

REPORT OF PHYSICAL OCEANOGRAPHY AND CLIMATE COMMITTEE

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The meeting was opened at 08:30 on Oct 22, by the Chairman, Prof. Paul H. LeBlond (Canada). Dr. Howard J. Freeland acted as rapporteur.

Items following from last year's meeting were considered first.

WOCE Pacific Atlas

Dr. Howard J. Freeland outlined progress: Dr. Lynne D. Talley has funding from U.S. National Science Foundation; other national organizations as well as PICES may be approached for assistance. POC members generally supportive of PICES involvement with publication and/or distribution of Atlas, but no specific proposal available.

State of the Ocean

PICES Press picked up on the suggestion made by POC last year for periodic updates on the state of the ocean. Summaries on ocean conditions in the western and eastern Pacific as well as the Bering Sea have appeared and are scheduled to continue. Appreciation and approval for these contributions was expressed by POC members. PICES press encouraged to expand coverage to other areas, such as western Pacific marginal seas.

Bathymetric Information

Dr. Thomas C. Royer reported that following last year's request for enhanced ocean bathymetry data, TCODE has included an inventory of bathymetric data sources on the PICES web site [<http://pices.ios.bc.ca>]. A print-out of the TCODE inventory of Web Sites was circulated.

Bering Sea Metadatabase

Mr. Allen Macklin reported on this program, designed to document data holdings (but not the data themselves) on the Bering Sea. Accessible at web address

<http://www.pmel.noaa.gov/Bering/mdb/>

Okhotsk Nomenclature

Prof. Yutaka Nagata and Dr. Vyacheslav B. Lobanov reported on progress on the multilingual (Japanese-Russian-English) Okhotsk Sea nomenclature. POC members emphasized the need for simple and unambiguous (rather than linguistically sophisticated) equivalencies. The Marine Information Research Centre (Tokyo) will cover publication costs of the Nomenclature to appear both as a PICES Scientific Report and a MIRC report.

WG 10 Report

Co-chairman Dr Christopher N.K. Mooers outlined progress. Major activities over the past year have been a Workshop, held in Fukuoka, Japan, January 31-February 2, 1997, proceedings of which were published in PICES Press, July 1997; setting up an online, updatable Japan/East Sea bibliography (on the PICES Web site); convening a symposium on "Circulation and Ventilation of Marginal Seas" at PICES VI; group meeting in Pusan immediately before the Annual Meeting of PICES. Preliminary findings and recommendations of WG 10 are also posted on the PICES Web Site. A draft report is scheduled to be circulated to POC members for external review by April 1, 1998. Final report, to be submitted for publication as part of the PICES Scientific Report Series, expected July 1, 1998. Co-chairmen Dr. Mooers and Dr. Sang-Kyung Byun were thanked for their work in leading WG 10.

Future of WG 9

POC endorses the recommendation made by the BASS Task Team for reconstituting WG 9 with new terms of reference and new membership as a "Monitoring Task Team" under the CCCC-IP.

Support for CREAMS

POC unanimously endorsed the following statement in support of the Circulation Research of East Asian Marginal Seas program: "POC recognizes the scientific value of CREAMS and its achievements on the ocean environment and climate change and sees it as a successful example of international cooperation among PICES member countries, and strongly supports CREAMS-II in 1998-2002 as its continuation. POC recommends that the Science Board endorse CREAMS-II as an essential component of research programs within the PICES framework."

Second Okhotsk Sea Workshop

A recommendation for this workshop arose from the first Okhotsk Sea workshop in Valdivostok. POC recommended last year that a workshop be held in the summer of 1998. Prof. Yutaka Nagata outlined plans for a 4-day workshop to be held in Nemuro, Japan, in November 1998 - after the fishing season, but before it gets too cold. Co-convenors would be Prof. Nagata, Drs. Vyacheslav B. Lobanov and Lynne D. Talley, and the workshop would focus on physical aspects of the oceanography of the Sea of Okhotsk, where there has been much recent progress. Financial support will be provided by the City of Nemuro; the only request to PICES is for travel for two invited speakers. POC strongly supported plans for this meeting and request for travel support.

