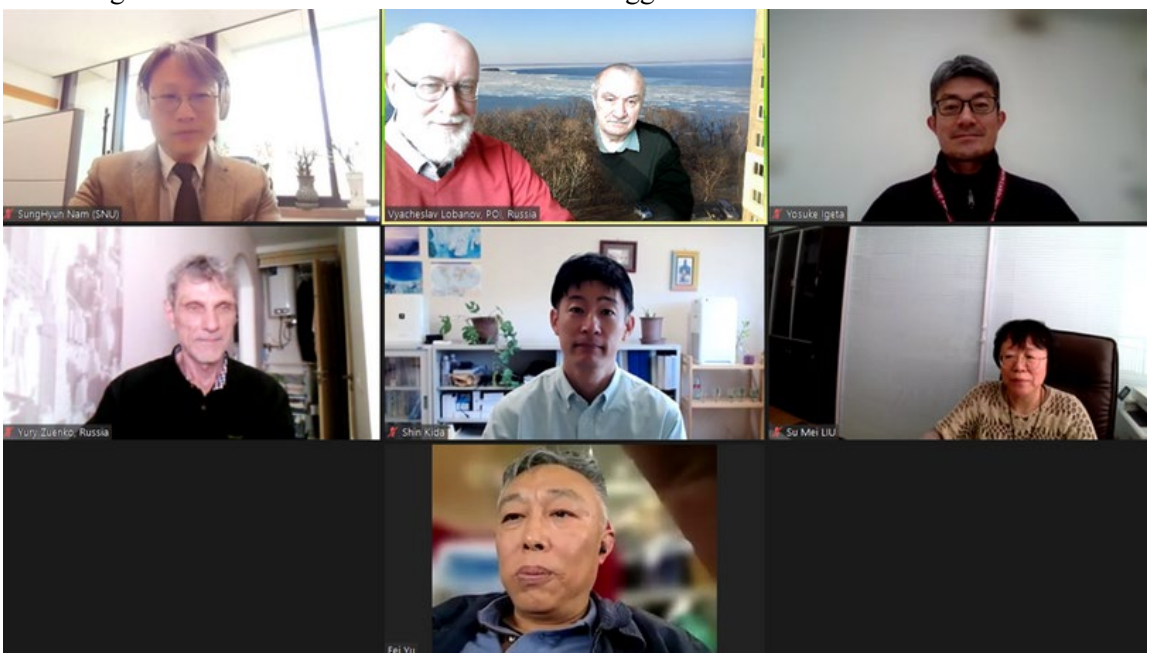
2025 Report of the Advisory Panel for a Circulation Research in East Asian Marginal Seas (AP-CREAMS)

The Advisory Panel for a CREAMS/PICES Program in East Asian Marginal Seas (AP-CREAMS) had 3 business meetings in 2025: on April 7 (online), October 3 (online) and November 9 (hybrid). Reports of these meetings are presented below. Endnotes with photographs and other related documents are presented in the end of this report.

Day 1: Business Meeting (on-line) **on April 7, 2025**, 11:00-12:45 (UTC+10)

1.1. Opening remarks, introduction of the participants, adoption of the agenda

There were 9 participants in the meeting: Vyacheslav (Slava) Lobanov (Russia), Pavel Tishchenko (Russia), Yury Zuenko (Russia), SungHyun Nam (Korea), Minkyoung Kim (Korea), Yosuke Igeta (Japan), Shinichiro Kida (Japan), Su Mei Liu (China) and Yu Fei (China) (see Endnote 1). Slava opened the meeting and explained the agenda. No comments or corrections were suggested.



Participants of the AP-CREAMS online meeting on April 7, 2025. Left to right and top to bottom: SungHyun Nam, Vyacheslav Lobanov, Pavel Tishchenko, Yosuke Igeta, Yury Zuenko, Shinichiro Kida, Su Mei Liu and Yu Fei. Minkyoung Kim left the meeting a bit earlier

1.2. A half-year report on AP-CREAMS activity to PICES SB and GC meetings

Slava explained the content of the Expert Group (EG) activity report that AP-CREAMS should submit to PICES Science Board (SB) for their intersessional meeting in coming May. The group suggested the following accomplishments in the period since October 2024:

a) submission a proposal of the scientific session for PICES-2025 (accepted)
b) publication of the article in PICES Press on CREAMS 30th Anniversary workshop
c) online meeting on April 7, 2025
d) revision of AP-CREAMS TOR
e) progress in the development of AP-CREAMS website

1.3. New Terms of Reference for AP-CREAMS

- Slava explained that the group should prepare more clear and convince justification for the expansion of AP-CREAMS target area from Marginal Seas toward western Pacific Ocean (Endnote 2). Since the

proposal that the group submitted to PICES on October 2024 there was a long discussion on this with SB and MONITOR Committee as a parent committee of the AP-CREAMS. There are a few comments and questions made by SB members to which the group should provide clear responses.

- Even among the AP-CREAMS members there are different opinions on this issue. Some members support an extension, as it will give new wider area, connection with the ocean, involvement of new people and closer links to new international programs such as CSK-2. While some members are negative to extension as it may dilute the initial target of AP-CREAMS, the Asian Marginal Seas, and make the AP less concentrated and weak. Some members support both options and, if extent, then to include only limited area of southern Okhotsk Sea (17) and NW Pacific (18 and 22), adjacent to marginal seas, and where we can develop international collaboration.
- Slava summarized preliminary discussion on this issue and asked the members for their opinions to discuss this now and send their comments by e-mail after the meeting. The comments received are presented in Endnote 3 and in a short form below:
- Ryan Rykaczewski: one of the strengths of the AP has been on its focus on comparison of these semi-enclosed seas and their importance to local communities. While inclusion of area 23 (i.e., extension to the dateline) would capture many interesting Kuroshio, Oyashio, and gyre processes, I worry it could dilute the specificity of CREAMS. So for this reason, I favor proposing that the research area be regions 16-22 (or even 17-22) to maintain an emphasis on the marginal seas but include exchange with the broader ocean.
    - Yury Zuenko: AP-CREAMS was established historically for the regions where marine researches were conducted by several countries and these countries agreed to coordinate their activity, in particular expedition surveys. But it will be not so easy for an expanded area because of the lack or absence of such multi-national surveys in new areas of expansion. However, a clear, careful clarification of our goals will be necessary in any case, either small or vast expanding, if we need to renovate our TORs. On this subject, I saw a rather good formula of AP-CREAMS activity: to exchange information on research cruises (and possibility to join the scientific teams), the cruises plans and results, to coordinate national and international surveys, to develop coordinated national observational programs. As to the limits of expansion - I see that the most suitable area to expand the CREAMS-style research activity is the area of Kuril and Japanese Islands (PICES areas 18 and 22), actively surveyed by Japan, Russia, and China, with some international projects.
    - SungHyun Nam: I prefer to extend to all areas in the northwestern Pacific except the vast open Pacific (area 23) with a focus on its marginal seas (areas 21, 20, 19, 17, 16, and 14). It is also important to include western boundary area of open ocean (areas 22 and 18) as there are significant exchanges to the marginal seas. The extension will (1) provide more opportunities for PICES community to involve the AP-CREAMS (e.g., bringing more attention to the workshops/sessions/mentorships the AP-CREAMS convenes), (2) enhance capacity of the AP-CREAMS to better coordinate programs to study marine ecosystem and its variability in the core (areas 19, 20, and 21) as well as extended areas, and (3) better facilitate the establishment of permanent observation and data exchange networks in a larger northwestern Pacific and its marginal seas, and disseminate more knowledge on the extended area. Considering the purposes of PICES, the extension will (1) better promote and coordinate marine research in the northwestern Pacific and its marginal seas (not limited to the core areas 19-21 but also the extended areas), (2) advance more scientific knowledge about the ocean environment, global weather and climate change, living resources and their ecosystems, and the impact of human activities, focused on the northwestern Pacific marginal seas, and (3) better promote the collection and rapid exchange of scientific information on more issues.
    - You Fei: I understand Yury's thought which the members of SB and POC may have some different idea for the expanding of AP-CREAMS. However, AP CREAMS had focused on sea areas 19, 20 and 21 for nearly thirty years. I wish there are some new point for our collaboration. Generally I agree the opinion of professor Nam. The west boundary current system Is very important for the east Asia marginal sea, And Okhotsk Sea is important for the formation of NPIW. So I suggest to include region 17, 18, 22 to AP CREAMS area. It's just the personal opinion. I will agree with the decision by all of our members.
    - Minkyoung Kim: The character of AP-ECOP may be different, but within the AP-ECOP, we are already slightly sharing updates and adapting initiatives together with the APECS (Association of Polar Early Career Scientists) group, as some members are involved in multiple groups.

