Introduction to Data Visualization

Schoolyard Ecology Looking at Data Workshop for Teachers

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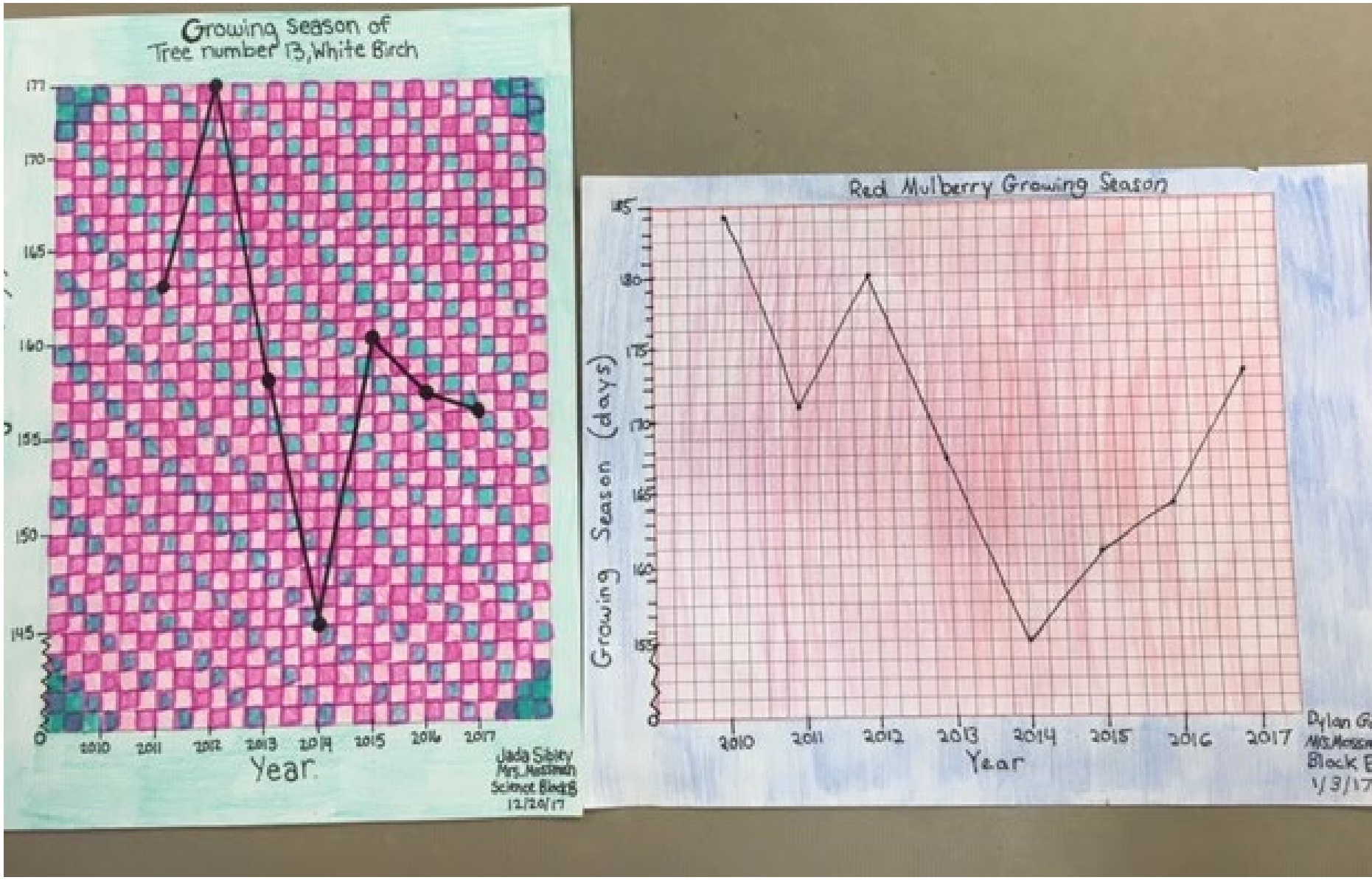
Harvard Forest

January 4, 2019

We use graphs of our data to tell a story and identify questions



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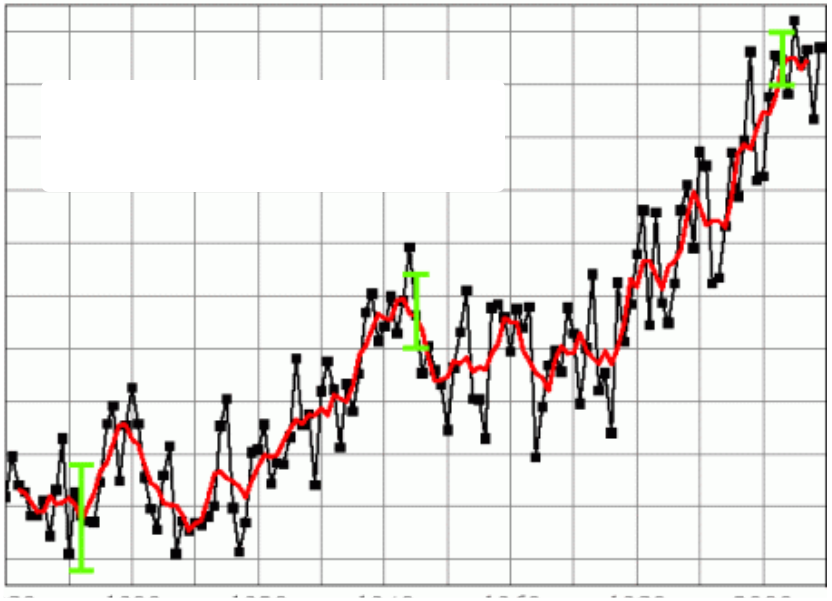

