



INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION  
COMMISSION OCEANOGRAPHIQUE INTERGOUVERNEMENTALE  
COMISION OCEANOGRAFICA INTERGUBERNAMENTAL  
МЕЖПРАВИТЕЛЬСТВЕННАЯ ОКЕАНОГРАФИЧЕСКАЯ КОМИССИЯ  
اللجنة الدولية الحكومية لعلوم المحيطات

# TSUNAMI NEWSLETTER

INTERNATIONAL TSUNAMI INFORMATION CENTER  
P.O. Box 50027, Honolulu, Hawaii 96850

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# INTERNATIONAL TSUNAMI INFORMATION CENTER

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Associate Director: Norman M. Ridgway

TSUNAMI NEWSLETTER is published by the International Tsunami Information Center to bring news and information to scientists, engineers, educators, community protection agencies and governments throughout the world.

We welcome contributions from our readers.

*The International Tsunami Information Center is maintained by the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization. The Center's mission is to mitigate the effects of tsunamis throughout the Pacific.*

## MEMBER STATES

Present membership of the International Coordination Group for the Tsunami Warning System in the Pacific comprises of the following States:

CANADA  
CHILE  
REPUBLIC OF CHINA  
ECUADOR  
FIJI  
FRANCE  
GUATEMALA  
INDONESIA  
JAPAN  
REPUBLIC OF KOREA  
NEW ZEALAND  
PERU  
PHILIPPINES  
SINGAPORE  
THAILAND  
UNITED KINGDOM (HONG KONG)  
USA  
USSR

## NEWS EVENTS

### IUGG Tsunami Meeting in Canberra, December 1979

The Tsunami Committee of the IUGG will hold its biannual meeting in conjunction with the General Assembly of the IUGG in Canberra, Australia on Dec. 6 and 7, 1979. The meeting will cover all aspects of the tsunami problem; scientific, engineering, and socio-economic. Prof. Soloviev, USSR, will be the general convenor of the meeting consisting of four half-day sessions. The first session, convened by Dr. Loomis, USA, will be about general tsunami theory, observations, historical information, statistics, and socio-economic problems. The second session, convened by Dr. Braddock, Aus., will be about specific problems in propagation, run-up, and engineering applications. The third session, convened by Prof. Reid, USA, will be about numerical methods as applied to the tsunami problem. The fourth session, convened by Dr. Iida, Japan, will cover experimental work and seismology related to tsunamis. Contributed papers should be limited to 15 minutes of material with a five minute question period. Each session will end with a talk by the chairman summarizing the recent progress in the areas covered by the session. A special meeting will be chaired by Dr. Bernard, Pacific Tsunami Warning Center, on present and future contributions of the research community toward improving the tsunami warning system. There will be a business meeting of the Tsunami Committee at some time during the first week of the Assembly to conduct such business as comes before it. One page abstracts of papers should be submitted to the chairman of the appropriate session or to Prof. Soloviev or to Dr. Loomis.

Prof. Serge L. Soloviev, Chairman  
IUGG Tsunami Committee  
Academy of Science, USSR  
Ulyanovskaya ul. 51  
Moscow 109004, USSR

Dr. Harold G. Loomis, Secretary  
Tsunami Committee, IUGG  
Joint Institute for Marine and  
Atmospheric Research  
2525 Correa Road  
Honolulu, Hawaii 96822

### Leo Heindl Memorial Fund, Association of Geoscientists for International Development (AGID)

We were very sorry to learn of the sudden death (on October 18, 1978) of Dr. L. A. Heindl who had compiled and issued the AGID NEWS since 1974. As a tribute to his enthusiastic and effective support of the Association, a Leo Heindl Memorial Fund has been established. All proceeds will go to AGID and contributions should be sent to: J. R. Jones, 2312 Rose Dawn Drive, Reston, Virginia 22091, USA.

Incidentally, AGID headquarters recently moved to Caracas and their new address is: AGID

c/o Ministerio de Energia y Minas  
Torre Norte, P. 19, CSB  
Caracas, Venezuela

### Third Meeting of Experts of the US-USSR on the System of Simultaneous Warning on Tsunamis

The Third Session of the Joint US-USSR Meeting of Experts on the system of Simultaneous Warnings of Tsunamis was held in USA from November 29 to December 8, 1978. Segments of the meeting were held in Boulder, Colorado; La Jolla, California; Honolulu, Hawaii; and Washington, D.C. USSR was represented by Dr. V. M. Popov, Chief, Arctic, Antarctic and Marine Department of the USSR State Committee on Hydrometeorology and the Control of the Natural Environment; Dr. A. V. Lipovka, Director of Operations, USSR State Committee on Hydrometeorology and the Control of the Natural Environment; Dr. K. F. Sergeyev, Director, Sakhalin Complex Scientific Research Institute, Academy of Sciences of the USSR and Dr. A. F. Alekseyev, Deputy Director, Computing Center, Siberian Branch of the Academy of Sciences of the USSR. USA was represented by the Project Leader, Mr. Bert J. Thompson, Chief, Oceanographic Services Branch, NOAA-National Weather Service, and by the Meeting Coordinator, Mr. Mark Spaeth, Tsunami Specialist, NOAA-National Weather Service.

Aside from the US and the USSR delegations, attendees included Dr. George Pararas-Carayannis, Director, ITIC; Mr. Norman Ridgway, Associate Director, ITIC; Mr. Gerry C. Dohler, Chairman of ITSU; Dr. Eddie Bernard, Director, Pacific Tsunami Warning Center; Lt. Dennis Sigrist, Ocean Services Program Coordinator; and Mr. Myron Kerner, Pacific Region, National Weather Service. The US tsunami research community at the University of Hawaii in Honolulu was represented by Dr. Harold Loomis, by Dr. Lester Spielvogel and Dr. Robert Harvey. Ms. Erika Desbonnet was the official conference interpreter.



Some participants and observers to the Third Meeting of Experts of the US-USSR on the System of Simultaneous Warnings on Tsunamis, in Honolulu. From left to right: Harold Loomis, Dr. George Pararas-Carayannis, Dr. Mr. Gerry Dohler, Mr. Mark Spaeth, Dr. K.F. Sergeyev, Dr. A.V. Lipovka, Dr. Eddie Bernard, Ms. Erika Desbonnet, Dr. V.M. Popov, Dr. A.F. Alekseyev, Dr. Robert Harvey and Dr. Lester Spielvogel.

#### Summary of Agreements:

- The Soviet side will provide analog seismograms recorded on the DS-BP seismometer system of the USSR for the July 1976 Chinese earthquake and for the August 1976 Mindanao Island tsunamigenic earthquake.
- The Soviet side will consider amplification changes for the Soviet long period seismograph installed in Hawaii.
- Both sides agree to exchange seismograms, tidal records, and geodetic data for all identifiable tsunamis, even those which have very small amplitudes.
- Both sides will study the possibility and usefulness of organizing a scientific symposium to define the present state of the art and future possibilities of predicting tsunamis.
- The Soviet side will provide geophysical coordinates for the tide stations at Petropavlovsk-Kamchatsky and Severo-Kurilisk.
- Two Soviet scientists will visit JIMAR for two months (March-April 1979) and two American scientists will visit Sakhalin in September 1979 for three weeks to process the 2nd open ocean cruise data.
- The sides agree that there will be an exchange of scientists of three to four weeks duration in 1980 so that the scientists may become familiar with the research programs in the various institutes in each country. The scientists and the problems they are to work on will be decided in 1979.
- A US technician will visit Yuzhno Sakhalinsk for two weeks in February 1979 to repair the time block on the US long period seismograph.
- The Soviet side agrees to transmit the data tapes regularly from the US long period seismographs at Yuzhno-Sakhalinsk through the US Embassy in Moscow.
- Dr. Alexseyev will prepare travel time charts for Soviet tide stations for which they request tsunami ETAs from PTWC and provide these charts to PTWC.
- Dr. Gusiakov will visit JIMAR for six weeks during August-September 1979 to work on seismic and tsunami models. A detailed research proposal will be submitted to JIMAR by February 1, 1979, on Gusiakov's work.
- Plans will be made during 1979 for a third open ocean experiment to be conducted in the 1981-1982 period. It was tentatively agreed that the experiment would last for one year and final decisions on the experiment design would be made in 1980.
- The US side (PTWC) will direct communications tests (dummy tests) to the three Soviet tide stations and the Soviet side will report tide heights in their responses.

