

# Pacific Climate Change Science Program

## Greenhouse 2011 Conference: Tropical Cyclone Wind Hazard Projections for the Western Pacific

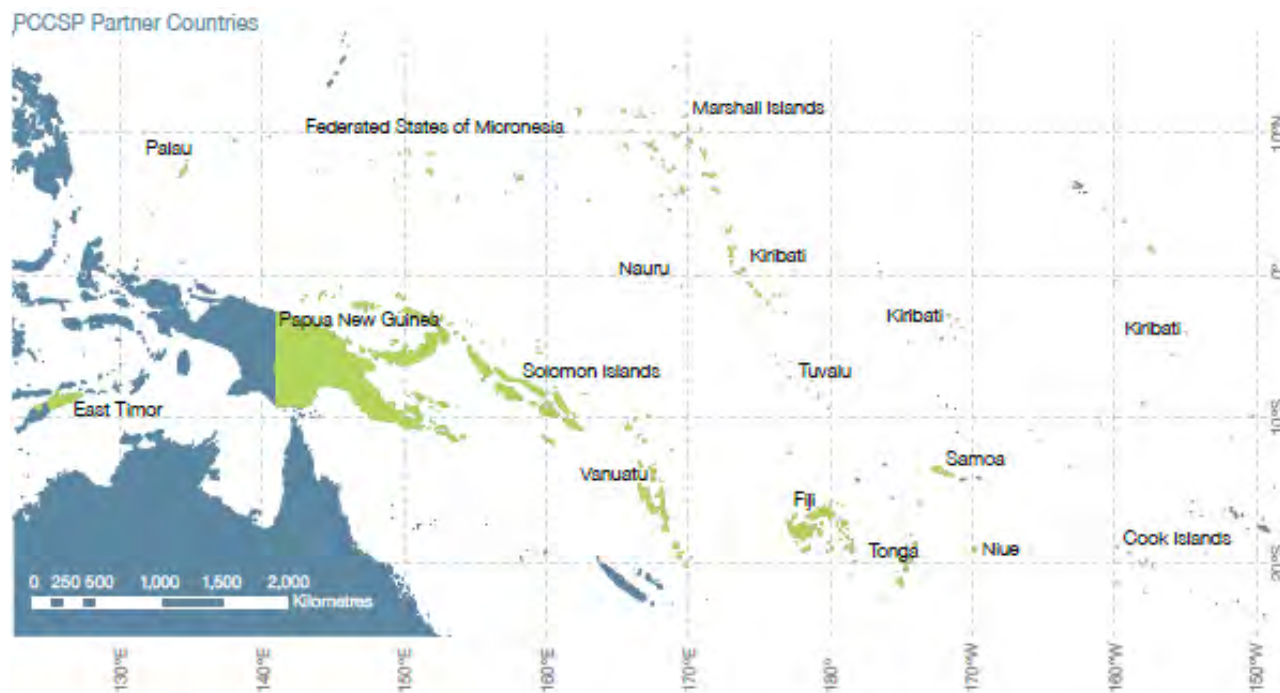
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Geoscience Australia



**Australian Government**

# Introduction

- The PCCSP partner countries are highly exposed to hazards produced by tropical cyclones including extreme wind, flooding, landslides and storm surge.



# Motivation

- To inform climate adaptation, these countries will require a detailed understanding of the hazard posed by tropical cyclones in the current climate as well as projections of how this hazard may change in the future.
- Unfortunately, there have been relatively few previous studies to estimate even the current climate hazard from tropical cyclones in this region:
  - 2003: Cyclonic wind risk assessed for Port Vila, Vanuatu (Shorten et al., 2003)
  - 2004: Tuvalu storm surge modelling (SOPAC Technical Report 380, 2005)
  - 2007: Natural hazard assessment for Asia-Pacific region including cursory cyclonic wind assessment (Internal AusAID document)



# Goal

- For the PCCSP, Geoscience Australia will provide the first detailed cyclonic wind hazard assessment for the 15 partner countries.
- Cyclonic wind hazard will be estimated for both the current climate and for the future climate under an A2-emissions scenario



# Context

## PCCSP Components:

1. Recent and current climate and trends
2. Climate drivers
3. Climate projections -> CSIRO -> GA
4. Ocean processes
5. Communication



# So how do we estimate the wind hazard from tropical cyclones?

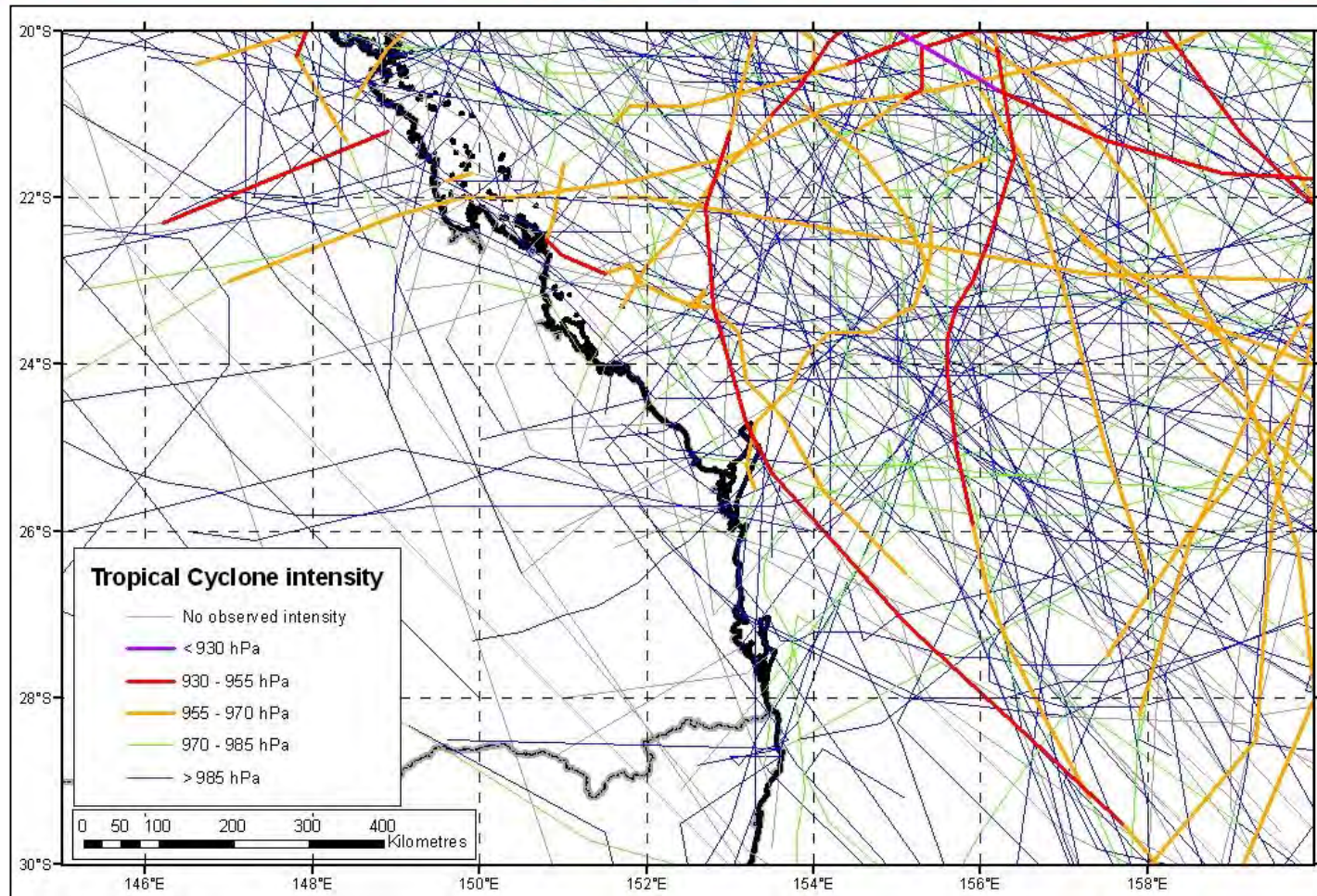
## Hurdles to overcome:

