



# Change is in the Air: Northeast U.S. Agriculture in a Changing Climate

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Cornell University

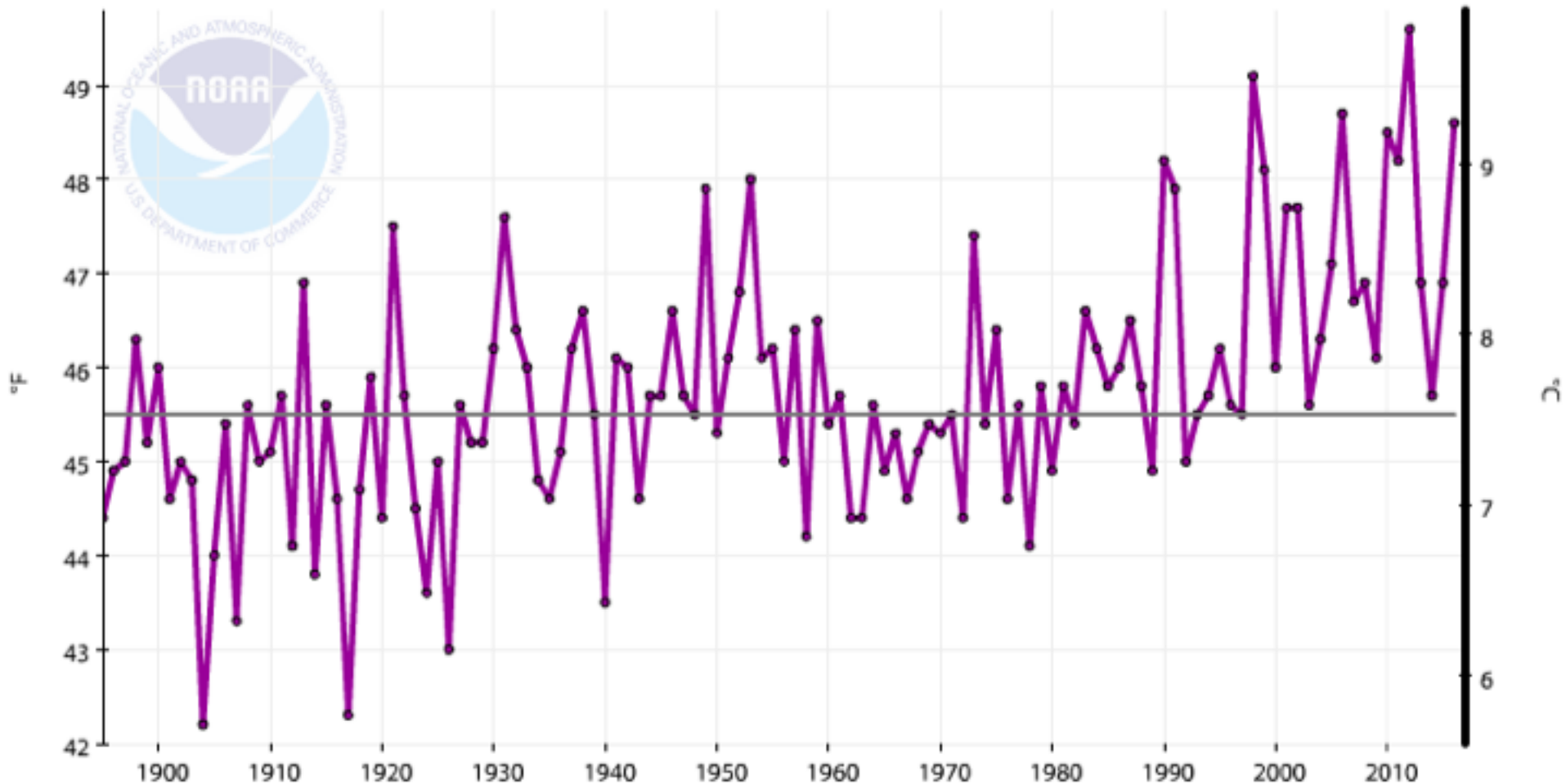




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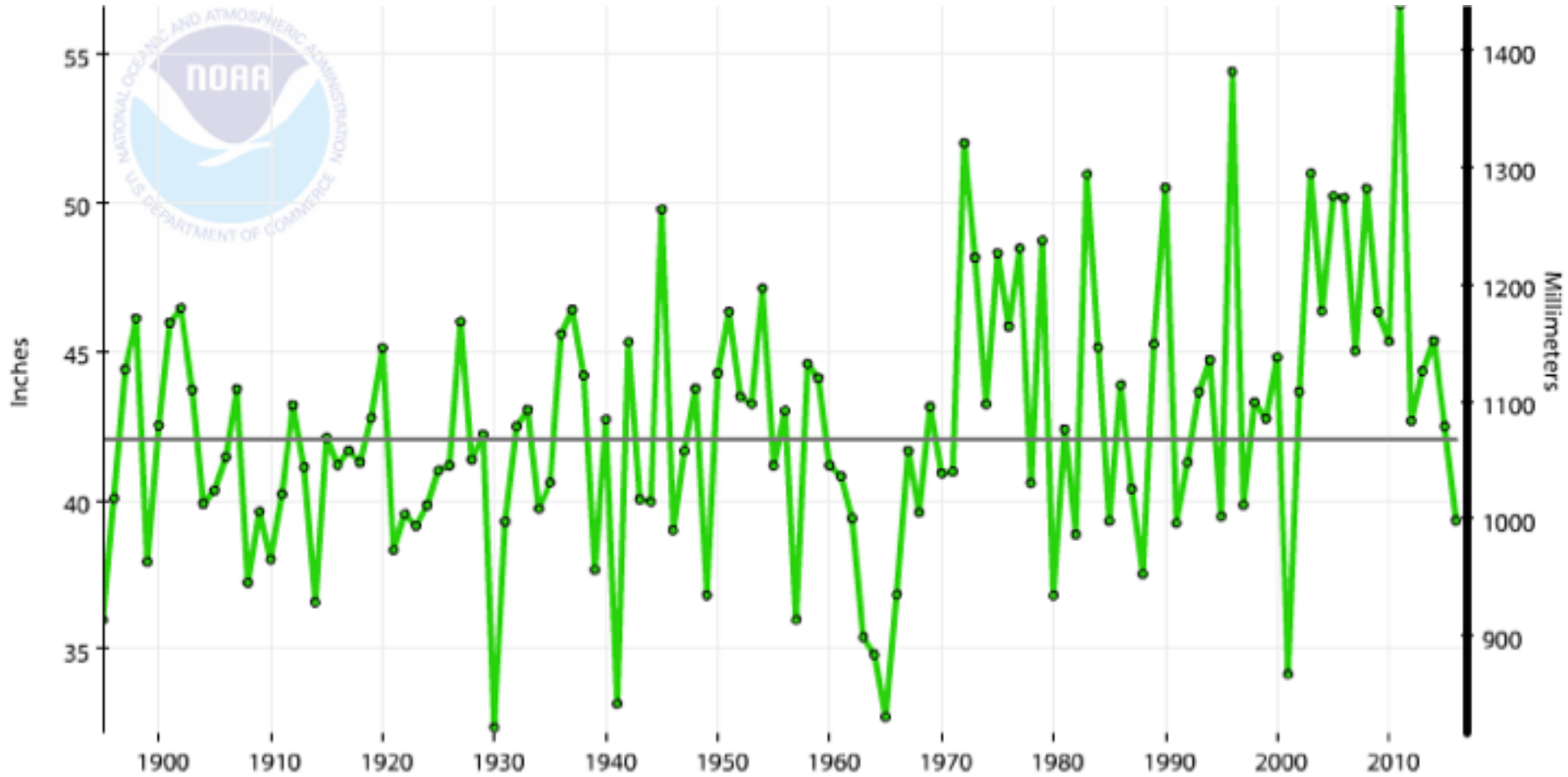
# Annual Temperature Northeast U.S.



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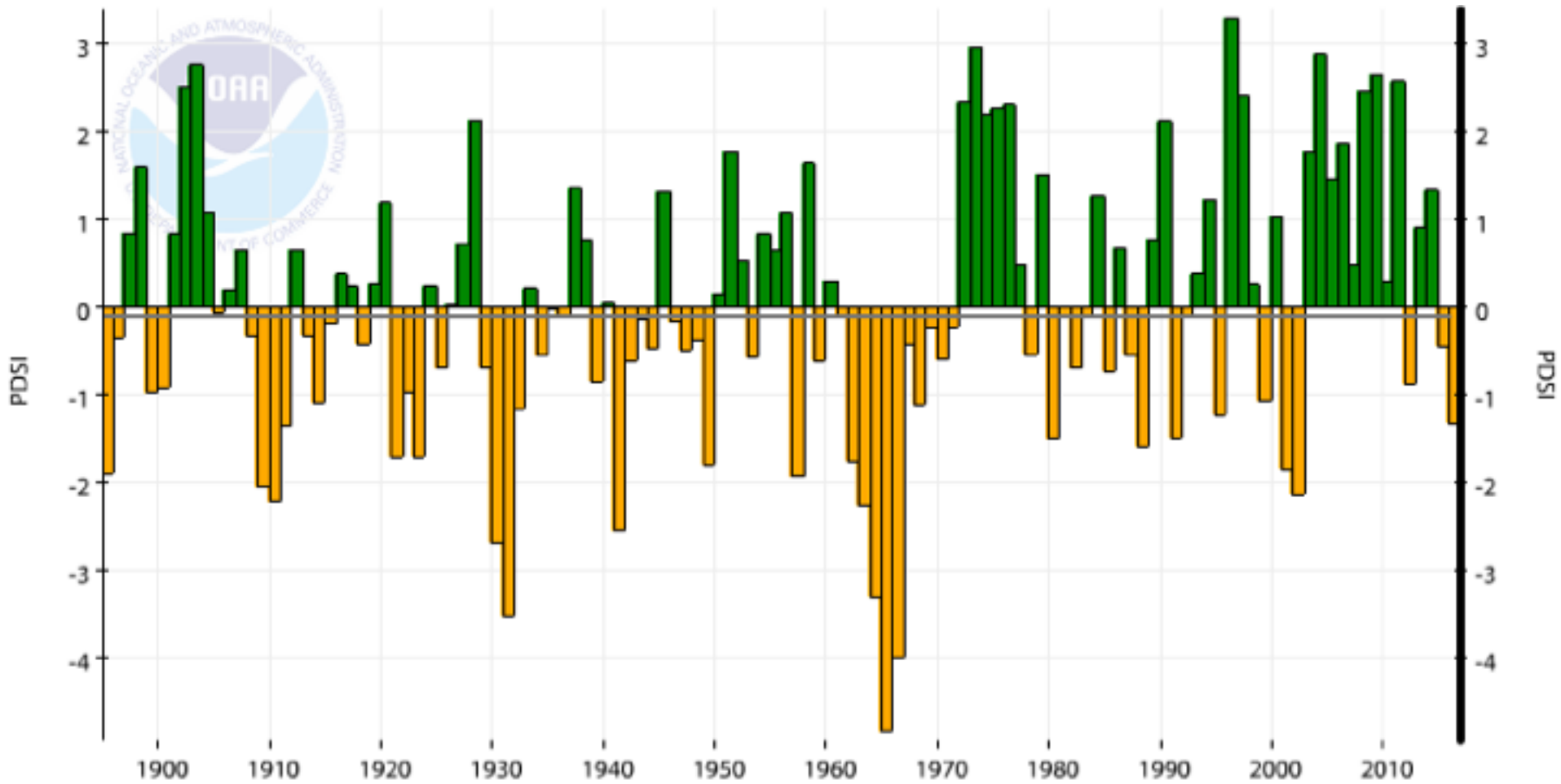
# Annual Precipitation Northeast U.S.



