

Workshop Overview

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Day 1: Extreme Meteorology Collaborative Map

What are the most extreme weather events we can find?

Where did they occur?

When did they occur?

How much damage did they do?

We will map our answers to these questions. Our map will serve as our data presentation.

Mapping is a very powerful tool for organizing and communicating spatially referenced data. It is becoming a common 21st century work skill in many fields (not just STEM disciplines).

Step 1: Team Work

Divide up into 2 person teams (please make sure that at least one person in your team is comfortable working with computers on new types of online programs).

If you have two computers you will use one to access these instructions and instructions on the website (you can have multiple tabs open in your browser)

<https://sites.google.com/site/kcksaturdayacademyteacher2/extreme-meterology>

and use the other computer to create your Google Drawings and Google Maps.

Step 2: Pick Your Weather Disaster

Choose your weather disaster:

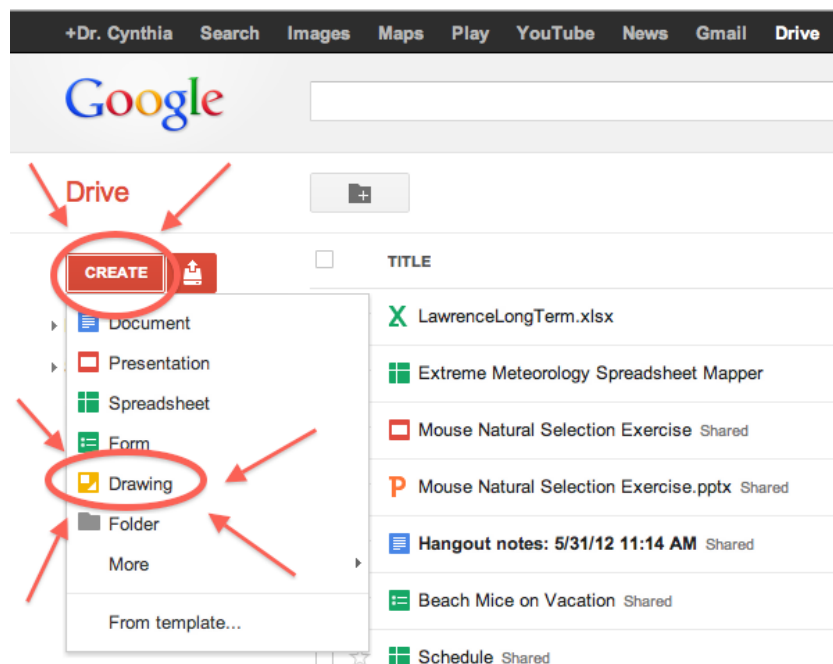
1. Highest rainfall amounts

2. Biggest flood (Patricia, Jackie, Joe)
3. Most severe drought
4. Biggest hail(Leontra, Larry, Lourdes)
5. Most lightening strikes (Debbie and Harry)
6. Biggest tornado (longest track, most damage) Sam and Dom
7. Highest straight line winds (Tyrun & Christian)
8. Biggest hurricane (Jasmine and Sara)
9. Coldest temperatures (longest period)
10. Hottest temperatures (longest period)
11. Worst ice storm (Debbie and Julissa)
12. Worst air pollution related to weather pattern (john mary)
13. Drought (Arnold, Steve)

