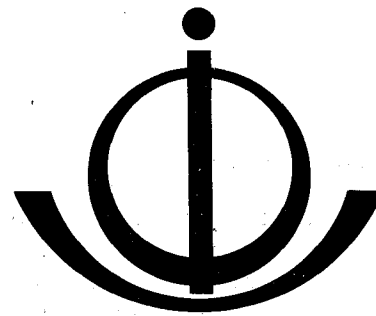




# INTERNATIONAL TSUNAMI INFORMATION CENTER



INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION  
COMMISSION OCEANOGRAPHIQUE INTERGOUVERNEMENTALE  
COMISION OCEANOGRAFICA INTERGOBERNAMENTAL  
МЕЖПРАВИТЕЛЬСТВЕННАЯ ОКЕАНОГРАФИЧЕСКАЯ КОМИССИЯ

P. O. Box 3650, Honolulu, Hawaii 96811 USA

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## NEWSLETTER

The ITIC Newsletter brings news and information to tsunami researchers, engineers, educators, community protection agencies and governments in 36 countries. We welcome your news, reports, papers, or abstracts.

### Earthquakes in Solomon Islands, July 20 & 21

A series of earthquakes which took place in the Solomon Islands on the 20th and 21st of July, 1975 kept ITIC's Honolulu Observatory in a state of flux for several hours while determining whether tsunami had been generated. The first quake took place on July 20 14:37Z at coordinates lat. 6.9S, long. 154.4E, with a magnitude of 8.0 on the Richter scale. A tsunami watch was issued for the Hawaiian Islands as well as other Pacific Basin points, and immediate communications were set up throughout the area with particular interest in the stations at Truk, Kwajalein, Canton, Apia, and Noumea. ETA's were determined for these islands, as well as for other points in the Pacific. At 18:20Z communiques from Kwajalein indicated a negative wave report, the ETA having been 17:52Z, and a watch cancellation was issued from Honolulu indicating that no Pacific wide wave had been generated. However, according to a subsequent newspaper account, a local tsunami was generated by the earthquake which destroyed the village of Torokino on the west coast of Bougainville in the Solomon islands killing 200 people. ITIC is still awaiting confirmation of the above-mentioned account.

At 19:54Z a second quake occurred at similar coordinates, lat. 6.15S, long. 155.12E, magnitude of 7.7. Again the machinery for tsunami detection was set in motion throughout the Pacific, however by 21:14 a press release was issued by the Observatory stating that there was no evidence that a Pacific wide tsunami had been generated. Three more major tremors occurred on July 21, none of which were tsunamigenic. The computer terminal and associated equipment at HO were activated and used extensively during the initial and later earthquakes of this series, both to compute epicenters and to generate messages.

### Singapore Joins Warning System

On March 2, 1975, the Government of Singapore accepted membership in the International Co-ordination Group for the Tsunami Warning System in the Pacific (ITSU). K. Rajendram, Director of the Meteorological Service of Singapore, sent the acceptance to the Secretary of the Intergovernmental Oceanographic Commission, Mr. Desmond P. D. Scott, making Singapore the 15th country in the tsunami network.

## REPORTS FROM ITIC - HONOLULU

### Visiting Scientists

Two scientists have been selected by the Intergovernmental Oceanographic Commission to visit ITIC during the current calendar year. They are Mr. Pedro Cabezas Gonzales from Ecuador and Mr. Cesar Vargas Faucheux from Peru. While at ITIC these scientists will familiarize themselves with the International Tsunami Warning System and conduct tsunami-related research. In addition they will work on the proposal to the United Nations Development Program for support in establishing a regional tsunami warning system in South America.

### NOAA Corps Officer Joins Tsunami Staff of the Pacific Tsunami Warning System

LTJG Dennis Sigrist, NOAA, joined the tsunami staff of the National Weather Service, Pacific Region, on August 13, as Assistant Tsunami Specialist. LTJG Sigrist will be working with Dr. Pararas-Carayannis, Director, ITIC, performing staff duties relating to the Tsunami Warning System in the Pacific Region.

Previous to his assignment with the NWS-PRH, LTJG Sigrist was assigned to the NOAA Ship Researcher, homeported in Miami, Florida. He joined the NOAA corps in 1973 after receiving his degree in Geology/Geophysics from the University of Hawaii.