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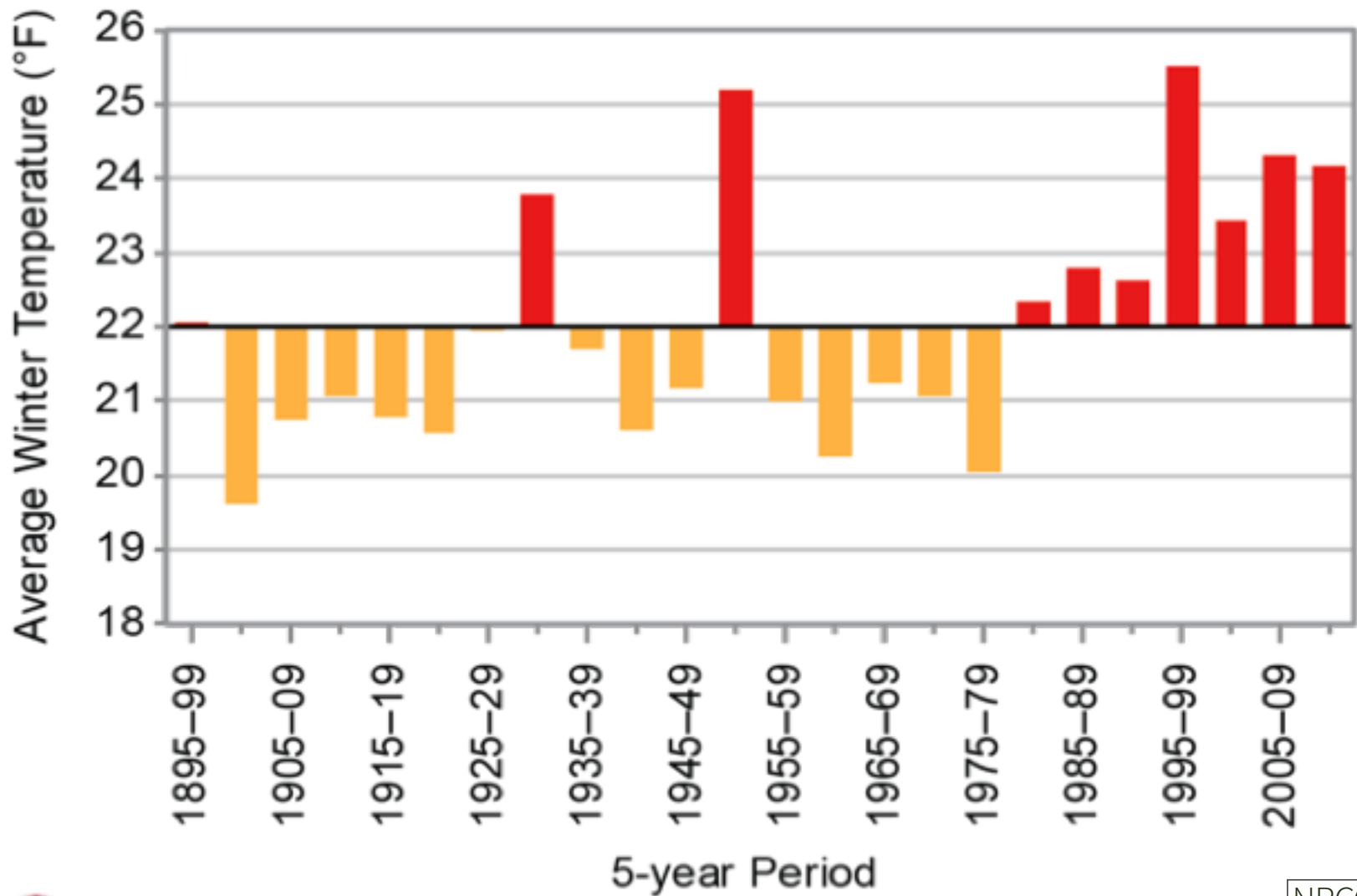
# Annual PDSI Northeast U.S.



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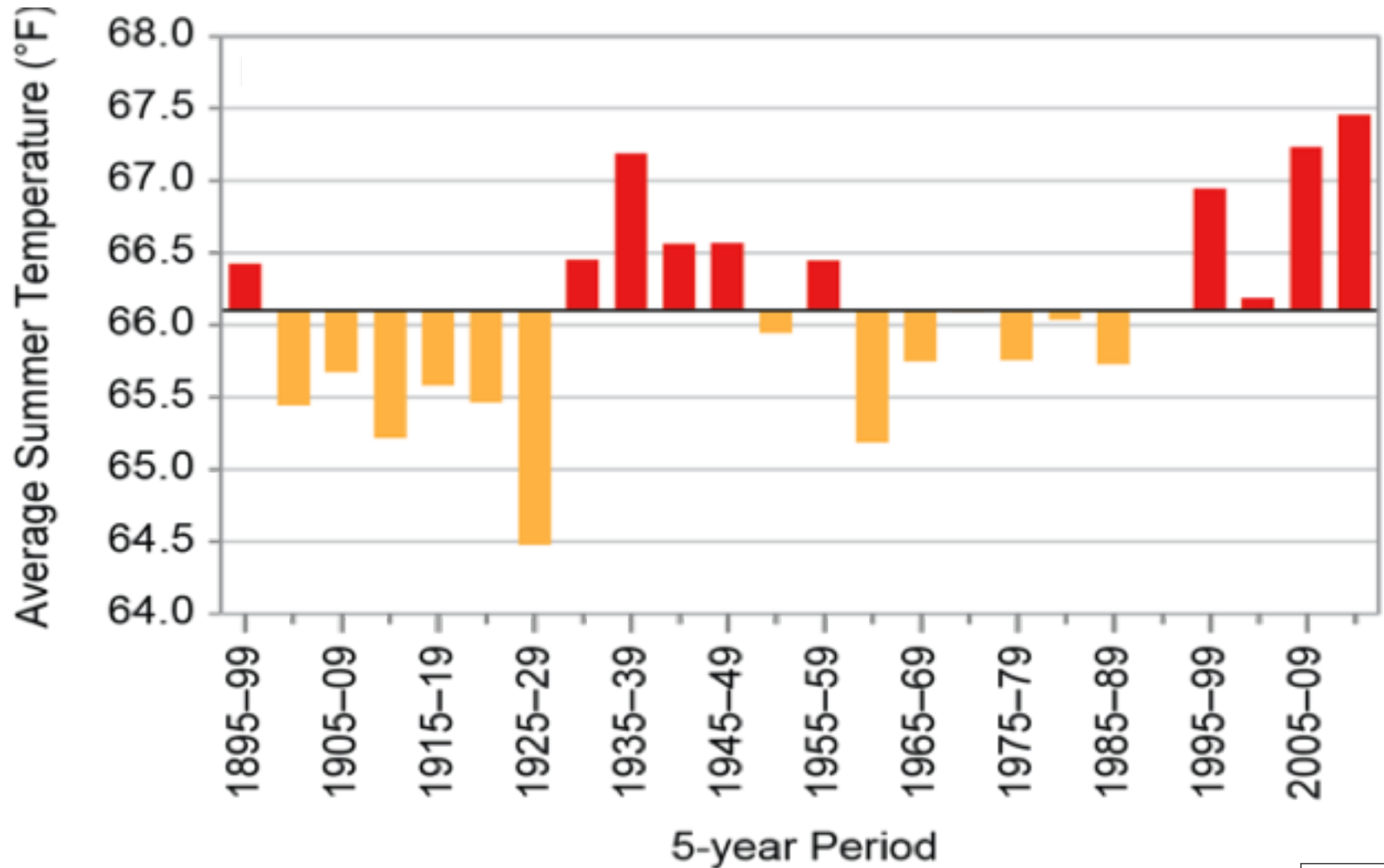
# New York Winter Temperature



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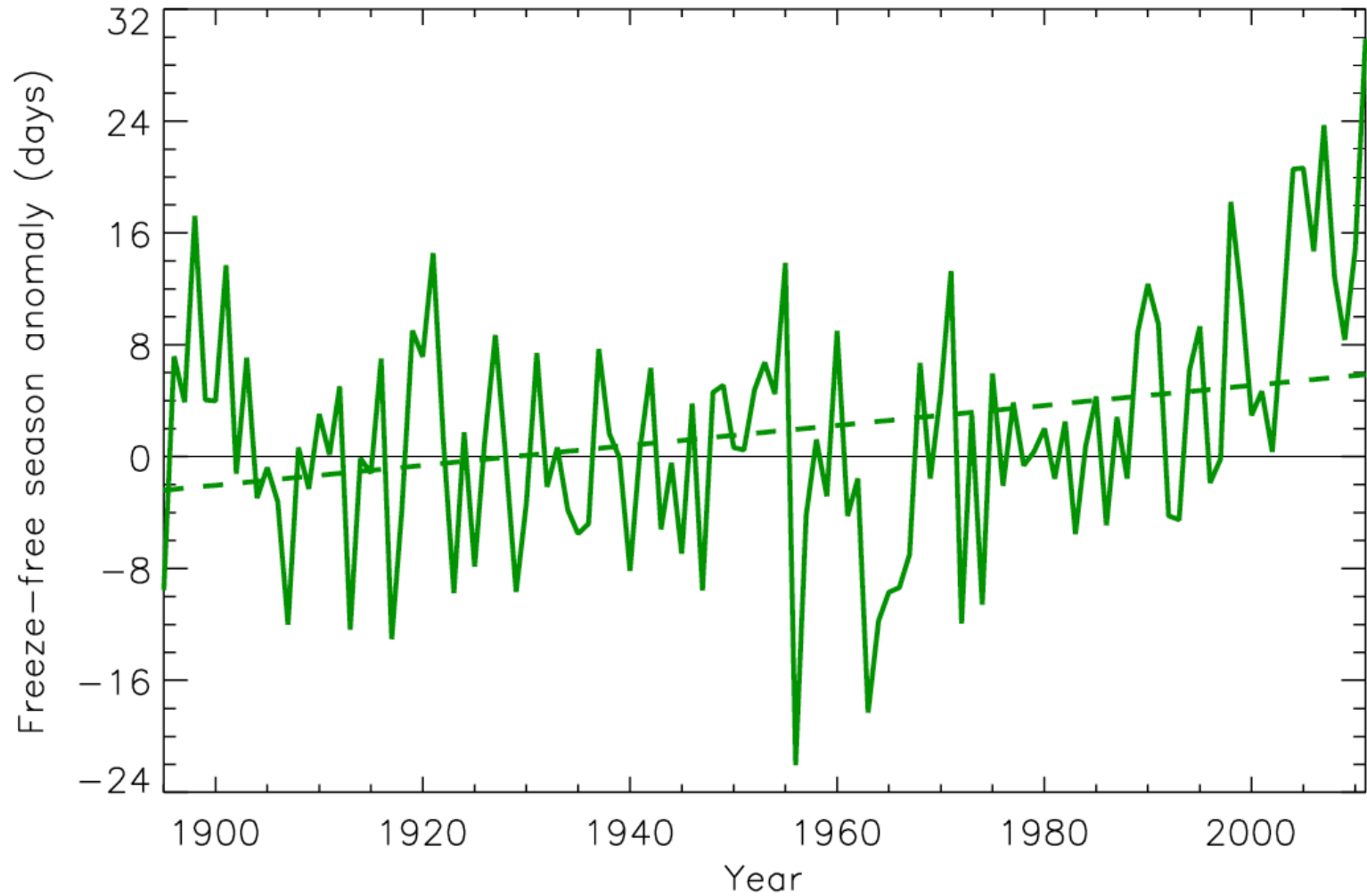
# New York Summer Temperature



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# New York Frost-Free Season

