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PICES IV in Qingdao - A Success

The Fourth Annual Meeting of the North Pacific Science Organization (PICES) took place in Qingdao, China, October 16-23, 1995. The meeting was well attended with more than 200 participants from the six member nations, plus outside representatives from FAO and NPAFC and a guest German scientist. This was the first meeting which included the two newest member nations, the Russian Federation and the Republic of Korea.

The meeting included six scientific sessions: circulation in the North Pacific, marine carrying capacity, the Bering Sea, transport and impact of contaminants, foodweb structures in coastal and oceanic ecosystems, and density dependent effects on the abundance of marine organisms. (See page 3 for summary reports of scientific sessions.)

The Science Board reviewed the reports and recommendations of the PICES Committees, and recommended actions for Council approval. The Governing Council then considered and approved the Science Board and Finance and Administrative Committee recommendations. (See next section.)

The meeting was broadly perceived as successful, combining excellent scientific presentations, long and thoughtful discussions by the participants, and effective organization and arrangements by the host country. The meeting was greatly enhanced by the warmth and extraordinary hospitality of the representatives of the People's Republic of China.

The editor would be pleased to receive any contributions that you may wish to make. Articles received will be published in the next edition of PICES PRESS.

Decisions Approved by Council

Resolutions developed by Science Board based largely on consideration of PICES Committee and Working Group recommendations were approved as decisions of Council as follows:

95/S/1: PICES - GLOBEC CCCC Program

1. Member States are encouraged to provide necessary financial support of CCCC and its program components.
2. The CCCC Workshop on Conceptual / Theoretical Studies and Model Development will be held in Nemuro, Hokkaido, Japan, in late June 1996. The full membership of the Implementation Panel will meet on that occasion.
3. Establishment of Task Teams is authorized on advancing the development of conceptual/ theoretical and modeling studies (MODEL), on development of basin scale studies (BASS), and on development of the intercomparison of regional scale studies (REX).
4. Other Executive Committee recommendations are endorsed.

95/S/2: Publications

The following reports should be published in the Scientific Report series:

- a. Proceedings of the Okhotsk Sea and Adjacent Areas Workshop
- b. Modeling of the subarctic North Pacific circulation (WG 7 report)
- c. CCCC Science Plan and Implementation Plan

95/S/3: Scientific Committees

1. The Vladivostok Workshop Report and its recommendations should be reviewed by BIO, FIS, and POC who should advise the Science Board on their implementation. POC should prepare the proposed list of geographical features of the Okhotsk

Sea region, including bays, straits, and currents, in all Member State languages.

2. POC should review WG 7 recommendations and advise on their implementation.
3. FIS should review and comment on the stock identification document provided by ICES.
4. Ways should be sought to increase participation in Scientific Committee meetings during PICES V.

95/S/4: Technical Committee on Data Exchange:

1. TCODE's strategic plan for PICES data management is endorsed.
2. Recommendation 8.1 on ship schedules should be reconciled with the Secretariat proposal preferred by the Science Board. TCODE members will arrange for submission of schedules, and the PICES WWW Home Page will be used for their dissemination.
3. TCODE should provide an implementation plan for its recommendation 8.2 on cruise reports.
4. TCODE should begin to implement its recommendations 8.3 (inventory of relevant data holdings of agencies and institutions in the PICES region) and 8.4 (inventory of long time series).
5. Representatives of TCODE should be invited to participate in relevant meetings of other groups, to report on TCODE activities and to learn of data requirements and issues. When possible, in order to minimize costs, such TCODE representatives should be from the country hosting the meeting.

95/S/5: Monitoring

1. Scientific Committees and CCCC Task Teams BASS and REX should review the WG 9 report and forward comments to the WG Chairman and the Secretariat for discussion during the WG's 1996 meeting.
2. PICES should express support for development of the Global Ocean Observing System (GOOS) and offer assistance in coordinating its implementation in the subarctic Pacific.

95/S/6: Future of Working Groups

1. WG 3 on Coastal Pelagic Fish has completed its work and will disband. Russian and Korean members of FIS should be asked to provide the names of their scientists working on pelagic species in order to complete the WG 3 inventory.
2. WG 5 on the Bering Sea will meet for a final time in 1996 to prepare recommendations on future directions in Bering Sea science.
3. WG 7 on Modeling Subarctic Pacific Circulation will edit its report for publication and will disband.

4. WG 8 on Practical Assessment Methodology will continue planning of Phase 1 of its practical workshop and will initiate planning for Phase 2.
5. WG 9 should complete its first report and should further consider development of a strategy for long term monitoring in the PICES region.

95/S/7: New Working Groups

The following groups are to be established :

1. WG 10 on Circulation and Ventilation in the Japan Sea (East Sea) (POC). (See page 12 for terms of reference.)
 2. WG 11 on Consumption of Marine Resources by Marine Birds and Mammals (BIO). (See page 13 for terms of reference.)
 3. WG 12 on Crabs and Shrimps (FIS). (See page 13 for terms of reference.)
- Member States should consider limiting their appointments to these groups to no more than three per group.

95/S/8: Electronic Communications

The Secretariat is authorized to establish a WWW Home Page.

95/S/9: Presentation of Papers

With a view to improving communication at PICES meetings, the Secretariat, in consultation with the Chairman and the Science Board Chairman, should review practices of other organizations for improving presentation of visual material. As an experiment for the Fifth Annual Meeting, speakers will be asked to provide advance copies of their presentations, in accordance with specifications to be developed by the Secretariat.



95/A/1: Council accepted the recommendations of the Finance and Administration Committee and agreed to the following actions:

1. *Auditor.* Accepted the audited accounts for 1994 and agreed to continue with Flader and Greene as auditor for another year.
2. *Trust Fund.*
 - a. Council approved that the Chairman and Executive Secretary develop a paper on the purpose of the Trust Fund for review by Council during PICES V.
 - b. Council agreed that Executive Secretary obtain information for circulation and review on the operation and funding of the WMO and the IOC Trust funds for review during PICES V.
3. *Notification Procedures.* Council agreed that Contracting Parties notify the Executive Secretary of members of their delegations three weeks before the coming Annual Meeting.

95/A/2: Council accepted the financial statements for the audited accounts of 1994 and the estimated accounts of 1995 and agreed to the following actions:

1. *1996 Budget.* The budget of \$509,000 CDN was approved.
2. *Forecast 1997 Budget.* The forecast budget for 1997 was reviewed and will be further considered during PICES V.
3. *Working Capital Fund.* Council raised the authorized level of the Working Capital Fund to \$100,000.
4. *Relocation and Home Leave Fund.*
 - a. Council approved the establishment of the Relocation and Home Leave Fund, set at a maximum of \$110,000.
 - b. To the extent possible, income for this Fund should be derived from the refund of the GST and from the levy in lieu of taxes from foreign staff.

95/A/3: Council accepted the proposal of the Republic of Korea to investigate the feasibility of hosting the 1997 Annual Meeting in Korea. It was agreed that the Republic of Korea would inform the Secretariat of their intentions by December 15, 1995. In the absence of offers to host the 1998 Annual Meeting, it will be held at the seat of the Organization.



Summary Reports of Scientific Sessions

FIS: Density-dependent effects on fluctuations of the abundance of marine organisms.

The Fisheries Science session was organized and convened by Vidar Weststad (USA) and Yasunori Sakurai (JAPAN). The session heard a total of 17 papers on density dependence processes in a diverse number of species from throughout the North Pacific. The topic session was organized to minimize formal presentation to the greatest degree possible in order to maximize the time available for general discussion. All of the presenters were well organized and utilized no more than their allotted time which left over two hours available for discussions and additional short informational presentations.

