The Tsunami and Coastal Hazards Warning System for the Caribbean and Adjacent Regions

Challenges and Opportunities

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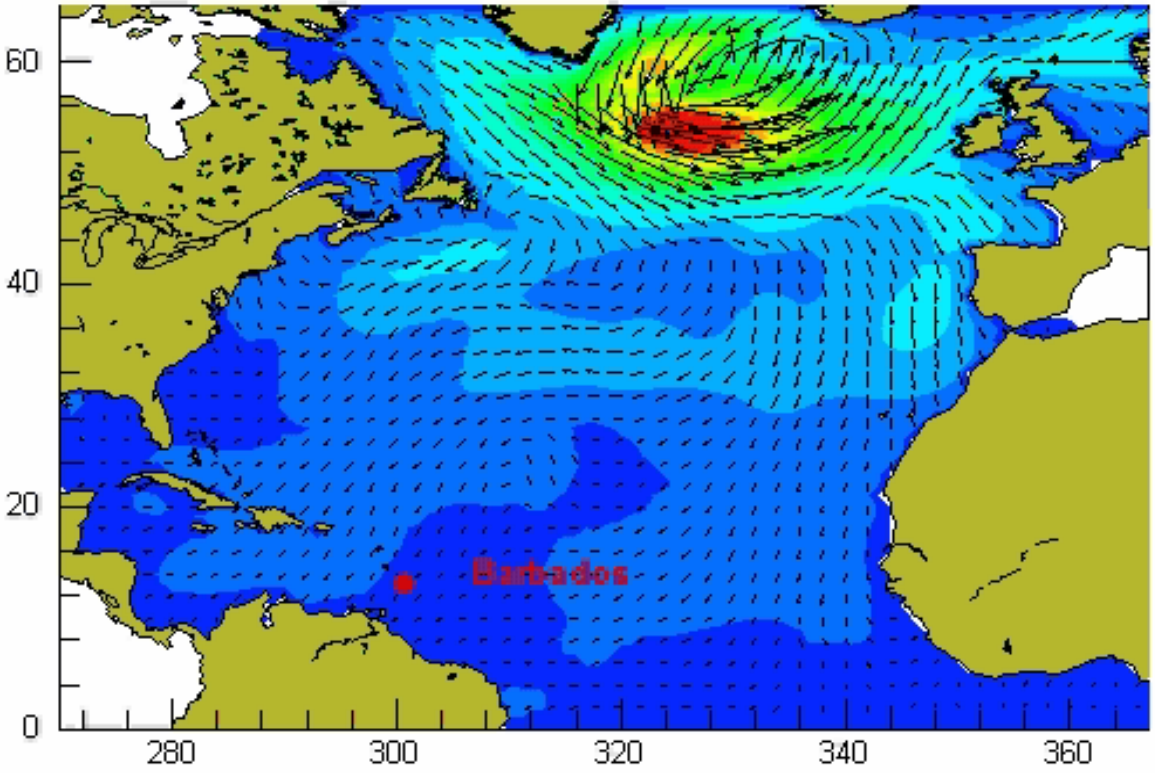
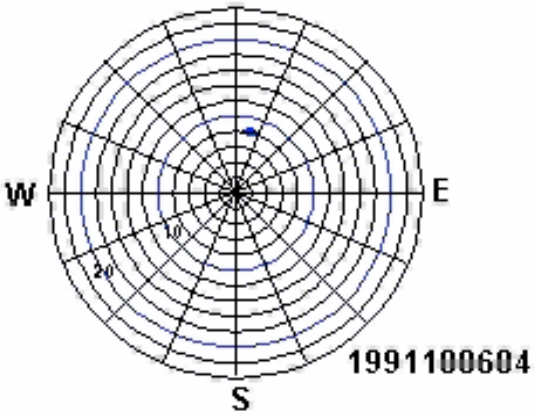
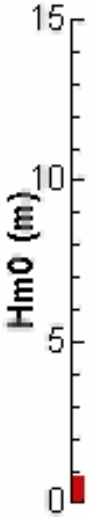
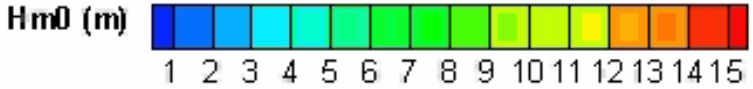
BAIRD