Remote Sensing Training Course and brochures

Dr. Andrey Martynov requested POC's consideration of two topics. In his absence, Dr. Seelye Martin spoke about Dr. Martynov's plans for a brochure on "Applications of Remote Sensing to Oceanography in East Asian Marginal Seas", similar to an existing brochure published by the European Space Agency for the Mediterranean Sea. POC members were favourable to the idea in principle; they suggested that such a project should be coordinated with Space and Oceanic Agencies of neighbouring countries before being brought to the consideration of PICES.

Dr. Vyacheslav B. Lobanov spoke to Dr. Martynov's second suggestion, for training courses on remote sensing to be held in Vladivostok for Russian participants. Would PICES help with funding the participation of international experts? While there was general support for the idea of training courses, there were questions whether single-country courses should have a high priority. Suggestions for attracting expert lecturers were made: for example, from participants at the forthcoming PORSEC meeting in Qingdao; through WESTPAC-IOC, which already has a program of technical courses. In the absence of a definite proposal, POC could not arrive at a recommendation. The Chairman will write to Dr. Martynov, reflecting the above points.

Translation

POC debated the request for translation of "Complex Studies of the Okhotsk Sea Ecosystem" from Russian into English. While supportive of the idea, POC also requested that Science Board provide policy guidance on the publication of translations, brochures, and other material.

New Working Group

POC supports the terms of reference proposed by BIO for a Working Group on CO₂ in the North Pacific.

PICES Seventh Annual Meeting

POC proposes the following activities for PICES VII:

1. "El-Nino: preliminary look", jointly proposed with BASS as a Science Board Symposium. POC convenor: Howard J. Freeland.
2. "Decadal variability of North Pacific climate" as a POC topic session. This is to address the issue of the reality of "Regime Shifts" and how to recognize and characterize them. Co-convenors: Masahiro Endoh and James E. Overland.
3. "CO₂ in the North Pacific" as a joint POC-BIO topic session. Co-convenors: Shizuo Tsunogai and TBA.

Best Presentation Award

The "Best Presentation Award" was made on the basis of nominations received from the audience at POC Topic and Symposium sessions. The winner was Dr. Young-Jae Ro of Korea.

Scientific Program

The following scientific papers were presented from the POC Committee sponsored part of the program.

Circulation and ventilatin of North Pacific marginal and semi-enclosed seas. (POC) Co-convenors: Sang-Kyung Byun (Korea) & Christopher N.K. Mooers (U.S.A).

Y.J. Ro, J.C. Lee, D.K. Lee. Recent investigation of the polar fronts of the East Sea by CTD profilings and ADCP trackings
Y.I. Zuenko, Y.V. Novikov. Thermal structure of the North-western Japan Sea upper layer: Climate and variability

J.Y. Yun, K. Kim, K.S. Lim. Effects of the North Korean cold water on the distribution of the physical properties in the East Sea near the coastal boundary

M.A. Danchenkov, A.A. Nikitin, V.P. Pavlychev. Branches and meanders of the Tsushima Current north of 40 N

C.N.K. Mooers, H.S. Kang. Simulation of Japan (East) Sea (JES) circulation

V.I. Kuzin, E.N. Golubeva, G.A. Platov. Short-range prognostic calculation of the Sea of Japan (East Sea) circulation

N.M. Pestereva. Long-term forecast of monthly sums precipitation in June for western coast of the Japan Sea

S.H. Son, D.K. Lee, S. Yoo. The pigment distribution in the East Sea/Japan Sea observed by coastal zone color scanner

G.I. Shapiro. Deep sea-shelf water exchanges at the shelf edge

V.V. Navrotsky. Mechanisms of influence of coastal and shelf waters on the open sea bioproductivity

S. Ito, H. Otobe, D. Inagake, M. Murakami. Intermittent intrusions of the internal tidal waves in the Sanriku coastal bays and its relations to the offshore circulations

C.N.K. Mooers, J. Wang. Seasonal circulation of Prince William Sound

T. Yoshida, K. Ishikawa. Some oceanographic features of the Okhotsk Sea derived from historical hydrographic observations