- Both sides will exchange technical publications through the International Tsunami Information Center on a continuing basis.
- Both sides agree that research is needed into the problem of identifying earthquakes which are tsunamigenic based on seismic data alone and will call the need to intensify work in this field to the attention of appropriate government authorities and scientific bodies.
- It was agreed to hold a fourth meeting of Experts during the second half of 1980 in the Soviet Union.



Visiting participants and observers to the Third Meeting of Experts of the US-USSR on the System of Simultaneous Warnings on Tsunamis. From left to right: Dr. V.M. Popov, Dr. A.F. Alekseyev, Dr. K.F. Sergeyev, Ms. Erika Desbonnet, Gerry Dohler, Dr. A.V. Lipovka, and Mr. Mark Spaeth.

#### Scientists Missing at Sea

The 94-foot motor vessel "Holo Holo," leased to the University of Hawaii, is missing from an oceanographic research mission. The ship left Honolulu on 9 December for a research mission off the west coast of the island of Hawaii for an Ocean Thermal Energy Conversion (OTEC) project. The ship failed to pick up three more scientists on the 11th or December at Kawaiahae, Hawaii.

An extensive search by the U.S. Coast Guard, the U.S. Navy, U.S. Air Force, and the University of Hawaii; covering thousands of square miles failed to locate to this day the vessel or any debris from it. The Coast Guard, Navy and Air Force have since abandoned the search, but the University of Hawaii 167-foot research vessel "Kana Keoki" is continuing the search.

Reported on board are John Laney, the Holo Holo's owner; crewmember John Rusekas; captain Michael Trens; University of Hawaii scientists Robert R. Harvey, Gary C. Niemeyer, and Michael H. Allen; University of California Lawrence Berkeley Laboratory scientists James Sandusky, and Stephen R. Shannon; and National Oceanographic and Atmospheric scientists Robert L. Charnell and Norman P. Laird.

Dr. Robert R. Harvey, one of the University of Hawaii scientists aboard the Holo Holo, is a tsunami researcher who has participated in the joint US-USSR tsunami experiments near the Kuril islands and who took part in the US-USSR Tsunami meetings in Honolulu, the first week of December.

### UNESCO - IOC - ITSU

#### First Session of the IOC Working Group for the Western Pacific and Associated WESTPAC Workshop, Tokyo, Japan, 19-24 February 1979

The First Session of the recently formed IOC Working Group for the Western Pacific (WESTPAC) will take place in Tokyo, Japan, 19-24 February 1979. The Group was established by resolution X-11A of the tenth session of the IOC Assembly. WESTPAC's terms of reference are to plan and coordinate long-term scientific research programmes necessary to attain its objectives; to facilitate and expedite the various activities conducted under the programmes of research; to evaluate and assess the results of the programmes of research; to regularly update programmes of research; to facilitate the exchange of data and ensure dissemination of scientific results; to assist participating States in the improvement of their capabilities to effectively participate in the programmes of research; and finally, to coordinate the programmes of research with related activities of interested intergovernmental and other organizations.

#### ESCAP/WMO Typhoon Committee

The Typhoon Committee of the United Nations Economic and Social Commission for Asia and the Pacific and the World Meteorological Organization (ESCAP/WMO) met in eleventh session October 3-9, 1978 in Bangkok. The Peoples Republic of China, participating in the sessions for the first time, suggested that a Joint Typhoon Data Gathering Experiment be carried out in the Western North Pacific on a scale equivalent to the current Monsoon experiment. The committee supported the suggestion and WMO was requested to take early action to investigate how it might be implemented.



In 1968 the Economic Commission and WMO endorsed the establishment of the Typhoon Committee as means to coordinate activities in an effort to reduce severe loss of lives and property from Typhoons. There was strong impetus for this. A Commission report of the time stated "In some years the annual typhoon damage is even more than two per cent of the gross national product." There were the huge losses of lives (Typhoon VERA in Japan in September of 1959 alone--4,640 plus 537 missing). The Committee's inaugural session was in December 1968 at Bangkok. The meeting was attended by the following participating Governments: the Republic of China, Hong Kong, Japan, the Republic of Korea, Laos, the Philippines, and Thailand. Representatives of Australia, France, the Netherlands, the Union of Soviet Socialist Republics and the United States of America attended as observers.

## INTERNATIONAL TSUNAMI INFORMATION CENTER

### Progress on ITSU-VI Action Items

A number of Action Items were identified at the ITSU-VI meeting in Manila in February of this year and were assigned to ITIC. The following is the progress made by ITIC on these Action Items.

1. Tsunami Post-Disaster Surveys: ITIC has written to ITSU national contacts for input in compiling Guidelines for Tsunami Post-Disaster Surveys. In addition, ITIC is conducting an extensive bibliographic search on survey-related procedures, and has contacted many agencies concerned with disaster assessment and disaster related surveys.

The ITIC bibliographic search includes subsea surveys, terrestrial photogrammetric measurements, aerial photography, spacecraft survey, application of satellite imagery to small scale mapping, as well as simple guidelines to field personnel conducting on-site ground surveys and reconnaissance. A report will be prepared.

2. Satellite Program: Information has been received on the satellite program of U.S.A. and Japan. The working group on the use of satellites in the Tsunami Warning System held its meeting in Canada last April. The meeting proceedings were forwarded to ITIC by Sydney Wigen who is Chairman of the Satellite Working Group. Soon as ITIC receives additional information from USSR, a report will be prepared.

3. Review and Recommendations on the Use of the Most Expedient Means of Communication between Warning Centers and Gauging Stations: It is a continuing effort of ITIC and of the Pacific Tsunami Warning Center (PTWC) to update and improve communications between PTWC and Tsunami reporting stations. A number of recommendations for improving communications have been received from Member States. Specifically, recommendations have been received from Ecuador, Chile and USA. Most of the changes and recommendations submitted so far have been adopted by the Pacific Tsunami Warning System. These recommendations and changes will be outlined in a future issue of the ITIC Newsletter, and will also be available in a separate report.



A report is also prepared by ITIC and the Pacific Tsunami Warning Center (PTWC) outlining the response limitations of the existing Tsunami Warning System and the need to establish a Warning System that has better response capability. A report is under preparation.

4. Existing Gauging Equipment and Improvements: Progress on this Action Item has been considerable, and an inventory of existing gauging equipment and improvements is compiled. ITIC has written to national contacts of ITSU Member States for current input. Through ITIC efforts, a number of new stations will be tied into the existing network.

#### Mr. Ridgway's Term Extended

At the meeting of the International Coordination Group for the Tsunami Warning System in the Pacific last March, it was the consensus of opinion among the participants that it would be impractical for an Associate Director of ITIC to be in office for only one year, and it was agreed that Mr. Norman Ridgway's appointment as Associate Director should be extended.