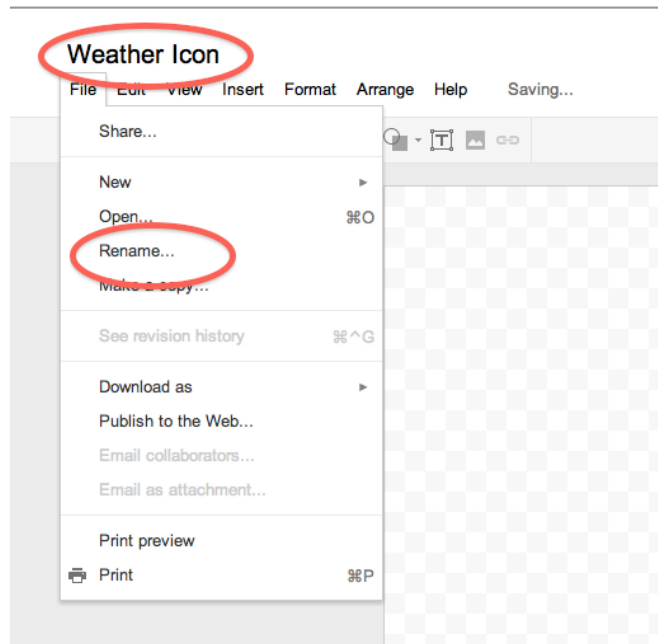
Step 3: Team Logo

Create a team logo that will act as your custom map icon

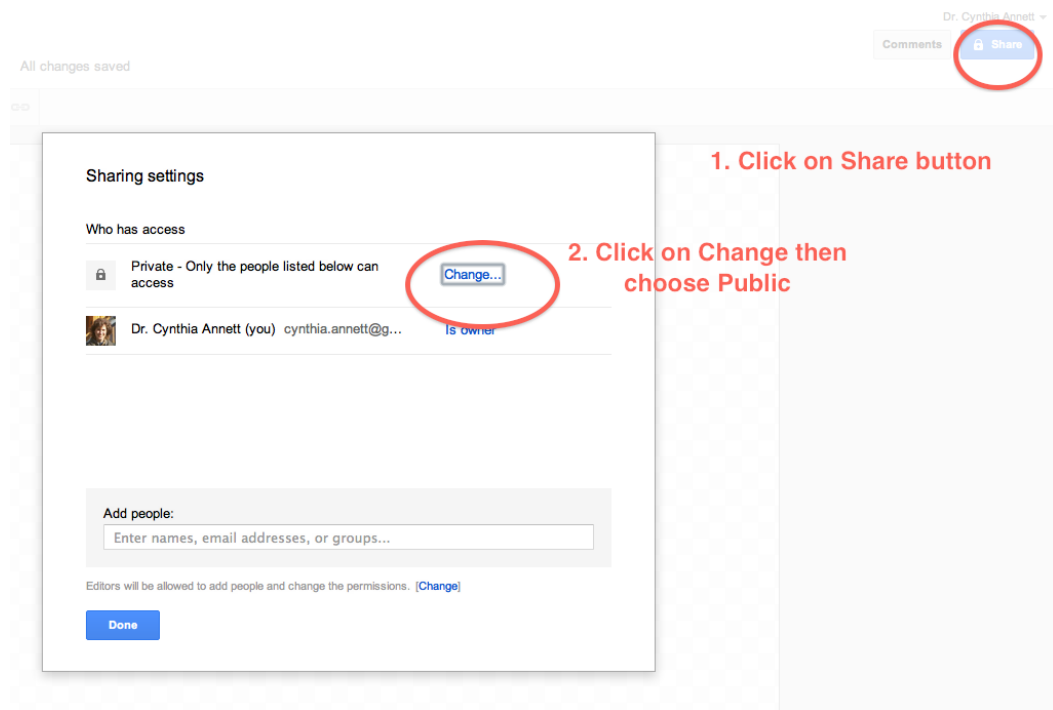
1. Log into your Google Account
2. Go to Google Documents <https://docs.google.com>
3. Click Create>Drawing