Wave climate at Barbados









Anatomy of my Presentation

- Role of UNESCO/IOC in CARIBE EWS
- Operational Systems
  - Detection, communications
- Preparedness, readiness and resilience
- Institutional Framework
- Possibilities for harmonization with a multi-hazard warning system

Role of UNESCO / IOC

- "Inter-America-Sea Tsunami Warning System" proposal (1993)
  - Approved by the 29 Member States of WCR
  - Approved by the IOC General Assembly 2002
- Tsunami Steering Group of Experts
- CARIBE EWS approved at Executive Council in June 2005

ICG CARIBE EWS Executive

Chair

Dr Lorna Inniss - BARBADOS

Vice Chairs

Christa von Hillebrandt - USA

Francisco Garces - VENEZUELA

Frederique Martini - France

Meetings of the Intergovernmental Coordination Group

- Jan 2006: ICG CARIBE EWS/I, Bridgetown, Barbados
- Mar 2007: ICG II, Cumaná, Venezuela
- Mar 2008: ICG III, Panama City, Panama
- Mar 2009: ICG IV, Martinique, France
- March 2010: ICG V, Managua, Nicaragua

Working Group and Chairs

- Monitoring and Detection Systems, Warning Guidance – Nicaragua and USA
- Tsunami and Coastal Inundation Hazard Risk Assessment and Research – USA and France
- Warning, Dissemination, and Communications – Anguilla and Bahamas
- Preparedness, Readiness and Resilience – USA and Venezuela

Interim Institutional Arrangements

- PTWC provides interim warning guidance to the Caribbean
- Barbados provides interim Information Center services to English-speaking Member States
- Secretariat duties are within the Tsunami Unit, IOC

Progress on ICG/I Recommendations

- To date, 24 MS have nominated their TNC and TWFP – 85% (Cuba have not nominated)
- Warning protocols being developed this year
- Strong links with regional disaster management organizations and coastal scientists

Proposed Caribbean Tsunami Warning Center

- The ICG proposed to have a warning center in the region by 2010
- The USA has established the Caribbean Tsunami Warning Programme (a precursor to CTWC)

Proposed Caribbean Tsunami Information Center

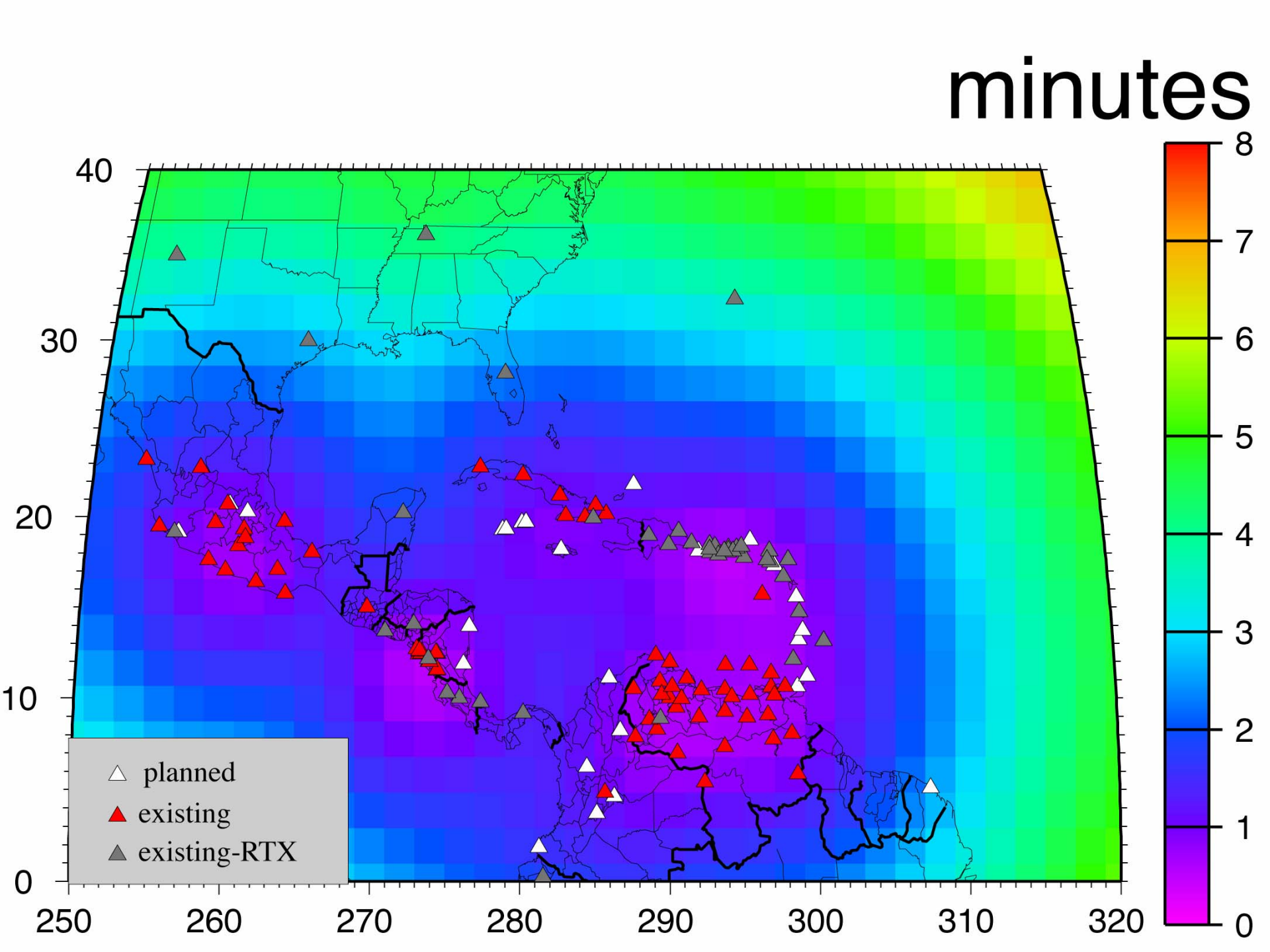
Government of Barbados has made a formal offer to host the Caribbean Tsunami Information Center, funded for the first three years by the Italian/UNDP programme

