

Workshop on Vulnerability of Non-structural Components of Hospitals and Health Centres
Tortola, British Virgin Islands, 13-14 July 1998

document prepared by Tony Gibbs, consulting engineer

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Part 1

**Programme
for the
Workshop
and
List of Participants**

NON-STRUCTURAL VULNERABILITY OF HOSPITALS AND HEALTH CENTRES WORKSHOP

AGENDA

Monday, 13th July, 1998

[Treasure Isle Hotel]

GROUP 1

[Personnel from Health Services only]

0830 hrs	REGISTRATION
0900 hrs	Opening Ceremony
0930 hrs	"The Seismic and Wind Hazards of the Caribbean and the BVI"
1000 hrs	"Non-structural Damage"
1045 hrs	BREAK
1100 hrs	"Prevention of Non-structural Damage"
1130 hrs	Video - "Mitigation"
1200 hrs	"Introduction to Vulnerability Surveys"
	<i>[END OF FIRST SESSION]</i>
1315 hrs	BREAK

Monday, 13th July, 1998

[Public Works Department Conference Room]

GROUP 2

[Personnel from Town & Country Planning, Public Works
Department, Development Planning Unit only]

1400 hrs	"Basic Principles of Designing for Earthquakes and Hurricanes"
1445 hrs	The BVI Building Code"
1530 hrs	CLOSE

Tuesday, 14th July, 1998

**[Field Trip for Group 2 to Peebles Hospital to meet with
Group 1]**

0900 hrs	Field Trips to Peebles Hospital [Technical Teams to conduct surveys in different locations with health personnel at their locations]
1200 hrs	LUNCH

Tuesday, 14th July, 1998

[Group 1 and Group 2 at Treasure Isle Hotel]

1330 hrs	Review of Field Trips
1445 hrs	Conclusions and Recommendations
1515 hrs	Evaluation
1530 hrs	CLOSE

NON-STRUCTURAL VULNERABILITY OF HOSPITALS AND HEALTH CENTRES WORKSHOP

Treasure Isle Conference Room at 9:00 a.m.

13th-14th July, 1998

PROGRAMME

9:00 a.m.

WELCOME

Mr. Elton Georges, OBE, Chairman/NEAC

9:05 a.m. - 9:15 a.m.

INTRODUCTION OF RESOURCE PERSONS

Mr. Donovan Gentles, National Disaster Coordinator

9:15 a.m. - 9:20 a.m.

BRIEF REMARKS

- ✓ Hon. Eileene Parsons, Minister for Health, Education & Welfare
- ✓ Mr. David Taylor, PAHO
- ✓ Dr. Irad Potter, Director of Health Services

9:20 a.m. - 9:25 a.m.

COURSE INTRODUCTIONS

Mr. Tony Gibbs, PAHO Consultant

9:30 a.m.

REMARKS

His Excellency the Governor, Mr. Frank Savage, CMG, OBE

9:35 a.m.

ADJOURNMENT

**"THE NON-STRUCTURAL VULNERABILITY
OF HOSPITALS AND HEALTH CENTRES"
EXPANDED PROGRAMME WITH TONY GIBBS' ITEMS HIGHLIGHTED**

MONDAY, 13 JULY 1998

0830hrs Registration

0900hrs Opening Ceremony

**0930hrs "The seismic and wind hazards of the
Caribbean and the British Virgin Islands" Tony Gibbs**

Requirements: overhead projector + spare bulb
 screen
 Kodak Carousel slide projector + spare bulb
 room which can be darkened (not just dimmed)

Seismic hazard: Tectonic setting of the Caribbean
 Some examples of significant earthquakes in the Caribbean
 The PAIGH study
 Recommendations in CUBiC
 The specific case of BVI
 Questions

Wind hazard: North Atlantic hurricanes and patterns in the Caribbean
 Some examples of significant recent hurricanes in the Caribbean
 Studies by Shellard, Rocheford and Davenport
 Recommendations in BNS CP28 and CUBiC
 The specific case of BVI
 Questions

Rain: General comments
 The Lirios curves
 Questions

1015hrs Video - "Mitigation" David Taylor

1045hrs BREAK

1100hrs "Mitigation and the Health Services" David Taylor

**1130hrs "Non-structural" Damage
and its Prevention Tony Gibbs**

Requirements: overhead projector + spare bulb
 screen
 Kodak Carousel slide projector + spare bulb
 room which can be darkened (not just dimmed)

Definitions: Structure and non-structural components of buildings
 Other non-structural aspects
 Limitations of codes, standards and regulatory mechanisms

Questions

- Competencies:** The role of persons outside of the construction industry
Tasks to be delegated to the construction industry
Questions
- Seismic hazard:** Examples of non-structural damage
Significance of damage to non-structural components of buildings
Aseismic design of non-structural components of buildings
Examples of retrofitting of non-structural components of buildings
Questions
- Wind hazard:** Examples of non-structural damage
Significance of damage to non-structural components of buildings
Wind-resistant design of non-structural components of buildings
Examples of retrofitting of non-structural components of buildings
Questions
- Rain hazard:** Examples of non-structural damage
Significance of damage from torrential rain
Design against torrential rain
Examples of retrofitting of non-structural components of buildings
Questions

1245hrs "Introduction to Vulnerability Surveys" Tony Gibbs

- Requirements:** overhead projector + spare bulb
screen
Kodak Carousel slide projector + spare bulb
room which can be darkened (not just dimmed)
- Competencies:** The role of persons outside of the construction industry
Tasks to be delegated to the construction industry
Questions
- Seismic hazard:** The survey process
Explanation of the survey form
Questions
- Wind hazard:** The survey process
Explanation of the survey form
Questions
- Rain hazard:** The survey process
Explanation of the survey form
Questions

1330hrs LUNCH

1430hrs Round Table Technical Discussion:

"Basic Principles of Designing for
Earthquakes and Hurricanes"

Tony Gibbs

Requirements: overhead projector + spare bulb
screen

Presentation: Designing against Multiple Hazards
Questions
Discussion

"The BVI Building Code"

Courtney de Castro

1600hrs CLOSE

TUESDAY, 14 JULY 1998

0900hrs Field Trips

Requirements: Assistant team leaders - Robert Wells, Courtney de Castro
(not more than 8 persons per team)
Digital cameras (one per team)
Note takers (one per team)
Transport
Access to health services facilities and property guides
As-built drawings for the health services facilities

1200hrs LUNCH

1330hrs Review of Field Trips

Requirements: overhead projector + spare bulb
screen
computer to display digital images and operator

Presentation: Each team presents its findings and conclusions
Questions
Discussion

1445hrs Conclusions and recommendations

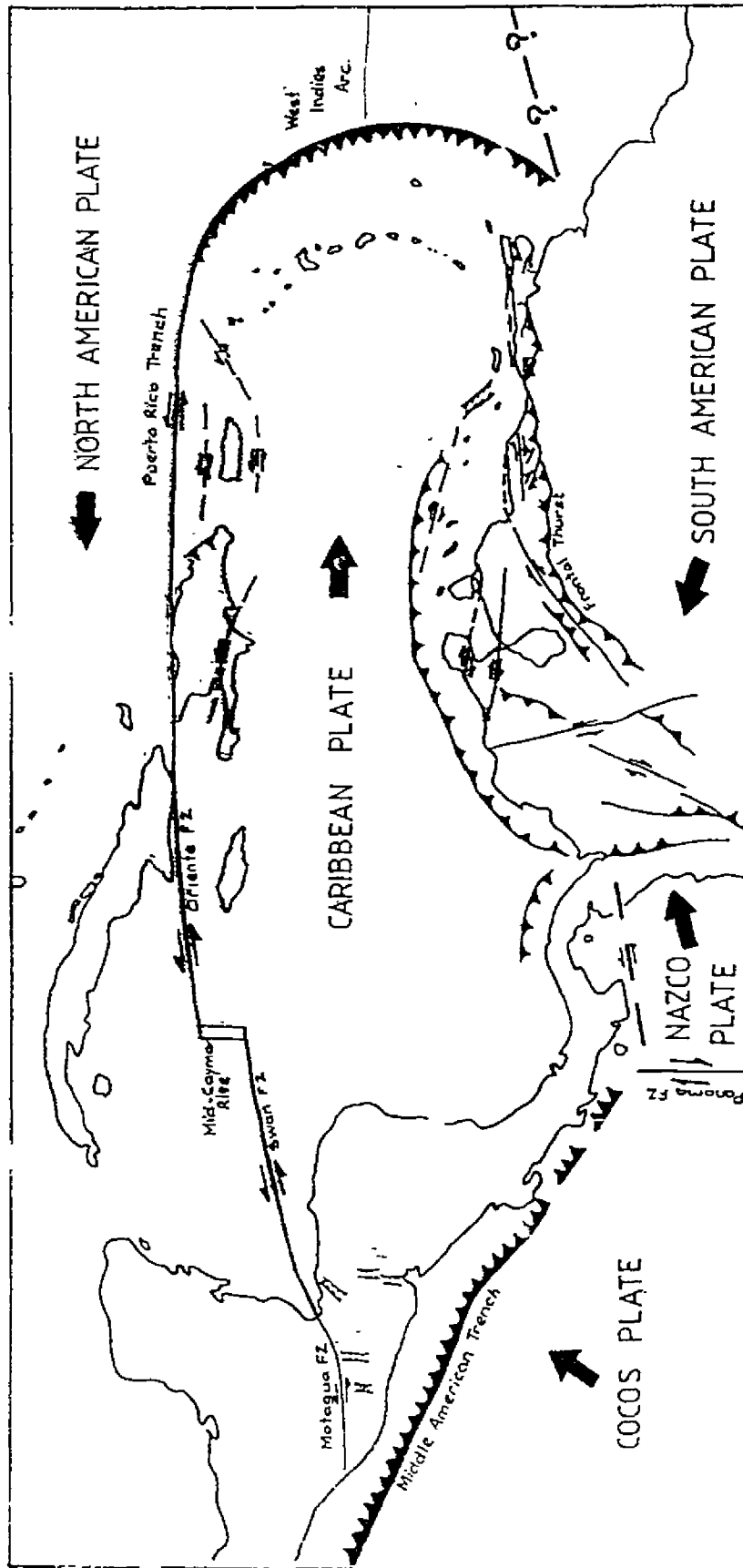
1515hrs Evaluation and Close (at 1530

List of Participants

Allen, Irene	Laboratory
Boyce, Myrle	Hospital Services
Carlton, Randolph	Telephone Management Unit
Charles, Winnifred	Peebles Hospital
Creque, Frederick	Ministry, Health and Welfare
Dabreo, Charleen	ODP
De Castro, Courtney	PWD
Durante, Lydia	B&F Medical Complex
Fraser, Denniston	Civil Aviation
Gentles, Donovan	ODP
Gibbs, Tony	PAHO Consultant
Gordon, Trevor	Public Works Department (architect)
Hash, Ronald Dr.	Chiropractic
Hodge, Irena	House Keeping
Jennings, Yvette	B&F Medical Complex
Joseph, Jasmine	Community Health
Letsome, Alceda	Adina Donovan Home for the Elderly
Longsworth, Francis Dr.	Health Department
Manns, Norah	Clinical Area
Martinez, Hugo	PAHO
Mathauious, Vessilie	Health Department
Parkins, Tania	Physiotherapy
Penn, Allan	Hospital Maintenance
Potter, Avaline	Public Works Department
Potter, Irad Dr.	Health Department
Reid, Evadney	Community Health
Rhymer, Mery Dr.	Private
Samuel, Vicki	Government Information Services
Skelton, Leon	Hospital Maintenance
Smith, Phillis	Records Unit (Hospital)
Smith, Will	Hospital Services
Stout, Leando	Fire and Rescue Service
Taylor, David	PAHO
Titely, Marva	Town and Country Planning
Vanterpool, Joseph	Education Department
Venzen, Maureen	Asst Hospital Adminstrtor, Roy Schneider Hospital, St Thomas
Walker, Gene Col.	VITEMA
Wells, Robert	Structural Engineer
Wheatley, Gracia	Pharmacy (Hospital)
Williams, Claudette	Community Health