### International Numbering System for Tides (INST) - Correction Note

The May Newsletter reported the adoption at ITIC of a 10-digit numbering system for storage and retrieval of tidal and tsunami data. In this system the first digit identifies in which of four earth sectors the station is located; the next four designate the latitude, and fraction of a minute deleted; and the last five, similarly, the longitude. A change has been made in the sector designation as follows:

- |         |                                  |
|---------|----------------------------------|
| Digit 1 | Northern and eastern hemispheres |
| 2       | Northern and western hemispheres |
| 3       | Southern and western hemispheres |
| 4       | Southern and eastern hemispheres |

As an example, the Honolulu tide gauge, Lat. 21° 18.39' N, Long. 157° 52.04' W, will be indexed 2/2118/15752. The / is used in printout for easier reading, but not in computer storage.

### Associate Director Arrives

Sydney Wigen, whose appointment as Associate Director of ITIC was announced in the previous Newsletter, arrived from Canada in late August, and commenced duties on September 1. His initial period of assignment for this post is one year. His wife, Nancy, and members of his family have joined him in Honolulu.

Mr. Wigen will initially be seeking to increase ITIC liaison with agencies and individuals concerned with seismic and tsunami observation, research, and warnings. He is also soliciting information on more automated systems of acquiring, transmitting, and processing tidal and seismic data, that could be applied by ITIC in increased automation of the Tsunami Warning System.

## ITIC Staff Support

Under the U.S. Comprehensive Employment Training Act (CETA) six trainees of the Program worked at ITIC for the past several months and contributed greatly to ITIC, while acquiring new skills. These were Messrs. Richard Farmer and Thomas LeBallister, and Mss. Cheryl Hoke, Geraldine Murphy and Judy Erminger. The ITIC staff is wishing them success in their careers.

## TSUNAMI WARNING SYSTEM IN THE PACIFIC

### Tide Station Inspections

ITIC is presently planning and coordinating with the U.S. National Oceanic and Atmospheric Administration's (NOAA) Pacific Tide Party the annual inspection of Pacific tide stations participating in the Tsunami Warning System. Mr. Mickey Moss and LTJG Garth Stroble of the Pacific Tide Party assisted by LTJG Dennis Sigrist, Assistant Tsunami Specialist in the staff of the Pacific Region, U.S. National Weather Service, will visit the stations in the Pacific to establish liaison for ITIC and to repair and inspect tide gages. It is expected that the following stations will be visited: Mardsen Point, New Zealand; Suva, Fiji Islands; Apia, Western Samoa; Pago Pago, American Samoa; Papeete, Tahiti; Honolulu, Nawiliwili, and Hilo, Hawaii; Wake, Johnston, Kwajalein, Truk, Guam, Midway, Canton, Yap, Malakal and Marcus Islands. A station visitation program in Alaska and the west coast of United States was completed earlier in the summer.

### US-USSR Tsunami Warning System Agreement

In response to the US-USSR Bilateral Agreement on Integration of Tsunami Warning Systems, signed on the 7th of December 1974, the Pacific Region of the U.S. National Weather Service has made considerable progress in implementing the operational terms of this Agreement. Specifically, the Agreement calls for the exchange of real-time seismic and tide data, communication tests, data submission to the International Tsunami Information Center, and a joint seismic experiment. The following progress has been made.

Full exchange of seismic and tide data was initiated between US and USSR last February. USSR seismic observatories at Yuzhno-Sakhalinsk and Petropavlovsk began to supply real-time seismic data including P-Phase arrival times to Honolulu Observatory for all earthquakes of magnitude 7 or above. Similarly the Honolulu Observatory included the Hydro-meteorological Service at Khabarovsk as an addressee on all information and tsunami warning bulletins issued. The exchange of seismic and tide data continues.

Communication tests were initiated by Honolulu Observatory using the existing Honolulu-JMA-Khabarovsk channel. These tests were initiated on February 12, 1975 and were satisfactory. The alternate routing of tsunami messages using WMO channels via America and Europe was tested on several occasions with negative results. These WMO communications for real-time tsunami data exchange were abandoned because of the lengthy communication delays of this system.

USSR has begun to submit to ITIC seismograms of tsunamigenic earthquakes, and mareographic recordings of tsunamis, as specified in the ICSU guideline on data exchange.

