ISSN 1195-2512

PICES PRESS

Jan. 1994 Vol. 2 No. 1

The Second Annual Meeting

The Second Annual Meeting of PICES took place at the NOAA Sand Point facilities in Seattle, Washington, on October 25-30, 1993. Dr. D. James Baker, Under Secretary of Commerce for Oceans and Atmosphere gave the address of welcome to the participants.

In addition to meetings of the standing committees of PICES, scientific sessions on important topics took place. 234 people attended the meetings from Canada(25), Japan(36), China(11), Russia(10), Korea(3), and the USA (149). A total of 80 papers were presented during the four days.

Scientific session topics included marine environmental quality and contaminants, biological contaminants such as exotic organisms carried in ship's ballast waters, ocean circulation and climate variability, physical oceanography and climate, fishery science, and factors leading to shifts in fish abundance and species dominance in coastal waters. These topics are of great importance in the North Pacific, both from the perspective of the state of health of the North Pacific ecosystem and its resources, and from the standpoint of understanding ocean processes and phenomena such as global climate change.

PICES is a broad, multidisciplinary organization involving scientific interests in oceanography, ocean chemistry, modeling, fisheries, climate and marine environmental quality. There are four standing committees-- Physical Oceanography and Climate (POC), Fishery Science (FIS), Biological Oceanography (BIO) and Marine Environmental Quality (MEQ). The four standing committees received reports and recommendations from six Working Groups. The Working Groups met prior to the Annual Meeting in Nemuro, Japan, Anchorage, and Seattle, USA. Advice from the working groups was reviewed by the standing committees and forwarded to the PICES Science Board (SB) which formulated recommendations for consideration by the Governing Council of the Organization.

Priority scientific issues identified during Committee meetings included the need to better understand variability of ocean characteristics and its effects on important resources such as fish populations as well as ocean circulation and mixing phenomena in the North Pacific. Of particular interest were discussions on the subarctic gyre and the carrying capacity in relation to salmon and other species. Human influences affecting runoff and coastal pollution are very important with respect to the ocean ecosystem and atmospheric transport of pollutants such as dioxins. Plastic pollution, radionucleides, and nutrient addition constitute important problems of concern to the participants, as is the increasing incidence of toxic algal blooms and the need to understand and predict occurrence of such blooms. There is increasing concern about ships' ballast water and the transport of exotic organisms that may be introduced to local waters.

Using fish scales, tree rings and other methods to examine historical trends in ecology and climatology are important methodologies that allow scientists to look back into the past and understand how the ocean and its resources vary. Studies of the feeding relationships, distribution and relationship of fish species to ocean conditions and how those conditions vary, are important in enabling scientists to explain and predict abundance of fish stocks and understand the ecosystem in the North Pacific. The PICES forum provides a very useful focus for discussion of these issues in the North Pacific and is unique in that no other organization provides for such a focus on the area.

Initiatives to hold three important scientific workshops were endorsed; specifically a workshop on monitoring subarctic ocean variability and a workshop to develop a PICES-GLOBEC international program on climate change and carrying capacity. A workshop in Vladivostok, prior to the Third Annual Meeting, to review present knowledge of oceanography and fisheries of the Okhotsk Sea and the Kuril Islands and the availability and exchange of data for implementing collaborative oceanographic research projects was supported.

The recommendations of the Science Board and the program adopted by the Governing Council address key scientific issues in the North Pacific. A broadly-based scientific program in ocean science, climate work and marine environmental quality is planned for the coming year and for the program at the Third Annual Meeting. Included is modeling of the Subarctic North Pacific, examination of the carrying capacity of the North Pacific ecosystem to produce fish such as salmon; the effect of climate and ocean variability on fish stocks and marine mammals, seabirds and other trophic levels; assembling information on Western and Eastern Pacific fish stocks, recruitment dynamics and the trophodynamics of coastal ecosystems.

In addition, the Organization agreed to accept the invitation from Japan to hold the next Annual Meeting in Nemuro, Japan, October 15-24, 1994. Representatives from the town of Nemuro attended the meeting and provided information to the participants and discussed arrangements.

Recommendations Adopted by Council

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

93/S/1: With the exception of Working Group 1, the Working Groups established during the First Annual Meeting will continue their work during the period prior to specific tasks as indicated. Working Group 2's second term of reference is modified to read "Identify the most important problems, scientific questions and knowledge gaps in sampling, analytical and assessment methodologies to evaluate marine environmental quality."

93/S/1.1: It is recommended that a new POC Working Group 7 on "Modeling of the Subarctic North Pacific Circulation" (Terms of Reference attached) be established to replace POC Working Group 1.

93/S/2: A technical report series, to be known as PICES *Scientific Reports*, will be established for publication of Working Group reports, data and information inventories, and workshop and symposium proceedings as appropriate. The Science Board will establish publication standards and serve as the editorial board.

93/S/2.1: The 1993 reports of Working Group 1 (Okhotsk Sea and Oyashio region), Working Group 3 (Coastal Pelagic Fish), and Working Group 6 (Subarctic Gyre) will be published in PICES Scientific Reports.

93/S/3: The Secretariat should strengthen communication among scientists, agencies, and organizations by means of electronic mail, facsimile, newsletter and other appropriate means.

93/S/4: PICES should encourage the exchange of scientific data, information, and research plans among its members and other Pacific Rim countries. In this connection, Contracting Parties should review constraints on data exchange in their laboratories with a view to facilitating data exchange. The Science Board should compile information on data access problems that are brought to their attention.

93/S/5: The Secretariat, with the help of the Working Group on Data Exchange and other Working Groups and Scientific Committees as appropriate, should initiate the following tasks:

1. Prepare, update when appropriate, and distribute inventories of physical, chemical, and biological data sets held by member states and other countries pertaining to the area of interest.
2. Encourage and facilitate deposition in international archives of unclassified and non-routine data sets with special attention to regions where data are now scarce.

93/S/6: A Workshop on *Monitoring Subarctic Pacific Ocean Variability* should be organized by the Science Board to be held in association with PICES III. The workshop should review current programs devoted to monitoring ecosystems, their atmospheric, oceanic, and anthropogenic forcing, and their biological productivity; and, taking into account relevant existing and planned international programs such as GOOS, should advise on a strategy for developing a PICES monitoring program.

93/S/7: The Secretariat, in consultation with Science Board, should develop and circulate a proposal for a visiting scientist program, and, when agreement has been reached as to its character and dimensions, should consult with Contracting Parties and other potential sources of funding.

93/S/8: A Workshop on the *Okhotsk Sea and Kuril Region* should be organized in Vladivostok to review present knowledge of oceanography and fisheries and the availability and exchange of data for implementing collaborative oceanographic research projects in the region for initial consideration by PICES III. The physical Oceanography and Climate Committee should take the lead in establishing a Workshop Steering Committee which should also include representatives of the Biological Oceanography and Fishery Science Committees, and Russian laboratories in Vladivostok.

