



# Project-Based Education to Develop Climate Change Literacy within New York State



Clarkson University:

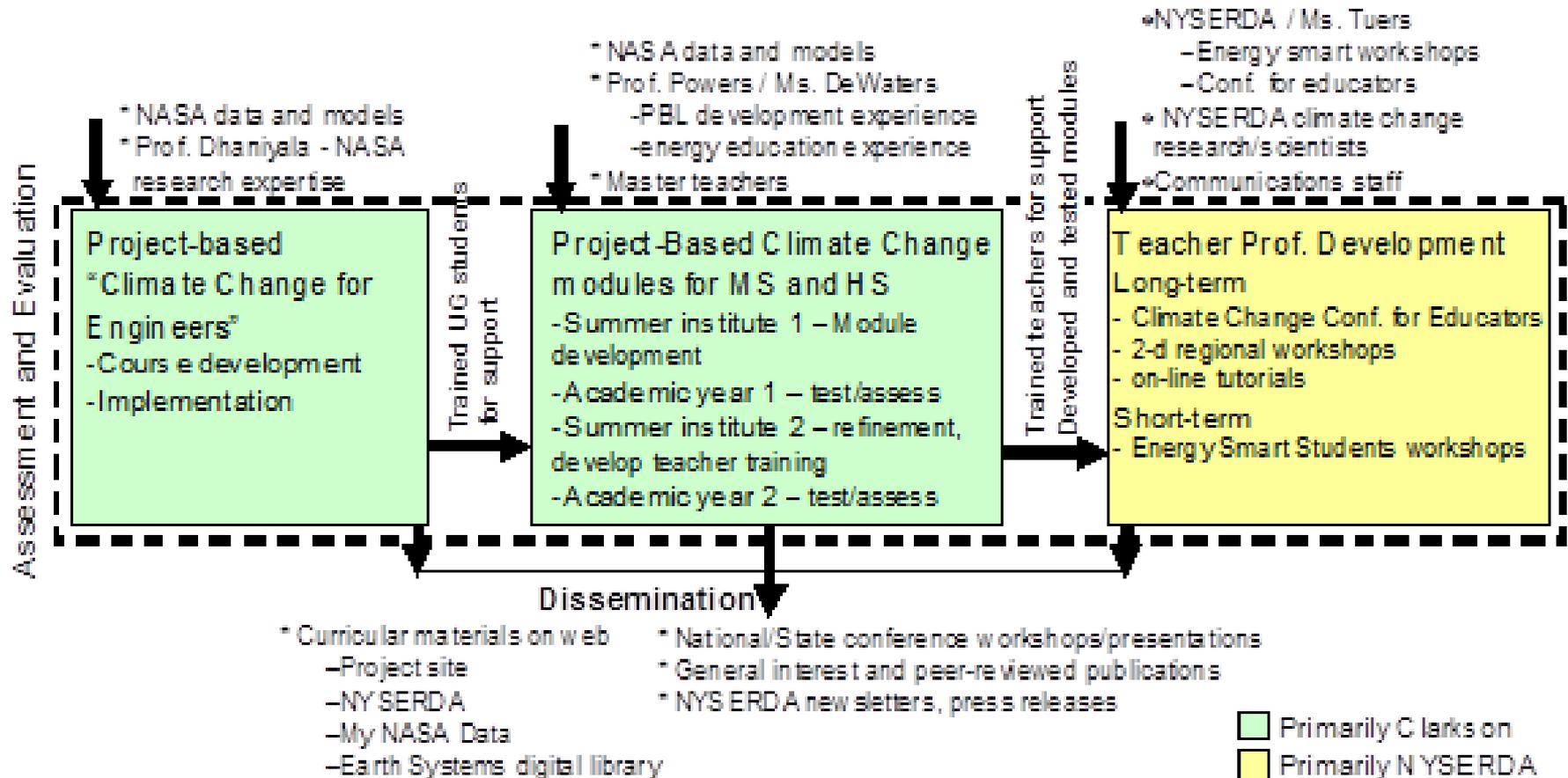
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# Overall Integration of Project Components



# Pedagogical Approach

- Climate literacy education should address content knowledge and problem solving / decision making skills.
- Materials with a societal context will make the materials more relevant and interesting.
  - holistic, inquiry-based climate change activities are more effective than passively feeding information to students
  - require students to actively investigate and formulate their own analysis of the extent, causes and responses to our changing climate.

