

# Precipitation types and events impacting NB Power infrastructure

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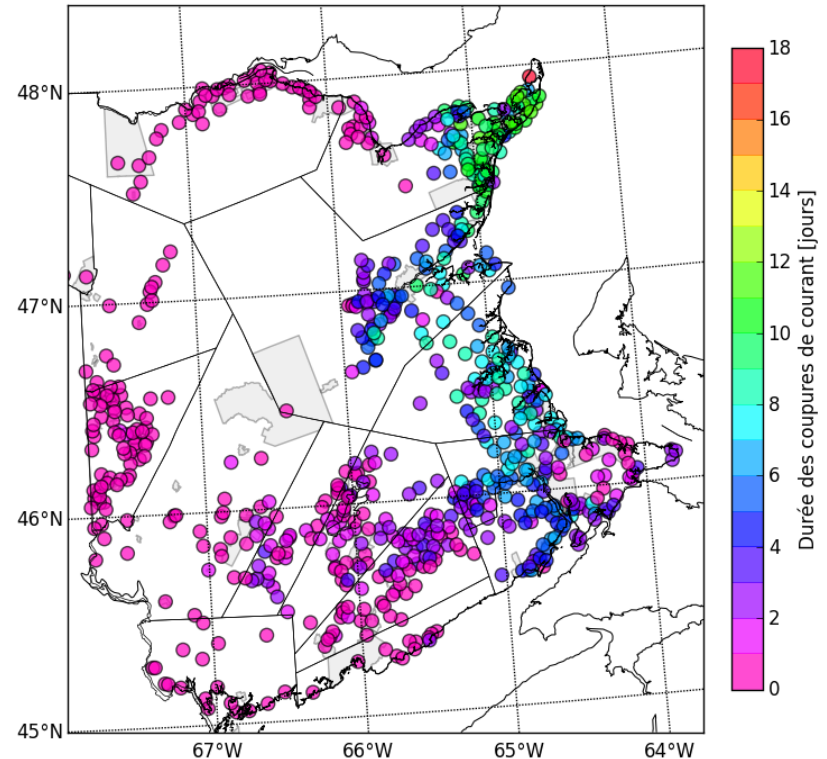
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# Goals

- To conduct a case study of the NB ice storm
  - To investigate the factors responsible of the severity of the storm and their impact on NB Power infrastructure.
- To analyze the WRF simulations for the list of events
  - To conduct a climatology of the precipitation events that impacted NB Power infrastructure

# Overview of the NB ice storm 2017

- Storm occurred 24-26 January 2017
- More than 50 mm of ice accumulated
- More than 133,000 customer without power
- Power was restored within a day
- Acadian Peninsula, most isolated area, stayed up to 18 days without power