93/S/9: A workshop should be organized just prior to PICES III to develop a PICES-GLOBEC *International Program on Climate Change and Carrying Capacity*. Working Group 6 and Working Group 3 will take a lead role in establishing a Workshop Steering Committee that should also include representatives of the host agency, and relevant PICES Science Committee members. The Steering Committee and Working Group members should (a) develop a strategy for determining the carrying capacity of the subarctic Pacific for salmon and other high-trophic level, pelagic carnivores and its changes in response to climate variations, (b) develop a plan for a cooperative study of how changes in oceanic conditions affect the productivity of key fish species such as salmonids in the subarctic Pacific and clupeoids and scombrids in the coastal zones of the Pacific Rim. For example, further study of existing or new salmon scale samples would be profitable. Cooperation with the NPAFC and other appropriate bodies should be invited.

93/S/10: Working Group 3, renamed Working Group on Coastal Pelagic Fish, will (a) compile an inventory of scientists working on key pelagic fishes in various geographic areas of the region, (b) assemble information on western and eastern Pacific pelagic fish stocks from all sources with a view to completing an inventory and summary of these data by PICES III, (c) plan a pan-Pacific comparison of life table differences and recruitment based on these data, and (d) begin planning a comparative trophodynamic model study of coastal ecosystems around the Pacific rim, to understand how these important systems support pelagic fish biomass, and how changes in oceanic conditions may lead to changes in species dominance and abundance (93/S/5 and 93/S/9).

93/S/11: Working Group 4, renamed Working Group on Data Exchange, will have the major responsibility for assisting the Secretariat in implementing 93/S/5, and will give special attention to the problems of standards and methods for the exchange of fishery and other biological data.

93/S/12: Working Group 5 on the Bering Sea will (a) establish small tasks groups to work by E-mail in developing research strategies for the principal scientific questions developed during the first meeting with the goal of preparing a report on these strategies for consideration at PICES III, (b) organize a Symposium on the Bering Sea for presentation at the Fourth Annual Meeting, and (c) initiate preparation of a book reviewing present knowledge of the climatology, oceanography, and biology of the Bering Sea.

Chairman's Overview

The first year of PICES has been a learning experience. Could life be breathed into this structure which had been carefully constructed but which had not yet been test driven? A few weeks after the end of the Second Annual Meeting, some first results can be seen. The turnout of scientists and the quality of the scientific program was certainly impressive. Both the Science Board and the Governing Council functioned with a minimum of friction and a maximum of effectiveness. Meaningful scientific projects were identified, and a useful set of resolutions was adopted. Now we must transform these aspirations into reality, into actual scientific work that advances understanding of the subarctic Pacific. That transformation will depend on the quality of ideas and ingenuity of planning, on the enthusiasm and support of scientists and governments, and on the energetic backup of the Chairman and the Secretariat.

Another favorable outcome came from discussions with the North Pacific Anadromous Fish Commission where it was agreed that the two organizations could cooperate in examining the factors affecting current trends in the productivity of the North Pacific and their impacts on salmonid carrying capacity. The proposed PICES-GLOBEC Program on Climate Change and Carrying Capacity would seem a good mechanism for this cooperation.

Effective implementation of the PICES agenda will require active interaction among the participants, including suggestions and criticisms directed to me and to the Secretariat. E-Mail and facsimile can make communication nearly instantaneous - please let us know your views.

Warren S. Wooster
Marine Affairs HF-05, Univ. of Washington
Seattle, WA USA 98195-6000
Phone: (1-206)-685-2497
Fax: (1-206)-543-1417
Omnet: W.Wooster
Internet:wooster@u.washington.edu

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.

Note from Science Board Chairman

In the last newsletter I reported that there was considerable interest amongst PICES scientists to develop a PICES-GLOBEC program in the North Pacific. I would like to update you on the progress we have made since then.

At the October Annual Meeting, the Science Board proposed to Governing Council that the Coastal Pelagic Fish Working Group, and the Subarctic Gyre Working Group collaborate with an ad hoc Steering Committee to develop a scientific plan for a PICES-GLOBEC International Program on "Climate Change and Carrying Capacity" in the North Pacific, in time for the Third Annual Meeting. Governing Council accepted this proposal, and agreed that the scientific plan should outline a strategy: 1) for measuring the carrying capacity for salmon and other high-trophic level, pelagic carnivores in the subarctic Pacific; and 2) for measuring, and comparing, how changes in oceanic conditions affect the productivity of key species, notably clupeoids and scombrids, in the coastal seas around the Pacific Rim.

Although the details have yet to evolve, a PICES-GLOBEC program will likely take a broad ecosystem approach, with a strong emphasis on the coupling between oceanographic processes, plankton production, and fish production.

To get exposure to a wide range of viewpoints (and advice), the PICES-GLOBEC scientific plan will be discussed at a special workshop which is planned to be held immediately before the Third Annual Meeting in October 1994. Please write me (c/o the Secretariat) if you have some strong views on what should be done within the context of a program on "Climate Change and Carrying Capacity", and I will pass them to the appropriate people so your ideas are considered during the planning process.

Dan Ware
Pacific Biological Station
Hammond Bay Rd., Nanaimo
B.C., CANADA V9R 5K6
Phone: (1-604)756-7218
Fax: (1-604)756-7053
Omnet: PBS.NANAIMO

Snapshots from the Second Annual Meeting, Seattle, Oct. 25 - 30, 1993

Mr. J.S. Beckett, Drs. R.J. Beamish and J. Rice take great interest in the wines at the Wine and Cheese Party

Dr. Y. Sakurai gives a lecture to fellow Japanese scientists on ..., beer probably, judging from the response

Dr. D.J. Baker giving the welcoming speech at the Opening Session

Dr. S.J. Yoo, Mr. K.S. Park and Dr. I.W. Bang at the Wine and Cheese Party

Dr. V.G. Wespestad having a chat with Russian scientists Drs. E.P Dulepova, O.S. Temnykh, V. Karpenko and Mrs. O.G. Shevtsova.

Prof. J.M. Wallace giving the keynote lecture at the Opening Session

Drs. A.A. Elizarov and P. Agafonov having a relaxing moment at the Wine and Cheese Party

Dr. W.S. Wooster, Mr. J.S. Beckett and Mr. W.L. Sullivan

Dr. L. Jones captures the attention of Drs. J.R. Hunter and G.D. Stauffer

Dr. B.L. Norcross on the lookout while Prof. Q.S. Tang loads up on goodies at the dessert table of the Aquarium Dinner

A hearty CHEERS from the Canadian representatives Drs. J.F. Garrett and J.C. Davis

CHEERS from us too - Prof. Y.K. Xu and Mr. S.P. Chen

FEATURE ARTICLE

OCEANOGRAPHY FROM SPACE IN THE 1990s

William C. Patzert
Jet Propulsion Laboratory, MS300-323
4800 Oak Grove Drive
Pasadina, CA, USA 91109
Omnet: W.Patzert

During the 1990s, there is good news -- the space agencies of Canada, Europe, Japan and the United States will launch a constellation of ocean-related satellite missions. These spacecraft will carry a variety of already proven, ocean-measuring instruments -- altimeters (ALT), scatterometers (SCAT), synthetic aperture radars (SAR), ocean color radiometers (OC), passive microwave radiometers (MR), infra-red and visible (VS) radiometers (IR), and other complementary sensors.

