

# ***CARIWIG Case Study Report***

# **Barbados Coastal Protection**

## Coastal Zone Management Unit

*Dr. Lorna Inniss*  
*Lisa Bartlett*



# Aim and objectives

- To assess the utility of the Regional Climate Model, Weather Generator and Tropical Storm Model in coastal protection and risk management.
- To compare the model outputs with those used in coastal management;
- To check the datasets generated against those for other models



# Which tools were used?

## How & why?

- **Regional Climate Model:** Will be used to validate trends in local climate observed at two weather stations (Husbands and Grantley Adams International Airport) and to predict future climate scenarios.
  - Values simulated from a single 25km grid square (area average)
- **Weather Generator:** Will be calibrated on observed daily data for a baseline period (1980-2010) and will be used to correct for biases in the Regional Climate Model.
- **Tropical Storm Model:** Used to generate 'what if' scenarios of historical storms at various categories and forward moving speeds.

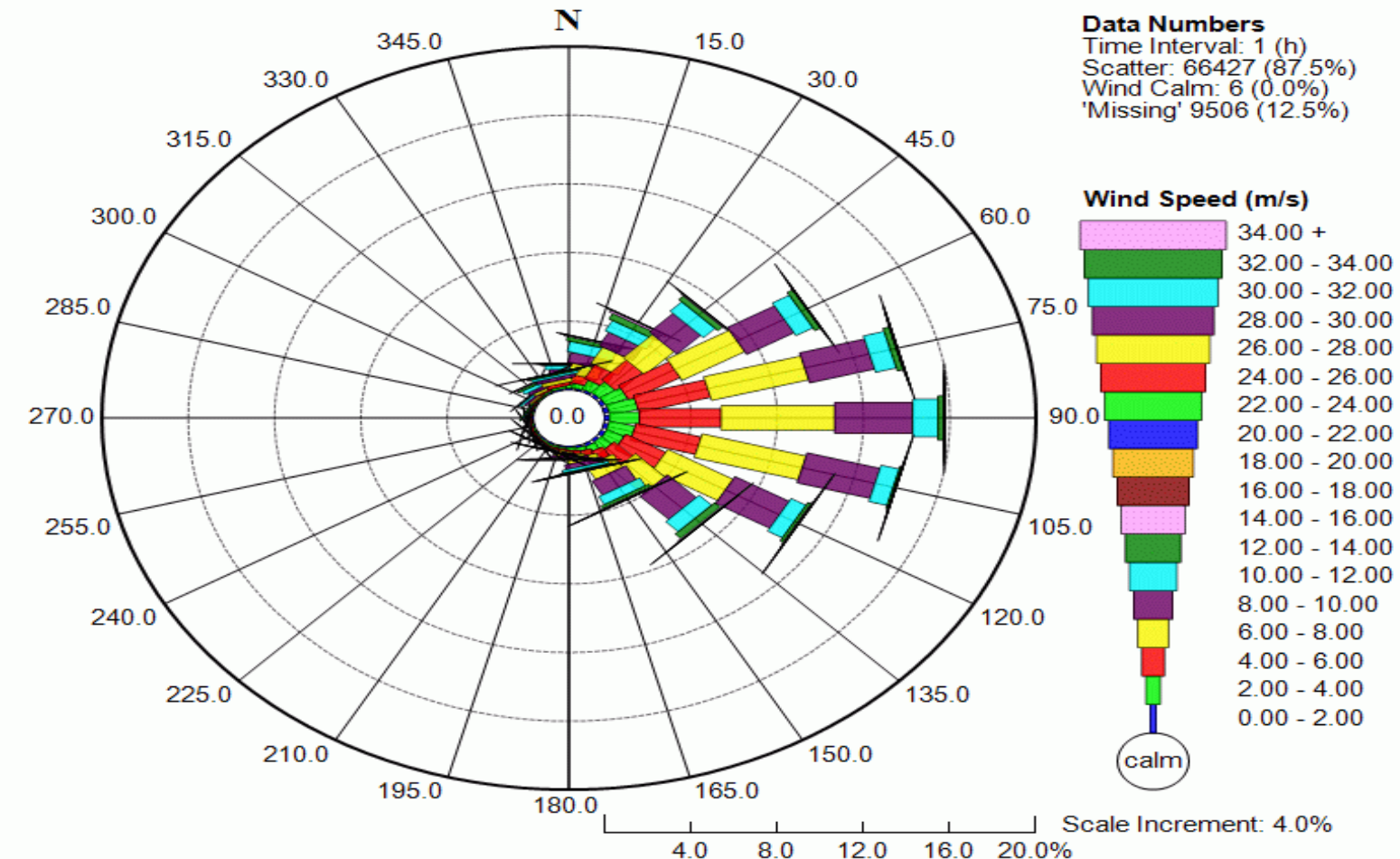


# The findings

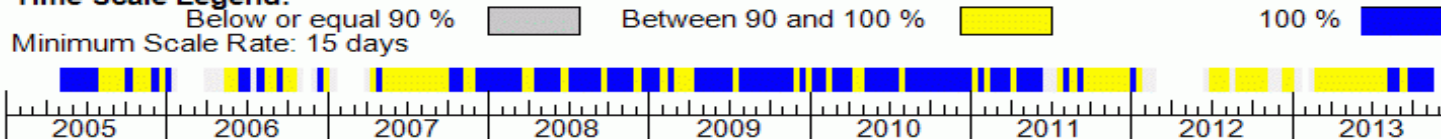
- Normal thresholds for wind speed and direction need to be determined.
  - Using observed data, determine the annual frequency of threshold exceedance. (Preliminary analysis shows this will be during the winter season)
- Outputs of RCM and WG will be compared with observed wind speed.
- Outputs of RCM will be compared with observed wind direction.
- We plan to use projections from RCM and WG to make qualitative inferences on potential effects of future changes in wind climate.