S.V. Gladyshev. Salt, ice and dense water production in the northern Pkhotsk Sea coastal polynyas in winter 1995-1996

S. Martin, R. Drucker, K. Yamashita. The variability of ice and brine production in the Okhotsk Sea polynyas

I. Yasuda, S.I. Ito, Y. Shimizu. Cold core anti-cyclonic eddies east of the Bussol' Strait

V.B. Lobanov, L. Mitnik, N. Bulatov. Some features of mesoscale and small scale wter dynamics in the southern Okhotsk Sea seen by the ERS-1 synthetic aperture radar

N.A. Dashko. The variability of precipitation in a monsoon climate of the Japan and Okhotsk Seas

M.Y. Zhou, F.L. Qian, S.M. Li, M. Li, C. Wu. Geographical and temoral variation of

- sensible and latent heat fluxes in the ocean area near China
- K. Taira. Activities toward NEAR-GOOS at Japanese universities
- S.D. Hahn, Y.S. Suh, Y.H. Ahn, J.H. Kim, J.H. Park. Real time water temperature mappings and services for NEAR-GOOS activity
- T. Yoshida, N. Hasegawa, Y. Kurihara. Present status on NEAR-GOOS real time data base at the Japan Meteorological Agency
- K.R. Kim. East Sea (Japan Sea) ventilation: a chemist's point of view
- S. Tsunogai, S. Watanabe. Ventilation of Japan Sea water studied with chemical tracers
- C.T. Chen, A. Bychkov. An anoxic Sea of Japan by 2200
- H.J. Freeland. The impact of El Nino event on the BC coast
- K. Hanawa, T. Yasuda. Retrospective analysis of sea surface wind fields over the north Pacific during the period of 1899-1995
- F. Wang. The deep western undercurrent near the Philippines
- M. Endoh, G. Yamanaka, Y. Kitamura. Time scale of tracer diffusion in the North Pacific intermediate layer
- K. Lee, T. Takahasi, S. Doney, R.A. Feely. No evidence for large interannual variations in global oceanic CO₂ uptake
- V.I. Kuzin, V. Moiseev. Seasonal variations of the North Pacific hydrological characteristics based on climatical data diagnosis

Endnote 1

Participants and Observers

Canada

Howard J. Freeland (rapporteur)
Paul H. LeBlond (Chairman)

China

Ming-Yuan Zhou

Japan

Masahiro Endoh
Nobuo Suginozawa

Korea

Kuh Kim
Jae-Yul Yun

Russia

Sergey V. Gladyshev
Vyacheslav B. Lobanov

Observers

Alexander Bychkov (Asst. Exec. Secretary, PICES)
Sang-Kyung Byun (Co-chairman, WG 10)
Allen Macklin (U.S.A.)
Seelye Martin (U.S.A.)
Christopher N.K. Mooers (Co-chairman, WG 10)
Yutaka Nagata (Japan)
Thomas C. Royer (TCODE representative)
Grigory I. Shapiro (Russia)
Bruce A. Taft (Co-chairman, WG 9)
Shizuo Tsunogai (Japan)

Endnote 2

Report of Working Group 10 Circulation and Ventilation in the Japan Sea (East Sea) and its Adjacent Areas

Major Activities

Workshop in Fukuoka, Japan (January 31 to February 2, 1997)

PICES Press article

Online (WEB), Dynamic (i.e., Updatable) JES Bibliography

Online (WEB), Draft WG 10 Report

PICES VI / POC Topic Session

Preliminary Findings & Recommendations (Revised October 21, 1997)

F1. A high-level of scientific background information exists (especially due to CREAMS), but a comprehensive understanding of the general circulation and ventilation that is sufficient to support fully the needs of future studies regarding the climate variability and change, pollution, fisheries, ecosystems, and biogeochemical fluxes has not yet been achieved. For example, while CREAMS has discovered strong mesoscale and submesoscale variability in the deep layers, a fundamental understanding of the circulation and ventilation of intermediate and deep layers of the JES does not yet exist. As another example, the upper layer mesoscale variability of JES is not well enough observed and understood to provide accurate several-day synoptic maps of fronts, jets, and eddies in the upper layer.

