

# **TSUNAMI NEWSLETTER**

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**INTERNATIONAL  
TSUNAMI  
INFORMATION  
CENTER**



**INTERGOVERNMENTAL  
OCEANOGRAPHIC  
COMMISSION - UNESCO**

INTERNATIONAL TSUNAMI INFORMATION CENTER

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Director

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 U.S. National Oceanic and Atmospheric Administration for 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  
CHINA  
COLOMBIA  
COOK ISLANDS  
ECUADOR  
FIJI  
FRANCE  
GUATEMALA  
INDONESIA  
JAPAN  
KOREA (REPUBLIC OF)  
MEXICO  
NEW ZEALAND  
PERU  
PHILIPPINES  
SINGAPORE  
THAILAND  
UNITED KINGDOM (HONG KONG)  
USA  
USSR  
WESTERN SAMOA

## NEWS EVENTS

### Eruption of Etna Volcano, Sicily, Italy

(From SEAN Bulletin, Vol. 6, No. 2, 28 February 1981)

The Istituto Internazionale di Vulcanologia reports explosions and extrusion of lava from Etna's NE Crater. After a period of ash emission at the end of January and the beginning of February, stronger activity began with intense explosions the evening of 5 February. Lava flowed through a breach in the W-to-NW side of the NE Crater cone. It formed 3 lobes that moved W, NW and N and covered the upper NW slope of the volcano. The N lobe, the largest, traveled about 2 km to about 2600 m elevation where it had a 1.2 km front. The eruptive activity stopped the evening of 7 February.

Eruptions occurred at the NE Crater in 1975 and 1977-1978. Explosions and extrusion of lava were most recently observed there in September 1980.

### Earthquakes in Greece

(From SEAN Bulletin, Vol. 6, No. 2, 28 February 1981)

Greece was devastated by 3 earthquakes on 24, 25 February and 4 March with magnitudes of 6.7, 6.4 and 6.5 respectively. 21 people were killed and 400 injured. Considerable damages were done in the Athens and Corinth areas. Numerous smaller shocks occurred between the three main earthquakes.

## UNESCO - IOC - ITSU

### Thirteenth Session of the Executive Council of IOC

The Summary report of the above mentioned session held from 23 to 28 June 1980 in Paris has been published. This report includes the adoption by the Council of the Summary report and recommendations of the Seventh session of ITSU (ITSU-VII) held in Vina del Mar, Chile in March 1980. Mr. G. Dohler, Chairman of ITSU, emphasized at the 13th Session of the Council the importance of an efficient warning system to reduce the continuing great loss of life and property due to tsunamis. He also informed the Council that ITSU-VII recommended a three-year UNDP project of approximately U.S. \$3 million to implement a system that would allow detection of the origin of the tsunami within one hour. The Council supported the proposal of the project to seek extra-budgetary funds through UNDP.

Mr. Dohler also drew attention of the Council to the fact that the post of Associate Director is still vacant, and urged Member States to consider the secondment of a scientist to this position.

### Fourteenth Session of the IOC Executive Council To Be Held

The Fourteenth Session of the Executive Council of the Intergovernmental Oceanographic Commission will be held from 22 to 27 June 1981 in Hotel Ybarra Semiramis, Puerto de la Cruz, Tenerife, Canary Islands. For more information, write to:

The Secretary  
Intergovernmental Oceanographic Commission  
Unesco  
7 Place de Fontenoy  
75700 Paris, France

### Colombia Joins ITSU

Sra Lilia Sanchez Torres, First Secretary of the Colombian delegation to UNESCO, was informed by Dr. Mario Ruivo, Secretary of the Intergovernmental Oceanographic Commission that Colombia's application was accepted for membership in the International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU) and in the Pacific Tsunami Warning System. Captain J. A. Martinez, the head of the Colombian Commission on Oceanography, will be the official tsunami national contact, and will represent Colombia in matters concerning the ICG/ITSU, ITIC and the Pacific Tsunami Warning System. Dr. George Pararas-Carayannis, Director of ITIC has corresponded with both Mrs. Sanchez Torres and with Captain Martinez giving information on details pertaining to Colombia's participation, the possible designation of tide stations along Colombia's Pacific Coast as official tsunami stations; and offering ITIC assistance with a tsunami preparedness program. Membership of Colombia in ICG/ITSU and the Pacific Tsunami Warning System is a culmination of efforts started 4-5 years ago by the Director of ITIC in close cooperation with Mr. Daniel Arango of UNESCO, Captain J. A. Martinez, Father J. E. Ramirez, and many other prominent Colombian scientists and government officials. Unfortunately, Father Ramirez of the Geophysical Institute of Javeriana University, who played a key role in focusing attention to the tsunami threat potential in Colombia and in the need for tsunami preparedness, passed away in January of this year.

### Recommendations of the Third Session of TEMA

The Third Session of the Working Committee for Training, Education and Mutual Assistance in the Marine Sciences (TEMA-III), which took place at Buenos Aires, Argentina, 21-26 April 1980, made recommendations to the Executive Council to consider the preparation of a comprehensive plan for a major assistance programme aimed at strengthening the marine science infrastructures in developing Member States. It also urged the Member States to give high priority to marine sciences and related training and education aspects within their plans for national development. A summary report outlining the specific recommendations has been published by IOC.