Density dependence in populations is an expression of change in a characteristic, such as growth, maturation, egg production, recruitment, that is proportional to population size. Density dependent relationships are regulatory processes that can lead to equilibrium, and tend to hold populations within bounds. Presentations in the Topic Session covered many aspects of density dependence, and for many species it was clear that density dependent processes regulated population abundance, and could regulate carrying capacity. Several examples of density dependent growth were presented which were linked to competition for food either through direct competition, or multi-species interactions within the food web. Another suite of papers dealt with density dependent changes in maturation, fecundity, survival, and recruitment rates that influenced species such as shrimp, sardines, anchovies, and pollock. In these species variation in production of spawn can lead to strong and rapid changes in population size, especially when there is a simultaneous change in ocean habitat.

Several papers dealt with decreases in size of Pacific salmon and increasing age of maturity. In Asiatic pink salmon changes appear to be linked to density dependence, but in North American stocks density dependence appears to be operating in some species and stocks, but in others the process appears to be more complex and may involve factors other than density dependence. A presentation on walleye pollock maturation in the Gulf of Alaska showed an increasing age of 50% maturity, similar to Gulf of Alaska chum salmon, but the increase in age of 50% maturity was inversely proportional to population

density, directly opposite of what is expected to occur.

The discussions following formal presentations were lively and far ranging. Several people offered extensive comments and observations on mechanisms of density dependence and interactions with density independent factors such as environmental variables. The discussions covered the general aspects of density dependence, its relevancy to carrying capacity, the problems of separating environmental effects from density dependent effects. Situations in which anthropomorphic effects, such as pollution, fishing and habitat modification, can skew population parameters and distort evidence of density dependence.

The conclusion of the FIS Topic Session on Density Dependence was that density dependent processes were evident as a regulator of population growth and biomass in a wide range of species. However, it was also evident that density independent factors could modify density dependent processes. For example, it was suggested that recent climatic change (regime shift) may have altered the environment of the North Pacific and caused salmon populations to respond to changes in population density in a different manner than in the previous environmental state. Also noted was the importance of multi-species interactions. It was pointed out that competition among species will influence the nature and degree of density dependence of individual competing species within a complex.

The session participants agreed that density dependence was an important determinant of carrying capacity. However, to develop a better understanding of the mechanisms controlling the carrying capacity and fluctuations of the abundance of North Pacific marine organisms it is necessary to understand more about the climate-ocean mechanisms that alter species specific carrying capacities. Also, more broadly structured models need to be developed to understand the relationship between density dependent processes and environmental change and community dynamics.

(Vidar Weststad)

BIO: Factors affecting the balance between alternative food web structures in coastal and oceanic ecosystems.

The organizers and convenors of the Biological Oceanography Science session were Prof. Makoto Omori of Tokyo University of Fisheries and Prof. Rong Wang of the Institute of Oceanology, Academia

Sinica. Interest in this topic was stimulated by reports of dramatic shifts in composition of species in several seas (some of them linked by inference to anthropogenic changes such as pollution or removal of commercial fish), and by theoretical studies of alternative stable states for ecosystems, with relatively rapid shifts between the states.

Prof. Omori summarized data from the Black Sea and from Tokyo Bay, both of which have experienced outbursts of jellyfish populations and sharp declines of other species, and speculated on degree to which these changes were ultimately anthropogenic. Dr. T. Weisse reviewed several examples in which changes in communities involving blooms of keystone predators (those which affect the species composition of their communities) with special methods of feeding. He described a change from individual to collective feeding in the planktonic protozoan, *Noctiluca*, and argued that an important attribute of the ctenophore, *Mnemiopsis*, was the apparent lack of saturation of feeding, leading to very great impacts on even dense concentrations of prey. The role of detritus (dead organic matter) in the carbon budget of the ocean was reviewed by Dr. H. Seki. Prof. M. Mullin showed the decreases in biomass of zooplankton and in abundance of a particular copepod, *Calanus*, associated with El Nino events in the California Current, and also tested the generality of an interdecadal decline in biomass on which the El Nino changes were superimposed. Dr. H. Sugisaki described food webs in waters around Japan, and how they varied in time and space, and Dr. R. Perry showed examples in which determination of isotopic composition of organisms can demonstrate differences in food web patterns.

Partly as a result of papers presented at this topic session, the BIO Science Committee decided to recommend that a session at the next annual PICES meeting address interannual and regional variations in life histories of key species, since some of the major changes in communities seem to be triggered by the interaction of a particular life history trait and a changing environment.

(Michael Mullin)

Science Board: Marine carrying capacity: fact or fiction?

Carrying capacity is a central concept in the Climate Change and Carrying Capacity (CCCC) research program being developed by PICES for GLOBEC, and yet it is the subject of both scientific and political

controversy. On behalf of the PICES Science Board, Makoto Kashiwai and Alec MacCall co-convened this symposium to explore aspects of the controversy and to move toward a broader "ecosystem" concept of carrying capacity that would help guide the CCCC program.

Makoto Kashiwai presented a historical review of the concept of carrying capacity. In the 1930's, Errington first used the term in relation to an upper limit to overwintering abundances of territorial birds, a limit imposed by a strong constraint on sheltering habitat and food supplies. It wasn't until the 1950's that the term "carrying capacity" was used by Odum to refer to the asymptotic abundance (often denoted K) in the Verhulst-Pearl logistic growth equation. Since that time, this usage of the term has become widely accepted in a single-species population growth context, with more recent allowances that carrying capacity (asymptotic abundance) can vary over time. However, the term "carrying capacity" also has come to be used (e.g., by Laevastu and Larkins) as a multispecies or ecosystem level measure of higher trophic level abundance or productivity, established by physical conditions and processes and by lower trophic level dynamics. This is how the term is used in the PICES/GLOBEC CCCC program.

Alec MacCall explored some theoretical aspects of the single-species logistic model, and demonstrated that carrying capacity does not constitute the strict limit implied in the name. Rather, it is a "soft" limit that may be realized only over prolonged periods if the value were to remain constant. Carrying capacity is not directly measurable, but is more akin to a point of balance. If population dynamics are described by the logistic model, supplementation by hatchery production can easily maintain populations at abundances exceeding their nominal carrying capacity. However, simple logistic dynamics predict that excessive supplementation can lead to instability and severe fluctuations in abundance.

Lloyd Dickie presented a more ecosystem-oriented view of marine carrying capacity, based on biomass size-spectra. The biomass size spectrum reflects an integration of physical and biological dynamics over the entire ecosystem. When organized into approximate trophic levels or "scalings", size spectra from widely separated marine ecosystems show remarkably similar patterns. These appear to arise from the similarity of physiological and ecological processes in marine ecosystems, and where differences occur, they

can be explained by fundamental principles. Differences in productivity among systems or over time are evident from size spectra, offering a relatively direct measure of ecosystem carrying capacity. Research is needed to elucidate the mechanisms producing these size spectra.

David Welch's presentation examined whether there is evidence that constraints in the ocean phase of salmon are strong enough to limit productivity, as opposed to the those constraints that are known to be imposed during the fresh-water phase of salmon. In addition to recent evidence that adult growth rates for several species appear to vary inversely to ocean abundance, there is evolutionary evidence of competitive displacement in adult digestive physiology. While this does not necessarily imply a tight limitation, it does argue against the contention that the ocean phase is not limiting for salmon.

