

REPORT OF THE ADVISORY PANEL FOR A CREAMS/PICES PROGRAM IN EAST ASIAN MARGINAL SEAS

AGENDA ITEM 1

Opening Remarks

The meeting of the Advisory for a *CREAMS/PICES Program in East Asian Marginal Seas* (CREAMS-AP) was held during PICES-2010 in Portland, U.S.A.. Seven Panel members, and two observers, from Korea, Japan, Russia and China attended the meeting (*CREAMS-AP Endnote 1*). Dr. Kyung-Ryul Kim, Co-Chairman of CREAMS-AP, opened the meeting at 9:25 h, October 23, 2010 and reviewed the agenda (*CREAMS-AP Endnote 2*). Dr. Kim stated that this was the second formal meeting of the year held by the Advisory Panel, following the one held in May in Qingdao (see *CREAMS-AP Endnote 3*). He also mentioned that Dr. Dongfeng Xu (China) was not able to attend because of problems obtaining a U.S. visa.

AGENDA ITEM 2

National reports on activities and plans related to CREAMS/PICES Program

China

Dr. Yu Fei briefly discussed activities of the Institute of Oceanology (IOCAS), Chinese Academy of Sciences. A survey of the Yellow Sea Warm Current (YSWC) was conducted as an activity of EAST-II.

Korea

Dr. Kyung-II Chang reviewed Korean EAST-I activities of 2010 and presented a brief plan for activities in 2011. Scientists and students joined an international GEOTRACES cruise conducted in July 2010 as part of the Korean EAST-I Program. Other activities in the Ulleung Basin in 2010 included four hydrographic surveys, deployment and recovery of surface bio-optical and subsurface sediment trap moorings (UBIM) and Super Station (E-RAP), the operation of other time series stations on a real-time basis, such as coastal monitoring based on HF radar stations and a coastal buoy (ESROB), and the volume transport monitoring by measuring submarine cable voltage in the Korea Strait. The first phase of the Korea EAST-I Program will finish at the end of 2010, and funding for a second 5-year phase will start in 2011. Pelagic-benthic coupling, reconstruction of paleo-environments, ecosystem modeling and future projections will be added to the previous research tasks in the second phase.

Dr. Jae-Hak Lee discussed the status of the time series measurement system, such as fixed platforms and moorings of surface buoys, and current meters and water level recorders, in the EAST-I and -II regions. He also explained the cruise plan in the northern East China Sea conducted by KORDI and Korean universities which can be considered a Korean EAST-II activity.

Japan

Co-Chairman, Dr. Joji Ishizaka, reported on the success of the *Nagasaki-maru* cruise as an activity of EAST-II (see Agenda item 4.2 for details), the development of new ocean color remote sensing products supported by the Yellow Sea Large Marine Ecosystem (YSLME) project, and results of ferry boat monitoring by Kyushu University (Japan) and the National Fisheries Research and Development Institute (Korea).

Russia

Co-Chairman, Dr. Vyacheslav Lobanov, spoke about recent Russian activities in the EAST-I program by the

CREAMS-AP-2010

V.I. Il'ichev Pacific Oceanological Institute (POI), with participation of other Russian institutes. Two cruises by the R/V *Professor Gagarinsky* (Ga46 and Ga47) implemented in the winter and spring seasons of 2010, along with additional observations taken in later cruises of the R/V *Akademik M.A. Lavrentyev*, focused on the study of winter–spring processes such as winter convection and sea ice formation in Peter the Great Bay, their role in dense water formation on the shelf, and ventilation of the deep basin as well as their impact on primary production. In spite of the relatively cold winter of 2009/2010, no evidence was found of deep basin bottom water ventilation by convection. A continuing trend of increasing bottom water temperature and decreasing oxygen was observed.

Dr. Yury Zuenko described three monitoring programs of the Pacific Research Institute of Fisheries and Oceanography (TINRO-Centre). One is focused on a detailed sampling of the upper part of Peter the Great Bay and has been carried out monthly from May to October since 2007. Another program generating annual observations covers a large area of EAST-I including Peter the Great Bay and adjacent northwestern parts of the sea. The third is a large-scale survey of most of the Russian Exclusive Economic Zone (EEZ) but this occurs infrequently.