As seen in the four tables below, a major new development is that the United States is no longer the only nor the prime player; bi- or multi-lateral sponsored missions will be the wave of the future. Fortunately, all the major oceanography interests will potentially be receiving "more-or-less" continuous data through the 1990s and into the next century. Space-based oceanography missions will collect global data that will be used to study ocean physics, air-sea interactions, marine meteorology, biological processes, sea ice, and a broad range of interdisciplinary problems. These ocean satellites have been planned to overlap in time and space with two major field programs, the World Ocean Circulation Experiment (WOCE) and the Tropical Ocean-Global Atmosphere (TOGA) program, as well as the many regional programs of the North Pacific PICES nations. Together, these satellite missions and in-situ experiments will provide the international science community with a bonanza of unique data. The resulting scientific studies are sure to provide a revolutionary new understanding of the Earth's ocean-atmosphere-cryosphere-biogeochemical climate system.

SCATTEROMETERS (SCAT)

Measuring near-surface vector winds over the global oceans, a scatterometer is already collecting data with an active microwave C-Band scatterometer onboard the European Space Agency's (ESA) first European Remote-Sensing (ERS-1) spacecraft. ERS-1 will be followed by ESA's ERS-2 in ~1994. Next to fly will be NASA's Ku-Band Scatterometer (NSCAT) aboard Japan's National Space Development Agency's (NASDA) first Advanced Earth Observing System (ADEOS-1) Satellite in 1996. ADEOS 1 will be followed in the late 1990s by ADEOS-2 carrying another NASA Ku-Band scatterometer sensor, SeaWinds. At the turn of the century, ESA will fly an advanced C-Band scatterometer (ASCAT) on their next-generation of Meteorological Operation Satellites (METOPS).

Table 1. SCATTEROMETER-RELATED SPACECRAFT: RECENT THROUGH NEXT DECADE

SATELLITE	SPONSOR	SENSORS/COMMENTS	LAUNCH	STATUS
ESA ERS-1	ESA	ALT, SAR, SCAT(C), IR	Jul. 1991	Operational
ESA ERS-2	ESA	ALT, SAR, SCAT(C), IR	1994+	Approved
ADEOS 1	JAPAN NASA	VS(AVNIR), OC(OCTS), Contribute NSCAT(Ku)	Early 1996	Approved Approved
ADEOS 2	JAPAN NASA	OC & VS(GLI), MR, IR SeaWinds(~Ku-SCAT)	1999+	Approved Approved
METOPS	ESA	ASCAT(C)		2000+ Proposed
EOS Series	NASA	ALT(proposed) Ku-SCAT(proposed)		2002+ Tentative Tentative

Thus, if all goes as presently planned, oceanographers and meteorologists can look forward to a decade of scatterometer measured vector winds over the global oceans.

ALTIMETERS (ALT)

The flight of active microwave altimeters for ocean circulation studies have begun with ESA's ERS-1; which was recently joined by the joint NASA/French Space Agency (CNES) TOPEX/POSEIDON advanced altimetric mission which was launched on August 10, 1992. Next, will come ESA's ERS-2 in late 1994. Beginning in ~1996, the US Navy plans to launch the first of two Navy Geodetic Satellite (GEOSAT) Follow-On altimetric missions. Aiming for a first launch in the late-1990s, NASA, NOAA, and CNES are considering jointly sponsoring a series of TOPEX/POSEIDON-class follow-on altimetric missions. ESA will also continue to fly altimeters on ESA's Environmental Satellite (ENVISAT) near the turn of the century.

The overlapping in time of altimetry and scatterometry missions will allow studies of the ocean circulation and its primary driving force, the surface vector winds.

OCEAN COLOR (OC)

An ocean color sensor (OC) for the study of ocean biological productivity will be flown onboard the US Sea-Viewing Wide Field Sensor(SeaWiFS) mission beginning in late-1994. SeaWiFS will be followed by the OCTS (Ocean Color Temperature Sensor) onboard the NASDA ADEOS spacecraft in 1996 and NASDA's next generation color sensor, the Global Imager (GLI), on ADEOS 2 at the end of this decade.

Table 2. ALTIMETER-RELATED SPACECRAFT: RECENT THROUGH NEXT DECADE

SATELLITE	SPONSOR	SENSORS/COMMENTS	LAUNCH	STATUS
GEOSAT	USN	ALT	Mar 1985	Completed late 1989
SPOT-2	CNES	DORIS(Tracking System)	Jan. 1990	Operational
ESA ERS-1	ESA NASA	ALT, SAR, SCAT, IR Alaska SAR Data Facility	Jul. 1991	Operational Operational
TOPEX/ POSEIDON	NASA CNES	ALT, GPS(Tracking), MR ALT, DORIS(Tracking),	Aug. 1992 Launch	Operational Operational
ESA ERS-2	ESA	ALT, SAR, SCAT, IR	1994+	Approved
GFO	USN	ALT	Mid-1996, ~2001	Approved
(2 GEOSAT Follow On Missions) Phase B Contract Awarded Aug. 92 (for #1)				
GAMES	CNES/NASA	GPS (Global Position System) for Gravity Field, applied to improving altimetry	~1998	Under Consideration
TOPEX/POSEIDON Follow-On	NASA/CNES NOAA	ALT, Tracking(GPS, DORIS) Ground System	~1998+	Under Consideration
ENVISAT	ESA	ALT, ASAR, OC(MERIS) ATSRR(MR), PRAREE(tracking system)	1998+	Approved
EOS Series	NASA	ALT(proposed) KuSCAT(proposed)	2002+	Under Consideration

Table 3. OCEAN COLOR-RELATED SPACECRAFT: RECENT THROUGH NEXT DECADE

SATELLITE	SPONSOR	SENSORS/COMMENTS	LAUNCH	STATUS
MOS-1	JAPAN	OC, VS, IR, MR	Feb. 1987	Operational
MOS-1B	JAPAN	OC, VS, IR, MR	Feb. 1990	Operational
SeaWiFS	(Orbit.Sci.Corp.) NASA	OC(8 bands) Data Purchase & Facility	Late 1994	Approved Approved
ADEOS 1	JAPAN NASA	VS(AVNIR), OC(OCTS) Contribute NSCAT(Ku)	Early 1996	Approved Approved
EOS AM & PM	NASA	OC & VS(MODIS N)	Late 1998	Approved
ENVISAT	ESA	ALT, ASAR, OC(MERIS) AATSR (MR), PRAREE (tracking)	1998+	Approved
SeaWiFS 2	NASA+TBD	OC, Data Purchase, etc.	1998	Under Consideration
ADEOS 2	JAPAN NASA	OC & VS(GLI), MR, IR SeaWinds(~Ku-SCAT)	1999+	Approved Approved

