

## Bringing Data & Research into the Classroom

Josh Galster  
Earth & Environmental Studies Dept.  
Montclair State University

Jennifer Anderson  
Geoscience Dept.  
Winona State University

With ideas from Laura Rademacher

## Our backgrounds

- **Josh:** Taught at Montclair State (public university in NJ) for 8 years
  - Interdisciplinary department that has undergrad through PhD students
  - Variety of courses from intro courses for non-majors up through graduate course
  - Specializes in hydrology and watersheds
  - Attempts to use data in about 1/3 of all class meetings
- **Jennifer:** Taught at Winona State Univ. (4-yr public university in MN) for 13 years
  - Primarily undergraduate institution
  - Intro/Gen Ed, upper-level majors, and science courses for future teachers
  - Specializes in planetary geology and geoscience education
  - Has used some data-rich activities but aspires to do more
- **Your** level of experience with data/research?

## Why incorporate data/research into the classroom?

- Think of and then pair up and generate a quick list of the benefits

## Why incorporate data/research into the classroom? (example responses)

- Cognitive growth
  - gain in knowledge and critical-thinking skills
  - think and work like a scientist (if made explicit)
  - communicate effectively
  - think analytically and critically
  - increase retention in the course and/or discipline
- Personal growth
  - gain confidence
  - feel more independent
  - Become more self-motivated
- Professional growth
  - enhance interests in a science career
  - develop ties to the scientific community

## Objectives for this session

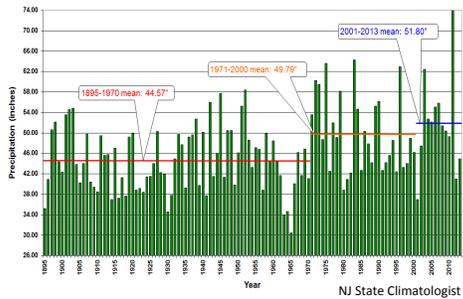
- Make the case for using data and conducting research in the classroom.
- Give examples at a variety of scales.
- Have you generate exercises that incorporate data/research into your teaching.

## Various scales and outcomes of classroom activities

- Data & Research
  - Using data as a piece of the research process
- Time involved: 10 minutes, a class/lab, a semester?
- Individual vs. group
- Outcome: thinking (TPS), writing, presentation, homework...

### Data example: Trends in Precipitation

Northern NJ Annual Precipitation (1895-2013)



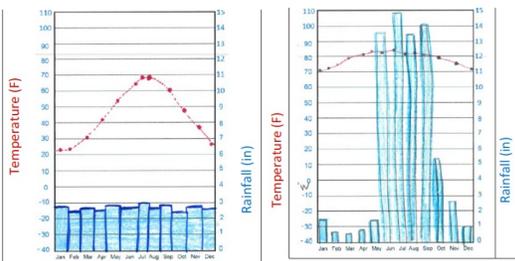
NJ State Climatologist

### Data example: Images

<http://earthobservatory.nasa.gov/IOTD/view.php?id=86041>

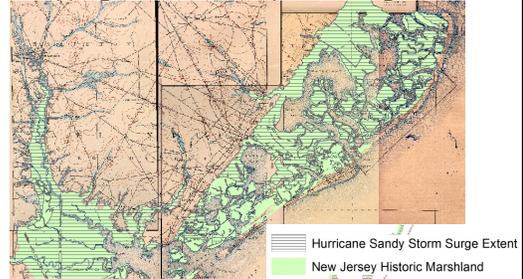


### Data Example: Climate Classification



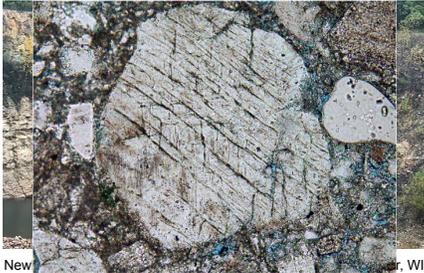
### Research example

- Mapping Hurricane Sandy storm surge in GIS



### Research Example

- Finding shocked quartz in new samples from an impact crater.



New Jersey, WI.

### Tips and Recommendations for Data

- Set the tone early: begin on the first day of class
- Start with the basics: define axes, look at units, trends, etc.
- Be sure students are prepared to do what you're asking them to do
- Ensure students see the relationship between the topic and course content.
- Incorporate group work.
- Make it clear how the use of data fits into the process of science.
- Use local examples.

## Tips and Recommendations for Research

- Give detailed and clear directions at the beginning of the research experience.
- Frequent deadlines are necessary and important.
- Make clear the purpose of each component within the project and within the course.
- Build in time for flexibility.
- Give students freedom to choose a topic, with guidance.
- Ensure students see the relationship between the topic and course content.
- Peer review is helpful to provide formative feedback.
- Students should communicate results beyond the professor.
- Incorporate group work.
- Prepare students by using data in the classroom

## Individual reflection

- Think of examples datasets to present in class
- Think of possible research projects to incorporate in a classroom
  - What level of class?
  - How long for discussion?
  - What will the students actually do? Will they write, do homework, share something

Develop something that will work best for you!

## Additional Resources

- On the Cutting Edge Undergraduate Research as Teaching Practice ([http://serc.carleton.edu/NAGTWorkshops/undergraduate\\_research/index.html](http://serc.carleton.edu/NAGTWorkshops/undergraduate_research/index.html))
- Council for Undergraduate Research (CUR); On the Cutting Edge Teaching with Data, Simulations, and Models ([http://serc.carleton.edu/NAGTWorkshops/data\\_models/index.html](http://serc.carleton.edu/NAGTWorkshops/data_models/index.html))