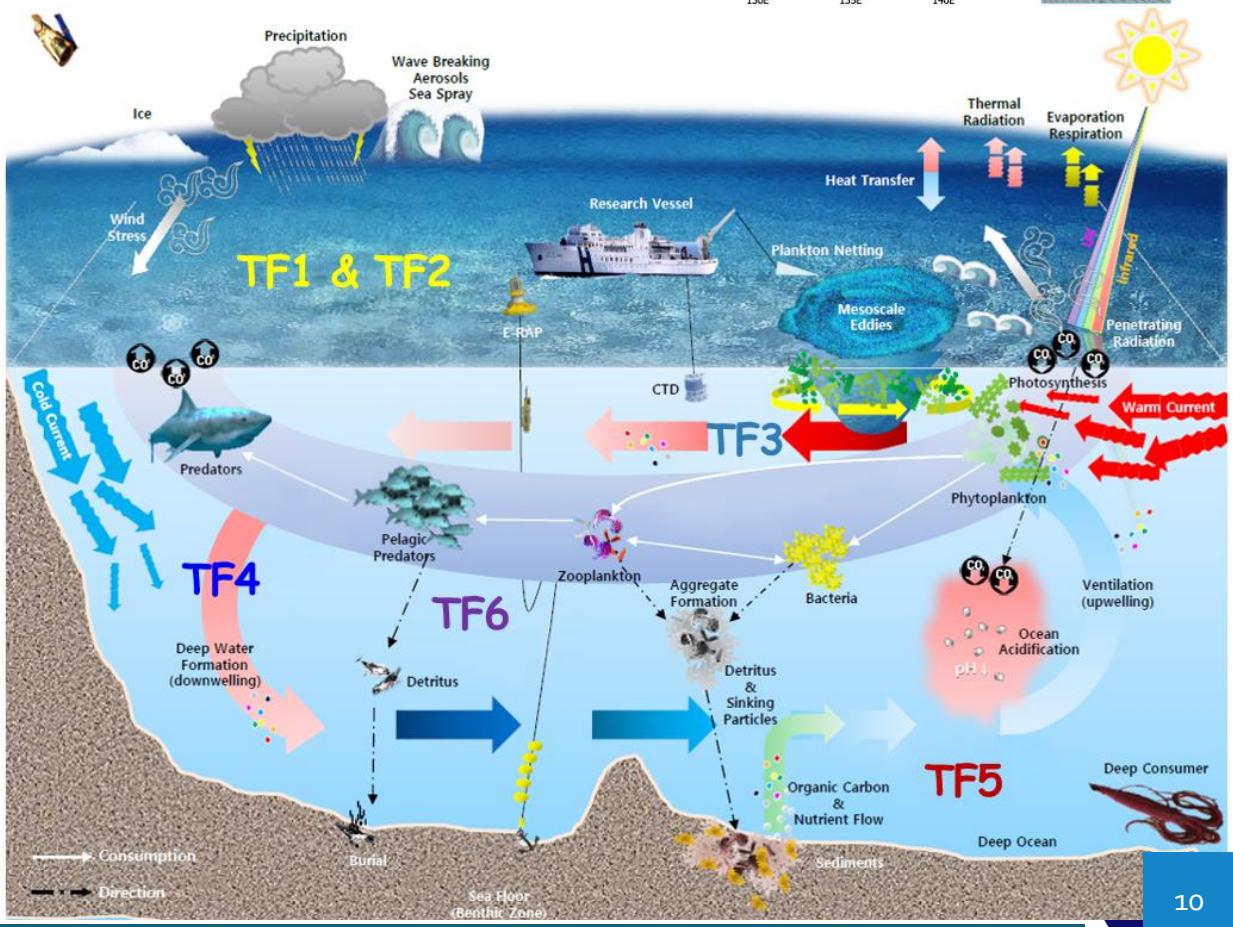
From KI Chang's presentation





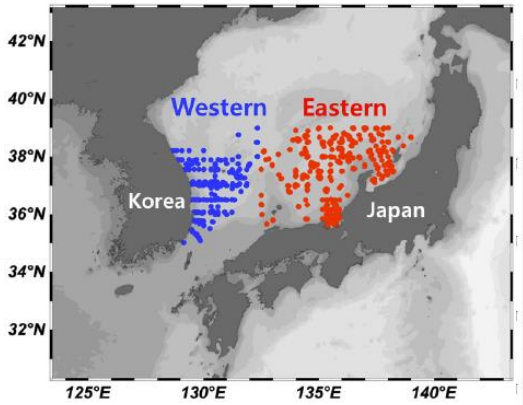
Flash talks

From several ECOP's presentations

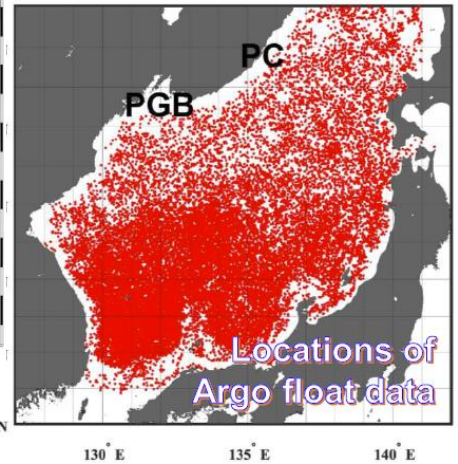
Flash talks (ECOPs; Early Career Ocean Professionals)

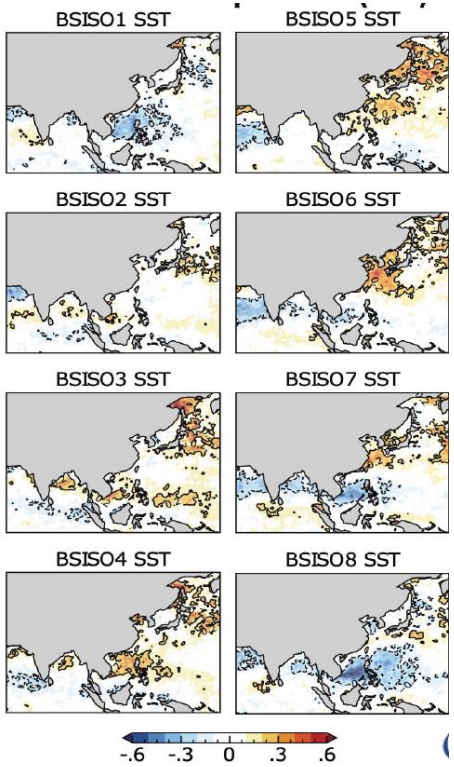
Chaired by **Jae-Hyoung Park** (17:10–18:30)

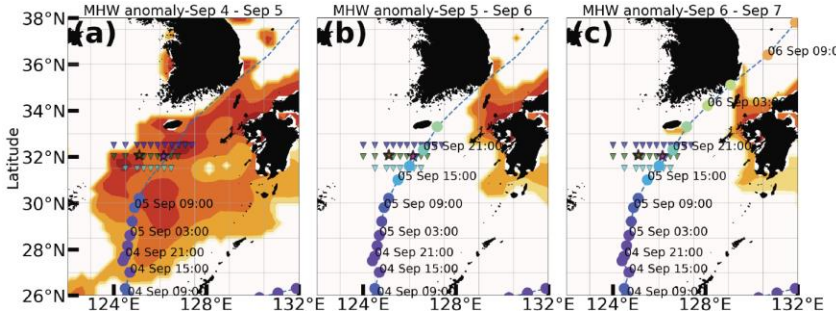
Sojin Park (Graduate student; Seoul National University), **Panini Dasgupta** (Postdoc; Seoul National University), **Saranya** (Graduate student; Seoul National University), **Joongmin Kim** (Graduate student; Seoul National University), **Seungsoo Kim** (Graduate student; Seoul National University), **Sihyeong Kim** (Graduate student; Seoul National University), **Seung Yong Lee** (Graduate student; Seoul National University), **Hyung-Ju Park** (Graduate student; Seoul National University), **Seung-Tae Yoon** (assistant Professor; Kyungpook National University), **Minkyoung Kim** (assistant Professor; Kyungpook National University), **Chanhyung Jeon** (assistant Professor; Pusan National University), **Jae-Hyoung Park** (assistant Professor; Pukyong National University), **Gyeongwoo Go** (Graduate student; Pukyong National University), **Eun-Seo Jeong** (Graduate student; Pukyong National University), **Yoona Song** (Graduate student; Pukyong National University), **Jimin Choi** (Graduate student; Pukyong National University)