AGENDA ITEM 3

Discussion on capacity building activities in 2011 and later

Dr. Ishizaka announced that CEARAC/NOWPAP was proposing their third training course on “*Remote sensing data analysis*” in Vladivostok, Russia in 2011 as a joint activity of NOWPAP, IOC-WESTPAC and PICES and suggested that CREAMS-AP should support the proposal. Dr. Lobanov mentioned that Science Board had already endorsed PICES involvement in the proposed training course at its 2010 inter-sessional meeting. Members agreed that the training course is part of the capacity building activities of CREAMS-AP and that they would assist in the activity. CREAMS-AP suggests that the POC and MONITOR Committees support the joint NOWPAP/IOC-WESTPAC/PICES training course and provide financial support in the form of travel grants for 4 students or early career scientists from PICES member countries to attend.

AGENDA ITEM 4

Status report and discussion on international cooperation

Hakuho-maru cruise in 2010

Dr. Dong-Jin Kang (Seoul National University) briefly mentioned that a GEOTRACES cruise was successfully conducted by the R/V *Hakuho-maru* from June 11 to July 23 in the western North Pacific and regions of interest to the EAST-I Program. It was unfortunate that the cruise could not include observations in Russian and Korean EEZs but it was productive, nevertheless, with onboard participation by Japanese, Korean, Russian and Chinese scientists.

Nagasaki-maru cruise in 2010

Dr. Ishizaka reported that the cruise of the T/S *Nagasaki-maru* was successfully conducted from July 17 to 27, 2010 in the Korean EEZ, getting the EAST-II Program off to a good start. The cruise had a complement of 27 participants, including 3 from Korea and 4 from China. Eighteen of these were students and post-doctoral level young scientists, so the cruise was also acted as a capacity building activity.

AGENDA ITEM 5

Progress on EAST-II Program*Report on Program of the East Asian Cooperative Experiment*

Dr. Ishizaka reported that the 5th PEACE (Program of the East Asian Cooperative Experiment) workshop, including a CREAMS-AP (EAST-II) meeting, was held on September 11 and 12, 2010 in Gangneung, Korea. Many results from both the EAST-I and EAST-II activities were presented and future directions were discussed. Last year, financial support from PICES for travel by 2 scientists was requested but, as it turned out, all participants were able to travel using their own funds. So the funds were not needed that year. The next PEACE meeting will take place in Nagoya, Japan in 2012.

Future plans

Dr. Ishizaka reported that a *Nagasaki-maru* cruise is scheduled for July 15–25, 2011 in the Korean EEZ and he proposed that it be included as one of the activities of EAST-II. The proposal was endorsed by CREAMS-AP members.

AGENDA ITEM 6

Proposal for a special session during PICES-2011

Dr. K.-R, Kim proposed that a special session on EAST-I activity be held at PICES-2011. Panel members agreed that the topic should be on “*Recent advances in monitoring and understanding of Asian marginal seas: 5-years of CREAMS/PICES EAST-I Program*” and should be for 1 day (*CREAMS-AP Endnote 4*). It was debated whether or not to hold it as either a workshop or topic session. A decision will be taken after discussion with the chairmen of the POC, MONITOR and BIO committees. Support for 3 invited speakers (MONITOR, POC, BIO) is requested.

AGENDA ITEM 7

Next CREAMS-AP meeting

It was tentatively decided to hold the next CREAMS-AP meeting in Hangzhou, China, as had been mentioned by Dr. Dongfeng Xu at the last CREAMS-AP meeting at Qingdao. Dr. Xu will circulate an announcement to CREAMS-AP members.

AGENDA ITEM 8

Miscellaneous Items

A PAMS (Pacific Asia Marginal Seas) meeting will be held April 21–23, 2011 in Taipei, Taiwan. Prof. Zhang at Toyama University, Japan plans to propose a special session related to the GEOTRACES cruise conducted in July 2010. Dr. J.H. Lee also plans to submit a proposal for a special session related to EAST-II activities. A summary of this CREAMS-AP meeting will be reported to the POC and MONITOR Committee meetings on October 27 by Drs. Ishizaka and Vyacheslav Lobanov, respectively.

The replacement of CREAMS-AP member, Dr. Sinjae Yoo, by Dr. Young Shil Kang was confirmed.

CREAMS-AP-2010

AGENDA ITEM 9

Closing

Co-Chairman, Dr. K.-R. Kim, closed the meeting at 12:00 h, October 23, 2010.