Part 2

**Visual Material
for
Seismic Hazards
of the
Caribbean and the BVI**



Tectonic Setting of the Caribbean
(after Molnar and Sykes, 1969)

Figure 1

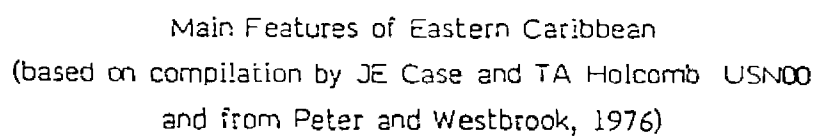
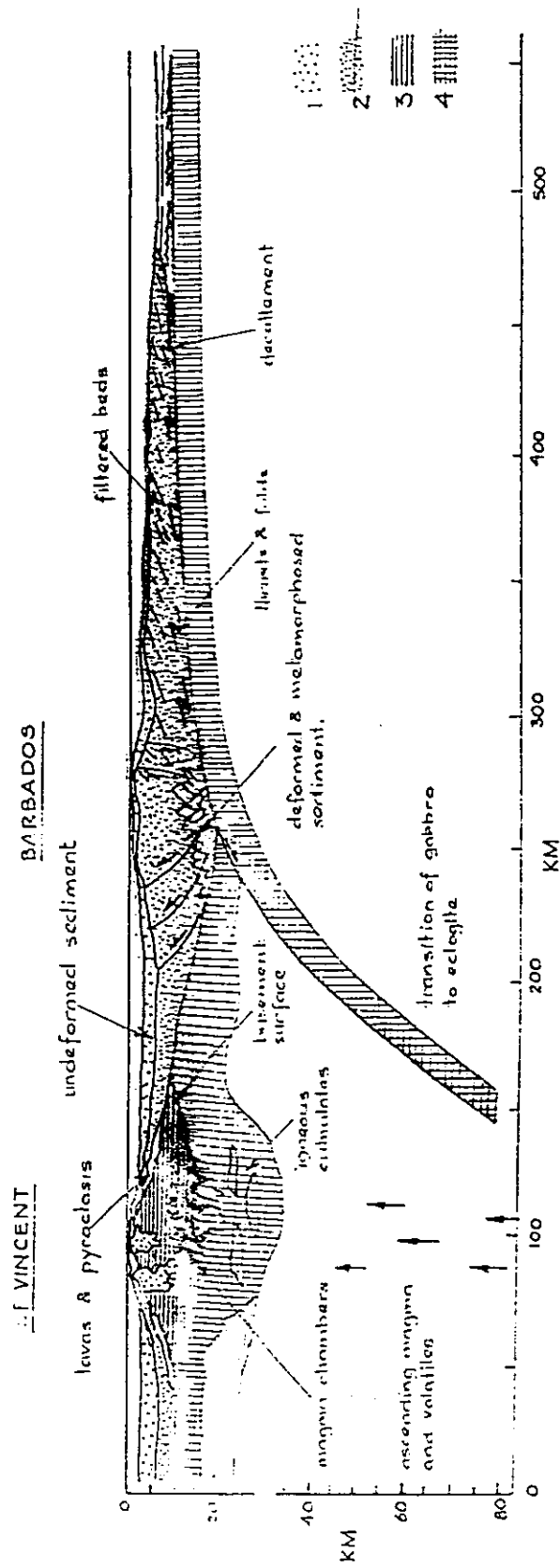


Figure 2



Diagrammatic cross-section of the Eastern Caribbean Island arc illustrating the structure and the processes acting on it. 1. Undeformed sediment. 2. Deformed and/or consolidated sediment. 3. Igneous crust produced by the volcanic arc. 4. Main oceanic crustal layer and lower crust of arc. Vertical exaggeration 2:1.

Structure In Region of Barbados
(Westbrook, 1970)

Figure 3

DATE	MAGNITUDE	COUNTRY	MM INTENSITY
1690, Apr. 5	7.5 - 8.0	St. Kitts, Antigua	VIII
1692, Jun. 7	---	Jamaica	IX
1701, Nov. 9	---	Hispaniola	VII
1751, Oct. 18	---	Hispaniola	VIII - IX
1766, Jun. 11	---	Cuba	IX
1766, Oct. 21	7.9	Trinidad	VIII
1770, Jun. 03	---	Hispaniola	VIII
1810, Oct.	---	Cuba	VII - VIII
1824, Apr. 20	---	St. Thomas	VIII
1827, Nov. 30	---	Guadeloupe, Martinique	VII
1839, Jan. 11	7.5 - 7.8	Martinique	IX
1842, May 7	7	Hispaniola	IX
1843, Feb. 8	7.8 - 8	St. Kitts, Montserrat, Antigua, Guadeloupe, Martinique	IX
1844, Apr. 16	---	Puerto Rico	VII
1844, Aug. 30	7	St. Vincent	VII
1851, May 16	7	Guadeloupe	VII
1852, Aug. 20	---	Cuba	IX
1867, Nov. 18	7.5	St. Croix, Virgin Islands	IX
1875, Dec. 8	---	Puerto Rico	VII - VIII
1880, Jan. 22	---	Cuba	VIII
1887, Sep. 23	---	Hispaniola	VIII
1888, Jan. 10	7.5	Grenada	VII
		Trinidad	VII-VIII
1897, Apr. 29	7	Guadeloupe	VII
1904, June	---	Hispaniola	VII - VIII
1906, Feb. 16	7	Martinique, St. Lucia	VII - VIII
1907, Jan. 14	7	Jamaica	IX
1918, Feb. 24	6.2	Trinidad	VII - VIII
1918, Oct. 11	7.5	Puerto Rico	IX
1928, Sep. 26	6.5	Barbados, Tobago	VI - VII
1932, Feb. 3	6.7	Cuba	VIII
1939, Aug. 14	---	Cuba	VII
1945, Dec. 23	6.5	Trinidad	VII
1946, May 21	7	Martinique	VII - VIII
1946, Aug. 4	8.1	Hispaniola	IX
1953, Mar. 19	7.5	St. Lucia, St. Vincent	VII
1957, Mar. 1	6.5	Jamaica	VIII
1968, Sep. 20	6.9	Trinidad	VII
1974, Oct. 8	7.5	Antigua, Barbuda	VIII
1976, Feb. 19	5.7	Cuba	VII-VIII