4. Give your drawing a name by clicking File>Rename

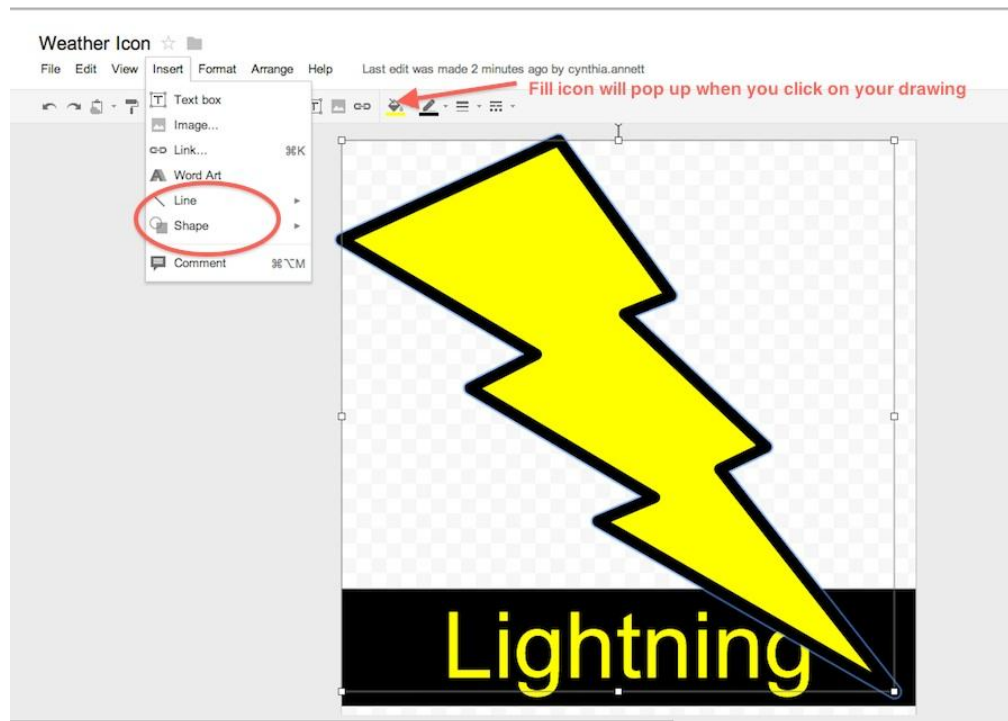


5. Make your Drawing Public

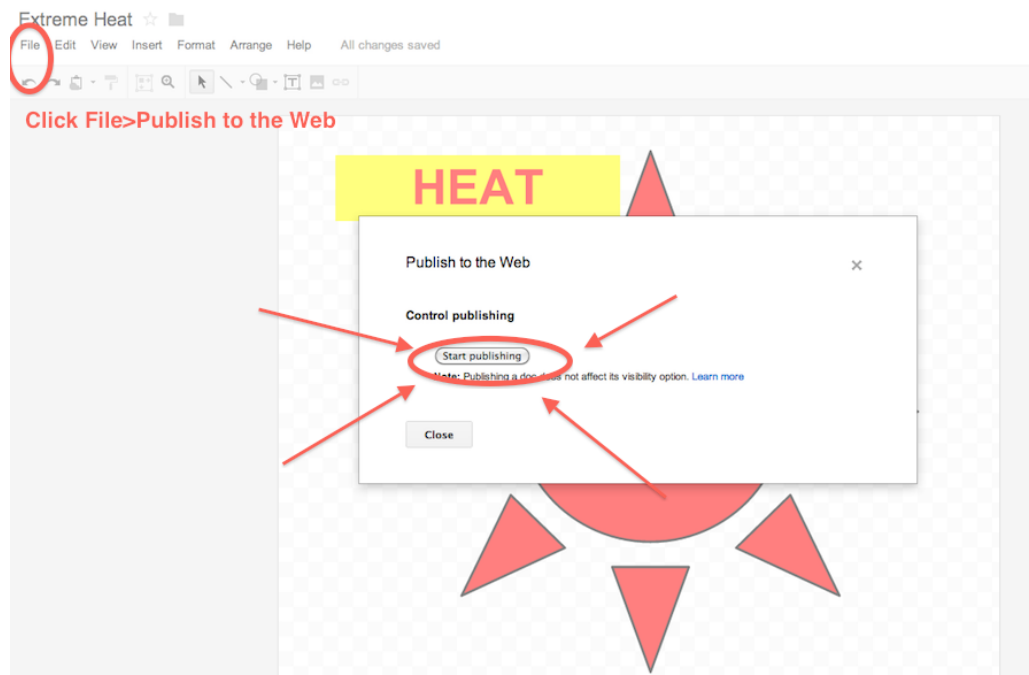


6. To create an image for your map icon click Insert and choose a Shape or Line. Use Scribble to draw a shape freehand.

Rules: do not use copyrighted material, do not use corporate logos, do not use images of famous people.