- Only 30 years of reliable historical track data
- High variability
- Intense tropical cyclones are rare events





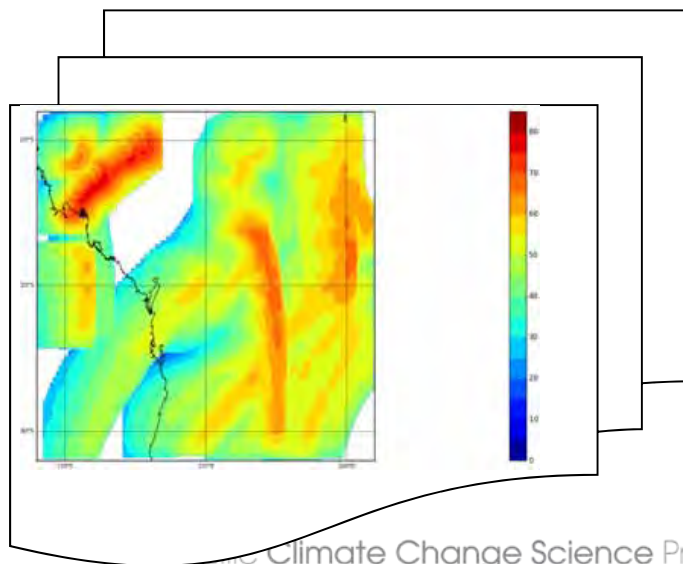
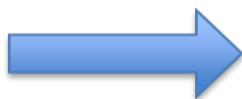
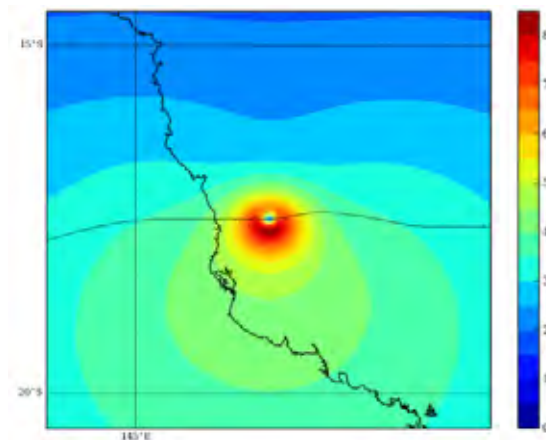
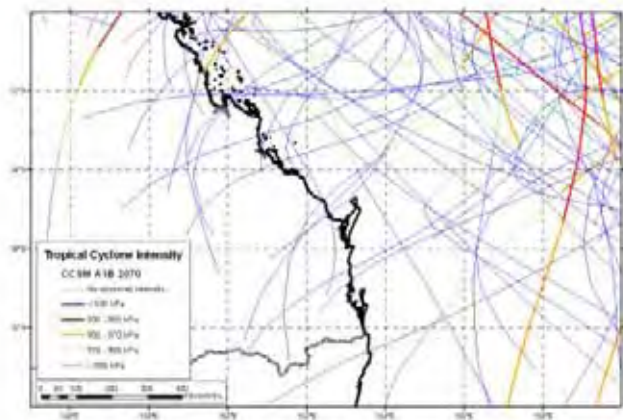
# Historical track record