# Project Objectives

- Increase **climate change literacy** among

- College students
- Middle/high school students
- Middle/high school teachers

Noted significant gains in climate KNOWLEDGE and AFFECT for ALL PARTICIPANTS; gains in behavior and self-efficacy less widespread

- Improve their **skills** at locating, accessing, and interpreting NASA (and other federal agency) resources related to earth science and climate change.

Achieved through workshops and classes

- Develop and use **hands-on activities and project/inquiry-based learning experiences** middle school, high school and college classrooms.

Achieved through workshops, classes, web

# Tutorials and Modules

[http://www.clarkson.edu/highschool/Climate\\_Change\\_Education/index.html](http://www.clarkson.edu/highschool/Climate_Change_Education/index.html)

## Tools/Tutorials

- MS Excel
- Google Earth
- GISS Surface Temperature database
- US Historical Climatology Network
- IPCC Data Distribution Centre (DDC)
- Northeast Climate Change

## Project Modules

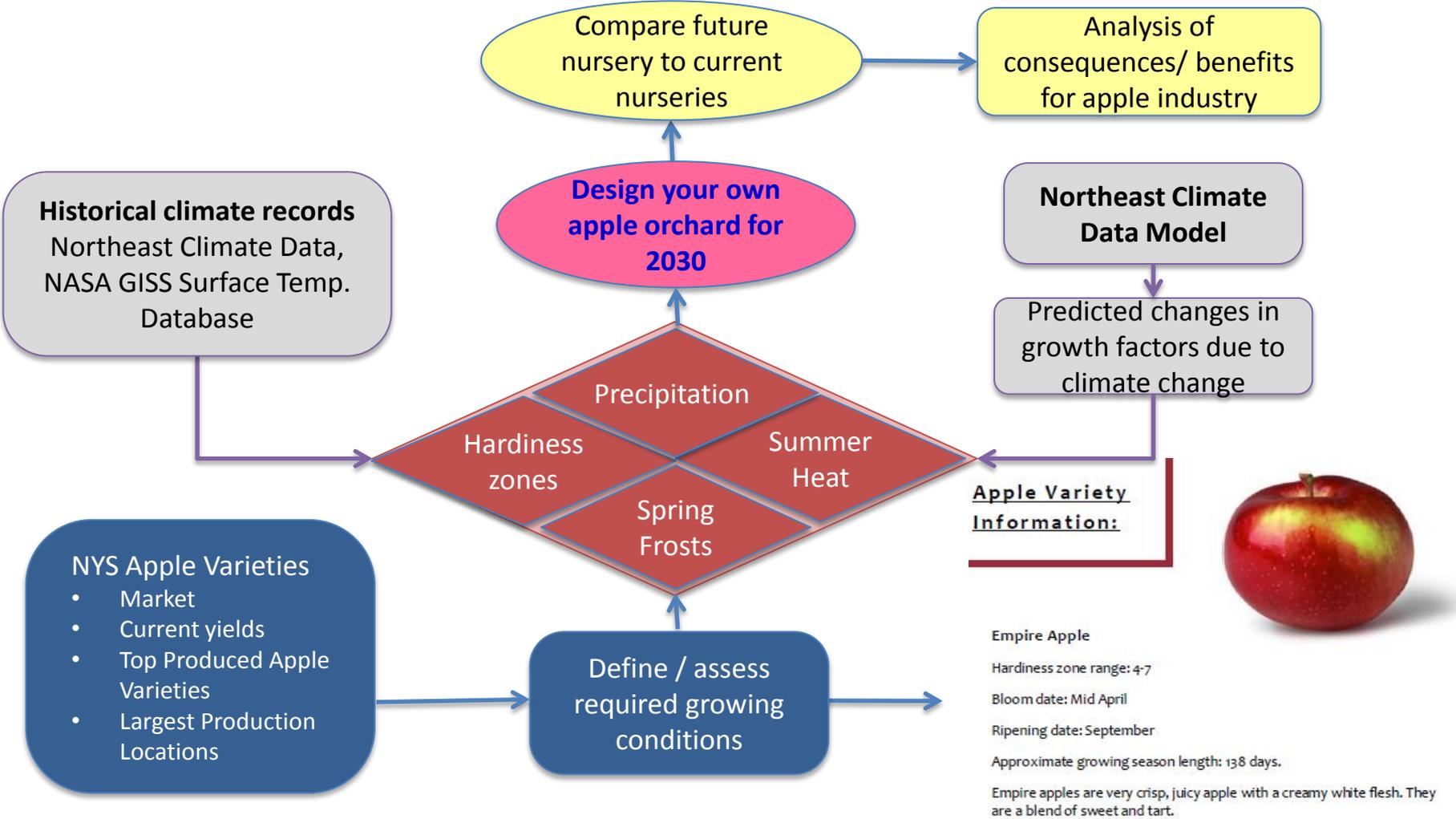
- Greenhouse Effect
- Amphibian Phenology
- Arctic Ice
- Climate Connections
- Lake Champlain Ice
- Dream Vacation
- Food Miles
- Power Profiler Module
- Mitigating Global Climate Change
- Apples in New York State

# Key Concern for NE USA:

Agriculture and ecosystems will be increasingly stressed by climate-related hazards... A longer growing season may allow farmers to explore new crop options, but this and other adaptations will not be cost or risk-free...

