

**Proceedings of the Caribbean Conference on Natural Hazards:
Volcanoes, Earthquakes, Windstorms, Floods**

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Preface

The nations bounding the Caribbean Sea have been the sites of major natural disasters in the past. For example, the town of St. Pierre in Martinique was completely destroyed, with the loss of approximately 30,000 lives, as a result of the eruption of Mount Pelée in 1902 while the island of Montserrat has still not fully recovered from the devastation caused by Hurricane Hugo in 1989. Circum-Caribbean countries will continue to be exposed to the effects of various natural hazards such as earthquakes, volcanic eruptions, tropical cyclones, floods, etc. Several incidents since the Conference in October 1993, including five felt earthquakes of magnitude greater than 5.0 in the eastern Caribbean, - three minor volcanoseismic crises in Montserrat and the extensive burning of sulphur deposits at the Soufriere in southwest Dominica, have served as reminders to the people of the region of the dangers they must coexist with.

The nature of each hazard is different and the level of awareness and degree of preparedness to cope with a particular hazard varies from place to place mainly depending on its frequency of occurrence. However, although local losses from natural hazards, in terms of economic damage, loss of life and injuries, fluctuate from time to time, the vulnerability of people and their property to damage from natural hazards increases with rapid population growth, increased urbanization and the dependence on sophisticated infrastructure.

The occurrence of one or more of these natural phenomena in certain areas is inevitable. But losses from them can be substantially reduced by the adoption of certain mitigating actions. Adoption of measures to mitigate the effects of earthquakes, volcanic eruptions, tropical cyclones, floods or landslides requires a clear understanding of where and why these phenomena occur, the recurrence rates for the large events and the possible locations and severity of hazardous effects that they can generate. In particular, the importance of attempting natural risk mitigation within a regional framework cannot be understated for the small island states. The International Decade for Natural Disaster Reduction (IDNDR: 1990-1999) provides an additional impetus towards attempting to effect some of these goals.

In October 1993, to commemorate the 40th anniversary of the Seismic Research Unit (SRU) of The University of the West Indies (UWI), St. Augustine, and as an activity of the IDNDR, a Caribbean Conference on Natural Hazards was organized and hosted by the SRU and the Department of Civil Engineering, with support from several local and regional organizations including:

- Centro Regional de Sismología para América del Sur (CERESIS)
- Caribbean Disaster Emergency Response Agency (CDERA)
- Association of Professional Engineers of Trinidad & Tobago (APETT)
- Department of Physics, UWI, St. Augustine
- Geological Society of Trinidad & Tobago (GSTT)
- Association of Trinidad & Tobago Insurance Companies (ATTIC)
- National Emergency Management Agency of Trinidad & Tobago (NEMA)
- Trinidad and Tobago Bureau of Standards (TTBS)
- Trinidad and Tobago Institute of Architects (TTIA)
- Meteorological Service of Trinidad & Tobago

The theme of the Conference was "Improving natural hazard awareness and reduction in the circum-Caribbean region" and its purpose was to provide an opportunity for individuals

or groups involved in hazard assessment, vulnerability reduction and disaster management in the Caribbean, Central America and northern South America to:

- (i) Present results of current research focussing on the region.
- (ii) Identify regional problems of outstanding interest in these fields and put forward suggestions as to how these could be tackled cooperatively by regional institutions.
- (iii) Share monitoring and analysis technology and risk mitigation strategies developed at regional and extra-regional institutions.

The major topics of the Conference were:

- (i) Earthquakes, earthquake hazards and risk.
- (ii) Volcano and earthquake monitoring instrumentation.
- (iii) Volcanoes, volcanic hazards and risk.
- (iv) Engineering for wind and earthquake forces.
- (v) Windstorms, floods, storm surges.
- (vi) Mitigation of natural disasters.

The five-day long (October 11-15) Conference was attended by more than 150 individuals from 33 countries involved in research or other activities related to natural hazards, especially as applied to the Caribbean, Central America and northern South America. This included geoscientists, engineers, architects, planners, policy makers, oceanographers, insurance executives, disaster managers, meteorologists, medical doctors, etc. In addition to the main conference, the Organization of American States (OAS) and the Pan American Health Organization (PAHO) ran concurrent workshops focussing on vulnerability reduction in schools and hospitals respectively. A meeting of the CERESIS governing council was also held during the Conference period. The IDNDR day on Wednesday October 13, coordinated by CDERA, was devoted to general aspects of disaster mitigation and management with a view towards enabling Caribbean participants to discuss accomplishments and formulate strategies in view of the World Disaster Conference which was to be held in Japan in May 1994.