Source: <http://www.bom.gov.au/weather/cyclone/tc-history.shtml>

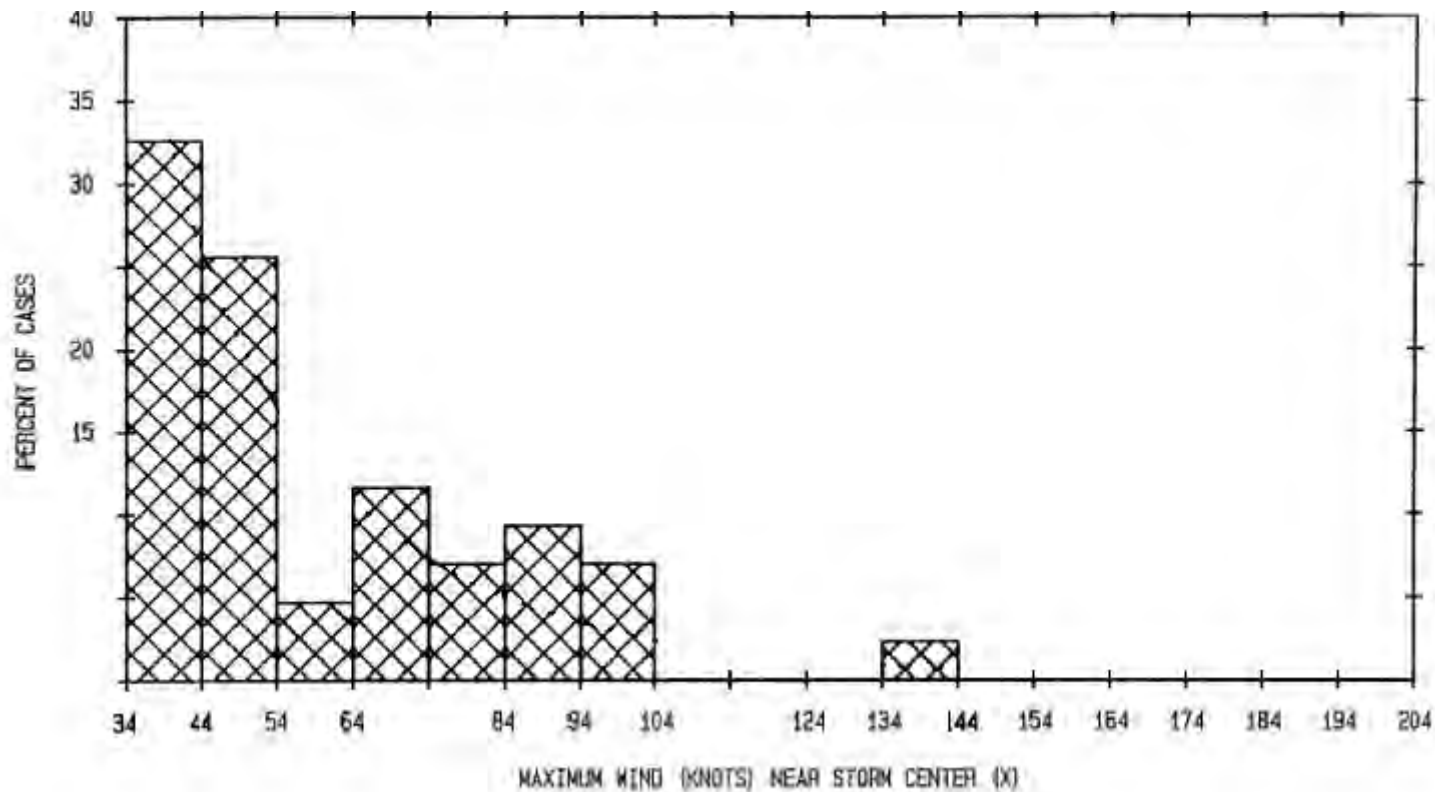


# Hazard estimation – TCRM

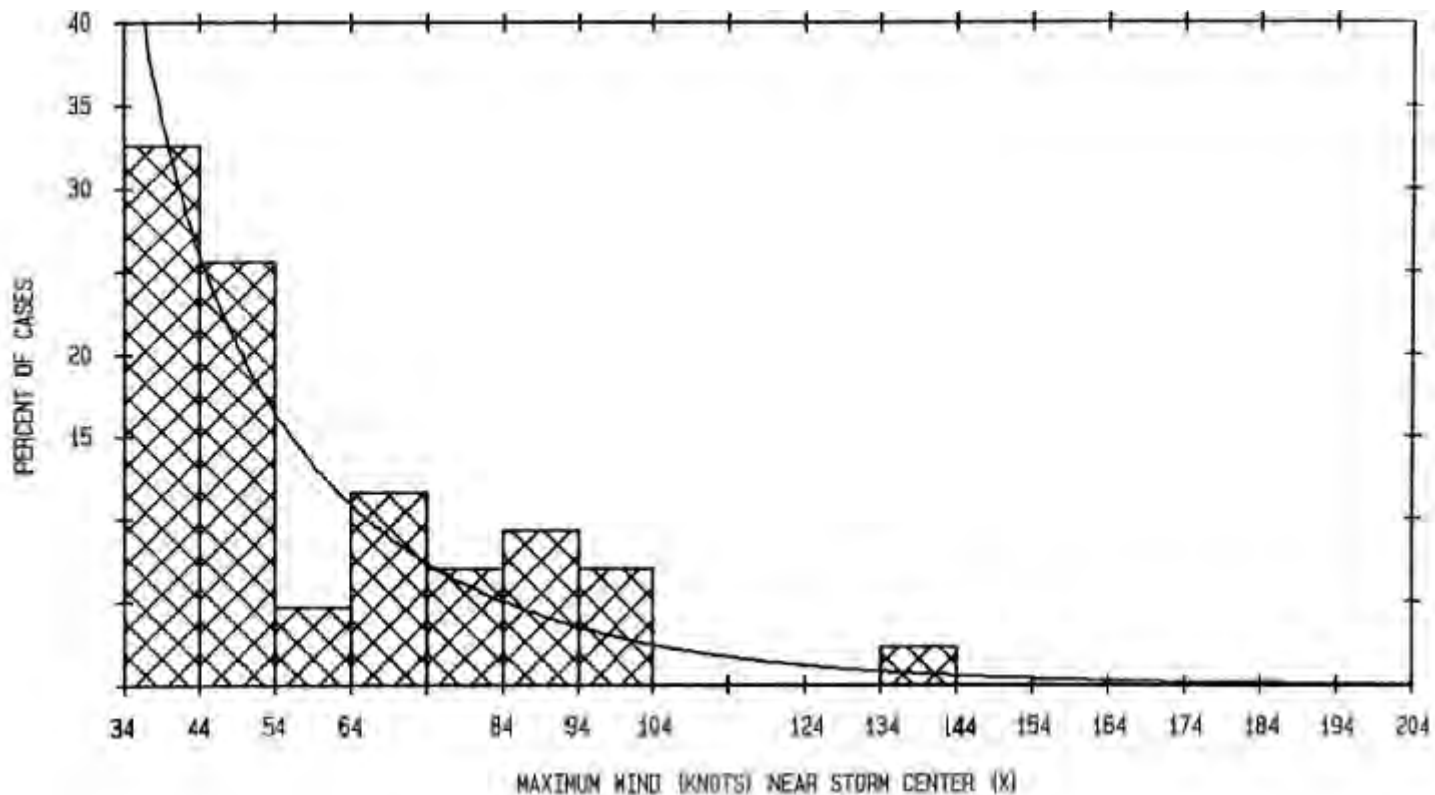




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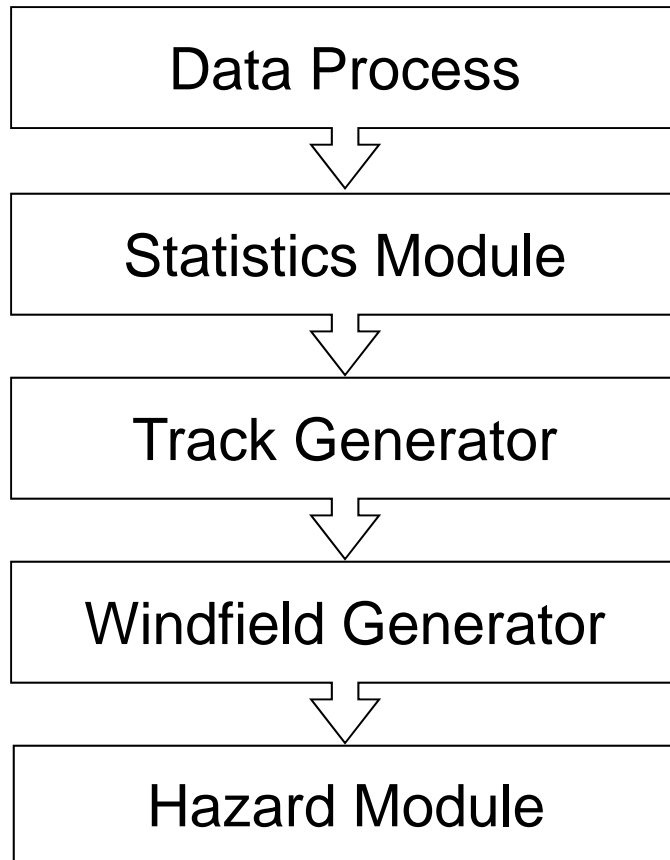