Oleg Gritsenko, working with N. Klovach, M. Novikova and L. Bazarkina, examined chum salmon populations sampled during a 1994 research cruise. Incidence of fish with "flabby muscles" was restricted to chum salmon, was highest in areas of high population density, and was independent of whether the fish were of Russian or of Japanese origin. As a criterion for having exceeded the carrying capacity of the ocean for this species, these authors propose that we would see an elevation in the incidence of diagnostic degenerative features, and that high incidence of flabby chum salmon are a specific example.

In addition to papers presented at the symposium, some presentations at other sessions of the Fourth Annual Meeting also related to the topic of carrying capacity. For example, Ming-Yuan Zhu, Xingua Mao and Ru-Bao Ji presented a MEQ paper on the "Effect of Aquaculture on the Sango Bay Ecosystem" in which the concept of carrying capacity was explored with respect to problems of multispecies aquaculture. As in the paper by Gritsenko et al., these authors measure carrying capacity by means of diagnostic conditions, in this case, decreased scallop growth rate and product quality.

Study of carrying capacity becomes more difficult and more controversial as we progress from theoretical numerical models to ecosystem studies in the real world. It also appears that carrying capacity itself is an elusive object of study, perhaps forcing us to focus on derivative population or ecosystem effects, whether they be biomass spectra or indicator condi-

tions. Thus, in common usage "carrying capacity" has yet another definition, that of being a level of abundance, above which undesirable (presumably density dependent) effects become problematic. This is a useful and practical concept, but much work is needed to relate it to the traditional textbook definitions of the term.

In conclusion, it may be premature to narrow our definition of carrying capacity unnecessarily. Large problems remain to be solved, and we will surely benefit by allowing the CCCC program the freedom to address these problems from a variety of viewpoints. Whatever approach is taken to the study of carrying capacity, PICES members and CCCC participants face a rare opportunity: As Dr. Gritsenko cogently observed, the north Pacific Ocean may be the best laboratory in the world to study carrying capacity in a marine environment, and how carrying capacity relates to fluctuations in climate.

(Alec MacCall)

MEQ: Sources, transport and impact of chemical contaminants.

Marine pollution in the North Pacific differs somewhat from the subject matter of other PICES committees, because pollution is mainly a coastal problem caused mainly by national or regional activities. Although contaminants are certainly present in the open North Pacific, and the transport routes which introduce them have been studied in some detail, the impact of pollution is (at present) of concern in coastal environments. In the light of this, the MEQ Committee has taken a slightly different approach to its subject from those of other Committees.

At previous PICES meetings, the MEQ Committee has reviewed marine pollution problems. The Committee decided that the largest single impact on coastal waters of PICES member states is likely to be that of the "Three Gorges" Dam on the Yangtze (Changjiang) River. This project, which is one of the largest hydro-electric dam developments in the world, will affect freshwater flow and sediment input to the East China Sea; this in turn will affect its oceanographic regime, and impacts could be felt in Korean and Japanese coastal marine systems.

One MEQ session at the PICES Qingdao meeting was convened by Prof. Zhou Jai-yi, and Drs. J. Stein and R. F. Addison and focused on our current assessment of the impact of the Three Gorges Dam. Chinese

planners and modellers have been predicting the anticipated changes in fresh water and sediment input which will result from the Three Gorges Project and several papers presented at Qingdao reviewed these. Direct effects of the project on salinity and sediment distribution are likely to be observed at least 100 km out from the Changjiang estuary; not unexpectedly, this region is at present the site of extensive commercial fisheries, and considerable discussion took place about the potential impact of the changes to the physical environment on these systems. Prediction of biological effects is necessarily less advanced than that of physical effects, but this subject is recognized as one which must be addressed. This is easier said than done, because the ability of marine scientists to predict biological changes resulting from physical impacts anywhere is not yet well developed

In the light of such considerations, the MEQ Committee has been planning to carry out a practical multi-disciplinary Workshop within which to compare and evaluate methods to assess the impact of environmental change. The Workshop will provide a vehicle in which scientists from PICES member countries can bring their techniques of analytical chemistry, sedimentology and biology to bear on a specific environmental problem. Although ultimately the aim of MEQ will be to address the question of the impact of the Three Gorges project, it is recognized that this will be an ambitious undertaking. Initially, then, MEQ will organize a Workshop to focus on environmental pollution in Jiaozhou Bay, probably in the Spring of 1997. Prof. Zhou Ming-Jiang generously offered the use of facilities at the Academia Sinica Institute of Oceanology for use as a base from which to carry out these studies. A sub-group of WG8 is now planning the operation of the Workshop.

(Richard Addison)

POC: Circulation in the subarctic North Pacific, and its marginal seas, and its impact on climate.

The Physical Oceanography Science sessions had a theme of "Circulation in the Subarctic North Pacific and Its Marginal Seas and Its Impact on Climate". The convenors Zhou MingYu (China) and John Garrett (Canada) planned the two sessions on a geographical basis, beginning with the very large space and time scales and then working around the North Pacific in a generally clockwise pattern, starting from the East China Sea. In spite of an unexpectedly large number of 'no-shows', the result

was a stimulating and informative series of presentations.

The first papers looked at 'big' physical oceanographic questions: large scale decadal changes in wind patterns and the formation and distribution of the North Pacific Intermediate Water. The first showed that for periods with direct observations of both atmospheric pressure and wind velocity, pressure anomalies could be used with atmospheric models to reproduce the observed wind field anomaly with reasonable accuracy. This technique was then applied to produce surrogate wind field anomalies for the much longer period with good pressure data, and to confirm the strengthening of midlatitude westerly winds since the mid-1970's and associated increase in heat in the Kuroshio extension. In the second presentation, a large scale model with coarse horizontal resolution, but high vertical resolution and careful attention to isopycnal and diapycnal diffusivities, was used to investigate the source and spreading of North Pacific Intermediate Water (NPIW) and the spreading of anthropogenic tracers. The results suggest that the deeper NPIW denser than $26.7 \sigma_t$ would come from the Okhotsk deep water by isopycnal diffusion, while the shallower, less dense NPIW could come from the region of the Kuroshio-Oyashio confluence through diapycnal diffusion from the surface. A later paper described development of instabilities in an idealized coupled atmosphere ocean model, leading to interannual oscillations even with steady annual forcing.

Several interesting and complementary presentations dealt with the oceanography of the East China Sea and adjacent Pacific Ocean from different perspectives, including water mass analysis, tracer distributions, and diagnostic modelling. This is a complex and dynamic region, and the high level of ongoing international cooperation and information exchange is enabling significant advances in knowledge. In addition to its obvious regional interest, research in the area addresses questions of global importance, as was demonstrated in a presentation on air-sea CO_2 exchange.

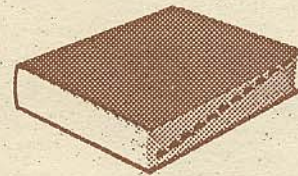
Recent surveys have shown steadily decreasing levels of dissolved oxygen in the deep water of the Japan Sea over the last 50 years, giving rise to speculation that significant deep convection no longer occurs. Both a box model and CFC tracer measurements presented at the POC session indicate that deep convection has taken place within the last 20 years. The variety of hypotheses for the oxygen decrease

suggests that further field work will be required to explain the observed O_2 decrease and project future levels.

Sea ice is important in the Sea of Okhotsk, the Japan Sea and the Bohai Sea, for navigation, as a source of cold salty water and in reducing air/sea heat and momentum exchanges. Sea-ice forecasting and forecast verification methods were presented. It was also shown that sea-formation in the Sea of Okhotsk can only provide half the salt needed for North Pacific Intermediate Water formation.