The terms of the Agreement proposed that the coordinated research on a joint seismic experiment between US and USSR should include exchange of instruments, seismic data, and information on methodology to be utilized. At present, U.S. National Weather Service

personnel are in contact with scientists in the USSR in order to determine both the instrumentation requirements and scope of the proposed seismic experiment. Following this communication, other US agencies will be contacted by the National Weather Service for the purpose of determining the extent of their participation, and the availability of seismic instruments necessary to carry out this experiment.

### Tsunami Tide and Seismic Sensors

Dr. George Pararas-Carayannis, Director of the International Tsunami Information Center, visited recently the Albuquerque Seismological Laboratory of the U.S. Geological Survey in Albuquerque, New Mexico, for the purpose of reviewing progress which has been made in the development of tsunami tide and seismic sensors. The development of the tsunami tide and seismic prototype sensors has been undertaken under the direction of Dr. Harold Clark of the Albuquerque Laboratory as a joint effort by NOAA's National Weather Service and the U.S. Geological Survey (USGS) for the Tsunami Warning System. These prototype sensors are presently undergoing tests. Eventually such tsunami tide and seismic sensors will be used with the GOES Satellite System to provide remote sensing and data telemetry capability for the International Tsunami Warning System in the Pacific. The principal goal of the GOES tsunami data telemetry system will be to reduce the time needed to evaluate the tsunami hazard, make decisions, and disseminate the warnings. The communication relay of GOES offers a unique opportunity to improve communications with remote stations and will permit also the International Tsunami Warning System to issue rapidly tsunami warnings on a regionalized basis. Both the Tsunami tide and seismic prototypes, developed by the Albuquerque Seismological Laboratory, can be coupled with existing standard seismometers and tide gages and are designed to operate with the GOES Interrogated Data Collection Platform Radio Set.

After reviewing the work on the tide and seismic sensors and seeing them operating, Dr. Pararas-Carayannis was very much impressed by the potential the new technology offers for improvement of the Tsunami Warning System which for the last 10 years has had few changes made to it.

### Summary of Activity in World Data Center A for Tsunamis

The WDC-A for Tsunamis activity was relocated from Honolulu to Boulder in December 1974 to take advantage of the data processing capability and staff available to WDC-A for Solid Earth Geophysics. Mr. James A. Lander was appointed Director of the WDC-A Tsunami. The data holdings in Honolulu for the period since the beginning of the IGY were copied, although both the quantity and quality of the records available at Honolulu were less than expected.

Four tsunamis occurred in 1974 as having perceptible motions. WDC-A has requested copies of the mareograms and seismograms from the participating stations. These were:

<u>Earthquake Epicenter</u>						<u>Maximum Tsunami</u>		
mo	da	hr	mn	lat	long	mag	ht	location
01	31	23	30	07.5S	155.9E	7.0	1.6m	Shortland Islands
02	01	03	12	07.4S	155.6E	7.1	4.0m	Shortland Islands
09	27	05	47	43.2N	146.7E	6.7	0.4m	Hanasaki, Japan
10	03	14	21	12.3S	077.8W	7.6	1.8m	Callao, Peru

WDC-A is acquiring copies of the large file of mareographic data with tsunami activity from the U.S. National Ocean Survey. These data are expected to reduce the number of records missing from the collection and to provide a substantial file of records beyond those called for in the Guide. After these have been processed, an effort will be made to complete the collection as called for by the Guide by requesting them from the participating stations.

WDC-A published a flyer listing the tsunamigenic earthquakes since 1957 which qualify for data exchange through the WDC system. It also reproduced the portion of the 1973 "Guide to International Data Exchange Through the World Data Centres" treating tsunamis.

The WDC-A has agreed to reprint the "Catalog of Tsunamis in Alaska" by Doak C. Cox and George Pararas-Carayannis and "Catalog of Tsunamis in the Hawaiian Islands" by George Pararas-Carayannis both previously issued by WDC-A and will issue these this fall as part of a new series of Solid Earth Geophysics publications. WDC-A has also offered to publish the revised "Preliminary Catalog of Tsunamis Occurring in the Pacific Ocean" when this is ready.

The WDC-A is preparing a file on magnetic tape which will contain the epicenter parameters of all tsunamigenic earthquakes, reported effect (wave heights, arrival time, damage and other effects) at each location, availability of data, and references. The file will be searchable by effects in a region, by tsunami event or by selected effects (wave heights, damage). It would be operational this year. Address of the Center is WDC-A for Solid-Earth Geophysics Environmental Data Service, NOAA, Boulder, Colorado 80302.