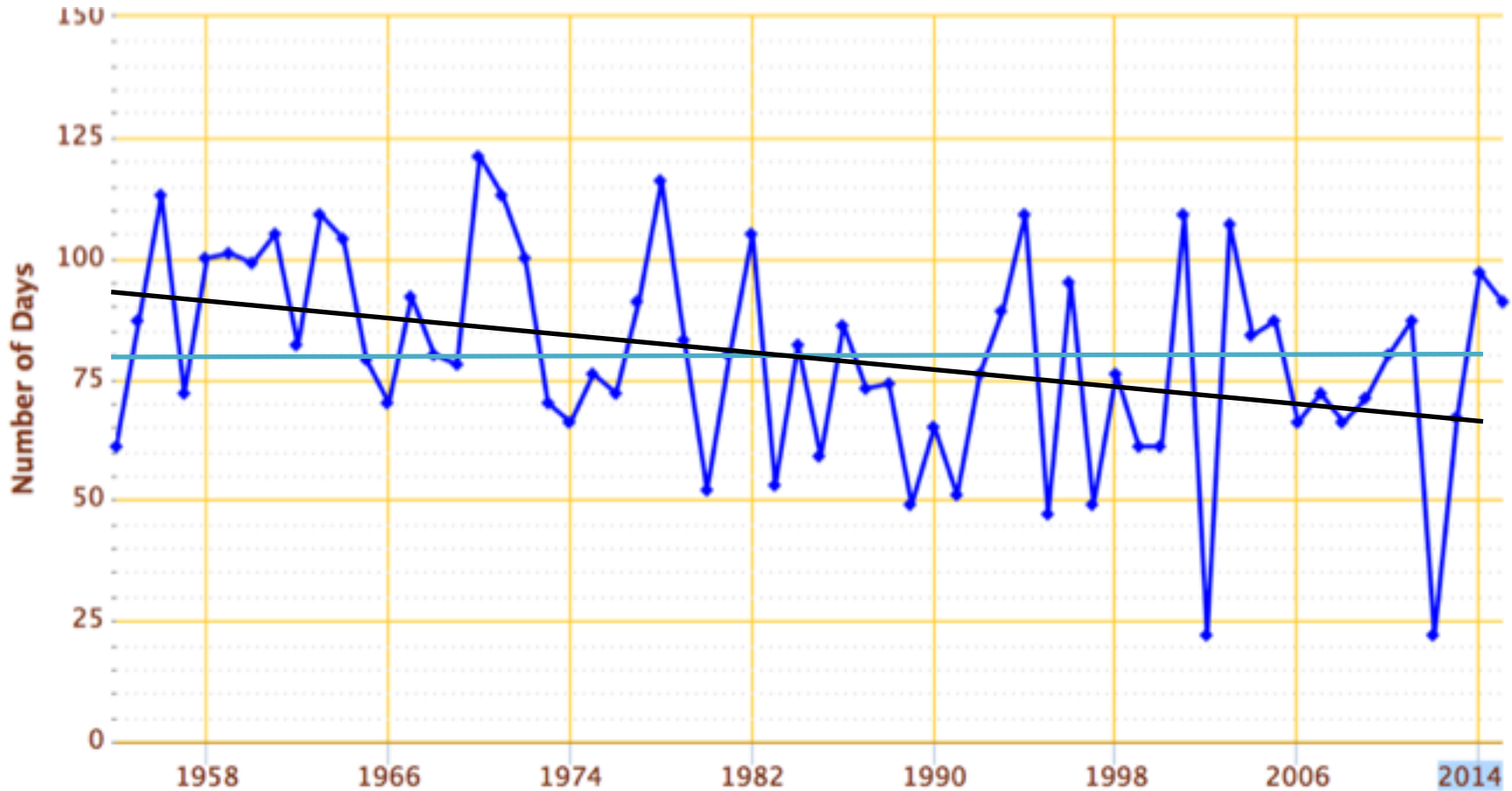


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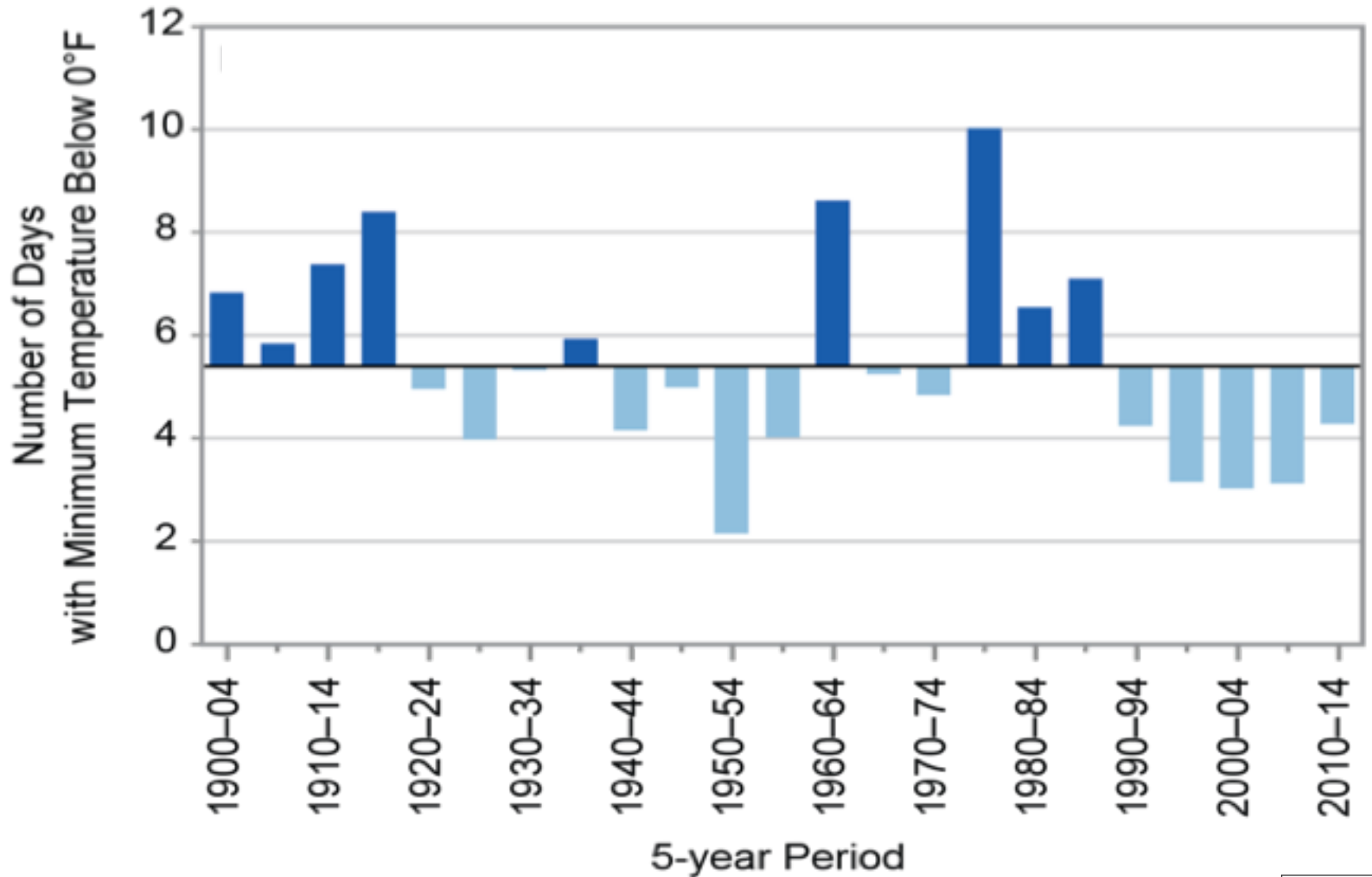
# Days with Snow Cover (NY)



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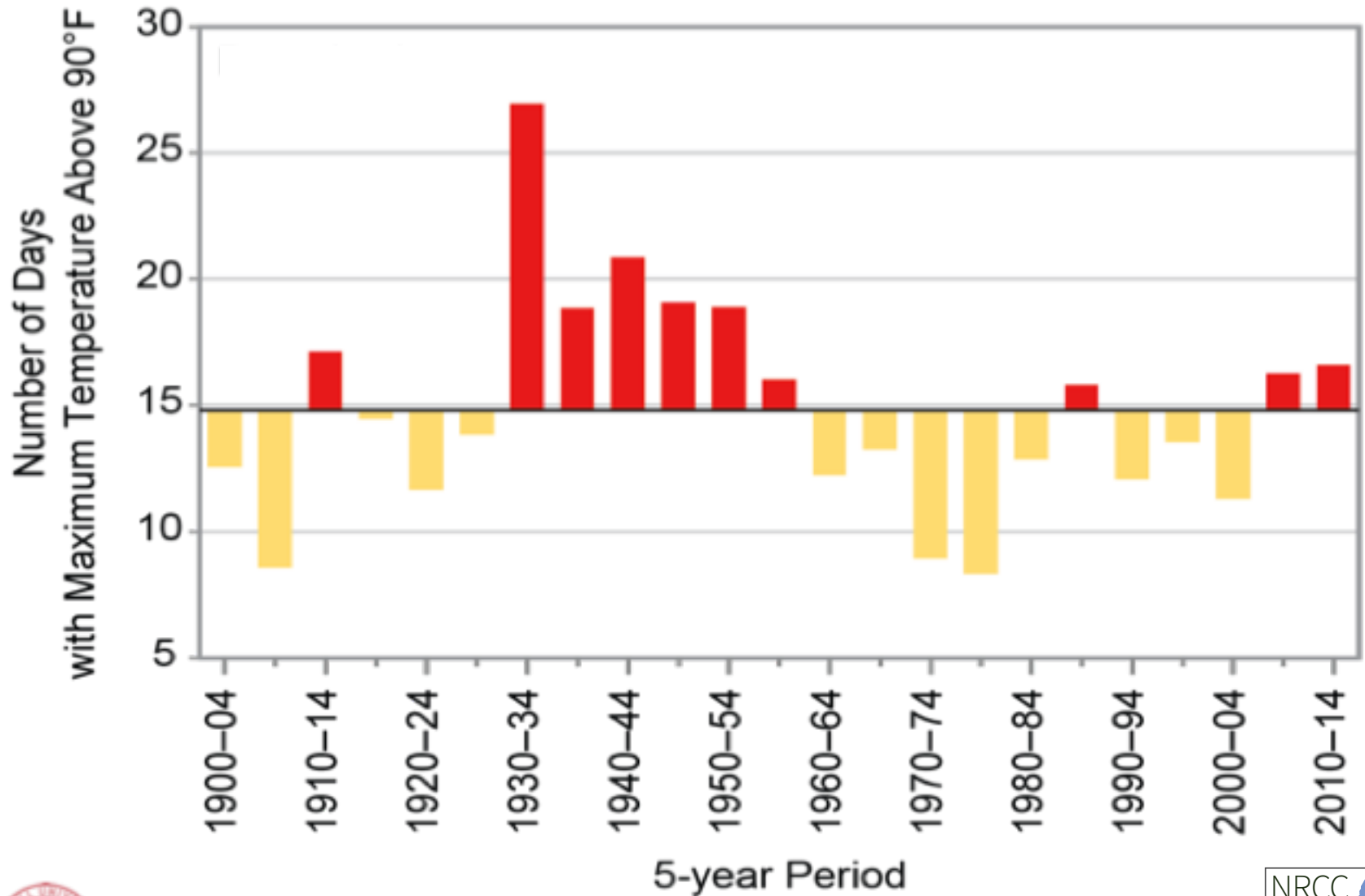
# Very Cold Nights (PA)