## Association of Geoscientists for International Development (AGID) Expands Operations

In order to build up AGID in Asia and the Pacific, the Association, headed by its President, Dr. Prinya Nutalaya, started its new headquarters at the Asian Institute of Technology (AIT) in Bangkok, Thailand, in February of 1981. The AIT in Bangkok, a post-graduate engineering institution for the whole Asian region, is providing facilities and services to the new headquarters. The former secretariat in Caracas is now operating as a Regional Office for Latin America and the Caribbean and a new Regional Office for Africa has also been established at Ahmadu Bello University at Nigeria.

The decision to move the Headquarters to Asia was taken by the Council in Paris, 1980, in recognition of the major accomplishments of the past two years in increasing the membership and organizing activities in Latin America, and in order to build up the Association in Asia and the Pacific, where the cost of operations are also lower than those in Venezuela. Discussions are now underway to explore possible avenues for cooperation with the Asian Regional Geoscience Network, various IGCP Asian projects, the ESCAP Regional Mineral Resources Development Center and other Asian organizations and individuals.

In Caracas, the Regional Office is now working in close cooperation with the Consejo Consultivo de Directores de los Servicios Geologicos de Latinoamerica, of which Dr. Bellizzia is also the Executive Secretary.

The Nigerian Office launched its own program in January, 1981, with the publication of the first issue of the bilingual, French-English, West Africa Geoscience Newsletter.

Enquiries regarding publications and memberships in the Association, and comments and proposals concerning activities are welcomed and may be addressed to the Headquarters or to either of the Regional Offices.

Headquarters: AGID, Asian Institute of Technology, Box 2754, Bangkok, Thailand

Regional Offices: AGID, Apartado 3672, Carmelitas, Caracas 1010A, Venezuela - AGID, Depts. Physics and Geology, Ahmadu Bello University, Box 393, Zaria, Nigeria

## Development of Marine Science and Technology in Africa

The Division of Marine Sciences of Unesco published recently a report on the development of a marine science and technology program in Africa. This report gives the proceedings of a meeting of a working group of experts on the project, which was jointly convened by the U.N. Economic Commission for Africa (ECA) and Unesco, in Addis Ababa, 5-9 May 1980.

During the past three years, both ECA and Unesco have made an increased effort directed towards strengthening the co-operation between the two Organizations with the formulation and implementation of development programmes for Africa. As an outcome of this effort, a document entitled "Arrangement between the Director-General of the United Nations Educational, Scientific and Cultural Organization and the Executive Secretary of the Economic Commission for Africa" was signed on 10 May 1979.

As stated in this document:

"The broad objectives of co-operation and of joint programme activities between Unesco and the Commission are the following:

- (a) to provide an operational basis for conceiving, formulating, programming and initiating joint action on specific projects within areas of common concern and regional priorities;
- (b) to initiate studies and provide background information on specific problem areas in science and technology such as would provide African States with guidelines for the formulation of policies and programmes for the development of science and technology education and research relating to socio-economic progress;
- (c) periodically to review and appraise the efficiency relevance and effectiveness of science and technology as tools for national development of Member States in the African region;
- (d) to promote national and multi-national action in programmes in intra-African co-operation in the development and utilization of facilities for scientific and technological education, training and research."

Furthermore, it was agreed that priority would be given to joint action in respect of programme activities and projects coming within the scope of this agreement in a specific number of fields, including marine science and technology.

Within the framework of this Arrangement and as a result of extensive consultation between ECA and Unesco, a project document on the Development of Marine Science and Technology in Africa was prepared as the first project for joint implementation by ECA and Unesco as Executing Agencies.

The above mentioned report summarizes the short and long term objectives of this cooperative effort and the recommendations of the Addis-Ababa meeting. For copies of this report, contact:

Division of Marine Sciences  
Unesco  
7 Place de Fontenoy  
75700 Paris, France

## INTERNATIONAL TSUNAMI INFORMATION CENTER - HONOLULU

### Japanese Officials Visit ITIC

Mr. Kita, Japanese Consul in Hawaii and Mr. Kobayashi of the Japanese Consulate and two visiting Japanese officials visited ITIC on 9 February of this year for the purpose of learning more about the Tsunami Warning System and the operation of ITIC. The Japanese visitors were Mr. Mitsugu Kanakogi, Director of the Earthquake Disaster Prevention Division of the Fire-Defense Agency of Japan, and Mr. Jiroh Kawasaki, Program Manager of the Firefighting and Disaster Prevention Division of the Shizuoka Prefectural Government.

### Tsunami Bibliography

The U.S. Nuclear Regulatory Commission has asked ITIC to complete the final review and editing of the tsunami bibliography. A draft tsunami bibliography was prepared by ITIC earlier but the project was stopped when funds ran out. It is expected that the final review and editing of the tsunami bibliography will be completed by the end of 1981 and arrangements will be made at that time for additional publication and distribution.

### Tsunami Lecture for the Micronesian Meteorological Technician Training Program

A group of meteorological technicians from Palau, Yap, Truk, Ponape, and Majuro was in Hawaii (U.S. National Weather Service, Pacific Region) for the Micronesian Meteorological Technician Training Program held from November 12 to December 19, 1980. Tsunami training was included as part of the program.

Dr. George Pararas-Carayannis, Director of ITIC and LTJG Paul M. Daugherty, Ocean Services Program Coordinator gave lectures to the group on: earthquake phenomena; cause and effect, propagation, run-up of tsunamis; tsunami warning system; communications; procedures and preparedness. The group toured Pacific Tsunami Warning Center at Ewa Beach, Hawaii after the lectures and were familiarized with the Tsunami Warning System and with Tsunami Reporting Procedures.