Similarly, I think allowing for some minimal expansion could be beneficial—especially in terms of understanding certain ocean systems (as Prof. Yu Fei mentioned) and gaining opportunities for collaborative cruises or research funding. But again, my understanding of AP-CREAMS is not as deep as that of the previous members yet, and I would like to learning and follow others' opinions.

1.4. AP-CREAMS proposed session for PICES-2025

Slava informed that the AP-CREAMS proposal on scientific session at PICES-2025 “Changing Asian Marginal Seas: from marine science to societal needs, current challenges for integrative science and UN Ocean Decade” was merged with 2 other relevant session proposals and now we will have 2 days session S2 "Changing ecosystem structure under global climate change: monitoring, detecting, modelling, and socio-ecological impacts" (https://meetings.pices.int/meetings/annual/2025/pices/program#s2). One day of the session will be focused to Asian Marginal Seas. The co-conveners of the S2 session are: Shin-ichi Ito, Japan, Julie Keister, USA, Jennifer Boldt, Canada, Minkyoung Kim, Korea, Vyacheslav B. Lobanov, Russia, Feng Zhou, China.

1.5. Implementation of our action points

The group discussed on the implementation of action points fixed at 26 Oct., 2024 meeting. They are:

a) further development of AP-CREAMS website and database, including metadata information on the AP-CREAMS cruises, and information on planned national cruises and possibility to participate for other members
b) continue exchange of information on national observational programs, cruise results and plans, try to arrange coordinated surveys
c) continue cooperation with relevant marine organizations in the region such as NOWPAP, IMBER, WESTPAC and others to exchange information and arrange joint activity
d) propose a topic session for PICES 2025 on integrated ocean science relevant to SEES of PICES in the AP-CREAMS area
e) extend AP term to 2025-2029
f) expand geographic coverage to NW Pacific
g) change the AP ToR accordingly

All the actions points are on the implementation or already done. Important is a development of AP-CREAMS website. SungHyun reported on the status of the AP-CREANS web page development. This will help to have closer communication with informing each other on plans and results and will help to arrange coordinated observations in the future. It is also linked to the extension toward the northwestern Pacific marginal seas. The webpage will provide the geographic areas of concern, among others.

1.6. Next meetings

PICES Secretariat asks every expert group to have online business meetings in September, before Annual Meeting and optionally have a face-to-face business meeting during PICES Annual Meeting-2025 (Nov 8-14). Most of the attended members supported to have a face-to-face business meeting during PICES-2025. It will be good to see each other, easier communication, some other people (observers) may join the meeting and AP-CREAMS activity.

1.7. Other activities, proposals, suggestions

The group discussed some new proposals relevant to the AP ToR. SungHyun proposed a capacity building activity on the theme of AI. It could be a training course on the theme, e.g., “Application of artificial intelligence technologies into marine science: focusing on cases of northwestern Pacific marginal seas”. He does not not believe he can organize any training course by himself for this or upcoming year, but hope there would be a volunteer to host such. The group suggested to think about this and discuss this later.

1.8. Summary and closing

Slava summarized the meeting and closed it on 12:45 (UTC+10)

Day 2: Business Meeting (on-line) **on October 3, 2025**, 11:00-12:10 (UTC+9)

2.1. Opening remarks, introduction of the participants, adoption of the agenda, rapporteur

There were 5 participants in the meeting. SungHyun Nam (co-chair), Minkyoung Kim (rapporteur), Jing Zhang, Su Mei Liu, Shinichiro Kida

2.2. An annual report on AP-CREAMS activity

SungHyun provided a brief review on past activities. In particular, development of "CREAMS website" is in progress and will be discussed.

2.3. New Terms of Reference for AP-CREAMS

- justification for expansion of AP-CREAMS target area from marginal seas toward western Pacific Ocean.
- SungHyun provided a brief review on new Terms of Reference (ToR) and justification for extended geographic area of AP-CREAMS, discussing initial/core vs extended areas, potential benefits for AP-CREAMS, and the rationale for PICES SB and GC.
- Comments from the SB and the corresponding responses were shared with the members one by one.
- Jing Zhang added her comments on the new ToR and justification, suggesting that we may emphasize our ongoing progress and the activities related to joint research cruises.



Participants of the AP-CREAMS online meeting on October 3, 2025. Left to right and top to bottom: Jing Zhang, SungHyun Nam, Minkyoung Kim, and Su Mei Liu. Shinichiro Kida left a bit early

2.4. AP-CREAMS proposed session for PICES-2025

- SungHyun explained that our session has been merged with two other related sessions, and it will now be held over two days (November 11, 2025) as Session 2 (S2) during the PICES-2025 Annual Meeting.
- Minkyoung mentioned the "Introduction to PICES" session and suggested attending it, especially in relation to the AI training course proposed by Slava, as organizing training sessions is one of the key activities of the AP-ECOP team. Although the session overlaps with the first day of Session 2 (S2), SungHyun kindly agreed to join Minkyoung.
  https://meetings.pices.int/meetings/annual/2025/pices/PICES-2025-General-schedule.pdf

2.5. Implementation of AP action points

SungHyun shared a draft of the AP-CREAMS webpage, which is currently being developed with Prof. KyungJae Lee (Incheon University). Prof. Lee will attend the AP-CREAMS face-to-face business meeting as an observer and present the first completed version of the webpage. He will collect feedback from the AP-CREAMS members and make revisions accordingly in the future.

2.6. In-person (face-to-face) business meeting at PICES-2025

This will take place from 13:55 to 17:30 on Sunday, November 9, 2025.