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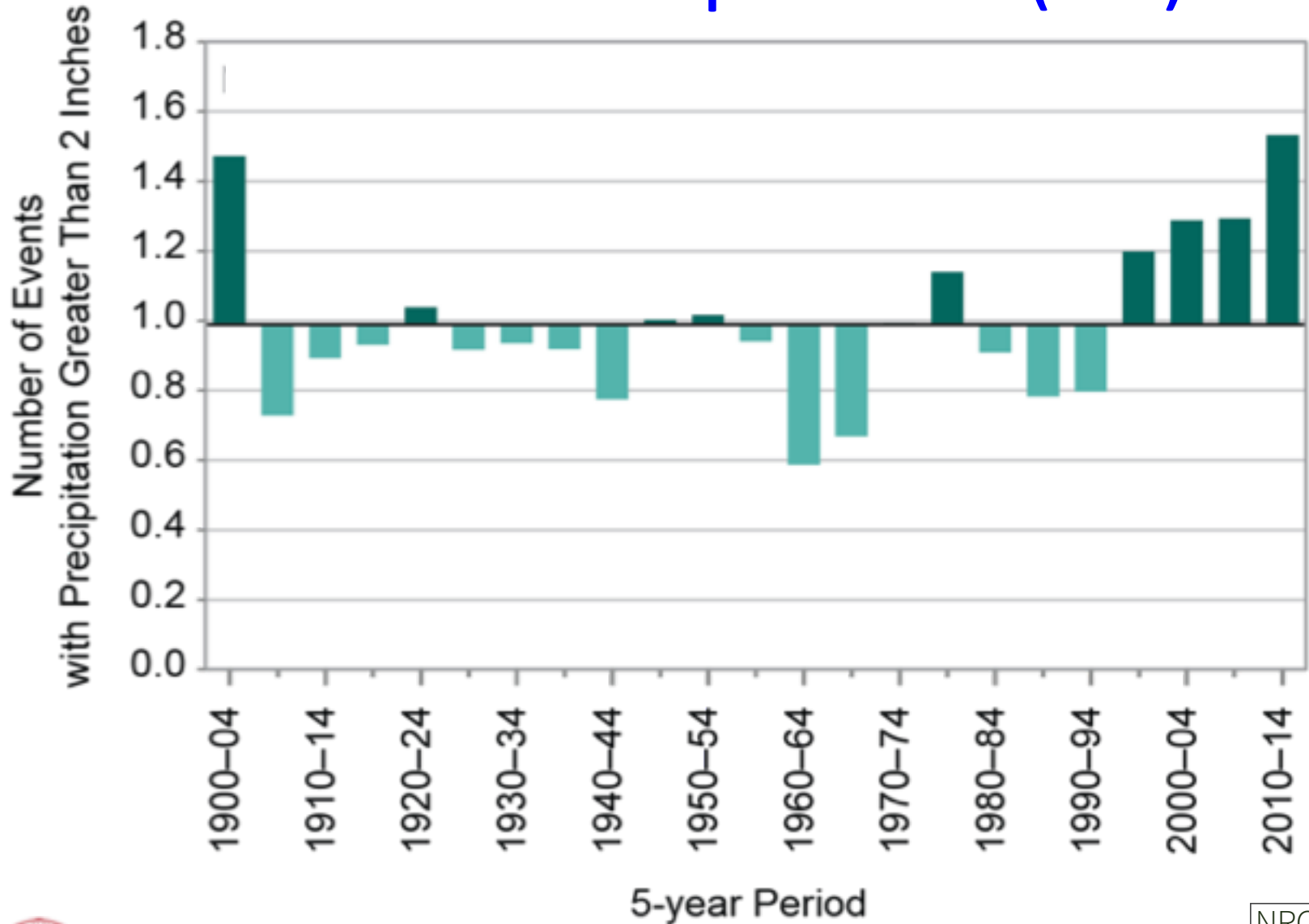
# Very Hot Days (PA)



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# Extreme Precipitation (NY)



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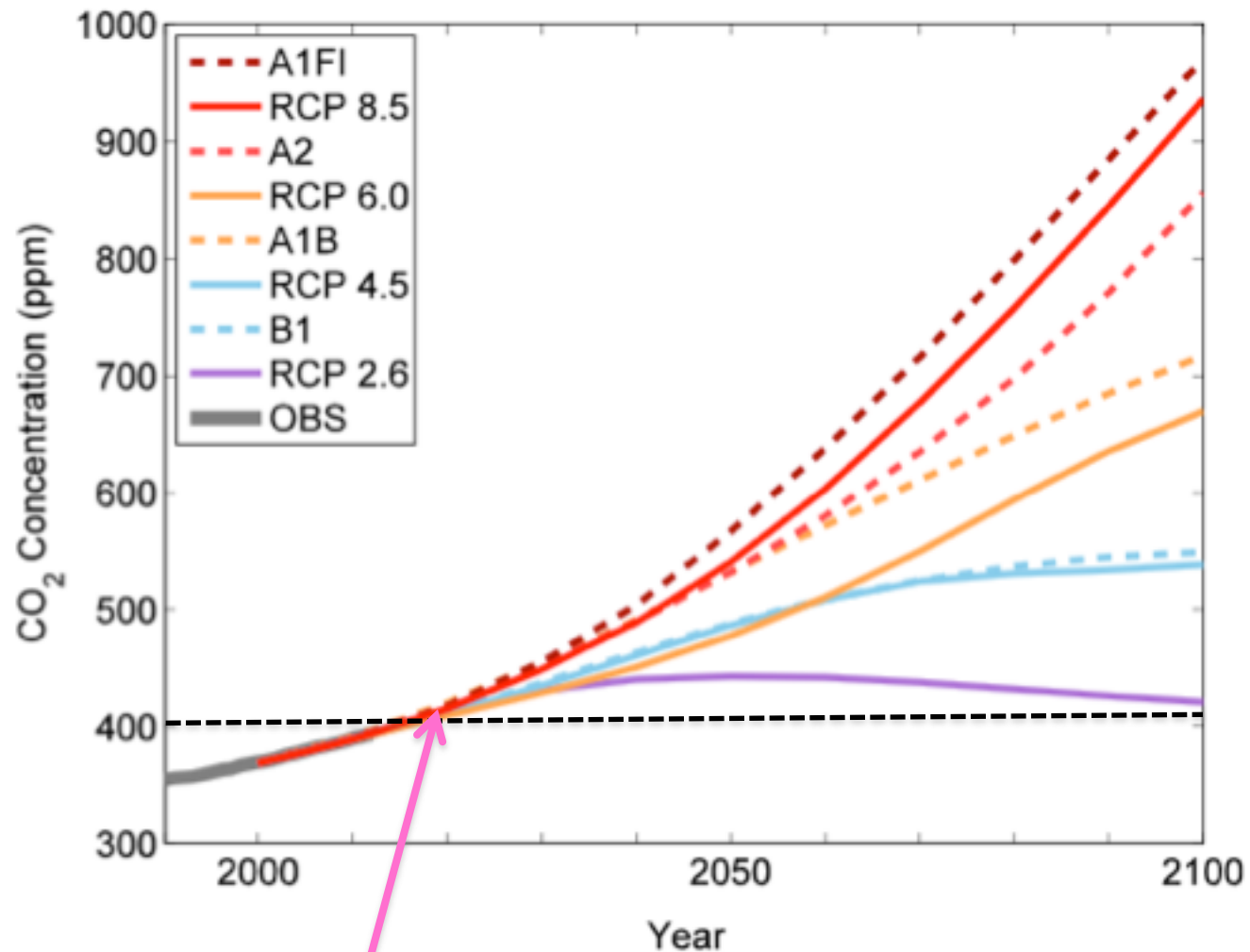
# So What Does the FUTURE Hold ?



