

NASA Astronomy and Space Science Fall 2018
Jason Hoch
Lesson Implementation & Reflection

Tracking Water Using NASA Satellite Data

Using real data from NASA's GRACE satellites, students will track water mass changes in the U.S. Students will estimate water resources using heat-map data, create a line graph for a specific location, then assess trends and discuss implications.

Link: <https://www.jpl.nasa.gov/edu/teach/activity/tracking-water-using-nasa-satellite-data/>

Student Artifacts

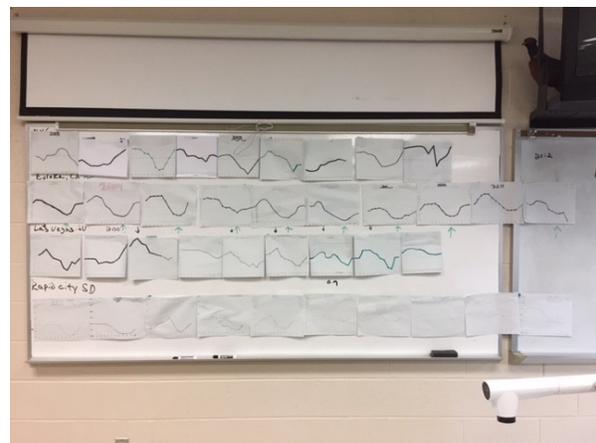
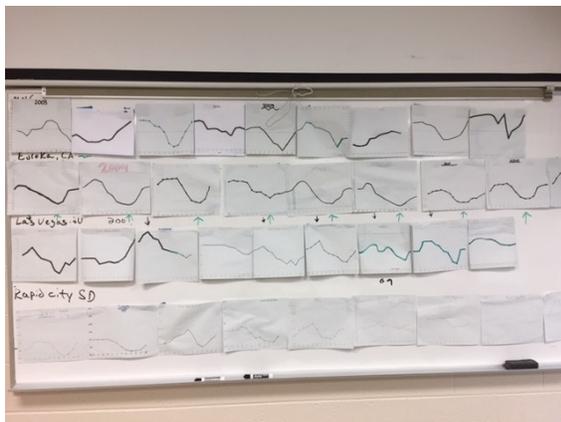
The following is the link for a Google sheet location of the heat maps. The students used these in place of color copies of the data for years 2003-2012.

https://drive.google.com/drive/folders/1dyXoEIBSPDoZYozE4S7PGu_zp96MTott

This is the google sites page where the students began the activity. It contains the websites needed to start the lesson.

<https://sites.google.com/site/marinescience83/1st-marking-period/earth-s-atmosphere>

This shows examples of the class graphs. Cities selected were New York City, Nashville, Eureka, and Rapid City.



This is a class link for a digital representation of the graphs that we are currently building.

https://docs.google.com/spreadsheets/d/1rL3_d5PTCs5I9G5X1EPDQiVXp1Galp9hLJ_Wd2s2zHU/edit?usp=sharing

Summary

Tracking water using data was used in my introduction to meteorology section. The lesson begins with a section of videos that are a standalone introduction to the mission and content surrounding the mission. I went ahead and broke up the background in the form of a question sheet for the preliminary videos as a class. As we watched sections of the introduction, I often pause and replay the videos to emphasize certain points on the question sheet. I did not print the “heat maps” in color, instead I uploaded the PDF’s of the 20003-2012 data to a class google site. This allowed the students to access the data giving them the option of printing it out at home. I was a little bit wary of the content being of middle school level. I pressed my ninth grade students to bring it up to their level. The differentiation between mass and weight is an overarching topic for the content. Pre-conceptions about the relationship between mass and weight and how these variables relate to gravity are areas for me to focus on with the ninth grade students.

As we get in to the graph construction I will work with my class to decide on a suitable scale to set as a standard for the data. At this point, students will organize the data in the form of a table. Yet, I always find myself wanting to tell the kids what scale they should rather than let them figure it out. During this lesson I will attempt to allow at least 2 of classes to go head and determine their own scale. Ideally I could use this as a teachable moment, if the scales from group to group and year to year are not consistent then the class graph will not be of much use. At that point the kids would have to go back and fix their scales. I like this idea and will update.

I ended up in the middle. I had an example data table displayed and helped the students with setting up their x-axis on the graph. Each class will determine the y scale for their selected city. The groups that built their own graph axis labels did well. It did take them a bit of time, but it was worth. I had one person with each group meet as a facilitator, next they returned their home group to explain the determined scale to the rest of their group.

Sources:

- De Wit, J. Seager, S. (2013) Science Vol. 342, Issue 6165, pp. 1473-1477 *Constraining Exoplanet Mass from Transmission Spectroscopy*, Retrieved from: <http://science.sciencemag.org/content/342/6165/1473.full>
- Hu, R., Seager, S., & Bains, W. (2013). Photochemistry in terrestrial exoplanet atmospheres. II. H₂S and SO₂ photochemistry in anoxic atmospheres. *The Astrophysical Journal*, 769(1), 6.
- Image Slide 4 The Search for Life Retrieved from: <https://exoplanets.nasa.gov/the-search-for-life/life-signs/>
- Image Slide 6 A Planet’s Transmission Spectrum Retrieved from: <https://exoplanets.nasa.gov/resources/297/a-planets-transmission-spectrum/>
- Image Slide 8 Investigation: Transit Tracks Retrieved from: <https://www.nasa.gov/sites/default/files/atoms/files/tt-apr-13-2011.pdf>
- Exoplanet Exploration Retrieved from: <https://exoplanets.nasa.gov/alien-worlds/strange-new-worlds/>
- Inventing the Future Retrieved from: <https://exoplanets.nasa.gov/the-search-for-life/inventing-the-future/>