Exchange of deep water between the Sea of Okhotsk and the North Pacific is not a simple or steady process, as illustrated by observations on a repeated section through the Bussol Strait. A deep warm core ring offshore completely disrupted the more usual picture in 1990 and possibly also in 1995. Observations since 1970 at a relatively nearshore station in the Gulf of Alaska are well correlated with both large scale ocean changes and with the Sitka air temperature, which goes back to 1828. Temperature at this station is highly correlated with the 18.6 year lunar nodal tide, which appears to be important for other high-latitude variables.

(John Garrett)



The Secretariat wishes to thank Drs. A. Bychkov and V. Lobanov for the wonderful Russian chocolates that many shared and enjoyed; and Mr. H. Endo for the beautiful flowers which brightened the Secretariat office immensely during the meeting.

(Christina & Christie)

PICES WWW Home Page

Our home page is under construction. Please take a look at:

<http://pices.ios.bc.ca>

Your comments and ideas for improvement would be greatly appreciated.

**SNAPSHOTS
FROM THE
FOURTH
ANNUAL
MEETING,
QINGDAO,
OCT. 16-22,
1995**



Governing Council representatives: Z.W. Liu, Y.K. Xu, W.L. Sullivan, W. Aron, W.G. Doubleday, V. Alexander, W.S. Wooster, S.D. Hahn, W.D. McKone, T. Sasaki, D.M. Ware (Science Board Chairman), M. Nakahara, Q.F. Liu



Science Board Representatives: J.Y. Zhòu (MEQ Chairman), M. Kashiwai (SB-Chairman-elect), P.A. Wheeler (BIO Chairman-elect), Q.S. Tang (FIS Chairman), W.S. Wooster (PICES Chairman), W.D. McKone (PICES Exec. Secretary), Y. Nagata (POC Chairman), M.M. Mullin (BIO Chairman), S.D. Hahn (Korean rep.), D.M. Ware (SB Chairman)



Representatives of Contracting Parties etc. at the Opening Session



Attentive participants at the Opening Session



BIO session Co-convenors Profs. M. Omori and R. Wang developing strategies



BIO Committee Meeting in progress



Dr. R.J. Beamish addressing participants at the Bering Sea Symposium



Local Organization Committee having a hearty toast at the reception



Russian scientists Drs. Bychkov, Luchin and Lobanov chatting over 8 bottles of Tsingtao Beer.



Participants enthusiastically loading up on gourmet dishes at the Opening Reception to prepare for hard work ahead



Korean delegates Drs. S.D. Hahn and H.T. Huh gearing up for a Tsingtao Beer drinking contest



New and old BIO Committee Chairmen Profs. M.M. Mullin and P.A. Wheeler discuss directions of the committee - Beer or wine?



MEQ Committee Chairman and members Prof. J.Y. Zhou, Dr. C.M. Watson and Dr. U. Varanasi



Prof. Q.S. Tang with happy host Mrs. C. Wooster at the Chairman's Reception



Dr. W.S. Wooster greeting Chinese delegation, Mr. Z.W. Liu, Mr. L. Jong and Prof. Y.K. Xu at the Chairman's Reception



PICES Secretariat carefully sampling food to ensure high standards at receptions



Mr. H. Endo, Prof. Q.S. Tang and Dr. W.S. Wooster wishing Dr. W. Aron best of luck with his retirement



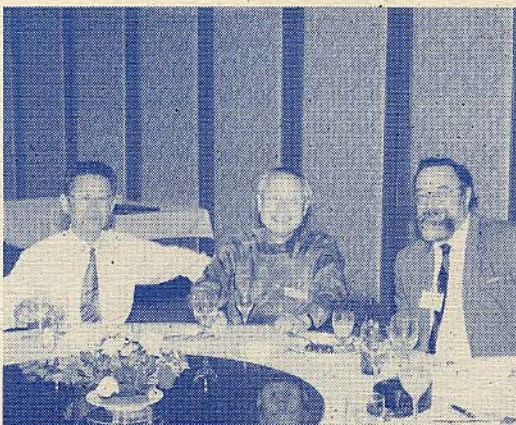
Drs. D.M. Ware, W.S. Wooster and W.D. McKone enjoying wining and dining at the Chairman's Reception



Mr. M. Nakaĥara, Dr. M. Miyata and Mr. H. Endo reassuring perplexed Mr. W.L. Sullivan on retirement



TCODE Chairman Mr. R. Brown and member Mr. L. Tong at the Chairman's Reception



New and old POC Committee Chairmen Profs. Y. Nagata, P.H. LeBlond and member K. Ohtani



Mr. Q.Y. Wang and Dr. W.S. Wooster examining photographs of the meeting closely



C. McAlister and C. Chiu from the PICES Secretariat pose with members of the Local Organizing Committee outside the venue on the last day of the meeting.

FEATURE ARTICLE

The Climate State of the North East Pacific in the Second Half of 1995

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The only notable incident affecting the climatic state of the North Pacific in the latter half of 1995 was the final retreat of the climate from the El Niño, or near-El Niño state that dominated the climate from 1991 to 1995. Earlier in the year the southern oscillation index produced the first positive monthly value since January of 1991. In the 2nd half of 1995 many more positive values emerged. The result for the North Pacific is a persistent state of normalcy. The two diagrams above show the sea surface temperature anomaly for June and November of 1995. Clearly, in June 1995 there were no large anomalies anywhere in the N.E. Pacific. The November map suggests that a large negative anomaly was emerging near the dateline, but this feature is in a region of very sparse data and is probably an artifact. I include this diagram because it illustrates our extreme sensitivity to data loss in the preparation of maps of this kind, and I agree with the suggestion made recently by Dr. Hanawa that PICES should play a more active role in encouraging monitoring activities in the North Pacific.

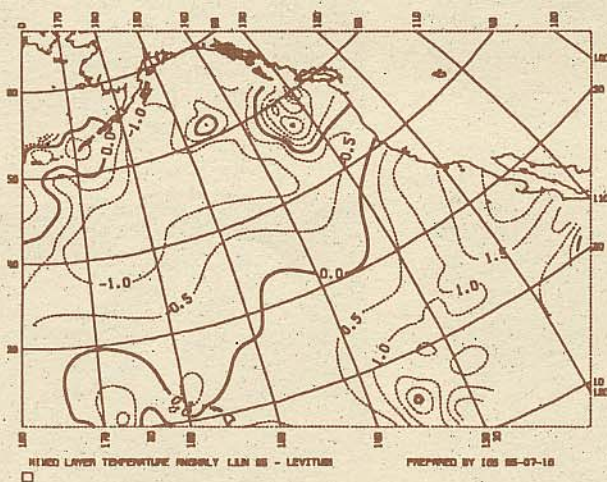


Fig. 1. Sea surface temperature anomaly, June 1995.

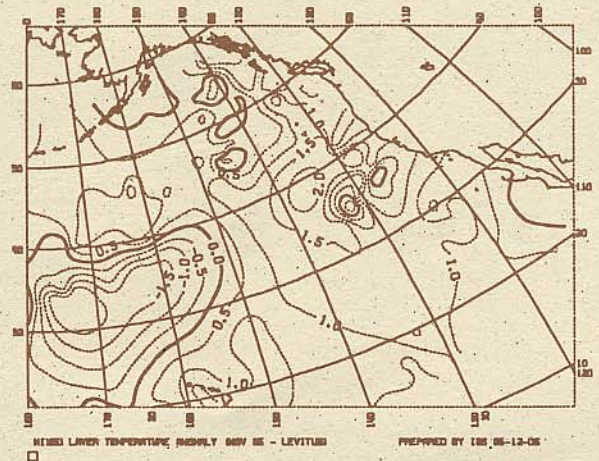


Fig. 2. Sea surface temperature anomaly, Nov. 1995.