R1. Proceed to achieve the necessary level of understanding and encourage the coordination of PICES-GLOBEC, PICES-JGOFS, etc. activities with PAMS/JECSS, CREAMS II, IOC-WESPAC, NEAR-GOOS, and their follow-ons.

F2. The level of regional scientific communication and cooperation is excellent.

R2. Future international studies should build upon the recent CREAMS and fisheries science experience, expertise, and infrastructure, including NEAR-GOOS.

F3. Major scientific issues in ocean dynamics, in general, and marginal semi-enclosed seas, in particular, can be addressed in JES, especially with NEAR-GOOS in prospect. For example:

- The influence of mesoscale variability on the mean flows and mean transports of properties.
- The influence of major topographic anomalies (e.g., deep basins and high rises) on coupling upper layer, intermediate layer, and lower layer mean and transient flows.
- The ventilation of intermediate and deep layers on seasonal, interannual, and interdecadal time scales.
- The interaction between wind-driven and buoyancy-driven circulation.

R3. Encourage development of such studies (e.g., CREAMS II) on an international basis. The use of CFCs and radionuclides as tracers is quite promising for studying ventilation and intermediate and deep level circulation. Analysis of sediment cores for alternating oxic and anoxic conditions is promising for the analysis of decadal and centennial variability.

F4. The entire JES must be studied as a connected dynamical system, both horizontally and vertically. However, free access to EEZs is the greatest limitation to international studies of the entire basin.

R4. PICES should endorse the general plan of research discussed in this report and use Article 247 of UNLOS to ensure EEZ access. [Research vessels should possibly fly the PICES or UN (IOC) flag]. Future international studies (e.g., CREAMS II) should be encouraged to follow the

procedure established by the PICES Governing Council for PICES endorsement to ensure free access to the EEZs of the JES.

- F5. Numerous valuable datasets are held in a “proprietary” (i.e., national security “classified”) status which is a limiting factor, especially for retrospective studies.
- R5. PICES should work to improve the data exchange situation, e.g., through funding for Russian scientists that will enable them to provide unique synoptic datasets and historical time series. Establishment of a regional database, on and international basis, would facilitate analytical and modeling studies.
- F6. JES circulation, chemistry, and biology are linked to adjacent seas and their river discharges, spawning grounds, etc.
- R6. Future multidisciplinary JES studies need to include links to adjacent seas, especially the East China Sea and Yellow Sea, and possibly the Sea of Okhotsk.
- F7. Simulation and nowcast/forecast modeling of JES circulation and ventilation to a broadly useful level of accuracy is a challenging but probably feasible task over the next decade.
- R7. JES modeling activities should be evolved to interact well with observational studies and monitoring for mutual benefit; e.g., design of observational networks, hypothesis development, model evaluation, and nowcast/forecast system development. And organized model-observations and model-model comparison activity in conjunction with CREAMS II and NEAR-GOOS should be considered to facilitate rapid progress. There may be a role for PICES to play in coordinating this activity.
- F8. Mesoscale and submesoscale variability has a strong influence on the distribution of plankton and fish, especially in the vicinity

of the subpolar front and jet. Since there is interannual variability in the mesoscale variability, interannual variability of the biota is anticipated. Similarly, since tidally induced mixing in shallow water has an impact on the marine ecosystems, and since there are seasonal and longer time scale variations in the shallow water mass characteristics, these sources of shallow water physical variability apparently influence the marine ecosystems.

- R8. A new working group to examine the biological response of the JES to physical variability should be considered.
- F9. The U.S.A. plans to participate in field experiments and modeling studies of the JES over the next five years, in coordination with Japanese, Korean, and Russian scientists of the CREAMS Program. This new effort, called CREAMS II, provides an unprecedented “critical mass” of activity that will present many opportunities for other scientists conducting complementary studies.
- R9. The Japanese, Korean, and Russian governments are encouraged to match the USA effort with an acceleration of support for CREAMS II and complementary research projects. To achieve its greatest potential, CREAMS II is encouraged to adapt a policy of open participation.
- F10. Important activities and initiatives are underway or planned to monitor the inflow through the Korean/Tsushima Straits and the outflow through Tsugara Strait, using submarine cables, ADCPs aboard ferry boats, and CTDs. There is a Russian and Japanese project to utilize the TASC submarine cable between Nakhodka, Russia and Naoetsu, Japan for JES monitoring; it has indicated strong variability on a several-week time scale which needs interpretation.
- R10. Monitoring systems for the inflow through Tatarski Strait and outflow through Soya

