Assessing the risk of hypothetical windstorms

University of Bath SAMBa ITT 2019

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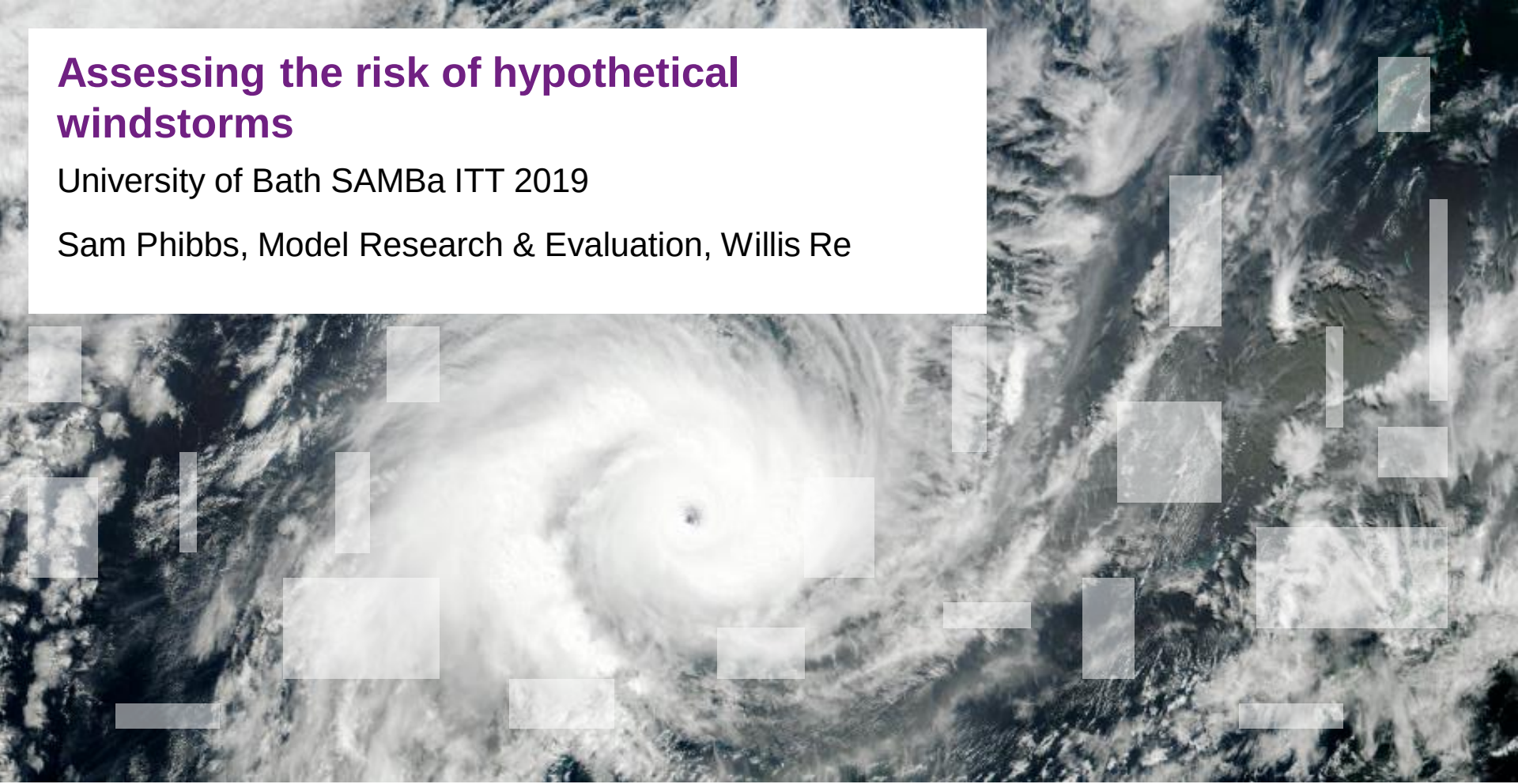
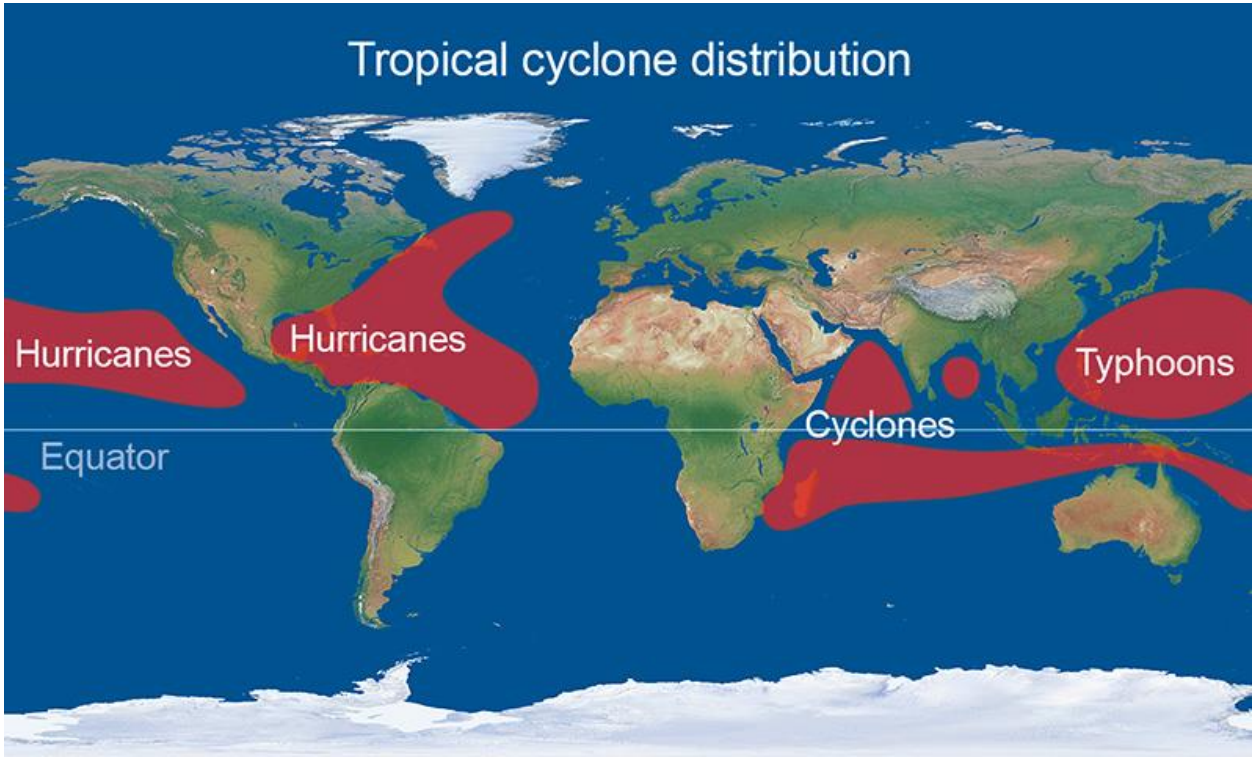