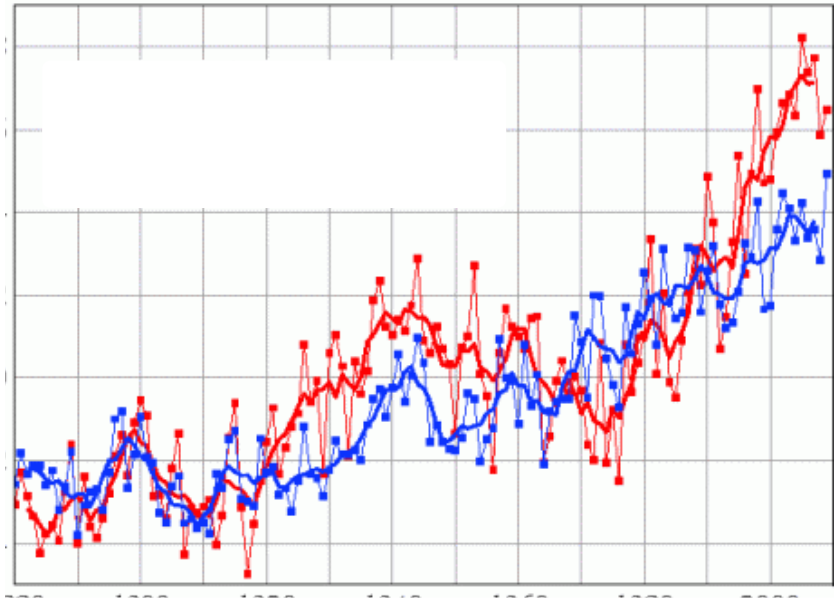

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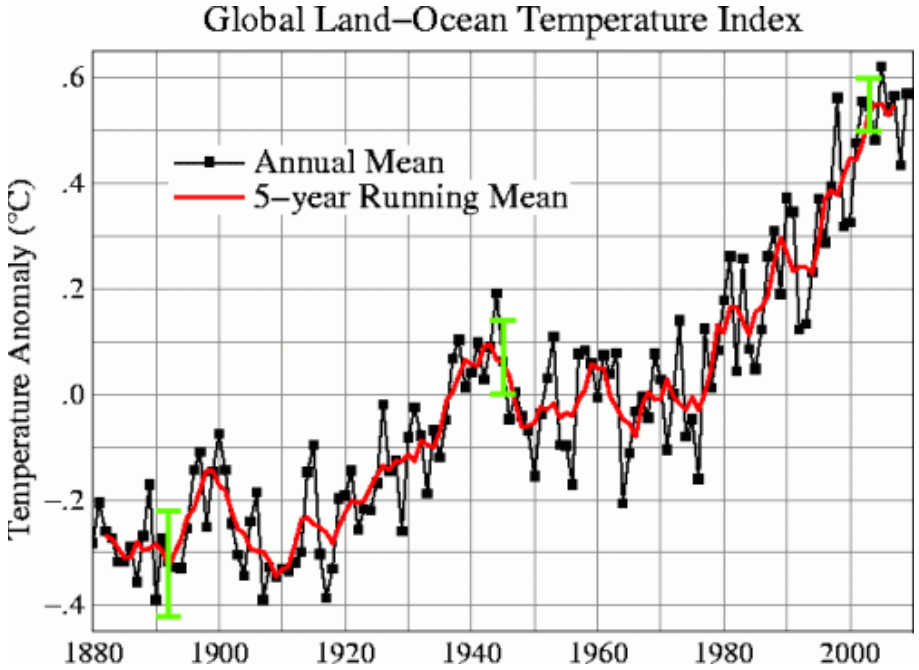
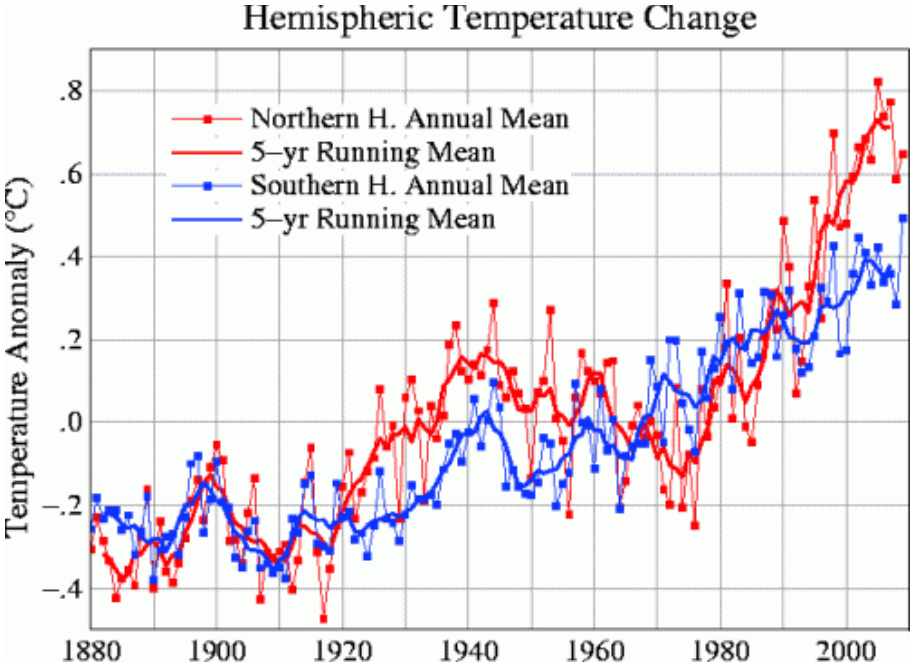