2.7. Other activities, proposals, and suggestions

- SungHyun mentioned that Slava suggested an AI-related training course, and Minkyoung noted that training courses are part of AP-ECOP's activities, so we can consider this together with AP-ECOP team (but Minkyoung is in charge of Mentorship Team, so another ECOP will take charge).
- Minkyoung inquired about the paper handling issue of the AP-CREAMS special issue in Progress in Oceanography, and Jing Zhang and SungHyun will follow up and assist.
- Su Mei suggested including more information about research progress, such as comparisons of marginal seas and key issues in the annual reports. SungHyun suggested that the new website could provide synthesized information and propose future research directions.

2.8. Summary and closing

The meeting was summarized and closed on October 3 12:10 pm.

Day 3: Business Meeting (hybrid) on November 9 (Sunday), 2025, 1:55 PM-5:30 PM at #201 (2F) Workpia Yokohama, Japan & https://us02web.zoom.us/j/84305960667

3.1. Opening remarks, introduction of the participants, adoption of the agenda, rapporteur

There were 14 participants in the meeting, including 9 members and 5 observers: SungHyun Nam, Vyacheslav B. Lobanov, KyungJae Lee, Saranya J. S, Yosuke Igeta, Yury I. Zuenko, Pavel Semkin, Jing Zhang, Kwang-Young Jeong, Gwang Ho Seo, Minkyoung Kim, Yu Fei, Takafumi Yoshida, and Seungsoo Kim



Participants of the AP-CREAMS online meeting on November 9, 2025. First row, from left to right: Minkyoung Kim, Yu Fei, Vyacheslav B. Lobanov, Jing Zhang, SungHyun Nam; Second row, from left to right: Seungsoo Kim, Kwang-Young Jeong, Gwang Ho Seo, Yury I. Zuenko, Saranya J. S, KyungJae Lee, Takafumi Yoshida, Pavel Semkin, Yosuke Igeta

3.2. An annual report on (national and international) AP-CREAMS activity

- (Korea) SungHyun explained that there are several national cruises, especially around the EEZ area (CTD operations). Time-series stations are ongoing, with a few observations conducted using gliders. Three ocean research stations are currently operating, and one more is under construction. There are no active international joint-cruise activities in the region at present.
- (Japan) Yosuke reported on monitoring activities conducted by the fisheries research institutes of Japan. Two main activities (corroborative work and Tajima-line observations) were introduced, and Yosuke will give a poster presentation on the results (POC-P7, 12th Nov. 18:00-20:30 pm).
  Data-sharing website has been modified as https://oceandata.fra.go.jp/
- SungHyun asked about data availability, that it could be linked to Workshop 10 (the Heatwave Team), where long-term continuous temperature time-series data are needed. However some processed data are not yet available.
- Jing Zhang suggested that the results and links could be connected to the PICES website, and asked whether there are any open data from Korea, China, or Russia. SungHyun mentioned buoy data (1999–present, e.g., https://doi.org/10.17882/57744, https://doi.org/10.17882/82957) and NIFS hydrographic data from the Korean side.

- (Japan) Jing Zhang also shared on-going projects, focusing on nutrient supply from terrestrial sources and tidal mixing in the East China Sea, as well as their plans for the Bering Sea (in 2028).
- (China) Yu Fei briefly explained the IOCAS cruises: 4 cruises in the Yellow Sea and 4 cruises in the East China Sea. Slava inquired about the purpose of studying the Yellow Sea Bottom Cold Water. SungHyun will connect Yu Fei's students with the PICES group studying marine heatwaves to facilitate collaboration.

3.3. New Terms of Reference for AP-CREAMS

- Slava presented the previous AP-CREAMS ToR (since October 2005) and outlined changes after PICES-2024 Annual Meeting. He also presented an updated ToR, Justification for the expansion of the target area (Endnote 4) and responses on the SB comments (Endnote 5).
- SungHyun added that the POC was supportive of the proposed changes, although Science Board (SB) expressed concerns about a few things such as potential overlaps with AP-ARC and AP-NPCOOS. Jing Zhang highlighted necessity of regional expansion, with material transport connections between seas. As a SB member Yuri mentioned that the SB was positive about the changes. Slava and SungHyun emphasized that sharing information on joint cruise coordinates and developing webpage are unlikely the key activities of AP-CREAMS.
- All members expressed their agreement with the ToR changes.

3.4. AP-CREAMS proposed session for PICES-2025

- Slava provided a brief introduction to our session at PICES-2025, including its history, how it was combined with two other sessions, and the number of abstracts submitted.
- S2 (Changing Ecosystem Structure Under Global Climate Change: Monitoring, Detecting, Modelling, and Socio-Ecological Impacts) will be held on 11–12 Nov, from 09:00 to 17:30, @Oshidori, 2F.

3.5. Implementation of the action points – CREAMS webpage

- AP-CREAMS Webpage Update: KyungJae Lee introduced the first release of the AP-CREAMS webpage and requested members to share relevant links and data. Website and contact: http://npmsscience.com/. Contact Prof. KyungJae Lee is kjlee83@inu.ac.kr.
- Yoshida suggested avoiding the use of geopolitical (SG-2) names of the sea.
- Slava noted that metadata for cruises have not yet been included. SungHyun explained that metadata will be linked via the data DOIs later, and also mentioned that "Future Cruises" section had better be added to facilitate information sharing and coordination.
- Jing Zhang inquired about the frequency of data uploads and whether data would be checked or quality-controlled before being shared within PICES. SungHyun suggested that data quality control and updates could be conducted approximately two-three times per year, following the AP-CREAMS business meetings.

3.6. Cooperation with international program/activities (NOWPAP, WESTPAC etc)

- Yoshida provided an update on the current situation of NOWPAP, noting that related activities are expected next year.
- Slava and SungHyun were elected as vice chairs of IOC WESTPAC, which is expected to lead to various synergistic activities.
- Jing Zhang and SungHyun serve as co-chairs of the one of IOC-WESTPAC Science program "Healthy, Productive and Sustainable Asian Marginal Seas (AMS)". An online workshop for 2025 is now scheduled for the first Saturday of December, and SungHyun will share further details later.

3.7. Other activities, proposals, and suggestions

- SungHyun proposed to consider an AI-related training course in the future as part of the AP's capacity-building activities.

- The next PICES meeting is scheduled to be held in Canada, with the session/workshop proposal deadline set for November 24, 2025. If anyone has an idea to propose session/workshop, sharing it before the deadline is encouraged.
  Slava suggested potential topics for the AP to think about such as (i) extending the regional coverage and (ii) applying AI in the Asian marginal seas. Alternatively, these ideas could be reserved for a future PICES meeting, as the upcoming one in Canada may have limited participation.

3.8. Next AP-CREAMS meeting

The next AP-CREAMS meeting is planned for the spring 2026. Yu Fei kindly offered to host the meeting in Qingdao, China, tentatively in May or June. The availability of members and the exact date will be surveyed later via email correspondence.

3.9. Summary and closing

The meeting was summarized and closed on November 9, 17:30 pm.

AP-CREAMS Endnote 1

Revision of AP-CREAMS AP Terms of References

During recent years in addition to the primary tasks, AP-CREAMS started activity in new directions, as a contribution to PICES/FUTURE request:

i) to pursue an integrative approach to include multiple disciplines beyond the physics and chemistry to cover whole social-ecological-environmental-system framework developed by FUTURE,
ii) to extend geographic coverage to include all North-East Asian Marginal Seas beyond the EAST-I and EAST-II regions, and
iii) to prioritize involvement of ECOPs in its activity.

