Incorporating Projections of The Future Climate

5 Climate Variables

Temperature

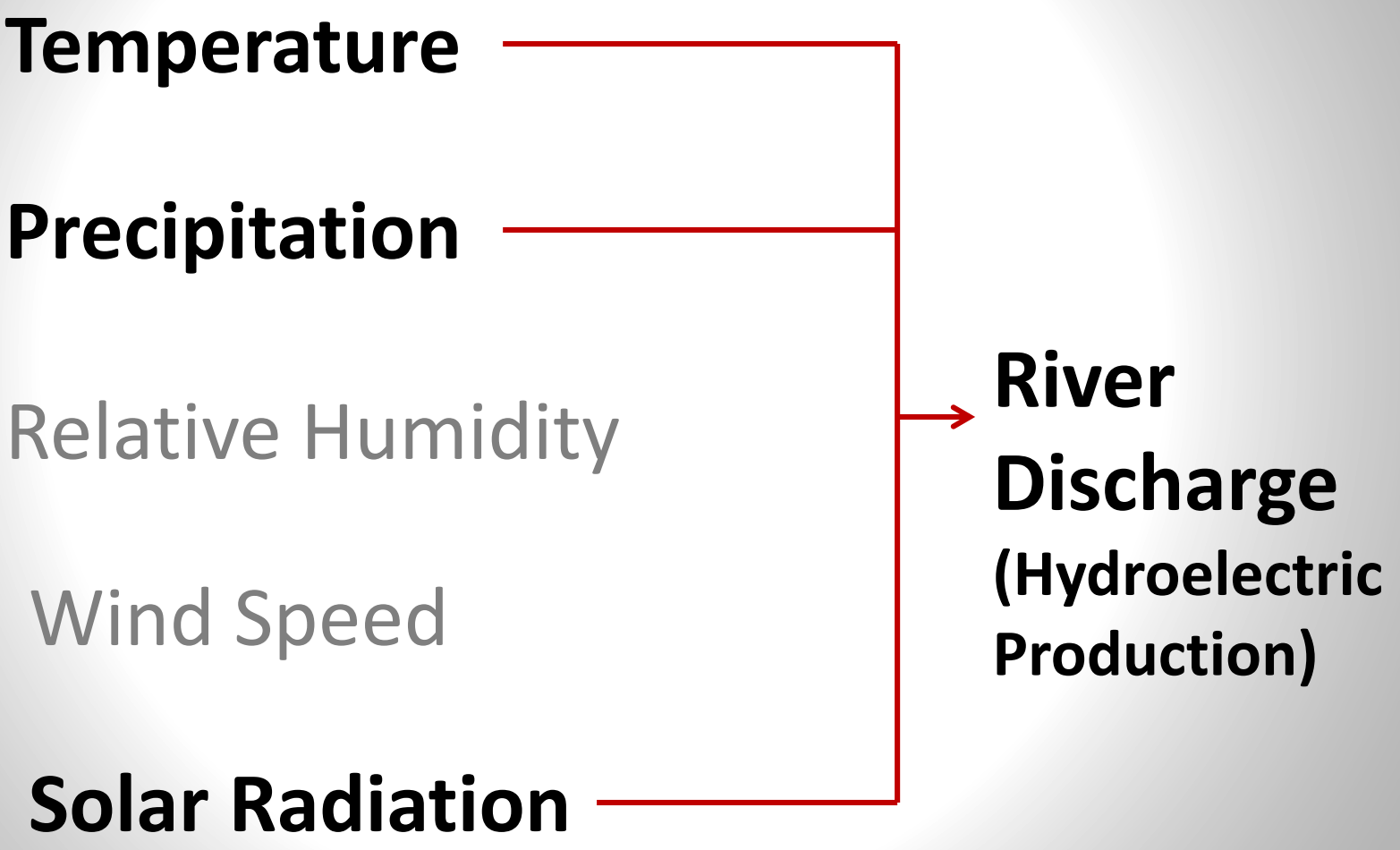
Precipitation

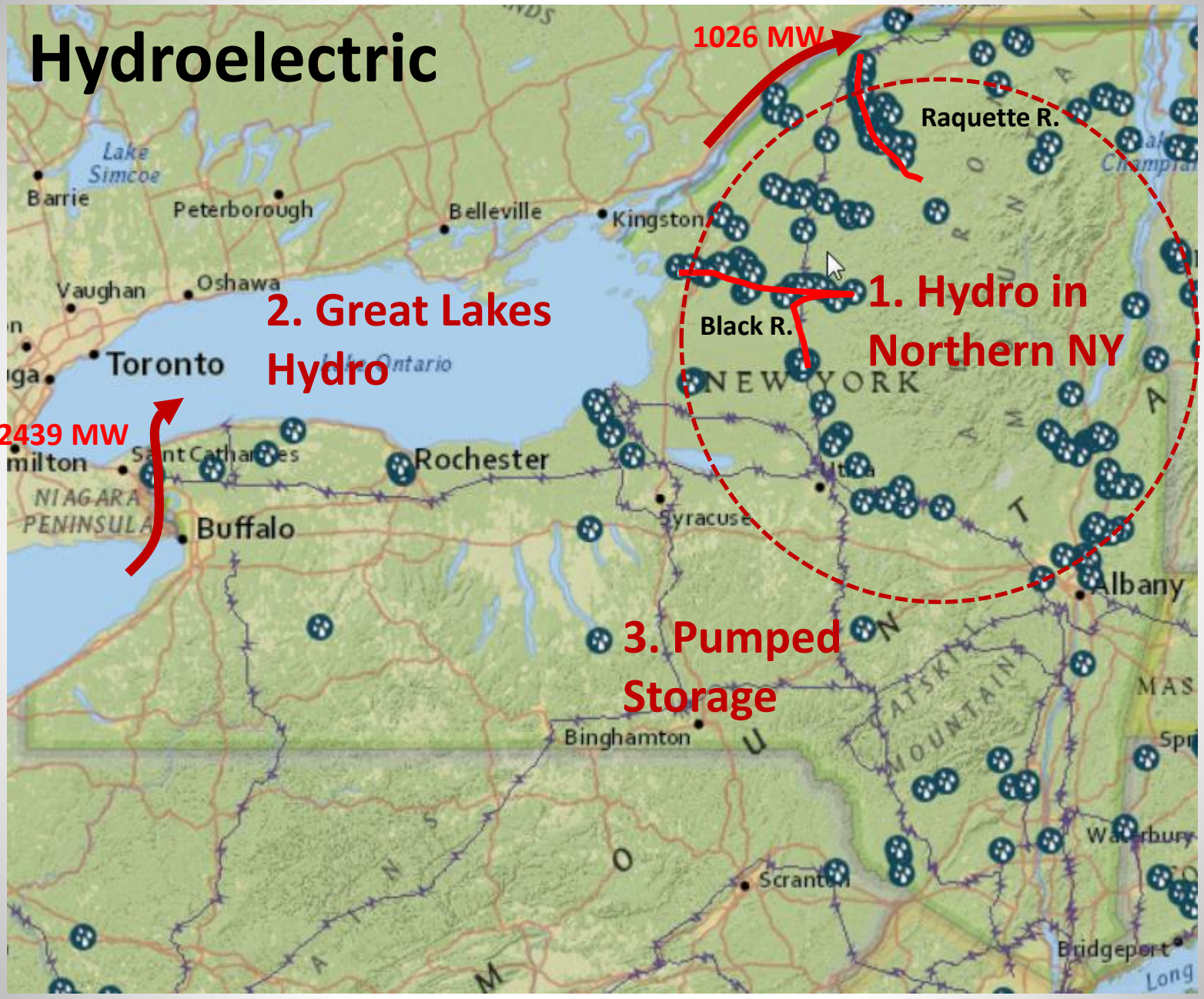
Relative Humidity

Wind Speed

Solar Radiation

5 Climate Variables




Hydroelectric
1026 MW
Raquette R.
Lake Simcoe
Barrie
Peterborough
Belleville
Kingston
Vaughan
Oshawa
2. Great Lakes Hydro
1. Hydro in Northern NY
Black R.
Toronto
Lake Ontario
NEW YORK
2439 MW
Rochester
NIAGARA PENINSULA
Buffalo
Syracuse
Albany
3. Pumped Storage
Binghamton
Scranton
Bridgeport