Global temperature graph from 1880 to 2014



Northern and southern temperature graph from 1880 to 2014

Graphs from NASA http://data.giss.nasa.gov/gistemp/graphs_v3/

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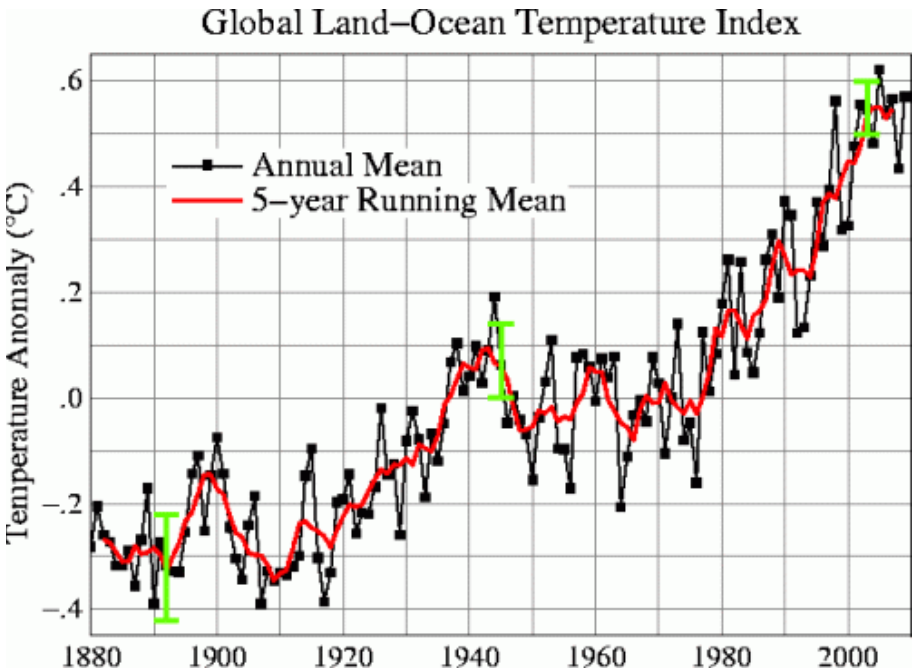

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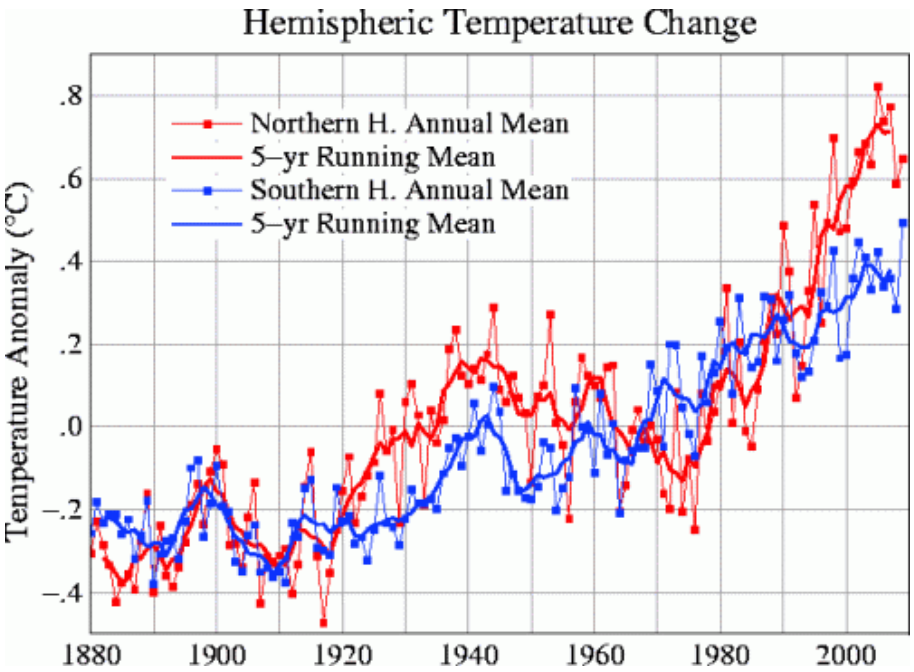