IOC, ITSU and ITIC were recently informed by Dr. D. E. Hurley, Director, New Zealand Oceanographic Institute, that the New Zealand Government, recognizing the contribution of Mr. Ridgway to the administration of ITIC, extended his appointment until June 1979. IOC, ITSU, ITIC and the Pacific Community of Nations interested in the Tsunami Warning System are very appreciative of New Zealand's support of this post.

#### ITIC Assists in the Preparation of Tsunami Articles and Film Scripts

A number of interesting tsunami articles appeared in the last few months in such magazines and periodicals as Readers' Digest, the New Pacific Magazine, Lloyd's Register of Shipping, International Wildlife, and in a book published by the National Geographic Society entitled, "Powers of Nature."

ITIC provided photographs and background materials for these articles and in some instances provided editorial review and corrections. In addition, ITIC has assisted in the editorial review of a television film and has provided material related to tsunamis for a Hollywood production of a disaster-type film.

#### Scientist from Thailand Completes Working Visit to ITIC

LCDR Sumeth Hinsharanan, Chief of the Hydrometeorology Division of the Department of Meteorology, National Research Council of Thailand recently completed a six-week working visit to ITIC under the UNESCO/IOC sponsorship and has returned to his country.



During his visit, LCDR Hinsherman also visited the Pacific Tsunami Warning Center (PTWC) and familiarized himself with the operations of the International Tsunami Warning System. In addition, LCDR Hinsherman became familiar with civil defense procedures which may be applicable, not only to tsunamis, but to other disasters which are more frequent in Thailand.

LCDR Sumeth Hinsherman poses with Mr. Norman Ridgway (left), Associate Director and Dr. George Pararas-Carayannis, Director, ITIC.

#### Japanese Scientists Visit ITIC

Dr. Ahirosi Miyakawa, Deputy Director Earthquake Preparedness Division, Sizuoka Prefecture Government, Mr. Takao Matsumura, Sociologist at Tokyo University, and Dr. S. Watanabe, Seismological Division of the Sizuoka Prefecture Government visited ITIC in early December for the purpose of familiarizing themselves with the Pacific Tsunami Warning System, and ITIC. The Japanese scientists were escorted by Dr. George Pararas-Carayannis in their visits to the Pacific Tsunami Warning Center and the Hawaii State Civil Defense facilities in Honolulu. Mr. Robert Schank of the Hawaii State Civil Defense gave the visiting scientists a presentation on civil preparedness in time of emergency. A major earthquake has been predicted for Sizuoka Prefecture in the near future, so the familiarization visits arranged by ITIC were of great interest to the Japanese scientists who are charged with the responsibility of disaster preparedness and planning in their country.

#### PAGASA Seismologist Visits ITIC

Mr. Rolando G. Valenzuela, Chief Seismologist with the Philippine Atmospheric Geophysical and Astronomical Administration (PAGASA), who had been on a training mission in Canada for the last six months, visited Honolulu in the later part of December for the purpose of familiarizing himself with the work of ITIC and the operations of the Pacific Tsunami Warning Center.

#### ITSU Chairman Visits ITIC

ITSU Chairman, Mr. Gerry Dohler, visited ITIC in early December and had discussions with Dr. George Pararas-Carayannis, Director and Mr. Norman

Ridgway, Associate Director of ITIC, on the progress made on the ITSU-VI Action Items, and the status of the Pacific Tsunami Warning System.

#### Other Visitors to ITIC

Dr. V. Popov, Prof. A. Alexeev, Dr. Sergeev and Dr. A. Lipovka, OF USSR, who were in Honolulu for the US-USSR bilateral tsunami meetings, visited ITIC and its staff in early December.

Recent visitors to ITIC included Dr. Ron Richmond, Director of Mineral Development, Suva, Fiji; Mr. James V. Wade, CCOP/SOPAC Technical Secretariat, Suva, Fiji; Mr. Mario C. Manansala, Bureau of Coast and Geodetic Survey, Manila, Philippines and Dr. Tad S. Murty, Institute of Marine Sciences, Victoria, Canada.

#### Associate Director, ITIC, Visits Australia

During his return from a trip to New Zealand over Christmas, Mr. Norman Ridgway visited Australia to discuss the possibility of Australia participation in the International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU). A meeting convened in Canberra was attended by representatives of the Departments of Science, Foreign Affairs, Transport and Natural Disasters and the Bureau of Mineral Resources. Although Australia itself is hardly susceptible to damage from tsunamis, a suitable participating tide-station along the north-east coast could be useful in monitoring any tsunamis arising from earthquakes centered in or near the New Britain, New Hebrides and Tonga Trenches. Similarly, a tide-station on the north-west coast could monitor tsunamis generated in or near the Java Trench. Mr. Ridgway also visited the Division of Fisheries and Oceanography, Commonwealth Scientific and Industrial Research Organization located in Cronulla, Sydney.

### EDITORIALS AND LETTERS

#### ITIC Moves to New Office

ITIC recently changed its location and is now established on the 4th floor, Prince Kuhio Federal Building, 300 Ala Moana Boulevard, Honolulu. Our new postal address is: P.O. Box 50027, Honolulu, Hawaii 96850, USA, phone number (808) 947-4838. This move inevitably caused much disruption and led to a delay in the publication of this Newsletter.

#### ITIC Director's Mission to the Southwest Pacific

A visit was made to Tahiti, New Caledonia, Fiji, Western Samoa, and American Samoa between 10-20 November 1978 by the Director of ITIC, Dr. George Pararas-Carayannis for the purpose of assessing existing facilities at these islands to determine whether improvements can be made to the

Tsunami Warning System (TWS). The following is a brief account of his activities and findings. A description of instrumentation and communications existing in islands of the Southwest Pacific has been provided in a report by Dr. John H. Hodgson of UNDP who visited the same locations June, July and August of 1978. Since facilities and instrumentation have been described in this report in detail, Dr. Pararas-Carayannis's description is summarized.

Tahiti, 11-12 November

In Tahiti, I met with Dr. J. Talandier, Director of the Laboratoire de Geophysique and his staff, and had a review of the existing facilities at Pamatai and a briefing on facilities existing in French Polynesia (Tuamotu Archipelago, the Marquesas Islands, the Gambier Islands, the Society Islands and the Austral Islands).

A number of long period seismic stations are operated in French Polynesia by the Geophysical Laboratory, which is under the auspices of the French Atomic Energy Commission. The seismic network in French Polynesia is adequate and seismic information from Tahiti is of great value to the Tsunami Warning System. I emphasized to Dr. Talandier the need for seismic input from French Polynesia, and I was assured of continuous cooperation. We agreed that telephone communication with Tahiti is good and therefore, PTWC should utilize telephone lines, when necessary, as well as the existing Civil Aviation circuit through Nandi.

Two tide gauges exist in the area, one at Rikitea on Gambier Island, and another one in Papeete Harbor. Both are functioning well. I was unable to visit the tsunami tide station at Rikitea, but I did visit the one in Papeete Harbor. One or two more tide gauges in French Polynesia would be particularly helpful to the Tsunami Warning System, particularly on islands of the Tuamotus that are exposed to tsunamis from South America.

