

# **COCONet Workshop**

**San Juan, Puerto Rico  
3 & 4 February 2011**

**Data & Observations – The  
Caribbean Experience**

**Carlos Fuller  
Deputy Director**

Caricom Climate Change Centre

# The Caribbean Community Climate Change Centre

- Endorsed by the CARICOM Heads of Government in July 2002
- An intergovernmental specialized agency of CARICOM with an independent management that is guided by
  - The CARICOM Council of Trade and Economic Development (COTED) on policy matters.
  - A board of directors with responsibility for strategic planning.
  - A technical secretariat headed by an Executive Director with responsibility for tactical planning.
- The Centre is mandated to coordinate the regional response to climate change and its efforts to manage and adapt to its projected impacts.
- The Centre possesses full juridical personality.
- Financially independent



◆ **Operational since  
January 2004**

◆ **Located in  
Belmopan, Belize**

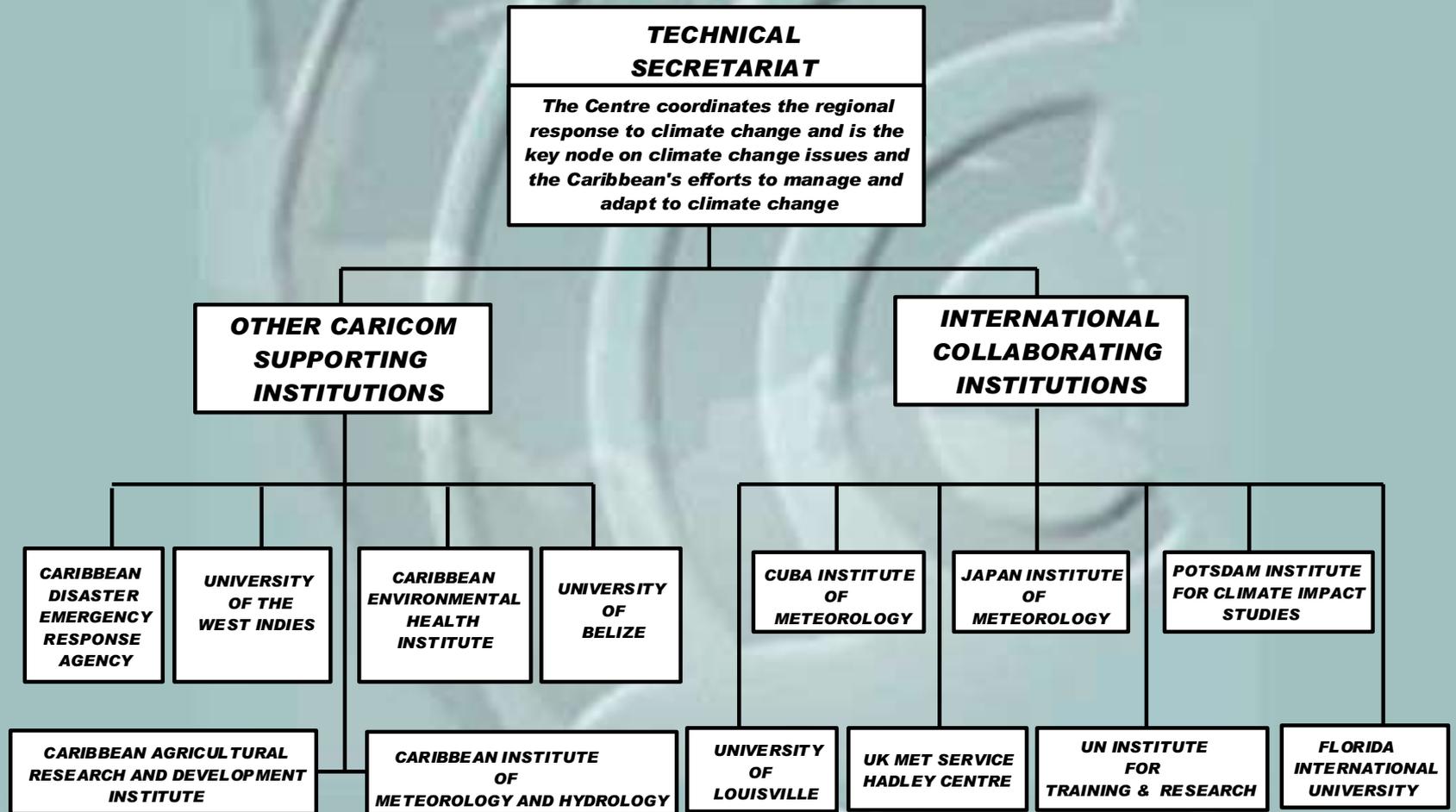
# Members



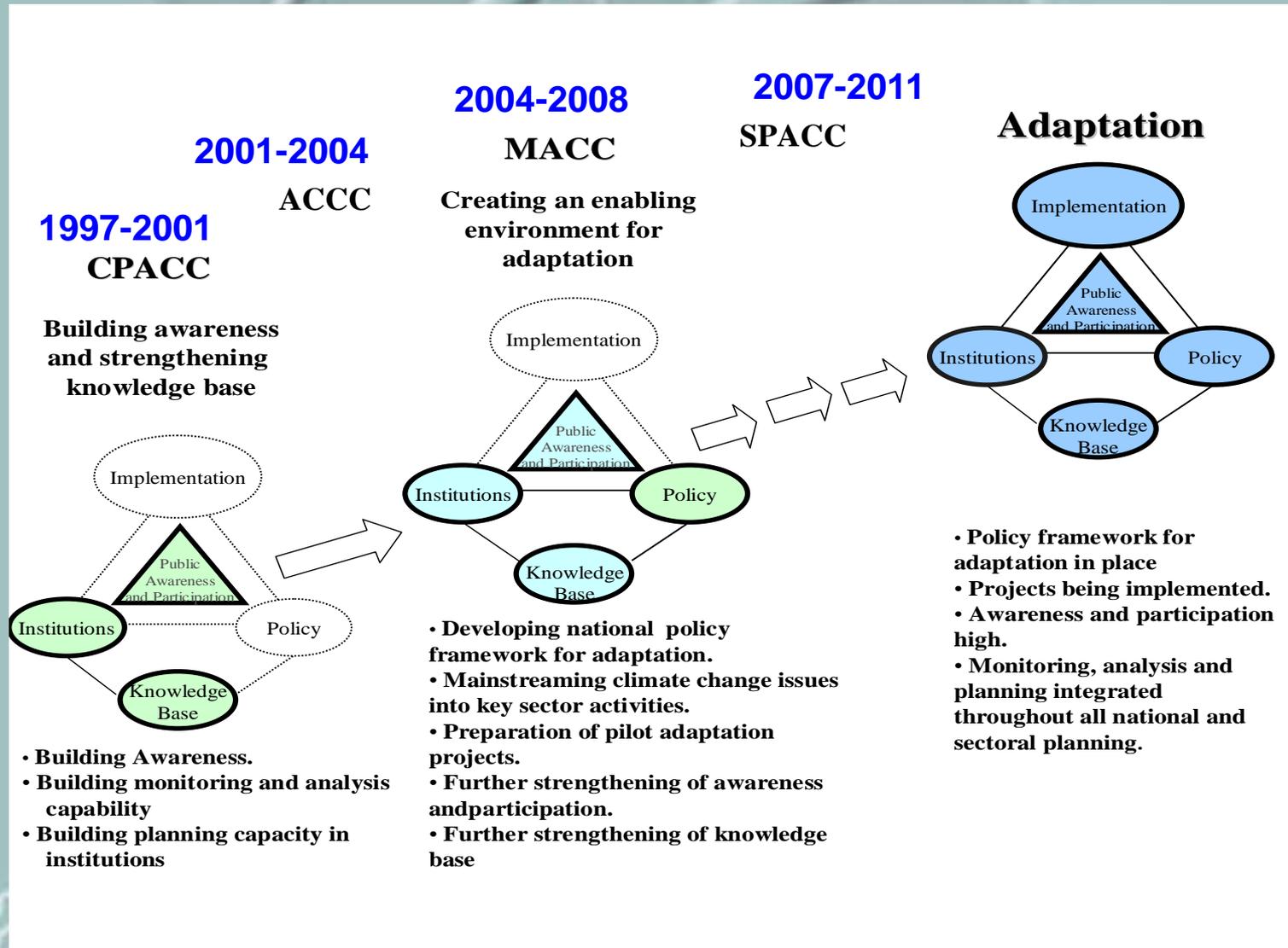
- Belize
- Dominica
- Grenada
- Guyana
- Haiti
- Jamaica
- Suriname
- Saint Lucia
- St. Kitts and Nevis
- St. Vincent & the Grenadines
- Trinidad and Tobago

- Antigua and Barbuda
- Bahamas
- Barbados

# Functional Organogram



# The Regional Response to Climate Change (1997 – 2011)



# **Caribbean Planning for Adaptation to Climate Change (CPACC) 1997 - 2001**

- 1. Design and Installation of Sea-level and Climate Monitoring System**
- 2. Establishment of Databases and Information Systems**
- 3. Inventory of Coastal Resources and Uses**
- 4. Formulation of Policy Framework for Integrated Adaptation Planning and Management**
- 5. Coral Reef Monitoring for Climate Change Impacts**
- 6. Coastal Vulnerability Assessment**
- 7. Economic Valuation of Coastal and Marine Resources**
- 8. Formulation of Economic and Regulatory Proposals**