In December of 1995 an advisory was issued by the Climate Prediction Center, Washington D.C., which I abstract as follows:

Most atmospheric and oceanic anomaly patterns indicate that weak cold episode conditions have developed in the tropical Pacific. Negative sea surface temperature (SST) anomalies continue throughout the equatorial Pacific from 160E eastward to the South American coast, with anomalies more than 1.0C below normal observed between 150W and 100W. Consistent with the SST anomaly pattern, convection during November [as inferred from outgoing longwave radiation (OLR)] was again weaker than normal over the central and western equatorial Pacific, and enhanced throughout Indonesia and the eastern Indian Ocean. Convection has been persistently weaker than normal (positive OLR anomalies) over the central equatorial Pacific for the past six months.

Enhanced easterlies were observed across the equatorial Pacific during November. This reflects a significant evolution toward cold episode conditions from those observed during the past six months, when enhanced easterlies were confined to the western tropical Pacific. This is the first time since the end of the 1988-89 cold episode that significantly stronger-than-normal easterlies have been observed throughout the equatorial Pacific.

What the above means is that there is slight tendency towards a La Niña, or cold event. [Note: personally I agree with Jim O'Brien and dislike the name "La Niña", it tends to suggest that "a little boy" is in

some sense the opposite of "a little girl", and I don't like that concept. O'Brien prefers the name "El Viejo", which translates as, the Old Man, which might be considered a phase opposite to a little boy.] It should be noted that the southern oscillation index is very close to zero, normal conditions, and as of writing is actually -0.7, or on the El Niño side of normal conditions. Also, the computer model run by Cane and Zebiak does not appear to be predicting a significant cold event. So it seems likely that nothing will emerge from all of this and that 1996 will be a thoroughly normal year.

NSCAT - Looking Forward to Global Winds

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E-mail: liu@pacific.jpl.nasa.gov

Winds advect atmospheric water and latent heat and drive ocean currents. The currents, in turn, transport heat, nutrient, and greenhouse gases throughout the ocean. These processes and air-sea exchanges are complex — turbulent and non-linear. Since processes at one scale affect processes at another scale, adequate sampling of the global wind systems are necessary. An example is the Pacific Ocean, which covers more than one third of Earth's circumference at low latitudes. Spaceborne measurements are the only means of providing ocean surface wind data for the Pacific at appropriate temporal and spatial scales.

A few decades ago, marine radar operators encountered noise on their radar screens which obscured small boats and low-flying aircraft. They termed the noise "sea clutter". This clutter was identified as the backscatter (reflection) of the radar pulses from the ocean surface by rippling waves on the ocean surface. The idea of remote sensing of ocean surface winds was based on the belief that these surface ripples are in equilibrium with the local winds. Over the last two decades, empirical relations have been developed between the radar backscatter and surface wind vectors.

The National Aeronautics and Space Administration (NASA) is going to launch a scatterometer (NSCAT) into a near-polar sun-synchronous orbit on the Japa-

nese Advanced Earth Observing Satellite (ADEOS) in August 1996. The six antennas of NSCAT will send microwave pulses at a frequency of 14 GHz to the Earth's surface and measure the backscatter. The antennas will scan two 600-km bands of the ocean separated by a 330 km data gap. NSCAT will provide surface wind vector at 50 km resolution over 90% of the ice-free ocean every two days, under both clear and cloudy conditions. It will cover more than twice the range of the scatterometer on the European Remote Sensing satellite ERS1 which scans only one 475 km band.

At present, there are 28 NSCAT science investigator teams: 16 selected by NASA's NSCAT and 12 by the Japanese ADEOS Projects. Atmospheric studies include analysis of wind statistics, understanding monsoon outbreak, improving numerical weather prediction, boundary layer parameterization, and meso-scale processes. Oceanic studies are mainly related to the modeling of wind-driven ocean circulation. Climate studies involve upper-ocean heat balance and El Niño to understand seasonal and inter-annual signals affected by wind. There is also interest in the understanding of how ocean surface waves interact with radar signal and wind. New investigations in typhoon genesis, ocean productivity, sea-air carbon dioxide flux, hydrologic balance, land vegetation, and polar ice are being initiated.

The ADEOS and NSCAT Projects are planning an intense calibration / validation program. A ground calibration station has been built for NSCAT at White Sands Test Facility. Besides direct calibration, the Projects are also supporting a number of postlaunch validation tasks. Japanese scientists will compare NSCAT data with wind measurements from Japanese meteorological stations at sea and the analysis field from the Japanese numerical weather prediction centers in the North Pacific. The US - led geophysical validation tasks include the use of in situ wind measurements (from buoys and ships), wind fields produced by operational numerical weather prediction centers, wind field derived from satellite observations other than NSCAT, and self consistence analysis. The sensor studies involve antennas bias and the effect of rain and surface slick on the backscatter. The field campaigns include measurements from drifters, moorings, research ships, and aircraft, in the Labrador Sea, the tropical Atlantic, the Gulf of Mexico, and the Argentina coast. The field campaigns selected will be jointly supported by other US funding

agencies, such as the Office of Naval Research, the National Oceanic and Atmospheric Administration, and the National Science Foundation.

According to the present plan, NSCAT will be turned on 30 days after launch when the wind observing mode will start. It will take approximately two months for sensor calibration and data check out, before the preliminary version of the data will be released. The first validation workshop will take place in January 1997 to refine the algorithms. Standard data products will be distributed by the Physical Oceanography Data Active Archive Center PODAAC of the Earth Observing System (EOS). A near real time fast data product will also be produced by the National Ocean and Atmosphere Administration (NOAA) and will be available from NOAA and JPL.

Looking beyond NSCAT, with the planned launching of an improved scatterometer, SeaWinds, on another satellite (ADEOS-2) in 1999, the acquisition of continuous data on ocean surface wind vectors for a period long enough to study the seasonal to interannual variability is assured. It also signifies the continuous cooperation between Japan and the U.S.A. in providing long term ocean-wind and complementary data for monitoring, understanding, and predicting global climate and environmental changes. The scatterometer is the only spaceborne sensor that could provide direct (wind) and derived (current) dynamic measurements to study transport processes in the energy-hydrologic and biogeochemical cycles. Thus, it is complementary to other spaceborne sensors which measure hydrologic parameters, e.g., the operational Special Sensor Microwave Imager (SSM/I) on the Defense Meteorological Space Program, the Advanced Microwave Scanning Radiometer (AMSR) to be launched in ADEOS-2, and suite of rain sensors on the joint US - Japanese Tropical Rain Measuring Mission (TRMM). It is also complementary to sensors which measure ocean biological productivity, e.g., Ocean Color and Temperature Sensor (OCTS) to be launched with NSCAT on ADEOS-1 and the Global Imager (GLI) and ADEOS-2.

Further information on NSCAT can be obtained from Ken Ford (NSCAT Program Manager at NASA Headquarters, e-mail: kford@mtpe.hq.nasa.gov), Jim Graf (Project Manager at the Jet Propulsion Laboratory, e-mail: James.E.Graf@ccmail.jpl.nasa.gov), or Timothy Liu, (NSCAT Project Scientist, e-mail: liu@pacific.jpl.nasa.gov). Examples of synergistic applications scatterometer in the study of global cli-

mate and environmental changes can be found at <http://airsea-www.jpl.nasa.gov/>.