## NATIONAL AND AREA REPORTS

### Latin American Tsunami Stations

In January, 1981, the U.S. National Weather Services Tsunami Specialist, Mr. Mark Spaeth, installed two remote telemetering tsunami tide stations

at Easter Island and at Antofagasta, Chile. Since then, the two tide stations have been telemetering data routinely. A third gauge was installed at LaPunta, Callao, Peru in February and the fourth system was completed in March at Isle San Cristobal, Galapagos, Ecuador.

#### New Appointee for the Position of Chief of Tides, Currents and Water Levels in the Canadian Hydrographic Service

Mr. Brian J. Tait was appointed as the Chief, Tides, Currents and Water Levels in the Headquarters Office of the Canadian Hydrographic Service, effective February 16, 1981. Mr. Tait will be responsible for formulating the policies and programs of the Service in the areas of tidal, current, and water level measurement; for coordinating the activities of the various regional offices and agencies involved in the program; and for representing the service both nationally and internationally.

A graduate of the University of Waterloo, Mr. Tait obtained B.A.Sc and M.A.Sc degrees in Mechanical Engineering while specializing in Environmental Fluid Mechanics. He worked in the field of ocean engineering with the consulting firm of James F. MacLaren Ltd., Willowdale, Ontario prior to joining the Hydrographic Service, and since 1975 has held the position of Regional Tidal Officer in the Central Region of C.H.S. in Burlington, Ontario.

Mr. Tait's office is located at 615 Booth Street, Ottawa, K1A 0E6 and his telephone number is (613) 995-4511.

#### Catalog of Tsunamis in the Pacific Ocean

Dr. Doak Cox, Director of the Environmental Center, University of Hawaii, is still in Boulder, Colorado at the National Geophysical & Solar-Terrestrial Data Center working on the Catalog of Tsunamis in the Pacific Ocean. Dr. Cox is cooperating very closely by correspondence with the other authors of the report, Drs. Iida, Soloviev and Pararas-Carayannis in an effort to finalize the historical catalog of tsunamis for the Pacific Ocean.

#### NSF Tsunami Research Plan

A U.S. Comprehensive Tsunami Research Plan is in preliminary draft form and is expected to be finalized in the summer of 1981 after careful review by members of a National Science Foundation Committee. The plan is the result of a tsunami workshop held in Southern California in May 1979, when a group of about seventy tsunami scientists and engineers reported on the status of tsunami research in United States and elected an ad hoc advisory committee to determine the focus of future research



activities. This advisory committee met in Honolulu, Hawaii in October 1979 and recommended that a National Tsunami Research Plan be developed with the assistance of agencies supporting tsunami research. The U.S. National Oceanic and Atmospheric Administration (NOAA) and the NSF co-sponsored a planning workshop held near Seattle, Washington, in August 1980 to address this recommendation. The plan which was developed contains recommendations for a coherent plan of tsunami research. The editors of the report, Dr. Eddie Bernard of the Pacific Marine Environmental Laboratory (NOAA) and Dr. Richard Goulet of NSF, added and expanded the report by adding expanded materials that explore the nature of tsunamis and their potential destructive impacts, examine government agency involvement, and explain priority actions to correct deficiencies in current research efforts. The final document is intended to provide the framework for a coordinated interagency effort by offering program options and guidance for agencies concerned with mitigation of tsunami hazards through research.

#### New Director for the Chilean Hydrographic Institute

Captain John Howard of the Chilean Navy assumed, in January of 1981, new duties as Director of the Hydrographic Institute in Valparaiso succeeding Captain Mariano Sepulveda. As Director of the Hydrographic Institute, Captain Howard will also be responsible for all the tsunami stations in Chile and will be the official national tsunami contact. ITIC is looking forward to working closely with Captain Howard in improving tsunami preparedness and the Tsunami Warning System.

#### New Vice Director of Hawaii State Civil Defense

Mr. Marvin J. Berenzweig was appointed Vice Director of the State of Hawaii Civil Defense (SCD) by Major General V. A. Siefertmann, Director of State's Civil Defense.

The new Vice Director emphasized to county and SCD personnel that top priority will be given to operational readiness and effectiveness. Mr. Berenzweig previously worked for SCD between 1976 and 1980 in various planning and operational capacities.

The Vice Director also served in key staff and major command positions during his more than 30 years as an infantry officer in the U.S. Army. Following combat command in Vietnam as a full colonel, he served on the staff of the Commander-in-Chief of the Pacific Command.

Mr. Berenzweig holds a Bachelor of Arts degree from the University of California, a Bachelor of Science degree from the U.S. Military Academy at West Point and a Master's degree in Communication from the University of Hawaii. He replaced Mr. James T. McClellan who retired in December, 1980.

### New Director for INOCAR

Commander Pedro R. Cabezas of the Ecuadorian Navy recently assumed his duties as Director, Instituto Oceanografico de la Armada (INOCAR) in Guayaquil, Ecuador. Commander Cabezas was a visiting ITIC scientist a few years ago and received thorough familiarization with tsunamis and the Pacific Tsunami Warning System. As Director of INOCAR Commander Cabezas will be the official responsible for Tsunami Warnings and Tsunami Preparedness in Ecuador, a country where earthquake and tsunami threat potential exists. ITIC welcomes Commander Cabezas' return to the Oceanographic Office and his continuous support of the Pacific Tsunami Warning System.