- 9. Preparation of St. Vincent and the Grenadines' First National Communication**

**Caricom Climate Change Centre**

# **Adapting to Climate Change in the Caribbean (ACCC) 2001 - 2004**

- **Development and distribution of risk management guidelines for climate change adaptation decision making;**
- **Development of the business plan and establishment of the basis of financial self-sustainability for CCCCC;**
- **Development of a guide to assist practitioners in CARICOM countries to integrate climate change in the environmental impact assessment (EIA) process;**
- **Development of a draft regional public education and outreach (PEO) strategy;**
- **Dialogue established with the South Pacific Regional Environment Programme (SPREP) and the Pacific Islands Climate Change Assistance Programme (PICCAP) for collaboration on issues related to climate change;**
- **Successful launch of a Master's Programme in climate change at UWI**
- **Statistically downscaled climate scenarios development for Jamaica, Trinidad and Tobago, and Barbados;**
- **Staff training and development at the Caribbean Institute for Meteorology and Hydrology (CIMH) in climate trend analysis in order to strengthen climate change capacity;**
- **Implementation of pilot projects on adaptation studies in the water, health and agricultural sectors.**

# **Mainstreaming Adaptation to Climate Change (MACC) 2004 - 2009**

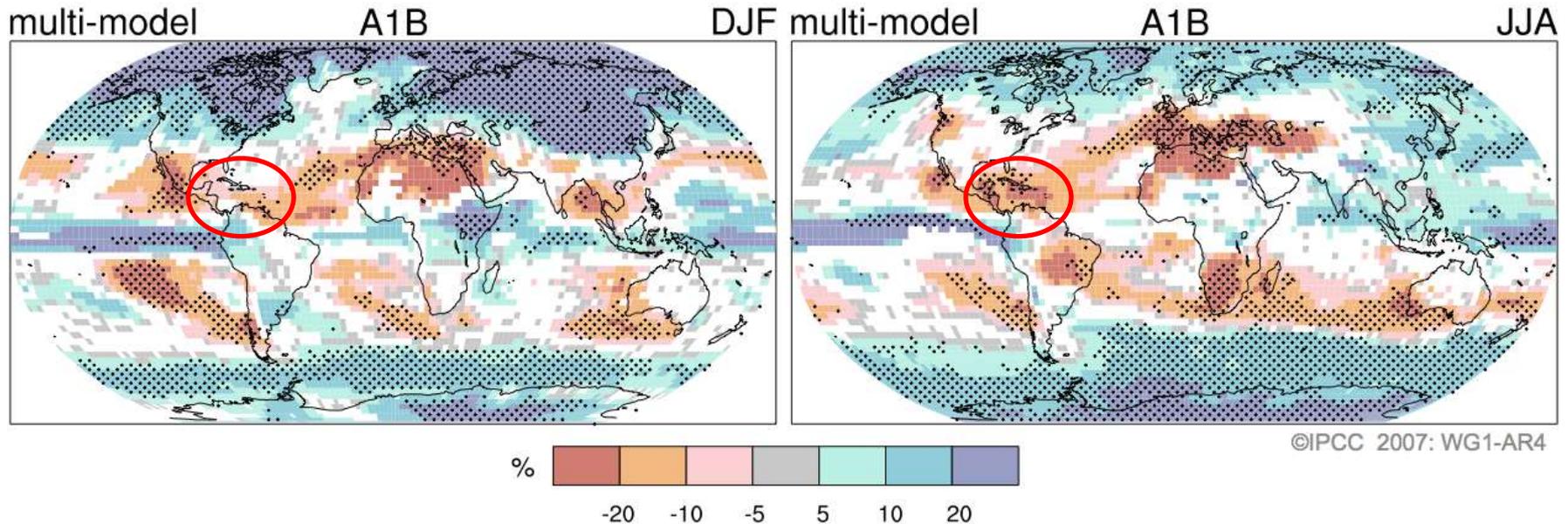
- **Strengthen regional monitoring**
- **Climate Modelling**
  - **Downscaling (PRECIS)**
  - **Japanese Earth Simulator**
- **Pilot Vulnerability Assessments**
  - **Barbados – Tourism**
  - **Belize – Water Resources (Surface Water)**
  - **Guyana - Agriculture**
  - **Jamaica – Water Resources (Ground Water)**
- **Prepare adaptation strategies**
- **Prepare regional climate change strategy**
- **Coordinate the region in the climate change negotiation process**