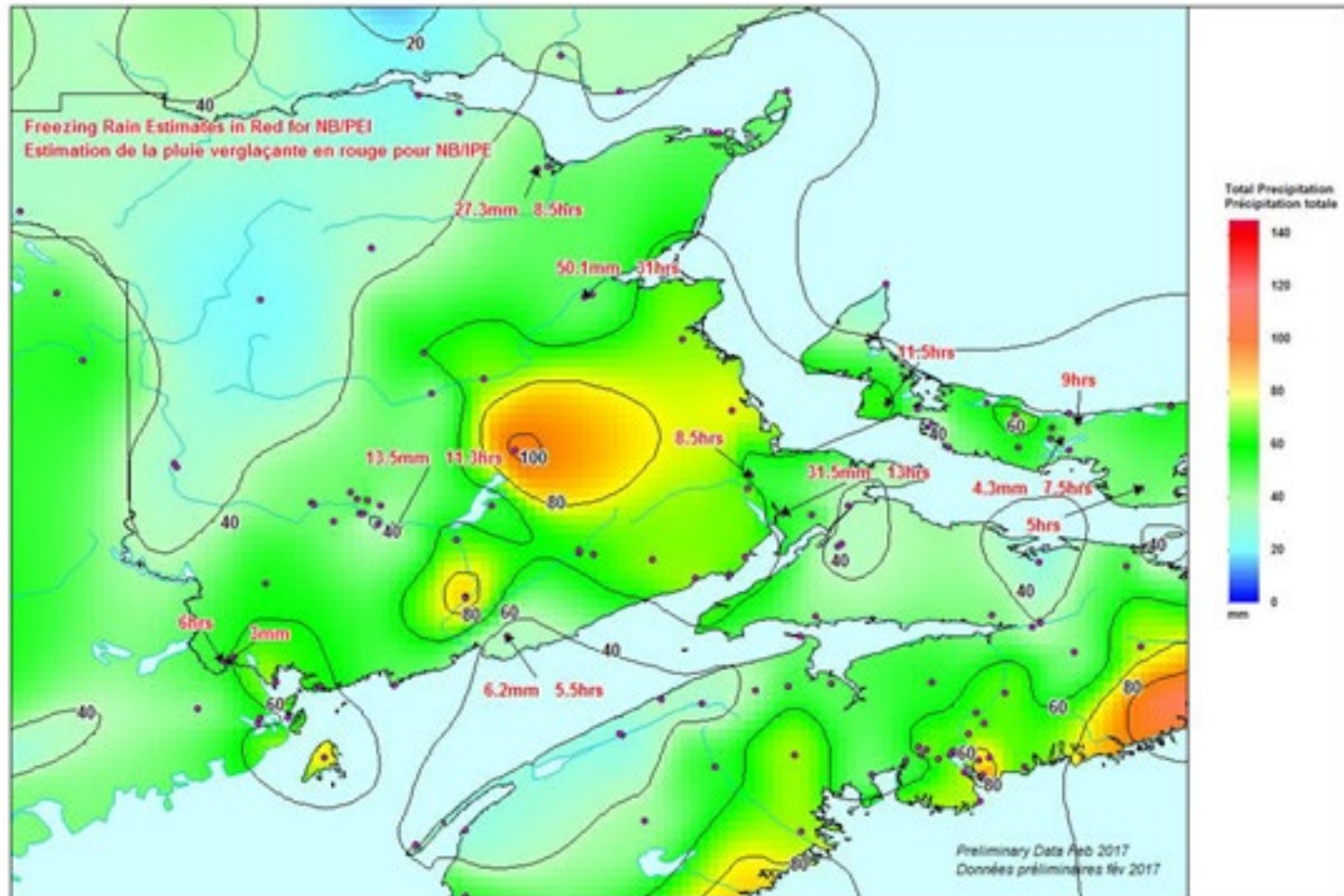
# Accumulated precipitation

Total Precipitation Jan 24-26 2017  
Précipitation totale 24-26 jan 2017



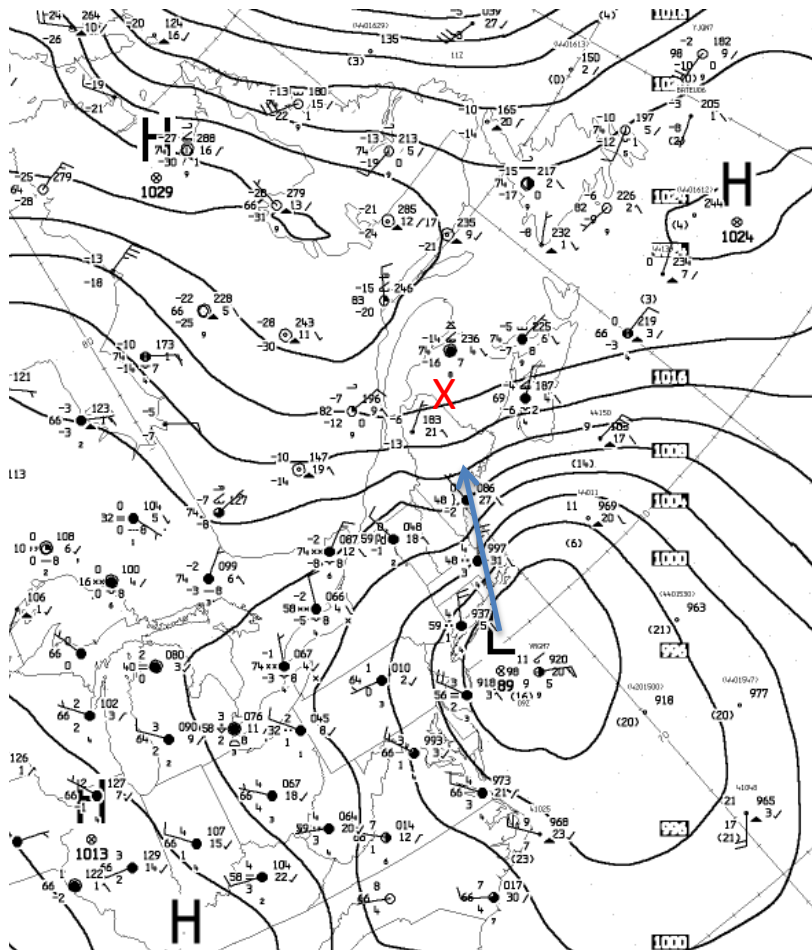
Environment Canada  
Atlantic Region  
Atlantic Climate  
Centre

Environnement Canada  
Région de l'Atlantique  
Centre Climatologique  
de l'Atlantique