Monitoring and Detection Systems, Warning Guidance

- Earthquakes are the trigger for more than 90% of all tsunamis
- The ICG must begin to develop early warning for ‘other’ triggered events

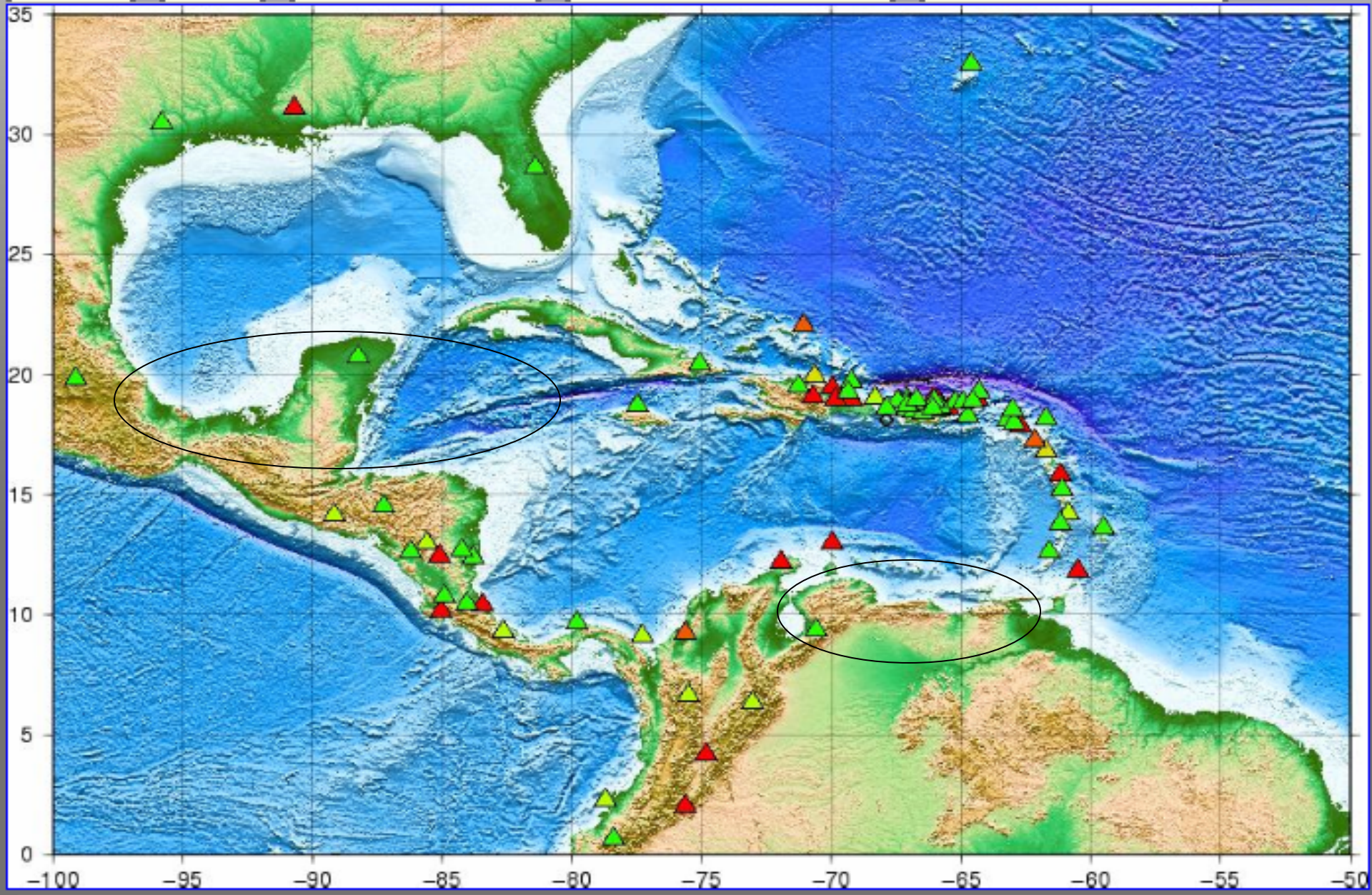
Seismic Network Development

- ICGIII endorsed definition of a core network of seismic stations
- Core network data free and open to all national warning centers
- Seismic Data Availability in the Caribbean 77% (95/124) of Core CARIBE EWS Stations are contributing in real time