Table 2.1 List of Destructive Earthquakes in the Larger and Lesser Antilles (Caribbean)

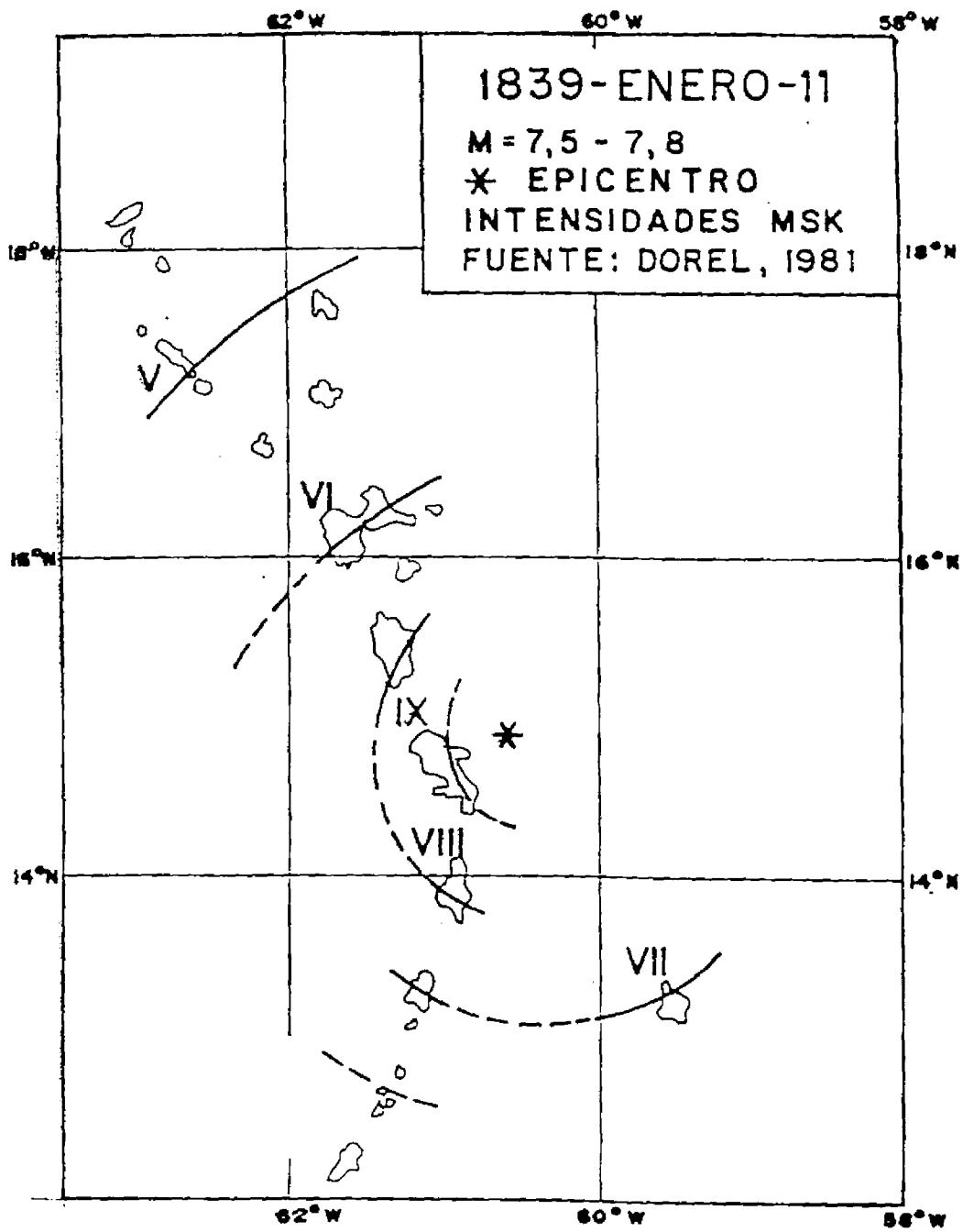