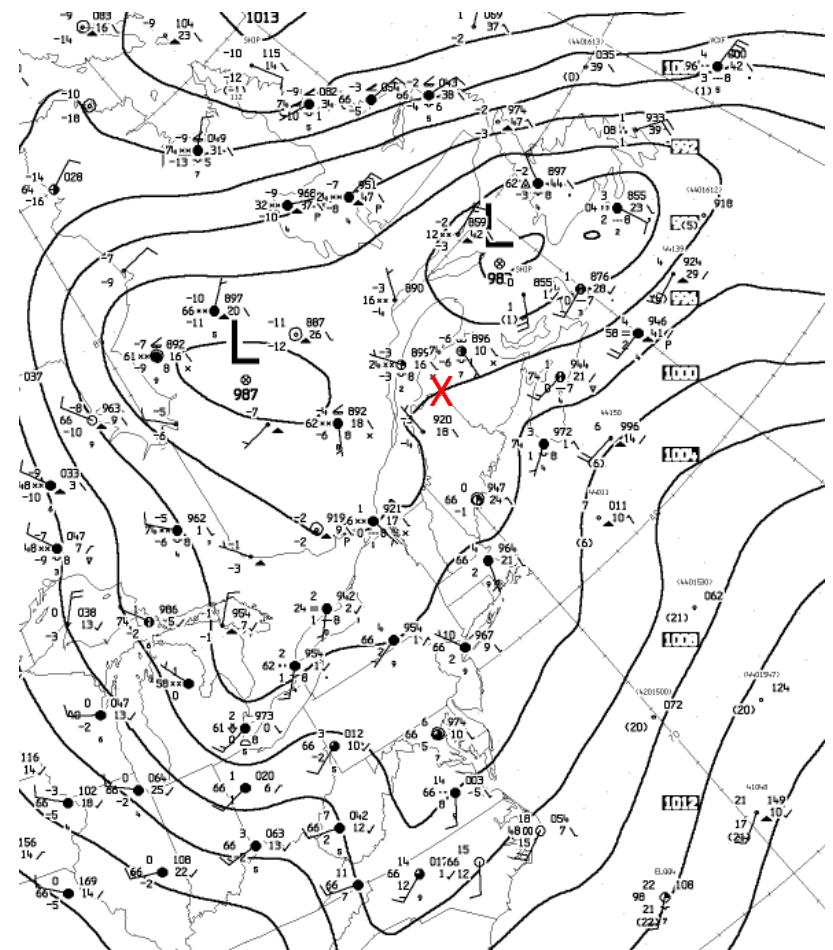


# Synoptic overview

(a) 1200 UTC 24 January 2017