### Director of Instituto Geofísico of Universidad Javeriana, Colombia, Died

It is with deep sorrow that we hereby announce the death of Reverend Jesús Emilio Ramírez, S.J. Father Ramírez, as he was known to his many friends throughout the world passed away on the 5th of January, 1981, after some months of painful illness. Rev. Ramírez was the cofounder and director of the Instituto Geofísico of Universidad Javeriana, Bogota, Colombia. His last published work was a detailed investigation of the earthquake of 11 December 1979 in Narino. Our director, Dr. George Pararas-Carayannis, visited with Father Ramírez on numerous occasions in the past and received last year a great deal of support from him during the ITIC field survey of the tsunami of 11 December 1979 in the state of Narino in Colombia. The many friends Father Ramírez had throughout the world regret greatly the passing of a good man and the loss of a good scientist.

### V. M. Popov, USSR Project Leader Died Recently

Vadim Mikhaylovich Popov, head of the Marine, Arctic and Antarctic Administration of the USSR State Committee on Hydrometeorology and Monitoring of the Natural Environment, has died at the age of 50 following a brief illness. He was a meritorious polar specialist, a distinguished worker of the USSR Hydrometeorological Service (Gidrometsluzhba), a meritorious worker of the merchant fleet, a hydrologist-instructor for aerial ice reconnaissance, and a member of the Communist Party of the Soviet Union since 1965.

In 1972, V. M. Popov was assigned to work in the central apparatus of the Main Administration of Gidrometsluzhba and appointed deputy head of the Arctic, Antarctic and Marine Administration. He was appointed the head of this administration in 1974. While holding this post, V. M. Popov continued work on the further advancement of scientific and applied research in the Arctic and Antarctic.

### Captain Mariano Sepulveda Assumes New Command

Captain Mariano Sepulveda, as of January of this year assumed new duties in the Chilean Navy. Captain Mariano Sepulveda was the Director of the

Chilean Hydrographic Institute for the last 3 years, and during this time he played an important role in the Tsunami Warning System. Last March, Captain Sepulveda, on behalf of this country, hosted in Vina Del Mar the Seventh Session of the International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU VII). The meeting in Vina Del Mar was very successful and participants will always remember Captain Sepulveda's fine hospitality and support.

#### Tsunami Inspection, Crescent City, California

After a 15 month down-time of the tsunami recorder at Crescent City, California the tsunami recorder is again operational. Extensive maintenance was performed on the gauge and the tsunami recorder in late March by Mr. Mickey Moss of NOAA's Pacific Tide Party. Because of Crescent City's vulnerability to tsunamis coupled with the November 1980 magnitude 7.1 offshore earthquake near Crescent City, there was concern for the proper operation of the tsunami remote recorder. Although the Pacific Tide Party will be performing quarterly inspections of the gauge and its remote recorder, it has been recommended that one of the new solid state Dynamaster recorders be programmed for Crescent City to avoid frequent breakdowns.

#### Tsunami Station Inspection

Lt. Kathy Andreen, Mr. K. Welker and Lt.jg. Mariane Molchan from the Pacific Tide Party of NOAA completed the following inspection and maintenance of tide stations of the Pacific Warning System for the months of October, November and December of 1980.

October 24	Honolulu, Hawaii
October 30	Crescent City, California
November 3-5	Hilo, Hawaii
November 5	Fort Point, California
November 6	Honuapo & Kailua-Kona, Hawaii
November 8	Kahului, Hawaii
November 10-12	Nawiliwili, Hawaii
November 20-24	Wake Island
November 26-28	Johnston Island
December 8	Guam
December 15	Okinawa, Japan

Prior to initiating their inspections, the Pacific Tide Party personnel coordinate their activities with the Pacific Tsunami Warning Center (PTWC) and with ITIC. In addition to inspecting and repairing the

instruments at the tide stations Pacific Tide Party personnel also familiarize observers or personnel at each station with wave reporting procedures and performs important liaison work for PTWC and for ITIC on tsunami related matters. This is an invaluable contribution to the effectiveness of the Pacific Tsunami Warning System.

## ANNOUNCEMENTS

### Wind Studies May Aid Tsunami Run-Up and Inundation Prediction

Studies on the effects of "terrain roughness" on tsunami run-up and inundation have been carried out by Dr. Charles L. Bretschneider of the University of Hawaii's Department of Ocean Engineering with the assistance of the J.K.K. Look Laboratory of Oceanographic Engineering.

Like wind tunnel studies, Dr. Bretschneider's experiments attempt to pinpoint how areas strewn with large boulders might differ in "roughness" or "friction" compared with, say, a golf course on grassy field. In theory, the "roughness" of these types of land can be measured and used to determine how it would affect an actual tsunami wave moving over the land. The experiments are being conducted in the Hawaii Kai area on the island of Oahu, Hawaii. Other field studies are also planned for two areas on the Kona Coast and Kolekole Beach Park on the island of Hawaii.

Upon completion of the field studies, a user's manual, which will include theory discussions, equations, charts, graphs, photographs of terrain types and computer programs, will be published. Such a manual will be a very valuable document for potential users such as governmental agencies, engineers, tsunami researchers, civil defense planners and coastal developers.

The accurate prediction of tsunami run-up is critical to forecasting for warning and evacuation purposes. It is also important for zoning and design standards.