Fifty-nine oral and poster presentations, of which five (5) were keynote lectures, were made in the main Conference sessions. The invitation to authors to submit their papers for publication in a Conference Proceedings yielded thirty-five (35) complete manuscripts. This publication is a collection of those papers, together with the abstracts for presentations for which complete manuscripts were not received.

The papers cover a broad spectrum of topics, display a good mixture of basic and applied research and, with the exception of windstorms and floods, can be considered as providing a representative sampling of the multidisciplinary and wide-ranging nature of the investigations undertaken to improve our understanding of natural hazards and how to mitigate their effects. The approximate split in papers is about 17 in seismology, 1 in instrumentation/networks, 3 in volcanology, 1 in meteorology, 10 in engineering for earthquake and wind forces and 3 on socio-economic and public issues. The small number of contributions for windstorms and floods is attributable to the lateness in including these topics since the Conference was originally being organized to cater for volcanic- and earthquake-related hazards only.

Although some aspects of natural hazards are better understood and documented than others, the Conference presentations and accompanying discussion clearly pointed to the necessity in the Caribbean for improved volcano monitoring using such modern technology as GPS, further work on establishing quantitative seismic hazard levels, the revision of the Caribbean Uniform Building Code (CUBiC) and improved dissemination of research results to end users who, in most cases, are not members of the academic community.

The papers are published in an order slightly different from how they were presented at the Conference. However, with few exceptions, the individual papers and their groupings

are arranged in a manner which I hope the readers will find to be logical and consistent. This publication should hopefully significantly add to the currently small amount of literature available on natural hazards focussing on the Caribbean region.

The Caribbean Conference on Natural Hazards: Volcanoes, Earthquakes, Windstorms, Floods would not have taken place without the generous material and financial support provided by the following institutions, companies, organizations and individuals:

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William B. Ambeh
SRU, UWI, St. Augustine, Trinidad
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Contents

Seismicity, Tectonics and Crustal Structure

Migration of seismic activity in the northern boundary of the Caribbean Plate? Jose Grases Galofre.....	1
Historical Seismicity of the Caribbean region, 1933-1963. (abstract). Raymond M. Russo and C. Bareford.....	11
Source processes of large ($M \geq 6.5$) earthquakes of the southeastern Caribbean (1926-1960). Diane I. Doser and Shelley R. VanDusen.....	12
The March 1988 east of Trinidad earthquake sequence. (abstract). William B. Ambeh and Raymond M. Russo.....	19
Study of seismicity and stress patterns in the southwestern part of the Puerto Rico (P.R.) Trench. (abstract). Lillian Soto and Klaus Bataille.....	20
The Churuguara area - seismic evidence of contemporary activity of the Oca-Ancon System. Frank A. Audemard M. and Gloria J. Romero T.....	21
Seismic swarms at 16 and 21 hours GMT in Central Venezuela Jorge Mendoza and Ricardo Rodríguez.....	33
A revised earthquake catalogue for the eastern Caribbean region: 1513-1992. John B. Shepherd, Lloyd L. Lynch and J.G. Tanner.....	43
A revised magnitude scale for the Puerto Rico Seismic Network. (abstract). Christa G. von Hillebrandt - Andrade.....	53
Seismic risk in southwest Tobago. (abstract). Frank Dale Morgan.....	54
Diagnosis of the time of increased probability of earthquakes of magnitude ≥ 5.5 in the Lesser Antilles arc. (abstract). N. Girardin and I. Rotwain.....	55
Seismicity and seismic hazard in the Dominican Republic. Luis Odonel Gomez.....	56
The earthquake of January 13, 1993, and implications for earthquake hazard in eastern Jamaica. Margaret D. Wiggins-Grandison.....	65
Results from 3D seismic tomography in northeast Venezuela. Mathias Franke, Enrique Gajardo and Antonio Villasenor.....	77
Historic geodetic constraints on: Caribbean - South America relative plate motion, plate boundary zone kinematics and seismic hazard. (abstract). J.C. Weber, W.B. Ambeh, T.D. Dixon, R.C. Speed, L.L. Lynch and D. Jeyanandan.....	92