# Tropical Cyclone Risk Model

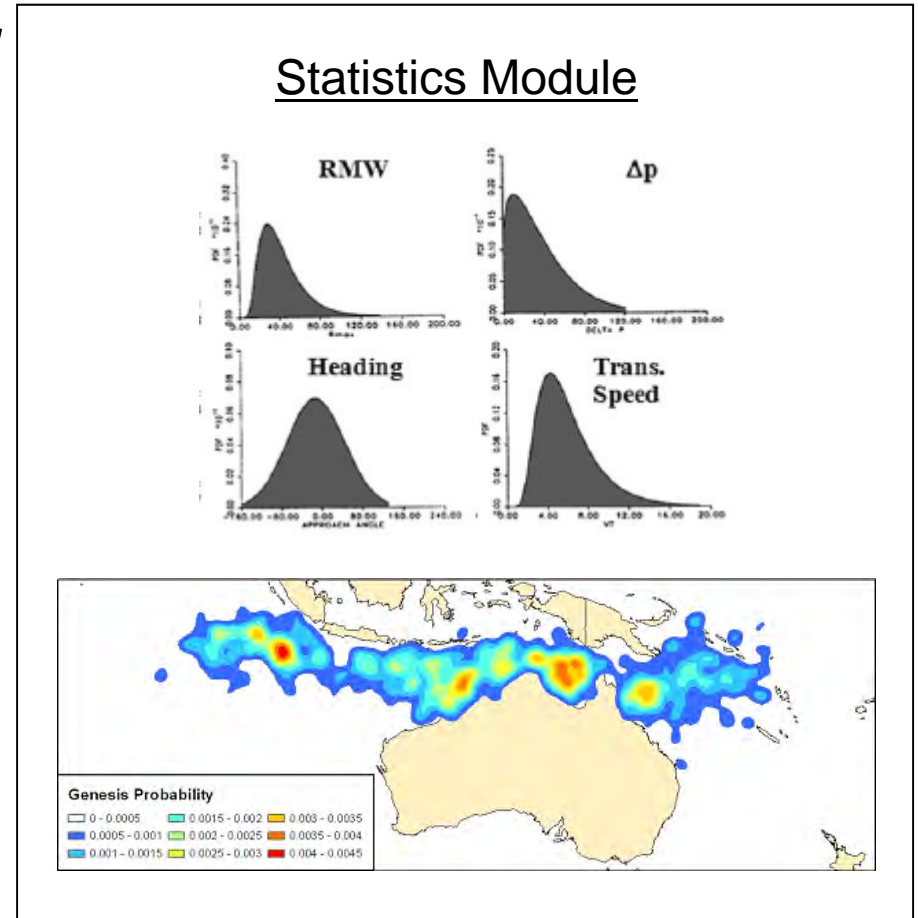
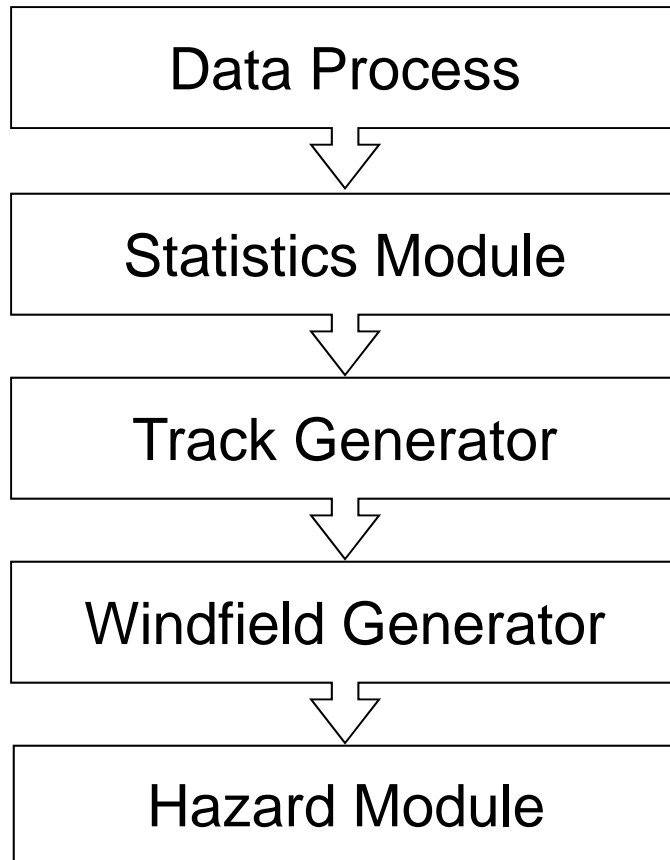
- The Tropical Cyclone Risk Model (TCRM) is a tool developed by Geoscience Australia for investigating the extreme wind hazard from tropical cyclones.