(b) 1200 UTC 26 January 2017

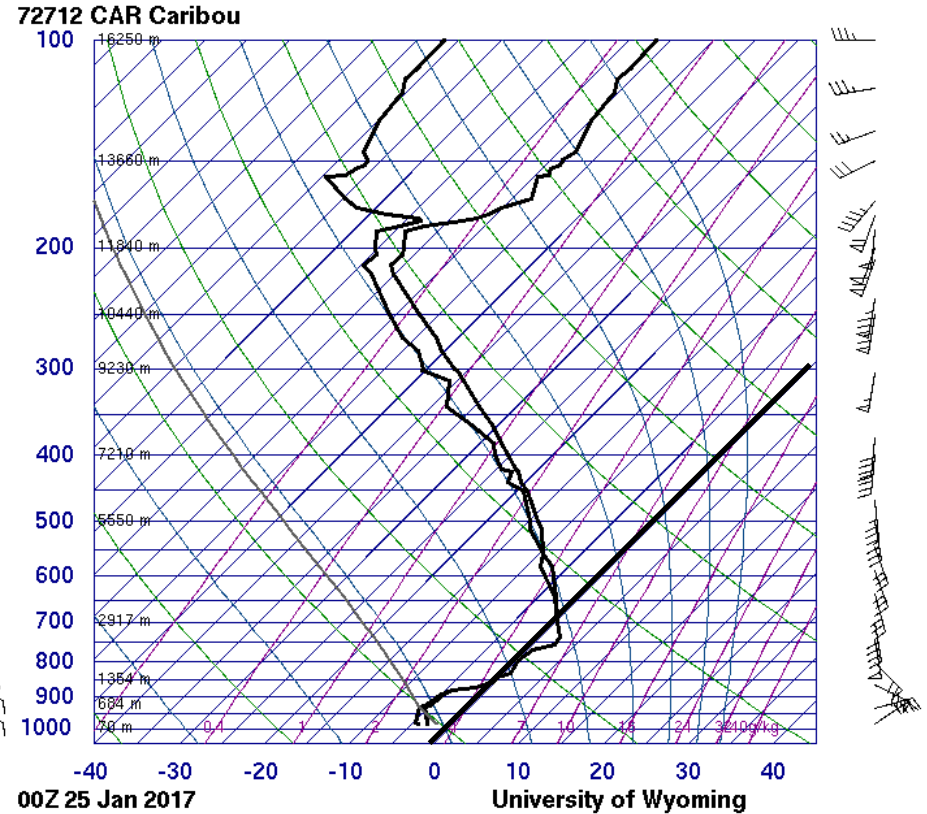
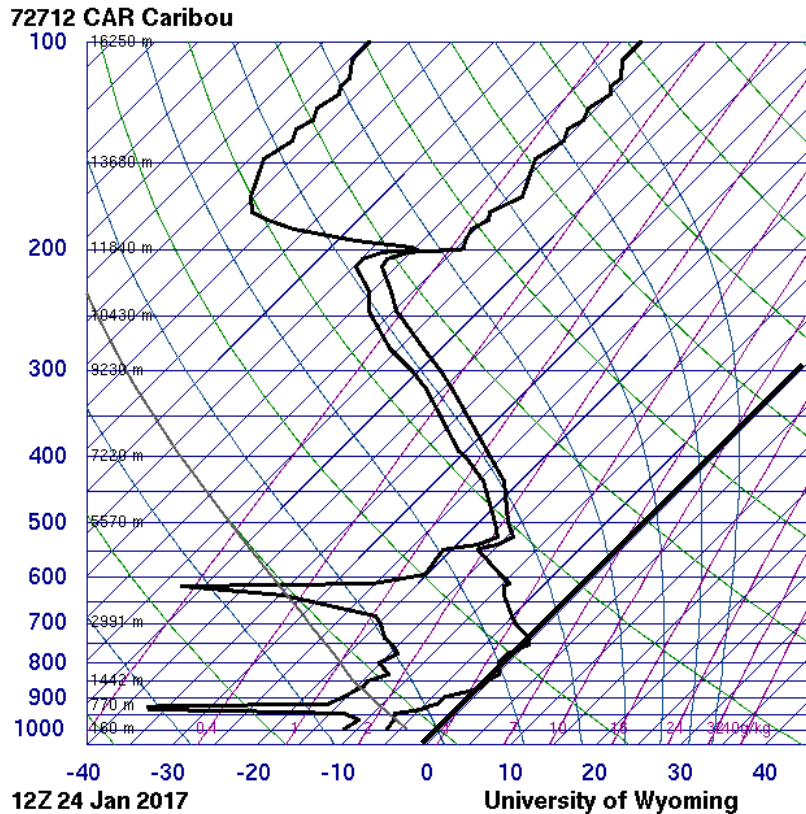