### Tsunami Photographs Available

The Catalog of Tsunami Photographs covering photos of nine tsunami events occurring during the period of 1946 to 1975 is published. This catalog serves as a guide for ordering tsunami photos, available in black and white prints, 35-mm transparencies or as copy negatives. Those tsunami photos available in color are so indicated in the descriptions. For a copy of this catalog and requests of photographs, write to:

The National Geophysical & Solar-Terrestrial Data Center  
NOAA/EDIS  
Boulder, CO 80303  
U.S.A.

### United States Earthquakes, 1978 Published

The publication of a summary of all earthquakes that occurred in the United States and nearby territories during 1978 is out of the press. Information found in this publication includes: a summary of felt and damage data reported for each earthquake; a list of earthquakes by state; results from local seismic networks; information on crustal movements; tsunamis; principal earthquakes of the world, and strong-motion seismograph data.

The report is available from:

The National Geophysical & Solar-Terrestrial Data Center  
NOAA  
325 Broadway  
Boulder, CO 80303  
U.S.A.

And also sold by:

The Superintendent of Documents  
U.S. Government Printing Office  
Washington, D.C. 20402 U.S.A.  
Price: \$4.75 (Stock No. 003-019-00050-1)

### Land Use Planning After Earthquakes

A study, funded by the National Science Foundation, was carried out by William Spangle and Associates to show that post-earthquake land use planning can reduce future earthquake risk in an urban area. The report entitled "Land Use Planning After Earthquakes" identifies the problems of lack of authorization and funding for redevelopment projects in disaster assistance program; the lack of procedures and funding for long-term reconstruction; and others. It also provides recommendations to overcome the problems. A limited number of free copies of the report are available from:

Frederick Krimgold  
National Science Foundation  
Earthquake Mitigation Program  
1800 G Street N.W.  
Washington, D.C. 20550  
U.S.A.

### Directory of World Seismograph Stations Available

Volume I (The Americas - Part I. United States, Canada, and Bermuda) of the above mentioned directory is available from World Data Center A for Solid Earth Geophysics. It is a compilation of detailed information about most of the past and present seismograph stations in North America.

It contains the location of seismological instruments, their technical characteristics, dates of operation, and availability of data fundamental to data exchange and to science. To order, write to:

World Data Center A for Solid Earth Geophysics (D61)  
325 Broadway  
Boulder, CO 80303  
U.S.A.  
Price: U.S. \$13.00

#### Strong-Motion Earthquake Data

The World Data Center A for Solid Earth Geophysics (WDC-A) and the National Geophysical and Solar-Terrestrial Data Center (NGSDC) are now disseminating to the scientific and engineering community a world-wide collection of strong-motion seismograms. Countries contributing to the strong-motion data base include Australia, Italy, Japan, New Zealand, Rumania, U.S.S.R. and Yugoslavia. The U.S. Geological Survey's Seismic Engineering Branch has furnished records from its network of operated and cooperative strong-motion stations, including those in Central and South America.

Copies of strong-motion records are available in various formats: 35-mm film, 70-mm film clips, paper copies, as digitized data on punched cards or magnetic tapes. The "Catalog of Seismograms and Strong-Motion Records," which can be ordered from NGSDC for \$3.00, furnishes a listing of most strong-motion records. Inquiries should be addressed to:

National Oceanic & Atmospheric Administration  
NGSDC/EDIS (D622)  
325 Broadway  
Boulder, CO 80303  
U.S.A.

#### Fifteenth Pacific Science Congress

The Fifteenth Pacific Science Congress will be held in February of 1983 at the University of Otago, Dunedin, New Zealand. The *First Announcement* of the Congress have been sent to members of the Pacific Science Association. The announcement contains a listing of the General Symposia, the Sectional Symposia, Congress information on venue, accommodations, climate and travel, and a preliminary statement on preconference and postconference tours. For more information or copies of the announcements, write to Convention Management Services of New Zealand, 15th Pacific Science Congress, P.O. Box 6063, Dunedin, New Zealand.

## International Tsunami Symposium, Japan, 25-28 May 1981

An International Tsunami Symposium will be held in Sendai-Ofunato-Kamaishi, Japan on 25-28 May 1981. The Symposium is organized by the Tsunami Commission of the International Union of Geodesy and Geophysics (IUGG) with the support of the Governor of Iwate Prefecture, and of the Chairman of the Japanese National Committee. The Symposium is co-sponsored also by the International Association for Hydraulic Research, the Oceanographic Society of Japan, the Seismological Society of Japan, the Japan Society of Civil Engineers, Ofunato City, Kamaishi City, Shizuoka Prefecture and Osaka Prefecture. Following the Symposium there will be a study tour. Symposium subjects will deal with

1. Tsunami Source and Earthquake
2. Hydrodynamics related to Tsunami and Simulation Techniques of Tsunami Waves
3. Tsunami Effects and Mitigation of Tsunami Hazards
4. Instrumentation, Warning System and Socio-Economic Effects

### ABSTRACTS AND RESUMES

#### Theory and Operative Prediction of Tsunami

Soloviev, S.L., ed.  
Laboratory of Seismology  
Institute of Oceanology  
Moscow, USSR

Collected Papers in the Russian language. Contents include:

S.S. Voit, A.N. Lebedev, B.I. Sebekin. Some features of tsunami waves controlled by excitation source parameters.

E.N. Pelinovsky, I.A. Soustova, V.E. Fridman. Tsunami wave diffraction in the ocean with variable depth.

V.F. Ivanov, L.V. Cherkesov. On joint dispersion and non-linear effect at tsunami wave propagation in shelf zone.

A.A. Poplavsky. On automatic short-term prediction of tsunami.