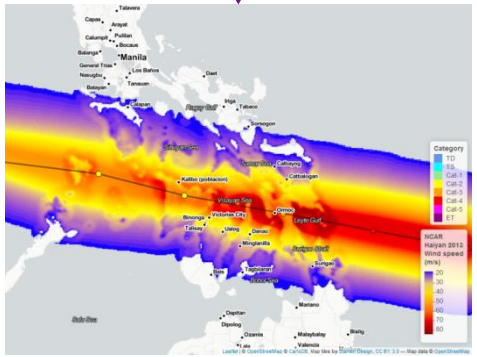
Willis Re

Agenda

- Introduction to tropical cyclones
- Motivation of assessing risk beyond historical data
- Current tools and what's missing – assigning probability to a scenario
- Examples of useful scenarios
- The challenge

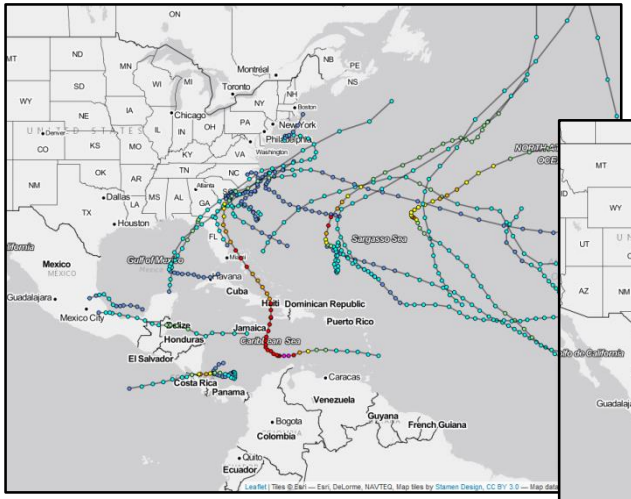
Tropical Cyclones
Introduction



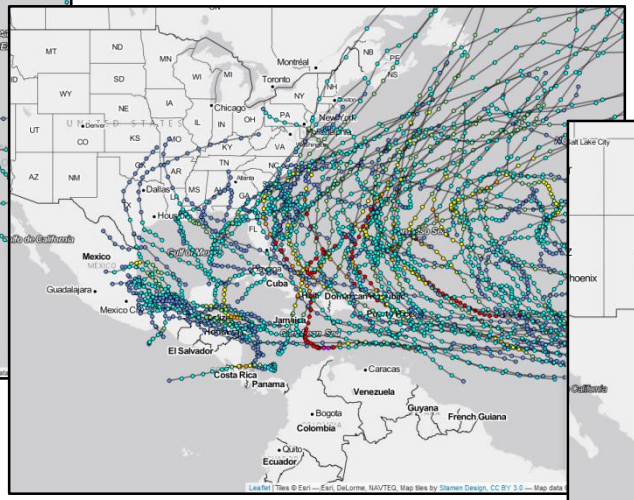


Motivation of assessing risk beyond historical data

2016 Hurricane Season



2010-2016 Hurricane Seasons



1961 Hurricane Carla

Motivation
Overview

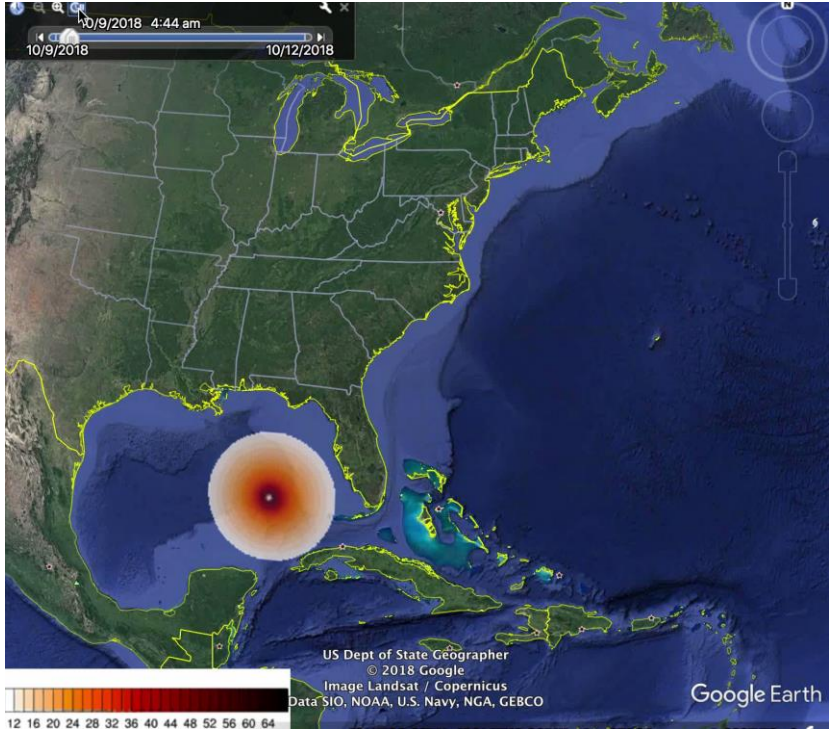
- Assessing the risk of natural catastrophes is essential
  - Insurers need to ensure they have adequate capital and re-insurance