CREAMS-AP Endnote 1

CREAMS-AP participation list

Members

Kyung-Il Chang (Korea)
Yu Fei (China)
Joji Ishizaka (Japan, Co-Chairman)
Kyung-Ryul Kim (Korea, Co-Chairman)
Jae-Hak Lee (Korea)
Vyacheslav Lobanov (Russia, Co-Chairman)
Yury Zuenko (Russia)

Observers

Dong-Jin Kang (Korea)
Jin-Yeong Kim (Korea)



Participants at the CREAMS-AP meeting at PICES-2010 in Portland, U.S.A., (left to right) Yu Fei, Joji Ishizaka, Jae-Hak Lee, Vyacheslav Lobanov, Yury Zuenko, Jin-Yeong Kim, Kyung-Il Chang, Dong-Jin Kang, and Kyung-Ryul Kim

CREAMS-AP Endnote 2**CREAMS-AP meeting agenda**

1. Opening remarks
2. Brief national report on activities and plans related to CREAMS/PICES Program
3. Discussion on capacity building activities in 2011 and later
4. Status report and discussion on international cooperation
 - 4.1 *Hakuho-maru* cruise in 2010
 - 4.2 *Nagasaki-maru* cruise in 2010
5. Progress on EAST-II Program
 - 5.1 Report on PEACE
 - 5.2 Future plans
6. Proposal for a special session during PICES-2011
7. Next CREAMS-AP meeting
8. Miscellaneous items
9. Closing

CREAMS-AP Endnote 3

**Summary Report of the Meeting of
the Advisory Panel for a *CREAMS/PICES Program*
for East Asian Marginal Seas**

China Ocean University, Qingdao, China
May 11, 2010

1. Opening remarks

The meeting was held at the China Ocean University, Qingdao, China, and was hosted by Dr. Sumei Liu. Seven members of the CREAMS/PICES Advisory Panel, from China, Korea and Japan, attended the meeting (Annex 1).

Dr. Kyung-Ryul Kim, Co-Chairman of CREAMS-AP, opened the meeting on 8:30 h on May 11, 2010. After everyone introduced themselves, Dr. Kim mentioned that this was a meeting (Annex 2) following the one held at PICES-2009 in Cheju, Korea in October 2009. He also informed everyone that Co-Chairman, Dr. Vyacheslav B. Lobanov, could not attend the meeting. Dr. Sumei Liu expressed her welcome to members.

2. National reports on recent activities and plans related to the CREAMS/PICES program in China, Japan, Korea, and Russia*China*

Dr. Yu Fei reported on activities by the Institute of Oceanology, Chinese Academy of Sciences (IOCAS). As part of the work of EAST-II, a hydrology survey on the 3-dimensional structure of the Yellow Sea Warm Current (YSWC) was being done in the Yellow Sea (YS) and a long-term fixed point mooring system was introduced. It was found that the YSWC is strongly influenced by cold wind surges in the upper layer in winter, is quite stable near the bottom layer, and is located at the western edge of the YS central trough. Meanwhile, it is suggested, by combining the analyses of CTD data, that the core of the YSWC lies near the bottom. A similar distributional trend of the temperature and salinity in the surface and bottom layers implies that vertical mixing may play an important role in the formation of a warm water tongue. IOCAS was also

studying the inter-annual variability of the Bohai Sea, Yellow Sea and East China Sea, which is included in the EAST-II area. It was found that SST has a notable variation period of 5 years in winter and 4 years in summer. The significant variation was found from the mouth of Changjiang River to Jeju Island. This variation should be given more attention in the EAST-II Program.

Dr. Donfeng Xu talked about the activities of the Second Institute of Oceanography, SOA (State Oceanic Administration). Mooring and CTD profile observations along the Zhejiang coastal area (South of Yangtze River) in 2009 showed that along the 15-m isobath line, the continuously southwestward flow exits from January to March, while the flow changes to northeastward from May to June. Along the 50-m isobath line, the flow was continuously northeastward from May to June. A cross-section of a towed CTD on April 30, 2009 at about 27°N showed a much stronger temperature and salinity front (which happened simultaneously) than that from the Group for High-Resolution Sea Surface Temperature (GHRSSST), with a 5 km resolution in the Zhejiang area. The SST data also showed that along an across-shelf section at 29°N, the thermal front moved mostly eastward at the end of February. The interannual analysis of the GHRSSST front showed that the near-coast water was colder in 2008 and 2010 compared with that of 2007 and 2009. Two cruises in the Changjiang River Estuary region in summer 2009 shows hypoxia in this area. Three-dimensional modeling with a resolution of a quarter degree using an MIT GCM model was finished in the area of 32°S to 65°N and 30°E to 72°W. The model was forced by NCEP data from 1950 to 2007. The result is under analysis.