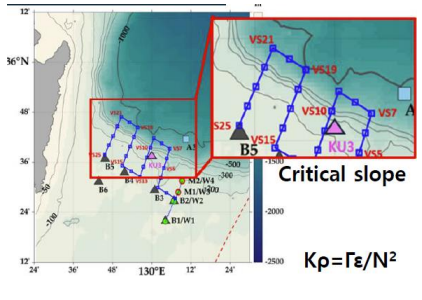


PC=Primorye coast
PGB=Peter the Great Bay

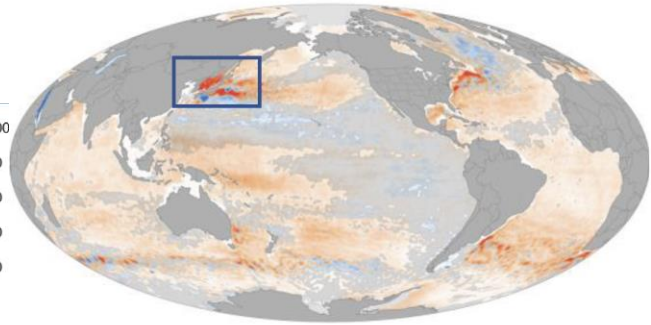


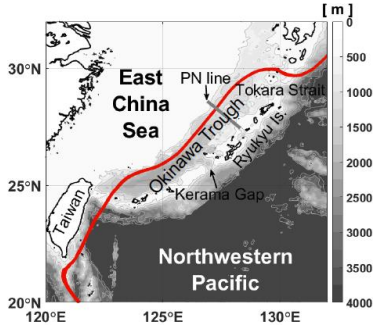


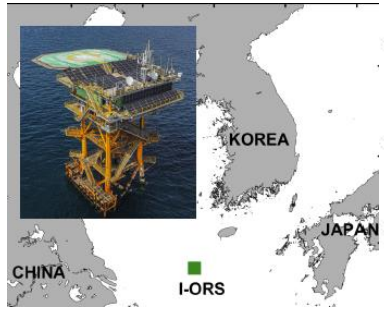


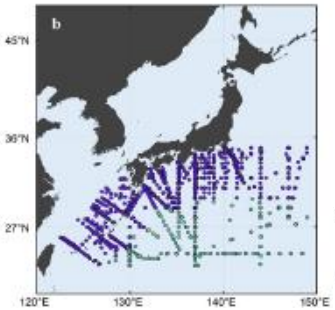


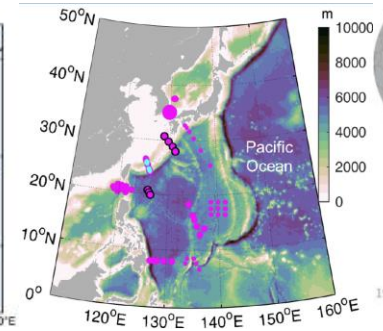
OCEAN HEAT TRENDS (1993-2022)