In the late 1990s, ESA will fly the Medium-Resolution Imaging Spectrometer (MERIS) color sensor and NASA's Earth Observing System (EOS) AM platform will carry the advanced, multi-use Moderate-Resolution Imaging Spectrometer (MODIS N) instrument. These measurements of ocean color (from which biological productivity can be calculated) studied in concert with altimetry and scatterometry data, and sea surface temperatures measured from the NOAA operational satellites, as well as others, will allow important studies of the thermal and biological response of the upper ocean to wind forcing and ocean circulation.

SYNTHETIC APERTURE RADARS (SAR)

For sea ice studies, a variety of synthetic aperture radars (SARs) are planned. ESA's ERS-1 is presently collecting excellent C-Band SAR data. In mid-1992, NASDA successfully launched the Japanese Earth Resources Satellite (JERS-1) which carries a L-Band SAR. Next will be ESA's ERS-1 follow-on, ERS-2, in 1994. In 1995, Canada's RADARSAT (Radar Satellite) will fly another C-Band SAR. At the end of the decade, ESA plans to fly an Advanced C-Band SAR (ASAR).

It should also be noted that throughout this decade, the passive microwave (MR) Special Sensing Microwave/Imager (SSM/I) sensor onboard the Defense Meteorological Satellite Program (DMSP) satellites will also be collecting complementary ocean and ice data. During the 1990s, polar oceanographers will have an unprecedented day-night, all-weather view of the ice-covered oceans.

Satellite oceanography was pioneered in the late 1970s through the 1980s with Seasat, Nimbus-7, and Geosat, as well as the passive microwave SSM/I sensor on the continuing DMSP satellites and the almost 20 year time series of infra-red (IR) Advanced Very High Resolution Radiometer (AVHRR) global sea surface temperature data from the NOAA polar-orbiting, operational birds. The successes of these missions and the hard work of the international ocean science community has resulted in the Canadian, European, Japanese, and US space agencies developing many ocean sensors for the next generation of Earth orbiting spacecraft. The message above is clear - through the 1990s and into the beginning of the next century we are going to be inundated with ocean data collected from space. For oceanographers, this will be a decade of tremendous new opportunities, a busy and exciting time for "Oceanography from Space."

Table 4. SAR-RELATED SPACECRAFT: RECENT THROUGH NEXT DECADE

SATELLITE	SPONSOR	SENSORS/COMMENTS	LAUNCH	STATUS
ESA ERS-1	ESA	ALT, SAR(C), SCAT, IR	Jul. 1991	Operational
	NASA	Alaska SAR Data Facility		Operational
NASDA JERS-1	JAPAN	SAR(L), High & Low Res. Visible(Stereo)	Feb. 1992	Operational
	NASA	Alaska SAR Data Facility		Operational
ESA ERS-2	ESA	ALT, SAR(C), SCAT, IR	1994+	Approved
RADARSAT	CANADA	SAR(C)	1995	Approved
	NASA	Contribute Launch		Approved
	NASA	Alaska SAR Data Facility		Approved
	NOAA	Distribute Data		Approved
ENVISAT	ESA	ALT, ASAR, OC(MERIS) ATSRR(MR),PRAREE(tracking)	1998+	Approved

Regional Environmental Satellite Monitoring

Emil E. Gherbek

The Institute of Automation and Control Processes in Vladivostok is able to provide support through the use of the Regional Environmental Satellite Monitoring (RESM) during your cruises or anytime should you request it.

Our RESM is based on daily real-time receiving and processing of NOAA/AVHRR imagery (HRPT/LAC format) from NOAA/9/10/11/12 satellites as well as on digitized geostationary GMS data. Our methods and software uses both orthodox and original techniques (e.g., triple-satellite NOAA/9/10/12 measurements). Our filtration techniques during cloudy weather is particularly important for the region. The RESM instrumental basis consists of the shore- based satellite receiving and processing system and (optional) shipboard one.

By means of RESM you can conduct object-oriented maritime studies: real-time planning of in-situ observations and ship's survey correction according to object's location, development and movements is possible. Real-time information concerning their object's propagation ways and natural traps (such as eddies, rings etc.) is available to biologists and ecologists.

RESM includes the following functions:
- providing for full-resolution 4-satellite NOAA-HRPT data;
- regular calculations of sea surface temperature fields and charts of various time and space scale (accuracy: 0.2-0.4 deg., even under cloudiness conditions);
- regular calculations of sea surface currents (accuracy: 8-12 cm/s) and wind (accuracy: 6-10 m/s) vector fields;
- selection and tracing of meso-scale natural objects (eddies, rings, sea currents and its meanders, frontal zones, ice fields, cyclones etc.); estimation of their short-term variability.

The system is located in Vladivostok, Russia, and covers a wide area from 17 to 62 N and to 160 E which includes the Okhotsk Sea, Sea of Japan, Yellow Sea, East China Sea and equatorial areas of Western Pacific.

Support can be provided as follows:

1) Regular RESM observations of areas or natural objects you choose; the results may be passed you by E-mail or post;

2) If you plan a maritime cruise, we can provide pre-expedition RESM observations of your cruise area; you can use the results to plan in-situ studies. During the cruise time, we can support your researches with RESM; you will obtain the results after completion of your cruise;

3) It is possible to install on board your vessel the digitized NOAA/APT System. Naturally, the RESM capabilities of the System are not as good as HRPT, but it will give you helpful information about movements and evolutions of your object of interest during the expedition; therefore it is possible to more accurately investigate areas of interest;

4) If you need detailed real-time information concerning structure changes and/or other time changes of your object of investigation, it is possible to get use of the R/V "AKADEMIK KOROLEV" (ship owner Far Eastern Hydrometeorological Institute) equipped with our Shipboard Satellite NOAA-HRPT System as well as various in-situ measuring devices. Although this way is complicated and expensive, it makes it possible to take a full advantage of RESM facilities and therefore to obtain more accurate and representative data. (We are now developing a compact shipboard NOAA/HRPT Station that will not require gyro-stable platforms; the Station will be able to be installed on relatively small vessels).

5) We are able to develop new methods and softwares to solve your problems by means of RESM.