Attenuation and Site Effects

Significance of Caribbean and regional earthquake events in the determination of seismic attenuation and hazard assessments in Florida. Douglas L. Smith, John J. Bellini, Tony J. Bartolini and Kenneth M. Lord.....	94
Attenuation of seismic waves in the Trinidad & Tobago area. Joan L. Latchman, William B. Ambeh and Lloyd Lynch.....	100
Seismic source evaluation, strong motion attenuation and soil response in Central America. Hilmar Bungum.....	113
Study of the Mexico City seismic data set: semiempirical approach and deterministic spectral analysis. (abstract). L.E. Pérez-Rocha, F.J. Sánchez-Sesna, M.O. Schroeder and E. Reinoso A.....	122
Estimation of response spectra from response spectral ratios. (abstract). M. Ordaz and A. Arciniega.....	123
Dynamic soil-structure interaction effects on response spectra. Héctor R. Aguilar-Becerril, Javier Avilés-Lopez and L. Eduardo Pérez-Rocha.....	124
Ground motion and building damage: Caracas, 29 July 1967 and Mexico City, 19 September 1985. Lawrence A. Drake.....	134

Seismic Hazard

New concepts in earthquake hazard mapping. (abstract). S.T. Algermissen.....	146
Earthquake hazard in the eastern Caribbean. William B. Ambeh.....	147
Revised estimates of the levels of ground acceleration and velocity with 10% probability of exceedance in any 50-year period for the Trinidad and Tobago region. J.B. Shepherd, J.G. Tanner and L. Prockter.....	165
Validation of seismic hazard results using historical and instrumental earthquake catalogues. (abstract). E. Gajardo, P. Quijada, M. Franke and M. Kozuch.....	176
Seismotectonics and seismic hazard analysis of the southeastern Caribbean region. (abstract). P. Quijada, M. Franke and E. Gajardo.....	177
The situation of the city of Mendoza, Argentina, in a seismic emergency. J.C. Castano, J.L. Zamarbide, E. Fernandez and M.A. Bufaliza.....	178
Seismic zonation for COLM dykes John P. Sully, Enrique Gajardo, Juan Murria and Jacinto Abi Saab.....	192

Instrumentation and Networks

Modern broadband seismic instrumentation techniques. (abstract). S. Pauly and C.M. Guralp.....	206
Low cost PC-based instruments for real time monitoring and analysis of low speed data. (abstract). Lloyd L. Lynch.....	207
The Eastern Caribbean Seismograph Network: telemetry, data acquisition and processing systems. (abstract). Lloyd L. Lynch, William B. Ambeh, Mitra Bridgemohan and Joan L. Latchman.....	208
Experiences with VHF FM-FM radio-telemetry system in the Venezuelan Seismological Network. Florentina M. Prida A.....	209

Volcanology

Eastern Caribbean volcanic hazards A.L. Smith and M.J. Roobol.....	220
Risk assessment of the Soufriere volcano, St. Vincent, W.I. Richard E.A. Robertson.....	230
Petrogenesis of the basalt-andesite-dacite association of Grenada, Lesser Antilles volcanic arc. (abstract). Joseph D. Devine.....	246
Petrology of Kick-'em-Jenny submarine volcano basalts. (abstract). Joseph D. Devine and Haraldur Sigurdsson.....	247
Submersible observations of Kick-'em-Jenny volcano. (abstract). Haraldur Sigurdsson and Joseph D. Devine.	248
Explosive submarine eruptions of Kick-'em-Jenny volcano: preliminary investigations of the potential tsunami hazard in the eastern Caribbean region. Martin S. Smith and John B. Shepherd.....	249

Windstorms and Landslides

The annual variability of tropical cyclone activity in the North Atlantic - Caribbean Sea - Gulf of Mexico Basin. H. Ramnanan.....	261
A hurricane surge prediction model for the eastern Caribbean. (abstract). D. Jordan and L.L. Moseley.....	271
Landslide hazard analysis in hilly tropical terrain - Trinidad & Tobago. (abstract). S.R. Wharton.....	272