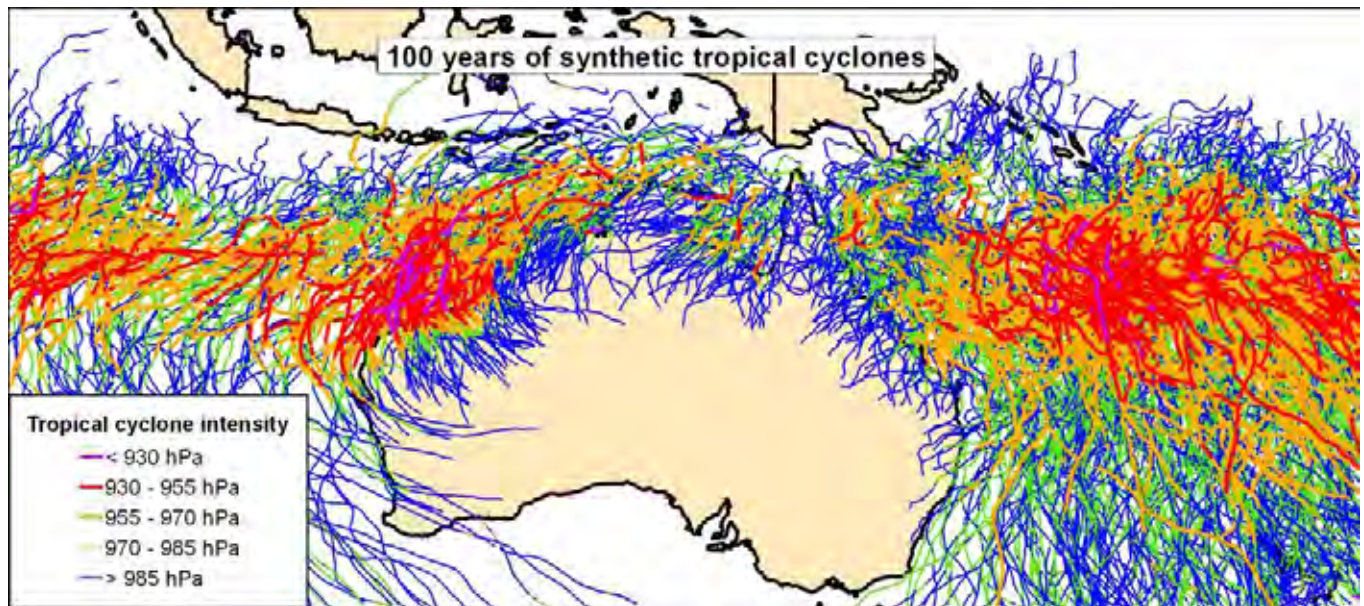
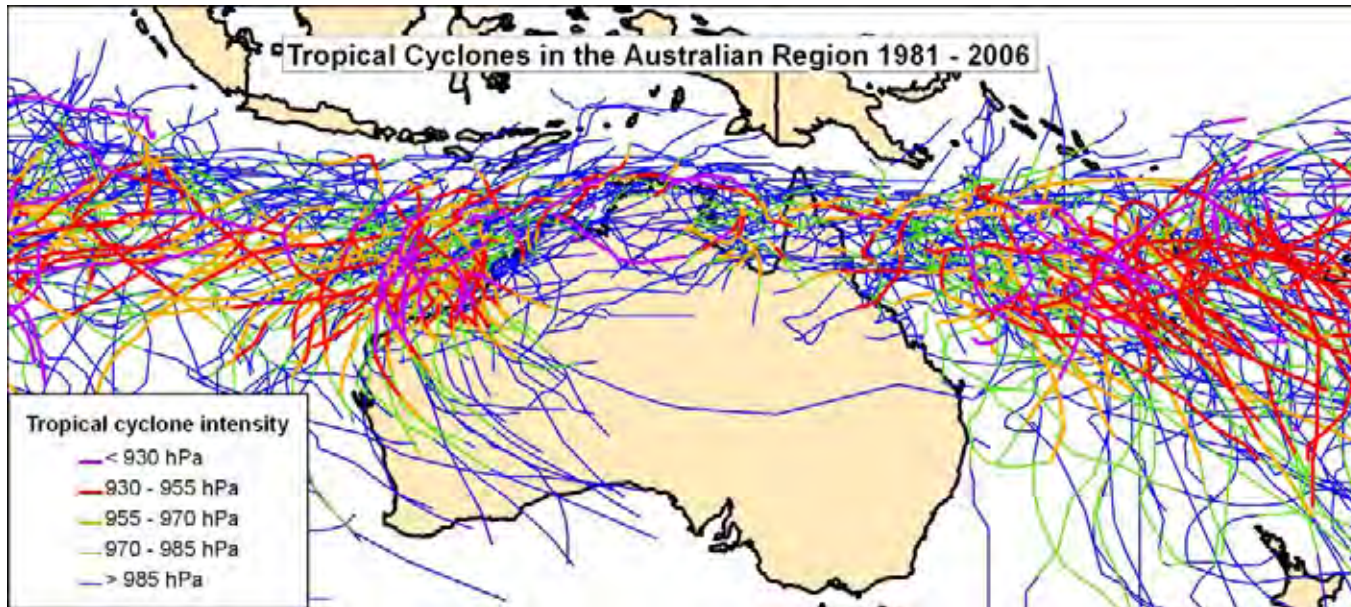
# Tropical Cyclone Risk Model



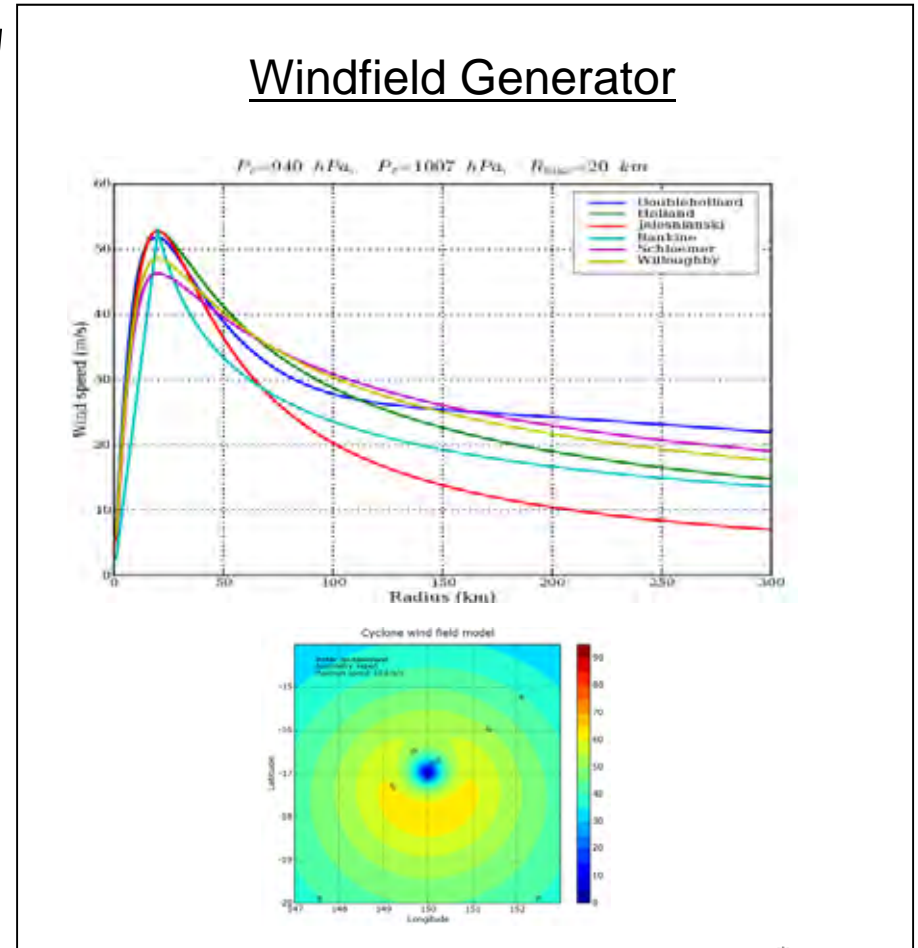
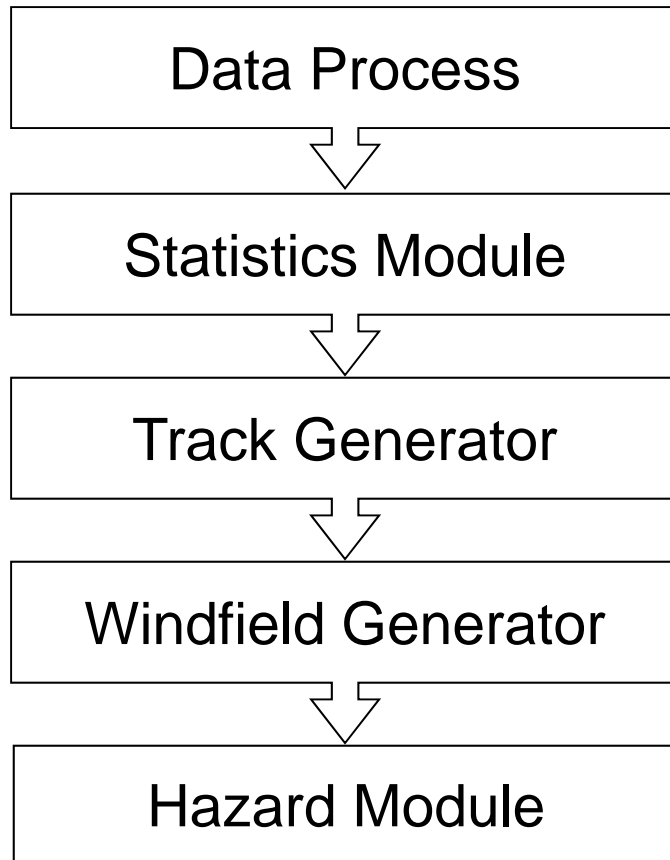
# Tropical Cyclone Risk Model