Figure 4a

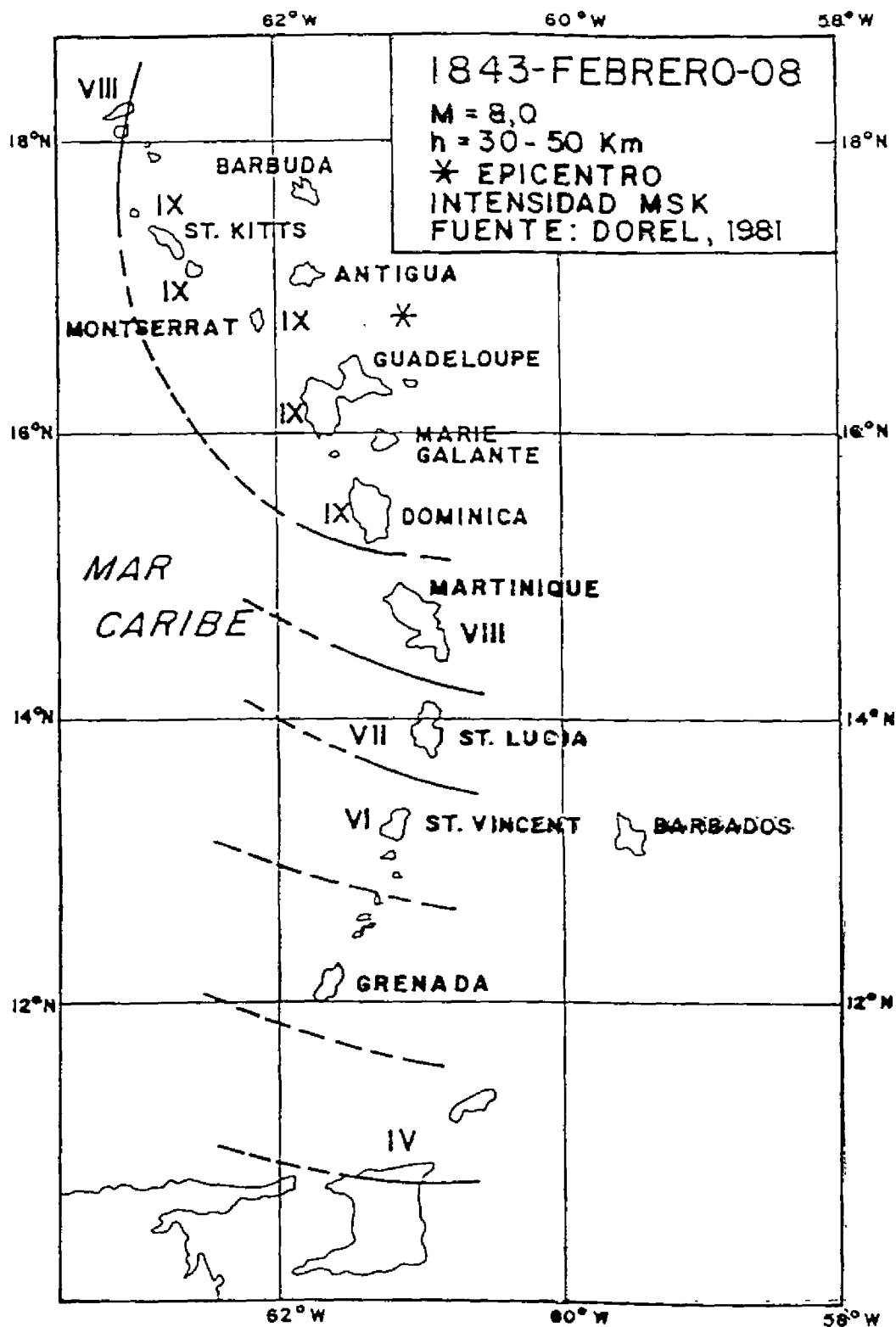


Figure 4b

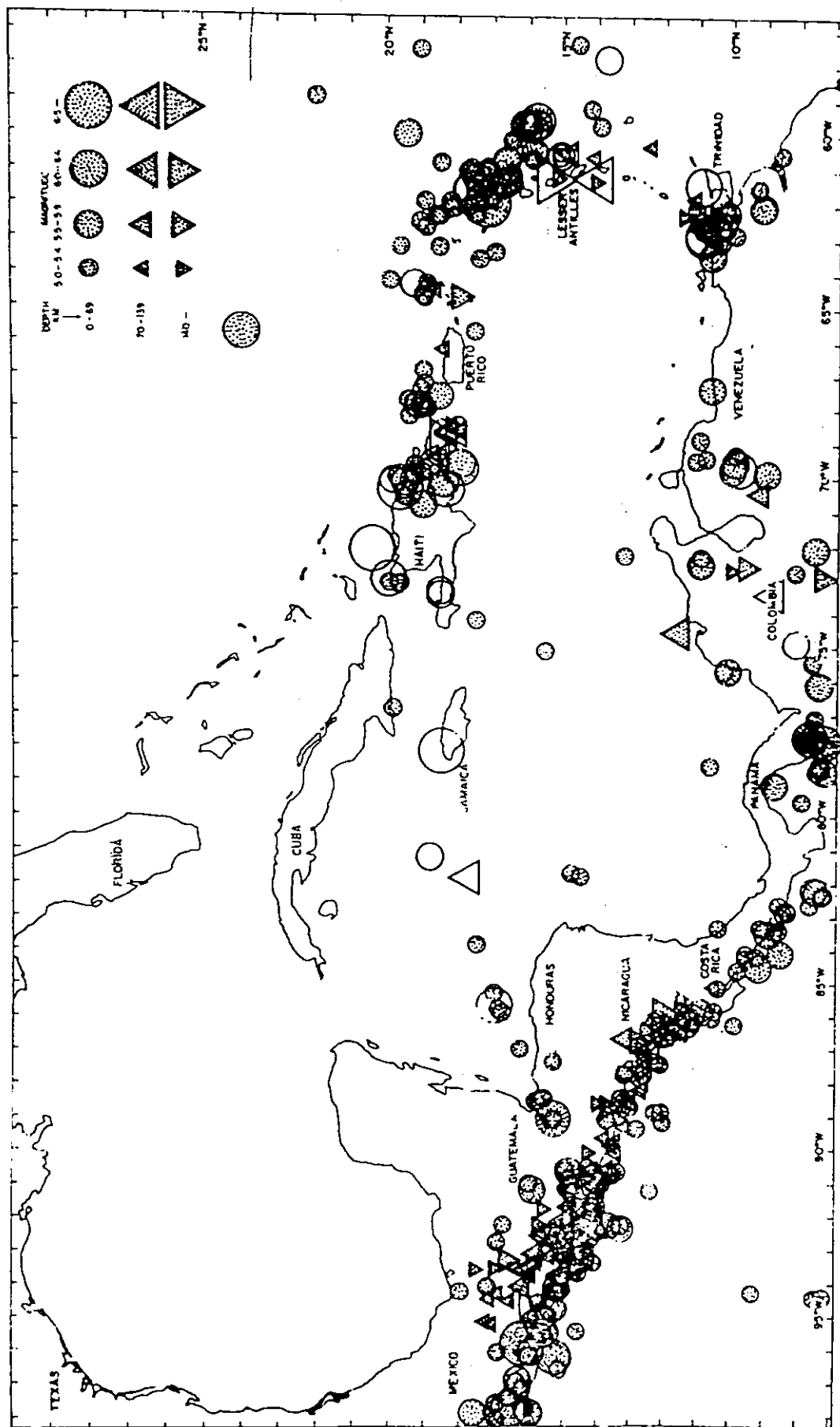