minutes
40
30
20
10
0
250
260
270
280
290
300
310
320
8
7
6
5
4
3
2
1
0
planned
existing
existing-RTX

Sea Level Network Development

- Slower due to limited funding available, and lack of established networks
- First meeting of the Caribbean sea level network in Puerto Rico, USA 2008



Gap < 1

Gap <= 5 min.

Gap <= 15 min.

Gap <= 30 min.

Gap <= 1h.

Gap > 1h.

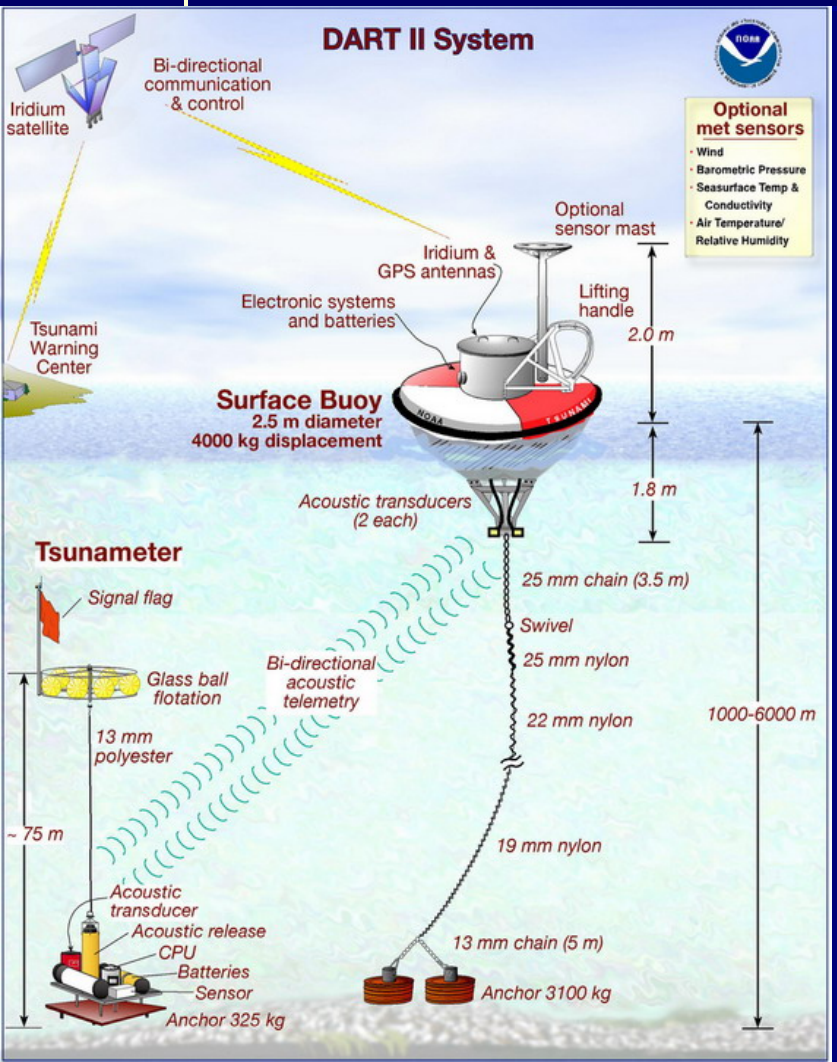
RT(15 min) Sin Datos.