I.N. Tikhonov. Estimation algorithm for epicentral distances by registration data of seismic station "Yuzhno-Sakhalinsk."

A.I. Ivashchenko, A.A. Poplavsky. Some results of additional investigation in the recognition problem of the earthquake tsunamigenicity.

I.N. Tikhonov, A.A. Poplavsky. Primary computer analysis of seismograms with intensive background.

R.N. Burymskaya, N.A. Zhbrykunova. Analysis of spectral and time characteristics of strong Kuril earthquakes for 1975-1976.

A.I. Ivashchenko, F.D. Zhuk. Calibration curves to define magnitudes  $m_p$  and  $m_s$  by mechanical seismograph recordings.

L.S. Oskorbin, O.N. Solovjeva. Nomogram for current determination of magnitude for local strong earthquake using body waves registered by seismographs with mechanical recording.

E.A. Vorobjeva. On travel times of maximal phase of surface waves at short distances.

E.A. Vorobjeva. Correlation of S/P parameters of seismic records obtained in near zone with orientation of fault plane in seismic source.

R.H. Burymskaya. Some results on stress conditions in the Earth's crust and upper mantle within the Kuril-Kamchatka zone.

A.M. Shurygin. Long-term tsunami prediction.

I.M. Shenderovich, G.N. Mar. Filters for infra-low frequencies in tsunami waves measurements.

A.G. Smagin, L.M. Grundel, Yu.P. Kurkin, B.G. Milshtein. High-sensible frequency recorder of changes of hydrostatic pressure levels.

B.V. Levin, B.M. Lysenko, V.E. Rokotyan. Lidar methods in research of long waves on sea surface.

V.A. Butkovsky, N.V. Deryugin, N.A. Simonov. Alarm automatized system of tsunami danger.

A.A. Alekseev, S.S. Voit, S.L. Soloviev. International symposium on tsunami in Ensenada.

Field Investigation of the Nankaido Tsunamis in 1707 and 1854 along the Osaka and Wakayama Coasts, West Kii Peninsula

Tokutaro Hatori  
Earthquake Research Institute

There are many old monuments of the Nankaido tsunamis of Hoei (Oct. 28, 1707) and the 2nd Ansei (Dec. 24, 1854) along the Osaka and Wakayama coasts, Western Japan. Most of these monuments were built just after the earthquakes to pray for the repose of the tsunami victims or to sound a warning to inhabitants. In this paper, the tsunami monuments are illustrated. Based on descriptions on the monuments, adding new data collected from the present field investigation, inundation heights



of the 1707 Hoei and 1854 Ansei tsunamis along the Wakayama coast are surveyed by hand-level. Behaviors (inundation height and area) of the two historical tsunamis are compared with those of the 1946 Nankaido tsunami (Dec. 21, 1946).

Inundation heights of the 1854 Ansei tsunami along the Wakayama coast, the west side of the Kii Peninsula, are 4.8 meters on the average and are 1.2 times as large as those of the 1946 Nankaido tsunami. The estimated heights of the 1707 Hoei tsunami are 5 meters with the localized run-up maximum of 6 to 7 meters. Along the Wakayama coast, the patterns of height distribution of the two historical tsunamis are similar to that of the 1946 Nankaido tsunami. However, the inundation heights of the 1707 Hoei and 1854 Ansei tsunamis along the coast in Osaka Bay are three times as large as those of the 1946 tsunami. Osaka suffered severe damage and many persons were drowned by the two tsunamis of 1707 and 1854. Estimated heights were about 3 meters. It suggests that the wave periods of the two historical tsunamis were longer than those of the 1946 tsunami. Although the source dimensions of the two historical tsunamis are similar to the 1946 tsunami (The source areas of three tsunamis extend 250 km along the Nankai trough), the rise times of crustal deformation for the two historical earthquakes differ significantly from the 1946 earthquake.

#### Motions in the Boundary Layers between Two Plates

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[In Report of the National Research Center for Disaster Prevention, No. 24, October 1980]

Dynamic processes in the gouge region between two plates in tectonical sense are studied to investigate mechanisms of earthquake occurrence. Material is assumed to obey the constitutive equation of second-order Rivlin-Ericksen type. The Couette flow is shown to be unstable in the range  $\Delta p < 3, R = 1, 10^{-5}, 10^{-10} - M = 1, 10^5, 10^{10}$  where  $\Delta p, R$ , and  $M$  are non-dimensional pressure gradient, Reynolds number and elastic parameter, respectively.

#### Horizontal Crustal Deformation and Earthquake Occurrence in the Izu Peninsula for the Period 1931-1978

Akio Yoshida

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Characteristics of the horizontal strains during the period 1931-1973-75 and the earthquake occurrence during the period 1931-1978 in the Izu Peninsula are investigated, and the relation between them is studied. In addition, some features of mean crustal deformation associated with earthquake occurrence are discussed.

The horizontal crustal deformations during this period in the Izu Peninsula are characterized by the accumulation of shear strains. The strains are consistent with those resulting from earthquakes in a region where many earthquakes have occurred, but on the whole the contribution of earthquakes has been small.

The cause of the accumulation of shear strains in the Izu Peninsula in this period may be attributed to the fact that the tectonic displacement of the Izu Peninsula to the west is larger in the southern part than that in the northern part.

The horizontal strains obtained by successive triangulation measurements reflect not only the elastic strains which have accumulated but also include strains caused by earthquakes which occurred during the successive measurements and also anelastic strains. The interrelations among these deformations are briefly discussed.