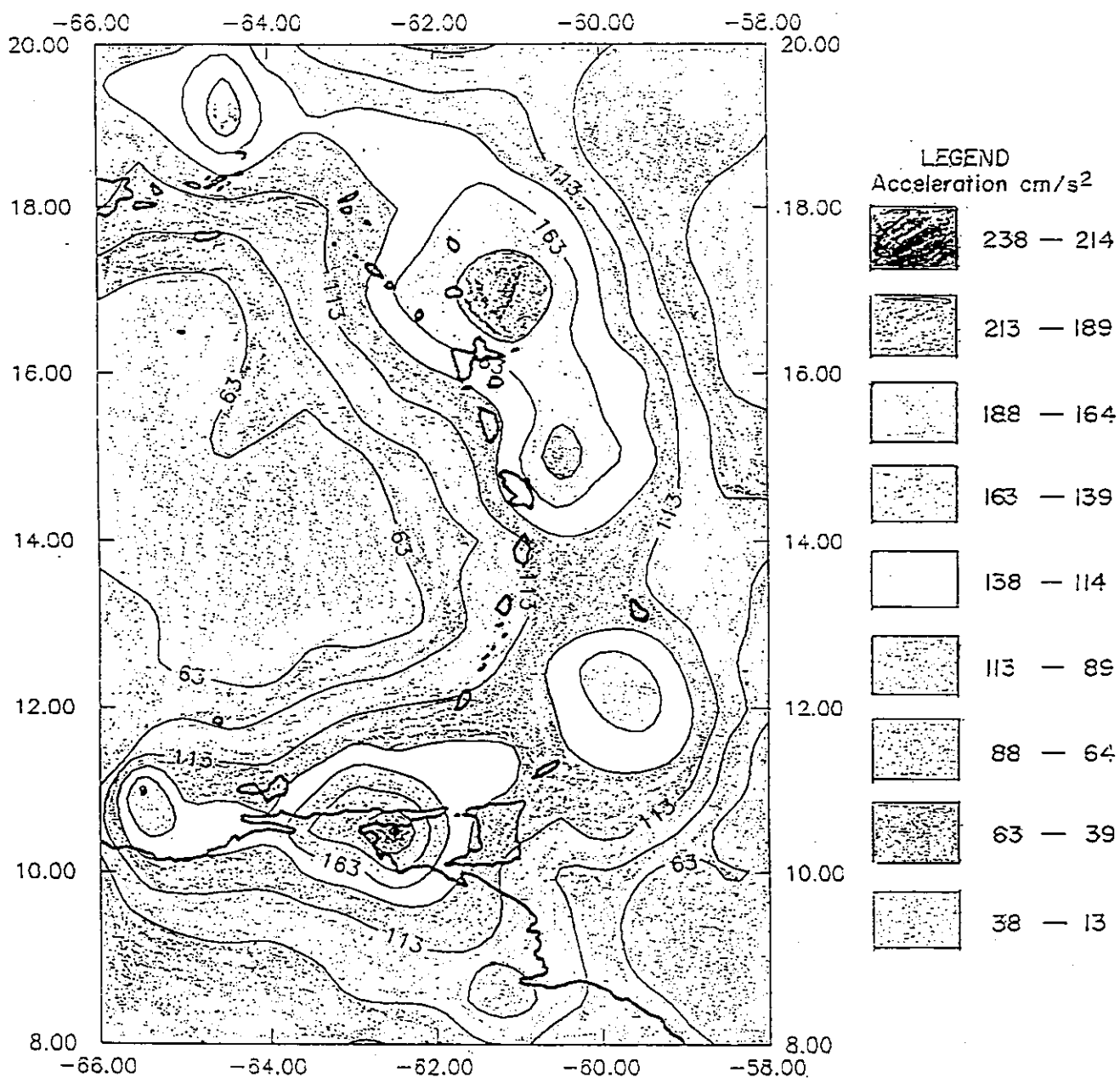


Fig 2. Caribbean earthquakes 1953-1963 (open circles) and 1964-1976 (dotted circles).