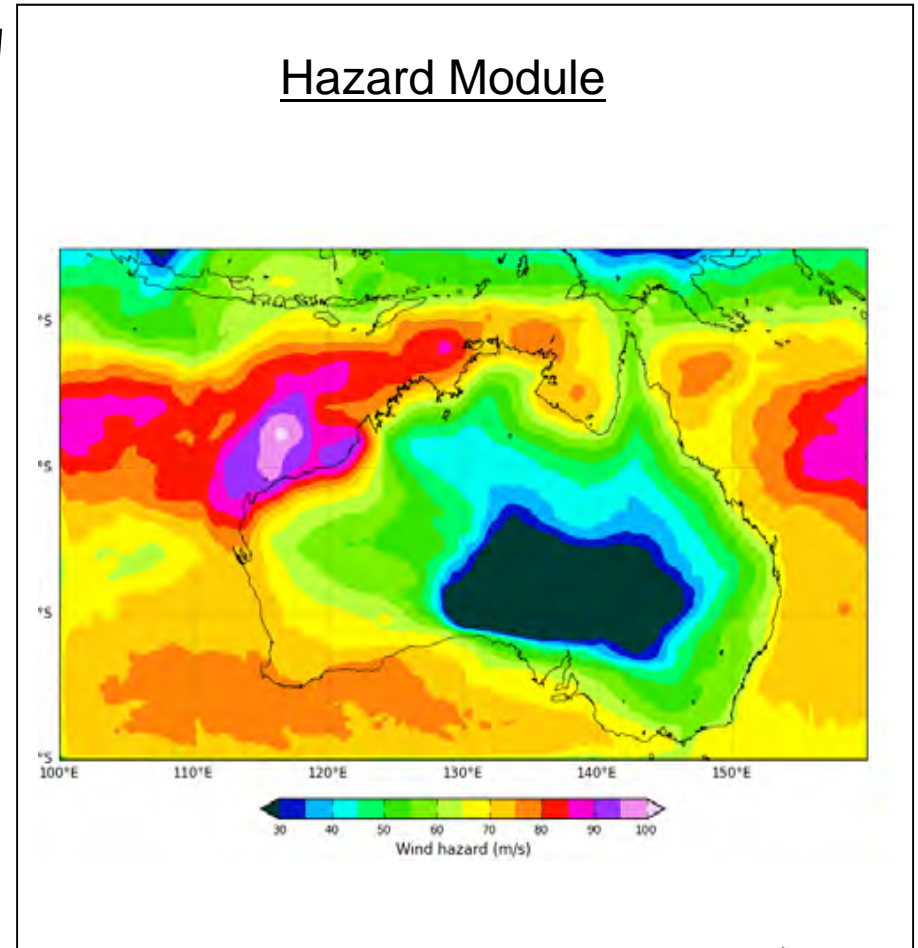
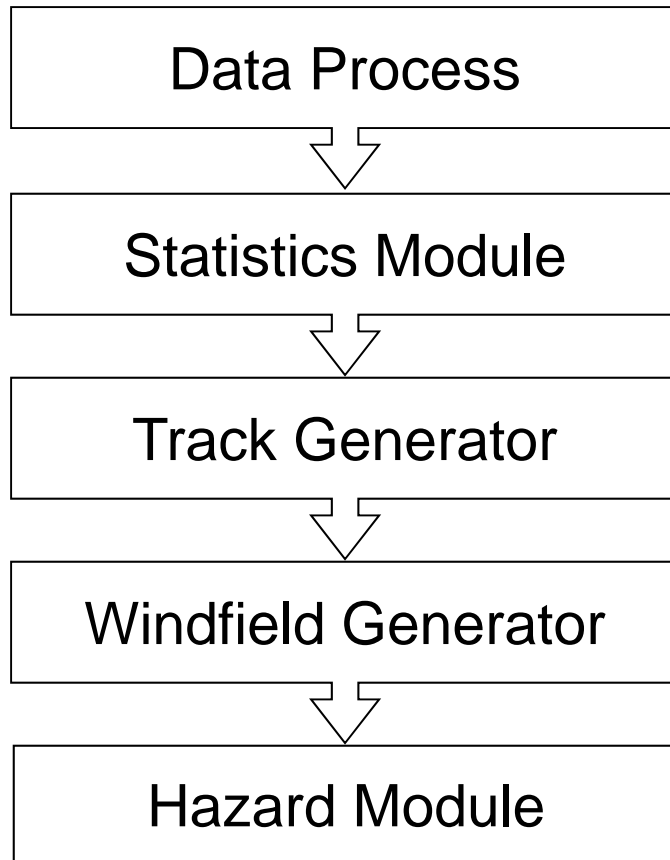