Overlap <= 5 min.

Overlap > 5 min.

Estacion no registrada.

D.A.R.T. Buoy


DART II System
Bi-directional communication & control
Iridium satellite
Optional met sensors
Wind
Barometric Pressure
Seasurface Temp & Conductivity
Air Temperature/ Relative Humidity
Optional sensor mast
Iridium & GPS antennas
Electronic systems and batteries
Lifting handle
2.0 m
Tsunami Warning Center
Surface Buoy
2.5 m diameter
4000 kg displacement
1.8 m
Acoustic transducers (2 each)
Tsunameter
25 mm chain (3.5 m)
Signal flag
Swivel
25 mm nylon
Glass ball flotation
Bi-directional acoustic telemetry
22 mm nylon
1000-6000 m
13 mm polyester
~ 75 m
19 mm nylon
Acoustic transducer
Acoustic release
CPU
Batteries
Sensor
Anchor 325 kg
13 mm chain (5 m)
Anchor 3100 kg


46409
46403
46402
46401
46404
46405
46411
46412
41424
42408
41420
41421
51407
42407
46406
32401
60N
50 N
40 N
30 N
20 N
10 N
0
10 S
20 S
170 W
150 W
130 W
110 W
90W
70W
50W

January 12th Haiti Event

- 7.0 Magnitude
- Struck in the early hours of the evening
- Significant loss of life due to earthquake
- A deadly local tsunami was generated – 3m run-up
- Triggered the CARIBE EWS and allowed for a comprehensive evaluation of the system's performance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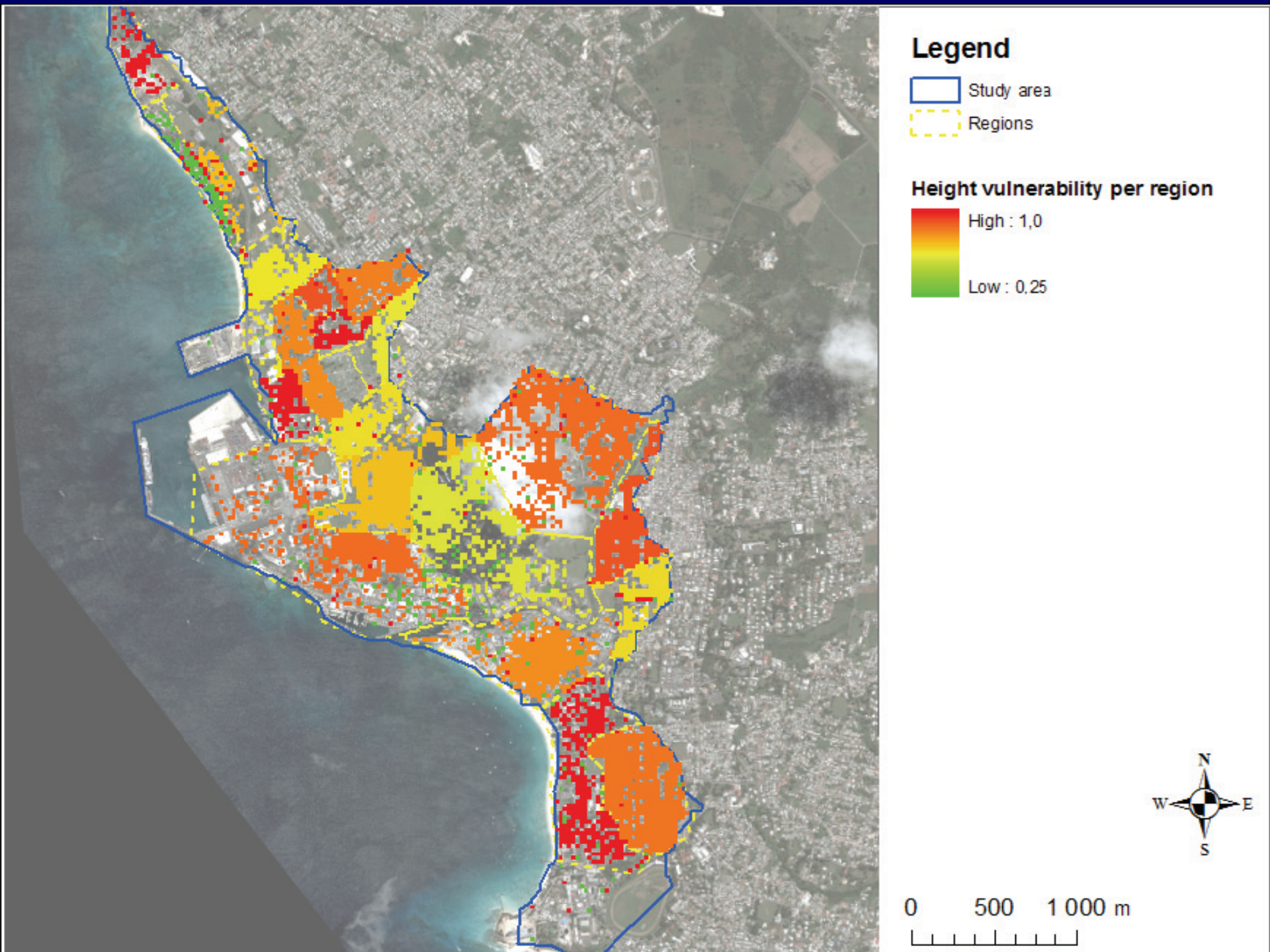
Hazard Risk Assessment and Research

- Mechanisms to incorporate considerations of non-seismic sources of tsunami into CARIBE EWS
- High resolution bathymetry and coastal topography requirements for modeling
- Collaboration with international modeling groups

Hazard Assessment NGI Study

- ICG partnership with the Government of Norway to conduct pilot hazard assessment for tsunamis and landslides
- Funding for data to support modelling, as well as the modelling itself
- Development of hazard maps


Legend
Study area
Regions
Height vulnerability per region
High : 1,0
Low : 0,25
N
W
E
S
0
500
1 000 m