For further information please contact:
Dr. Emil E. Gherbek,
Laboratory of Computer-Aided Measurements,
Institute of Automation and Control Processes
Far East Branch of Russian Academy of Sciences.
5 Radio St., Vladivostok 690041, RUSSIA
E-mail: herbek@iapu2.marine.su
Phone: (7-423-2) 310-468
Fax: (7-423-2) 310-452

Report on the Progress of the 1993 El Niño

Howard Freeland
Ocean Physics, Inst. of Ocean Sciences
P.O. Box 6000, Sidney
B.C., CANADA V8L 2B2
Omnet: IOS.BC Internet: hjfree@ios.bc.ca

The 1993 El Niño was a surprise only because it actually took place. An El Niño is a large scale perturbation in the climatic state of the equatorial Pacific. When an El Niño occurs it usually induces a warming of the surface waters around the Pacific Coast of N. America. All of the forecasting tools available in December 1992 were forecasting either normal conditions for 1993 or a La Niña (anti-El Niño or cold event). The 1993 El Niño can be rated as a weak to moderate event. As of today (13th Sept. 1993) the forecast is for normal conditions through the next few seasons. However, given the failure to predict this year's event all forecasts should be treated with caution.

The following notes will attempt to summarize how the 1993 event affected the coast of British Columbia.

The Institute of Ocean Sciences maintains a network of sampling stations around the coast of B.C., Canada. These sample sea-surface temperature and salinity daily and provide a monitoring capability on the climatic state of the ocean, locally. Most stations have been running since 1934. The following uses data from 3 stations that are well exposed to the Pacific Ocean.

Figure 1 shows a plot of sea-surface temperature (SST) sampled daily at Amphitrite Point on the south west coast of Vancouver Island. The shaded areas show the observed temperatures above or below normal. This shows that SSTs moved above normal in March of 1993. For the next few months the response to the El Niño was quite modest with SSTs only about 1°C above normal. In mid-May temperatures began to rise very rapidly and reached a peak of about 4°C above normal in late May and early June. This was then followed by a very rapid decline to near normal temperatures around June 5th. This appeared to be coincident with the establishment of winds from the and so, presumably the establishment of coastal upwelling systems.

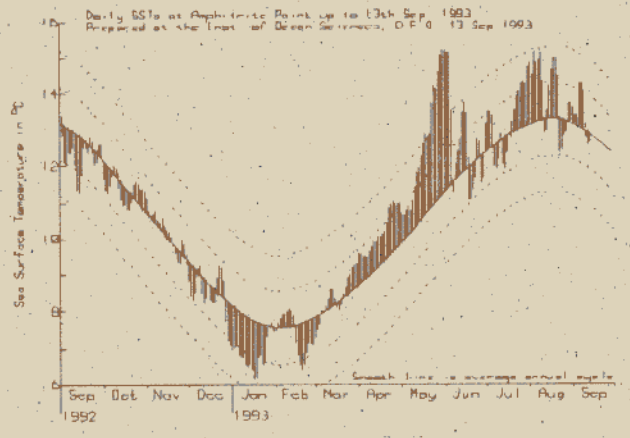


Fig. 1:. SSTs at Amphirtite Point

Figures 2 and 3 show the same kind of plot but for more northerly sites, Kains Island, near the entrance to Quatsino Sound off northern Vancouver Island and Langara Island at the NW tip of the Queen Charlotte

Islands. These show behaviors similar to that at Amphitrite Point, but the deviations from normal are not as large. As expected, Kains Island shows greater similarity with Amphitrite than does Langara.

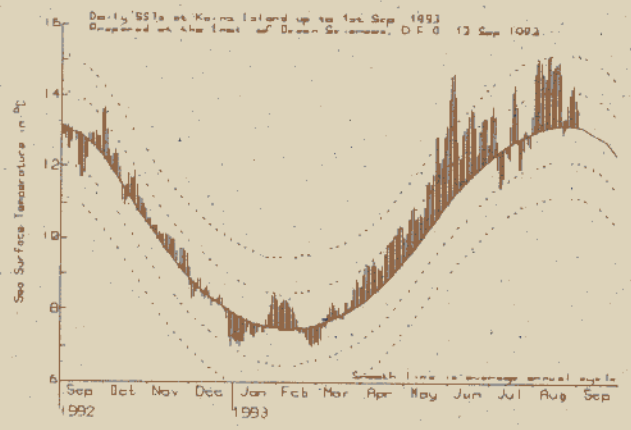


Fig.2: SSTs at Kains Island

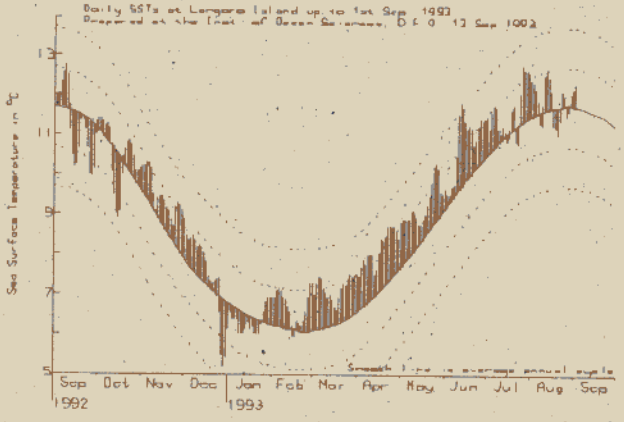


Fig.3: SSTs at Langara Island

Surveys conducted along Line-P on the Tully and by Department of National Defense (Canada) using air-dropped XBTs (AXBTs = Airdropped expendable bathythermographs) showed the distribution of the El Niño warming with depth and distance offshore. These showed in particular that in May 1993 the warming extended from the coast out 900 km and showed substantial warming over the top 100 meters of the ocean.

By late June, when DND completed the AXBT survey for us, the warming had extended to greater depth and showed clear evidence of the warming having been pushed away from the coast. In fact, despite the rapid drop in temperature at Amphitrite Point in early June, the N.E. Pacific was still affected by the 1993 El Niño in late June.

The IGOSS (Integrated Global Ocean Survey System) receives XBT survey information from ships of opportunity from which maps of, among other things, sea-surface temperature distribution can be made. The IGOSS maps of sea surface temperature anomalies (deviations from normal) show the evolution of the Pacific Warm event on the very largest scale over the last 4 months.