# Observing Components MACC Project

- Installation of 11 tide gauges & AWSs
  - Trinidad and Tobago installing additional 5 tide gauges & AWSs
  - Jamaica installed additional station
- Installation of 4 CORS stations
  - Antigua and Barbuda, Belize, Dominica, St. Vincent and the Grenadines
  - Monitors tectonic movement
- Installation of CREWS station in Jamaica
  - Water quality including pH, acidity, & met. parameters

# Projected Patterns of Precipitation Changes

## Projected Patterns of Precipitation Changes



Useful information, but at very low resolution. Adaptation assessment need detailed spatial information at regional, national and local level ; **Resolution is Important!**

# Modeling Activities

- The GCM's resolution of 300 km cannot resolve the small islands of the Caribbean.
- The Centre is collaborating with other institutions in the use of downscaling regional models (25 & 50 km resolutions) to look at future climate scenarios.
- Collaborating Institutions include:
  - Hadley Centre
  - University of the West Indies
  - INSMET in Cuba
  - CATHALAC in Panama

**Belize: Sept 25-29, 2006**



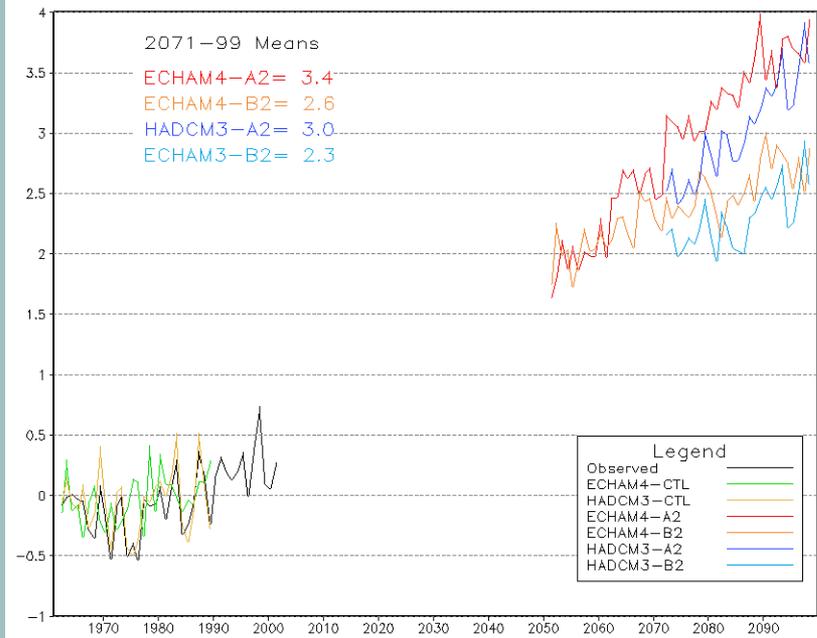
**Cuba: Dec 4 – 10, 2006**

# Downscaling

- PRECIS model – Hadley Centre
- Regional collaboration
  - INSMET (Cuba)
  - UWI Mona (Jamaica)
  - UWI Cave Hill (Barbados)
  - CCCCC
- Japanese Earth Simulator
  - 2 meteorologists

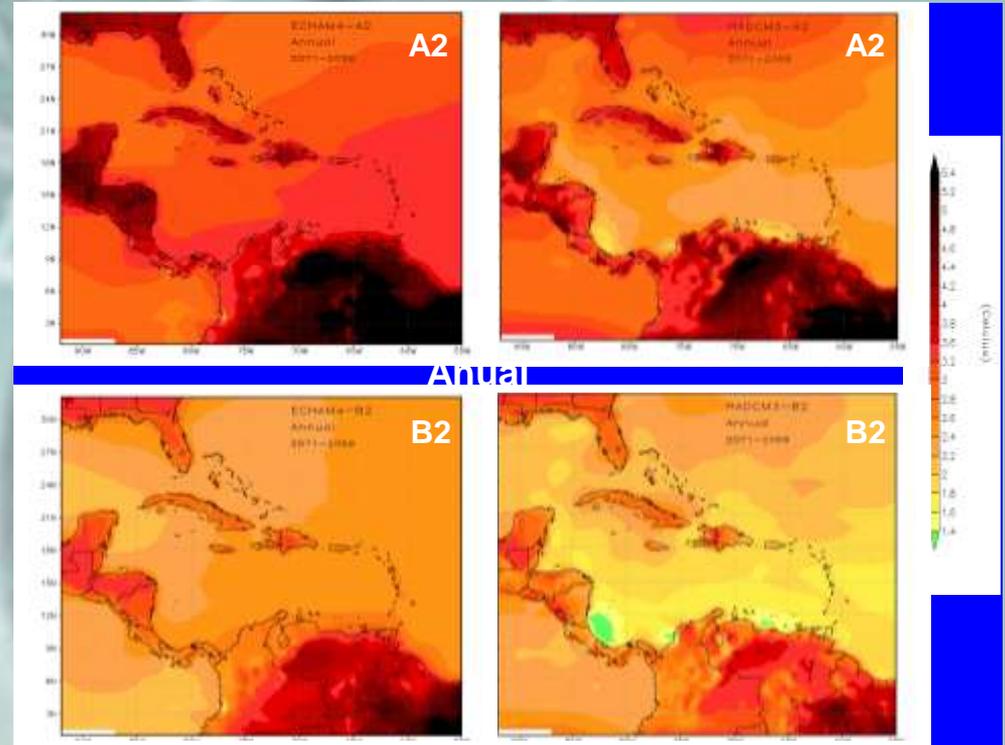
# Results...