Seismic research in French Polynesia includes extensive studies of T-phases as recorded by short period seismic recorders. A high correlation between tsunamigenic earthquakes and T-phases has been found, and this method is used for tsunami prediction. Records of several major tsunamigenic earthquakes and the T-phases were shown to me by Dr. Talandier. Considering that most tsunamigenic earthquakes are producers of T-phases, it appears that the technique holds promise. In addition to the T-phases, Dr. Talandier explained to me the use of short period P for activating their alarms. This results in considerable savings of time. For example, for an event occurring in the Aleutians, the travel time of the P-wave to Tahiti is approximately 10 minutes. A surface seismic wave would require about 33 minutes. Thus, a savings of 23 minutes can be realized by using the P-wave for activating the alarms.

Noumea, New Caledonia - 14-15 November

In Noumea, I met with Dr. M. Jacques Recy, Director of the Geophysical Program of ORSTOM (Office de la Recherche Scientifique et Technique Outre-Mer) and his staff, and with Mr. Jean Robert, Chief of the Meteorological

Service. ORSTOM operates seismic stations in New Caledonia, but seismology is a small program of the overall geophysical program of ORSTOM. The seismic station in Noumea, which is part of the TWS, is of limited usefulness because the station is not manned on a 24-hour basis. I discussed with Dr. Recy and his staff, and the Director of the Meteorological Service, the possibility of transmitting the signal to the Meteorological Office in Noumea which has around-the-clock communications. However, even if transmission of the signal was possible, another problem exists in that the Meteorological Center is understaffed and tsunami-related messages may not be acknowledged early. Therefore, the seismic station in Noumea is of limited usefulness and not much can be done to improve communications at the present time.

The tide station in Noumea is operated by the Hydrographic Office of the Navy Department, but because the station is located within a protected bay, the station is also of limited usefulness to the TWS. It was agreed with Dr. Recy that efforts should be made in improving the coverage of the seismic station in Noumea in the future and in locating an additional tide gauge (with remote sensor) on an exposed coastal area of New Caledonia. However, the TWS should finance the installation of additional stations, as ORSTOM does not have any local requirements.

More promising is the situation in the New Hebrides. A seismographic network has been installed in the islands in cooperation with Cornell University, and a tide gauge is operated satisfactorily at the harbor of Port Villa. It would be possible to transmit seismic and tidal data from the New Hebrides, and the Civil Aviation link to Nandi could be used to provide tsunami warning to Port Villa through the Meteorological Office. Dr. Recy agreed to look into this and to coordinate this effort of including the station at New Hebrides into the International Tsunami Warning System. He will contact ITIC at a future time regarding his progress in this area.

#### Suva, Fiji - 15-16 November

In Fiji, I met with Mr. Ronald Richmond, Director of Mineral Development, and his staff, and reviewed the facilities there, as well as future plans for additional stations. Four seismic stations exist in Fiji. These four are in operation -- three being of short period vertical component and only one being a three-component short period system. The proposed network of seven additional seismic stations will improve coverage in the area. These stations will be at Viti Levu, and in the neighboring islands of Ovalan, and Vunindawa, and at the islands of the Kandavu Group. Once operational, all of these stations will be telemetered to Suva and recorded on a Develocorder.

The tsunami tide station at Suva Harbor was visited. A problem exists at this station in that the signal recorded is irregular and fudgy. An inspection of the gauge on the pier was conducted to determine the cause of the problem but the gauge appeared to work well. Therefore, it must be that the remote recorder is defective. A new recorder should be sent to Fiji.

I discussed with Mr. Richmond the possibility of including Fiji into a Regional Tsunami Warning System for the Southwest Pacific, an idea to which he was very much in favor as the tsunami potential for Fiji is a serious one. He agreed that the proposed Regional Warning System should include Fiji, Tonga, Samoas, New Hebrides, and possibly the Solomons. Mr. Richmond also expressed interest in the installation of seismic alarms, similar to the ones installed in Hawaii, as part of the regional system. We agreed to work together on a cooperative proposal to UNDP for a regional system in the Southwest Pacific.

Apia, Western Samoa - 17-18 November

In Apia, I visited with Mr. Christopher Hewson, Superintendent of the Apia Observatory and his staff, with whom we discussed the possibility of establishing the Apia Observatory as the headquarters for a Regional Tsunami Warning System. We agreed that we will draft a proposal for a Regional Tsunami Warning System to be submitted to the United Nations Development Program (UNDP), for possible funding.

Existing seismic facilities at Western Samoa are of limited usefulness at this time to the TWS. There is a WWSF station at Afiamali near Apia and two short period, one component (vertical), visual recording seismographs in the Apia Geophysical Observatory. The WWSF station is an old station. Records from this station are photographically reduced, making the use of the station of limited value to the TWS.

More seismic stations will be required in Western Samoa if Apia is to be established as a Regional Center. The tide station in Apia Harbor with remote recording in the Apia Observatory functions well, but one or two more tide gauge stations would be particularly desirable as part of a Regional System. The seismic and tide stations at Apia are now covered by Apia Observatory staff on a 24-hour basis. Telex communications with Pago Pago, Nandi, Suva, Honolulu, New Zealand and Tonga, have been established. Mr. Hewson is particularly interested in establishing additional seismic and tidal stations. The possibility of a tsunami along the coast of Western Samoa is high, and any improvements in stations and communications, as well as in the program of public education on tsunamis, would be particularly welcome.

Pago Pago, American Samoa - 19-20 November

In Pago Pago, I met with Mr. Tom Tatekawa, the OIC at the Pago Pago Meteorological Station. I reviewed the facilities there, and discussed the tsunami hazard in American Samoa. I was not able to meet with the Director of the Disaster and Emergency Preparedness Office, since it was a weekend. However, the Government of American Samoa has expressed interest in tsunami preparedness and are aware of the potential tsunami hazard in American Samoa, and particularly in the bay of Pago Pago, which historically has been affected by tsunamis. American Samoa should participate with Western Samoa and the other islands of the Southwest Pacific into a Regional Tsunami Warning System. The tidal station in Pago Pago appears to be properly working. Maintenance is performed by the staff of the Meteorological Office at Pago Pago.

### Conclusions and Recommendations

*I believe that my mission to the Southwest Pacific was of great help in assessing existing facilities in the area, and the need for establishing a Regional Tsunami Warning System. My recommendations can be summarized as follows:*

- 1. An increase in the number of participating stations would be particularly helpful to the TWS particularly in New Hebrides, Solomon Islands, Papua New Guinea, Fiji, and Western Samoa. These stations can be both seismic and tidal stations; however, the need for tidal stations is particularly greater. Existing and new stations in the SW Pacific should be GOES Platforms with remote sensors. The Japanese geosynchronous satellite can provide coverage of the area.*
- 2. A Regional Tsunami Warning Center in the Southwest Pacific should be established. This Regional Center should be responsible for local events only and should work closely with the Pacific Tsunami Warning Center. ITIC should assist S.W. Pacific island nations with the writing of a proposal to UNDP for possible funding of a Regional Tsunami Warning System.*
- 3. Funds are needed for the development of educational materials related to tsunami hazards, which can be distributed to Pacific Island stations and in particular, to the islands of the Southwest Pacific.*

*As a result of my S.W. Pacific mission, a number of recommendations will be made to the Pacific Tsunami Warning Center for improving communications with existing stations and establishing communications with new possible stations. A draft proposal to UNDP will be prepared by ITIC for review by Pacific island nations wishing to participate in a Regional Tsunami Warning System. Once approved, a final proposal will be prepared by the participating island nations to UNDP requesting funding of a Regional Tsunami Warning System.*

## TSUNAMI WARNING SYSTEM IN THE PACIFIC

### Progress at the Pacific Tsunami Warning Center

Instrumentation at the Pacific Tsunami Warning Center (PTWC) - PTWC has continued to receive seismic and tide messages from the GOES platform. On August 17, PTWC established a computer link with the GOES computer through the TI Silent 700. This link (via telephone circuit) enables PTWC to obtain an immediate readout of the interrogation of GOES platform. For example, during the August 23 earthquake, PTWC interrogated the Albuquerque seismic platform and obtained a hard copy printout of the data in five minutes.