Northern and southern temperature graph from 1880 to 2014

- The graphs are based on temperature records from weather stations and buoys worldwide.
- The graphs show yearly average differences between measured land and ocean temperatures in a given year and a baseline average annual temperature (the temperature anomaly shown on the Y axis).
- They also show a five-year running average, which is the average of the temperature anomalies for the current year and the four preceding years.
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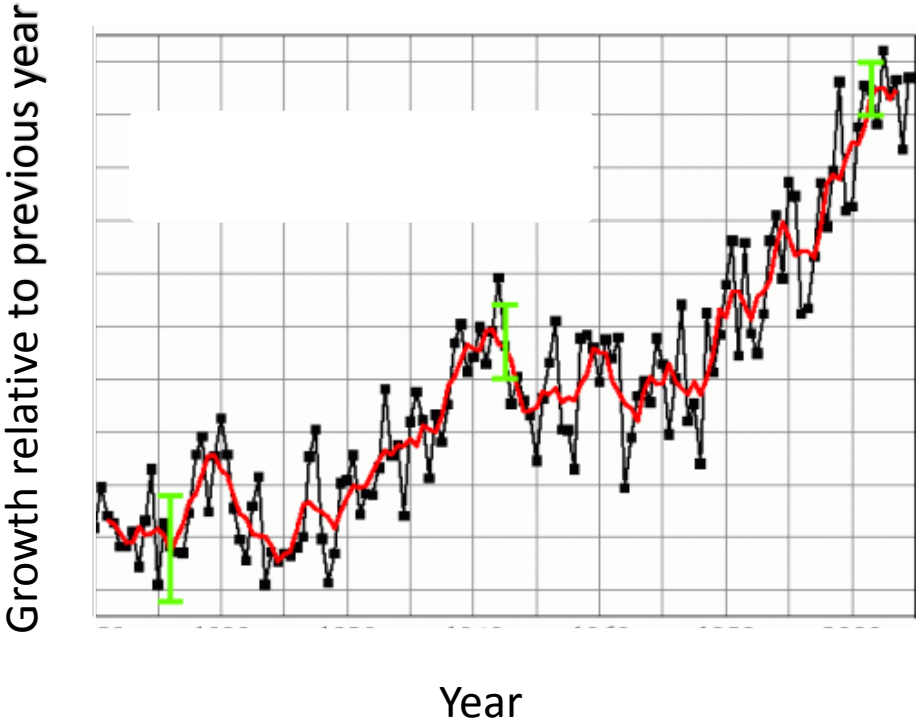
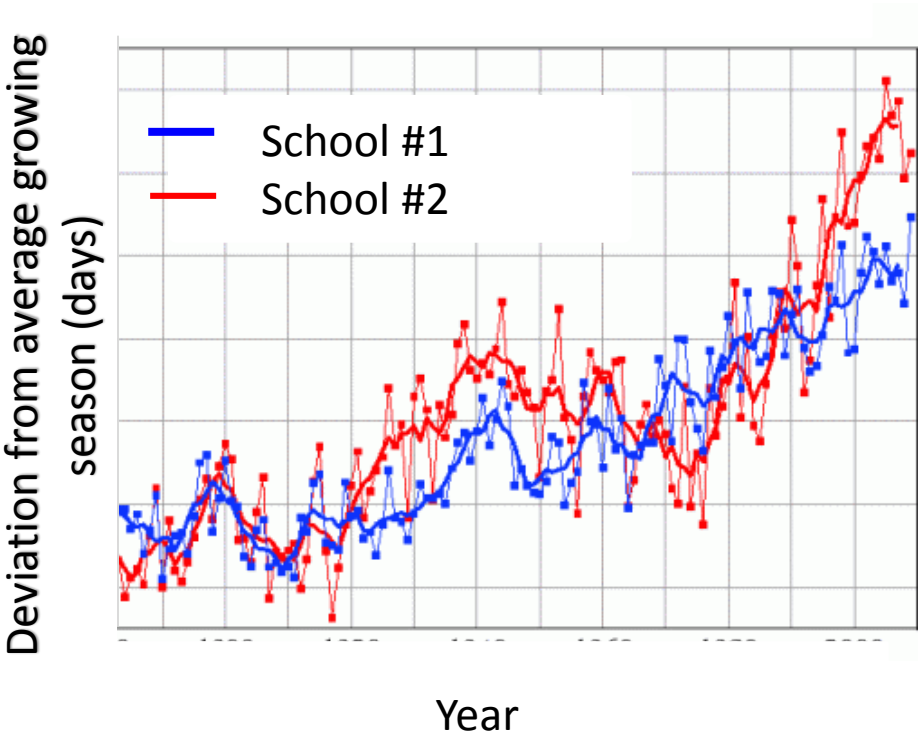
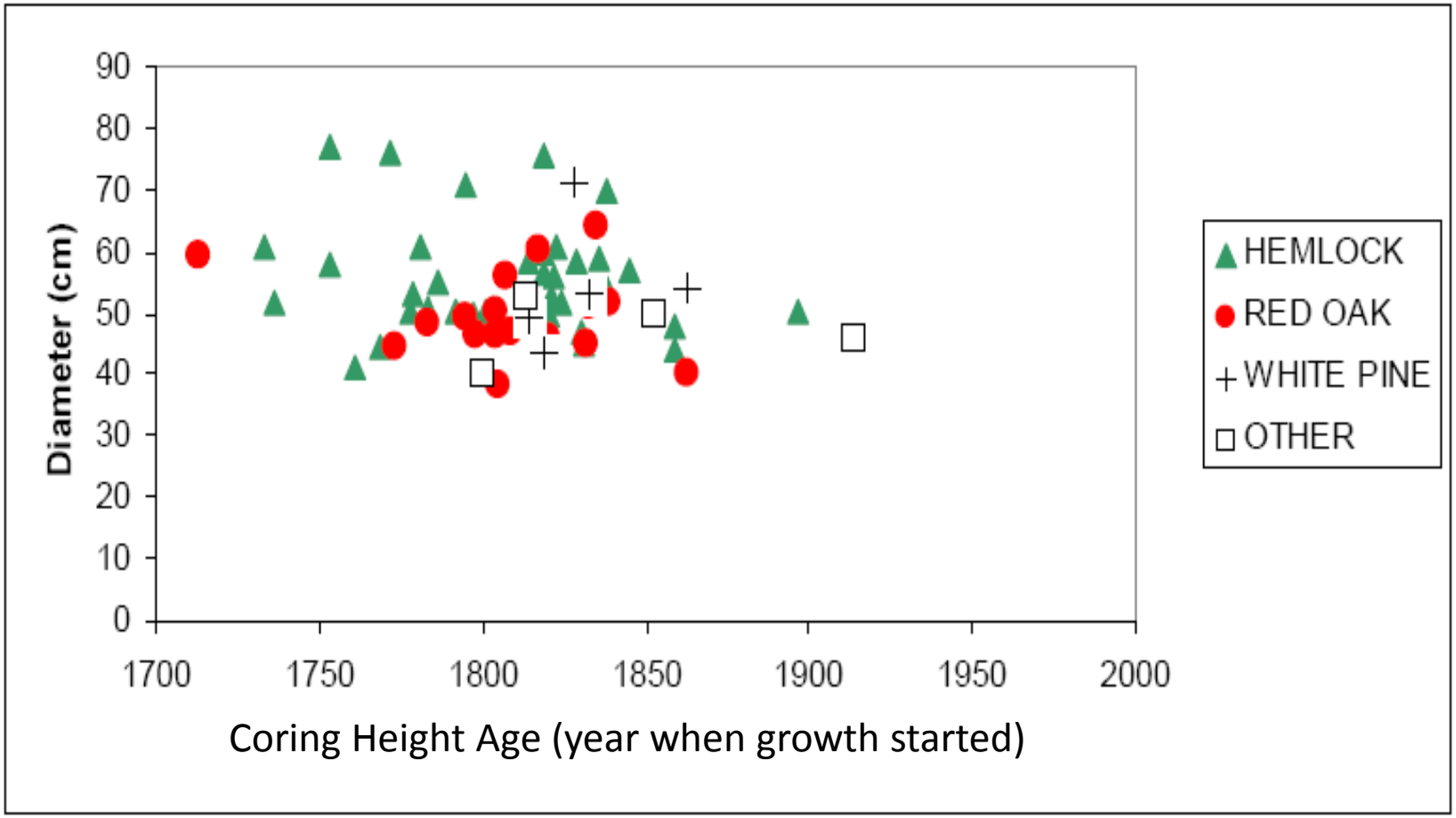
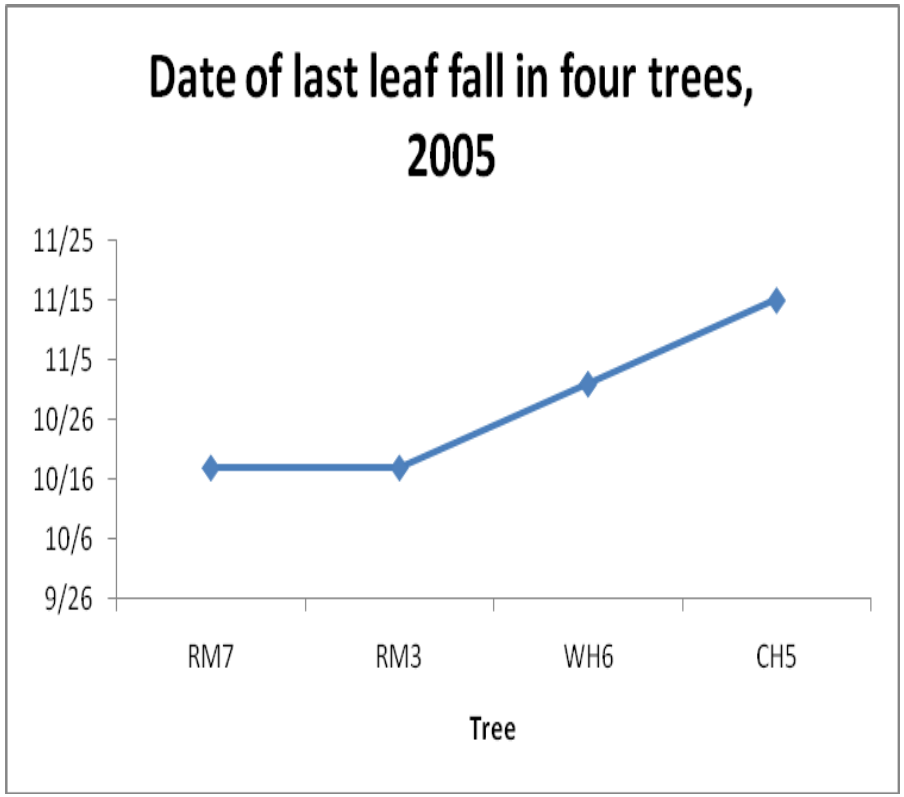