#### Deep Sea Pressure Observation and Its Application to Pelagic Tide Analysis

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September 1980]

The Meteorological Research Institute, J.M.A., installed a quartz crystal pressure gage on the sea bottom (2200-meter depth) about 110 km south-southwest of Omaezaki in August, 1978, to observe sea level variation of the tsunami. The observations began on August, 1978, and are now continued regularly.

The pressure gage is confirmed to be of use as a pelagic tide gage because the comparative tidal analysis of the pressure records and the coastal sea level records at Omaezaki showed consistent relations between the two.

The tidal residual spectrum of the deep sea pressure variations has an energy level about one order lower than the sea levels at Omaezaki in the frequency range lower than 0.5 cpd. The tidal residual spectrum at Omaezaki has a configuration such that the energy density decreases toward higher frequency in proportion to  $f^{-5/3}$  with a local rise in the frequency band between 0.1 cpd and 0.4 cpd, which may be due to meteorological disturbances. The tidal residual spectrum of the deep sea pressure has also a slope depending on  $f^{-5/3}$  on the lower frequency side but a rather gentle slope on the higher frequency side due to the high

frequency noise caused by the insufficient accuracy of the pressure observations. Consequently, the tidal residual spectral energy of the deep sea pressure becomes about the same level as that of the sea level at Omaezaki in the frequency range higher than 0.08 cph. This leads to the conclusion that the accuracy of the deep sea pressure gage used here is maintained about the same level as the coastal tide gage in the frequency range analyzed here.

### The Seasat Reports

The following are abstracts of a series of reports on Seasat, the first satellite dedicated to establishing the utility of microwave sensors for remote sensing of the earth's oceans. These reports are found in Science, Vol. 204, June 29, 1979, pp. 1405-1421.

Seasat Mission Overview: During some 3 months of orbital operations, Seasat collected a unique set of global synoptic data on ocean winds, waves, temperature, and topography. All indications from a preliminary analysis of these data are that most of the mission's proof-of-concept objective -- the demonstration of nearly all-weather microwave surveillance of the world's oceans -- will be met.

Seasat Low-Rate Data System: The Seasat low-rate data system is a distributed, nonreal-time, magnetic-tape system for information processing. Its function is to apply the necessary calibrations, corrections, and conversions to yield geophysically meaningful products from raw spacecraft telemetry data. It also provides a remotely accessible catalog of satellite data.

Surface Observations for the Evaluation of Geophysical Measurements from Seasat: The surface observations used in the initial assessment of Seasat are discussed with emphasis on their ability to describe the synoptic-scale winds over the ocean.

Seasat Altimeter Calibration: Initial Results: Preliminary analysis of radar altimeter data indicates that the instrument has met its specifications for measuring spacecraft height above the ocean surface ( $\pm 10$  centimeters) and significant wave height ( $\pm 0.5$  meter). There is ample evidence that the radar altimeter, having undergone development through three earth orbit missions [Skylab, Geodynamics Experimental Ocean Satellite 3 (GEOS-3), and Seasat], has reached a level of precision that now makes possible its use for important quantitative oceanographic investigations and practical applications.

Seasat Scatterometer: Results of the Gulf of Alaska Workshop: The Seasat microwave scatterometer was designed to measure, globally and in nearly all weather, wind speed to an accuracy of  $\pm 2$  meters per second and wind direction to  $\pm 20^\circ$  in two swaths 500 kilometers wide on either side of the spacecraft. For two operating modes in rain-free conditions, a limited number of comparisons to high-quality surface truth indicates that these specifications may have been met.

Seasat Scanning Multichannel Microwave Radiometer: Results of the Gulf of Alaska Workshop: The scanning multichannel microwave radiometer results for the Gulf of Alaska Seasat Experiment Workshop are quite encouraging, especially in view of the immaturity of the data-processing algorithms. For open ocean, rain-free cells of highest-quality surface truth wind determinations exhibit standard deviations of 3 meters per second about a bias of 1.5 meters per second. The sea-surface temperature shows a standard deviation of approximately 1.5°C about a bias of 3° to 5°C under a variety of changing meteorological conditions.

Seasat Synthetic Aperture Radar: Ocean Wave Detection Capabilities: A preliminary assessment has been made of the capability of the Seasat synthetic aperture radar to detect ocean waves. Comparison with surface and aircraft measurements from five passes of the satellite over the Gulf of Alaska indicates agreement to within about  $\pm 15$  percent in wavelength and about  $\pm 25^\circ$  in wave direction. These results apply to waves 100 to 250 meters in length, propagating in a direction predominantly across the satellite track, in sea states with significant wave height ( $H_{1/3}$ ) in a range of 2 to 3.5 meters.

Seasat Visible and Infrared Radiometer: Visual and infrared images produced by the Seasat visible and infrared radiometer (VIRR) are adequate for the identification of cloud, land, and water features. A statistical comparison of VIRR-derived sea-surface temperatures in a cloud-free region with a National Oceanic and Atmospheric Administration analysis based on various surface measurements taken in the same region showed agreement to  $\pm 1.7^\circ$  K root-mean-square.