## Temperature

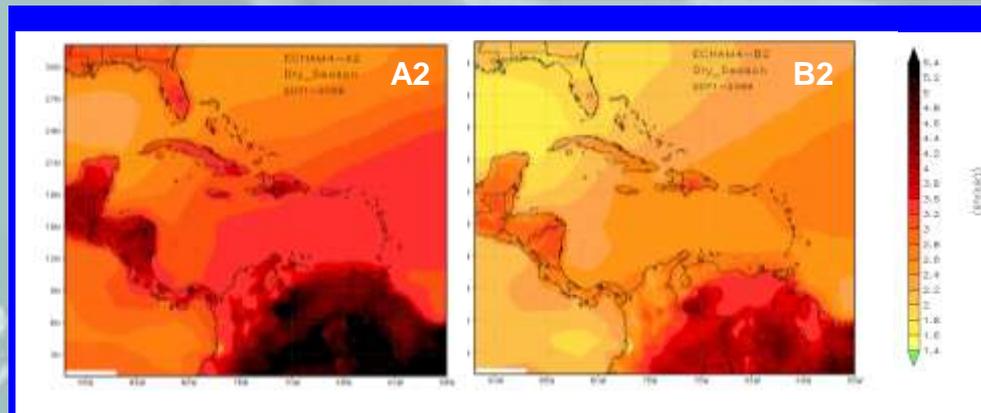


## ECHAM4

## HadCM3



## ECHAM4

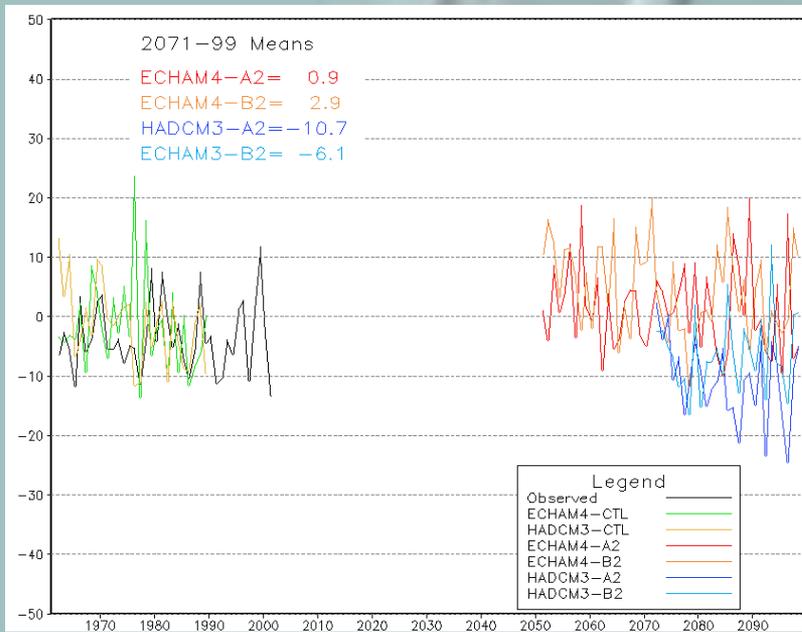


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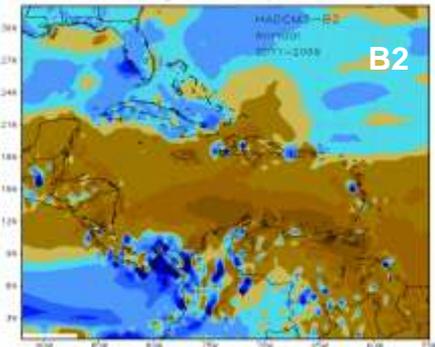
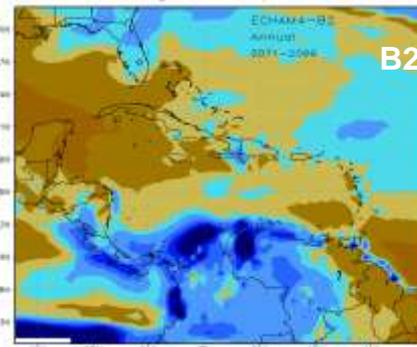
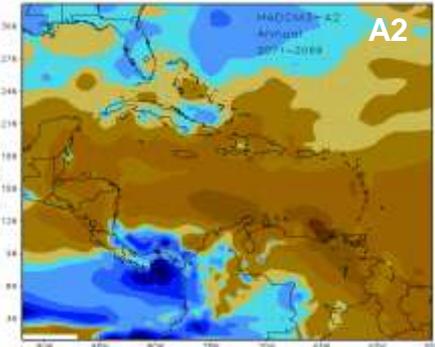
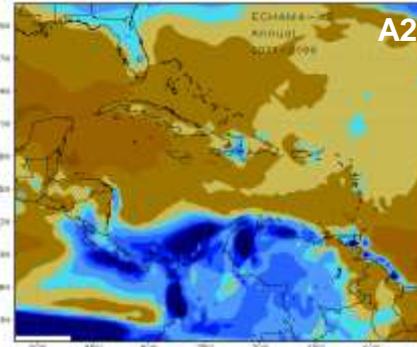
# Results...