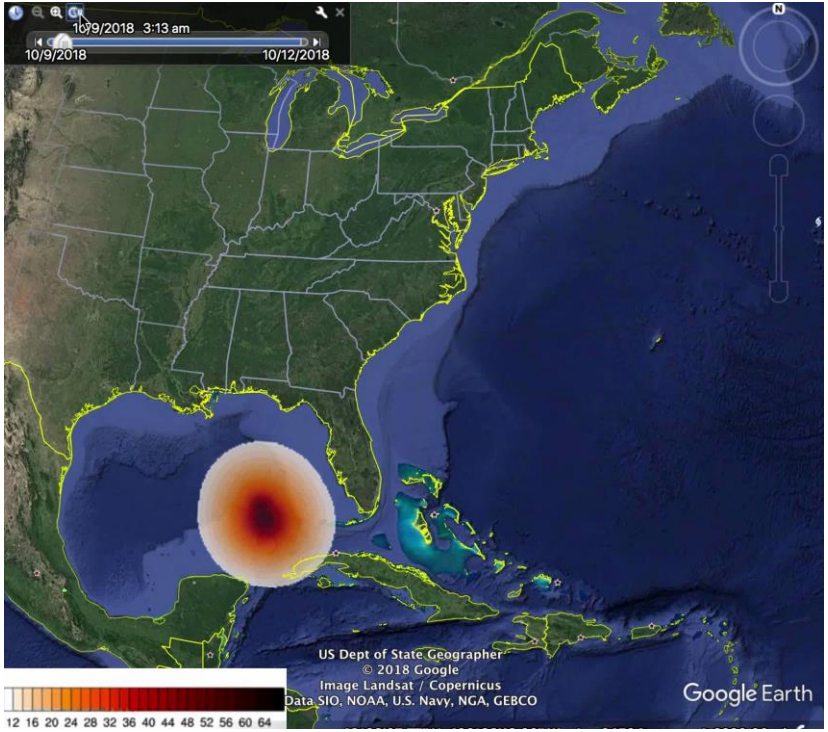
- Catastrophe models are the tool of choice
  - Stochastic catalogue of events e.g. 10,000 years of tropical cyclones
  - Events have a probability of occurrence or return period assigned to them by simply ranking the events by loss and considering the length of the catalogue

- *Realistic disaster scenarios* / *counterfactual scenarios* also widely used
  - Assessment of potential damage
  - No method of establishing probability of occurrence

Scenarios

What Michael could have been like under continued climate change?