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# Setting the Stage



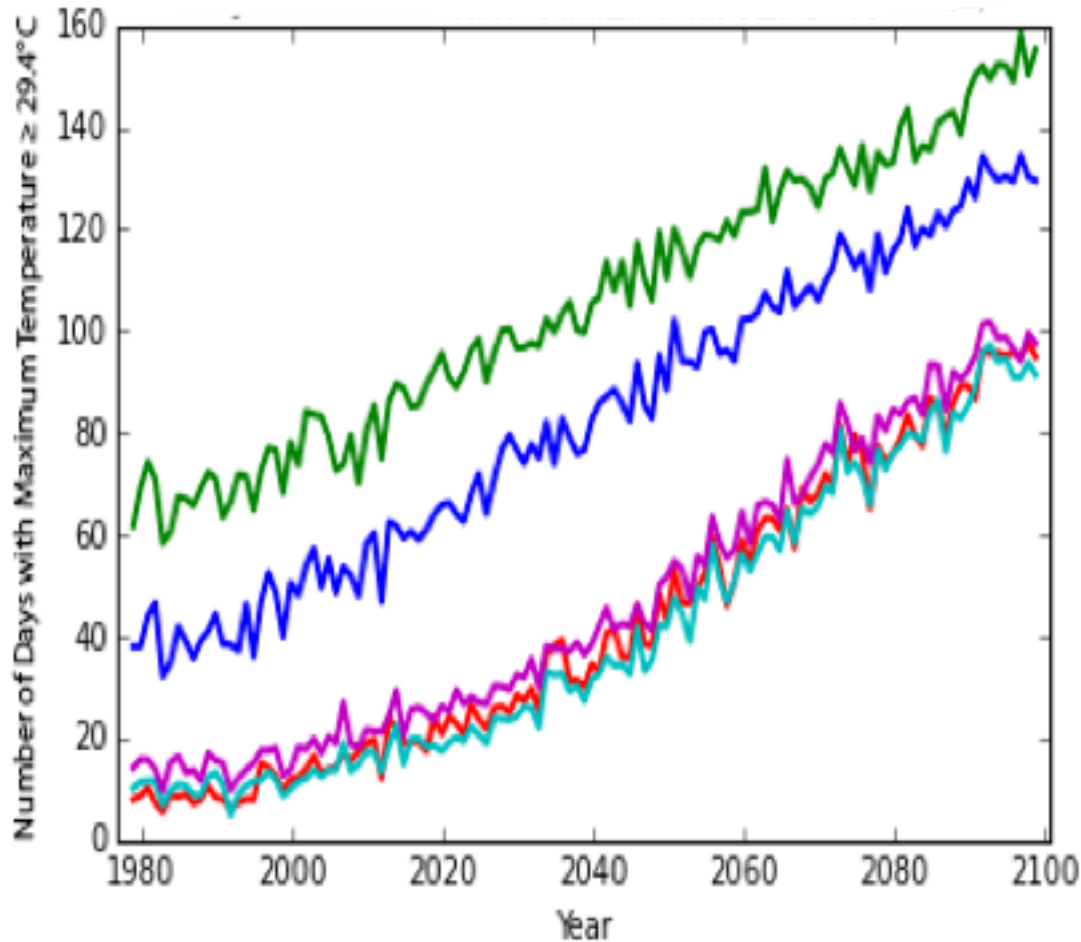
You Are Here



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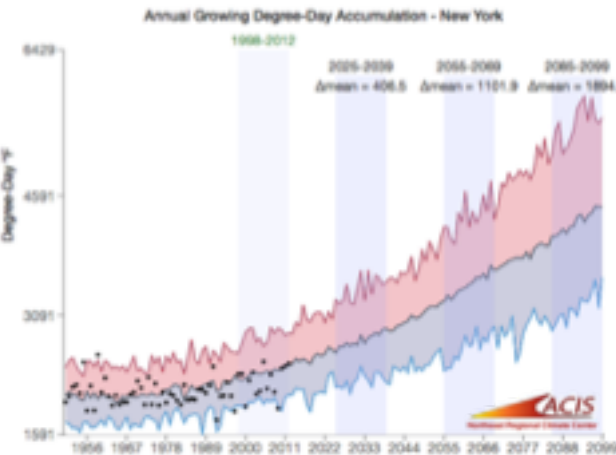
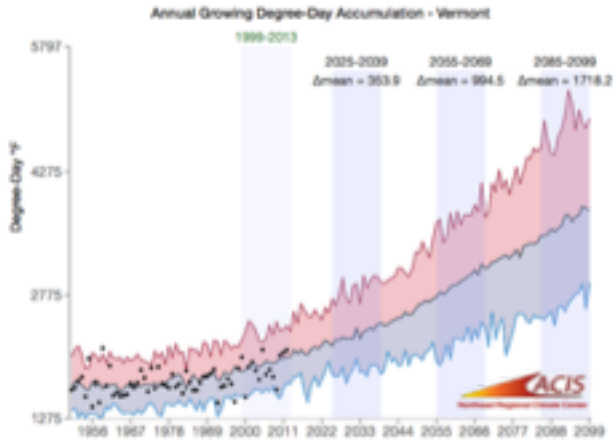
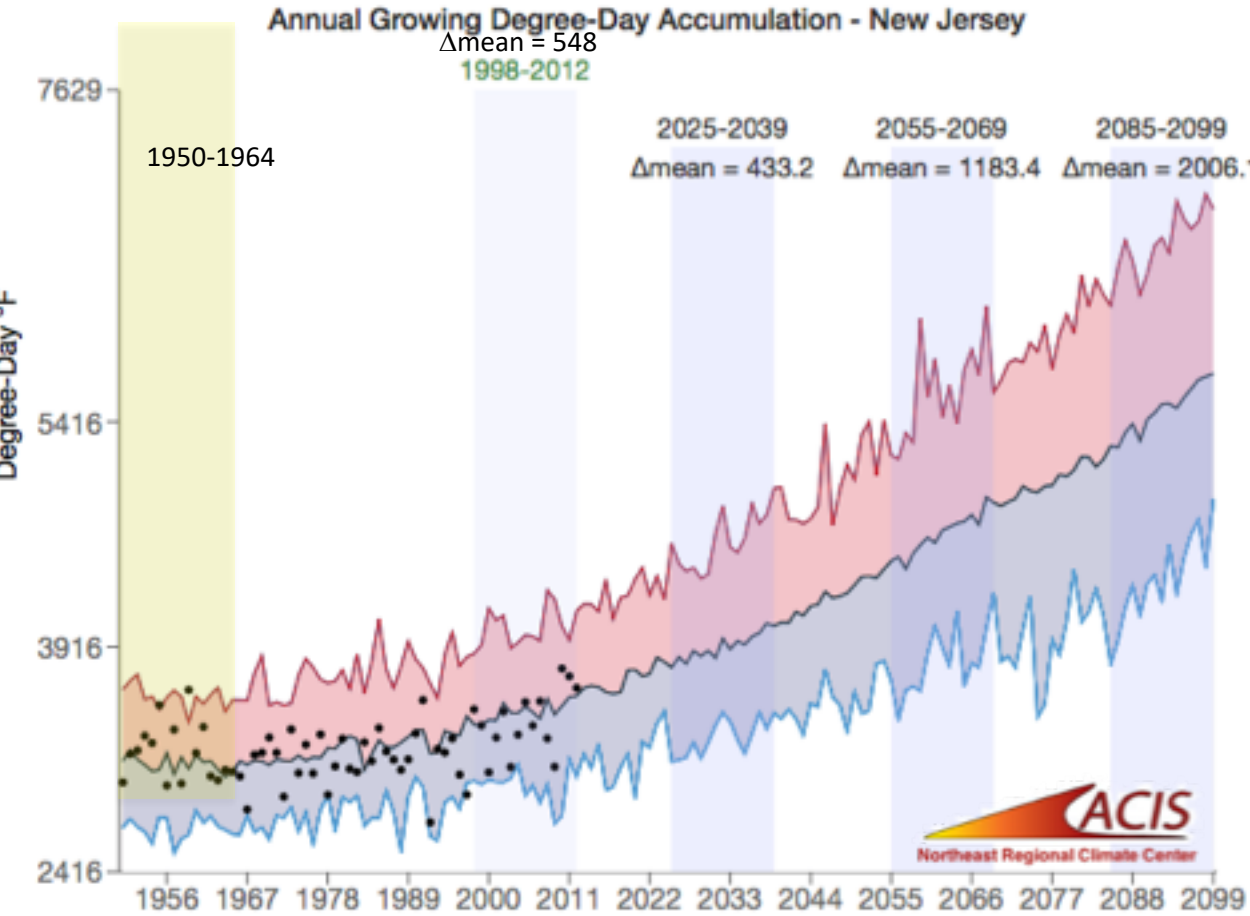
# Days with Max > 85° F High Emissions



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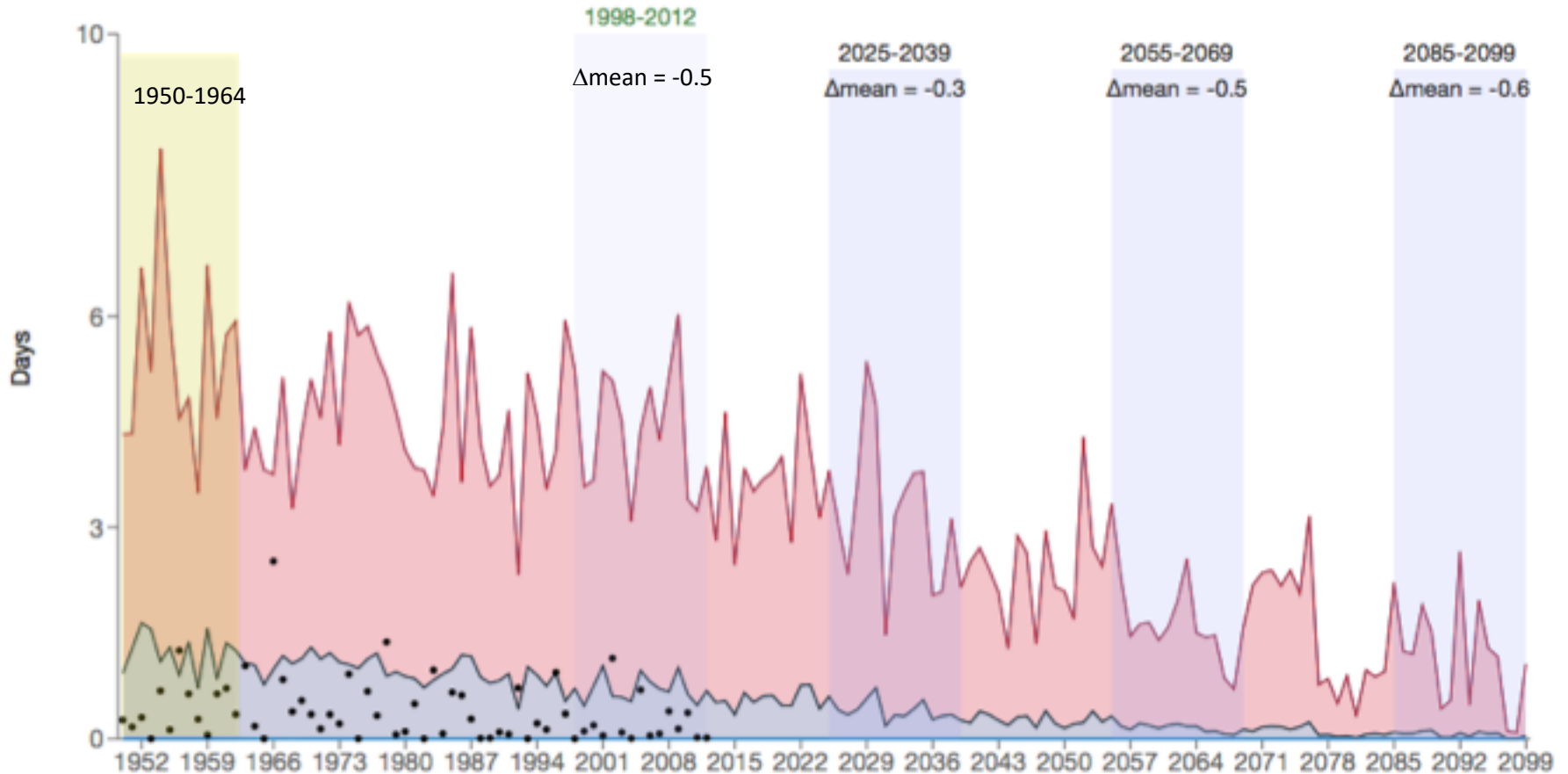
# A Holistic View of the Growing Season





# Days < 32° F May

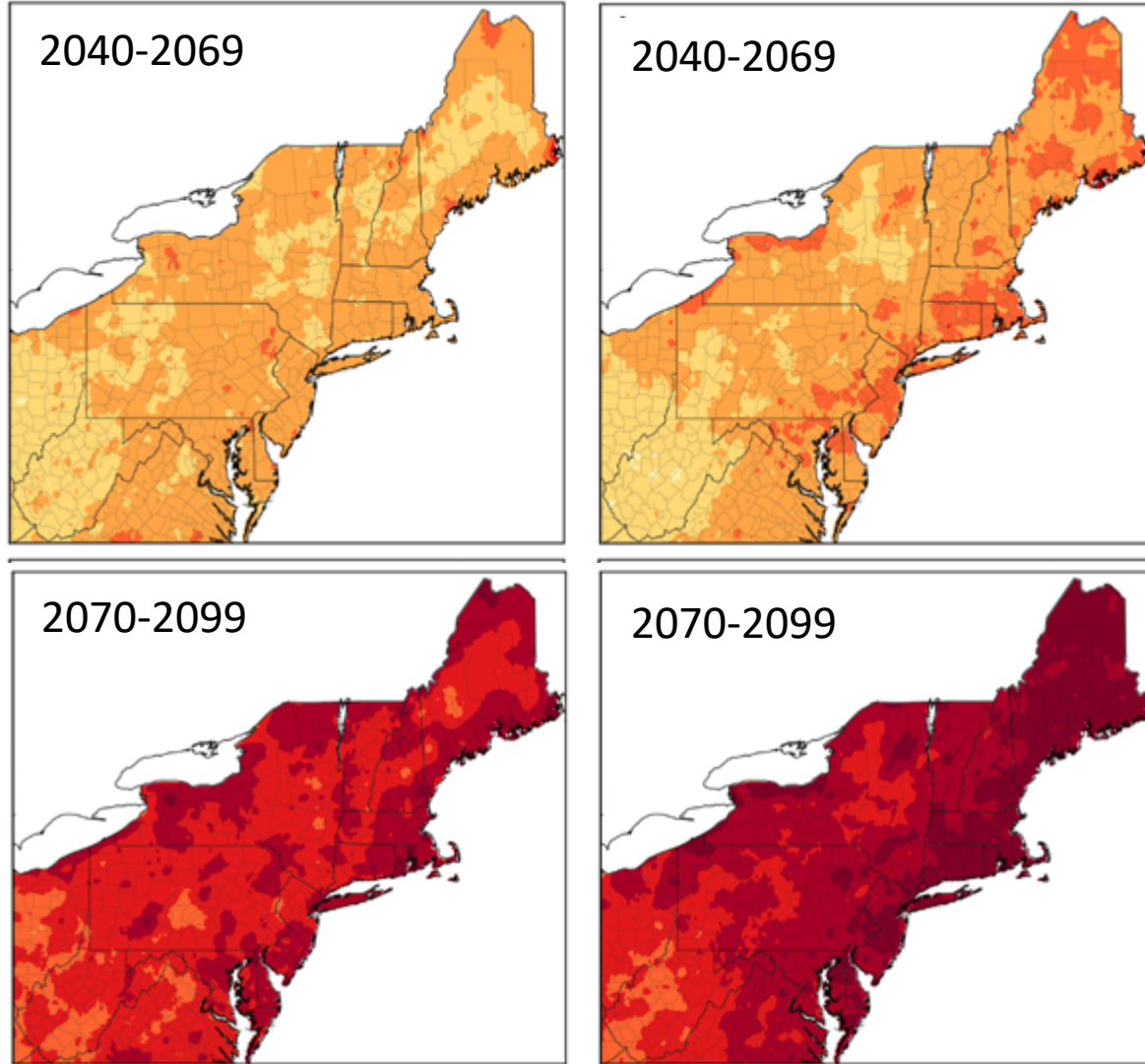
May Days with Minimum Temperature Below 32°F - New Jersey



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# Last Spring - First Fall 32° F