PICES Annual Meeting

1996 - Nanaimo, Canada; 1997 - Korea

The PICES 1996 meeting will be held 11-20 October in Nanaimo, British Columbia, Canada.

The Republic of Korea has confirmed that it will host the Sixth Annual Meeting in Korea in October, 1997.

Terms of Reference of New WGs

Working Group 10: Circulation and Ventilation in the Japan Sea (East Sea) and its adjacent areas

- Review the present level of knowledge of the oceanic circulation and ventilation in this area, and identify knowledge gaps.
- Review the ongoing and planned scientific programs in this area, and identify gaps.
- Review studies relating chemical, biologic and geophysical regimes, and encourage interactive understanding and planning of multidisciplinary experiments.
- Identify the scientific and logistical difficulties of ocean studies in the area.
- Encourage the planning of experiments and discussion relating to physical processes in the area.

Working Group 11: Consumption of Marine Resources by Marine Birds and Mammals in the PICES Region

- In order to evaluate the effects of predation by marine birds and mammals on intermediate and lower trophic levels of subarctic Pacific marine ecosystems, the Working Group will:
 - Obtain and tabulate available data on population sizes and prey consumption by marine birds and mammals.
 - Calculate seasonal and annual consumption, expressed as numbers and biomass, of particular marine resource species by particular bird and mammal populations.

- Where possible, stratify the calculation as to age classes of prey and locality (local stock impacted).
- Prepare a report for PICES describing data sources and methods of calculation, and the results, and identifying major lacunae in knowledge.

Working Group 12: Crabs and Shrimps

Because of recent changes in the abundance of crabs and shrimps and their economic consequences in the PICES region, the Working Group is established to:

- Identify the persons performing scientific work on the distribution, recruitment, larval transport, migration, population dynamics, and influences of environmental conditions for crabs and shrimp in the PICES region.
- Identify data that are available that would assist in the analyses of factors affecting abundance trends.
- Review current knowledge of factors affecting abundance and survival of crabs and shrimp and identify the key scientific questions relating to the understanding of the reasons for abundance fluctuations.
- Exchange data on the abundance of crabs and shrimp stocks in the PICES region.

Meetings of Interest

The following is a sample of future meetings that might be of interest. Your help in making a more comprehensive list would be greatly appreciated.

1996

Jan 22-25: 9th Western Groundfish Conference; Newport OR, USA. (Elaine Stewart; ODFW, 2040 SE Marine Science Drive, Newport OR, USA 97365)

Jan 22-26: International Symposium on CO₂ in the Oceans; Mayaguez, Puerto Rico. (Frank J. Millero, Univ. of Miami, RSMAS, MAC, 4600 Rickenbacker Cswy, Miami FL, USA 33149; e: fmillero@rsmas.miami.edu; t: 305-361-4707; e: gingram@rsmas.miami.edu; f: 305-361-4144)

Feb 9-10: CREAMS Workshop; Vladivostok, Russia. (Yuri Volkov, Far Eastern Hydrometeorological Research Institute, 24 Fontannaya St., Vladivostok 690600, Russia; e: fehri@stv.sovam.com; f: 4232-22-7754; t: 4232-26-9788)

Feb 12-16: AGU/ASLO Ocean Sciences Meeting; San Diego CA, USA. (Suzette Kimball, American Geophysical

Union; e: suzette_kimball@nps.gov, or Polly Penhale, American Society of Limnology and Oceanography; e: ppenhale@nsf.gov)

Feb 25-28: 11th International Symposium on Okhotsk Sea & Sea Ice "The Workshop on International Multidisciplinary Plans in the Sea of Okhotsk"; Mombetsu, Hokkaido, Japan. (Soshi Hamaoka, Dept. of Planning and Coordination, Mombetsu Municipal Office, Saiwai-2, Mombetsu, Hokkaido, Japan 094; t: 01582-4-2111; f: 01582-3-1833. Or Kunio Shirasawa; e: kunio@lt.hines.hokudai.ac.jp).

Feb 29-Mar 1: International Workshop on the Okhotsk Sea and Arctic; the Physics and Biogeochemistry Implied to the Global Cycles -- Influence of Sea Ice on Climate and Marine Ecosystem; Tokyo, Japan. (Takatoshi Takizawa, Ocean Research Department, JAMSTEC, 2-15 Nat-sushima, Yokosuka, Kanagawa, Japan 237; t: 0468-67-5571; e: takizawat@jamstec.go.jp; f: 0468-65-3202)

Mar 5-8: Oceanology International 96; Brighton, UK. (Angela Pederzoli, OI96, Spearhead Exhibitions Ltd, Ocean House, 50 Kingston Rd., New Malden, Surrey KT3 3LZ, UK; e: oi96@spearhead.co.uk; f: 0181-949-8186; t: 0181-949-8186/8193)

Apr 3-12: World Submarine Invitational '96; San Diego California, USA. (Kevin Hardy, UCSD, San Diego, California, USA; e: khardy@ucsd.edu or Jim Richardson; e: 71233.2475@compuserve.com)

Apr 16-18: HYDROTOP 96; Marseille, France. (c/o Association SIEM, 314 Avenue du Prado, 13008 Marseille, France; f: 33-91-22-71-71; t: 33-91-22-72-72)

May 6-10: 21st General Assembly of European Geophysical Society; Den Haag, The Netherlands. (EGS Office, Postfach 49, Max-Planck-Str. 1, 37189 Katlenburg-Lindau, Germany; e: egs@linax1.dnet.gwdg.de; t: 49-5556-1440; f: 49-5556-4709)

May 13-16: EnviroAnalysis'96 The Biennial International Conference on Chemical Measurement and Monitoring of the Environment; Ottawa, Canada. (Secretariat, Dept. of Chemistry, Carleton University, 1125 Colonel By Drive, Ottawa ON, Canada K1S 5B6; e: rburk@ccs.carleton.ca; http://www.carleton.ca/~rburk/env96.html)

May 14-15: GOOS Priorities Agreements Meeting (by invitation); Washington DC, USA. (US GOOS Project Office, NOAA/NOS, 1305 East-West Highway, Silver Spring MD, USA 22901; t: 301-713-3063; f: 301-713-4307; e: usgoos@nos.noaa.gov)

May 19-22: 6th Annual Meeting of SETAC-Europe; Taormina, Sicily, Italy. (Rod Parrish, Soc. of Environmental Toxicology and Chemistry, 1010 N. 12th Ave., Pensacola FL, USA 32501; t: 904-469-1500; f: 904-469-9778)

May 26-31: 30th Congress of Canadian Meteorological and Oceanographic Society; Toronto, Ontario, Canada. (David Hudak; t: 905-833-3896 Ext. 242; f: 905-833-

0398; e: cmos_lac@chinook.physics.utoronto.ca. Or Ted Shepherd; e: cmos_sci@chinook.physics.utoronto.ca; f: 416-978-8905)

Jun 11-14: APFIC Symposium on Environmental Aspects of Responsible Fisheries; Seoul, Korea. (Veravat Hongskul, APFIC Secretary, FAO Regional Office for Asia and the Pacific, Bangkok 10200; t: 662-281-7844; e: FAO-RAPA@cgnet.com; f: 662-280-0445)

Jun 17-20: 25th APFIC Session; Seoul, Korea. (Veravat Hongskul, Asia-Pacific Fishery Commission, FAO Regional Office for Asia and the Pacific, Bangkok 10200; t: 662-281-7844; f: 662-280-0445; e: FAO-RAPA@cgnet.com)