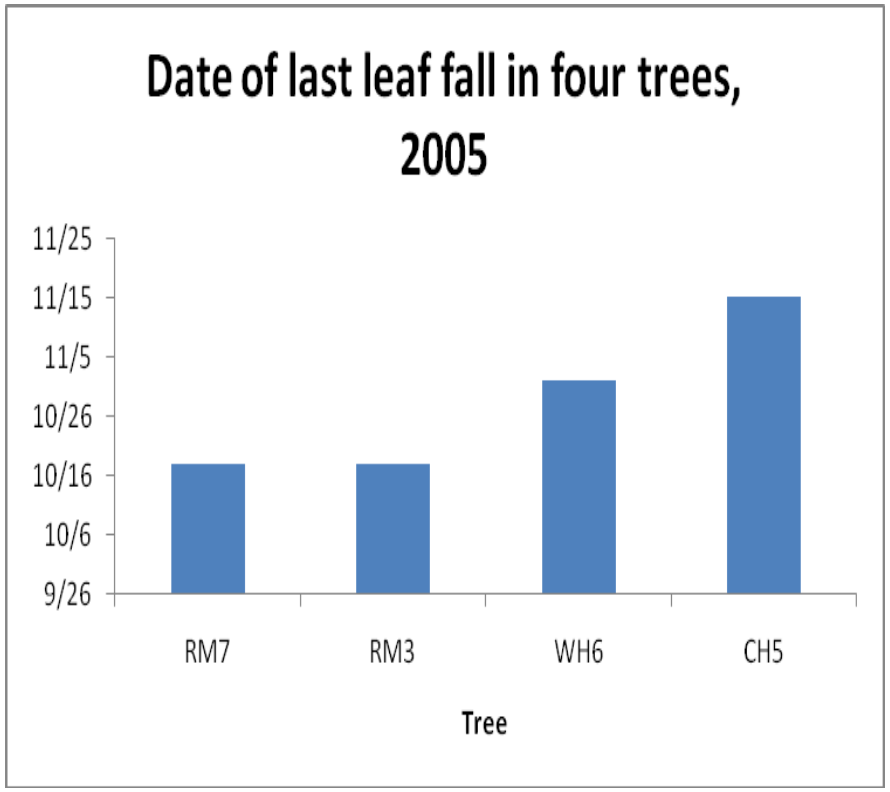


What if the same graph were showing changes in annual growth of trees relative to the previous year (biomass or diameter), or a deviation from an average length of growing season at two schools, what might you conclude?