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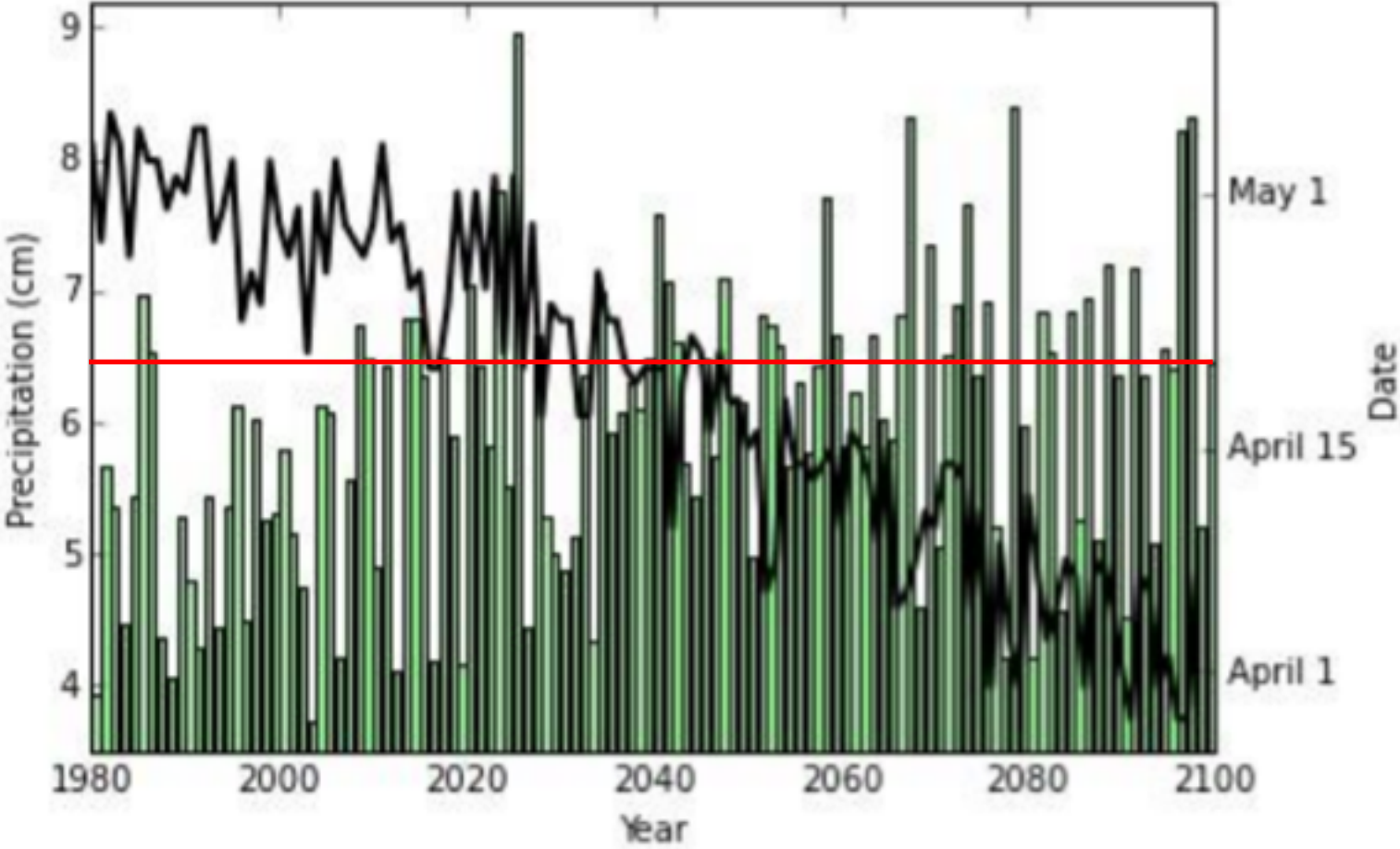
Hey! Maybe I can  
plant earlier!



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# Precip 3 Weeks Prior to Last Frost



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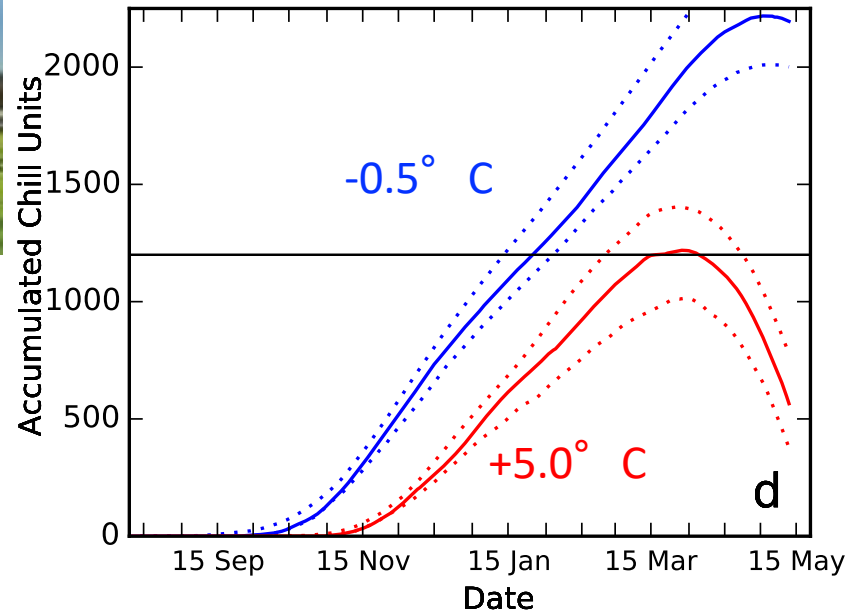
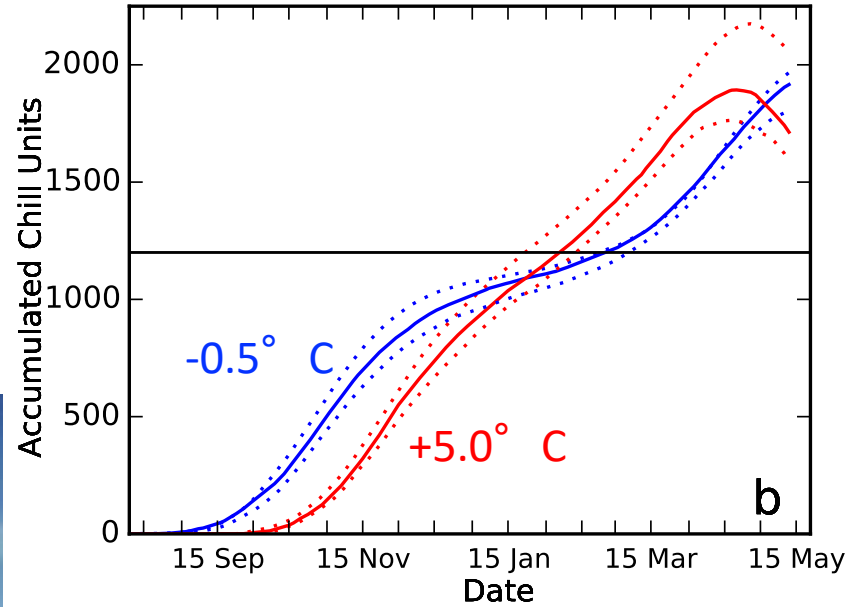


# Implications for Agriculture

- ✓ Despite extended season and warmer springs....will fields be workable?



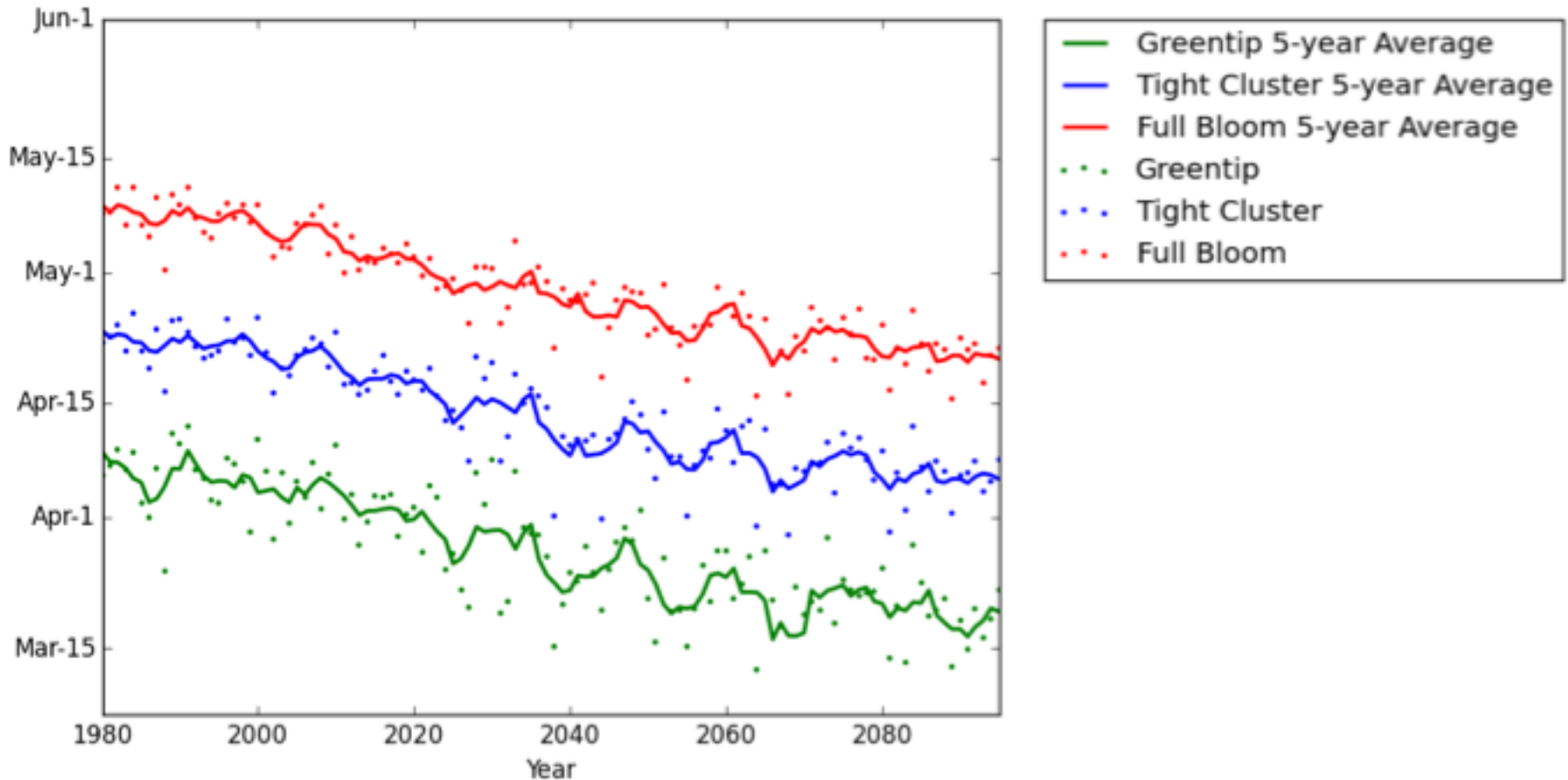
# Apple Chill Accumulation



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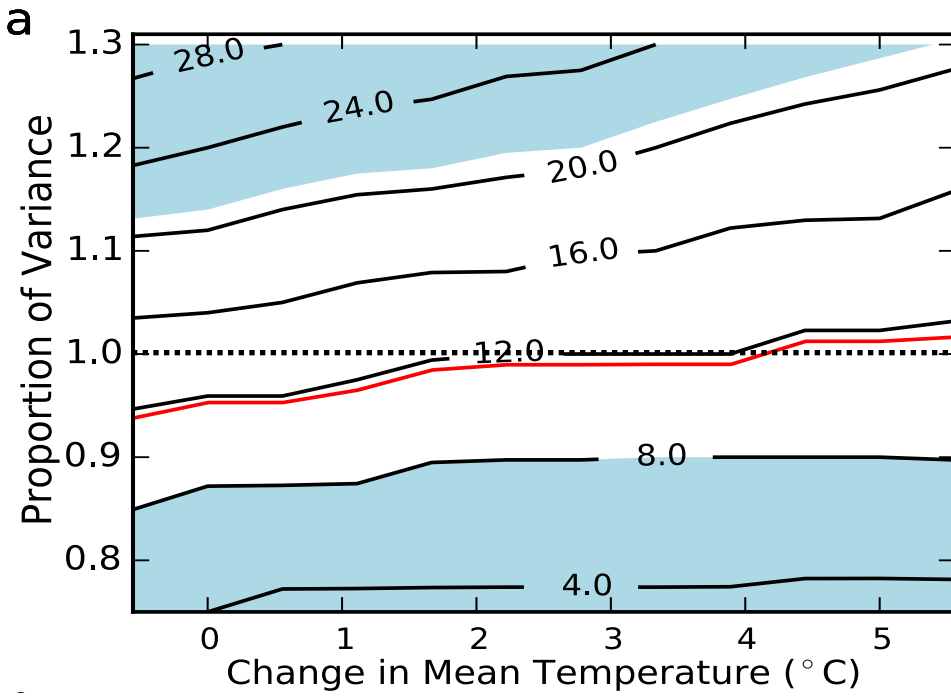
# Apple Phenology Dates