Dr. Liu reported on activities that took place this year with colleagues from the Ocean University of China (OUC), including two cruises in April–May and September or October for the Yellow Sea, and June and September or October for the East China Sea, supported by National Science Foundation of China. During those cruises, the interests were key nutrient regeneration processes in sediment. In 2011, four cruises will be carried out to reconstruct the history of the ecological environment in the Yellow Sea and East China Sea, and will be supported by the Ministry of Science and Technology of China.

Korea

Dr. Jae-Hak Lee spoke about recent activities in Korea. As a part of the Korea EAST-1 Program, deployments of integrated moorings were conducted in the Ulleung Basin by Seoul National University (SNU), Korea Ocean Research Development Institute (KORDI) and other universities in February of 2010. The Super Station has a moored profiler designed to travel up and down in the upper layer to observe water properties repeatedly about two times per day. Subsurface mooring equipped with current meters and a sediment trap near the Super Station is focusing on a multidisciplinary oceanographic study in the region where a meso-scale eddy appears frequently. In the period from July to September of 2010, KORDI will have four hydrographic survey cruises in the Yellow Sea and East China Sea using the R/V *Eardo*. Each cruise is focusing on Yellow Sea Bottom Cold Water, the effect of the Three Gorges Dam, the oceanic response to the typhoon pass and the climatic connectivity between the North Pacific and the East China Sea. The National Oceanographic Research Institute has a plan to deploy a new buoy mooring in the mid East China Sea which will contribute to the collection of various atmospheric and oceanic time series data. A Geostationary Ocean Color Imager (GOCI) will be launched onboard Korea's Communication, Ocean, and Meteorological Satellite in June or July of 2010. GOCI, which is the first ocean color imager to operate from geostationary orbit, will provide a monitoring of ocean color in the EAST-I and EAST-II study region.

Japan

Dr. Joji Ishizaka introduced some of activities taking place in Japan. As a part of the Yellow Sea Large Marine Ecosystem (YSLME) ocean color (YOC) project, sea truth data for ocean color remote sensing in the Yellow Sea and East China Sea was shared among scientists from Japan, Korea and China and successfully used for verification. This is one of the good examples of international collaboration. Kyushu University and the

Korean National Fisheries Research and Development Institute (NFRDI) are monitoring currents, temperature, salinity and chlorophyll-*a* in Tsushima Strait by ferry boat. The data can be compared with ship observation data in the East China Sea taken by KORDI and other organizations. Nagasaki, Nagoya and Kyushu universities are conducting cruises in the East China Sea, focusing on Changjiang River Diluted Water, in collaboration with KORDI and other organizations, and the next cruise will be from July 17–27, 2010 as part of the EAST-II program (Agenda 4). Kyushu University is also collaborating with scientists from Taiwan regarding the Taiwan Warm Current. Giant jelly fish are a very serious problem in this area, and joint research of Japan-Korea-China is ongoing. There will be a survey of the Chinese coast by the Chinese Academy of Fisheries funded by the Japanese Fisheries Research Agency. The SOLAS group of Japan (Mitsuo Uematsu, University of Tokyo) and China (Gao Huiwang, OUC) received funding for three years starting from 2010, and a joint cruise of the R/V *Hakuho-maru* is taking place in May 2010.

Russia

Drs. Kyung-Ryul Kim and Ishizaka briefly introduced the V.I. Il'ichev Pacific Oceanological Institute contribution to EAST-I on behalf of Dr. Vyacheslav Lobanov. A cruise completed in the NW EAST-II area and Peter the Great Bay on the R/V *Professor Gagarinsky* (Ga46) from February 28–March 16, 2010 focused on how the extremely cold winter of 2010 affects ventilation of bottom water by slope convection, and primary production in the ice covered sea. They also conducted the final leg (Ga47) for long-term monitoring of deep and bottom water properties along 132°E section on April 22–29, 2010.