## Adapting to the Changing Climate:

### Apple Trees in New York State



# Meeting Teachers' Needs

## Successes ...



- Many modules developed, all inquiry based, some high in 'rigor' and 'relevance'
- Teachers in close proximity allowed continued communication and follow up

## ... and Challenges

- Teachers had quantitative difficulties
  - Accessing data and graphs
  - Using excel
  - Statistical, percent calculations
- Lack of confidence lead to modules often not taught in inquire mode as designed, more as 'step-by-step guide' that teachers could repeat from workshop experience
- Modules may be better for more advanced math classes, where both teachers and students have better quantitative skills?



# Sustainability, Dissemination

## Successes ...



- Modules disseminated on website and at teacher conferences statewide

## ... and Challenges

- Sustainability of success difficult without long-term funding or 'piggy back' project
  - Upkeep of modules very hard – web resources constantly in flux and being updated, modules must keep changing
  - Long term tracking and communication with teachers hard; limited data for long term impact



# Key Web Sites / Contacts

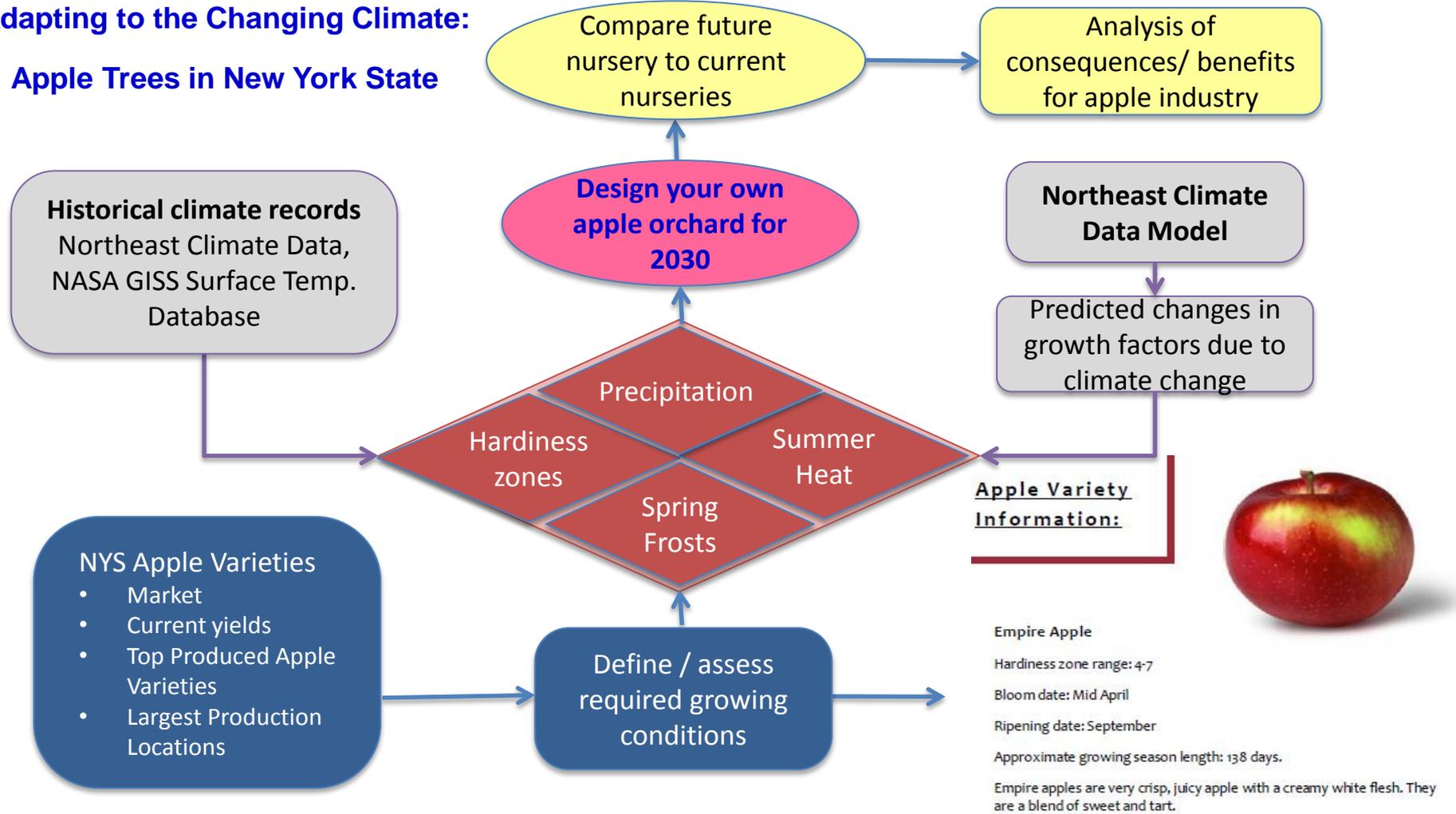
- Our program
  - [http://www.clarkson.edu/highschool/Climate\\_Change\\_Education/index.html](http://www.clarkson.edu/highschool/Climate_Change_Education/index.html)
- Contacts: (area code – 315)
  - Susan Powers (268-6542; [sep@clarkson.edu](mailto:sep@clarkson.edu))
  - Assessment - Jan DeWaters (268-6577; [dewaters@clarkson.edu](mailto:dewaters@clarkson.edu) )