#### Micro-Tsunami Measurement and Wave Forecasting Program

The Micro Tsunami Measurement and Wave Forecasting Program, conducted by NOAA's Joint Tsunami Research Effort (JTRE), on the north shore of Oahu off Mokuleia, Hawaii, consists of two pressure transducers, one located near shore and another 5 kilometers offshore. Output from this measurement system is telemetered to the JTRE, at the University of Hawaii, where it is recorded both magnetically and visually. The most significant output of the system is the relative amplitude between the offshore and onshore sensors. This relationship provides a measure of the response of the islands to long period waves such as tsunamis. Shore gages of this type produce data of quality that cannot be matched by shoreline or ordinary tide gage recording systems. The nearshore gage will be utilized in a swell forecasting test program being conducted cooperatively with the Pacific Region of the U.S. National Weather Service. By separating out waves of a distant storm, low frequency waves arriving first, and higher frequency waves following, the NWS will be able to forecast wave information from distant storms with greater accuracy and reliability.

#### USSR/USA Kuril Tsunami Experiment

On August 1, the Soviet vessel "Valerian Urgvayev" departed Nohodka USSR for a 2-month tsunami measurement project in the Kuril region. Dr. Robert Harvey and Mr. Don Shinmoto of NOAA's and University of Hawaii's Joint Tsunami Research Effort (JTRE) are aboard as the U.S. party. The experiment, a project under the USSR/USA Environmental Protection Agreement, is an attempt to measure tsunamis in the open ocean where they are uncontaminated by near-shore processes. The tsunamis will be recorded by bottom gages developed by JTRE. Upon completion of the at sea portion of the experiment, Dr. Gaylord Miller (JTRE) will join Dr. Harvey in Sakhalin to process the bottom gage records. Dr. Harvey will then proceed to Novosibirsk in Central Russia to compute the source functions of the tsunamis using programs developed there earlier this summer by Lt. Eddie Bernard

(JTRE) and Soviet scientists. The overall objective of the Joint Tsunami program under the agreement is to improve international Tsunami Warning Services provided by the ITIC. Increased knowledge of the transformations which occur as a tsunami interacts with the shoreline will help establish design criteria for tsunami hazard to coastal structures.

## INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION AND UNITED NATIONS

### ITIC Director Visits IOC

Dr. George Pararas-Carayannis, Director of the International Tsunami Information Center, visited in August the UNESCO and Intergovernmental Oceanographic Commission (IOC) headquarters in Paris, France for the purpose of discussing with the Secretary of IOC, Mr. Desmond P.D. Scott, and other IOC and UNESCO officials the International Tsunami Warning System in the Pacific. As a result of these discussions, it was agreed that ITIC should be more closely identified with IOC in its operation, and in the visiting scientists' program. In addition to IOC, he visited the Oceanography and Seismology Divisions of UNESCO to establish a better liaison and to provide ITIC input into UNESCO publications dealing with natural disasters.

While in Paris, Dr. Pararas-Carayannis visited with the International Council of Scientific Unions' (ICSU) officials to revise the ICSU guide on the international data exchange requirements. Following the meetings in Paris, he attended the International Union of Geodesy and Geophysics (IUGG) Conference in Grenoble, France.

### Tsunami Report Given at IOC

The ITIC Newsletter has received from Dr. G. Giermann, Deputy Secretary of the Intergovernmental Oceanographic Commission, a presentation made by Mr. Dohler of Canada to the IOC Executive Council, March 1975, in Venice, on the Tsunami Warning System in the Pacific. This report gives a summary of the origin and operation of the Tsunami Warning System, and of the use of regional warning systems. A copy can be provided on request to the Newsletter.

### New Brochure on Tsunami Warning System

UNESCO's Intergovernmental Oceanographic Commission has recently released an informational pamphlet, "Tsunami Warning System in the Pacific". The attractive three color publication is available for world wide distribution for public information and education programs and is printed in French, Spanish, Russian as well as English language versions.

The brochure gives a brief explanation of the phenomenon of tsunami and the tsunami watch and warning system in the Pacific area. Also featured are a map showing Pacific reporting stations and tsunami travel times to Honolulu and the ten tsunami safety rules.