3. Capacity building activities in 2010 and later

3.1. Training course on satellite data analysis

Dr. Ishizaka introduced a proposal from NOWPAP/CEARAC (Northwestern Pacific Action Plan Special Monitoring and Coastal Environmental Assessment Regional Activity Center) to have a training course on satellite data analysis for coastal environmental assessments in Russia in 2010 together with the PICES Annual Meeting. A similar training course was held in Japan in 2006 and Korea in 2008. The Panel thinks this course is important, and supports it as part of a CREAMS-AP activity and recommends PICES to support their training course in 2010.

3.2. New developments

NOWPAP/CEARAC is seeking a host in China to have another remote sensing training course for 2011 or 2012. CREAMS-AP asked its Chinese members to help NOWPAP/CEARAC find a host and/or to find another possible training course other than remote sensing.

4. Status report and discussions on international co-operation

4.1. Hakuho-maru cruise in 2010

Dr. Toshitaka Gamo reported that a cruise by the R/V *Hakuho-maru* will take place from June 11 to July 23, 2010 as part of the Asian GEOTRACES investigation. Since Russian government did not permit observations in the Russian EEZ, it was decided to shift stations from the Russian EEZ to the Japanese EEZ. Stations in the Korean EEZ are still on schedule even though the Korean government has not yet issued permission. Thirty-five scientists from Japan, 6 from Korea, 5 from Russia and 1 from China are planning to participate in the cruise.

4.2. Nagasaki-maru cruise in the East China Sea

Dr. Ishizaka reported the situation of the R/V *Nagasaki-maru* cruise scheduled for July 17 to 27, 2010 in the East China Sea. Twenty-four scientists and students from Japan, 5 from Korea and 4 from China are planning to attend the cruise. Permission from the Korean government to have observations in the Korean

CREAMS-AP-2010

EEZ is pending.

4.3. China-Japan-Korea GLOBEC Symposium

Dr. Liu reported that the 4th China-Japan-Korea GLOBEC/IMBER Symposium will be held in Cheju, Korea on May 18–20, 2010.

5. Progress on EAST-II Program

Dr. Ishizaka reported that an EAST-II workshop is planned on September 11 and/or 12, 2010 at Gangneung-Wonju University, Korea, as a joint effort with PEACE (Program of the East Asian Cooperative Experiment). Dr. Kim suggested that the presentations should be limited to recent national- and international-related activities, and time should be allowed for discussion. Drs. Ishizaka and Jae-Hak Lee agreed to draft an agenda for mid-July or earlier.

6. CREAMS-AP activities

6.1. Updating membership information

Addresses of the Panel members were checked, and corrections were made for Sumei Liu, Dongfeng Xu, Yu Fei, Toshitaka Gamo, and Jae-Hak Lee (see *Annex 1*).

6.2. New members

Dr. Kim reported that Dr. Sinjae Yoo expressed wishes to resign from the Advisory Panel and that Dr. Young-Shil Kang from NFRDI was recommended as a new member. The Advisory Panel fully endorsed Dr. Kang's membership. Dr. Kim also suggested that members consider the possibility of adding other members if it is felt necessary.

6.3. Next CREAMS-AP meeting

Dr. Kim reported that next Advisory Panel meeting will be a part of the 2010 PICES Annual Meeting in Portland, U.S.A. Since the date is not fixed yet, Dr. Kim will request that the PICES Secretariat set the Panel meeting for either October 22 or 24, 2010.

Dr. Xu expressed interest in hosting an Advisory Panel meeting in the spring of 2011 at the Second Institute of Oceanography, Hangzhou, China.

7. Miscellaneous items

Dr. Ishizaka noted the problem of naming the EAST-1 area. Possible alternative names may be the Tsushima-Liman Currents System (TLCS) or Liman-Tsushima Currents System (LTCS); the Panel hopes that PICES Governing Council will be able to solve the problem. Dr. K.-R. Kim will check the recently published *Marine Ecosystems of the North Pacific Ocean 2003–2008* (PICES Special Publication 4, 2010) for ideas.

Dr. Xu announced that there may possibly be funds from the China-Korea-Japan Cooperative Study, and members agreed to consider submitting a proposal in 2011.

Dr. Ishizaka mentioned a request from the PICES Secretariat for an article by the CREAMS-AP for PICES Press; the deadline for submission is the end of May. Dr. Kim will check with the Secretariat about the requirements for the article.