# Favorable conditions for freezing rain

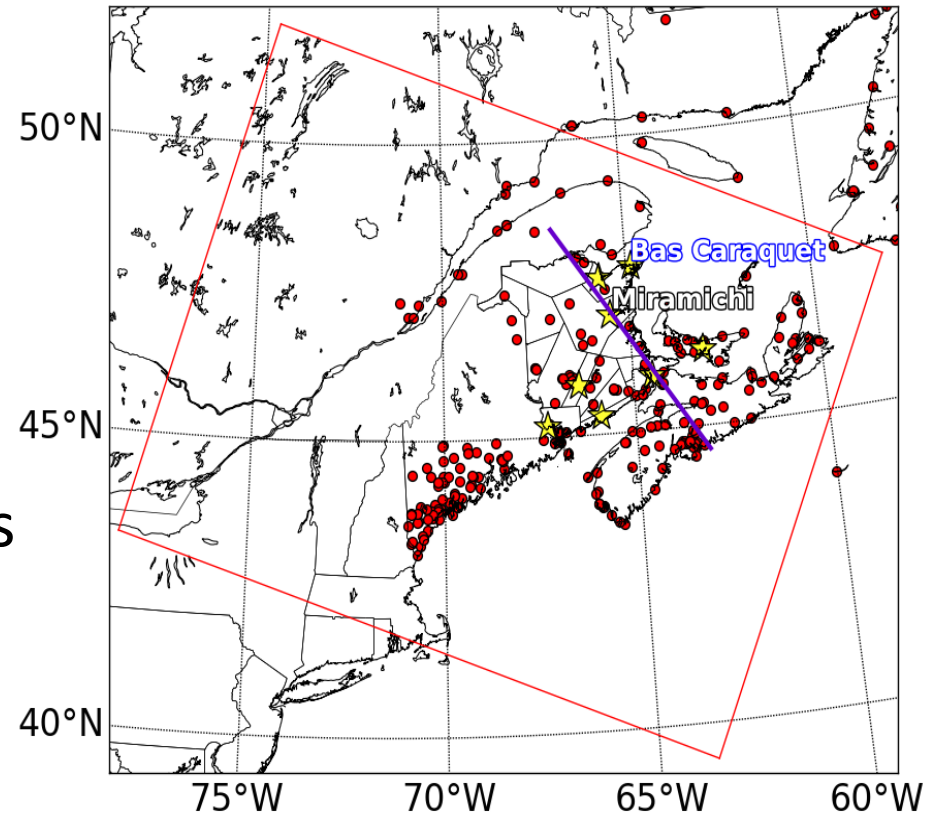
(a) 1200 UTC 24 January 2017

(b) 0000 UTC 25 January 2017



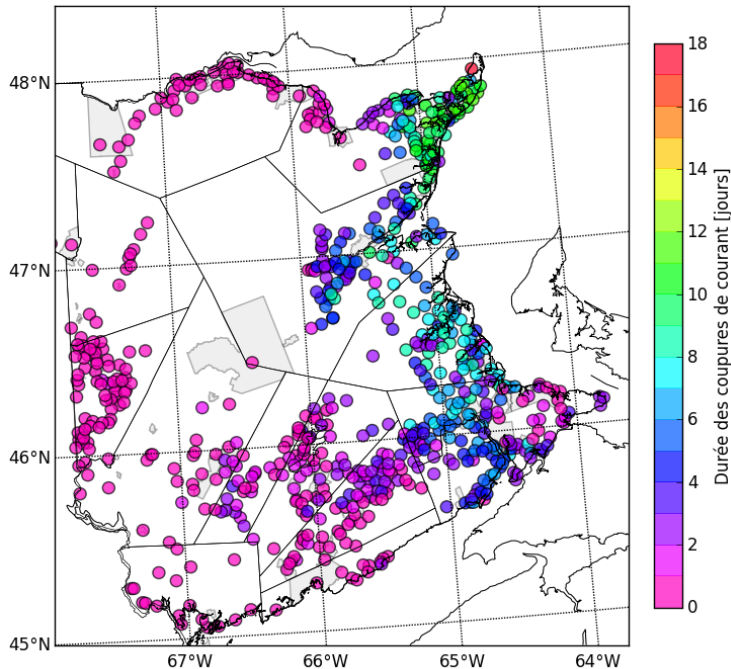
# Experimental design

- Conducted high resolution simulation of the storm ( grid spacing  $\sim 3$  km)
- Compared with observations
- Used the simulations to investigate weather conditions and precipitation types in areas impacted by the storm:
  - Miramichi
  - Acadian Peninsula