Copies of this publication may be requested from the Director, ITIC, P.O. Box 3650, Honolulu, Hawaii 96811, U.S.A., or the Secretary, IOC, UNESCO, Place de Fontenoy, 75700 Paris, France.

## NATIONAL AND AREA REPORTS

### Regional Tsunami Warning Systems in South America

At the fourth meeting of the Intergovernmental Oceanographic Commission's (IOC) International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU), Wellington, New Zealand, February 4-7, 1974, it was recommended that the Director of the International Tsunami Information Center (ITIC) should advise the Governments of developing countries on sources of international funds for setting up their own national tsunami warning systems. Furthermore, it was suggested that an action plan be provided for establishing national warning systems and for participation in the International Tsunami Warning System.

This recommendation was officially adopted at the fourth session of the Executive Council of the IOC which met in Ottawa, Canada, June 17-22, 1974. The ITIC's functions were expanded to give technical advice on the equipment required for an effective warning system and to provide assistance in the establishment of national tsunami warning systems.

The ITIC, in accordance with these resolutions and in fulfillment of its responsibility to Member States of the ICG/ITSU, prepared a report on technical assistance available from the United Nations system for support of National Tsunami Warning Systems, requested by interested developing nations. The report provides guidelines for the preparation and submission of project proposals, assistance available from the UN system, responsibilities of all contracting parties undertaking a project, technical advice, and procedures to be followed at all stages of project development and implementation. It is entitled "United Nations Assistance in the Establishment of Tsunami Warning Systems in Developing Countries; Guidelines for a Project Proposal", and it is available on request from ITIC.

Dr. George Pararas-Carayannis, Director of ITIC, visited South America in June and July, under UNESCO-IOC support, and presented this report to appropriate government agencies in Ecuador, Peru, and Chile, which are the first developing countries to request such ITIC assistance. While in South America, Dr. Pararas-Carayannis visited with United Nations and UNESCO missions, with scientists and personnel of the InterAmerican Geodetic Survey, of National Universities, and of local Civil Defense Authorities, and with officials of different government agencies charged with the responsibility for the Tsunami Warning System in each country.

Dr. Pararas-Carayannis toured several existing tsunami tide stations and Communications and Oceanographic Centers. Based on these visits and on discussions with local officials, he assessed the requirements of each country for establishing a national tsunami warning system and reached an agreement with them on the type of instrumentation and number of stations which will be required to provide rapid warnings for locally generated tsunamis. The instrumentation and communications proposed for the national tsunami warning systems are expected to enhance considerably also the International Tsunami Warning System in the Pacific for which the South America region has been rather critical in the past. The TWS presently has insufficient flow of seismic and tsunami data from South America for properly evaluating the tsunami hazard.

An agreement was reached also with officials in each country for the preparation of a proposal for financial and technical support necessary for the establishment of National Tsunami Warning Systems. Furthermore it was agreed that the proposal should be presented to the United Nations Development Program (UNDP) for support as a regional South American program for the three countries. ITIC was asked to assist with the coordination of the project and the writing of the proposal. Agencies in each country agreed to provide ITIC

with information on their organizational structure, country contribution to the tsunami system, a communications plan for data telemetry, and a Civil Defense plan for warning dissemination, for inclusion in the UNDP proposal.

## ABSTRACTS AND RESUMES OF RECENT PUBLICATIONS RECEIVED AT ITIC

### Numerical Investigations of Tsunami Behavior

Li-San Hwang and David Divoky  
Tetra Tech Incorporated  
630 North Rosemead Blvd.  
Pasadena, California 91107

The authors have extended and improved previous work in numerical modeling of tsunamis. In particular the paper includes a computation of the midocean character of the 1960 Chilean tsunami, the 1964 Alaskan tsunami, and a special calculation of local wave behavior at Hilo, Hawaii which provides an approximate description of the observed coastal effects of the Alaskan tsunami.

### Nearfield Tsunami Behavior

Michael Chen, David Divoky and Li-San Hwang  
Tetra Tech. Inc.  
Pasadena, California

Three regions of approximation for the long wave theory are examined in investigating tsunami behavior where depth is small in comparison with the horizontal length scale; (a) linear equations, (b) finite-amplitude equations, (c) Boussinesq or Korteweg-De Vries type of equations.