Jun 17-22: 7th Pacific Congress on Marine Science and Technology (PACON 96); Honolulu HI, USA. Theme: Solutions for the Pacific Century. Room accommodations only contact: The Ilikai Hotel, Group Reservations (mention PACON), US 1-800-245-4524, Fax: 808-947-0892 and International 1-800-645-5687. (PACON International, P.O. Box 11568, Honolulu HI, USA 96828; e: saxena@wiliki.eng.hawaii.edu; t: 808-956-6163; f: 808-956-2580; e: pacon@wiliki.eng.hawaii.edu)

Jun 23-28 PICES-GLOBEC CCCC Workshop on Conceptual/Theoretical Studies and Model Development; Nemuro, Hokkaido, Japan. (PICES Secretariat, c/o Institute of Ocean Sciences, P.O. Box 6000, Sidney BC, Canada V8L 4B2; e: pices@ios.bc.ca; t: 604-363-6366; f: 604-363-6827)

Jun 24-27: 2nd International Airborne Remote Sensing Conference and Exhibition: Technology, Measurement, & Analysis; San Francisco CA, USA. (Robert Rogers, ERIM, Box 134001, Ann Arbor MI, USA 48113-4001; t: 313-994-1200 Ext. 3382; f: 313-994-5123; e: rogers@erim.org; <http://www.erim.org/CONF/conf.html>)

Jun 24-29: 8th International Coral Reef Symposium; Panama. (Maria Majela Brenes P., Convention Manager, STRI Unit 0948, APO AA, USA 34002-0948; f: 507-280970; e: stri01.naos.brenesm@ic.si.edu)

Jul 1-6: International Institute of Fisheries Economics and Trade Conference; Marrakesh, Morocco. (Ann L. Shriver, IIFET, 213 Ballard Hall, Oregon State University, Corvallis OR, USA 97331-3601, e: shrivera@ccmail.orst.edu)

Jul 8-11: Scientific Meeting on Marine Environment and the Global Change Programs. The Oceanography Society (TOS) in cooperation with WCRP, IGBP, HDP and SCOR; Amsterdam, The Netherlands (TOS, 4052 Timber Ridge Dr., Virginia Beach, VA, USA t: 804-464-0131; f: 804-464-1759; e: jrhodes@ccpo.odu.edu)

Jul 14-17: 15th International Conference of the Coastal Society, "Seeking Balance: Conflict, Resolution and Partnership"; Seattle, Washington, USA. (Megan Bailiff; http://www.wsg.washington.edu/conferences/coastal_society.html; e: mbailiff@u.washington.edu)

Jul 14-18: International Congress on the Biology of Fishes; San Francisco CA, USA. (Alec Maule, NBS CR Lab, 55101A Cook Underwood Rd., Cook WA, USA 98605; e: alec_maule@nbs.gov; t: 509-538-2299; f: 509-538-2843)

Jul 14-21: Space Studies of the Earth's Surface in 31st COSPAR Scientific Assembly, Special Session "Satellite Altimetry for Ocean Circulation Study"; Birmingham, UK. (COSPAR'96, Universal Conference Consultants, China Court Business Centre, Ladywell Walk, Birmingham B5 4RX, UK; e: cospar96@star.sr.bham.ac.uk; f: 44-121-622-2333; t: 44-121-622-3644; Telnet 134.76.29.69 via Internet, Username = COSPAR96, Password = COSPAR96; <http://www.mpae.gwdg.de/COSPAR/COSPAR.html>)

Jul 23-27: Western Pacific Geophysics Meeting; Brisbane, Australia. (Program Coordinators for Ocean Sciences Special Sessions: Eric Lindstrom; e: woce@access.digex.net. Or Angus McEwan; e: mcewan@bom.gov.au)

Jul 28-Aug 2: The 2nd World Fisheries Congress: Developing and Sustaining World Fisheries Resources: The State of Science and Management; Brisbane, Australia. (Secretariat, P.O. Box 1280, Milton Brisbane, Queensland 4064, Australia; e: fish96@sunray.im.com.au; f: 617-3369-1512; t: 617-3369-0477)

Aug 12-17: Coastal Zone '96; Rimouski, Quebec, Canada. (Secretariat, Groupe de recherche en environnement c; tier (GREC), Univ. du Quebec, 310 allée des Ursulines, Rimouski, Quebec, Canada G5L 3A1)

Aug 13-16: Pacific Ocean Remote Sensing Conference "Ocean Science and Probing"; Victoria BC, Canada. (Jim Gower, PORSEC'96, Inst. of Ocean Sciences, P.O. Box 6000, Sidney BC, Canada V8L 4B2; f: 604-363-6479; e: gower@ios.bc.ca; t: 604-363-6558)

Aug 19-23: WOCE Pacific Workshop; Newport Beach, California, USA. (Sasha Walters, US WOCE Office, 305 Arguello Drive, College Station, Texas, USA 77840; t: 409-845-1443; f: 409-845-0888; e: swalters@astra.tamu.edu; <http://www-ocean.tamu.edu/WOCE/uswoce.html>)

Sept 4-6: NAFO Workshop "Assessment of Ground-fish Stocks Based on Bottom Trawl Survey Results"; Dartmouth, Nova Scotia, Canada. (Hans Lassen, Danish Institute for Fisheries Research, Charlottenlund Slot, DK-2920 Charlottenlund, Denmark; t: 4533-96-3300; f: 4533-96-3333; e: hl@dfu.min.dk. Or Tissa Amaratunga, NAFO Secretariat, P.O. Box 638, Dartmouth, Nova Scotia, Canada B2Y 3Y9; t: 902-469-9105; f: 902-469-5729)

Oct 7-11: Radionuclides in the Oceans, Part 1; Cherbourg, Océville, France. (IPSN, Cherbourg, France; t: 33-3301-4100)

Oct 11-20: PICES 5th Annual Meeting; Nanaimo BC, Canada. (PICES Secretariat, c/o Institute of Ocean Sciences, P.O. Box 6000, Sidney BC, Canada V8L 4B2; t: 604-363-6366; f: 604-363-6827; e: pices@ios.bc.ca)

Oct 21-24: International Symposium on Geology and Geophysics of the Indian Ocean; Goa, India. (Madhusudana Rao, National Institute of Oceanography, Dona Paula, Goa, India 403 004; f: 91-832-223340)

Oct 21-25: The Third International Conference on the Marine Biology of the South China Sea; Hong Kong. (Secretary, 3rd ICMBSCS, The Swire Institute of Marine Science, The Univ. of Hong Kong, Cape d'Aguiar, Shek O, Hong Kong; t: 852-280-92179; f: 852-280-92197; e: swireml@hkucc.hku.hk)

Oct 21-26: NPAFC 4th Annual Meeting; Tokyo, Japan. (North Pacific Anadromous Fish Commission, 6640 Northwest Marine Drive, Vancouver BC, Canada V6T 1X2; e: wmorris@unixg.ubc.ca; t: 604-228-1128; f: 604-228-1135)

Oct 28-29: International Symposium on Assessment and Status of Pacific Rim Salmonid Stocks; Sapporo, Hokkaido, Japan. (Hisashi Endo, NPAFC Secretariat, 6640 Northwest Marine Drive, Vancouver BC, Canada V6T 1X2; e: endo@unixg.ubc.ca; t: 604-228-1128; f: 604-228-1135)