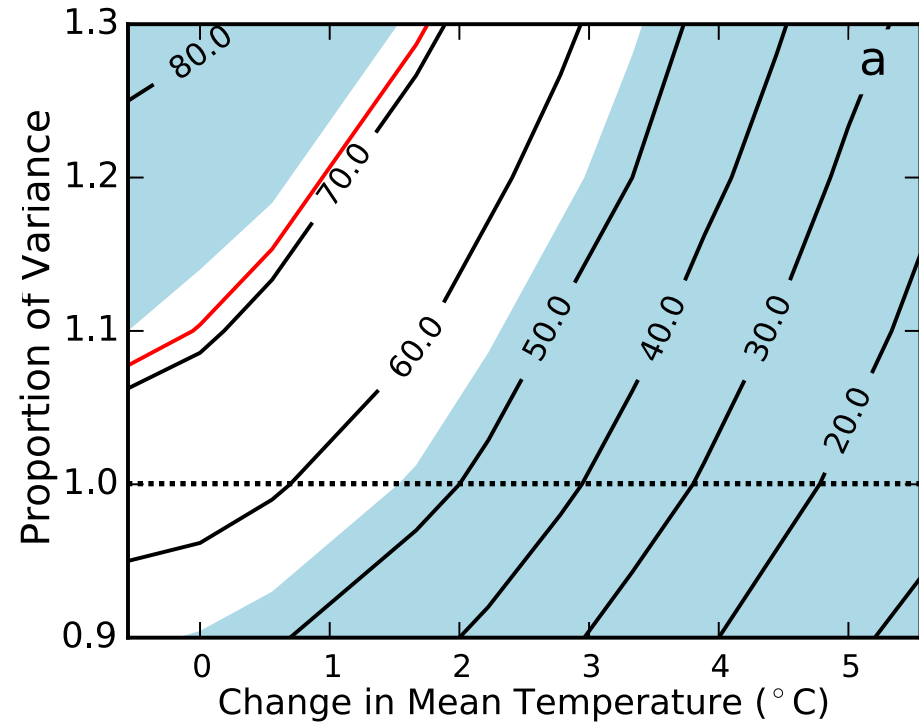
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# Ithaca



# Asheville

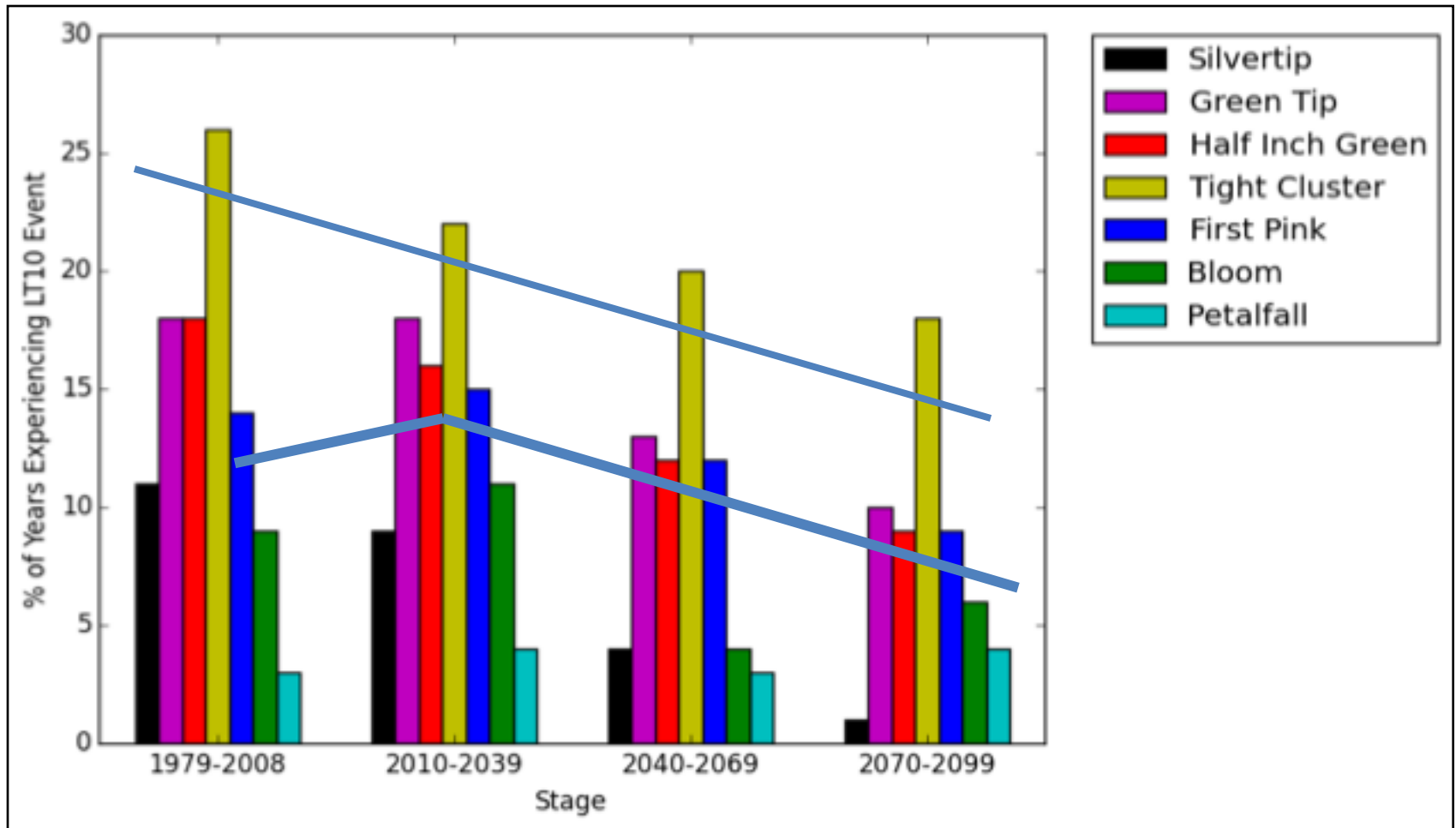


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# Apple Blossom Freeze Risk



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# Implications for Agriculture

- ✓ Spring Freeze Risk does not appear to increase in the long term
- ✓ Some indication of increased risk in the short term



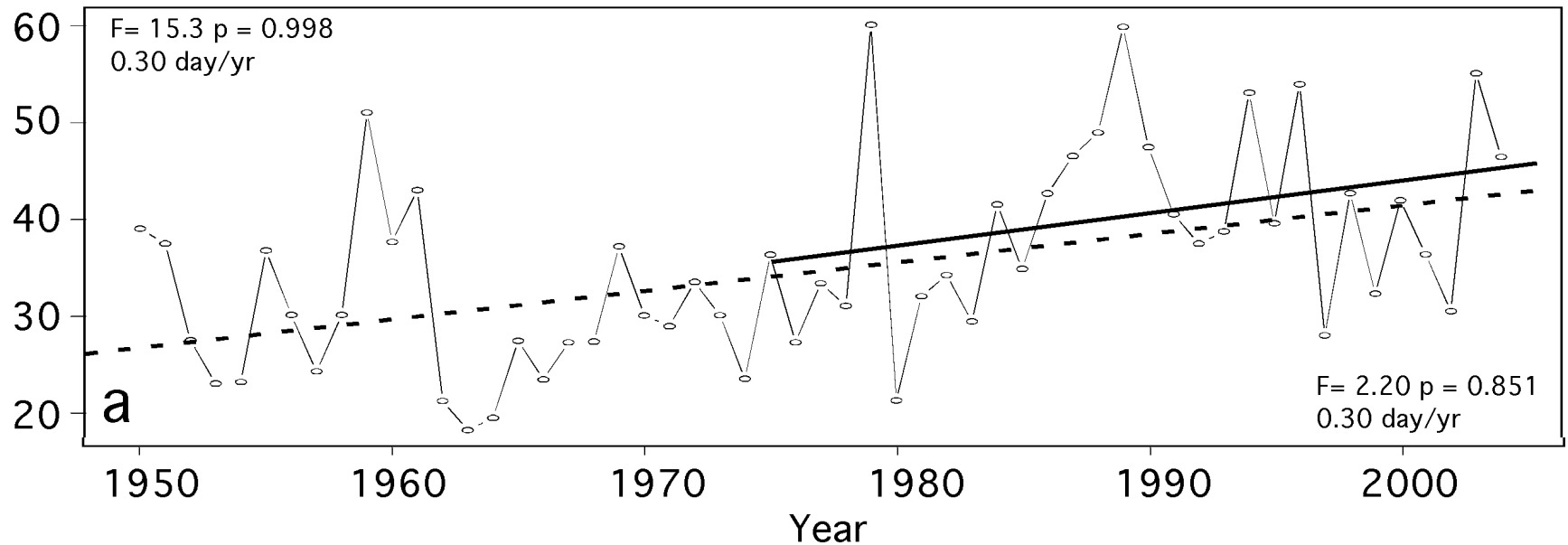
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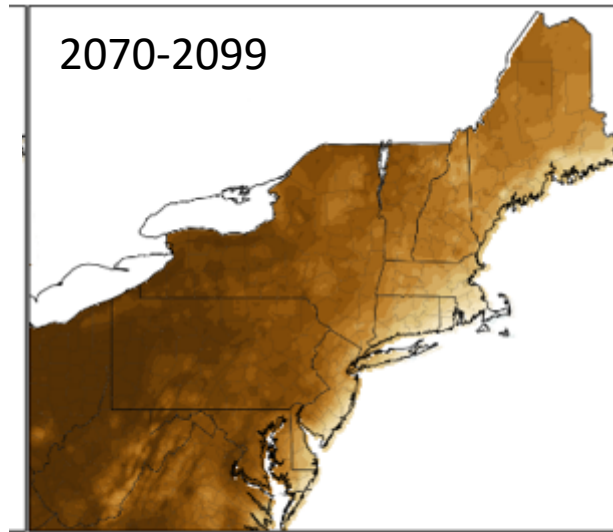
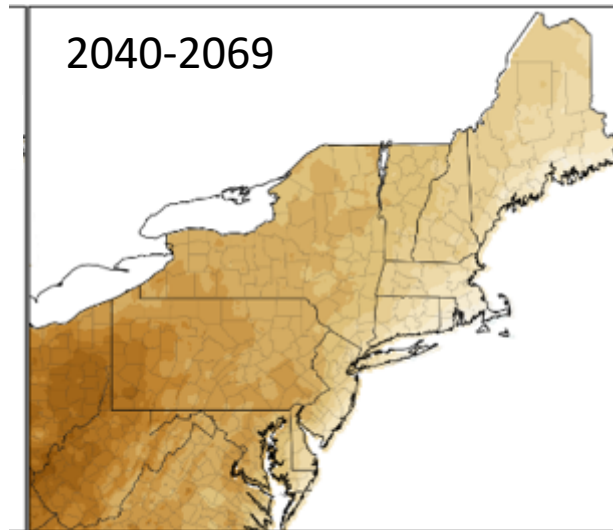
# Modeled Dollar Spot Risk



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# Summer RH High Emissions

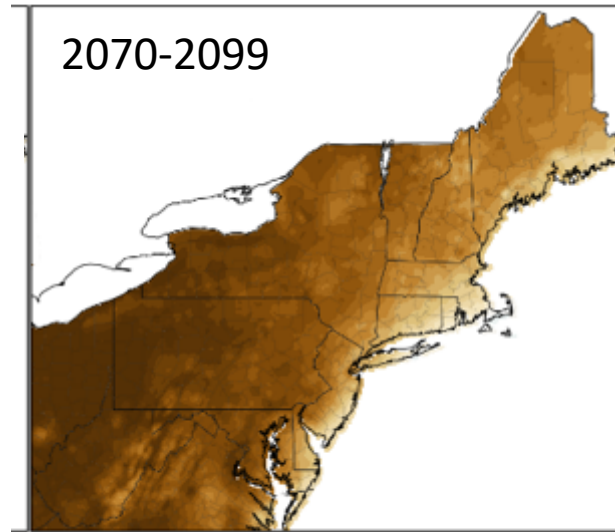
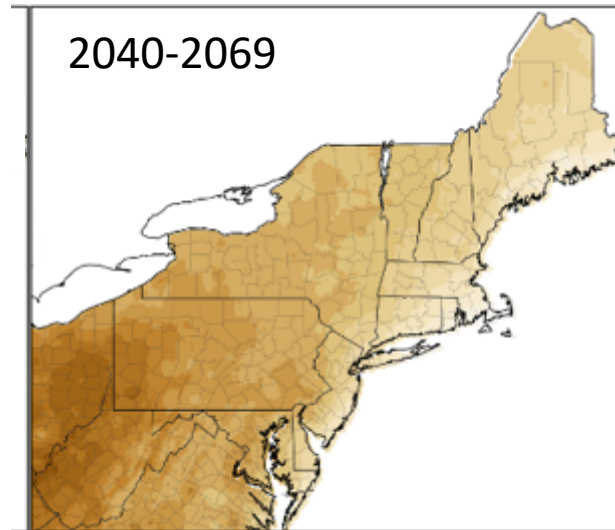


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# Summer RH High Emissions

Temper  
Summer  
Diseases that  
Depend on  
Leaf  
Wetness?