8. Closing

The Co-Chairman, Dr. KR Kim, closed the meeting at 16:00, May 11, 2019. Members expressed their appreciation to the local hosts, Drs. S.M. Liu and Y. Fei.

Annex 1

CREAMS-AP participation list

May 11, 2010, Qingdao, China

Members

Toshitaka Gamo (Japan)

Yu Fei (China)

Joji Ishizaka (Japan)

Kyung-Ryul Kim (Korea)

Jae-Hak Lee (Korea)

Sumei Liu (China)

Dongfeng Xu (China)

Dr. Jae-Hak Lee

Climate Change and Coastal Disaster Research
Center

Korea Ocean R&D Institute (KORDI)

1270 Sadong, Ansan

Korea, Republic 426-744

Phone: (82-31) 400-6121

Fax: (82-31) 408-5829

E-mail: jhlee@kordi.re.kr

Address corrections for members

Dr. Dongfeng Xu

Second Institute of Oceanography

SOA

36 Baochubei Road

Hangzhou, Zhejiang

China, People's Republic 310012

Phone: (86-571)8196-3076

Fax: (86-571)8883-9374

E-mail: xudongfengyhcn@yahoo.com.cn

Prof. Toshitaka Gamo

Atmospheric and Ocean Research Institute

University of Tokyo

5-1-5 Kashiwanoha

Kashiwa, Chiba

JAPAN 277-8564

Phone: (81-4) 7136-6080

Fax: (81-4) 7146-6081

E-mail: gamo@aori.u-tokyo.ac.jp

Dr. Yu Fei

R&D Center of Marine Environmental

Engineering & Technology

Institute of Oceanology

Chinese Academy of Science

No. 7 Nanhai Road, Qindao

China, People's Republic 266071

Phone: (86-532)82898187

Fax: (86-532)8289-8186

Email- yuf@qdio.ac.cn

Prof. Sumei Liu

Department of Marine Chemistry

College of Chemistry and Chemical Engineering

Ocean University of China

238 Songling Road

Qingdao, Shandong

China, People's Republic 266100

Phone: (86-532) 6678-2005

Fax: (86-532) 6678-1810

E-mail: sumeilu@ouc.edu.cn



Participants at the CREAMS/PICES workshop meeting held at the China Ocean University in Qingdao, China, (left to right) Yu Fei, Dongeng Xu, Jae-Hak Lee, Toshitaka Gamo, Sumei Liu, Kyung-Ryul Kim, and Joji Ishizaka.

Annex 2

CREAMS-AP meeting agenda

May 11, 2010, Qingdao, China

1. Opening remarks
2. National reports on recent activities and plans related to the CREAMS/PICES program in China, Japan, Korea, and Russia
3. Discussion on capacity building activities in 2010 and later
 - 3.1 Possible training course on satellite data analysis
 - 3.2 New developments
4. Status report and discussions on international co-operation
 - 4.1 *Hakuho-maru* cruise in 2010
 - 4.2 *Nagasaki-maru* cruise in the East China Sea
 - 4.3 China-Japan-Korea GLOBEC Symposium
5. Progress on EAST-II Program
6. CREAMS-AP activities
 - 6.1 Updating membership information
 - 6.2 New members
 - 6.3 Next CREAMS-AP meeting
7. Miscellaneous items
8. Closing

CREAMS-AP Endnote 4**Proposal for a 1-day POC Topic Session at PICES-2011 on**
*“Recent advances in monitoring and understanding of Asian marginal seas:
5-years of CREAMS/PICES EAST-I Program”*

Under the auspices of the EAST-I program and the supervision of the CREAMS/PICES Advisory Panel, scientists from Japan, Korea, and Russia have carried out many successful cruises in the East Asian Marginal Seas over the last 5 years. With the active discussion and promotion by CREAMS/PICES of a new EAST-II program focusing on the Yellow and East China Seas, it is timely to have a forum summarizing some important results obtained by the international cooperative efforts of EAST-I. This session welcomes studies on hydrography, circulation, and ecology and their variability in East Asian Marginal Seas in the PICES area and on effect of climate and long-term changes in the abiotic and biotic environments of this region.

Support for 3 invited speakers (MONITOR, POC, BIO) will be requested.

Recommended convenors: K.-R. Kim, (CREAMS-AP), T. Gamo, (CREAMS-AP), K.-I. Chang, (POC), V. Lobanov, (MONITOR), Y.-S. Kang (BIO)