Oct 29-Nov 1: CalCOFI Conference; Asilomar CA, USA. "The Symposium of the Conference, organized by John Hunter and Anne Hollowed, will concern the biology of Pacific hake (whiting)" (George Hemingway or Mary Olivarría, MLRG, Scripps Inst. of Oceanography, La Jolla California, USA 92093-0227; t: 619-534-4236/2868; e: ghemingway@ucsd.edu; e: molivarría@ucsd.edu; f: 619-534-6500)

Nov 1-8: The 3rd International Symposium on Flatfish Ecology; Texel, The Netherlands. (Netherlands Institute for Sea Research (NIOZ), P.O. Box 59 1970 AB Den Burg, Texel, The Netherlands)

Nov 13-15: International Symposium on the Role of Forage Fishes in Marine Ecosystems; Anchorage AK, USA. (Brenda Baxter, Alaska Sea Grant College Program, Univ. of Alaska, PO Box 755040, Fairbanks AK, USA 99775-5040; e: fnbrb@aurora.alaska.edu; t: 907-474-6701; f: 907-474-6285)

Nov 17-22: 17th Annual Meeting of SETAC-North America; Washington DC, USA. (Rod Parrish, SETAC, 1010 N. 12th Ave., Pensacola FL USA 32501; t: 904-469-1500; f: 904-469-9778)

Nov 25-27: International Symposium on Benguela Dynamics: Impacts of Variability on Shelf-Sea Environments and their Living Resources; Cape Town, South Africa. (The BEP Symposium Secretariat, Dept. of Zoology, Univ. of Cape Town, Rondebosch 7700, South Africa; e: bep@ucthpx.uct.ac.za; f: 27-21-685-3937)

1997

March 17-19: 4th Thematic Conference on Remote Sensing for Marine and Coastal Environments; Orlando, Florida, USA. (Robert Rogers, ERIM, Box 134001, Ann Arbor MI, USA 48113-4001; t: 313-994-1200 Ext. 3382; f: 313-994-5123; e: rogers@erim.org)

Apr 6-10: 7th Annual Meeting of SETAC-Europe; Amsterdam, The Netherlands. (Rod Parrish, SETAC, 1010 N. 12th Ave., Pensacola FL, USA 32501; t: 904-469-1500; f: 904-469-9778)

Apr 7-11: Radionuclides in the Oceans, Part 2; Norwich and Lowestoft, UK. (MAFF, Lowestoft, UK; t: 44-1502-562244)

Sept 2-14: The Summit of the Sea; St. John's, Newfoundland, Canada. (Dave Finn, Summit of the Sea John Cabot 500th Anniversary Corporation, P.O. Box 1997, 1 Crosbie Place, St. John's, Newfoundland, Canada A1C 5R4; e: david.finn@porthole.entnet.nf.ca; t: 709-579-1997; f: 709-579-2067)

Sept 10-12: NAFO Symposium "Visioning Sustainable Harvests from the Northwest Atlantic in the Twenty First Century"; St. John's, Canada. (Hans Lassen, Danish Institute for Fisheries Research, Charlottenlund Slot, DK-2920 Charlottenlund, Denmark; t: 4533-96-3300; f: 4533-96-3333; e: hl@dfu.min.dk. Or Tissa Amaratunga, NAFO Secretariat, P.O. Box 638, Dartmouth, Nova Scotia, Canada B2Y 3Y9; t: 902-469-9105; f: 902-469-5729)

Oct 8-11: International Symposium on Fisheries Stock Assessment Models for the 21st Century: Multiple Information Sources. 15th Lowell Wakefield Symposium; Anchorage, Alaska, USA. (Brenda Baxter, Alaska Sea Grant College Program; e: fnbrb@aurora.alaska.edu; f: 907-474-6285; t: 907-474-6701)

Week following Oct 10: PICES 6th Annual Meeting; Korea. (PICES Secretariat, c/o Institute of Ocean Sciences, P.O. Box 6000, Sidney BC; Canada V8L 4B2; t: 604-363-6366; f: 604-363-6827; e: pices@ios.bc.ca)

Last week of October: The 5th Indo-Pacific Fish Conference; Noumea, New Caledonia. (Bernard Seret, ORSTOM, Museum National Histoire Naturelle, Laboratoire d'Ichtyologie generale et Appliquee, 43 rue Cuvier 75231 Paris, France; f: 33-140-793771; e: seret@mnhn.fr. Or Michel Kulbicki, ORSTOM BP A5 Noumea, New Caledonia; f: 687-264326; e: kulbicki@noumea.orstom.nc)

Oct 27-31: NPAFC 5th Annual Meeting; Victoria BC, Canada. (North Pacific Anadromous Fish Commission, 6640 Northwest Marine Drive, Vancouver BC, Canada V6T 1X2; t: 604-228-1128; f: 604-228-1135)

Nov 16-21: 18th Annual Meeting of SETAC-North America; San Francisco CA, USA. (Rod Parrish, SETAC, 1010 N. 12th Ave., Pensacola FL, USA 32501; t: 904-469-1500; f: 904-469-9778)



PICES New Officers

The Vice Chairman of Governing Council Mr. Cong-meng Liu's (Peoples Republic of China) term of office has come to an end and Dr. Hyung-tack Huh of the Republic of Korea has been elected for a two-year term. The Chairman of Science Board Dr. Dan Ware's (Canada) term has ended and Dr. Makoto Kashiwai of Japan has been elected to a three year term. Chairmen of three of the Scientific Committees have also served their terms and were replaced as follows:

BIO (Biological Oceanography Committee): Dr. Michael Mullin (USA) replaced by Dr. Patricia Wheeler (USA).

MEQ (Marine Environmental Quality Committee): Dr. Jia-yi Zhou (China) replaced by Dr. Richard Addison (Canada).

POC (Physical Oceanography and Climate Committee): Dr. Yutaka Nagata replaced by Dr. Paul LeBlond (Canada).

The FIS (Fishery Science Committee) Chairman Dr. Qi-sheng Tang (China) will serve one more year to fulfill his term of three years.

CCCC Workshop in Nemuro

A PICES-GLOBEC CCCC (Climate Change and Carrying Capacity Program) Workshop on Conceptual / Theoretical Studies and Model Development will be held June 23-28 this year in Nemuro, Hokkaido, Japan.

PICES Publication List

The following publications are available upon request, free of charge, as long as stocks last.

1. Annual Report
1992 (out of stock)
1993 (out of stock)
1994
1995
2. PICES Press
Vol. 1 No. 1, June 1993 (out of stock)
Vol. 2 No. 1, January 1994 (out of stock)
Vol. 2 No. 2, July 1994

Vol. 3 No. 1, January 1995

Vol. 3 No. 2, July 1995

Vol. 4 No. 1, January 1996

3. PICES Scientific Report Series
No. 1: Part 1: Coastal Pelagic Fishes
Part 2: Subarctic Gyre
(130pp., October 1993) (out of stock)
No. 2: The Okhotsk Sea and the Oyashio Region
(227pp., April 1995) (out of stock)
No. 3: Monitoring Subarctic North Pacific Variability
(94pp., December 1995)
4. The PICES Papers: Reports of Meetings Leading to the Establishment of the North Pacific Marine Science Organization (PICES), 1978 - 1992. (143pp., 1994)
5. PICES Scientific Workshop
Part A: Summary Report and Review Papers
(90pp., December 1991)
Part B: National Reports
(115pp., December 1991)

PICES News E-mail Distribution

We are distributing, via e-mail, news and information on marine sciences in the North Pacific. More than 900 scientists from 32 countries all over the world are currently on the e-mail list.

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