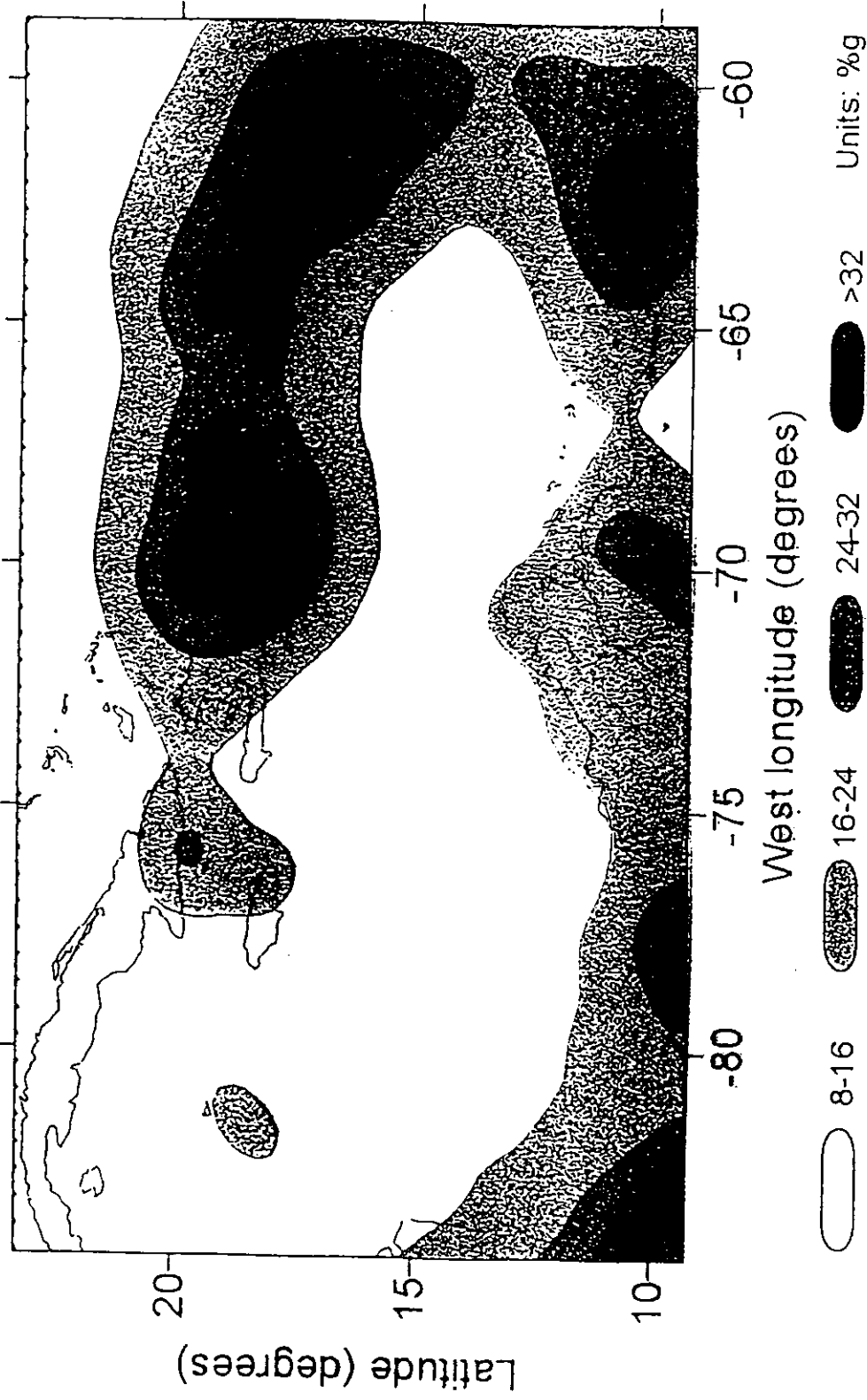
Acceleration Hazard

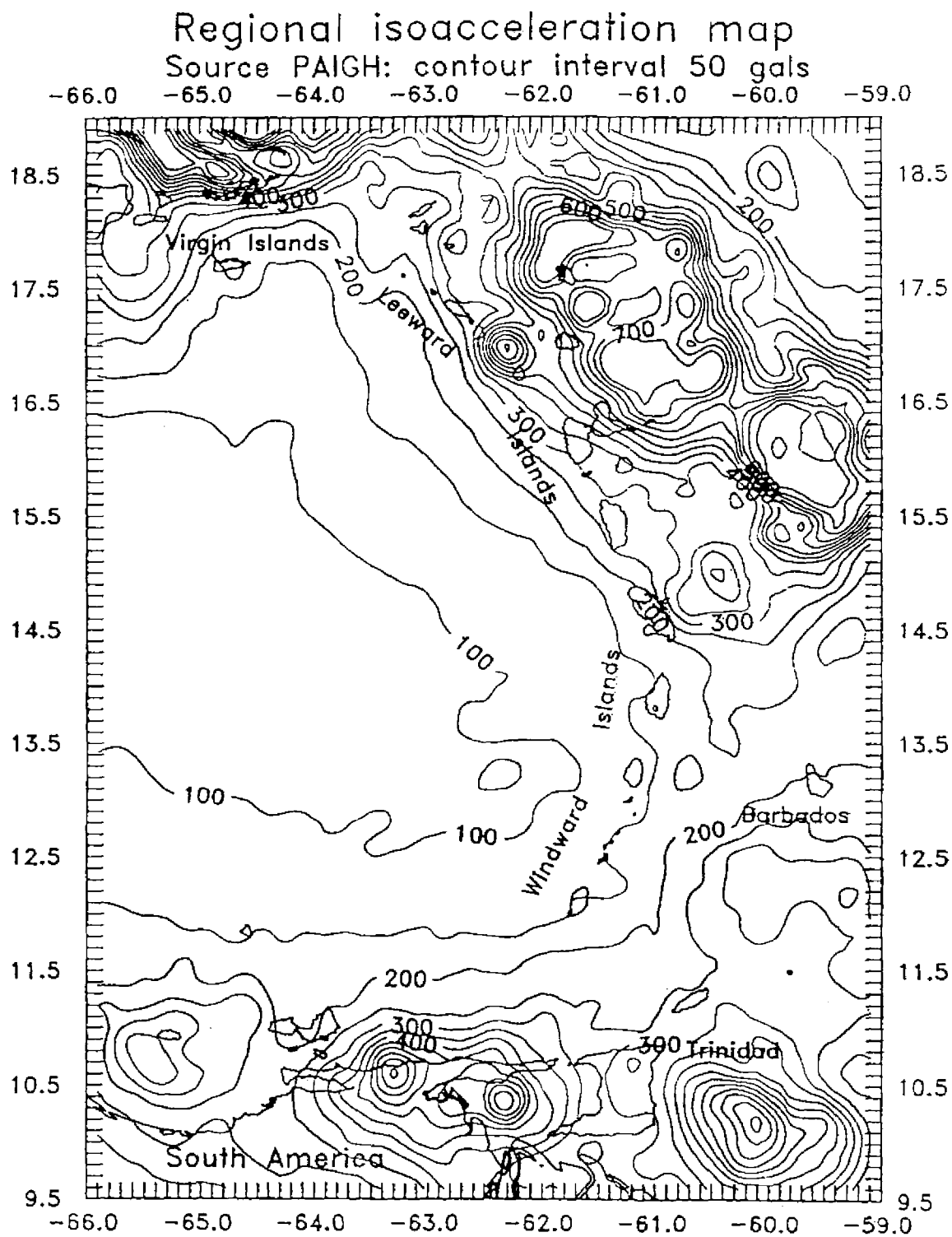


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Figure 4

Probabilistic Seismic Hazard Map for the Caribbean
Return period: 475 yr Method: Historic Parametric





Isoacceleration Map of the Eastern Caribbean