## Precipitation



ECHAM4

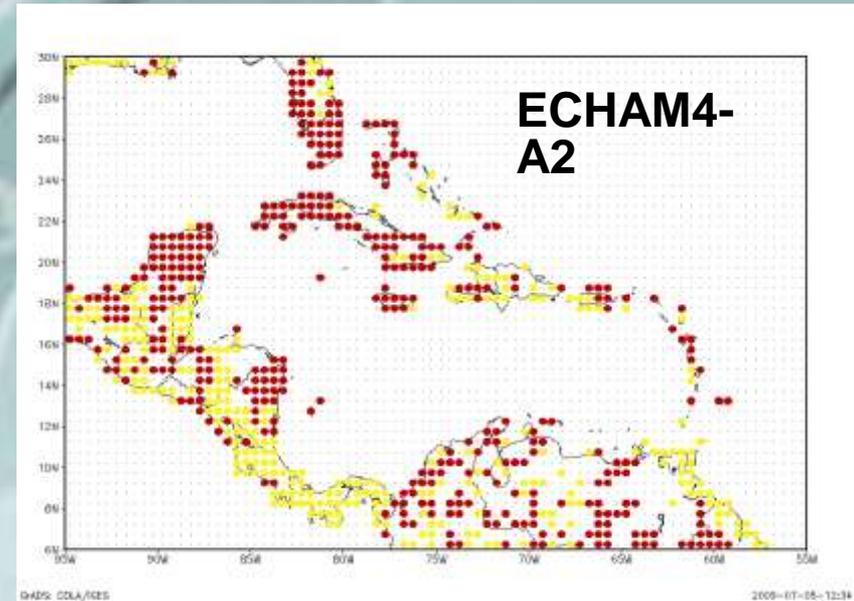
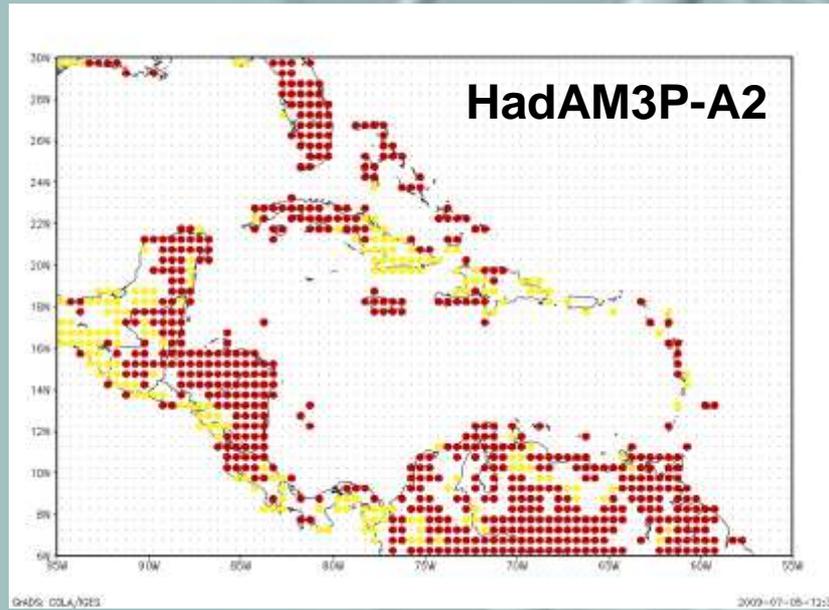
HadCM3



Annual

# Results examples from PRECIS II

## Change in Meteorological Drought occurrence

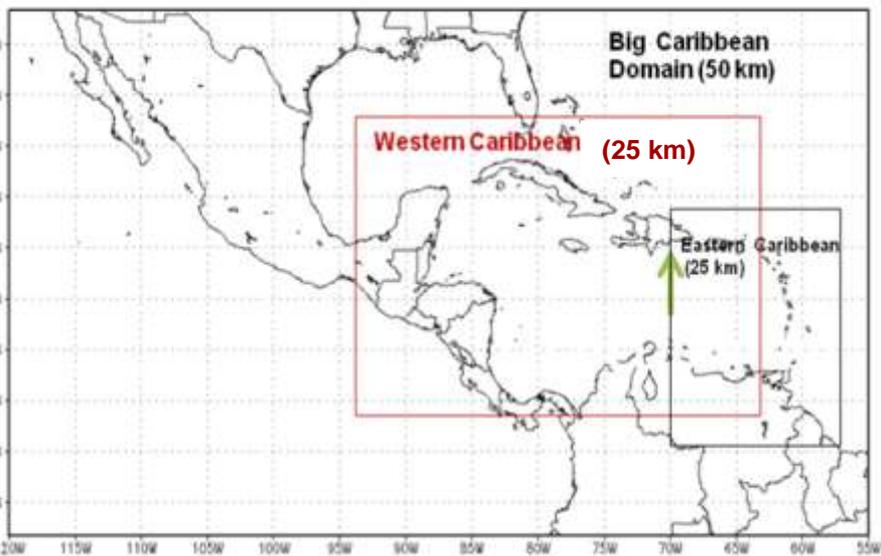


**Red dots:** Increase in the maximum consecutive number of seasons (may-oct or nov-apr) with rainfall lower than normal precipitation (~long term drought)

**Yellow dots:** Increase in the occurrence of an individual season with rainfall lower than normal precipitation (~short term drought)

- These results indicate that short and long term drought will increase the water availability stress;
- These are preliminary results which have been under analysis for research publication. Further results are expected in short term as part of INSMET research project.

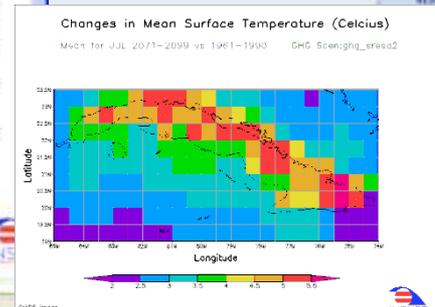
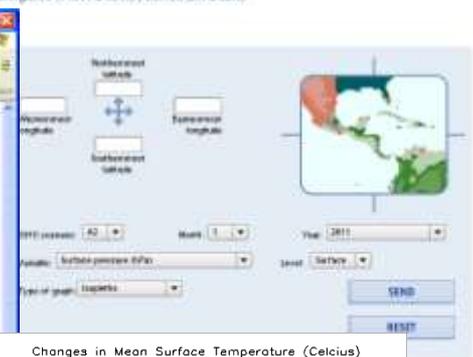
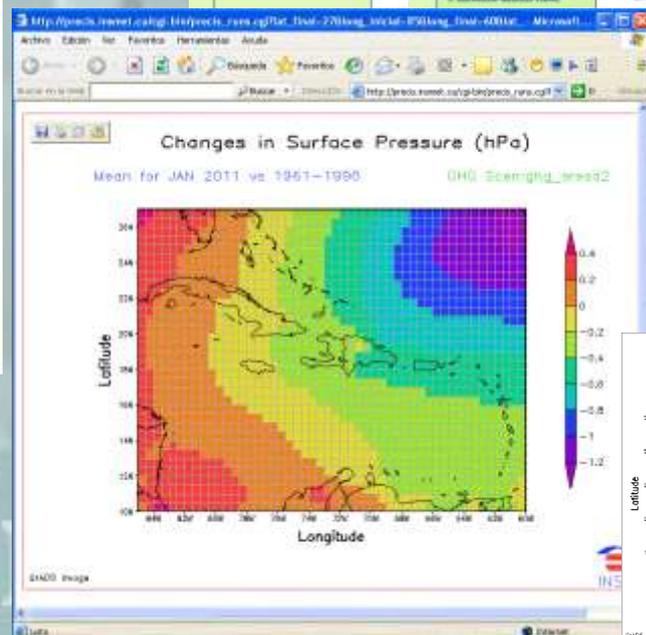
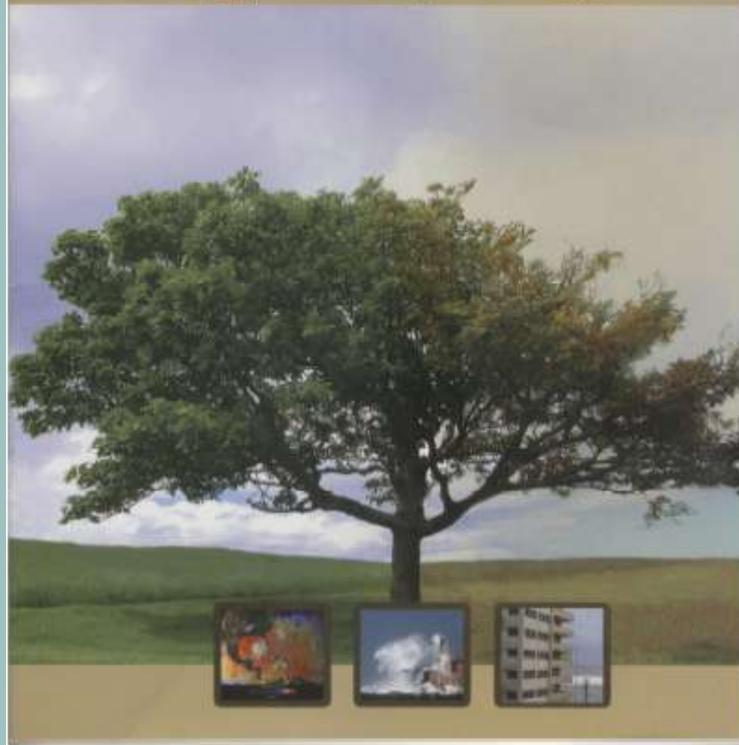
# How many experiments are finished?