Peregrine (1967) first developed the full Boussinesq approximation in two horizontal dimensions over variable depth, and his approach has been followed here. Chapter 2 presents the derivation, somewhat modified from Peregrine's to facilitate later numerical application. Chapter 3 presents the finite-difference approximation and includes a discussion of procedures adopted to overcome numerical difficulties. Chapter 4 discusses treatment of boundaries while Chapter 5 shows examples of actual applications. Discussion and listings of the computer codes are given in the appendices.

### Seawave - A Revised Model for Tsunami Applications

Maynard Brandsma, David Divoky and Li-San Hwang  
Tetra Tech. Inc.  
Pasadena, California

The generation, propagation and interaction of tsunamis with coastal or island areas is a problem of considerable current interest. The probability of flooding of coastal areas and the siting of coastal nuclear power plants are two areas where tsunami hazard must be considered. This report describes the development of deterministic models for the generation and propagation of a tsunami over a variable depth ocean, the response of an island to a train of straight crested long period sinusoidal waves, and the response of a variable depth harbor to an incident train of long waves of arbitrary form.



### Waves Generated by Horizontal Oscillations

Y. Keen Lee and Li-San Hwang  
Tetra Tech. Inc.  
Pasadena, California

The current energy crisis has focused interest on alternative energy sources to meet the future energy needs of the nation. In particular, the increased use of nuclear power plants is envisaged. Due to the need for a vast supply of cooling water, such plants will be sited along the coast or offshore in protected artificial basins. In many cases, e.g., in California, the sites are in regions susceptible to earthquakes. The horizontal ground motions associated with such earth tremors imply the generation of waves by vertical structures such as seawalls and relatively steep shorelines. The resulting waves are radiated away from the generating region into the open sea unless they are trapped by the local bathymetry or reflected by coastal boundaries and offshore islands, sand bars etc. For protected basins, the waves generated within the basin by the horizontal motion of its boundaries will accumulate, since the waves can escape only through a relatively narrow opening. Under appropriate conditions, depending on the spectral composition of the horizontal ground motions, the dimensions of the basin and the duration of the disturbance, resonance can occur with resulting large wave amplitudes within the basin which may be detrimental to power plant operation.

### Seismicity and Submarine Volcanic Activity in French Polynesia

Jacques Talandier and Guy T. Kuster  
Laboratoire de Geophysique  
Papeete, Tahiti  
Laboratoire de Detection et de Geophysique Commissariat a l'Energie Atomique  
Montrouge, France

The implementation of ten short period seismic stations in French Polynesia since 1963 allowed the detection of previously unnoticed seismic activity in the Central South Pacific (5 to 30°S, 125 to 160°W). The epicenter location, depth and magnitude of all major events which occurred in this region are tabulated. The Tahiti-Mehetia region which is the zone of activity closest to the stations is studied in detail. Swarms of earthquakes are observed at two well defined sites. Their similarity with typical pre-eruptive swarms, their location near two seamount and the general volcanic context are considered indicative of two active submarine volcanoes. The existence of a "hot spot" at the southeastern tip of the Society Island chain is suggested.

### Marine Geodesy and Tsunami Prediction

N. K. Saxena  
Department of Civil Engineering  
University of Illinois at Urbana-Champaign  
Urbana, Illinois 61801

A marine geodetic approach to determine the velocity, direction and height of tsunami wave is described. A configuration of the supplementary system to be used with the existing tsunami warning system is provided for the Pacific Ocean, where most of the destructive tsunamis occur. Recommended is the use of sonar, satellite and seismic data, which can provide a more reliable and quicker warning than it is possible today. Thus, marine geodetic approach can improve the tsunami prediction capability tremendously.

## Historia de los Grandes Tsunamis Producidos en la Costa Occidental de America del Sur

Enrique Silgado Ferro  
CERESIS, Apartado 3747  
Lima, Peru

This paper documents, in Spanish, accounts of locally produced tsunamis occurring on the west coast of South America from 1570 to 1960 and provides descriptive and technical information on the size and accompanying destruction.

### Geoscientists for International Development

Tsunami scientists and investigators may be interested in the Association of Geoscientists for International Development. AGIC, as an association, aims to make the world aware of the benefits of scientific and rational use of the capabilities and insights of the geosciences. This aim also carries the corollary that geoscientists must be sensitive and capable of adjusting to forces and constraints acting outside of disciplinary limits. One way is for geoscientists to share their experiences. The Association's publication, AGID News, provides a forum for this sort of exchange. For information write c/o A. R. Berger, Department of Geology, Memorial University, St. John's, Newfoundland, Canada.