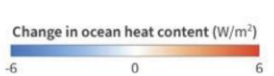








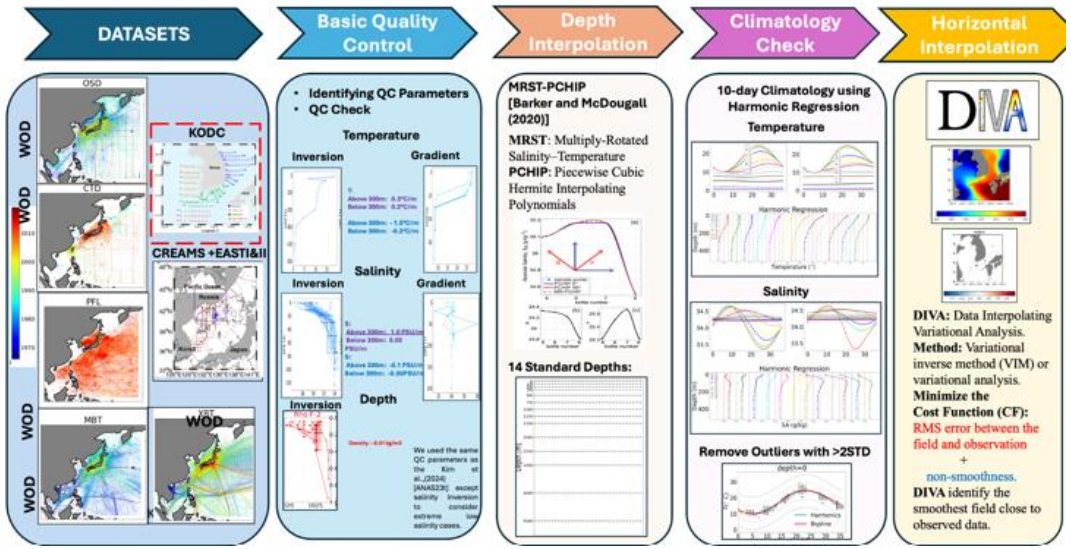


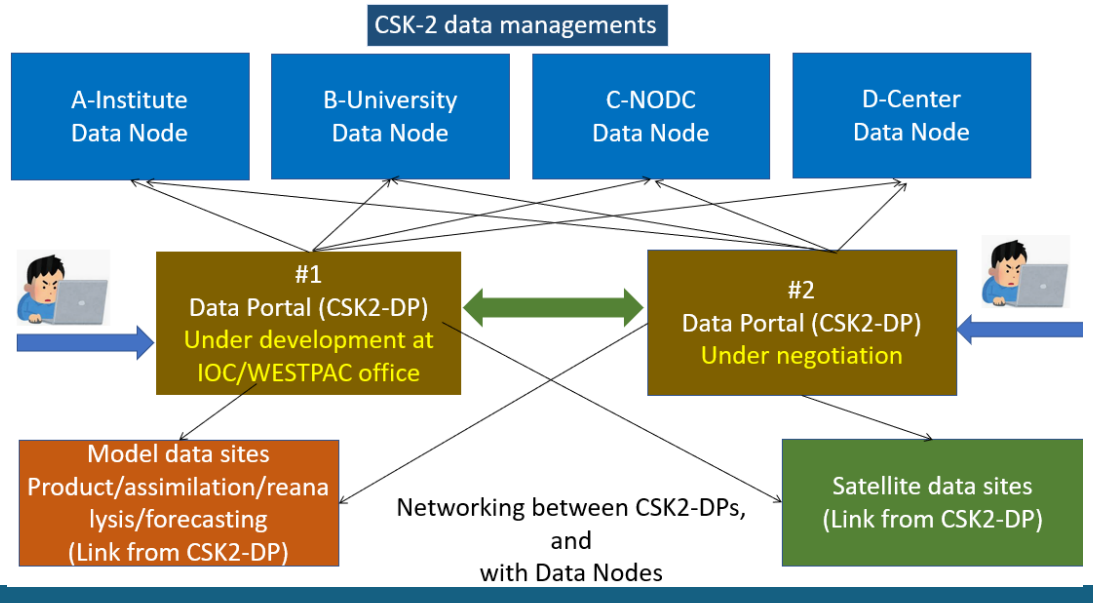


From YG Kim's, K Ando's, M Kim's, T Yoshida's, SE Kim's presentations

Future plans 1–2 & Panel discussions

Long-term gridded Database of the East Asian Marginal Seas





glodap

(Global Ocean Data Analysis Project)

MOSAIC

(Modern Ocean Sediment Archive and Inventory of Carbon)

Broccoli

(Bomb Radiocarbon and the Ocean Carbon Cycle: Observations, Legacy and Implications)

SOOS

(Southern Ocean Observing System)

Data Provider	Data User
CREAMS	NOWPAP

Beyond Disciplinary Borders

Proposals for interdisciplinary collaboration on East Asian ocean science

Proposal 1

Oceanography and history of science

Proposal 2

Oceanography and science policy

Proposal 3

Ocean science and science education

Lessons learned from 30 years of CREAMS experience (personal perspectives)

- **Long-lasting support of CREAMS under changing geopolitics**
- **Scientific findings on EAMS**
- **Data/information management system**
- **SEES (Social-Ecological-Environmental System) approach toward more integrative science**

Thank you

- **Any Question?**
  Please email to me at namsh@snu.ac.kr