supplemental slides

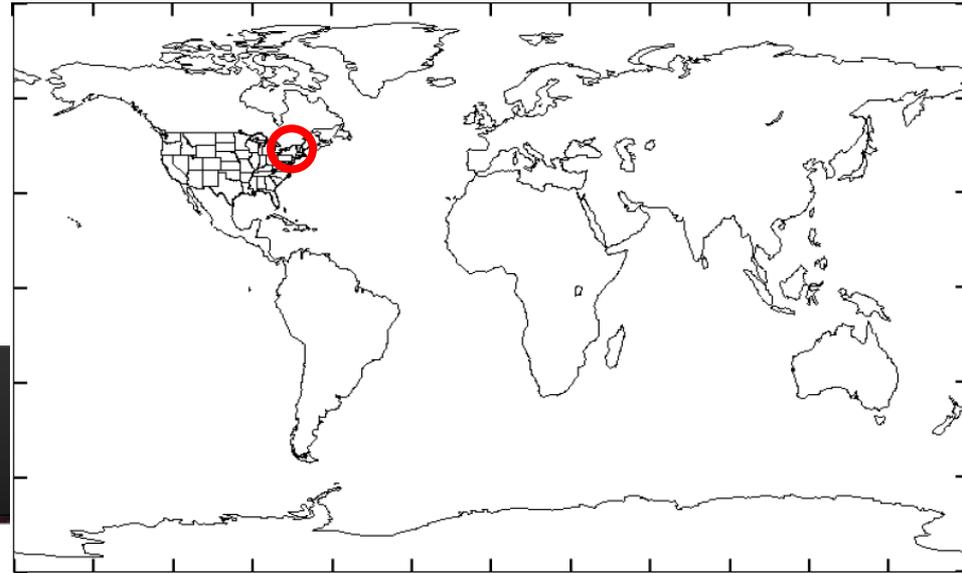
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## Adapting to the Changing Climate: Apple Trees in New York State



# Access historical temperature data



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## GISS Surface Temperature Analysis

Station List Search: (44.4 N,75.3 W)

Stations are ordered by distance from center at (44.4 N, 75.3 W) distance from that station.

Distance	Station Name
25 km (*)	Canton 4se
37 km (*)	Brookville, Canada
37 km (*)	Ogdensburg 4ne
44 km (*)	Wanakena Ranger Scho
58 km (*)	Morrisburg, On