Correspondingly the AP members drafted new terms of reference, as below (changes are highlighted by italic):

1. To coordinate programs to study the marine ecosystem and its variability in the *North-West Pacific* and its Marginal Seas in the PICES area under global changes, both natural and anthropogenic; effect of long-term and extreme changes in the abiotic and biotic environments of this region;
2. To facilitate the establishment of permanent observation and data exchange networks in this region;
3. To convene workshops/sessions/*mentoring* to evaluate and compare results from the program;
4. To enhance capacity building, knowledge dissemination, cooperation with other international marine organizations/programs in the region.
5. *To provide more opportunities for ECOPs to join particularly from Asian countries.*

Primarily focus area of AP-CREAMS would be extended to include Okhotsk and Bering Seas and western part of the North-Western Pacific. To understand the processes in the Asian Marginal seas and their impact on adjacent area of the Pacific it is important to consider more wide area which would include connection of the seas with the ocean. In addition to North-East Asian marginal seas the proposed extension would cover western part of the North-Western Pacific bounded from the east by the date change line (Fig. 1).

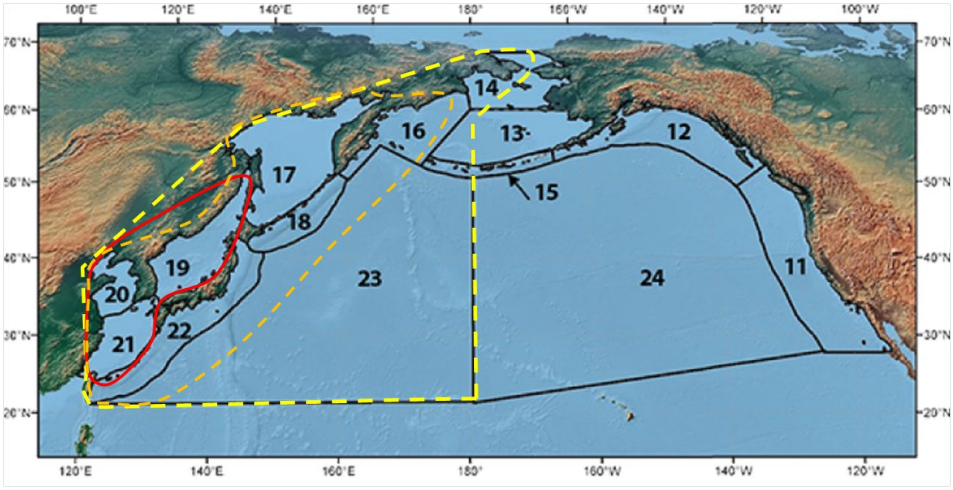


Figure 1 – Current AP-CREAMS focus area (red) and proposals 1 (orange) and 2 (yellow) overlapped on PICES NPESR regions map

AP-CREAMS Endnote 2

Comments of the AP-CREAMS members on the expansion of the target area

2025-04-14 Minkyoung Kim
I preferred to listen to and follow the decisions made by previous members. The character of AP-ECOP may be different, but within the AP-ECOP, we are already slightly sharing updates and adapting initiatives together with the APECS (Association of Polar Early Career Scientists) group, as some members are involved in multiple groups. Similarly, I think allowing for some minimal expansion could be beneficial—especially in terms of understanding certain ocean systems (as Prof. Yu Fei mentioned) and gaining opportunities for collaborative cruises or research funding (maybe..?). But again, my understanding of AP-CREAMS is not as deep as that of the previous members yet, and I would like to learning and follow others' opinions. :)

2025-04-14 Yu Fei
I understand Yury's thought which the members of SB and POC may have some different idea for the expanding of AP-CREAMS. However, AP CREAMS had focused on Japan Sea， East China Sea and Yellow Sea for nearly thirty years. I wish there are some new point for our collaboration. Generally I agree the opinion of professor Nam. The west boundary current system Is very important for the east Asia marginal sea, And Okhotsk Sea is important for the formation of NPIW. So I suggest to include region 17,18,22 to AP CREAMS area. It's just the personal opinion. I will agree with the decision by all of our members.

2025-04-09 Yury Zuenko
I have read your proposals with interest, understand your idea and quite respect it. You want to do exactly the step I've warned about - to create "little PICES" for our region of NW Pacific. Actually, this idea is logic - we fully share the PICES strategy of multi-disciplinary a multi-national approach in marine sciences but NW Pacific is more interesting and important for us, and we feel themselves less comfortable in the American-dominated "big PICES" oriented mostly on other regions. However, I still value the PICES unity and am sure that in PICES (as it is now) regional agenda only cannot be a reason for establishing a new Advisory Panel (in fact, you propose new AP, with new TORs and new members), but any AP should have a functional specificity. Anyway, I consider your efforts as beneficial to me, personally. So, even if you refuse to correct your ambitious plan to make it more suitable for PICES authorities (particularly in TORs), but this CREAMS request will not face visible resistance in POC and SB - I will support it, too.

2025-04-09 SungHyun Nam
I have learned a lot from you. Thanks to your comments, I could better understand the history and politics, relationship between PICES and AP-CREAMS. I hope we can leaverage this opportunity for the AP-CREAMS to grow up. My thoughts on the issues are included in the attached file.

What regions to add	What benefits will this give to AP-CREAMS?	Rationale for PICES SB and GC (justification why we should extent the area)
Prefer to extend to all areas in the northwestern Pacific except the vast open Pacific (area 23) with a focus on its marginal seas (areas 21, 20, 19, 17, 16, and 14). It is also important to include western boundary area of open ocean (areas 22 and 18) as there are significant exchanges to the marginal seas.	The extension will 1) provide more opportunities for PICES community to involve the AP-CREAMS (e.g., bringing more attention to the workshops/sessions/mentorships the AP-CREAMS convenes), 2) enhance capacity of the AP-CREAMS to better coordinate programs to study marine ecosystem and its variability in the core (areas 19, 20, and 21) as well as extended areas, and 3) better facilitate the establishment of permanent observation and data exchange networks in a larger northwestern Pacific and its marginal seas, and disseminate more knowledge on the extended area.	Considering the purposes of PICES, the extension will 1) better promote and coordinate marine research in the northwestern Pacific and its marginal seas (not limited to the core areas 19-21 but also the extended areas), 2) advance more scientific knowledge about the ocean environment, global weather and climate change, living resources and their ecosystems, and the impact of human activities, focused on the northwestern Pacific marginal seas, and 3) better promote the collection and rapid exchange of scientific information on more issues.

2025-04-07 Yury Zuenko
One additional comment to our discussion about AP-CREAMS expansion.
AP-CREAMS is a unique inter-sub-regional community within PICES, and sometimes I heard questions at SB or POC: why these several sub-regions (19, 20, 21) have a supervising AP but others have not? The answer was that CREAMS was established historically for the regions where marine researches were conducted by several countries and these countries agreed to coordinate their activity, in particular expedition surveys. This issue (multi-national surveys in the limited area of common interest) is our specific feature understandable for PICES community and I guess it is the main reason of such long history of AP-CREAMS. Otherwise, if we clarify that the goal of AP-CREAMS is something as "to develop multidisciplinary communication and collaboration between marine scientists exploring the area of East Asia marginal seas and adjacent Pacific" - it would look as an attempt to create "regional PICES", i.e. to divide PICES community to small parts which will have the same goals as PICES itself but concerned particular regions. This regional separatism maybe will not be approved by PICES authorities.