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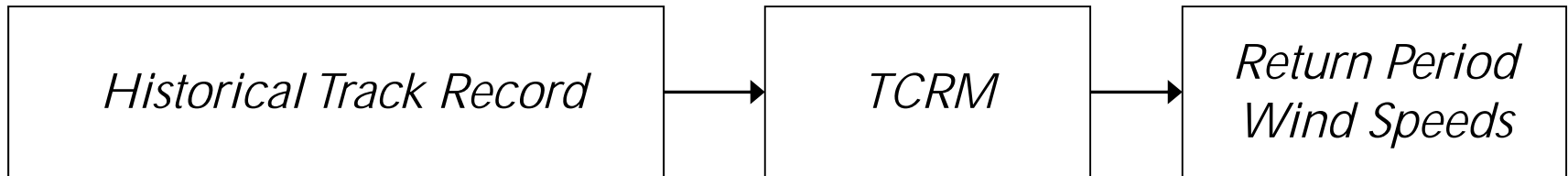




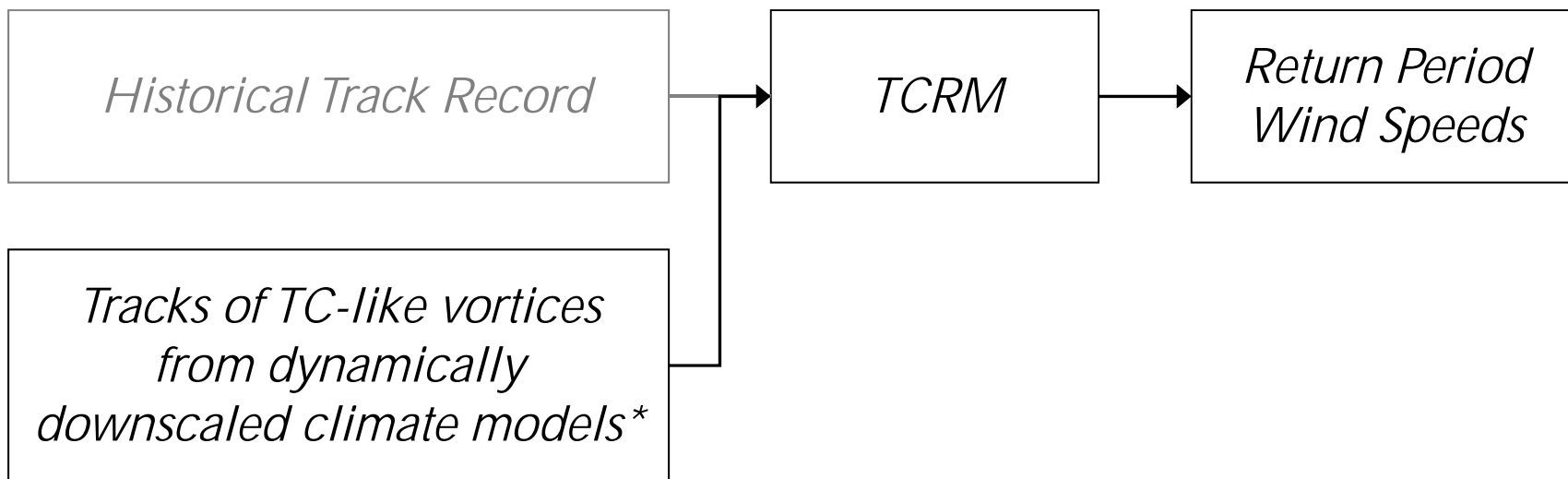
# Tropical Cyclone Risk Model



# Cyclonic Wind Hazard Projections



# Cyclonic Wind Hazard Projections



\* A2 climate scenario. GCMS: ECHAM, MIROC, GFDL-MR, GFDL-HR, UKHAD



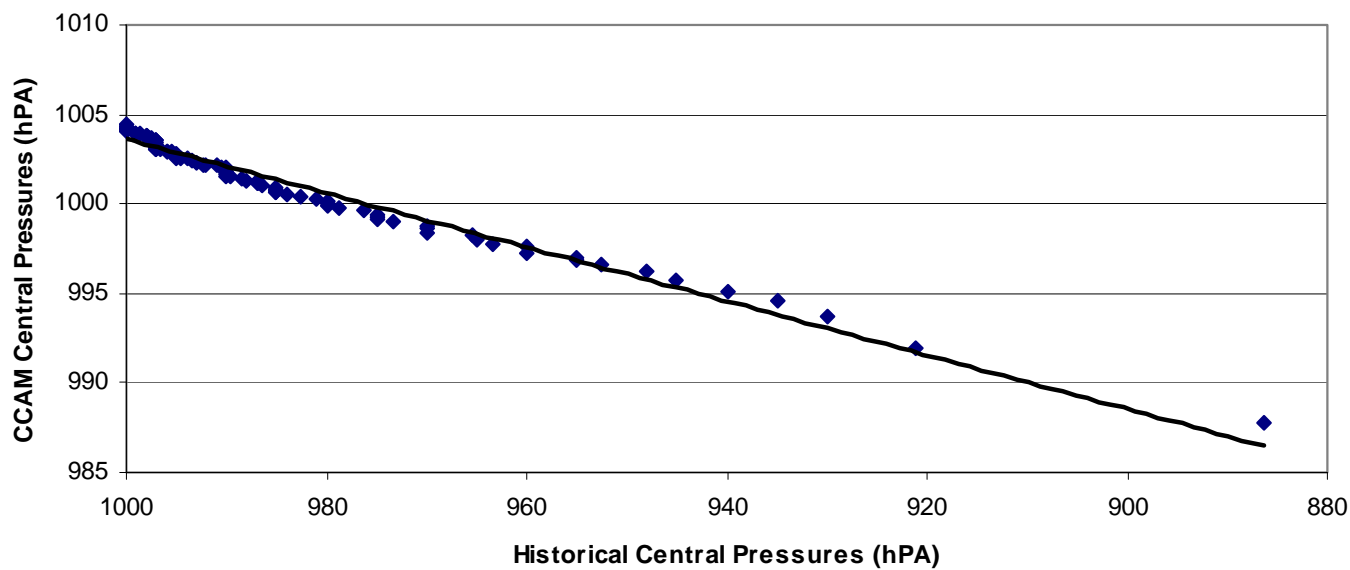


# Cyclonic Wind Hazard Projections

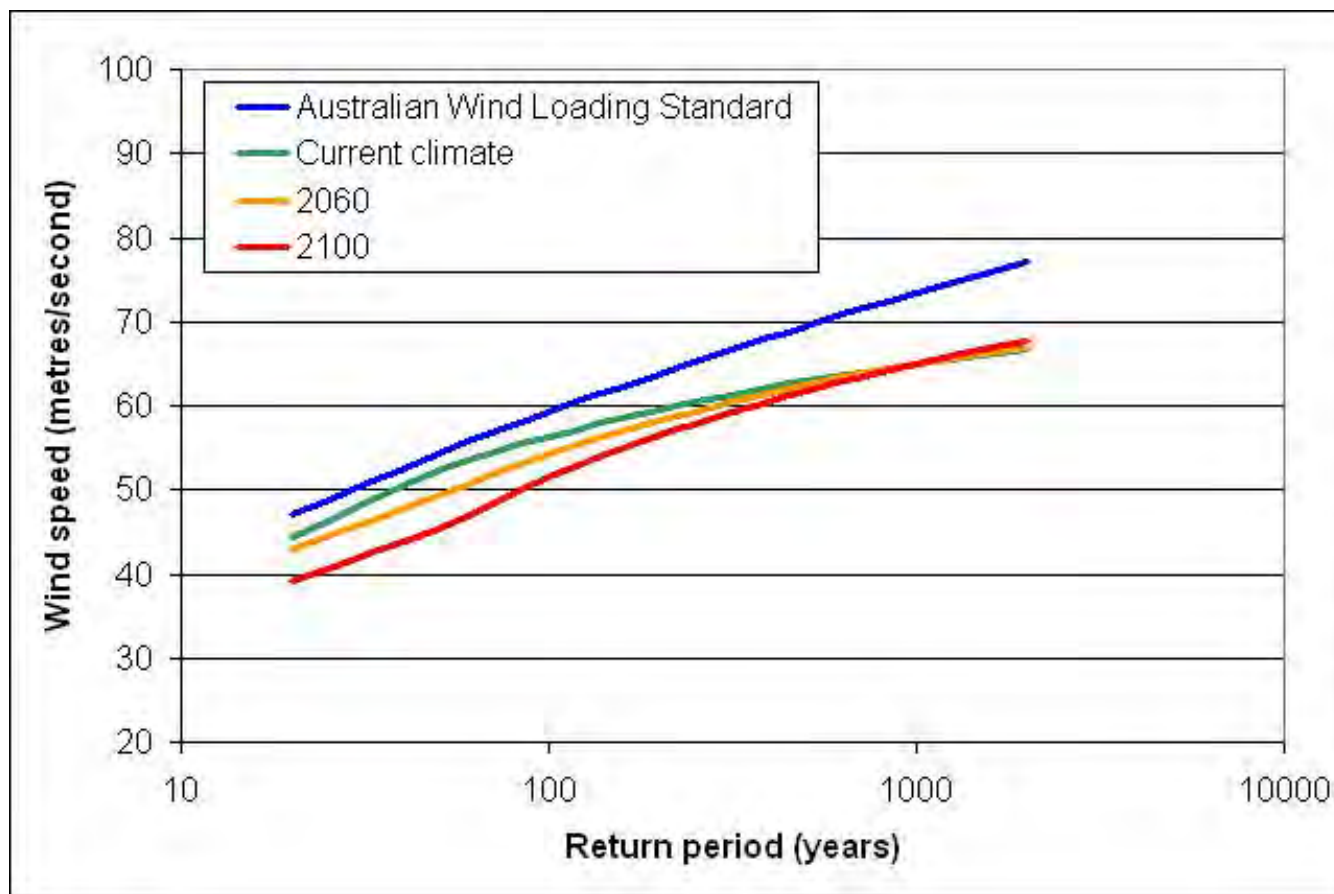
- Storm frequency set to historical average for current climate simulation. Frequency