### PACIFIC TSUNAMI WARNING CENTER

#### Gordon Burton - New Geophysicist-in-Charge at Pacific Tsunami Warning Center

Mr. Gordon D. Burton, assumes his duties as the Geophysicist-in-Charge of the Pacific Tsunami Warning Center in January of this year. Mr. Burton was formerly a Geophysicist with the Conservation Division, U.S. Geological Survey in Reston, Virginia. His career also includes many years with the Magnetism Division, U.S. Naval Oceanographic Office in Bay St. Louis, Missouri as a Geophysicist. He graduated from the University of Texas with a B.S. in 1958 and has completed graduate courses in Geology/Geophysics at Columbia University.

#### Thomas Sokolowski - New Geophysicist-in-Charge at Alaska Tsunami Warning Center

Mr. Thomas J. Sokolowski, Geophysicist on the Pacific Tsunami Warning Center staff for a number of years assumed new duties as Geophysicist-in-Charge of the Alaska Tsunami Warning Center in March of this year. Before coming to PTWC eight years ago, Tom worked for the Joint Tsunami Research Effort, NOAA, DOC in Hawaii and the Coast and Geodetic Survey, Department of Commerce in Rockville, Maryland as a Geophysicist.

He received a M.S. degree from the University of Hawaii in 1970 and a B.S. in 1961 from the Washington and Jefferson College in Pennsylvania. Mr. Sokolowski participated in the US/USSR Scientist Exchange Program in July 1977 to develop new methods for improving tsunami warnings to the public. In October 1977, he was awarded the Department of Commerce Silver Medal Award for outstanding contribution toward automation of the PTWC.

Seismic Summary (November 1, 1980 to Press Time)

<u>Event No.</u>	<u>Event</u>	<u>Location</u>	<u>Action Taken</u>
1980-20 (PTWC)	Nov 8 1028 (UT) 7.1	Vicinity of Eureka, California 41.2 N 124.3 W	Press Release
1980-21 (PTWC)	Dec 31 1032 (UT) 6.5	Kurile Island Region 47.1 N 151.1 E	Press Release
1981-1 (PTWC)	Jan 18 1811 (UT) 6.6	Honshu, Japan 39.3 N 141.7 E	Press Release
1981-2 (PTWC)	Jan 19 1511 (UT) 6.7	Papua New Guinea 6.2 S 138.1 E	Press Release
1981-3 (PTWC)	Jan 23 2114 (UT) 6.7	Szechwan Province, China 31.3 N 101.9 E	Press Release
1981-4 (PTWC)	Jan 30 0853 (UT) 6.9	Shemya, Aleutian Islands 51.9 N 176.1 E	Press Release
1981-5 (PTWC)	Feb 17 1519 (UT) 6.6	New Hebrides 19.8 S 170.6 E	Press Release
1981-6 (PTWC)	Feb 24 1617 (UT) 6.8	Athens, Greece 38.7 N 22.9 E	
1981-7 (PTWC)	Feb 26 1718 (UT) 6.5	New Hebrides 15.2 S 164.3 E	Press Release

## LATE ANNOUNCEMENTS

### The Journal of the Tsunami Society

The Tsunami Society plans to publish a journal on the Physics of Natural Hazards, and is now asking for contributions.

Send one copy of your completed manuscript to EDITOR, The Tsunami Society, Box 8523, Honolulu, Hawaii, 96815, U.S.A. Your manuscript will be reproduced and circulated to reviewers. Based on the comments of the reviewers, the decision of the Editor will be final.

The journal of The Tsunami Society is devoted to Physics of Natural Hazards, as its title indicates. So your material should relate to this. Multi-disciplinary studies will be considered if they primarily emphasize the physical aspects of natural hazards. Manuscripts should be typed one and one-half or double-spaced on one side of white paper. Line drawings should be in black ink and inserted into the manuscript at the appropriate location, so as to fit onto a page. If available, a word-processor might be used. Use pica type, if available; equations may be written in with black ink. Strive for camera-ready copy. (The nicer it looks, the more the reviewers will be impressed!) If accepted, as is or subject to revision, then the original artwork will be requested where needed to upgrade the quality of the figures. The original manuscript and artwork will be returned only if requested. The natural hazards that may be treated may include, but are NOT limited to, meteorite impacts, wind-storms, landslides, earthquakes, lightning, volcanic eruptions, and, of course, TSUNAMIS!

### Civil Defense Tsunami Exercise

The State of Hawaii Civil Defense Agency and the International Tsunami Information Center (ITIC) will hold in early August a Tsunami training exercise to familiarize officials in local and state government agencies with problems associated in predisaster planning and in mitigation of tsunami effects. The objectives of the exercise will be to provide a systematic emergency operating experience; to improve familiarity with emergency plans; standard operating procedures and checklists; to exercise civil defense warning and communication systems; and to expand public awareness of tsunami warning and response processes.

A number of officials will participate in briefing orientation and the subsequent exercise which will receive extensive press coverage. The tsunami exercise will be administered by Mr. M. Berenzweig, Hawaii's Vice-Director of Civil Defense and Mr. Harry Gill, Intelligence Officer of the Agency. Dr. George Pararas-Carayannis, Director of ITIC, serving also as the State Tsunami Advisor, is responsible for developing a realistic scenario of a potentially dangerous tsunamigenic earthquake and providing the technical data and information that will determine appropriate responses in accordance with county and state preparedness plans.

The experience that will be gained from this exercise is applicable to other areas of the Pacific in need for predisaster and postdisaster planning. ITIC will monitor closely the results to determine response efficiencies, and tsunami awareness.

MEMBER STATES  
of the  
INTERNATIONAL COORDINATION GROUP  
for the  
TSUNAMI WARNING SYSTEM IN THE PACIFIC