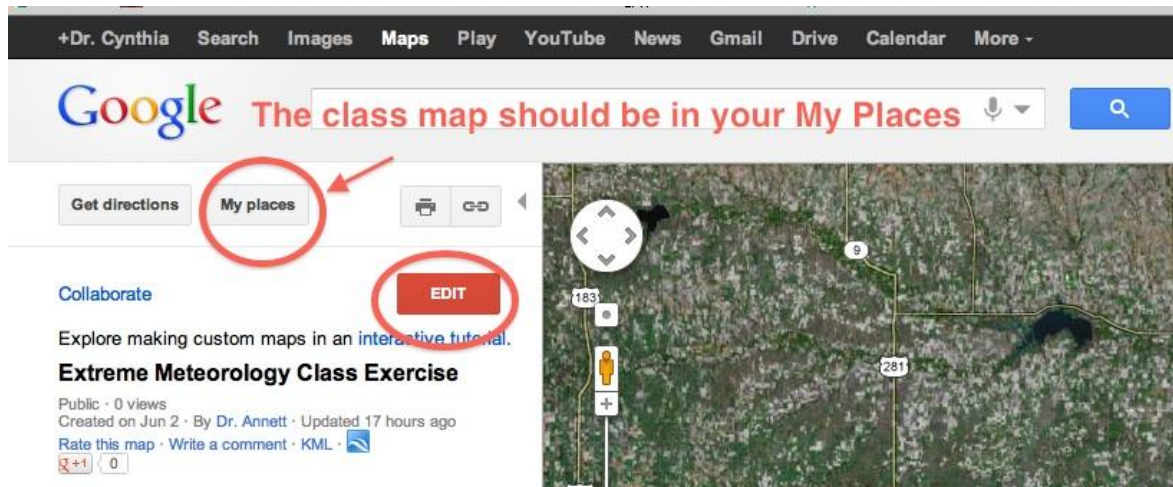
7. Publish your drawing to the web and copy the link that it gives you.



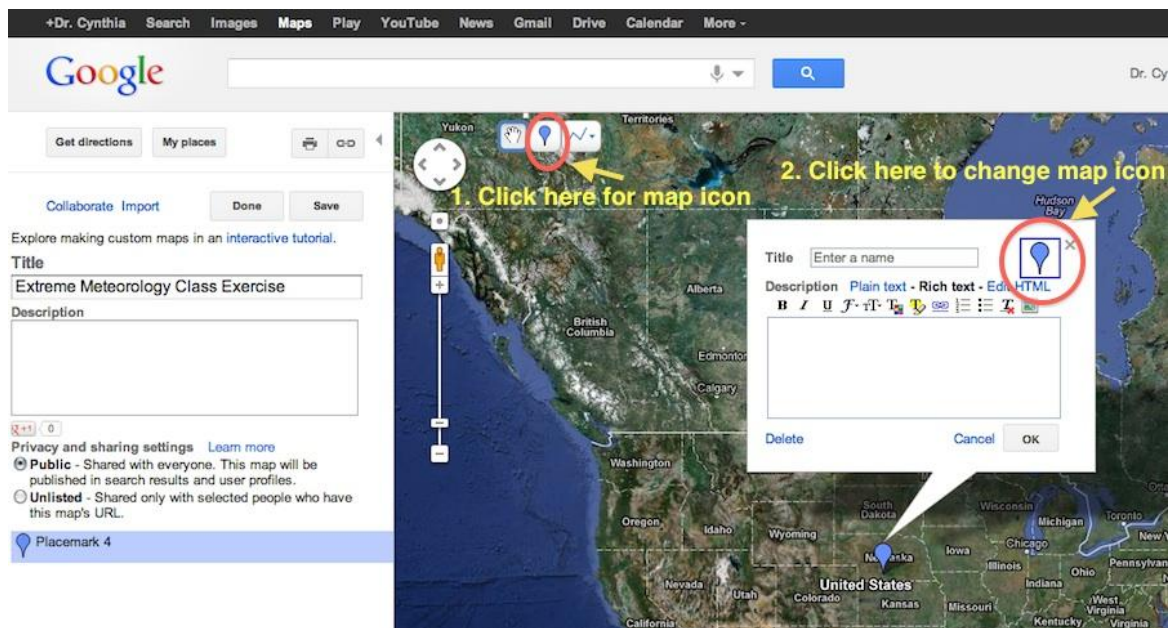
8. Now that we have our custom map icon, it is time to go to Google Maps and start working on