New Computer at PTWC - The Data General Eclipse S-230 Computer was accepted for use at PTWC in July this year. Extra CRT terminals were added.



Monthly Communications - PTWC continues to test twice monthly communications of the Pacific Tsunami Warning System to determine the round trip message travel time to tide and seismic stations.

Hawaii Regional Tsunami Warning System - PTWC reports that the Hawaii Regional Tsunami Warning System has been successfully operating since its completion earlier this year with all seismic and tide stations in the System being almost 100% operational.

Current List of National Contacts: International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU)

<u>CANADA</u>	<u>Chairman ICG for ITSU</u> Mr. Gerry C. Dohler Canadian Hydrographic Service Room 314 615 Booth St. Ottawa, Ontario, K1A OE6 Canada	<u>National Contact</u> Mr. Sydney O. Wigen Institute of Ocean Sciences, Patricia Bay P.O. Box 6000 9860 W. Saanich Road Sidney, B.C. V8L 4B2 Canada
<u>CHILE</u>	Comandante Marcelo Polizzi Director Instituto Hidrográfico de la Armada Casilla 324 Valparaíso	
<u>CHINA</u>	Nomination not received (IOC contact: Permanent Delegation of China to Unesco)	
<u>ECUADOR</u>	Capitán de Fragata E.M. Fernando Alfaro Director Instituto Oceanográfico de la Armada Casilla 5940 Guayaquil	
<u>FIJI</u>	Mr. Ronald N. Richmond Director of Mineral Development, Mineral Resources Division Private Mail Bag, G.P.O., Suva, Fiji Islands (CABLE: GEOLOGY SUVA)	
<u>FRANCE</u>	M. Jacques Recy Directeur de Recherche Office de la Recherche Scientifique et Technique Outre-Mer B.P. 4 Nouméa Cédex (Nouvelle Calédonie)	
<u>GUATEMALA</u>	Ing. Jose Vaussaux Palomo Jefe del Departamento de Sismologia Division del Observatorio Meteorologico Nacional Ministerio de Agricultura Palacio Nacional Guatemala	

INDONESIA Dr. Aprilani Soegiarto  
Director  
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JAPAN Dr. Hideo Watanabe  
Head, Seismological Division  
Observation Department  
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Chiyoda-ku  
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KOREA Mr. Myong Bok An  
Director of Weather Analysis  
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NEW ZEALAND Dr. R. A. Heath  
New Zealand Oceanographic Institute  
P.O. Box 12-346  
Wellington North

PERU Teniente César Vargas Faucheux (Vice-Chairman, ICG for  
Jefe, Departamento Oceanografía ITSU)  
Dirección de Hidrografía y Navegación de la Marine  
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Capitán de Corbeta Sevilla Aspillaga  
Casilla Postal 80  
Dirección de Hidrografía y Navegación de la Marina  
La Punta, Callao

PHILIPPINES Mr. Wellington A. Miñoza  
Chief, National Geophysical and Astronomical Service  
PAGASA  
1424 Quezon Boulevard Extension  
Quezon City

SINGAPORE Mr. K. Rajendram  
Director, Meteorological Service  
Meteorological Office  
3rd Floor, 15 Grange Road  
Singapore 9 (Republic of Singapore)

THAILAND Commander Thanom Charoenlaph  
Hydrographic Department  
Royal Thai Navy  
Aroon Amarin Road  
Bangkok 6

USA

Mr. Bertrand J. Thompson  
Chief, Oceanographic Services Branch  
National Oceanic and Atmospheric Administration  
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Mr. G. L. Bell  
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USSR

Dr. V. M. Popov  
Chief of the Arctic, Antarctic and Marine Department  
Hydrometeorological Service of the USSR  
Pavlik Morozov 12  
Moscow D-376

NATIONAL AND AREA REPORTS

Tsunami Reports

Professor S.L. Soloviev, Chairman, Council on Seismology and Earthquake Engineering, USSR Academy of Sciences, Moscow and Chairman of the IUGG Tsunami Committee, recently wrote to inform us that, after receiving the first set of "Tsunami Reports" (1976-1977), he had checked with Mr. N.A. Shchetnikov, Sakhalin Complex Scientific Research Institute, to see if some of the reported tsunamis were recorded by Soviet tide gauges. There was no evidence of tsunamis for Event No. 1977-9 (Tonga Trench, June 22) and Event No. 1977-12 (Indonesia, August 19). However, for Event No. 1976-26 (Philippines, August 16) there were indications of an increment of seiches on some mareograms from the south part of the Kurile Islands. These increments (in limits of several centimeters) occurred at the approximate expected arrival time for the Philippine tsunami.

U.S. Scientists Return from Soviet Oceanographic Cruise

Two scientists from NOAA's Joint Institute for Marine and Atmospheric Research (JIMAR) in Honolulu recently returned from a unique oceanographic cruise - two months aboard the Soviet research ship URYVAEV with a team of scientists from the USSR. Dr. Robert R. Harvey and Lt. Stephen L. Poole, NOAA Corps, collaborated with oceanographers and seismologists from the Sakhalin Complex Scientific Research Institute in the 1978 Joint US/USSR Tsunami Expedition, a two-month attempt to measure a tsunami in the deep ocean.

JIMAR, located at the University of Hawaii, is the expansion of the former Joint Tsunami Research Effort and is the research counterpart of the Pacific Tsunami Warning Center at Ewa Beach. Soviet scientists came to JIMAR in May to help plan the 1978 expedition. It was decided to deploy an array of bottom pressure and seismic recorders in a 1,700 mile arc

along a highly tsunamigenic region, the submarine trench that extends from Japan to the Mariana Islands. JIMAR scientists designed and built high resolution bottom pressure recorders which can detect sea level changes of less than 1 cm. beneath 7 km of ocean.

Dr. Harvey and Lt. Poole traveled to the USSR in August to join the expedition team aboard the Soviet research vessel R/V VALERIAN URYVAEV. The ship's complement consisted of the two Americans, 11 Soviet scientists and 24 crew members, including 4 women. The URYVAEV is a medium sized weather ship usually found launching balloons amid the ice floes of the Okhotsk Sea. The expedition took the ship and her crew on an 8,000 mile trek south to Saipan, through the Caroline Islands and across the equator.

Cruising along the seaward side of the trench, the expedition team deployed buoyed current meter arrays, ocean bottom seismometers and the bottom pressure recorders. While these instruments were recording data the team went on to make repeated hydrographic casts across the Kuroshio current, using a conductivity, temperature and depth (CTD) and expendable bathythermograph (XBT's) from NOAA's Pacific Marine Environmental Laboratory in Seattle. The Kuroshio measurements were intended to provide ground truth for the recently launched SEASAT satellite radar altimeter. These data, taken in September during the locked orbit period of the satellite have since become invaluable since NASA lost contact with SEASAT on October 9.

After a second stop in Saipan the expedition recovered instruments and made more hydrographic sections across the Kuroshio.

Although no tsunamigenic earthquakes occurred during the two month expedition~ rare ocean bottom, sea level and seismic data were recorded in addition to the unique Kuroshio measurements.