Warning and Communications

- Communications Plan approved at ICG II
  - Official communications system to be utilized (GTS)
  - Forecast points identified by PTWC and many confirmed by MS

Warning & Communications

- Multi-hazard risk requires redundancy in communications system (e.g. RANET and EMWIN)
- Disparity in reliability and availability of communications systems in MS
- Diversity of languages and dialects spoken in vulnerable coastal communities

Preparedness, Readiness and Resilience

- USAID/CDEMA project to support Tsunami Information Services
  - Protocols development for warning
  - Educational materials development
- Efforts underway to access funding for Spanish counterpart project

Ideas for Building a Multi-Hazard Warning System in the Caribbean

- Institutional arrangements
- Monitoring and detection systems
- Data collection and hazard assessment
- Communications moving towards harmonization
- A warning Focal Point works for all?
- Simulation exercises

Sea level Multi-Hazard Network

- Climate change SL network cannot be used for tsunami (11 stations funded and installed)
- National SL stations that have not been incorporated into a regional network
- Countries have not yet understood the importance of system maintenance

Communications Network

- WMO's GTS was offered immediately for the transmission of tsunami warning messages, BUT
- Capacity requirements for WFPs not yet fulfilled
- Redundancy supported through EMWIN in the region

Caribe Wave/LANTEX 2011

- A test of the disaster management components in the region
- Communications protocols are being completed
- Each member state decides what level of simulation will be conducted (table top, field-based, single hazard etc)

BARBADOS

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Thank you!!!

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CHAIR

BARBADOS

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