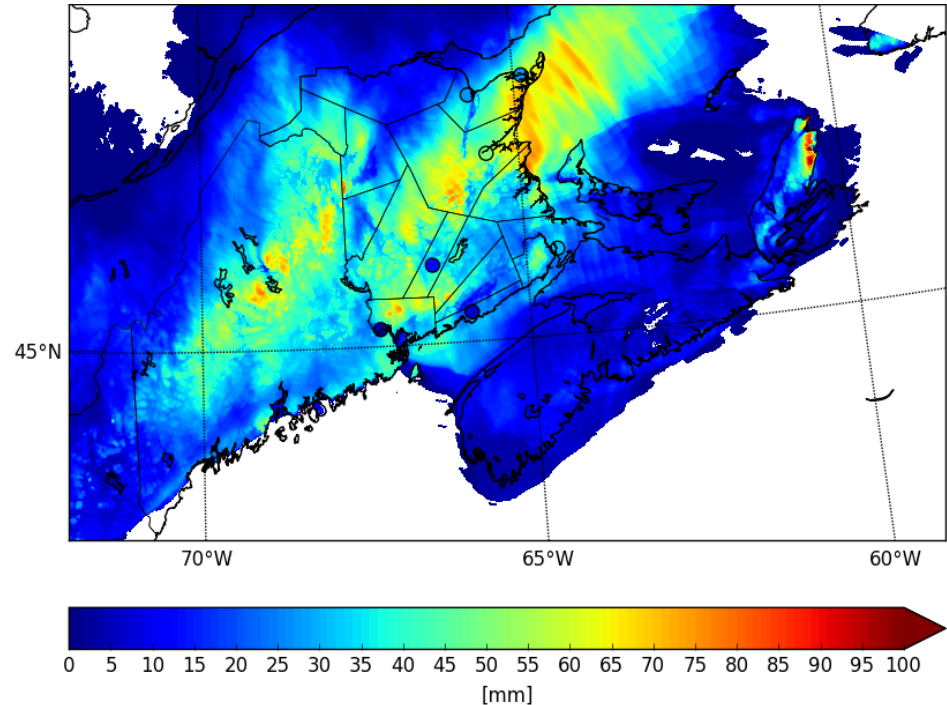


# Power outages and precipitation

Duration of power outages



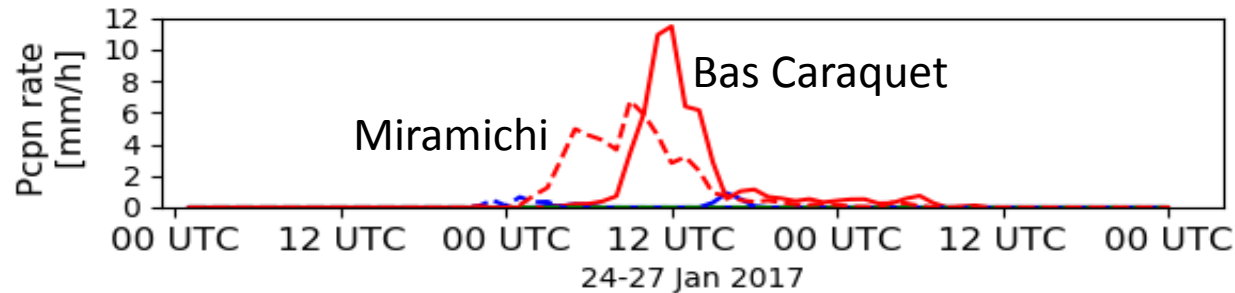
Accumulated freezing rain



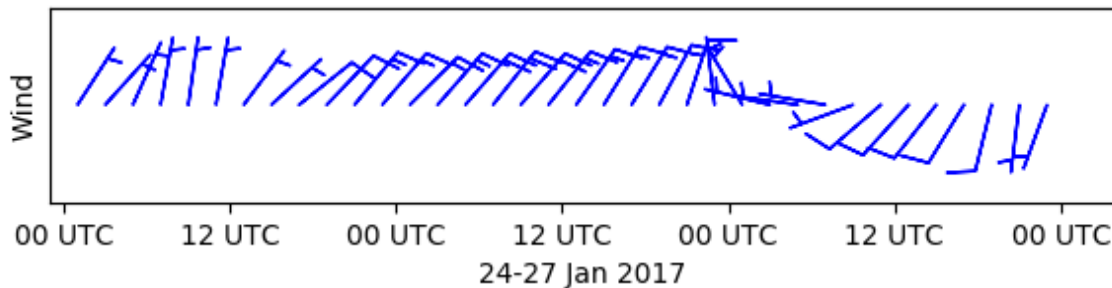
- Longest power outages were located on the coast of NB
- These were associated with maximum amounts of freezing rain
- But Miramichi had shorter power outages, it could be due to the wind speed



# Wind speed and freezing rain

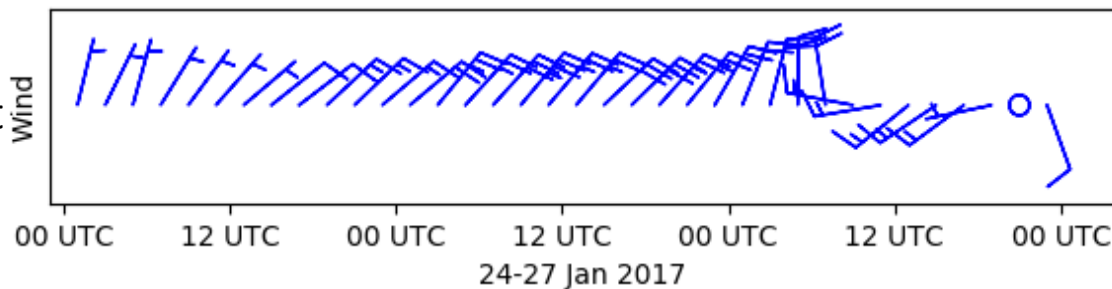


Miramichi



Higher amounts of freezing rain reported in Miramichi but weaker winds (~40 km/h)