Age and diameter of trees on Mt Wachusett. Data from DA Orwig.




Date of last leaf fall in four trees, 2005
11/25
11/15
11/5
10/26
10/16
10/6
9/26
RM7
RM3
WH6
CH5
Tree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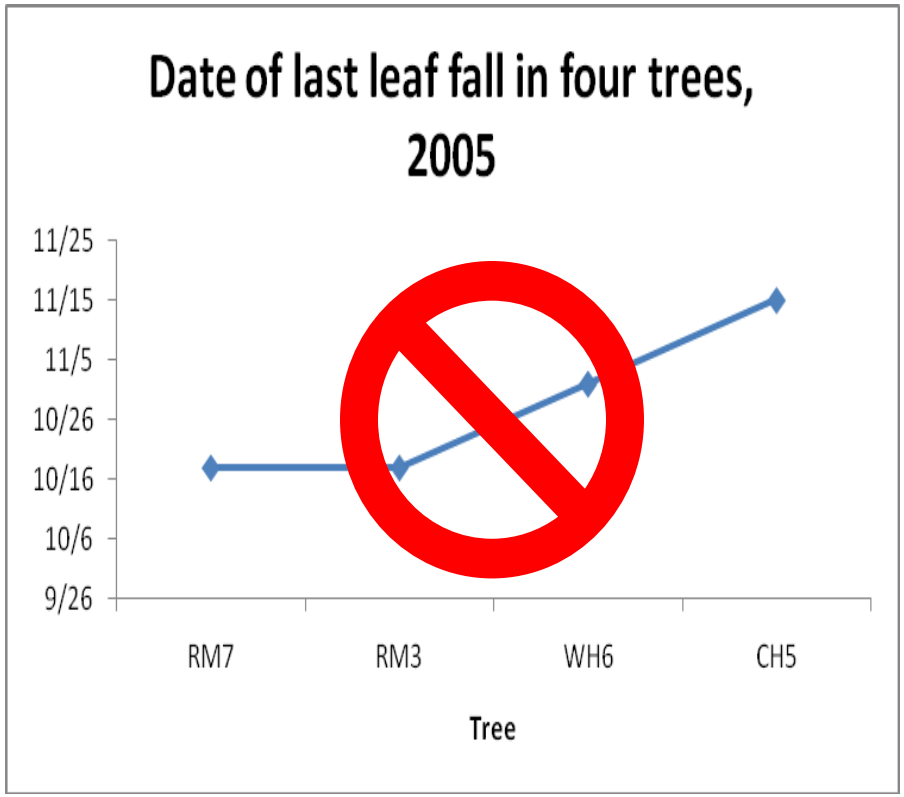
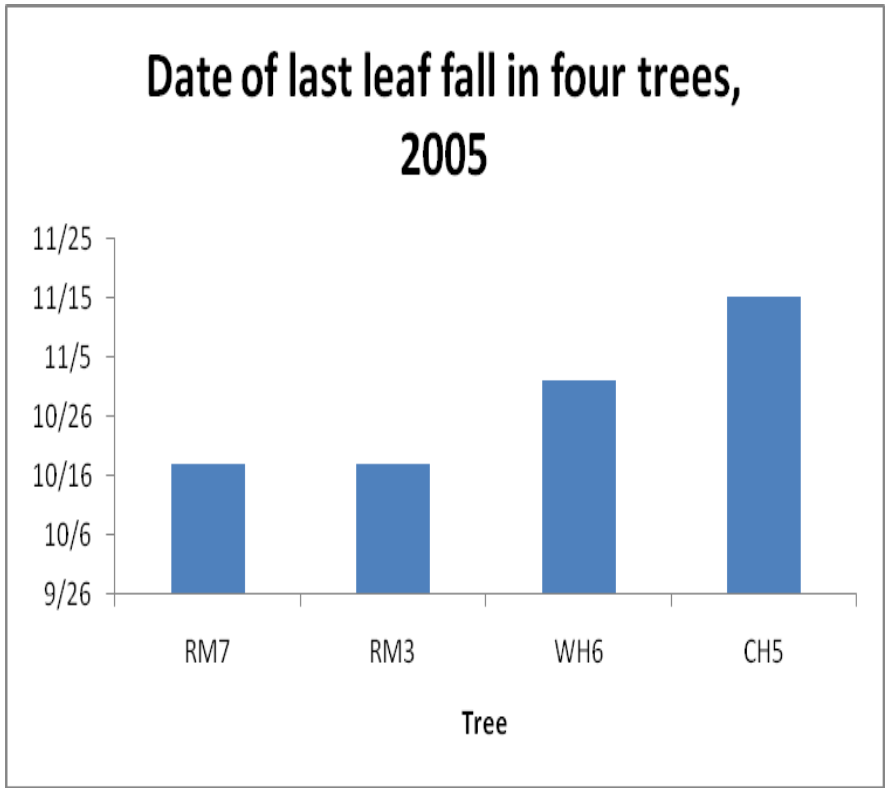
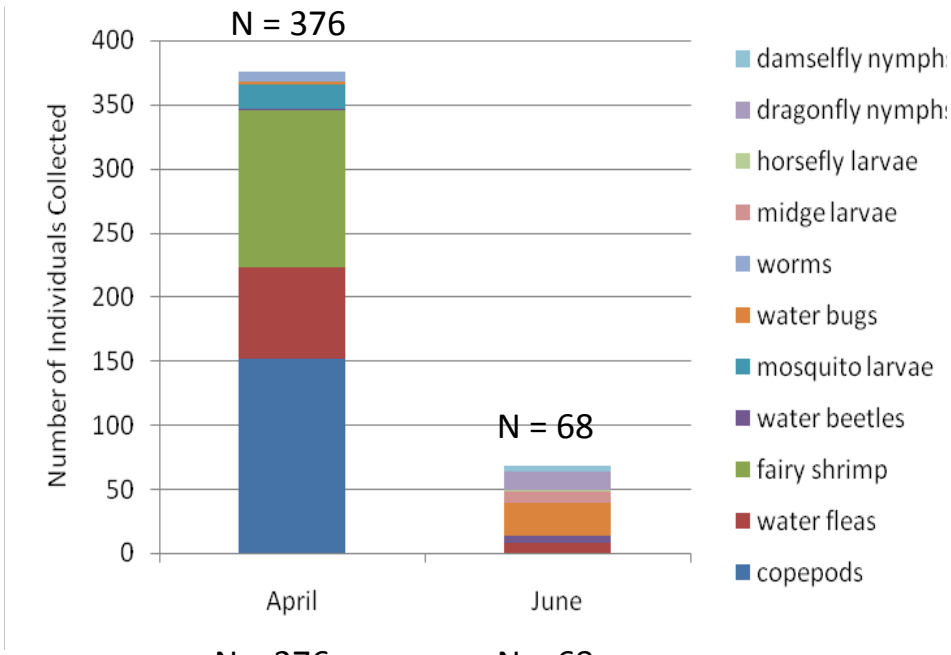
a. Line graph – not appropriate