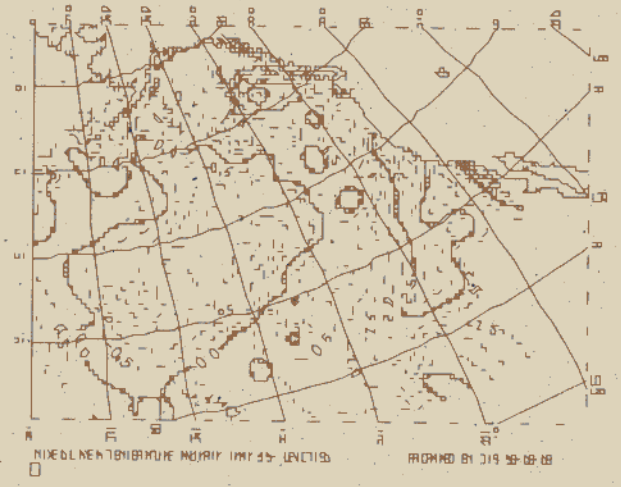


Fig. 4: SST anomalies in May

Figure 4 shows the deviations from normal in May 1993. The coastal strip (within 1000 km of the coast of N. America) shows water warmer than normal with deviations up to 4°C above normal off northern California. Off the BC coast the deviations are more moderate with temperatures running about 2°C above normal. In the far central Pacific (centered on 35°N and 150°W) there is a large cold pool.

In Figure 5 the temperatures for June show a very similar pattern. Deviations off the coast of BC remained around 2°C above normal, but the very large deviations from normal off northern California have been reduced by about ½°C. The central Pacific cold pool appears to be sending a tongue of cool water along the approximate path of the sub-arctic current in the general direction of British Columbia.

In Figure 6 the evolution continues. The cold pool has been split into two regions, one that resides near the dateline and one that appears to be the remnant of the tongue mentioned above. The tongue is now very near the coast of BC. According to this map temperatures remain very high in the Alaska Gyre well north of BC, but this warm are is based on only a single observation. (The data coverage in the Alaska Gyre for July 1993 was extremely poor.) South of B.C. temperature deviations remain relatively high but are continuing to decline.

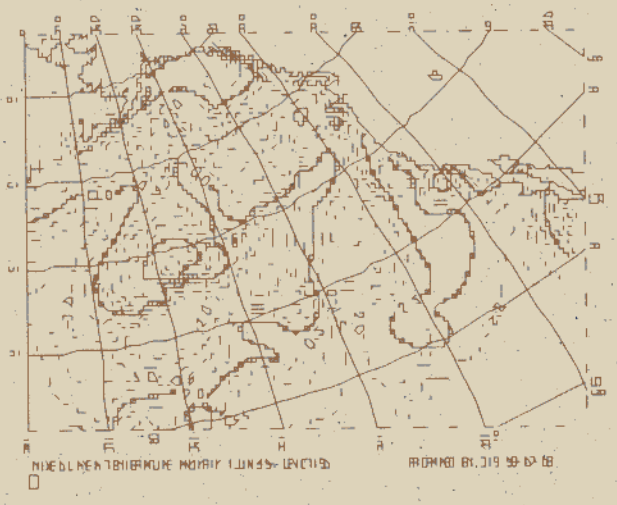


Fig. 5: SST anomalies in June

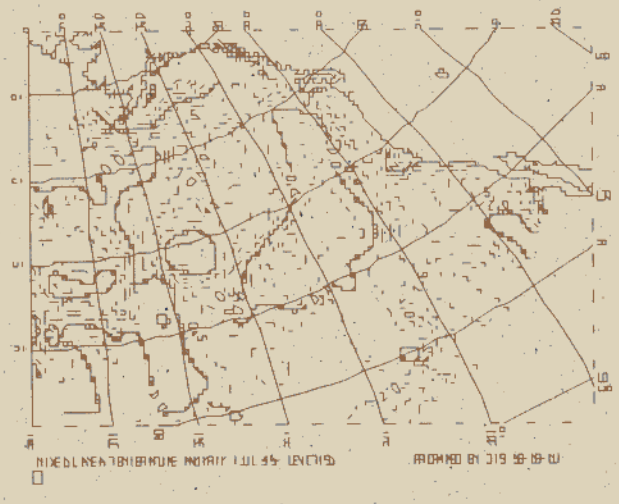


Fig. 6: SST anomalies in July

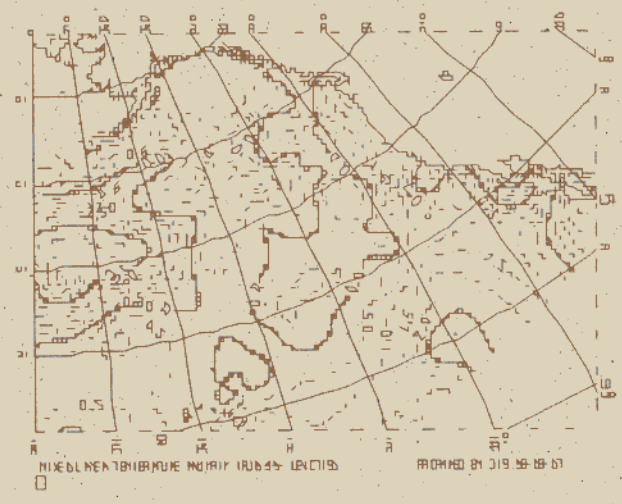


Fig. 7: SST anomalies in August

In Figure 7 the warm Gulf of Alaska has disappeared (presumably because of the one erratic observation in July). The cold tongue has reached the coast of British Columbia and SSTs in the Pacific N.W. have returned to normal. In the far south of the map SSTs appear to have gained ½°C or so, but the data coverage in that area is poor.

On the equator, where the El Niño is forced, conditions have remained somewhat puzzling. By the end of July 1993 sea surface elevations and temperatures had returned to normal, but the southern oscillation index (SOI) remains persistently negative. The SOI is normalized by its own standard deviation, so the present deviation of -1.4 is not large, just 1.4 standard deviations below normal. But it has remained negative ever since this minor El Niño began. Winds on the equator are anomalously weak. In previous El Niño episodes like this one the SOI moves close to zero, rarely actually reaches the zero value and starts varying between +1.5 and -1.5 standard deviations, so this El Niño does appear to be terminating in a somewhat unusual fashion. This will bear watching.

Occurrence of Pacific (Chub) Mackerel off the B.C. Coast: 1993

Dan M. Ware and Brent Hargreaves
Pacific Biological Station
Hammond Bay Rd., Nanaimo
B.C., CANADA V9R 5K6
Omnet: PBS.NANAIMO
Internet: wared@pbs.dfo.ca
Internet: hargreavesb@pbs.dfo.ca

Pacific mackerel spawn off southern California. When a high stock abundance and unusually warm temperatures coincide, large numbers of Pacific (and Jack) mackerel migrate as far north as British Columbia and southeast Alaska to forage in the summer. These conditions occurred during the strong El Niño events of 1940, 1941, 1983, and 1993, but not during the 1958 event, when the mackerel stock biomass was at a low level. In normal, or cool summers, very few mackerel are seen in Canadian coastal waters. Since mackerel are significant predators of juvenile salmon and herring, their appearance in large numbers is now regarded as a harbinger of poor survival, particularly in the west coast of Vancouver Island stocks.