5 Climate Variables

Temperature

Precipitation

Relative Humidity

5 Climate Variables

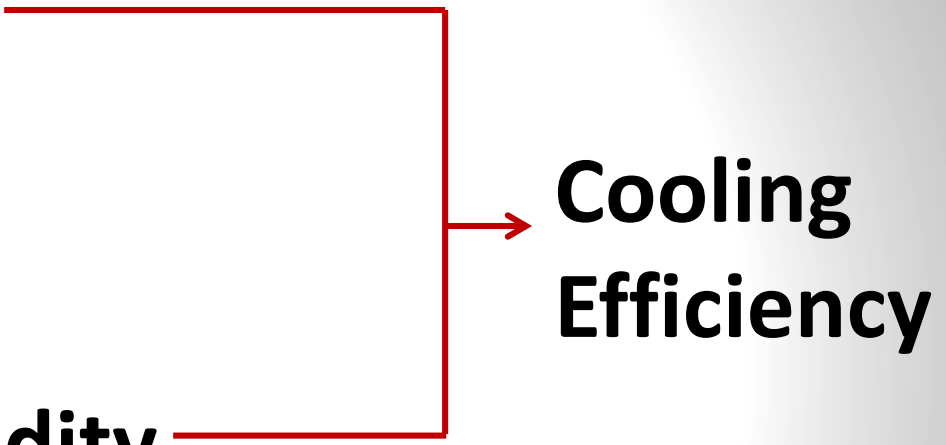
Temperature

Precipitation

Relative Humidity

Wind Speed

Solar Radiation



Climate Variables

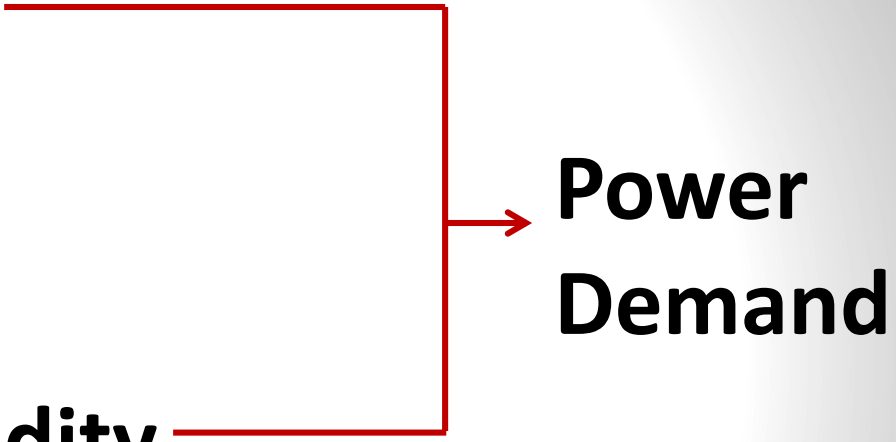
Temperature

Precipitation

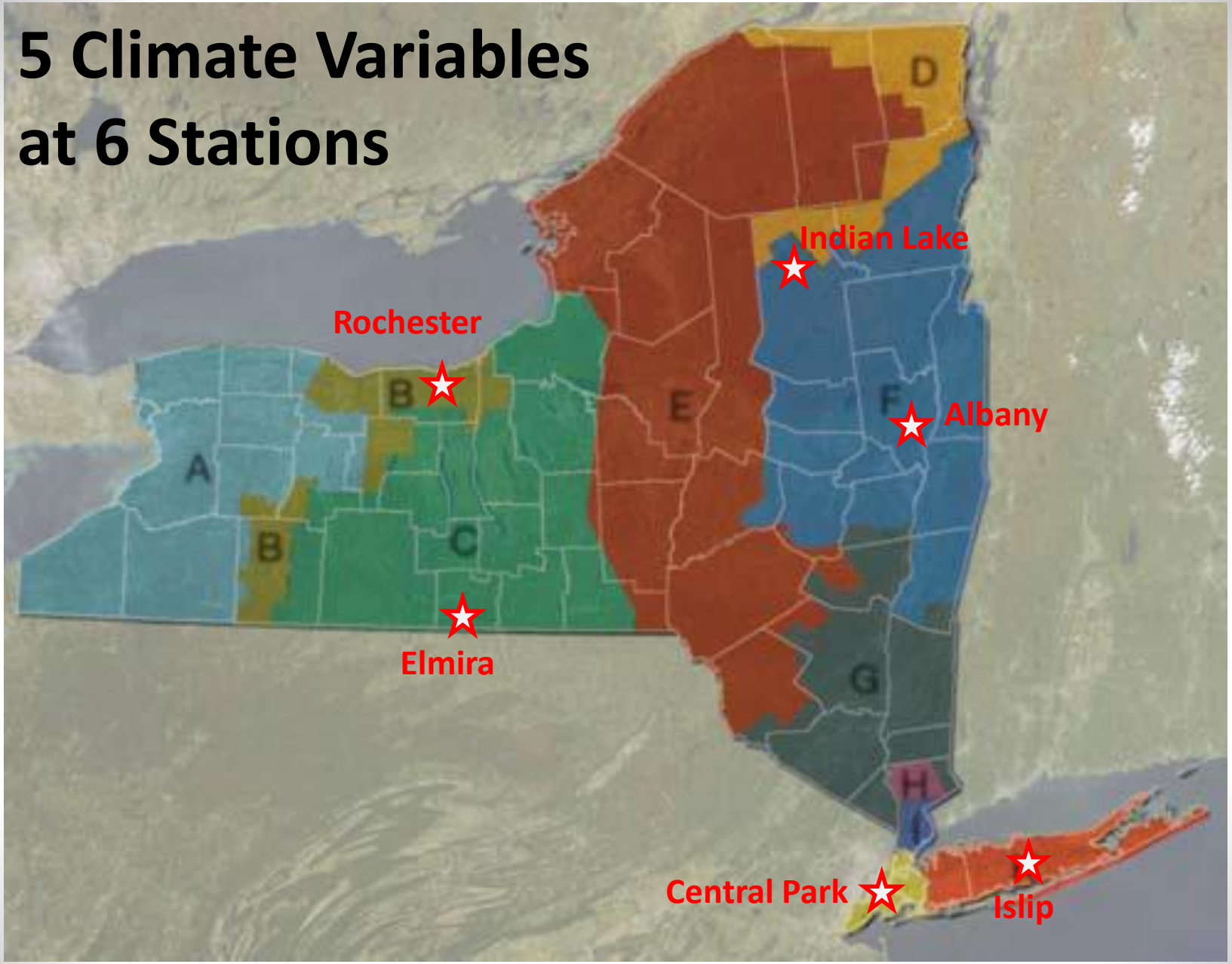
Relative Humidity

Wind Speed

Solar Radiation



5 Climate Variables at 6 Stations



Base Map Source: ClimAID. 2011. Chp. 8.