our Extreme Meteorology map. You should be logged into your Google Account. We have shared the map with you so [click on this link to go to the map](#).

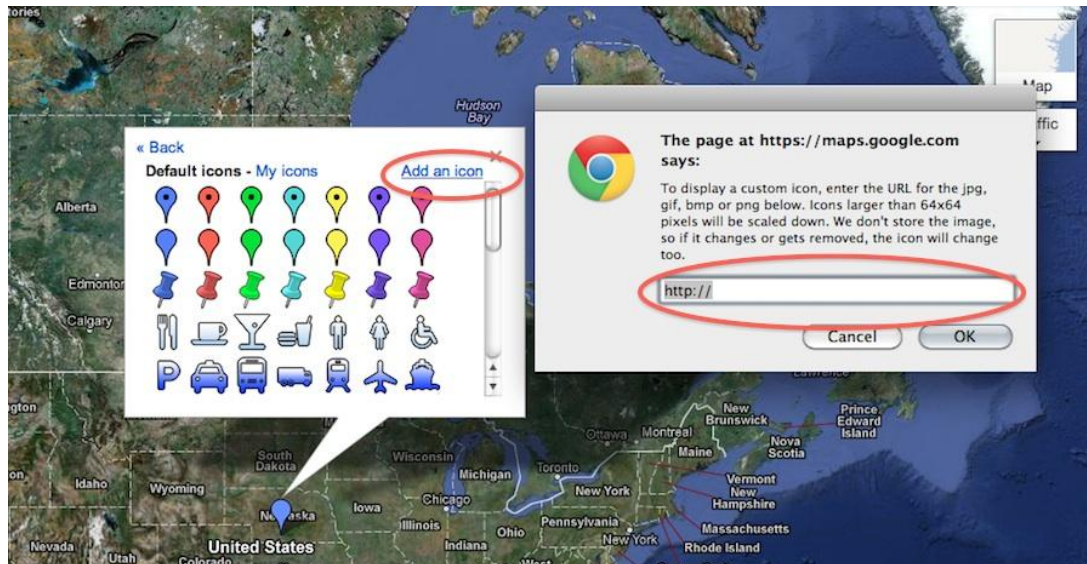
Click on Edit.