As Howard Freeland points out in this newsletter, the 1993 El Niño did not develop off B.C. until March. Water temperatures were moderately above normal until late May, but then soared to 4°C above normal, until early June when coastal upwelling (and cooler temperatures) began.

The following mackerel observations and sightings along the B.C. coast last summer were contributed by numerous commercial and sports fishermen, and Department of Fisheries and Oceans (DFO) Fishery Officers and research staff. We are greatly indebted to them for collectively reporting the chronology of the 1993 mackerel migration:

May 10. The first mackerel were sighted in B.C. off Tofino (49°N). There were no sightings in Barkley Sound before May 22. A sport fishing charter operator observed a striking increase in the clarity of the water in Barkley Sound on May 22. With the appearance of this "blue" water, mackerel moved into Barkley Sound, and in only two days had penetrated 46 km inland to the head of Alberni Inlet. Studies conducted by DFO staff indicated heavy predation by mackerel on juvenile herring and salmon in both Barkley and Nootka (49.5°N) Sounds.

May 10-20. Salmon sport fishermen reported catching mackerel along the coast between Tofino and Nootka Sound. A DFO biologist also caught four Pacific mackerel in a bottom trawl off Nootka Sound on May 16. Based on the May sightings, the mackerel schools appeared to be moving northward along the west coast of Vancouver Island at an average speed of about 21-23 km/day.

Early June. Large numbers of mackerel were observed in Quatsino Sound (50.5°N) and Pt. Hardy (Queen Charlotte Strait, 50.5°N).

Mid-June. Sport and commercial fishermen reported catching mackerel in the northern and southern portions of the Strait of Georgia (49°N).

Late June-early July. Pacific and Jack mackerel were sighted in Smith and Rivers Inlets (51°N), and along the west coast of the Queen Charlotte Islands (52-54°N). Mackerel in Kano Inlet (53.3°N) were observed eating herring and sand lance. The schools were still there in late-August, and had lots of body fat. Pacific mackerel were caught by sports fisherman in the southern Strait of Georgia between July 6 and 11.

Late July. 50-100 Pacific and Jack Mackerel were caught during the salmon seine opening off Langara Island (54°N). Some sunfish were also observed in the area, and over a thousand porpoise. Many Pacific and Jack mackerel were caught in southeast Alaska in July and August, especially in Ketchikan and Sitka (57°N) areas.

August. Pacific mackerel were more abundant and more widely distributed than Jack mackerel during an annual DFO mid-water trawl survey off the southwest coast of Vancouver Island (48-49°N) in early August. A small number of Pacific mackerel were caught in a bottom trawl on a NOAA research survey on August 24 and 25 at 59.3°N in the Yakutat area. This was the most northern confirmed report of the limit of distribution.

Early September. A sports fisherman caught a Jack Mackerel in the southern part of the Strait of Georgia on Sept. 12.

Sightings from the southern Canadian border to southeast Alaska in late July and early August indicate that mackerel were spread over 11° of latitude from the Canadian border (48°N) to Yakutat, Alaska (59°N).

Monitoring pollution in the North Pacific

A.V. Tkalin, FERHRI

The Japanese Fisheries Agency has recently started a new project to monitor World Ocean pollution by persistent and toxic chemicals (S. Tanabe, Mar. Pollut. Bull., 1993, 26: 114-115). This project uses Japanese fishing boats to collect air and water samples for subsequent analysis of PCBs, HCHs, DDTs, CHLs, HCB and other contaminants. The monitoring program started in 1992 and will continue for five years. It is intended to open this monitoring project to overseas participation in future.

The Canada's National Report presented at the PICES Scientific Workshop (Seattle, 10-13 December, 1991), noted that Canadian scientists are interested in studying long-range transport of chlorinated compounds over the North Pacific. Other possible and on-going research areas include (C.S. Wong): nutrient loading into the

Pacific Ocean, oxygen cycle, plankton productivity changes, monitoring of tar balls, plastics, etc.

We believe that the monitoring program of the Japanese Fisheries Agency may be of some interest to PICES member countries, Russia, Korea and other Pacific states. Our Institute (FERHRI) is willing to cooperate by providing research vessels for collecting air, water, biota and bottom sediment samples. During the last decade FERHRI research vessels ("Akademik Korolev", "Professor Khromov", "Priliv") have been used for various international programs: SAGA (Soviet-American Gas and Aerosol Experiments: 1983, 1987, 1990), INPOC (International North Pacific Ocean Climate: 1991-1993), BERPAC (Soviet-American and Russian-American Ecological Expeditions in the Bering Sea: 1977, 1981, 1988, 1990, 1993). Sample collection can be done during the scientific cruises as well as during commercial cruises of FERHRI research vessels (from Russia to Japan, Korea or China).

If you have any suggestions, please write to:
Dr. A.V.Tkalin
Department of Ecological Monitoring
Far Eastern Regional Hydrometeorological Research Institute (FERHRI)
24, Dzerzhinsky St., Vladivostok 690600 RUSSIA.
Fax: (7-423-2)-227754, (7-423-2)-270418
Telex: 213115 MRF SU
Phone: (7-423-2)-224887
Internet: fehri@stv.iasnet.com

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.

International Pacific Halibut Commission, Annual Meeting, Bellevue, Washington, USA, Jan 24-27, 1994

International Symposium on Okhotsk Sea and Sea Ice, Mombetsu, Hokkaido, Japan, Feb. 6-9, 1994

American Society of Limnology and Oceanography, San Diego, California, USA, Feb. 21-25, 1994

Pacific Rim Fisheries Conference, Beijing, China, March 8-10, 1994

Society of Naval Architects and Marine Engineers, Calgary, Alberta, Canada, March 16-19, 1994

International Conference on Marine Debris, Miami, Florida, USA, May 8-13, 1994

American Geophysical Union, 3rd Western Pacific Geophysics Meeting, Hong Kong, July 25-29, 1994.