### ANNOUNCEMENTS

#### Geodetic Measurement in the Ocean

A topical conference cosponsored by the Marine Technology Society and the American Geophysical Union will be held at University of Illinois at Urbana-Champaign, Urbana, Illinois, June 28-30, 1976. The tentative program structure is as follows:

##### Keynote Speech

- Session 1 Ocean Bottom Topography and Bathymetry
- Session 2 Positioning and Navigation
- Session 3 Industrial Needs and Requirements
- Session 4 Mean Sea Level
- Session 5 Instrumentation
- Session 6 Plenary Session

#### 15th International Conference on Coastal Engineering

July 11-17, 1976. Honolulu, Hawaii.

For information, write: Professor Charles L. Bretschneider  
Chairman, Organizing Committee, COASTAL-76  
Dept. of Ocean Engineering, University of Hawaii  
2565 The Mall  
Honolulu, Hawaii 96822

3rd Triennial International Exhibition on the Exploitation of the Oceans

March 8-12, 1977. Bordeaux, France.

For information, write: Oceanexpo  
8 rue de Michodiere  
75002 Paris, France

CONFERENCE REPORTS

IUGG Tsunami Committee Symposium and Report

A Tsunami Symposium was held on August 29th at Grenoble under the auspices of IAPSO, and was convened by Dr. E.C. LaFond. With Dr. S.L. Soloviev, Chairman of the IUGG Tsunami Committee in the chair, the following papers were presented:

1. W. Adams: Conditional expected tsunami inundation at arbitrary coastal locations in Hawaii.
2. R.D. Braddock: The tide well problem.
3. L. Hwang  
and  
D. Divoky: An Atlas of tsunami sources and their computed circum-Pacific influences.
4. J.C.H. Mungall  
and  
A.C. Vastano: Generation of oscillatory wave trains in water of finite depth by travelling atmospheric disturbances.
5. T.S. Murty: Tsunami propagation through a field of pack ice.
6. T.S. Murty  
and  
S.O. Wigen: Atlantic Ocean tsunamis: effects on the east coast of North America.
7. S.L. Soloviev: An improved tsunami intensity scale.
8. G. Pararas-Carayannis: Engineering considerations in the assessment of potential tsunami hazard.

In addition to the above papers whose abstracts were submitted earlier, the following three papers were also presented:

9. F. Gonzalez: Long surface wave transport in irregular basins.
10. E. Bernard: Tsunami response of the Hawaiian Islands.
11. K. Olson: Some recent observations from sensitive tsunami recorders at three small Pacific atolls.

Dr. Gonzalez discussed one and two-dimensional models for wave propagation due to perturbations entering from both sides of a canal. Mr. Bernard presented the results of a numerical model of the response of the Hawaiian Islands to tsunamis. He also showed a movie on tsunamis which consisted of shots of real tsunamis, numerical model results and hydraulic model studies. Dr. Olson discussed records of a small tsunami in June 1975 at Marcus, Wake and Johnston Islands. These records were made with transducers placed outside the reefs of these islands.

After the symposium, the Tsunami Committee held a meeting, and received a report from its Chairman, Dr. S. Soloviev on the activities from 1971-75. Five new members were elected to the committee:

1. Dr. A.S. Alexeev: Computer Center, Siberian Branch,  
Academy of Sciences, USSR.
2. Dr. L. Hwang: Tetra Tech,  
California, USA.
3. Dr. G. Pararas-Carayannis: Director, International Tsunami  
Information Center,  
Honolulu, USA.
4. Mr. J.V. Presbitero: Director, Bureau of Coast and  
Geodetic Surveys,  
Philippines.
5. Dr. J. Talandier: Chief, Geophysical Observatory,  
Tahiti, French Polynesia.