Accounting for Climate Change

Downscaled CMIP5 (circa 2010) Climate Projections

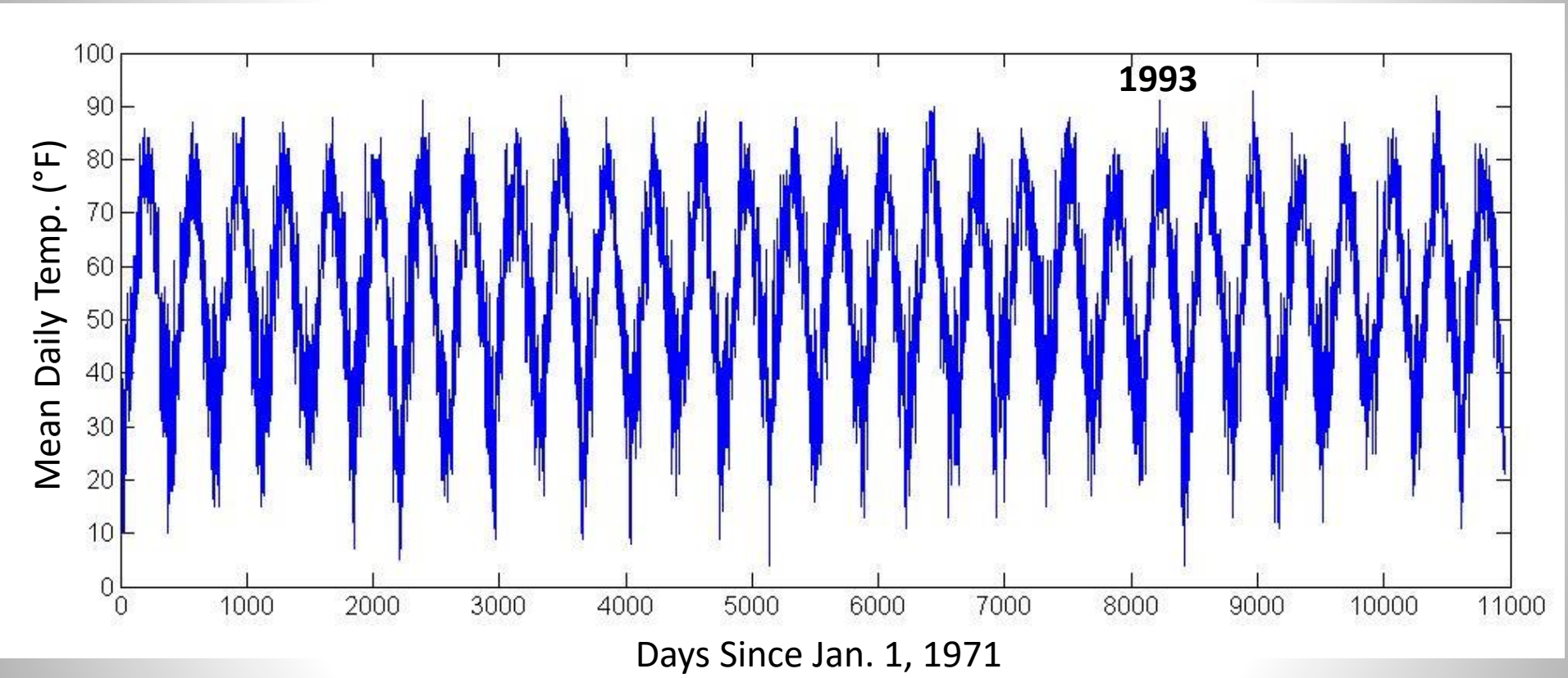
Region 4 (New York City) – Temperature

Baseline (1971-2000) 54.6 °F	Low Estimate (10th Percentile)	Middle Range (25th to 75th Percentile)	High Estimate (90th Percentile)
2020s	+ 1.5 °F	+ 2.0 to 2.9 °F	+ 3.2 °F
2050s	+ 3.1 °F	+ 4.1 to 5.7 °F	+ 6.6 °F
2080s	+ 3.8 °F	+ 5.3 to 8.8 °F	+ 10.3 °F
2100	+ 4.2 °F	+ 5.8 to 10.4 °F	+ 12.1 °F

Source: NYSERDA ClimAID, Supplement to Report 11-18

Based on assessment of downscaled projections from 35 CMIP5 climate models and 2 emission scenarios.

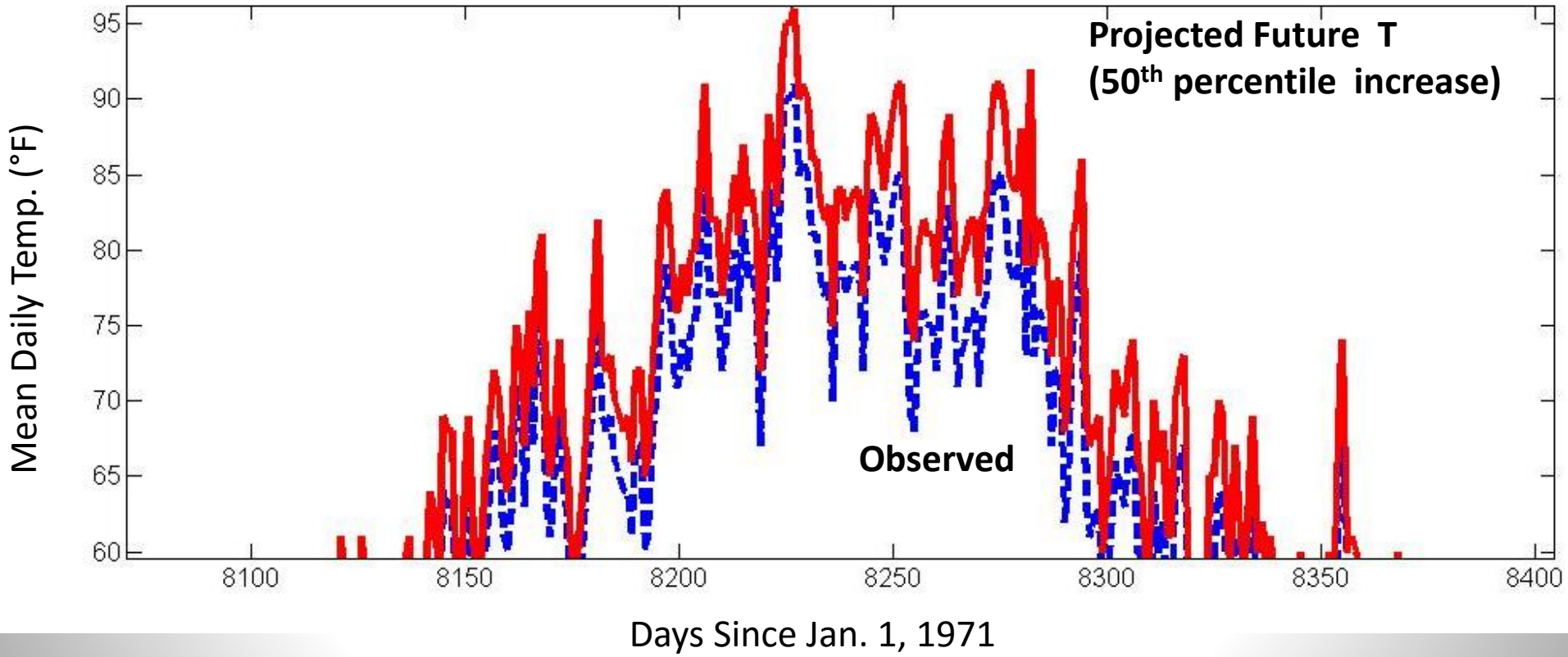
Example of Day-to-Day Variability



- Use historic period from 1971 to 2000 to set variability.
- Period has representative extremes:

  e.g. in 1993, 39 days with max T > 90°F

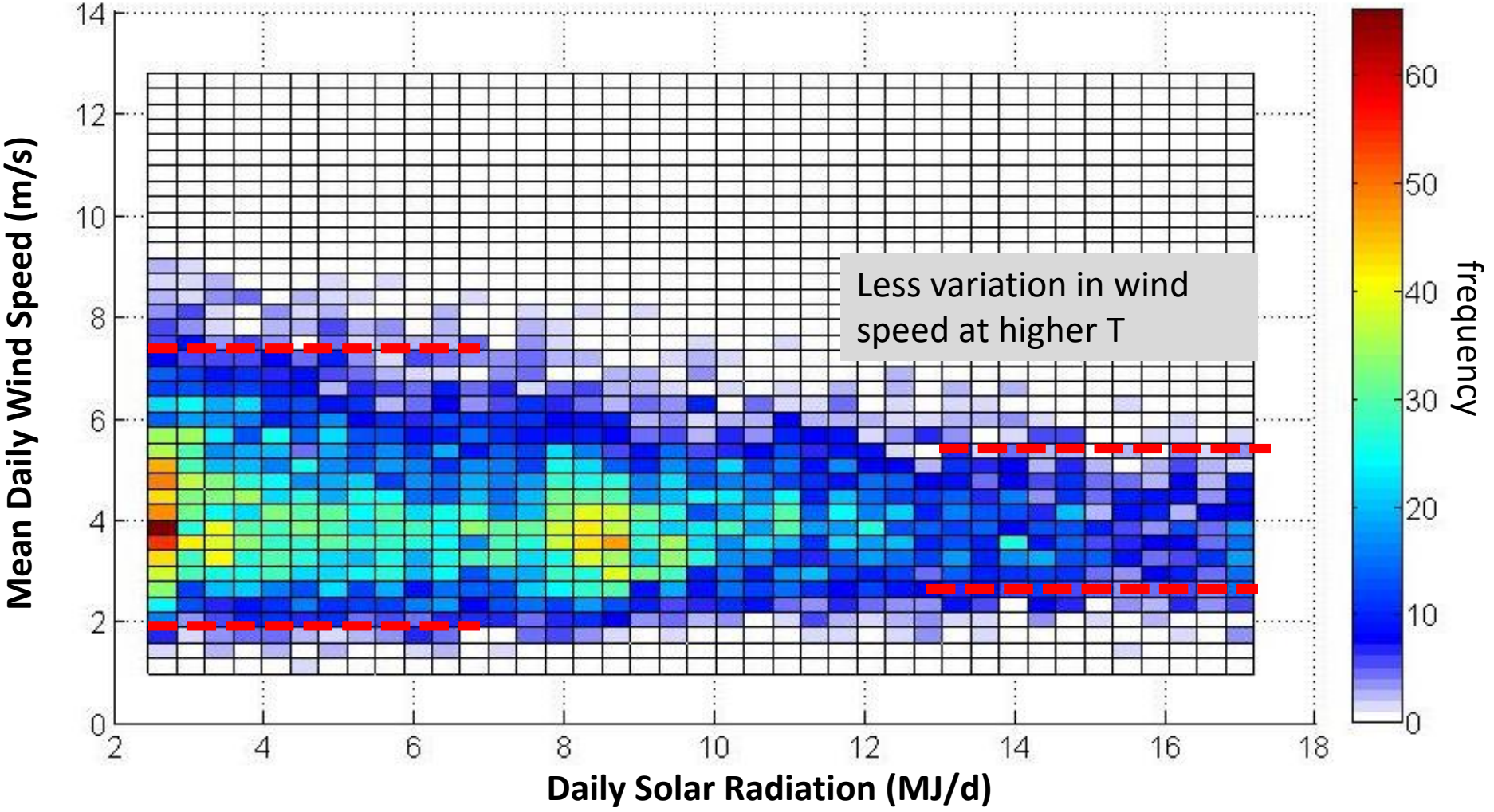
Example of Day-to-Day Variability (Summer 1993)



In suite of GCM runs, will look at 50th and 82nd percentile increase.