To avoid this uncomfortable situation, we need to clarify the goals for AP-CREAMS which will be relevant to PICES but clearly different from its goals. It was quite easy previously when AP-CREAMS limited its activity by 3 seas in the southwestern corner of the PICES area. But it will be not so easy for an expanded area because of the lack or absence such multi-national surveys in new areas of expansion. However, a clear, careful clarification of our goals will be necessary in any case, either small or vast expanding, if we need to renovate our TORs.

On this subject, I saw a rather good formula of AP-CREAMS activity in the explanation of future website (sorry, I have wrote some phrases from the screen):
"to exchange information on research cruises (and possibility to join the scientific teams), the cruises plans and results, to coordinate national and international surveys, to develop coordinated national observational programs"
- this should be the core of our activity, I guess.

As to the limits of expansion - I see that the most suitable area to expand the CREAMS-style research activity is the area of Kuril and Japanese Islands (PICES areas 18 and 22), actively surveyed by Japan, Russia, and China, with some international projects. Sure, this is an area rather complicated for international studies because of the frontier conflict between Japan and Russia, but we already met some similar problems in the Japan/East Sea and have some experience what to do (although mainly negative). The southern Okhotsk Sea connects these areas with the traditional CREAMS region, so it could be logically involved, though I have no information about its exploring by any country except Russia.

2025-04-06 Ryan R. Rykaczewski
I wanted to offer my initial thoughts on Point #2 that Slava raises-- extension of the primary focus area. I see an extension of the geographic area as an opportunity to emphasize the feedbacks between larger-scale basin processes and the marginal seas. I recall that there is a rich history of oceanography surveys and time series that extend into Region 23. However, one of the strengths of the AP has been on its focus on comparison of these semi-enclosed seas and their importance to local communities. While inclusion of area 23 (i.e., extension to the dateline) would capture many interesting Kuroshio, Oyashio, and gyre processes, I worry it could dilute the specificity of CREAMS. So for this reason, I favor proposing that the research area be regions 16-22 (or even 17-22) to maintain an emphasis on the marginal seas but include exchange with the broader ocean.

I expect discussion of the point with the group would be valuable, and I am certainly willing to be convinced that the region should be broader. I look forward to hearing more following the discussion.

AP-CREAMS Endnote 3

Revised AP-CREAMS Action Plan with Rationale for extension of AP-CREAMS focus area and revision of Terms of Reference (2025-07-21)

1. AP-CREAMS tasks and their implementation

The AP-CREAMS (Advisory Panel on *Circulation Research in the East Asian Marginal Seas*) was established in October 2005 with the following tasks:

1. To initiate and coordinate studies on hydrography, circulation, and biology, as well as on variability of oceanographic and biological properties in the PICES area of the East Asian Marginal Seas;
2. To estimate climate-scale and long-term changes in abiotic and biotic environments of this region;
3. To facilitate the establishment of permanent observation and data exchange networks in this region;
4. To convene workshops/sessions to evaluate and compare the results of national and international research programs.

Primarily the activity of the AP-CREAMS is focused on the Northeast Asian marginal seas, which are sensitive to climate change and anthropogenic impacts, where intensive national activities take place, and where a strong need for international coordination and collaboration to study the variability of hydrodynamics, biogeochemistry, ecosystems, fisheries, and influence of human activities at multiple scales in the area exists.

Research activities among PICES member countries in the region of the Northeast Asian marginal seas have a permanent character and need ongoing coordination, as the interests of different countries tightly overlap. Some ideas on further development of international surveys and observation networks have already been discussed by AP-CREAMS though specific details, such as joint standard sections, format of data exchange, operational information on planned and ongoing cruises, extension of the target area, *etc*. are not yet developed.

Meetings of the AP-CREAMS are organized 2-3 times each year with exchange of results of international and national activities and plans. Results of the joint research in the CREAMS area have been published in leading scientific literature. AP-CREAMS is continuing the preparation of publications on the state of the regional ecosystem, namely on the PICES Scientific Report “Oceanography of the Yellow and East China Seas”, and regional chapters (Areas 19 and 21) for the North Pacific Ecosystem Status Report-3.

During the most recent period (2023-2024) the AP convened the following workshops and scientific sessions:

- a workshop on “Changing social-ecological-environmental system of the North East Asian Marginal Seas: New challenges for integrative marine science” during PICES-2023 in Seattle, USA;
- CREAMS 30th Anniversary & CSK-II Joint-Workshop « International collaboration for science of East Asian Marginal Seas in a changing climate: circulation, biogeochemistry, and socio-economic research», July 25-26, 2024, Seoul, Korea;
- scientific session “Past, Present and Future of CREAMS program: 30 years of international research in North East Asian Marginal Seas” at PICES-2024 in Honolulu, USA;
- proposal of scientific session on “Changing Asian Marginal Seas: from marine science to societal needs, current challenges for integrative science and UN Ocean Decade is accepted for PICES-2025 in Yokohama, Japan.

AP-CREAMS maintains close contacts with leading regional international organizations, such as IOC/WESTPAC, UNEP/NOWPAP (CEARAC), IMBeR and others. Their representatives participate in the

AP meetings and other activities. Information on their current programs and proposals for collaboration is provided and discussed at the AP meetings.

2. Revision of AP-CREAMS AP Terms of References

During recent years, in addition to the primary tasks, AP-CREAMS started activity in new directions, as a contribution to PICES/FUTURE and in response to their request:

i) to pursue an integrative approach, to include multiple disciplines beyond the physics and chemistry to cover the whole social-ecological-environmental-system framework developed by FUTURE,
ii) to extend geographic coverage to include all North-East Asian Marginal Seas beyond the EAST-I and EAST-II regions, and
iii) to prioritize involvement of ECOPs in its activity.

Correspondingly, the AP members drafted new terms of reference, as below (changes are highlighted in italics):

1. To coordinate programs to study marine ecosystems and their variability *in the East Asian Marginal seas and their interaction with the western North Pacific in a light of global change;*
2. To facilitate the establishment of permanent observation and data exchange networks in this region;
3. To convene workshops/sessions/*mentoring and build knowledge networks* to advance, evaluate and compare results from the program *and its linkages to broader PICES activities;*
4. *Develop recommendations for PICES to better collaborate within PICES, and with indigenous and international initiatives relevant to the Asian marginal seas;*
5. To enhance capacity building, knowledge dissemination, and cooperation with other international marine organizations/programs in the region *with relevant expertise (e.g., IOC/WESTPAC, NOWPAP, NEAR-GOOS etc.)*;
6. *To provide more opportunities for ECOPs to join.*

3. Justification of the AP-CREAMS focus area

To understand the processes in the Asian Marginal seas and their impact on adjacent areas of the Pacific it is important to consider the wider area, to account for physical-biological connectivity across the western North Pacific and to evaluate potential climate impacts across a broader PICES domain with a focus on its marginal seas. In addition to Northeast Asian marginal seas the proposed extension would cover the Okhotsk Sea, western part of the Northwestern Pacific and western part of the Bering Sea, including regions 16, 17, 18, 22 and narrow northwestern part of region 23 (Fig. 1). This extension is also timely because of increasing human activity along new maritime routes in the Arctic and their gateways which must pass the Northeast Asian marginal seas and currently developing new international research programs like Cooperative Study of Kuroshio-2 (CSK-2) by IOC/WESTPAC, when branches of the Kuroshio impacting marine ecosystems in the broader western Pacific areas including the marginal seas. However, the AP will keep its balance among and primary focus on the initial marginal seas to not dilute the specificity of CREAMS.