Seismic Codes

Seismic design codes : philosophy, application and effectiveness. David Key.....	273
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Comparison of Caribbean and North American seismic provisions. Myron W. Chin and S. J. Pantazopoulou.....	283
Determining seismic base shear - a more rational approach. Patrick Paultre and Denis Mitchell.....	294
<i>Design and Analysis of Structures</i>	
Seismic risk reduction: the need for and importance of earthquake-resistant design and construction of structures. (abstract). Vitelmo V. Bertero.....	303
Uncertainty in the design of earthquake resistant structures. David Key.....	304
Seismic risk mitigation designs for two East Caribbean infrastructure projects. A. Wightman, B.G. Chin and P.W. Henderson.....	311
More about the study of floor-plan shape influence on buildings' response to earthquakes. L. Teresa Guevara and Edgar Fortoul.....	329
<i>Vulnerability, strengthening and retrofit of structures</i>	
Structural and functional vulnerability of hospitals. Vanessa Rosales.....	339
The seismic retrofitting of local clay block walls : research in progress. R.P. Clarke and A.K. Sharma.....	345
Small unengineered buildings : factors affecting their resistance to earthquake and wind forces. Robin W.A. Osborne.....	358
Construction practices and seismic vulnerability : typical single-family dwellings in Trinidad, West Indies. Robin W.A. Osborne.....	365
Seismic reliability improvement by retrofitting of oil refinery equipment. (abstract). José Grases	371
Possible applications of isolation systems in Venezuela to retrofit buildings damaged by earthquakes and to improve building structural control. (abstract). Milton E. Contreras.....	372
<i>Socio-economic issues and public policy</i>	
A strategy for retrofitting critical structures in reducing earthquake and hurricane risks. Winston H.E. Suite.....	373
The effect of the January 13, 1993, earthquake on the Mona Campus, UWI : the case for an earthquake vulnerability reduction programme. Barbara E. Carby.....	381

The use of GIS as disaster preparedness and response tool. Jacob Opadeyi.....	389
Risk mitigation strategies: the case of the Costa Oriental oil fields in Western Venezuela. (abstract). Juan Murria.....	395

List of contributors

(their addresses are at the beginning of their respective contribution)

Aguilar-Becerril, H.R.	124	Morgan, F.D.	54
Algermissen, S.T.	146	Moseley, L.L.	271
Ambek, W.B.	19, 92, 100, 147, 208	Murria, J.	192, 395
Arciniega, A.	123	Opadeyi, J.	389
Audemard, F.A.	21	Osborne, R.W.A.	358, 365
Avilés-Lopez, J.	124	Ordaz, M.	123
Bareford, C.	11	Pantazopoulou, S.J.	283
Bartolini, T.J.	94	Paultre, P.	294
Bataille, K.	20	Pauly, S.	206
Bellini, J.J.	94	Pérez-Rocha, L.E.	122, 124
Bertero, V.V.	303	Prida, F.M.	209
Bridgemohan, M.	208	Prockter, L.	165
Bufalíza, M.A.	178	Quijada, P.	176, 177
Bungum, H.	113	Ramnanan, H.	261
Carby, B.E.	381	Reinoso, E.	122
Castano, J.C.	178	Robertson, R.E.A.	230
Chin, B.G.	311	Rodríguez, R.	33
Chin, M.W.	283	Romero, G.J.	21
Clarke, R.P.	345	Roobol, M.J.	220
Contreras, M.E.	372	Rosales, V.	339
Devine, J.D.	246, 247, 248	Rotwain, I.	55
Dixon, T.D.	92	Russo, R.M.	11, 19
Doser, D.I.	12	Saab, J.A.	192
Drake, L.A.	134	Sánchez-Sesna, F.J.	122
Fernandez, E.	178	Schroeder, M.O.	122
Fortoul, E.	329	Sharma, A.K.	345
Franke, M.	77, 176, 177	Shepherd, J.B.	43, 165, 249
Gajardo, E.	77, 176, 177, 192	Sigurdsson, H.	247, 248
Girardin, N.	55	Smith, A.L.	220
Gomez, L.O.	56	Smith, D.L.	94
Grases, J.	1, 371	Smith, M.S.	249
Guevara, L.T.	329	Soto, L.	20
Guralp, C.M.	206	Speed, R.C.	92
Henderson, P.W.	311	Suite, W.H.E.	373
Jeyanandan, D.	92	Sully, J.P.	192
Jordan, D.	271	Tanner, J.G.	43, 165
Key, D.	273, 304	VanDusen, S.R.	12
Kozuch, M.	176	Villasenor, A.	77
Latchman, J.L.	100, 208	Von Hillebrandt-Andrade, C.G.	53
Lord, K.M.	94	Weber, J.C.	92
Lynch, L.L.	43, 92, 100, 207, 208	Wharton, S.R.	272
Mendoza, J.	33	Wiggins-Grandison, M.	65
Mitchell, D.	294	Wightman, A.	311
		Zamarbide, J.L.	178