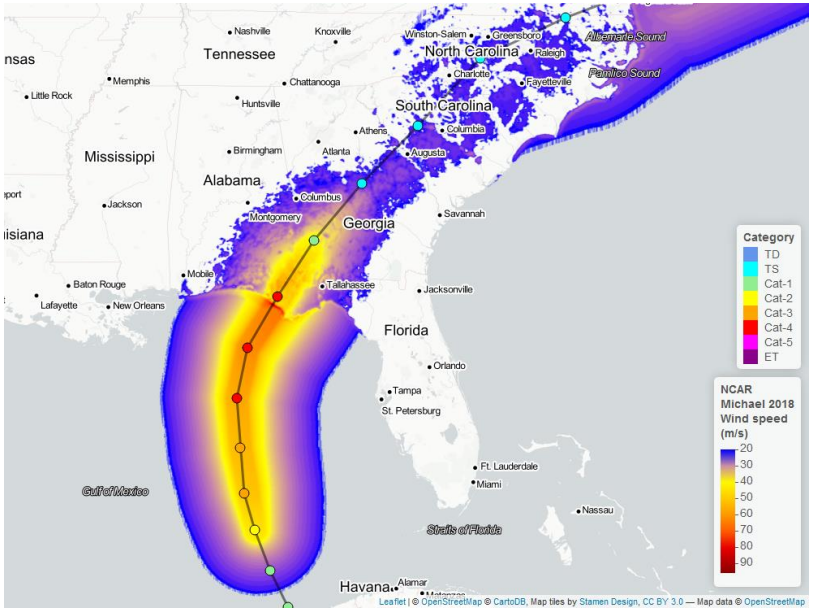




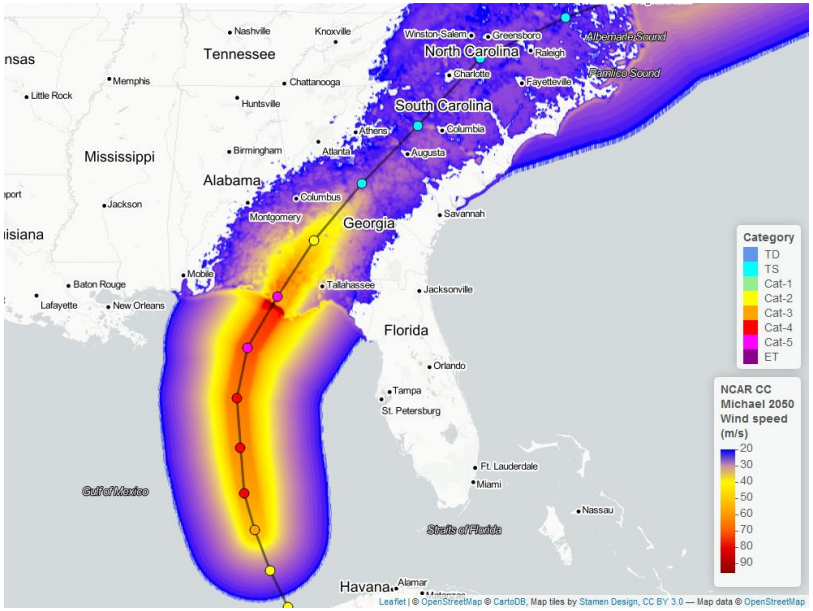
Scenarios

What Michael could have been like under continued climate change?

Michael: Original

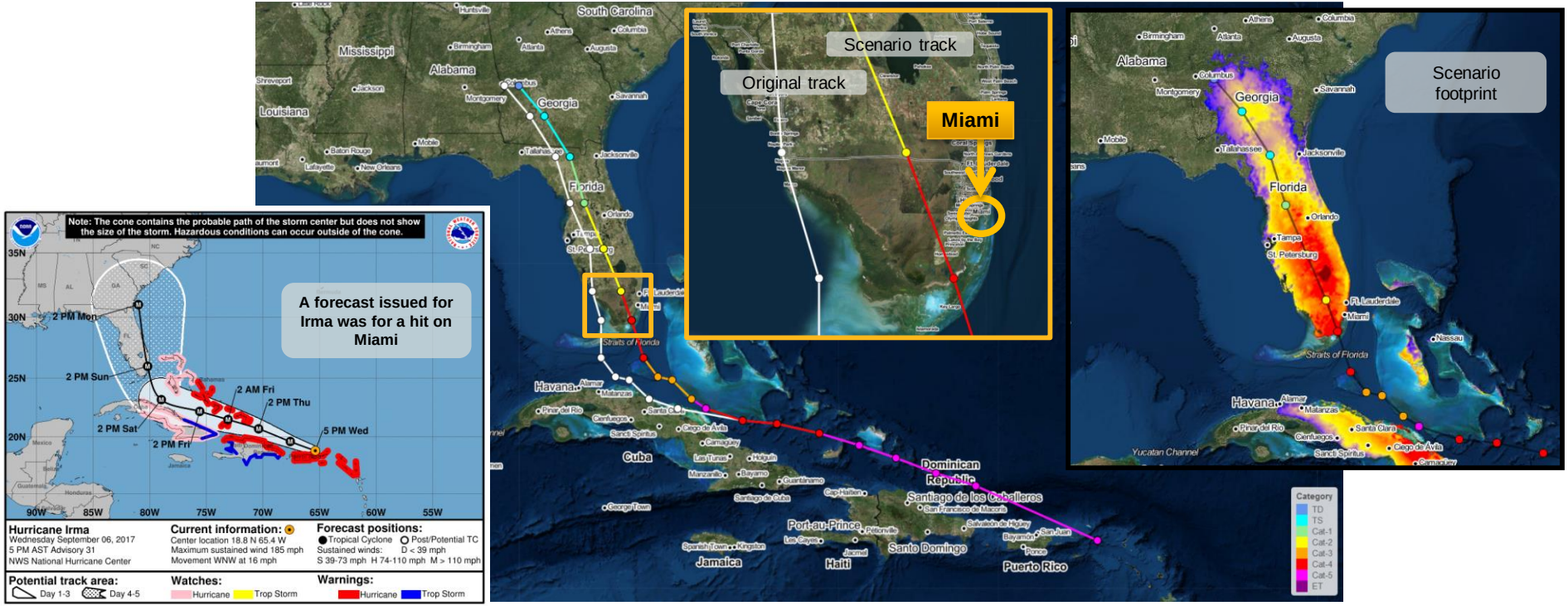


Michael: Category 5



Scenarios

What if Irma hit Miami?