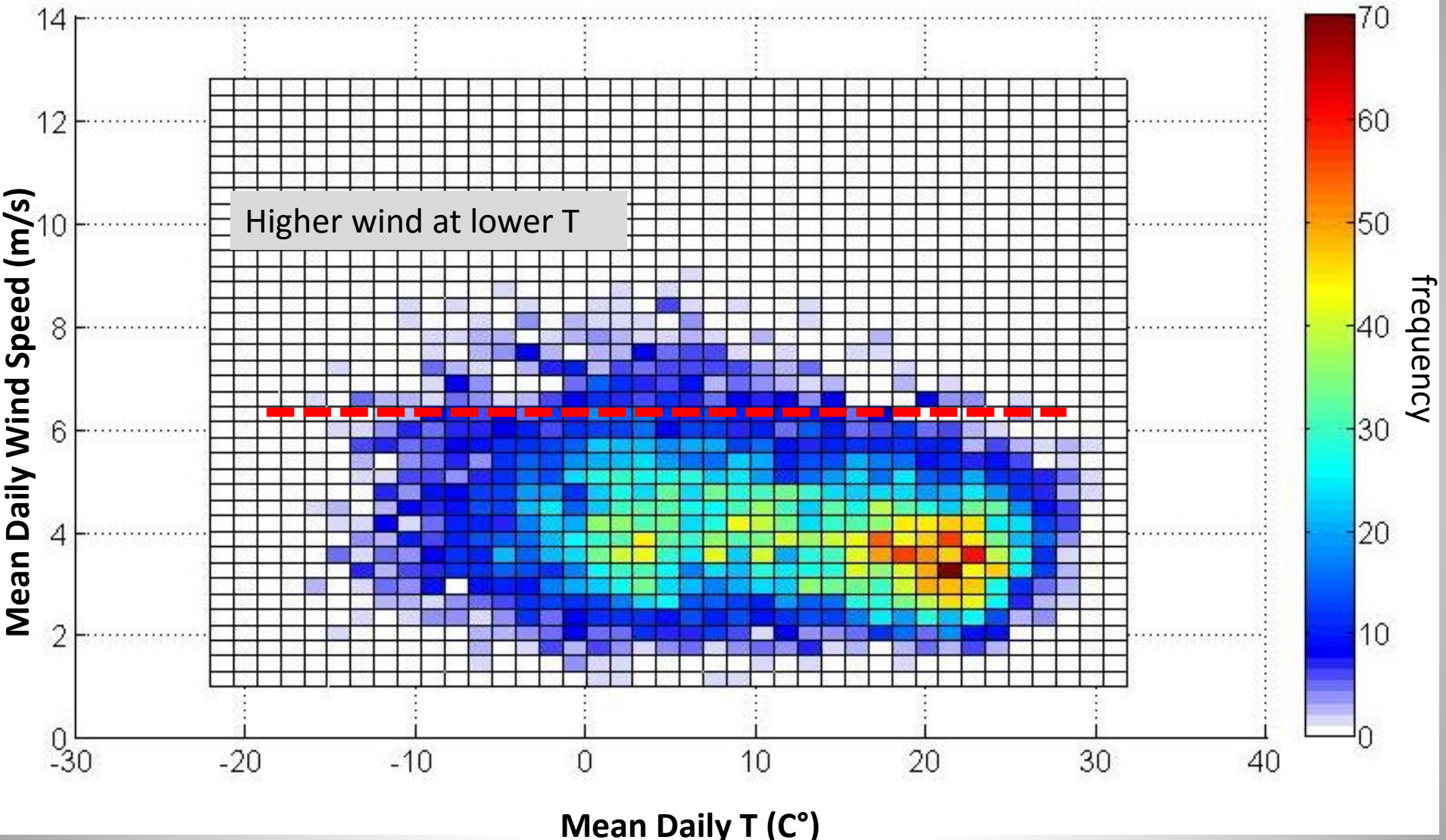
Besides assessing time series of single climate variables, we will also assess correlation among variables in time and space (i.e. across 6 sites)

Example: Wind vs Solar



Site: Elmira

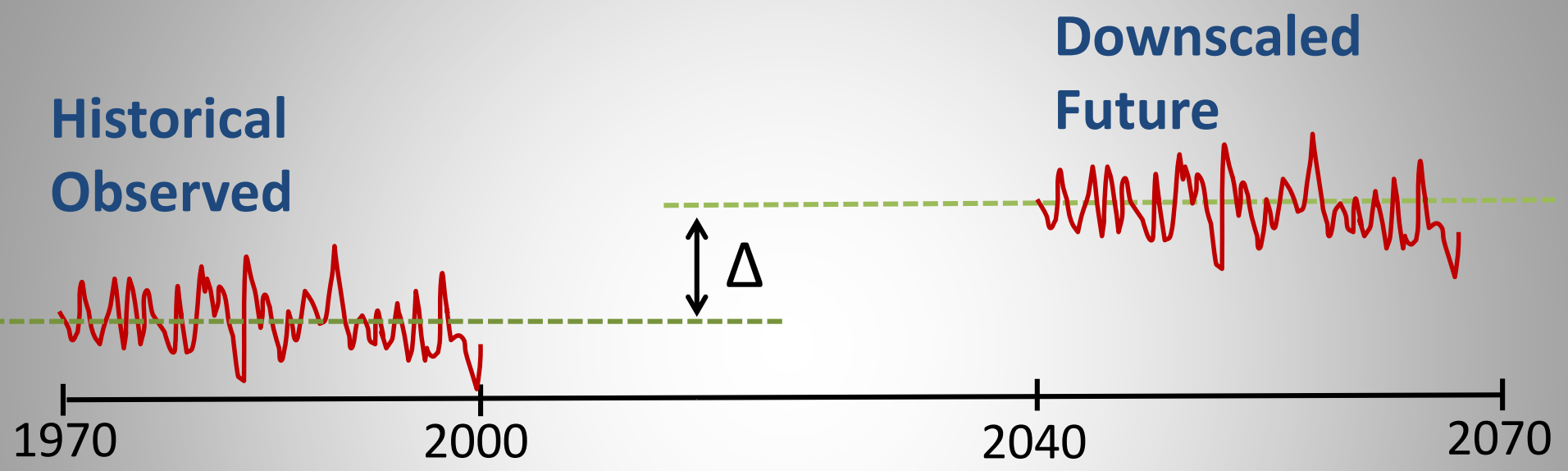
Example: Wind vs. Temp.