The extension will:

1. provide more opportunities for the PICES community to be involved in the AP-CREAMS activity (e.g., bringing more attention to the workshops/sessions/mentorships the AP-CREAMS convenes),
2. enhance capacity of the AP-CREAMS to better coordinate programs to study the marine ecosystem, its variability in the core areas (19, 20, and 21) as well as the influence, exchange and interactions of ecosystem components between the core area and the extended areas. The extension will also facilitate the establishment of permanent observation and data exchange networks in a larger western North Pacific and its marginal seas, and disseminate more knowledge on the extended area.

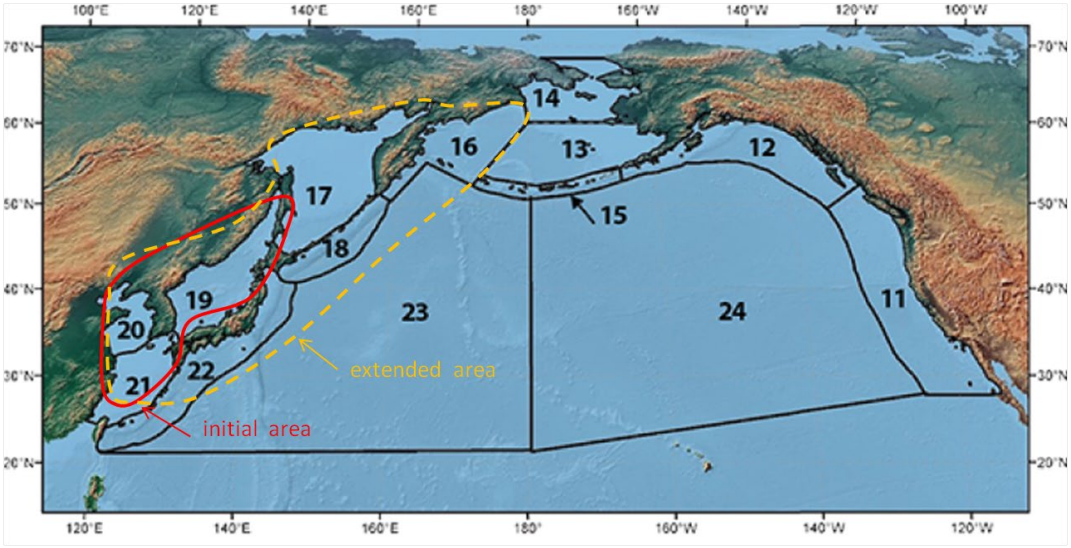


Figure 1. AP-CREAMS initial focus area (red line) and proposals of its extension (yellow dashed line) overlapped on PICES NPESR regions map

Considering the goals of PICES, the extension will:

1. better promote and coordinate marine research in the western North Pacific marginal seas (not limited to the core areas 19-21 but also the extended areas),
2. advance more scientific knowledge about the ocean environment, global weather and climate change, living resources and their ecosystems, and the impact of human activities, focused on the western North Pacific marginal seas, and better promote the collection and rapid exchange of scientific information on more issues

The extension will not overlap in spatial extent with other existing PICES EGs AP-ARC and AP-NPCOOS because of AP-CREAMS will focus on the areas off the coast (not near the coast, thus be separated from focus of AP-NPCOOS) and mid-latitude Asian marginal seas (not Pacific Arctic and its Gateway and thus be separated from focus of AP-ARC). Below we present a few cases for better understanding that science/knowledge for the core areas of AP-CREAMS (19, 20, and 21) is linked to that for the extended areas (16, 17, 18, and 22).

Case 1. Interannual variability of winter sea levels induced by local wind stress: Interannual variations of sea level averaged over the core area (Areas 19, 20, and 21) are significantly affected by sea surface wind patterns, particularly on the extended area (Area 17). See Figure 2 below originating from Han et al. (2020).

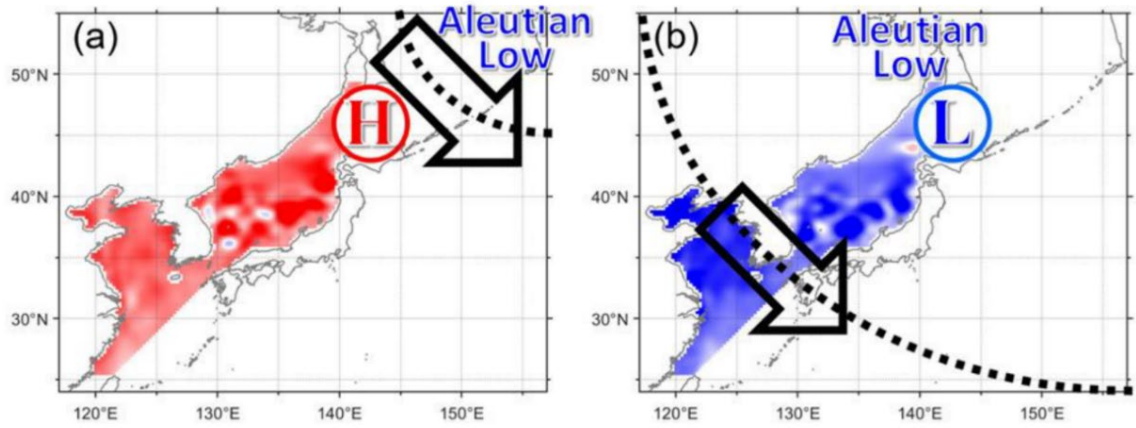


Figure 2. Schematic diagrams accounting for the winter NorthEast Asian Marginal Seas (NEAMS, Areas 19, 20, and 21) mean sea level anomalies. (a) A stronger winter monsoon with northwesterly wind or southeastward wind stress (black arrows) and associated atmospheric pressure gradients (black dotted lines) in the southern Sea of Okhotsk (Area 17); e.g., the northeastward retreat of the Aleutian Low obstructs the

outflow transport from the Area 19 into the Pacific by Ekman dynamics to yield a higher (red) NEAMS sea level during Period H (period of positive NEAMS mean sea level anomaly). (b) In contrast, a stronger winter monsoon in the southern Area 19 obstructs the inflow transport from the Pacific to the Area 21 and to the Area 19 to yield a lower (blue) NEAMS sea level during Period L (period of negative NEAMS mean sea level anomaly). Source: Han et al. (2020)

Case 2. Hydrographic structure and material concentrations, and their variability within and beyond the Area 19 linked to processes outside the core area (extended area): Hydrographic structure and material (e.g., ^{134}Cs) concentrations, and their natural and human-induced variations in the core area (Area 19) are significantly affected by those in the extended areas (Areas 17, 18, and 22) as well as the other core areas (Areas 20 and 21) via the current systems shown in Figures 3 and 4 originating from Yasuda (2003) and Inoue et al. (2023).