| No. | Driving conditions |           | Domain            | Resolution | Period    |
|-----|--------------------|-----------|-------------------|------------|-----------|
|     | GHG Scenario       | LBCs Data |                   |            |           |
| 1   |                    | ERA15     | Big Caribbean     | 50 km      | 1979-1983 |
| 2   |                    | ERA40     | Big Caribbean     | 50 km      | 1979-1993 |
| 3   |                    | HadAM3_H  | Big Caribbean     | 50 km      | 1961-1990 |
| 4   | SRES A2            | HadAM3_H  | Big Caribbean     | 50 km      | 2071-2100 |
| 5   | SRES B2            | HadAM3_H  | Big Caribbean     | 50 km      | 2071-2100 |
| 6   | SRES A2            | ECHAM4    | Big Caribbean     | 50 km      | 1961-2100 |
| 7   | SRES B2            | ECHAM4    | Big Caribbean     | 50 km      | 1961-2100 |
| 8   | SRES A2            | ECHAM4    | Eastern Caribbean | 25 km      | 1961-2100 |
| 9   | SRES B2            | ECHAM4    | Eastern Caribbean | 25 km      | 1961-2100 |
| 10  | SRES A2            | ECHAM4    | Western Caribbean | 25 km      | 1961-2100 |
| 11  | SRES B2            | ECHAM4    | Western Caribbean | 25 km      | 1961-2100 |

# Sharing Results

## Glimpses of the Future A BRIEFING FROM THE PRECIS CARIBBEAN CLIMATE CHANGE PROJECT



PRECIS Acceso en línea

<http://precis.insmet.cu/Precis-Caribe.htm>

Email: [precis.insmet@insmet.cu](mailto:precis.insmet@insmet.cu)

# Pilot Vulnerability Assessments

- Bahamas – Tourism
- Belize – Water Resources (Surface Water)
- Guyana - Agriculture
- Jamaica – Water Resources (Ground Water)
  
- Experiences shared at regional workshops
  - Regional workshop in Guyana on use of agriculture tools for 2 experts per country
  - Using regional expertise (Cuba)

# Workshops

## Workshop on Use of Biophysical Models for Climate Impact Studies in Agriculture

- Objective: Train agricultural professional staff of CARDI
- Funded by UNITAR



**CARIBBEAN REGIONAL TRAINING WORKSHOP ON BIOPHYSICAL MODELS AND CLIMATE CHANGE IMPACT ASSESSMENT ON AGRICULTURE**  
APRIL 14-25, 2008

- Funded by Commonwealth Secretariat, FAO & UNDP's Caribbean Risk Management Initiative (CRMI)

Topics: Biophysical principles, GCMs, PRECIS/HADCM3, MagicC/Scengen, WOFOST (4.1&7.1.2), DSSAT



- Facilitated by staff from INSMET (Cuba)

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# Consultancy Services

- Guyana requested advice on flooding in Georgetown, Guyana
- CCCCC assembled team of meteorologists, hydrologists and emergency management specialists
  - CCCCC, CIMH, University of Louisville, Belize Met. Service
- Consulted with relevant agencies in Guyana
- Team provided government with technical advice including deployment of rain gauges and river gauges

# Collaboration

- Co-sponsored along with GCOS Secretariat the “Meeting on Furthering the Implementation of the GCOS Regional Action Plan for Central America and the Caribbean” held in Belize City, Belize from 28 to 30 January 2008.
- Convened regional and international agencies involved in project development, project implementation and project funding to promote the implementation of the Regional Action Plan

# Project Proposals

- Provision of Additional and Better Upper Air Observations to Climatological Centres
- Creating and Sustaining a Regional Technical Support Centre
- Improving Access to Climate Data in the Region
- An IOCARIBE-GOOS Partnership to Support a Multi-Use Sea Level Observation Network for the Caribbean region
- Adapting to Climate Change: Raising Awareness in Central America and the Caribbean

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# Funding Agencies

- Canada - Announced additional financial support to GCOS
- Caribbean Development Bank – Not interested in supporting observing programmes, but very interested in funding data rescue and data management projects
- World Bank – Funding projects with observing components
- Italy – Interested in projects with regional character through a recognized regional institution

# Data Requirements

- Upper Air and surface weather observations
  - Rainfall rates
- Marine observations
- Hydrological observations
  - Groundwater
- Ecological and phenological observations
- Soil data
- Bathymetry and topography
- Crop Yields

# Other Requirements

- Data Rescue
- Recovery of data
- Data Management

# Opportunities

- Complete implementation of data management projects
  - CLIDATA and CLISOFT
- Strengthen regional data centres in Caribbean and Central America to create authoritative climate data sets
- Coordinate and strengthen sub-regional Climate Outlook Fora
- Assist in establishment of Regional Climate Centre (RCC) for WMO RA IV

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# Special Programme for Adaptation Climate Change (SPACC) 2007 - 2011