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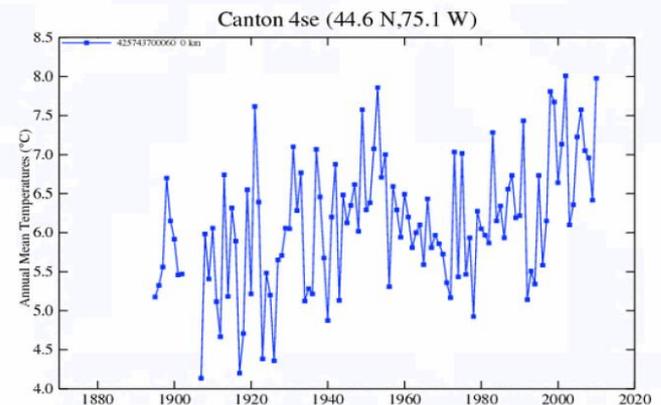
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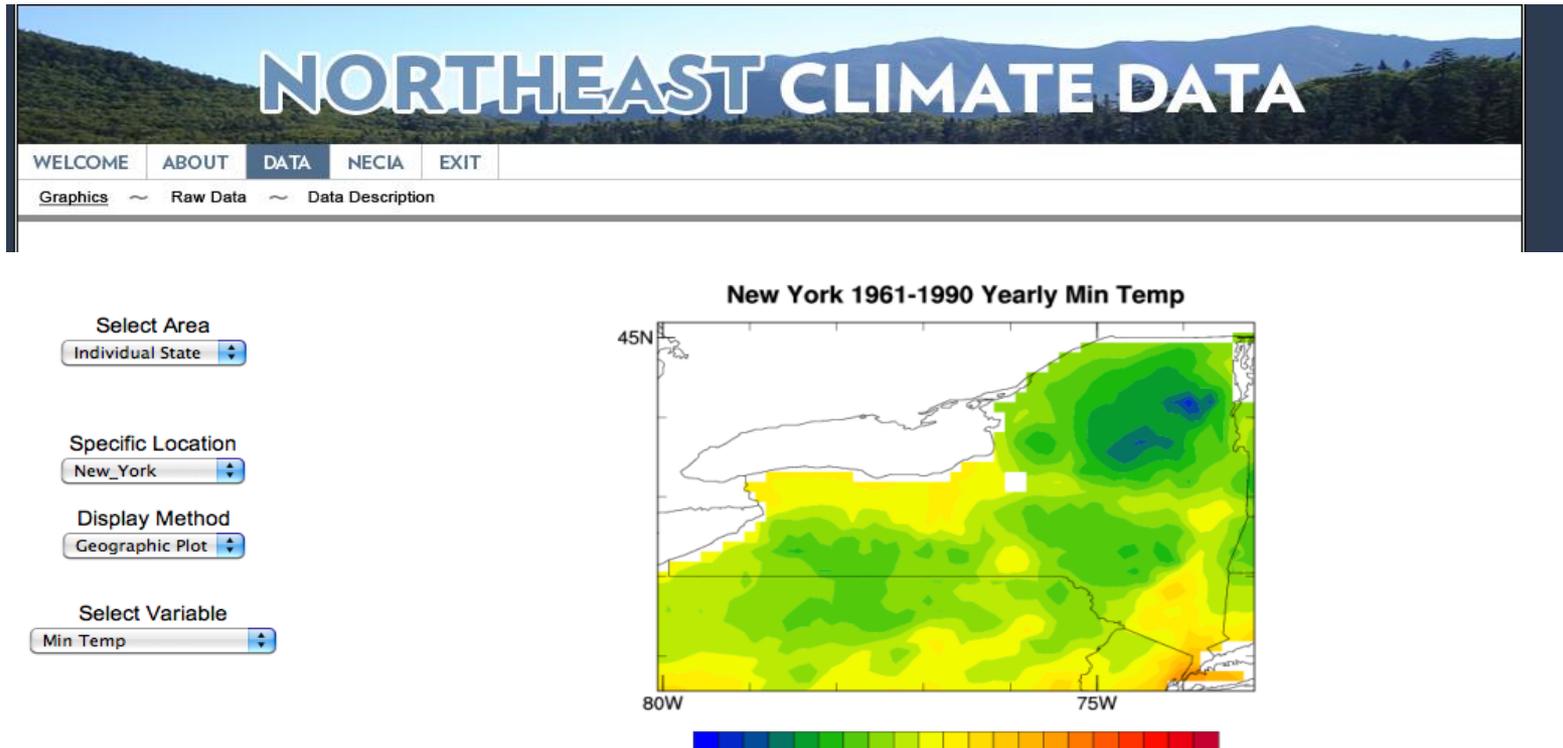
### Downloads

- Download the plot in Postscript form
- Download monthly data as text

[http://data.giss.nasa.gov/gistemp/station\\_data/](http://data.giss.nasa.gov/gistemp/station_data/)

# Predicted Changes in NYS

- <http://northeastclimatedata.org/>



• Minimum temperature	
• Maximum temperature	• Hardiness zone
• Average temperature	• Days over 90°F
• Relative humidity	• Days over 100°F
• Snow depth	• JJA Heat index (June, July August)
• Coldest day of the year	• Growing season length