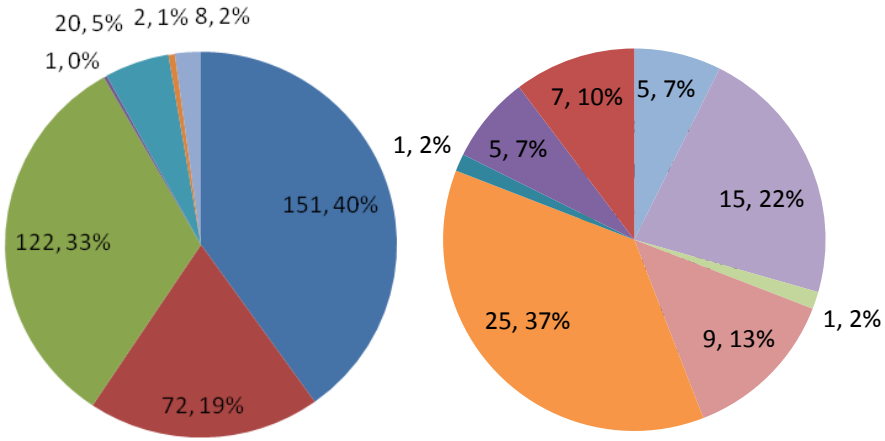


b. Bar graph – appropriate

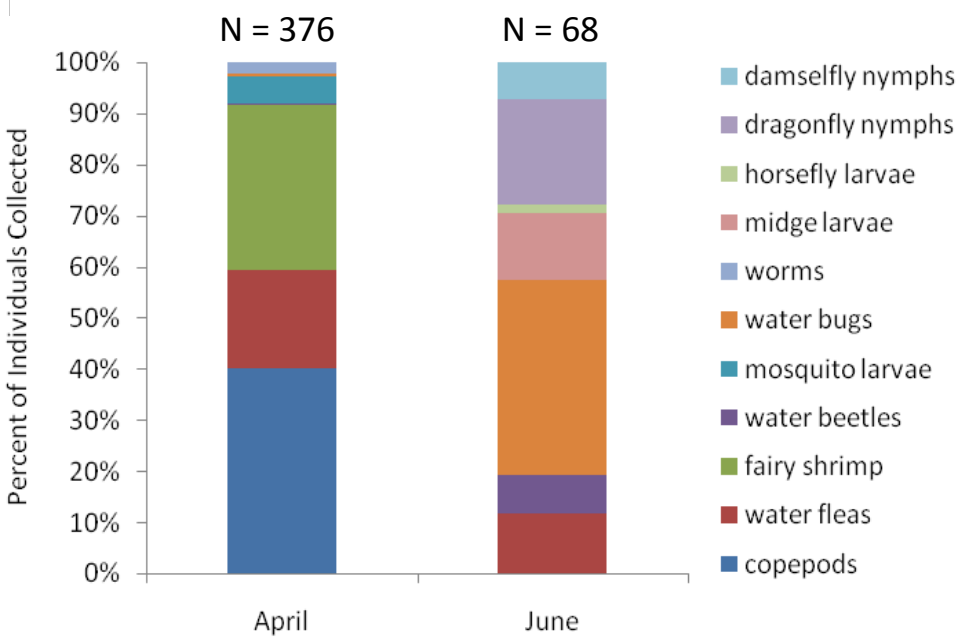


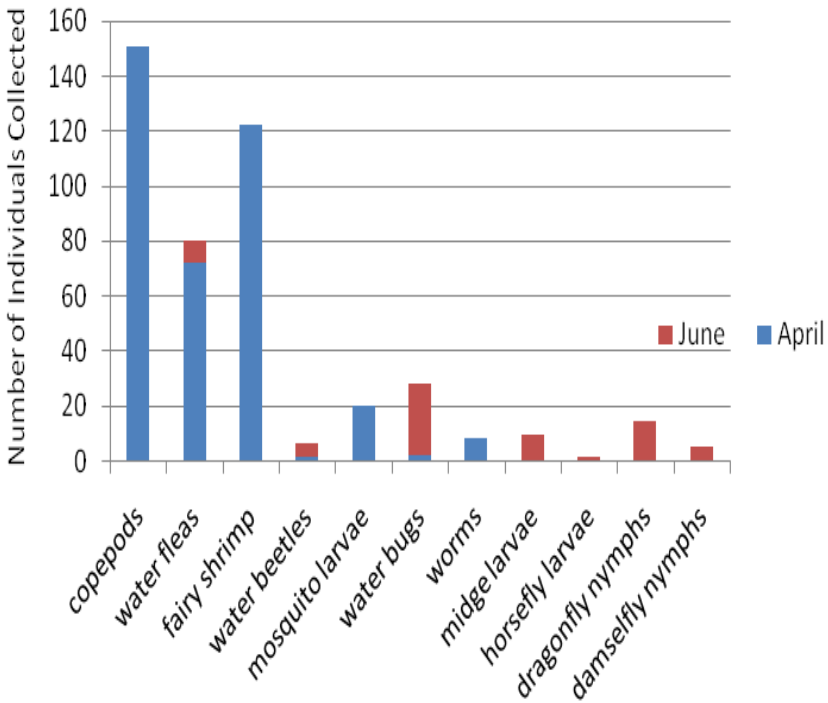
Macroinvertebrate communities in a Cape Cod Vernal Pool, April and June, 1996. Data from EA Colburn