The following officers were elected by the committee:

- |                   |               |
|-------------------|---------------|
| Dr. S.L. Soloviev | Chairman      |
| Dr. K. Iida       | Vice Chairman |
| Dr. G.R. Miller   | Vice Chairman |
| Dr. T.S. Murty    | Secretary     |

The following resolutions were adapted:

1. The IUGG tsunami committee approves the activities of its officers during 1971-1975.
2. The IUGG tsunami committee mourns the loss of Leonard Murphy, an organizer of the Tsunami Warning Service, a valued member of the committee, and most of all, a good friend.
3. The IUGG tsunami committee notes with great satisfaction the advent of the joint US-USSR tsunami research program, as one of the main aims of the committee is to foster such an example of international cooperation.
4. The committee expresses its gratitude to IUGG, IAPSO, The French National Committee and IOC for the facilities in Grenoble for the symposium and for financial support which contributed greatly to the success of the scientific as well as the business meeting.

### Visitors to ITIC

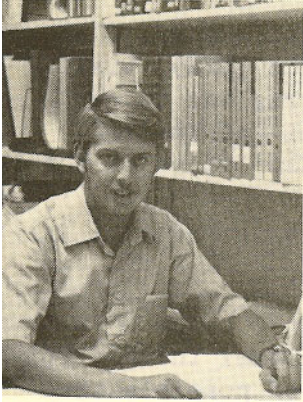
Dr. Karl Johannessen, Associate Director, Meteorology and Oceanography, and Dr. Glenn Flittner, Chief, Ocean Services Division, U.S. National Weather Service (NWS), visited the NWS Pacific Region Headquarters last month. The purpose of the trip was to review ocean programs, tsunami activities, and the International Tsunami Information Center. While here they visited the Honolulu Observatory, and the ITIC office on the campus of the University of Hawaii.

### Seismic Summary

During the months of May, June, July and August, the International Tsunami Information Center's Honolulu Observatory undertook the following investigations of possible tsunamigenic earthquakes:

<u>Date and Origin Time (U.T.)</u>	<u>Epicenter</u>	<u>Magnitude</u>	<u>Region</u>	<u>Comments</u>
May 10 14-28-49	35.7 S 74.6 W	7.8	Chile	Tsunami Watch
June 10 13-47-17	42.9 N 147.6 E	7.2	Hokkaido Japan	Small local tsunami
June 13 18-08-03	43.5 N 148.2 E	6.6	"	
July 8 09-37-12	29.3 N 113 W	6.7	Gulf of California	
July 10 18-28-57	7 N 126 E	7.1	Mindanao Philippines	
July 20 14-37-29	6.5 S 154.9 E	7.7	Solomon Sea	Tsunami Watch
July 20 19-54-17	6.9 S 155.5 E	7.3	"	
July 21 02-38-43	6.6 S 154.9 E	6.7	"	

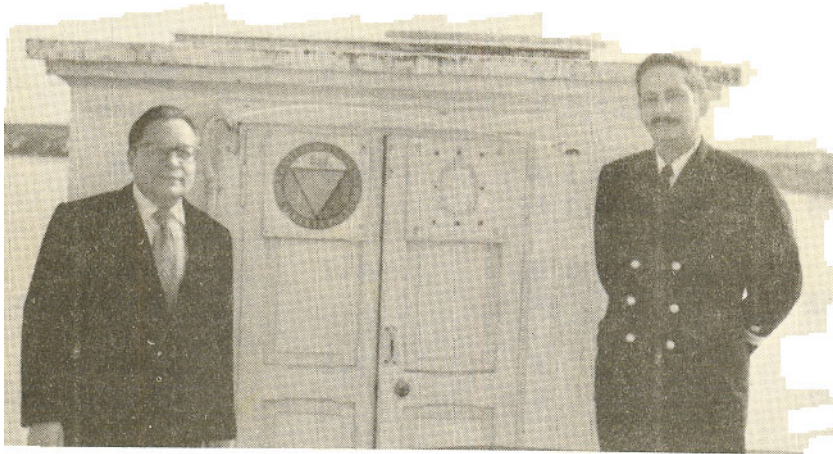




LTJG Dennis Sigrist who recently joined the staff of the Tsunami Warning System in the Pacific.



Mr. Sydney Wigen, new Associate Director of ITIC.



Mr. Cesar Vargas Faucheux (right) of the Peruvian Hydrographic Service and his assistant shown in front of the Callao-La Punta gauge.



Dr. George Pararas-Carayannis, Director of ITIC and Mr. Pedro Cabezas Gonzales, Associate Director, Oceanographic Institute of Ecuador, visiting tsunami stations at Manta (left) and La Libertad, Ecuador.