**Supports efforts by three island states (Dominica, St. Lucia, and St. Vincent and the Grenadines) to *implement specific pilot adaptation measures addressing the impacts of climate change on biodiversity and land degradation*; thus achieving a high level of integration between these Conventions at a practical field level.**

- 1. Identify, prioritize and evaluate, and design appropriate options and measures that would address biodiversity and land degradation at the community level.**
- 2. Support implementation of selected adaptation measures (on a pilot basis) in seven sites in participating countries to enhance the resilience of insular ecosystems under threat from climate change and land degradation**
- 3. Develop National Sustainable Development Strategy (1 country) which integrates climate change, biodiversity conservation, and land degradation management within national development planning framework.**

# **PROCESS FOR DEVELOPING “CLIMATE PROOF” BUILDING CODES FOR SAINT LUCIA**

**Revision of Hurricane Wind Speed Information developed by Professor Curry et al (Georgia Tech University) by the consultants, International Codes Council (ICC). The hurricane studies developed by Curry et al considered the impact of climate change on the intensity and frequency of hurricane in the Saint Lucia area.**

**Technical translation of the Curry et al study into wind speed adjustment factor for critical buildings by Dr. Peter Vickery, wind expert, working for ICC. An increase in design wind speed of 15% was computed.**

**Development of engineering guidelines by ICC Consultant, Tony Gibbs, based on computed wind speed design.**

**Incorporation of the Engineering Guidelines by the Saint Lucia government into its building codes presently in draft form.**

**Re-design of the planned retrofitting of the Marchand Community Centre in Castries, incorporating the new engineering guidelines. The Marchand Centre serves as a hurricane shelter for residents in that area and as a telecommunication center for the Saint Lucia National Emergency Management Organization (NEMO).**



East Caribbean Financial Holding Co

Parent Company of:  
Bank of Saint Lucia Limited  
Bank of Saint Lucia Interna  
ECFH Global Investment S  
EC Global Insurance Comp  
Mortgage Finance Compan  
Property Holding & Develop

# **ENHANCING CAPACITY FOR ADAPTATION TO CLIMATE CHANGE (ECACC) PROJECT 2007 - 2010**

- **British Overseas Territories: Anguilla, British Virgin Islands, Cayman Islands, Montserrat, Turks and Caicos**
- **Development and implementation of Public education and outreach (PEO) programmes**
- **Enhance national capacities to undertake environmental monitoring, vulnerability and risk assessments in key environment and socio-economic sectors**
- **Development and implementation of national climate change strategies and action plans**
- **Development of effective mechanisms for sharing information and experience**

# **IDB Projects**

- **TOWARDS A REGIONAL OPERATIONAL FRAMEWORK FOR AN INTEGRATED OBSERVING NETWORK FOR ENVIRONMENTAL CHANGE IN THE WIDER CARIBBEAN REGION**
- **CARBON NEUTRAL TOURISM IN THE CARIBBEAN**