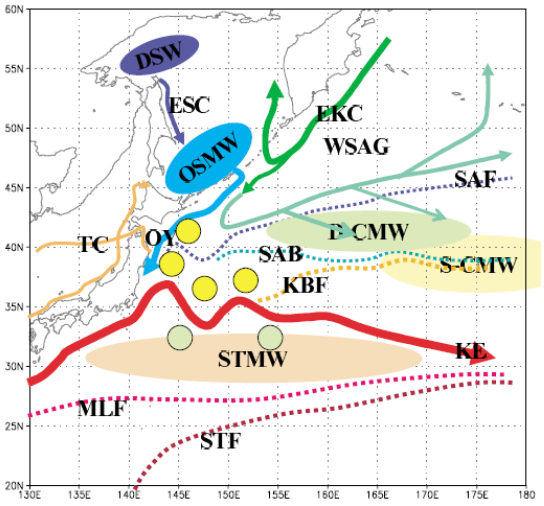


Figure 3. Schematic illustration of the near-surface current, front and water-mass structures in the Kuroshio-Oyashio transition area. EKC: East Kamchatka Current, WSAG: Western Subarctic Gyre, ESC: East Shakalin Current, OY: Oyashio, KE: Kuroshio Extension, TC: Tsushima Warm Current, SAF: Subarctic Front, SAB: Subarctic Boundary, KBF: Kuroshio Bifurcation Front, STF: Subtropical Front, MLF: Mixed Layer Front, STMW: Subtropical Mode Water, S-CMW: Shallow Central Mode Water, D-CMW: Dense Central Mode Water, DSW: Dense Shelf Water, OSMW: Okhotsk Sea Mode Water. The yellow circles denote warm-core rings and light green ones cold-core rings. Source: Yasuda (2003)

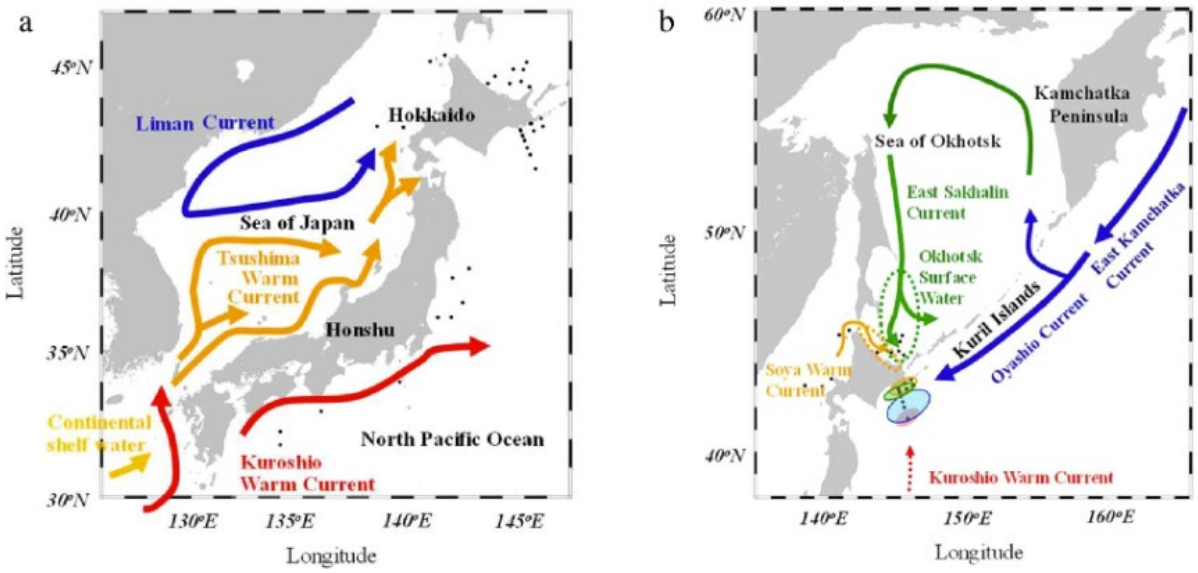


Figure 4. (a) Seawater sampling locations around the Honshu and (b) Hokkaido islands in Japan, along with the major current systems. Source: Inoue et al. (2023)

References

- Han, M., Nam, S., Cho, Y. -K. *et al.* Interannual variability of winter sea levels induced by local wind stress in the northeast Asian marginal seas: 1993-2017. *J Mar Sci Eng* 8(10), 774 (2020). https://doi.org/10.3390/jmse8100774
- Inoue, M., Mashita, K., Kameyama, H. *et al.* Subarctic-scale transport of ^{134}Cs to ocean surface off northeastern Japan in 2020. *Sci Rep* 13, 7524 (2023). https://doi.org/10.1038/s41598-023-34775-8
- Yasuda, I. Hydrographic structure and variability in the Kuroshio-Oyashio Transition Area. *J Oceanogr.* 59, 389-402 (2003). https://doi.org/10.1023/A:1025580313836

AP-CREAMS Endnote 4

Responses on the SB comments on the AP-CREAMS new ToR (May –Aug 2025)

(the spelling and typos are as in original messages, AP-CREAMS responses are in italic)

1. To the list of ToRs (Sanae): GC requested removal of "particularly from Asian Countries"
- *Accepted, removed.*

2. To the list of ToRs (Thomas): This was the initial focus but still applicable? Added new bullet below to be clear about overlap in spatial extent with AP-ARC and AP-NPCOOS
- *An overlapping issue was discussed with AP-ARC and AP-NPCOOS. No problem of an overlapping.*

3. To the list of ToRs (Thomas): This is redundant to the inclusive wording above**.**
- *Accepted, corrected.*

4. To Justification (Steven): Trying to articulate the scientific justification and relevance to PICES right from the start.
- *Accepted, corrected.*

5. To Justification (Steven): This should be coordinated with AP-ARC. In other words, AP-CREAMS co-chairs should review the TORs of AP-ARC and revise their TORs.
- *There will not be an overlapping. AP-CREAMS will focus on the areas off the coast (not near the coast; separated from focus of AP-NPCOOS) and mid-latitude Asian marginal seas (not Pacific Arctic and its Gateway; separated from focus of AP-ARC). We have checked AP-ARC ToR and picked up some useful things to our new ToR. We have contacted both these APs and they expressed a support to AP-CREAMS new ToR and extension of the area.*

6. To Justification (Thomas): To avoid clear overlap with AP-ARC (which has very similar mandate for some things) could the CREAMS area be change to only include 17 and keep 16 with ARC and drop 18, 22, and 23?
- *There will not be serious overlapping. AP-CREAMS would like to extend its area on some minor parts of the 18, 22 1nd 23 which are connected with marginal seas (see Figure 1 in ToR).*