Top to Bottom: Dr. Robert Harvey, Dr. Alex Rabinovich and LT Steve Poole launch a Bottom Pressure Recorder off the fantail of the URYVAEV.





Crew and Scientists on the R/V VALERIAN URYVAEV



R/V VALERIAN URYVAEV amid the ice in the Okhotsk Sea

## Tsunami Symposium Held in Japan

A one-day symposium on tsunamis was held at Hokkaido University, Sapporo City on October 3, 1978. The convener and the chairman were Dr. H. Miyoshi and Dr. Y. Nagata, respectively, and 5 themes were presented. The contents of the lectures dealt with the following subjects:

Mr. Yoshinobu Tsuji: "The viewpoint of the historical data on the Tokai earthquakes and tsunamis"

Mr. Tsuji carried out the monumental task of digging up much old data in the Tokai districts. He is of the opinion that the Tokai districts are not now threatened by an impending big earthquake.

Dr. Tokutaro Hatori: "The historical tsunamis in Hokkaido"

Dr. Hatori pointed out the blank area lying off Kushiro, Hokkaido, where neither earthquakes nor tsunamis have occurred for a long time. He introduced other historical tsunamis in Hokkaido.

Dr. Hisashi Miyoshi: "The tsunami in the Aegean Sea"

Dr. Miyoshi introduced three Atlantises in the Kyushu districts, Japan. He suggested that the story of the third Atlantis which had existed in the Beppu Bay and sank on September 4, 1596, was the most instructive.

Dr. Mashito Nakano: "The development and the decay of the tsunami in a bay"

Dr. Nakano introduced an interesting fact that the whole energy of the seiche in a bay was apt to be shifted to the next-door bay, and stimulated much curiosity of the audience.

Dr. Hiroyoshi Togashi: "The run-up of the tsunami and the counterplan against it"

Dr. Togashi introduced the considerations from the technical viewpoint into the Oceanographical Society of Japan. Of course, such considerations are the socially most important ones, and this society has rather lacked them.

## ANNOUNCEMENTS

### Tsunami Workshop - May 7-9, 1979

Under the sponsorship of the U.S. National Science Foundation, Tetra-Tech, Inc. of Pasadena is organizing a Tsunami Workshop to be held at the Coto de Caza in Southern California on 7-9 May 1979. The purpose of the workshop is to provide a forum for a critical review of the status of tsunami research. Participation is limited to about 40 invited persons from industry, government agencies, and academia. The format of the workshop will consist of presentations of critical reviews of selected topics by various invited speakers. Each review will serve as a focus and guide for discussions by workshop participants. The following is the Agenda of the Tsunami Workshop:

#### May 7 - Monday

##### MORNING (8:00 AM)

##### 1. Introduction

Welcoming remarks and review of  
workshop objectives and procedures

National Science Foundation

##### 2. Tsunamigenic Earthquakes

2.1 Fault Mechanisms and Frequencies of Occurrence

\*G. Plafker, USGS  
\*\*R. Geller, Stanford Univ.

2.2 Characteristics of Ground Motions Inferred from Seismic Waves

\*H. Kanamori, Caltech  
\*\*J. Kelleher, NRC

-- L U N C H --

##### AFTERNOON (1:00 PM)

##### 3. Tsunami Generation

3.1 "Near Field" Effects within the Source Region

\*K. Kajiura, Japan  
\*\*K. Lee, Tetra Tech

3.2 "Far Field" Generation of Transoceanic Tsunamis

##### 4. Tsunami Propagation

4.1 A Survey of Fundamental Features

\*E. Tuck, Australia  
\*\*P. Liu, Cornell Univ.



May 8 - Tuesday

MORNING (8:00 AM)

4. Tsunami Propagation (cont'd)

- |     |                               |                                     |
|-----|-------------------------------|-------------------------------------|
| 4.2 | Evaluation of Existing Models | *T. Wu, Caltech<br>**J. J. Lee, USC |
|-----|-------------------------------|-------------------------------------|

5. Coastal Transformations and Terminal Effects

- |     |  |  |
|-----|--|--|
| 5.1 | Coastal Transformation--Survey of Fundamental Features and Evaluation of Existing Models | *G. Carrier, Harvard<br>**J. Hammack, UC Berkeley              |
| 5.2 | Engineering Methods--Run-up, Surge on Dry Bed, and Energy Dissipation                    | *B. LeMehaute, Univ. of Miami<br>**G. Pararas-Carayannis, ITIC |

-- L U N C H --

AFTERNOON (1:00 PM)

- |     |  |  |
|-----|--|--|
| 5.3 | Island Response to Tsunamis                  | *R. Reid, Texas A&M<br>**E. Bernard, PTWC, NOAA  |
| 5.4 | Bay and Harbor Responses to Tsunamis         | *F. Raichlen, Caltech<br>**D. Divoky, Tetra Tech |
| 6.  | <u>Numerical Aspects of Tsunami Modeling</u> | *C. Mei, MIT<br>**J. Houston, WES                |

May 9 - Wednesday

MORNING (8:00 AM)

7. Coastal Protection

- |     |   |   |
|-----|---|---|
| 7.1 | Shore Protection and Flood Plain Management         | *R. Wiegel, UC Berkeley<br>**O. Magoon, COE       |
| 7.2 | Combined Effects and Tsunami Flooding Risk Analysis | *I. Collins, Tetra Tech<br>**H. Loomis, JTR, NOAA |

-- L U N C H --

AFTERNOON (1:00 PM)

- |    |   |  |
|----|---|--|
| 8. | <u>Instrumentation and Observations</u> | *W. Van Dorn, UC San Diego<br>**K. Olsen, LASL |
| 9. | <u>Discussions and Conclusions</u>      | *L. Hwang, Tetra Tech                          |

\* Chairman  
\*\* Recorder

International Symposium on Earthquake Prediction to be held in Paris,  
France: April 2-6, 1979

Sponsored by UNESCO, this symposium will deal with several aspects of earthquake prediction in the physical and social sciences. Sessions are planned to discuss earthquake precursors, methods of prediction, response to prediction, the role of institutions in the predictive process, and the communication of predictions and warnings.

For information about the symposium or proceedings, write: The Director, Division of Earth Sciences, UNESCO, Place de Fontenoy, 75700 Paris, France.

13th Annual Congress, Canadian Meteorological and Oceanographic Society,  
to be held at the University of Victoria, British Columbia from May 30  
to June 1, 1979

Papers are being called for the above Congress. The theme sessions will consist of both invited and contributed papers and subsequent sessions of contributed papers on meteorology and oceanography. Sessions of common interest, according to the papers submitted, will be included. Poster sessions may also be held, depending upon the response received. Those submitting papers are asked to indicate if they are willing to present them in a poster session.

Titles and definitive abstracts (300 words maximum) should reach the program committee by February 1, 1979. Send abstracts to:

Dr. Richard Bennett  
Resource Analysis Branch  
Ministry of the Environment  
Parliament Buildings  
Victoria, B.C.  
Canada V8V1X4

XIV Pacific Science Congress to be held in Khabarovsk, USSR; August 20 -  
September 5, 1979

Preliminary programs for this Congress are given in "Information Bulletin, Pacific Science Association." Vol. 30, No. 5, September 1978. Two of the symposia include topics which may be of particular interest to our readers. Section FI (Physical Oceanology) includes "Tsunami" and Section BVIII, FIV (Marine Geology) includes "Ranges and fractures in the Pacific floor."