American Fisheries Society Annual Meeting, Halifax, Nova Scotia, USA, Aug. 21-25, 1994

International Association for Hydraulic Research: Symposium on Waves, Modelling and Scale Effects, Vancouver, British Columbia, Canada, Aug. 21-27, 1994

NAFO Symposium on Impact of Anomalous Oceanographic Conditions at the Beginning of the 1990s in the Northwest Atlantic on the Distribution and Behavior of Marine Life, Sept. 14-16, 1994

Hydroinformatics '94 Meeing, Delft, Netherlands, Sept. 19-23, 1994

ICES Annual Meeting, St. John's, Newfoundland, Canada, Sept. 20-28, 1994

International Association for Water Pollution Res. and Control, Adelaide, Australia, Oct. 2-7, 1994

NPAFC 2nd Annual Meeting, Vladivostok, Russia, Oct. 10-15, 1994

International Symposium on the Assessment, Yield and Long-term Sustainability of Large Marine Ecosystems of the Pacific, Qingdao, China, Oct. 10-14, 1994

PICES 3rd Annual Meeting, Nemuro, Hokkaido, Japan, Oct. 15-24, 1994 (See First Announcement for details)

SCOR Annual Meeting, Dunsmuir Lodge and IOS, Sidney, Canada, Oct. 17-21, 1994

International Conference on Coastal Engineering, Kobe, Hyogo, Japan, Oct. 23-28, 1994

CALCOFI Annual Meeting, Lake Tahoe, California, USA, Oct. 25-27, 1994

International Symposium on North Pacific Flatfish, Anchorage, Alaska, USA, Oct. 26-28, 1994

IOC's International Conference on Marine Scientific Research and Integrated Coastal and Ocean Management for Sustainable Development, Lisbon, Portugal, Nov. 7-12, 1994

Pacific Science Congress, Beijing, China, June 5-12, 1995

PICES 4th Annual Meeting, China, the week of 16th, October, 1995 (To be confirmed)

NPAFC 3rd Annual Meeting, Seattle, USA, Nov. 6-11, 1995

UBC Grant

The University of British Columbia
Department of Oceanography / Fisheries Centre / Westwater Research Centre

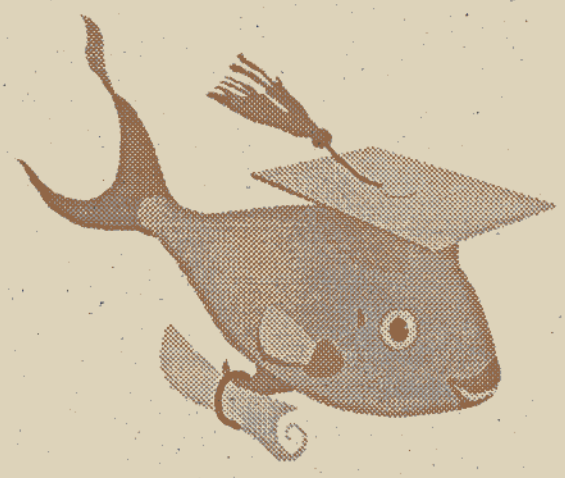
Opportunities for graduate students and post-doctoral fellows

The Natural Sciences and Engineering Research Council of Canada has awarded a 3 year Strategic Grant to Mike C. Healey, Paul H. LeBlond and Carl J. Walters for a fisheries oceanography project: BIOPHYSICAL CONTROLS OF SALMON MIGRATION AND PRODUCTION. Physical oceanographic, dynamic programming, and individual-based biophysical models, and empirical analyses will be used to: 1) develop and evaluate alternative models for predicting stock-specific production, return migration routes, and return times of Fraser River sockeye salmon, 2) evaluate hypotheses of salmon migration behaviour and response to the marine environment, and 3) estimate the impacts of global climate change on salmon production and migration.

Excellent research opportunities and funding are immediately available to support two M.Sc. students, two Ph.D. students and one Post-Doctoral fellow in physical oceanography and fisheries ecology. Strong aptitude and interest in computer modelling and analysis of complex systems are required. Please fax your curriculum vitae, with a brief statement of your research interests and when you will be available to:

Dr. Keith A. Thomson
Fisheries Centre, Univ. of British Columbia
2204 Main Mall, Vancouver
B.C., CANADA V6T 1Z4
Tel: (1-604) 822-3025
Fax: (1-604) 822-8934

Replies from students and post-doctoral fellows with alternative funding are also encouraged.



Bibliographic Data Base Request

Scientists comprising the groundfish task at the NMFS Alaska Fisheries Science Center engage in research related to the distribution, abundance and life histories of commercially-important species in the Bering Sea and Gulf of Alaska as well as contiguous waters of the Aleutian Islands and U.S. West Coast. In support of these activities, we are assembling a computerized database consisting of citations (and abstracts) from peer-reviewed and "gray" literature. Hoping to accomplish this project as efficiently as possible, we are soliciting input from fisheries biologists and other individuals who have already entered relevant citations into bibliographic databases for their personal libraries. We are presently compiling citations in PAPYRUS, which has a built-in utility for converting a number of other bibliographic database file formats to the PAPYRUS format. We also have the support of the software developer to assist with the inevitable format conversions from other products. Ultimately, we envision a bibliographic database of commercially and ecologically important fish and invertebrate species which is electronically accessible to the larger scientific community. (This assuming insurmountable copyright issues are not encountered.) If you have such a database and are willing to share it with us, or can refer us

to someone (or an institution) that does, please contact us. Also, we welcome any comments or suggestions related to our effort that you may have. Thank you for your assistance.

Dr. Robert A. (Bob) McConnaughey
Alaska Fisheries Science Center
National Marine Fisheries Service
7600 Sand Point Way NE, Bldg. 4,
Seattle, WA, USA 98115-0070
Phone: (1-206) 526-4150
Fax: (1-206) 526-6723
Omnet: R.MCCONNAUGHEY
Internet: mcconnar@race.afsc.noaa.gov

PICES.OCEAN News

As announced in the PICES PRESS vol. 1 No. 1, PICES Secretariat set up an electronic bulletin board PICES.OCEAN on Omnet in order to facilitate the exchange of news and information on marine sciences in the North Pacific.

The board is open to all who wish to put in information on: ship schedules, research development and progress, announcement of meetings, calls for research proposals, access to and quality control on data bases, research job opportunities, recent publications, and any other items that would be of interest to the North Pacific marine science community.

If you are not on Omnet but want to read the articles on the board, we can mail them to you as PICES.OCEAN News series through Internet. Approximately 200 scientists from 7 countries are currently on the e-mail list.

If you want to be added to the list, please make a request by providing us with your Internet address.
We are now looking into the possibility of having a bulletin board system on Internet. If you have any suggestions or comments on the electronic communication system, please send them to:

PICES.SEC (Omnet)
pices@ios.bc.ca (Internet)

PICES PRESS Mailing list

Thanks to your support, interest and recommendations, our general mailing list has expanded more than four fold this year, with more than 700 individuals and organizations from 16 countries all over the world. Our aim is to bring PICES to all those interested in activities in North Pacific marine science. If you know of friends and colleagues who might benefit from or contribute to PICES or PICES Press, please give them our address or give us their address, and we would be glad to add them on our mailing list.

Note From Editor

In the first edition of PICES PRESS it was indicated that quarterly editions would be produced. We now find this is too ambitious and we intend to reduce publication to semi-annual.

PICES PRESS

Published and produced by:

PICES Secretariat
c/o Institute of Ocean Sciences
P.O. Box 6000, Sidney,
B.C. Canada V8L 4B2
Phone: (1-604)-363-6366
Fax: (1-604)-363-6827
Omnet: PICES.SEC
Internet: pices@ios.bc.ca

ISSN 1195-2512