7. To Justification (Steven): The existing cruise programs in the larger and newr domain are bisased to Russia. Any existing observational programs as a colloabroation of from PICES countries? It is hard to accept the motivation for now without any tangible outcomes or initiatives in the proposed areas.
- *Not only Russia, but other AP-CREAMS core countries (Korea, China, and Japan) are interesting in the extended area to have own national programs/projects to do some scientific activities. In the case of Korea, the ice breaker Araon access to the extended region every summer and has tried to establish semi-permanent observation with the central Bering Sea. There are many activities in the Kuroshio Extension area by Japan and China. New international programs as CSK-2 and others which are developing in the NW Pacific are mentioned in new document attached.*

8. To Justification (Steven): At the moment, the regions of 20 and 21 are relatively limted in the AP-CREAMS compared to region 19. Thus, I would suggest to focus on the regions of 20 and 21 instead of extending the regional domain.
- *We are already focused on these regions. However, we need to extend the area slightly covering an interface area between primarily focused regions, adjacent seas and the open ocean. We will control that a balance among the AP-CREAMS core areas may not be influenced by the extension.*

9. To Justification (Thomas): In response to GC concern I don't find the arguments here sufficient, especially since the last point is for this AP to remain focused on marginal seas!
- *More arguments are provided in the updated ToR and Justification*

10. To Justification (Thomas): IF the AP wants to extend beyond the marginal seas then please indicate issues of physical or biological oceanography that are essential to fully understand changes in the marginal seas directly (e.g., changing currents, timing, shifting species distributions, etc.).
- *These issues are provided in the updated ToR and Justification*

11. To Justification (Thomas): Finally, can CREAMS point to some specific examples where knowledge transfer either between regional seas or with the open North Pacific have hindered scientific activities of AP-CREAMS, other PICES ExG, or PICES member state National programs?
- *More arguments are provided in the updated ToR and Justification*

12. To Justification (Thomas): In my opinion this won't necessarily translate to increased interest and CREAMS has very useful products that may just need to be packaged differently for the broader PICES community.
- *Accepted*

13. To Justification (Thomas): Although part of this may be true there are other bodies in PICES already working on some of this so please provide more details why CREAMS needs to expand spatial coverage.
- *More explanation on why to extend toward the Pacific is provided in new Justification. We do not duplicate the goals of other PICES bodies in these areas. One of the main role of AP-CREAMS is to organize joint cruises and joint long-term monitoring. We plan to do it in the extended area*

14. General question (Sung Yong): Have you tried contacting the AP-ARC co-chairs to discuss your and their TORs? The given document states that there is no overlap, but I am not sure AP-ARC agreed with your revised statements. I want to be careful in handling this because this will be the final round to revise the Action Plan, so I would like to avoid presenting justification from a single perspective. Likewise, you should discuss your thoughts with the AP-NPCOOS co-chairs before including them.
- *Yes, we have contacted both these EXs and received positive responses. We checked AP-ARC ToRs and found that there are not much overlapping, as we are looking only for western most part of their area and we are focused mostly on organizing joint observations and long-term monitoring, while AP-ARC is focused on a whole system. We have picked up some ideas of their ToRs to our modified our ToRs as was recommended by SB. AP-ARC focus on Northern Bering Sea-Chukchi Sea (NBS-CS) and AP-CREAMS revised action plan focus on western Bering Sea, so there almost no overlap between them. For AP-NPCOOS, we know they focus on the observation methods in the coastal regions of a whole PICES area and not focus on open ocean.*

15. General question (Sung Yong): Another comment was that there might be unexplored or less observed regions within the current AP-CREAMS domain, i.e., regional imbalance, and it would be better to study more or make them balanced within the domain before you propose its extension. The response did not include this. Please indicate the details. adding the word 'balance' is not enough because it makes your statement contradict itself:
(1) If you admit that the regional studies are not balanced within the current domain, MONITOR (and SB/GC) would recommend that it would be better to focus on the current domain instead of expanding it
(2) If you admit that the regional studies are balanced, they would ask for the relevant proof.
- *This is not absolutely necessary to keep a balance in the studies of various parts inside the primary region. Main reason of our extension is a necessity to cover adjacent ocean areas as the processes inside and outside the marginal seas are connected. We are expanding our focus area not because we already studied every part of the primary region. We have many gaps in primary region. Second reason is that the AP-CREAMS is mostly focused on joint cruises, joint observational programs, to maintain monitoring of the state of the area and its changes. Now we like to move beyond our primary borders as we plan to have more joint observations outside of primary area to join international programs developing in the ocean. However, we will keep focus on our marginal seas too.*

Appendix 1

Response of AP-NPCOOS

2025-08-14 Jennifer Jackson
Jae-Hyoung and I have discussed AP-CREAMS new ToR and we are fully supportive of the changes. These changes should also benefit AP-NPCOOS. I suggest also informing WG-49 about these changes because they would benefit the work they are doing on subsurface marine heat waves in coastal regions.

2025-08-09 SungHyun Nam
As one of Co-chairs of PICES AP-CREAMS, I would like to ask your opinion on our terms of reference (TORs) we are revising (please check the attached file for revised Action Plan of the AP-CREAMS). The AP-CREAMS is now revising the TORs as below (changes are highlighted in italics).

1. To coordinate programs to study marine ecosystems and their variability *in the East Asian Marginal seas and their interaction with the western North Pacific in a light of global change;*
2. To facilitate the establishment of permanent observation and data exchange networks in this region;
3. To convene workshops/sessions/*mentoring and build knowledge networks* to advance, evaluate and compare results from the program *and its linkages to broader PICES activities;*
4. *Develop recommendations for PICES to better collaborate within PICES, and with indigenous and international initiatives relevant to the Asian marginal seas;*
5. To enhance capacity building, knowledge dissemination, and cooperation with other international marine organizations/programs in the region *with relevant expertise (e.g., IOC/WESTPAC, NOWPAP, NEAR-GOOS etc.)*;
6. *To provide more opportunities for ECOPs to join.*

Although the primary focus of the AP will be on the initial geographic areas (East Asian Marginal seas, PICES Areas 19, 20, and 21), we propose to extend the geographic areas of concern considering the wider areas in the Northwestern Pacific (PICES Areas 16-22). One of the comments from the PICES SB on new AP-CREAMS Action Plan were "AP-CREAMS should review the ToRs of AP-ARC and revise their TORs" and to avoid overlapping with this group. Similar comments were also applying for the AP-NPCOOS. So, we have done this.
We found that there are not much overlapping, as the AP-NPCOOS is focused on the coastal ocean observing system while the AP-CREAMS on more scientific activities targetting marginal seas mostly far off the coast, but only potentials for synergetic activities to better work for linkages between coastal ocean observing systems and scientific activities for the East Asian Marginal seas. Our justification may look clear to us, nevertheless we would like to make it clear and convince to other PICES members, particularly to SB members. Thus, it would be greatly appreciated if you check our justification (attached) and confirm that the AP-NPCOOS is fine with newly revised AP-CREAMS TORs.

Appendix 2

Response of AP-ARC

2025-08-16 Nadja Steiner
I agree that the initial TORs were a bit too general, making it appear that there my be overlap, but I think the revised TORs are much clearer in terms of differentiating the region. While there may be overlap in procedures and topic, the geographic focus makes them didtincly different and I don’t see any issues.

2025-08-18 Sei-Ichi Saitoh
I agree with the improvement of Ap-CREANS ToRs and support the AP-CREAMS ToRs changes.