# Wind Rose



## Time Scale Legend:



**Selected Data:** 03 May 2005 08PM to 31 Dec 2013 10PM

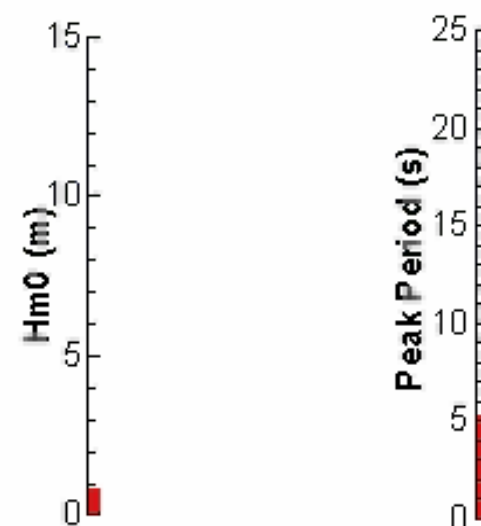
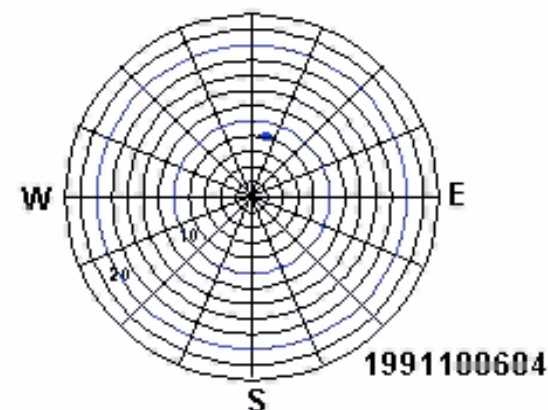
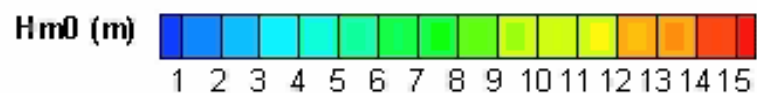
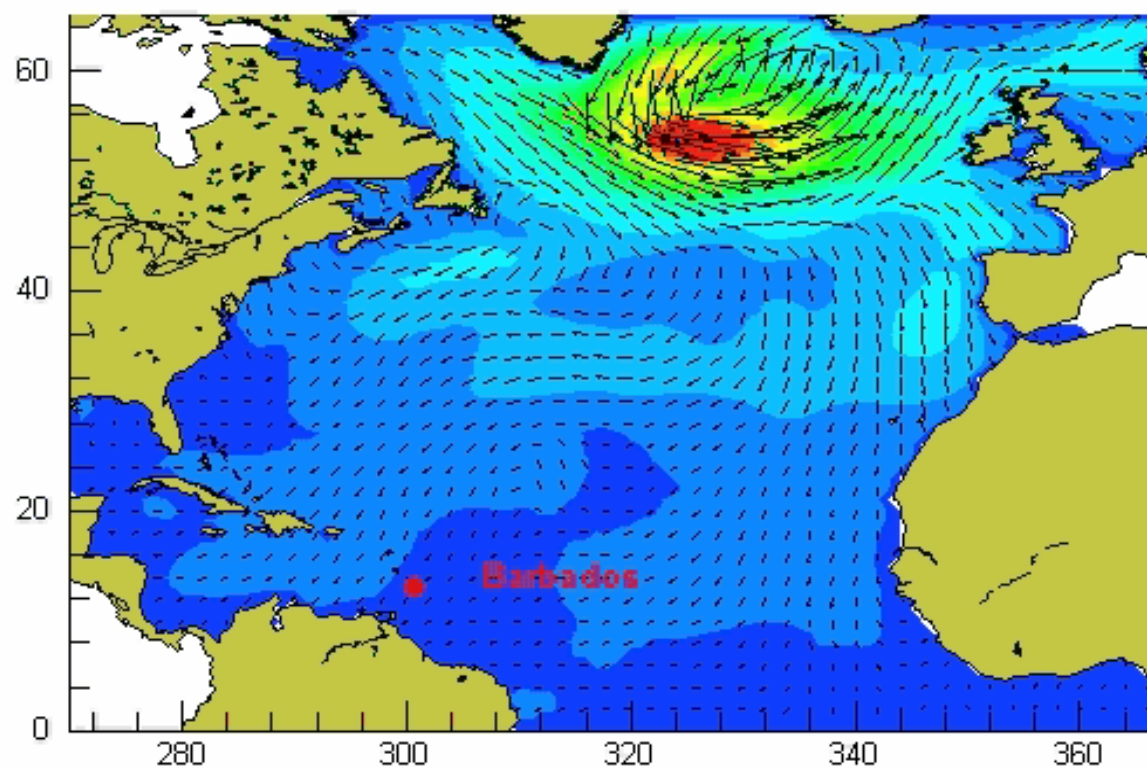
**Calm Wind Conditions:** Wind speed = 0.0 m/s

**Source File:** C:\Projects\caymans\Metoccean\Hindcast\Old\Buoy\BUOY-42056.bts

Entire Range: 03 May 2005 08PM to 31 Dec 2013 10PM

Variables: WSPD WDIR

## Wave climate at Barbados



# Use of Wind Data

- Wind data used to hindcast wave climate - period, height, direction and duration of locally generated waves
- Forecast nearshore impact of distantly generated waves
- Based on the two above plus bathymetry and sediment transport, design shoreline stabilization structures to withstand ambient wave climate



# Implications for policy & planning

- If we take the results as is, then local geographic distinctions in vulnerability are not possible using the models;
  - Coastal policy and plan must be island-wide;
  - Disaster risk management planning may be sectoral, but not
  - Early warning cannot be on a local scale;
  - No improvement in warnings of impending high sea level;





# Feedback on the tools

- Neither Regional Climate Model or Weather Generator provides projections of sea level rise, storm surge or near-shore waves
  - Variables we are most interested in.
  - Models currently do not have the scope for these aspects.
- Tropical Storm Model
  - Variable wind speed vs time does not show much variation over island no matter forward moving speed as island is very small.
  - Wind vs time is however important in determining wave climate during extreme events.



# What more could be done?

- Any further downscaling possible?
- Possible links with nearshore wave climate model
  - Match observed wind speed and direction to observed wave heights and direction
  - Possible distinction in waves by coast?
  - Identification of island 'hotspots' for DRM and CCA planning (areas more prone to high waves consistently due to wind at that location)