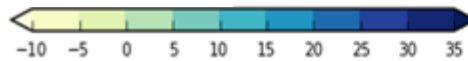
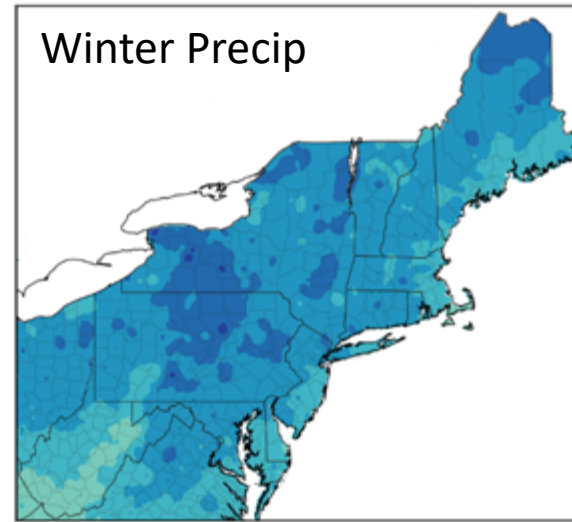
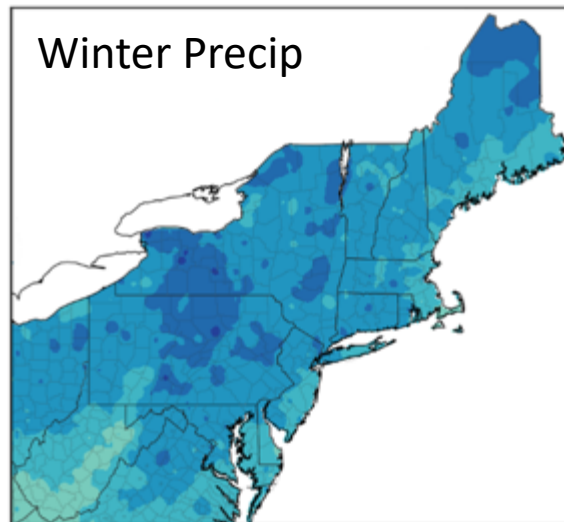
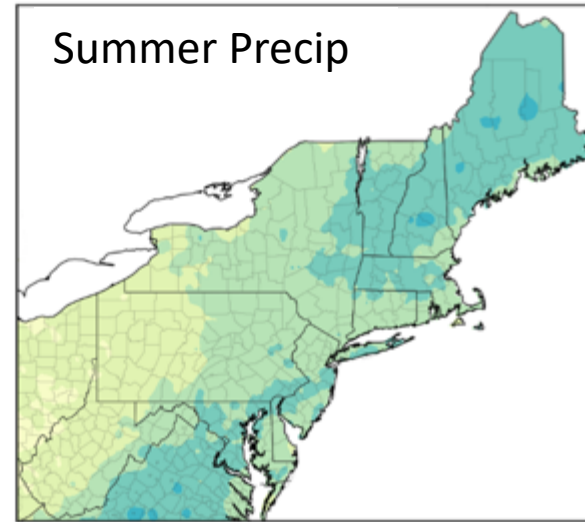
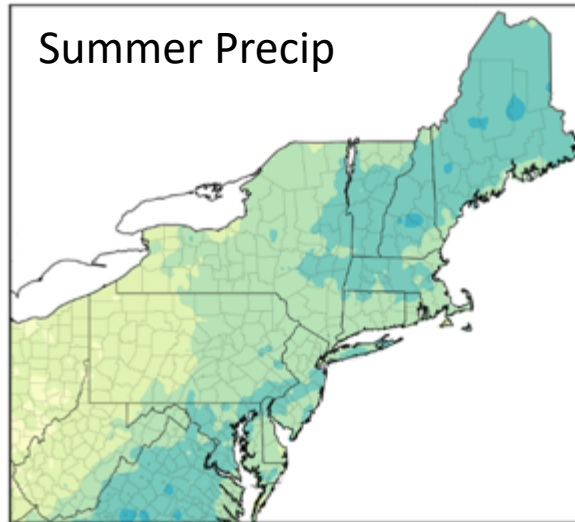


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# 2040-2069

# 2070 - 2099



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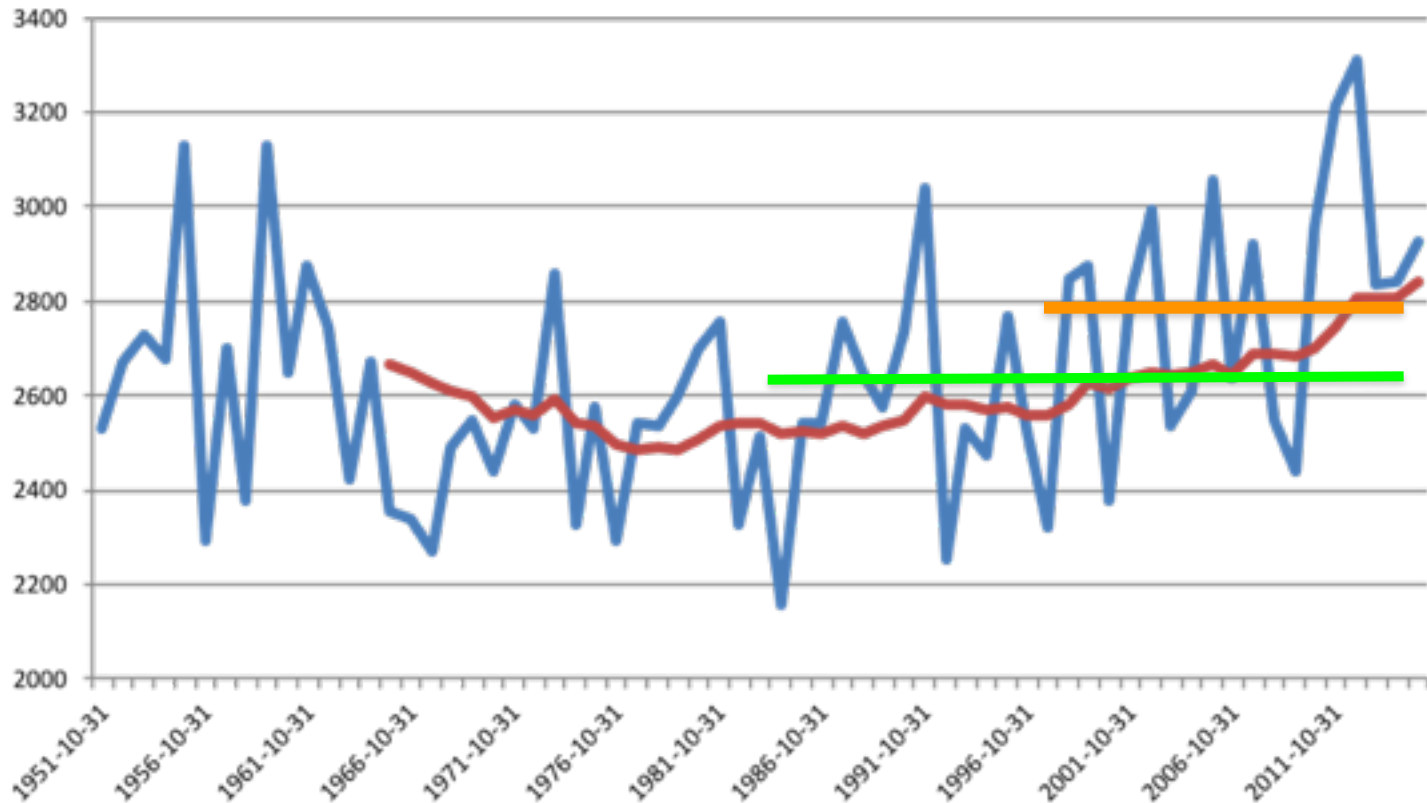


# Effective Agricultural Management in a Changing Climate

- ✓ Realize the climate is changing
- ✓ Recognize that many practices are really based on the historical climate
- ✓ Use all the data and info that are available to maximize the ability to adapt to the changing climate



# Rethink the convention of 30-years defining “normal” climate



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# Throw Away the Calendar



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# And Intuition Too

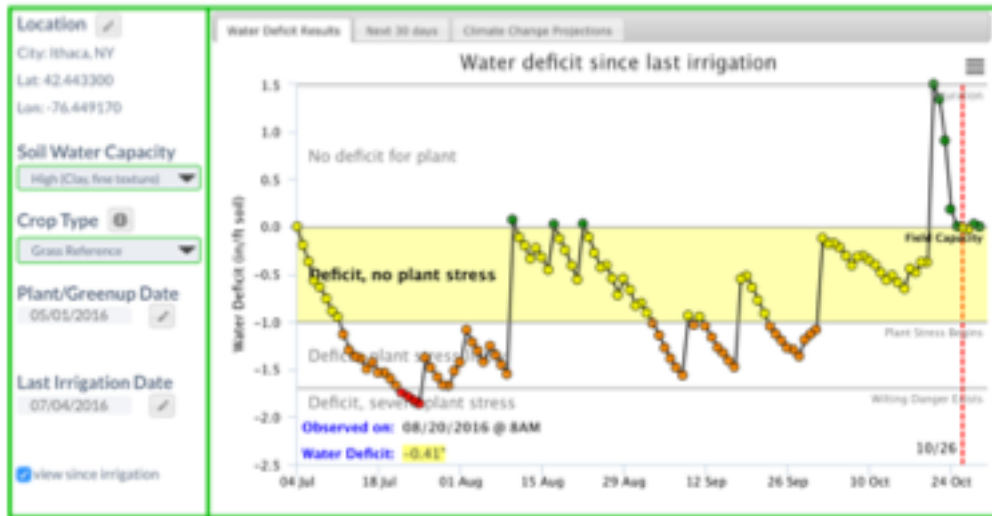


# Replace them with DATA



# And Data Driven Decision Tools

<http://climatesmartfarming.org/tools/csf-water-deficit-calculator/>



Select a disease:  
 Apple Scab

State:  
 New Jersey

Weather station:  
 Cream Ridge

Date of Interest:  
 05/05/2017

Calculate

Map Results More info

### Apple Scab Results for Cream Ridge

Primary scab season is over. Ascospores were essentially all released on April 25. If you are unsure whether ascospores have been depleted in your orchard, enter your green tip date to recalculate ascospore maturity for your orchard.

Green Tip Date: 2/23/2017

[Ascospore Maturity Graphs](#)

#### Infection Events Summary

	Past	Past	Current	Ensnung 5 Days				
Date	5/3	5/4	5/5	5/6	5/7	5/8	5/9	5/10
Infection Events	No	No	Combined	Yes	No	No	No	No
Days to Symptoms	-	-	-	9-10	-	-	-	-
Average Temp (F) for wet hours	-	37	60	63	-	39	37	-
Leaf Wetness Estimate (hours)	0	2	10	9	0	6	3	0
Hours ≥90% RH	0	2	10	9	0	6	3	0
Rain Amount	0.00	0.00	1.25	0.02	0.00	0.00	0.00	0.00

Download Time: 5/11/2017 23:00

<http://nwa.cornell.edu/index.php?page=apple-diseases>



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Climate  
is changing



Any  
Questions??



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