Those who hope to attend the Congress and wish to be included in the mailing list for information circulars and registration forms should write to: Organizing Committee

XIV Pacific Science Congress  
The Academy of Sciences of the USSR  
12 Zhdanov St., Rm. 90  
Moscow 103045 USSR

IUGG Tsunami Meeting - Canberra, Australia, December 6-7, 1979

The Tsunami Committee of the International Union of Geodesy and Geophysics (IUGG) will hold its biannual meetings in conjunction with the General Assembly in Canberra, Australia on December 6-7, 1979. One page abstracts should be submitted to:

Prof. Serge L. Soloviev, Chairman  
IUGG Tsunami Committee  
Academy of Science, USSR  
Ulyanovskaya ul. 51  
Moscow 109004, USSR

Dr. Harold G. Loomis, Secretary  
Tsunami Committee IUGG  
or Joint Institute for Marine and  
Atmospheric Research  
2525 Correa Road  
Honolulu, Hawaii 96822

OCEANEXPO 80: 4th International Exhibition on the Exploitation of the  
Oceans: Shipbuilding, Offshore Techniques, Harbours, Fishing, Pollu-  
tion Control to be held in Bordeaux, France; March 4-8, 1980

For information, write: TECHNOEXPO SA  
8 Rue de La Michodière  
75002 Paris, France

Eleventh Session of the IOC Executive Council, Mexico City, 26 February -  
3 March 1979

The provisional agenda of the above session is as follows:

1. Opening of the session
2. Administrative Arrangements for the session
  - 2.1 Adoption of the Agenda
  - 2.2 Election of Rapporteur
  - 2.3 Conduct of the session
  - 2.4 Timetable, documentation
3. Introductory Statements by the Chairman, First Vice-Chairman and the Secretary on intersessional activities
4. Consultation with the Director-General, Unesco, on the appointment of a new Secretary of the Commission
5. Actions arising from meetings of the governing and subsidiary bodies of the Commission
  - 5.1 Ocean Science
    - 5.1.1 Statement by the Third Vice-Chairman on intersessional activities

- 5.1.2. Global Atmospheric Research Programme (GARP)
  - 5.1.2.1 First GARP Global Experiment (FGGE)
  - 5.1.2.2 GARP Atlantic Tropical Experiment (GATE)  
Oceanographic Atlas
- 5.1.3. Second session of the IOC Association for the Caribbean and adjacent regions (IOCARIBE-II)
- 5.1.4. Co-operative Study of the Kuroshio (CSK)/Western Pacific (WESTPAC)
  - 5.1.4.1 Fourth CSK Symposium
  - 5.1.4.2 WESTPAC Workshop and first session of the Working Group for WESTPAC (WESTPAC-I)
- 5.1.5. First session of the Working Group on the Investigations of 'El Niño' (EL NINO-I)
- 5.1.6. Fifth meeting of the ad hoc Group of Experts on the International Bathymetric Chart of the Mediterranean (IBCM-V)

## 5.2 Ocean Services

- 5.2.1. Statement by the Second Vice-Chairman on intersessional activities
- 5.2.2. Integrated Global Ocean Station System (IGOSS)
  - 5.2.2.1 First session of the Joint IOC/WMO Working Committee for IGOS (JWC-IGOS-I)
  - 5.2.2.2 Recommendations on the continuation of observations by means of anchored and drifting buoys on a permanent basis following the completion of the First GARP Global Experiment (FGGE)
- 5.2.3. International Oceanographic Data Exchange (IODE)
  - 5.2.3.1 Ninth session of the Working Committee on IODE (IODE-IX)
  - 5.2.3.2 Status of IODE

## 5.3 Training, Education and Mutual Assistance in the marine sciences (TEMA)

- 5.3.1. Statement by the Fourth Vice-Chairman on intersessional activities

5.3.2. Consideration of applications received for assistance  
under the IOC Voluntary Assistance Programme

6. Actions arising from associated meetings and activities of concern to the Commission
  - 6.1 Third UN Conference on the Law of the Sea
  - 6.2 Scientific Committee on Oceanic Research (SCOR) - Fourteenth General Meeting
  - 6.3 Programme of the Division of Marine Sciences of Unesco
7. Evaluation and future direction of certain IOC Activities
  - 7.1 Global Investigation of Pollution in the Marine Environment (GIPME)
    - 7.1.1. Study in Depth by the Scientific Advisory Board
    - 7.1.2. Report as to how the Commission could collaborate with various international organizations investigating marine pollution
  - 7.2 Scientific Advisory Board (SAB)
8. Administration and Structure
  - 8.1 Future Role and Functions of the Commission (FUROF)
  - 8.2 Programme Forecast 1981-82
9. Dates, place and arrangements for the twelfth session of the Executive Council (EC-XII) and the eleventh session of the Assembly (IOC-XI)
10. Adoption of the Summary Report and resolutions of the session
11. Closure of the session



Some of the participants to the Tsunami Session of the. Long Wave Symposium in Ottawa, Canada, June 6-8, 1978. From left to right: LT John Nelson, Dr. Lester Spielvogel, Dr. Harold Loomis, Mr. Sydney Wigen, Dr. Gabriel Godin (conference organizer) and Dr. Muss.

### ABSTRACTS AND RESUMES

#### Tsunami -- A Selected Bibliography

Rani J. K. Chawla  
Marine Sciences Directorate  
Department of Fisheries & the Environment  
Ottawa, Canada

Manuscript Report Series No. 51, 1978

The bibliography is presented in microfiche form. About 1,900 references to tsunami literature, in the fields of seismology, oceanography, aeronomy and geology are given.

#### Methods of Calculating Tsunami Origin and Spreading

Edited by S. L. Soloviev

Publishing House "Nauka," Moscow, 1978, 144 pp, price 1 rouble 40 copecks.

Contents:

V.A.Bernshtein: On mechanism and mathematical description of the tsunami excitation process.

V.K. Gusjakov: A survey of papers on the problem of tsunami waves excitation.

G.S. Podjapolsky: Tsunami excitation by an earthquake.

L.E. Novikova, L.A. Ostrovsky: On excitation of tsunami waves by a travelling displacement of the ocean bottom.

A.I. Yanushauskas: Waves excitation caused by underwater sources of variable intensity.

V.A. Bernshtein: Displacements occurring on the border of elastic semi-space under action of concentrated mass forces.

B.V. Levin: A survey of papers on experimental modelling of the tsunami excitation process.

### Tsunami Research in the Open Sea

Edited by E.F. Savarensky and S.L. Soloviev

Publishing House "Nauka," 1978, 147 pp, price 1 rouble 40 copecks.

#### Contents:

A.S. Aleckseev, V.K. Gusjakov, L.B. Chubarov, Y.I. Shokin: Numerical study of tsunami generation and spreading in basins with real bottom topography. Linear pattern.

A.N. Lebedev: On the directivity of tsunami waves radiation, connected with large scale heterogeneity of the bottom relief.

V.G. Bukhteev, N.L. Plink: Tsunami waves transformation on the shelf and the redistribution of energy.

V.G. Bukhteev, N.L. Plink: Numerical modelling of a real tsunami.

M.V. Babii, R.A. Yaroshenya: Results of the calculation of a bays' level free oscillation periods, made as example for the Kasatka Bay.

V.M. Ljatkher, A.N. Militeev, S.Y. Shkolnikov: Calculation of the tsunami waves' runup.

R.N. Burymskaya: Peculiarities of tsunamigenic earthquakes source mechanisms.

S.L. Soloviev: Basic data on tsunamis at the Pacific coast of the USSR (1737 - 1976).

N.A. Shchetnikov: A tsunami caused by the Moneron earthquake of 1971.