(from John Shepherd - PAIGH)

Figure 4

St. Kitts/Anegada Passage/Virgin Islands
Contour Interval 50 gals: Source PAIGH

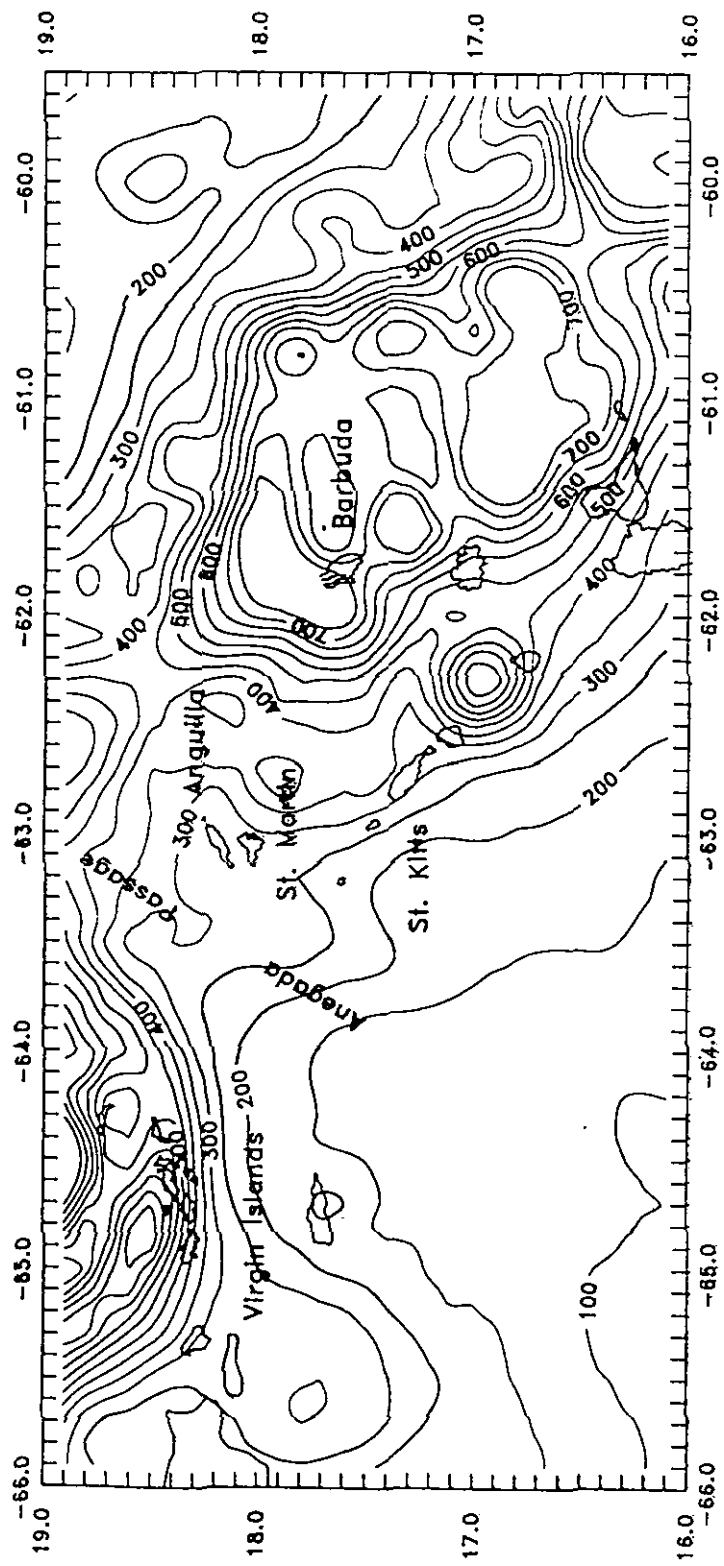


Table 1 - Seismic Zone Coefficients

ZONE NO.	Z FACTOR UBC 1985 & CUBIC	Z FACTOR UBC 1988
1	$3/16 - 1/4$	0.1
2	$3/8 - 1/2$	0.15 - 0.2
3	$3/4$	0.3
4	1	0.4