Site: Elmira

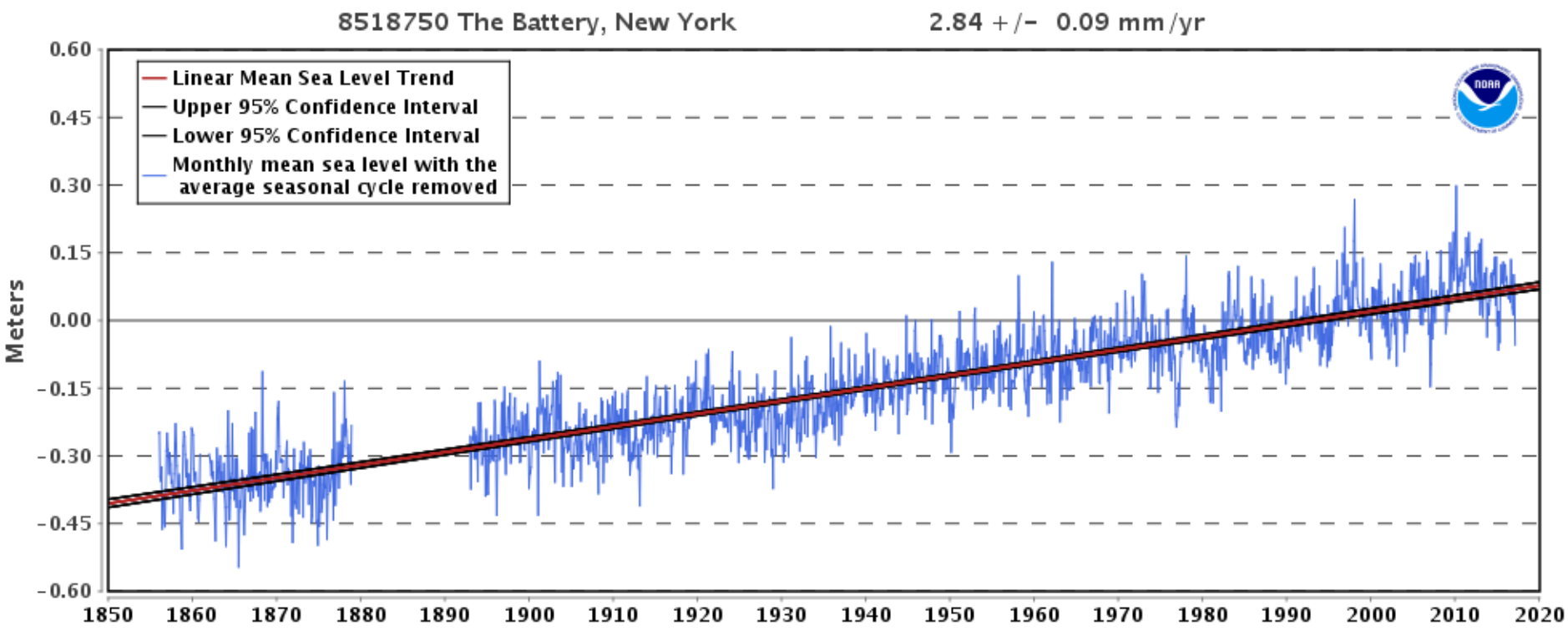
BACK-UP SLIDES

Accounting for Climate Change



We let historic period set day-to-day variability but shift time series by % change predicted by climate model projections.

Additional Considerations: Sea Level Rise (SLR)



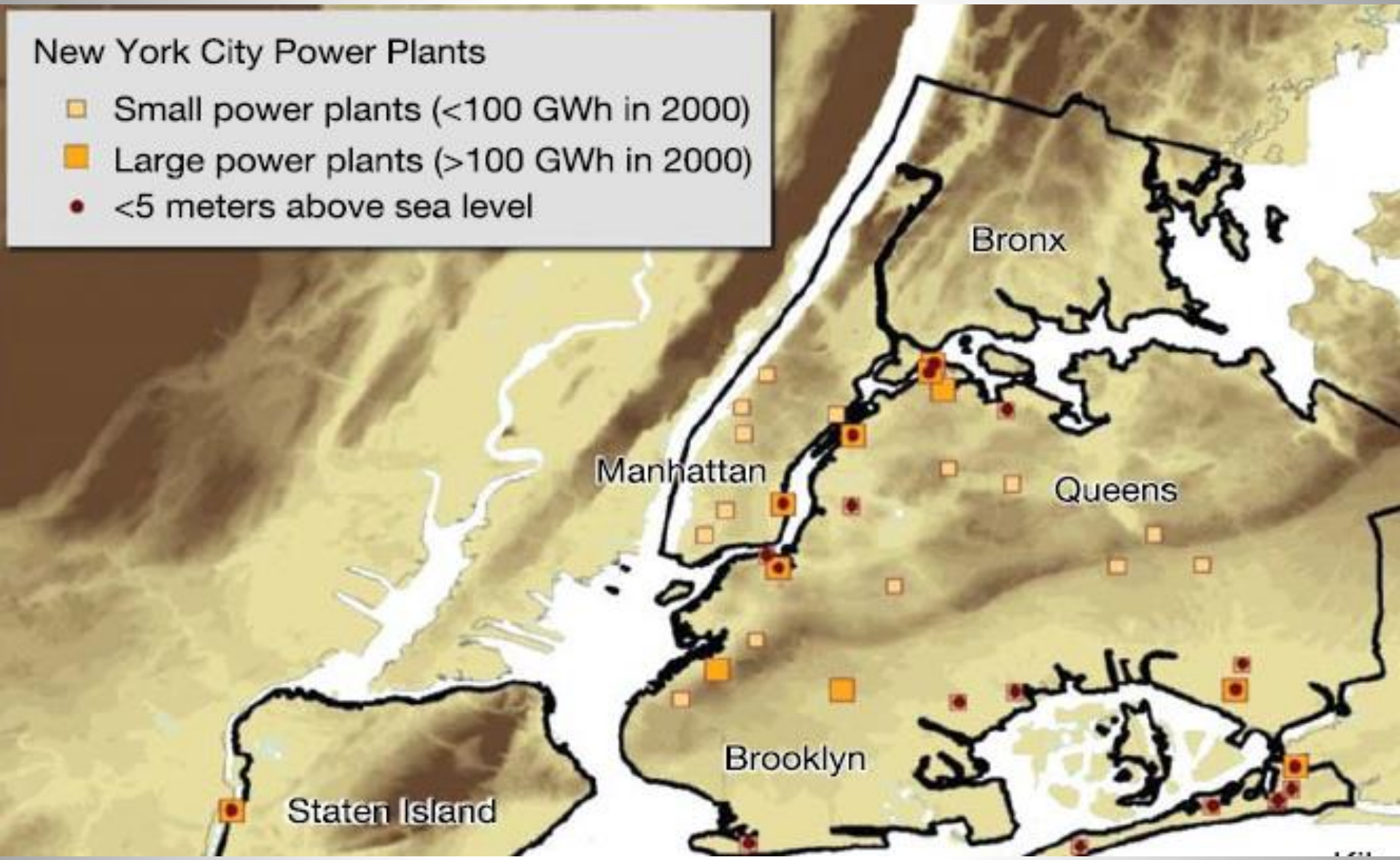
Source: https://www.tidesandcurrents.noaa.gov/sltrends/sltrends_us.htm