then scaled for future climate simulations in proportion to the relative numbers of downscaled storm tracks.



# Scaling Central Pressure

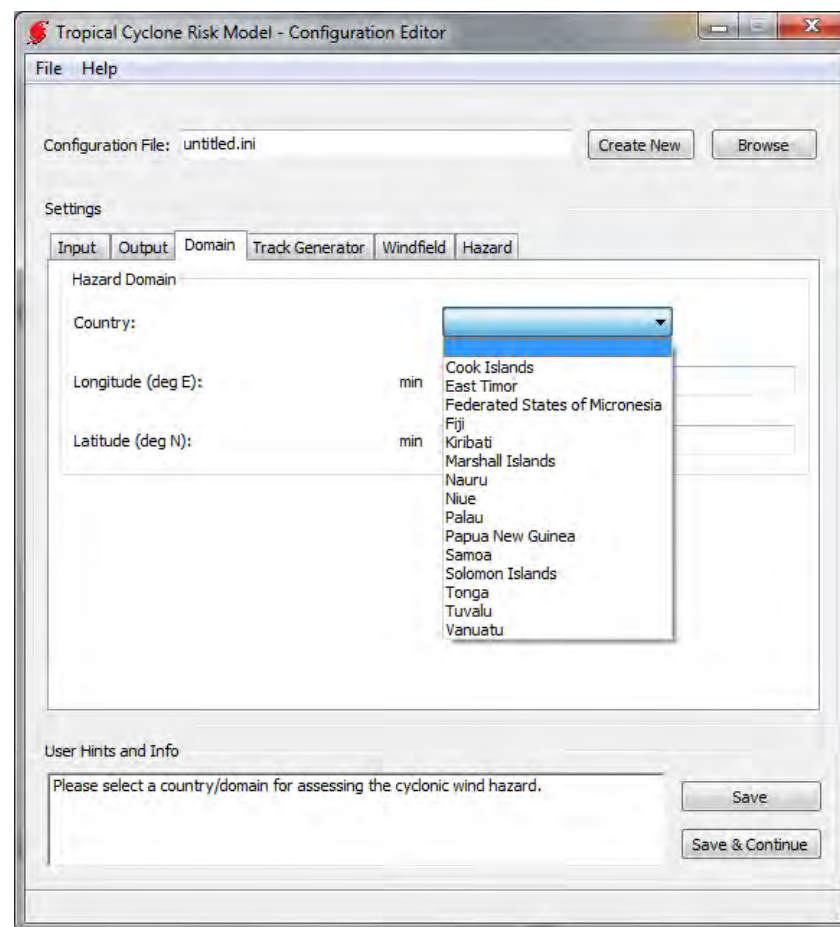


# Example Cyclonic Hazard Projections



# Future Directions

- TCRM will be released as open source software later in the year
- Training workshops will be held for representatives from the PCCSP partner countries on using TCRM
- A graphical user interface has also been developed to make this process more user friendly



# Thanks!