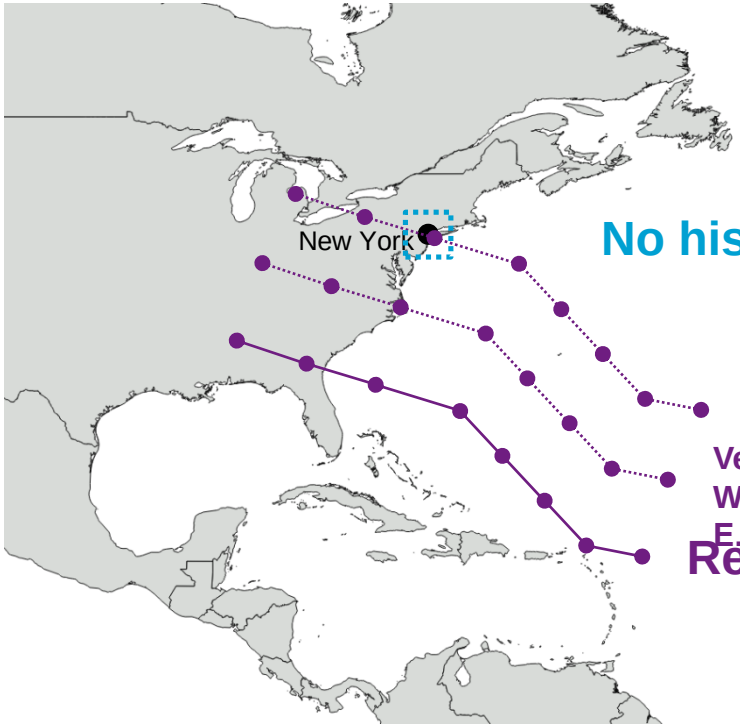
Challenge
Overview

- Establish method of assigning probability to hypothetical natural catastrophes

- Starting point
  - Tropical cyclones
  - Freely available tropical cyclone track data*
  - Find probability of occurrence for any imagined track

- Obstacles
  - Probability of exact hypothetical track occurring is extremely small and not helpful. Need work out important characteristics, then assign probability
  - Whether the storm hits exposure is an important characteristic

Challenge
Example



No historical data to assess risk

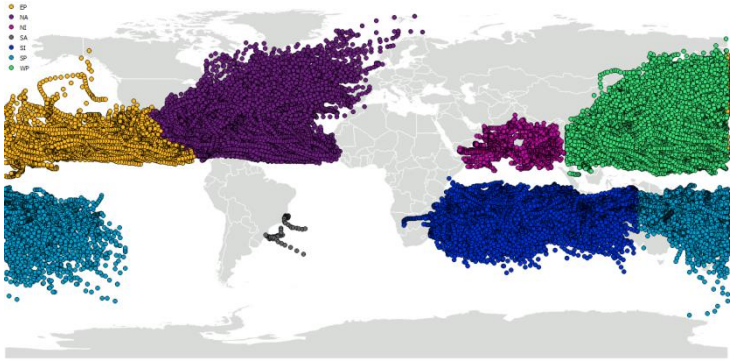
Need to consider if small chance it hits exposure is taken into account

Very small chance of exact track further North, What about important characteristics? E.g. intensity at landfall, similar track…

Recent storm

Challenge
Global Tropical Cyclone Data

- Position and intensity of storms back to 1851 dependent on basin
- Important fields:
  - Latitude, Longitude, Time, Central Pressure



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	IBTrACS WMO: International Best Tracks Archive for Climate Stewardship -- WMO DATA ONLY -- Version: v03r10															
2	Serial_Nur	Season	Num	Basin	Sub_basin	Name	ISO_time	Nature	Latitude	Longitude	Wind(WM(	Pres(WMC	Center	Wind(WM(	Pres(WMC	Track_type
3	N/A	Year	#	BB	BB	N/A	YYYY-MM	N/A	deg_north	deg_east	kt	mb	N/A	%	%	N/A
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Challenge

Data location: FTP site

https://eft-eu.willisre.com/
Username: SAMBa
Password: Y0y7NseS

Allstorms.ibtracs_wmo.v03r10.csv

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