Learning from Earthquakes - 1977 Planning and Field Guides

200 pp. Price \$5.00 (includes mail and handling charges).

Published by: Earthquake Engineering Research Institute

Available from: EERI Secretary, 424-40th Street, Oakland, CA 94609

The aim of the Planning and Field Guides is to help maximize the learning to be gained from investigations following future earthquakes. The Guides are meant for use in the planning and field execution of such investigations. Through their use, both the afflicted communities and the investigators can understand how to participate in the investigation and what information is of greatest value. The Planning Guide, intended for executives and planners, is bound separately and is available at no cost. The Field Guides (Engineering Field Guide, Geoscience Field Guide and Social Science Field Guide) are for field investigators.

Intergovernmental Oceanographic Commission - Summary Report: Tenth Session of the Assembly, including Resolutions from the Seventh and Eighth Sessions of the Executive Council - Paris, 27 October - 10 November 1977.

Intergovernmental Oceanographic Commission, UNESCO, Paris, April 1978.

This report contains a summary of the discussions which took place during the session, both in Session Committees and in plenary. The 29 resolutions which were adopted are given in full in Annex II.

During the session, the traditional Bruun Memorial Lectures were presented. This year the theme followed was "The importance and application of satellite and remotely sensed data to oceanography." Abstracts are given in Annex VI. The full lectures will be published in the IOC Technical Series.

For convenience, the resolutions adopted at the seventh session of the Executive Council, Bergen, Norway, 21-26 June 1976, and at its eighth session, Paris, 4-8 April 1977 are given at the back of the volume. (No resolutions were adopted at the ninth session of the Executive Council.)

Revised Wave Runup Curves for Smooth Slopes

Philip N. Stoa  
U.S. Army, Corps of Engineers  
Coastal Engineering Research Center  
Kingman Building  
Fort Belvoir, Va. 22060  
USA

Coastal Engineering Technical Aid No. 78-2. July 1978.

Results of previous tests of monochromatic wave runup on smooth structure slopes were reanalyzed. Runup results for both breaking and non-breaking waves are given in a set of curves (for structure slopes fronted by horizontal and 1 on 10 bottom slopes).

Included are example problems and a curve for scale-effect corrections.

#### Annotated Bibliography of CERC Publications

Andre Szuwalski  
U.S. Army, Corps of Engineer  
Coastal Engineering Research Center  
Kingman Building  
Fort Belvoir, Va 22060  
USA

Available from: National Technical Information Service  
ATTN: Operations Division  
5285 Port Royal Road  
Springfield, Virginia 22151  
USA

This bibliography includes a listing of publications issued by the Coastal Engineering Research Center (CERC) since 1963. Indexes of authors and keywords are also included.

#### Proceedings of the Symposium on Tide Recording

Edited by R. Britton

The Hydrographic Society Special Publication No. 4, 203 pp.

Available from: The Hydrographic Society of North East London Polytechnic  
Department of Land Surveying  
London, England

Contents: Papers presented at the British Hydrographic Society Symposium, held at the University of Southampton, April 14-15, 1976.

1. G. W. Lennon "The National Network for the Monitoring of Sea Level and the Committee on Tide Gauges"
2. N. C. Glen "The Uses made of Tidal Data"
3. S. A. Hands "Tidal Measurement for Conservancy Purposes"
4. J. Eady "The Monitoring of Tide Gauges by the Ordnance Survey"
5. R. J. Ekblom "The Ideal Gauge"

6. P. Pugh "The Design of Coastal Tide Gauges"
7. R. Cuff & J. Osborne "Some Designs for Gauges for the Measurement of Water Levels at a Fixed Point"
8. R. Threadkell "Problems Associated with the Knowledge of Tidal Levels Offshore"
9. W. Powell "Offshore Tidal Gauges"
10. J. B. Rae "The Design of Instruments for the Measurement of Tides Offshore"
11. W. R. Blain,  
N. B. Welber,  
D. Nash &  
M. J. Ridge "A Transverse Levelling Experiment in Southampton Water"
12. E. M. Bradley "Problems of Tide Recording Associated with Large Tidal Range in the Bristol Channel"
13. R. Dinnage & G. Boorman "Case Histories of a Contract Surveyor"

Marine Geodesy. An International Journal of Ocean Surveys, Mapping and Sensing, Vol. 1, No. 4, 1978

Editor-in-Chief: N. K. Saxena

Published by Crane, Russack & Co., Inc., 347 Madison Avenue, New York, N.Y. 10017

This issue of "Marine Geodesy" is the first of two issues to be devoted exclusively to papers on Tsunamis which were presented by the IUGG Symposium on Tsunamis held in Ensenada, Mexico in 1977. The following papers are published in the present issue.

- |                       |  |
|-----------------------|--|
| Kuniaki Abe:          | "Determination of the Fault Model Consistent with the Tsunami Generation of the 1964 Niigata Earthquake" |
| Masito Nakano:        | "Path of Propagation of Tsunami Waves"   |
| E. Silgado:           | "Recurrence of Tsunamis in the Western Coast of South America"   |
| Salvador F. Farreras: | "Tsunami Resonant Conditions of Concepcion Bay (Chile)"  |
| Shigehisa Nakamura:   | "A Concept of Tsunami Economics"   |

Lewis G. Hulman,  
William S. Bivins,  
and Myron H. Fliegel:

"Tsunami Protection of Coastal Nuclear Power  
Plants in the United States"

Seismic Summary (August 23 to Press Time)

<u>Event No.</u>	<u>Event</u>	<u>Location</u>	<u>Action Taken</u>
1978-14	Aug 23 0038 (UT)	Costa Rica 9.9 N	Press Release. Queried tide stations at Balboa and Acajulta - both negative.
	(PTWC) 6.6	85.7 W	
	(ATWC) 7.1		
1978-15	Nov 4 2230 (UT)	East of Solomon Is. 8.2 S	
	(PTWC) 6.8	163.2 E	
1978-16	Nov 5 2202 (UT)	SE San Cristobal I. Solomon Islands	Tsunami Watch. Watch cancellation (based on negative report from Kwajalein). Press Release.
	(PTWC) 7.5	10.9 S	
		162.2 E	
1978-17	Nov 29 1952 (UT)	Mexico-Guatemala border	Tsunami Watch. Watch cancellation. Press Release.
	(PTWC) 7.3	16.1 N	
	(ATWC) 7.8	96.4 W	
	(Newport) 8.1		
1978-18	Dec 6 1401 (UT)	NE of Hokkaido, Japan	Press Release.
	(PTWC) 6.9	43.8 N	
		148.5 E	
1978-19	Dec 12 1144 (UT)	Near Mindanao, Philippines	Press Release.
	(PTWC) 6.7	8.0 N	
		123.5 E	
1978-20	Dec 23 1123 (UT)	Off Republic of China (Taiwan)	Press Release.
	(PTWC) 6.9	23.5 N	
		122.0 E	

(PTWC) - Pacific Tsunami Warning Center, Honolulu

(ATWC) - Arctic Tsunami Warning Center, Alaska

ITIC WISHES  
HEALTH  
HAPPINESS  
AND  
PROSPERITY  
TO ALL DURING THE NEW YEAR !!



ITIC staff posing in front of the ITIC office prior to moving to their new location. From left to right: Mrs. Millie Ching, Secretary; Dr. George Pararas-Carayannis, Director; Ms. Lori Nishimura, Librarian; Mr. Norman Ridgway, Associate Director; and Ms. Susan Nishioka, Computer Programmer.