ClimAID estimates of SLR

b. Region 4 – New York City

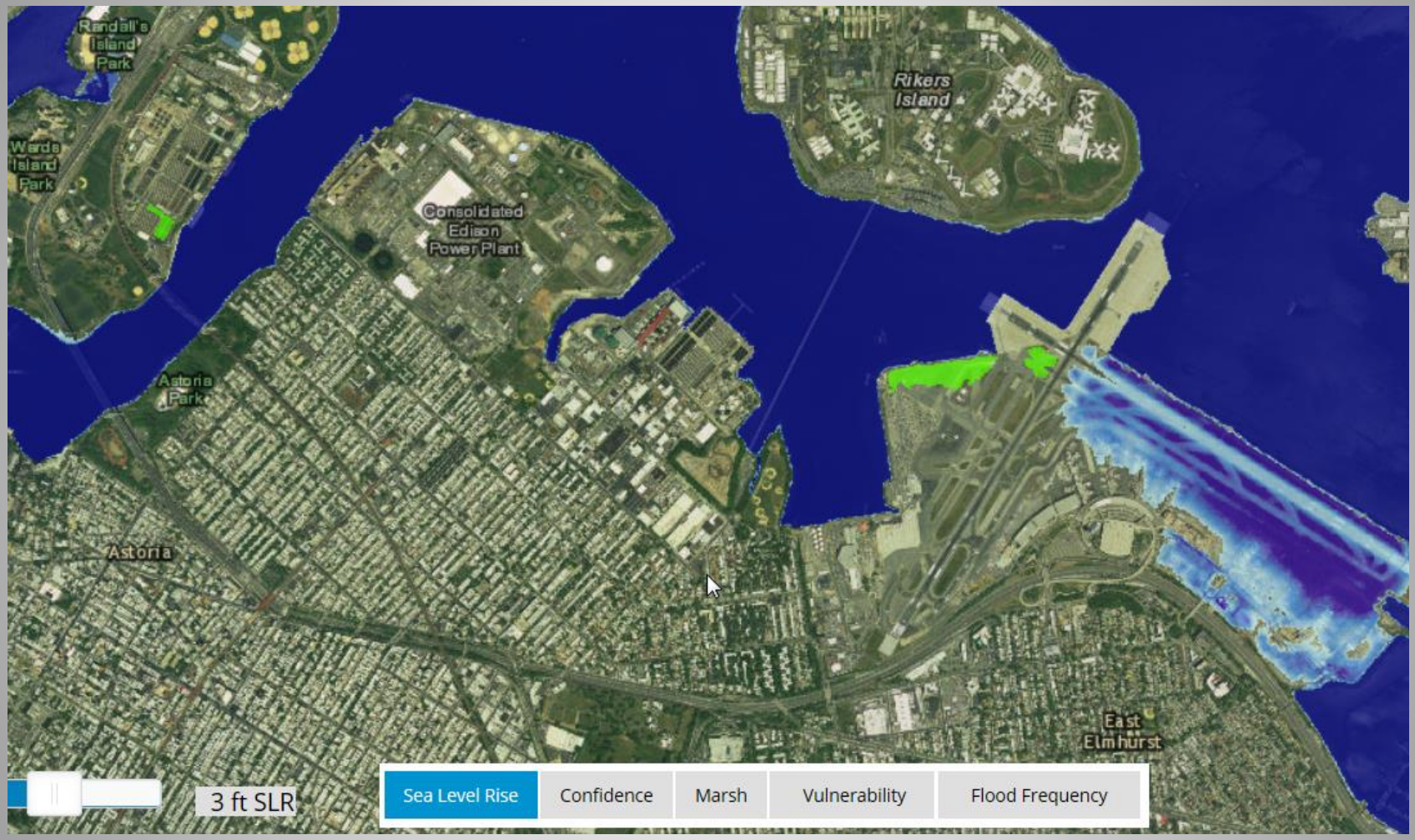
Baseline (2000-2004) 0 inches	Low Estimate (10th Percentile)	Middle Range (25th to 75th Percentile)	High Estimate (90th Percentile)
2020s	2 in	4 to 8 in	10 in
2050s	8 in	11 to 21 in	30 in
2080s	13 in	18 to 39 in	58 in
2100	15 in	22 to 50 in	75 in

Source: NYSERDA ClimAID, Supplement to Report 11-18



Source: NYSERDA ClimAID, Chp. 8, Figure 8.4

Example of Vulnerability with 3’ SLR (NOAA SLR Viewer)



Source: https://coast.noaa.gov/digitalcoast/tools/slr