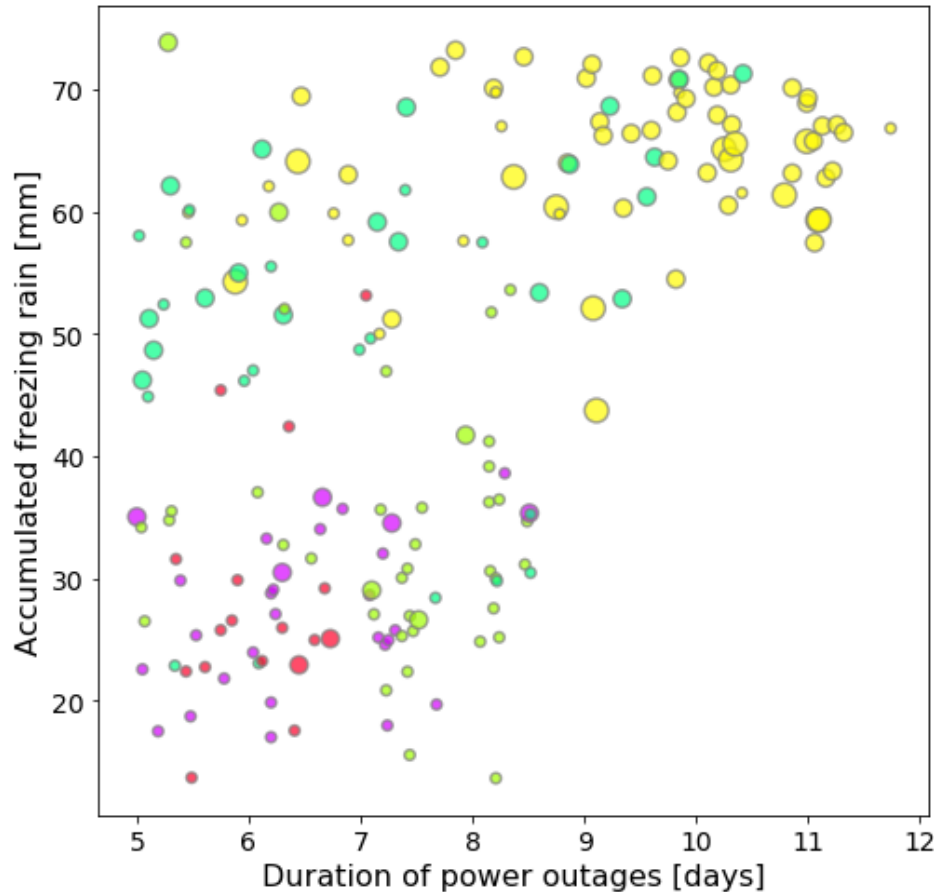
Bas Caraquet



Lower amounts of freezing rain reported in Bas Caraquet but stronger winds (~60 km/h)

- Wind speed would have been the key meteorological factor responsible of the power outage

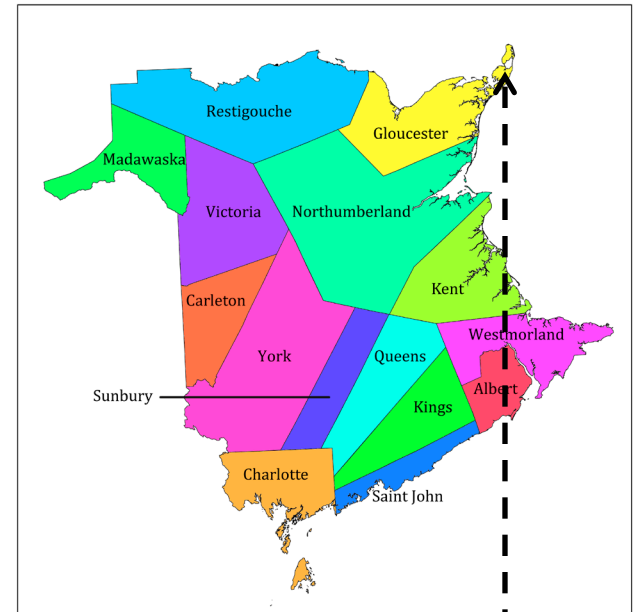
# Duration of power outages



Extreme conditions at *île Miscou*:

- Power duration: ~18 days
- Accumulated ZR: ~60 mm
- $V_{\max} = 43$  km/h and  $V_{\text{mean}} = 20$  km/h

Legend:



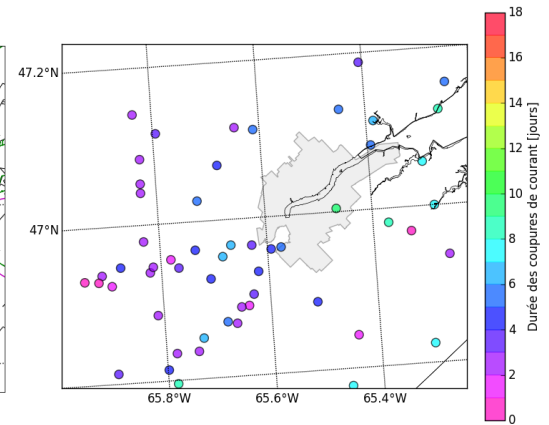
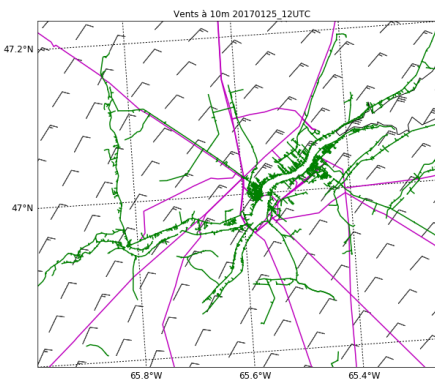
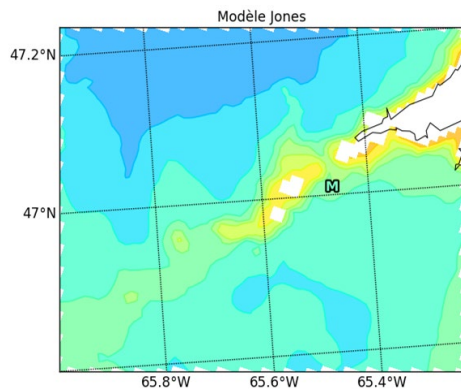
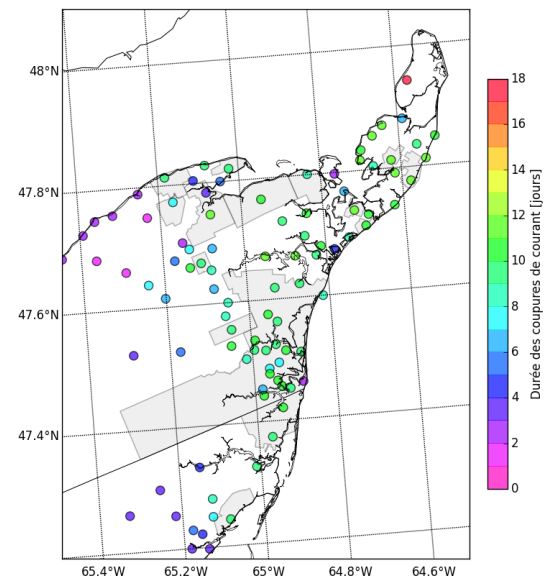
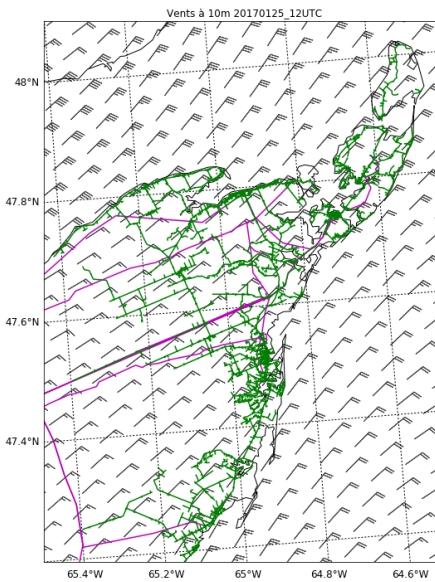
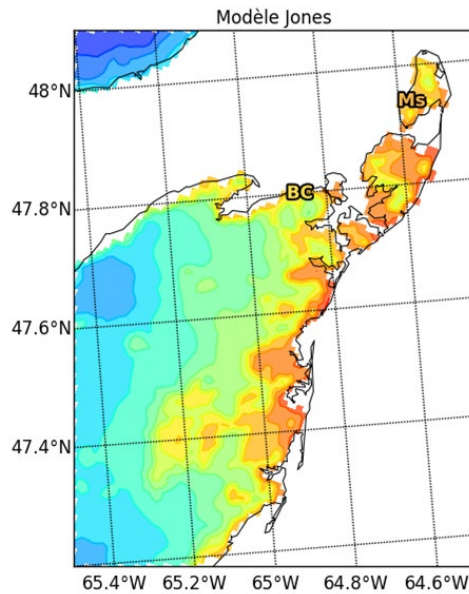
- < 10 km/h
- 10 km/h to 20 km/h
- > 20 km/h



# Summary

- One of the costliest natural disaster in NB history
- Produced  $> 50$  mm of ice accumulation, strong winds and occurred in isolated area
- Wind speed combined with freezing rain seemed to be the key meteorological factors
- Longer duration power outages were associated with higher amounts of freezing rain with some exceptions
- It also depends on the geographical locations

# Transmission/distribution lines



# List of events since 2003

- Over the 86 events, 47 events were reproduced by the WRF runs
- Similarities and differences among these storms will be studied
- Storms with similar amounts of snow but without impacting NB Power will also be studied