April, 376 organisms June, 68 organisms





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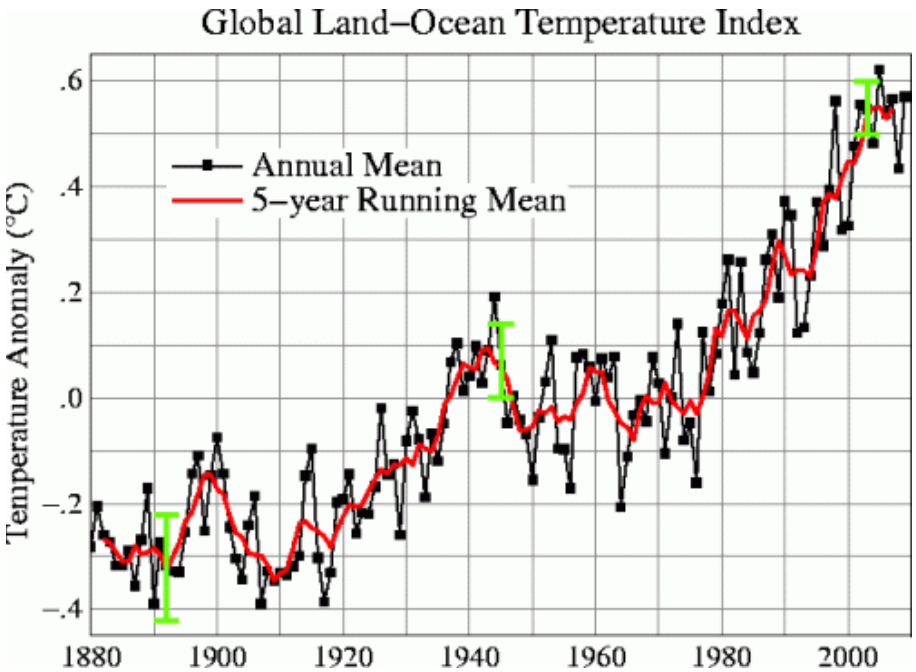

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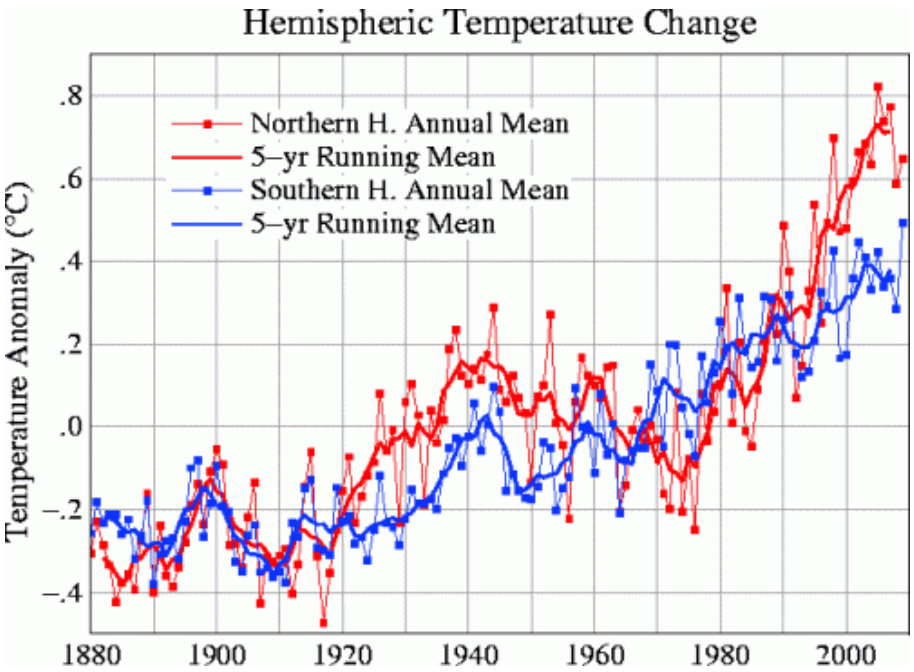

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Steps in Preparing Visual Presentations of (Schoolyard) Data

- Collecting the Data
- Organizing Data and Inputting data to a Data base

Level 1 – STEP 1 IN DATA ANALYSIS
Levels 2 and 3 also need to do this

- Preparing data for analysis
  - Transformations (e.g., change numbers to percent, date to Julian Day, etc.)
  - Extracting additional information
    - (e.g., biomass accrual for the whole plot, length of growing season)
- Carrying out data analysis
- Data analysis through visual presentations of data
  - Looking at Data – Graphing considerations
  - Kinds of graphs – what is appropriate for your data and questions?

Levels 2, 3

Level 2 teachers – Creating graphs by hand or by using graphics programs with structured exercises
Looking at graphs and answering questions about them.

Level 3 teachers – Organizing your students' data and creating **and interpreting** graphs of the data, or otherwise working with data to meet your individual goals for today. We hope graph INTERPRETATION will be part of your work!

- Sharing graphs, ideas, questions

Workshop evaluation and feedback