Strait should be considered. Also, the interpretation of the TASC data, together with auxiliary data, should be evaluated for its potential utility as part of a multi-component monitoring system.

F11. The EEZ of North Korea (DPRK) encompasses one of the most critical subdomains for the JES circulation and ventilation. Hence, it is essential to involve DPRK in future studies of JES.

R11. Continue to invite DPRK to participate in PICES meetings. DPRK participation may be most feasible for PICES VIII, to be held in Vladivostok.

F12. Research programs in other regions (e.g., Mediterranean Sea, Labrador Sea, and Irish Sea) may have generic value for understanding the JES circulation and ventilation, and designing strategies for observing and modeling JES.

R12. Invite scientists from other regional seas programs to speak at future PICES meetings so that information exchange may be facilitated.

F13. The JES is a nearly closed system, and, as such, offers the opportunity for physicists, chemists and biologists to develop strategies for a mutually consistent description of physical and biogeochemical transport processes. Apparently, the JES carbonate and silicate systems differ from those of the North Pacific, and are thus, of intrinsic interest. The airborne transport and deposition of particles must be considered, and the transport of suspended matter from the East China Sea/Yellow Sea must also be considered.

R13. The transport processes should serve as a focus for the next generation of JES studies after CREAMS II, both for their intrinsic importance to JES biogeochemistry and their stimulation of a high level of physical understanding of the regime.

F14. Ice processes, both thermodynamical and dynamical, have an important influence on JES circulation, ventilation, and water mass formation in the northern JES (Tatarskiy Strait), along the Primorski coast, and in Peter the Great Bay.

R14. Ice processes need to be incorporated in future studies of the JES circulation and ventilation.

F15. Evidence is increasing that synoptic atmospheric forcing is important to the circulation and ventilation of JES, including surface heating/cooling as well as wind stress. However, the importance of synoptic scale evaporation and precipitation have yet to be ascertained.

R15. Encourage the exploration of synoptic atmosphere-ocean coupling, especially the development of synoptic air-sea exchange datasets.

F16. Time series from coastal stations, satellite data, repeated hydrography, and atmospheric surface climatologies have revealed rich variability and provided insights into the physical nature of JES. The few existing time series of direct current observations have revealed surprising variability.

R16. Encourage the development of long-term current monitoring sites at strategic locations in the JES.

F17. The chemical oceanographers have utilized a variety of chemical tracers to develop box models for exchange processes and transfer rates in the JES that can be evaluated and utilized by physical and biological oceanographers.

R17. Physical oceanographers should attempt to reconcile their observations and models with the chemical oceanographers' description of exchange processes and estimates of ventilation rates.

F18. Physical and chemical data indicate that the JES vertical structure and ventilation depths (i.e., from a 2-layered to 3-layered and return to 2-layered system) have changed (i.e., T increased; DO decreased in the bottom layer) over the past 60 years. Hence, there is conclusive evidence for climate variability and/or change on time scales of a century.

R18. The JES is an efficient regime for developing monitoring strategies for (and documenting and discriminating) climate variability and/or change, placing the physics, chemistry, and biology on a mutually consistent basis.

Schedule for completing WG 10 Report

Nov. 15, 97 – Contact authors for outstanding contributions
Jan. 1, 98 – Remaining draft contributions are due
Jan. 15, 98 – Draft report circulated to WG 10 for internal review and updating
Feb. 15, 98 – WG 10 comments and updates are due
Mar. 1, 98 – Drs. Byun & Mooers meet for editorial review
Apr. 1, 98 – Final draft report sent to POC for external review
Jun. 1, 98 – POC comments received
July 1, 98 – Submit revised report for publication