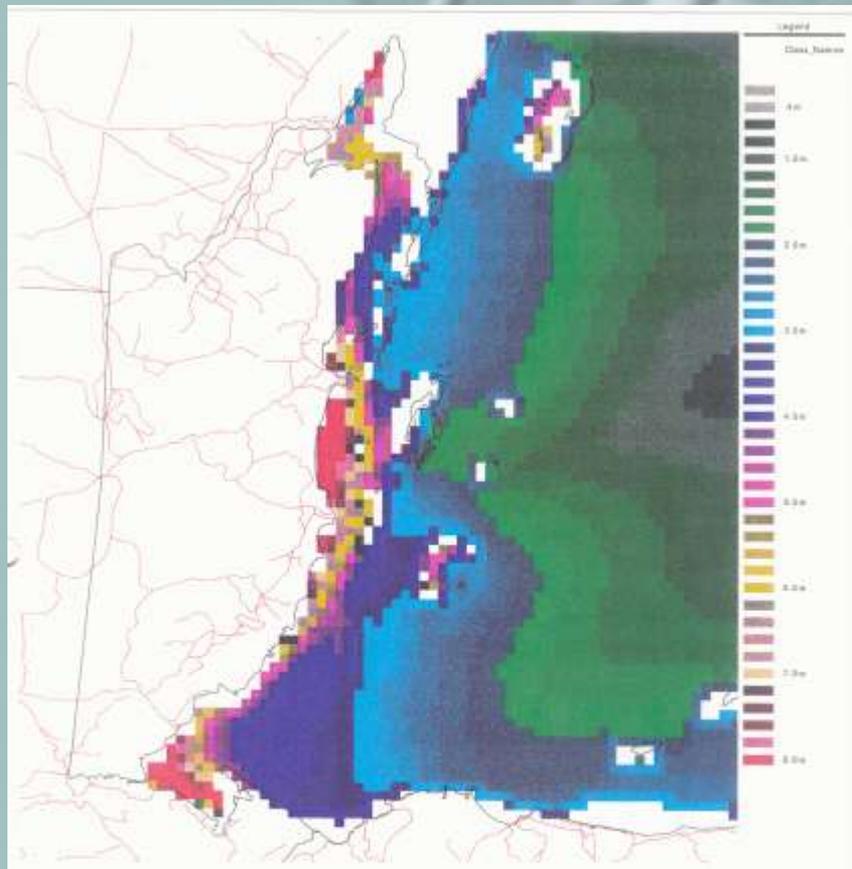
# Storm Surge



The COMET Program

# Caricom Climate Change Centre

# Wind and Storm Surge Hazard Maps

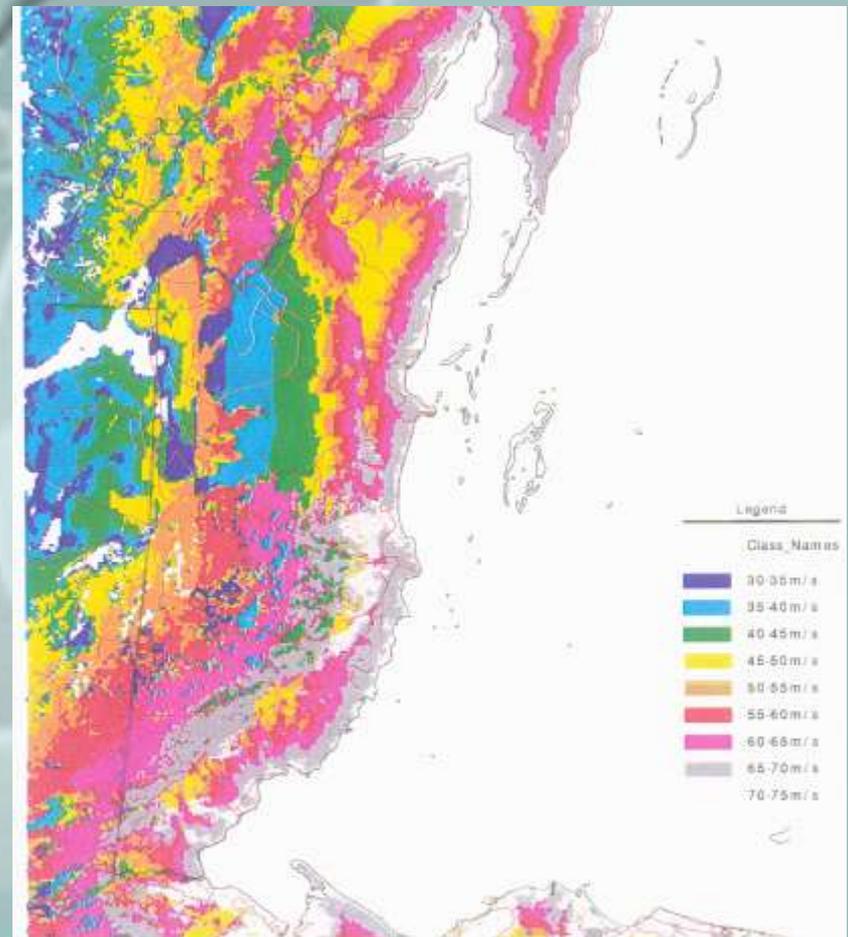


**Category 5 Storm Surge (wind 72 m/s, 910mb, westbound @5m/s)**

Storm Surge from TAOS Version 1.5, 4km/cell regional model. Values include wind setup, pressure setup, and wave setup. Steep unprotected shorelines may experience high direct wave action.

Caribbean Disaster Mitigation Project  
Belize Coastal Hazard Assessment  
Organization of American States  
US Agency for International Development

Scale  
0 5 Kilometers  
Projection: UTM-17 N  
Base Map: US OMA Digital Chart of the World Version 1.0



**Wind Speeds from Category 5 Hurricane**

Caribbean Disaster Mitigation Project  
Belize Coastal Hazard Assessment  
Organization of American States  
US Agency for International Development

Scale  
0 5 Kilometers  
Base Map: US OMA Digital Chart of the World Version 1.0



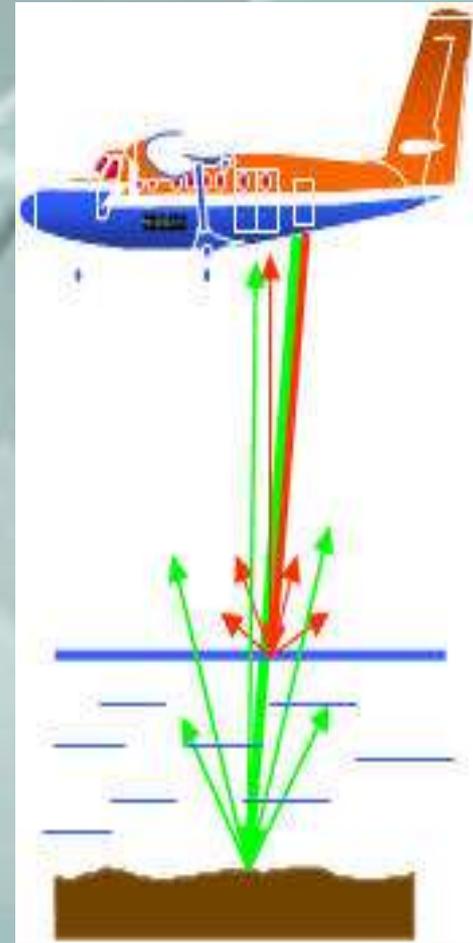


# CHALLENGES

- Lack of high resolution topographic and bathymetric data
  - In most Member States topographic charts are at the 20 metre contour resolution
  - Most Member States are using maritime charts based on old British Admiralty Charts derived from bathymetry done in the 1950s

# Opportunity

- Develop regional mobile LIDAR capacity
- Bathymetry and topography
- Land use
- Utilizing regional expertise
- Access to laboratories
- Funding required to procure hardware and design mounting system



# INFORMATION AND EARLY WARNING-RELATED PROJECTS

- Develop Early Warning Regional Drought Forecast Model
- Develop Climate Change Sectoral Impact Models
- Clearing-house for Climate Change information in the Caribbean
- Modeling of sea level rise in the Caribbean, east-west

# Collaboration with Pacific

- Dialogue initiated (2001-2004) with the South Pacific Regional Environment Programme (SPREP) and the Pacific Islands Climate Change Assistance Programme (PICCAP) for collaboration on issues related to climate change:
- Led to successful launch of a Master's Programme in Climate Change at University of the West Indies (UWI) utilizing syllabus from University of South Pacific: now in its 6<sup>th</sup> year
- Collaboration continuing through UNDP
  - Pacific ISDR Platform
  - Training for meteorological personnel
- New UNDP project for South/South collaboration underway
- MOU between SPREP and CCCCC to be signed shortly

# Collaboration

- GCOS – “Meeting on Furthering the Implementation of the GCOS Regional Action Plan for Central America and the Caribbean” Belize 28 - 30 January 2008
- UNFCCC – CGE Meeting (2006) & Technical Workshop on Funding for Technology Projects for LAC (May 2010), Belize
- Engineers Canada (WFEO) - Workshop on Infrastructure Climate Risk Assessment, March 23, 2010, Recife, Brazil
- International Tourism Board - Panel Session on Climate Change and the Cruise Industry, Berlin March 11, 2010
- IPCC Workshop On Scientific Writing for SIDS – Belize 27-29 April 2011

# Climate Activities

- Installation of tide gauges and automatic weather stations
- Installation of CORS
- Installation of CREWS
- Downscaling of GCMs
- Hosting of Regional GCOS meeting
- Development of regional Clearinghouse
- Development of regional Data Management System
- Hosting IPCC Workshop on Scientific Writing for SIDS
- Installation of weather stations for CARDI
- Installation of weather stations for Guyana
- Development of regional LIDAR capacity

# Contact Information

- Caribbean Community Climate Change Centre (CCCCC), Lawrence Nicholas Building, PO Box 563, Ring Road, Belmopan, Belize
- [www.caribbeanclimate.bz](http://www.caribbeanclimate.bz)
- [cfuller@caribbeanclimate.bz](mailto:cfuller@caribbeanclimate.bz)
- [cfuller@btl.net](mailto:cfuller@btl.net)

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