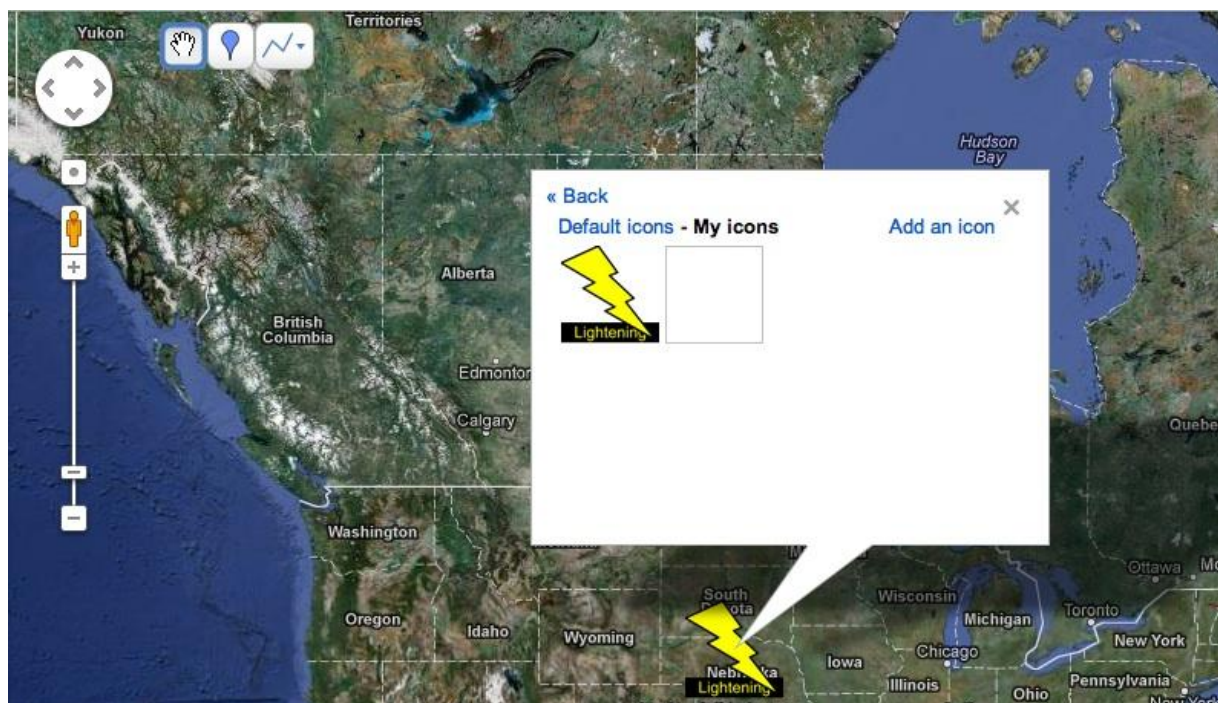
9. Add the custom icon you created in Google Drawing. Begin by adding a regular map icon to your map, then open the dialog box. Once you are in the map icon dialog box you can change the icon to your custom icon.



Click Add an icon and then paste in the url for your Google Drawing. Click OK.

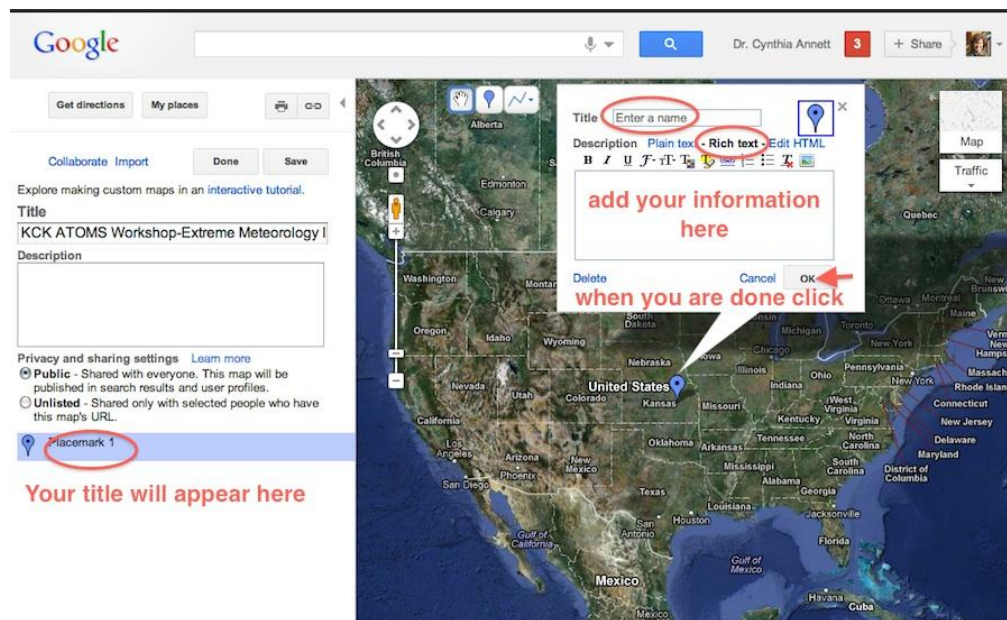


Your icon will now appear in My Icons. You can now use your own custom map icon to add information to your map.



Step 4: Annotate Your Markers

1. Add information to the map by writing text and adding links and photos to the map icon dialog box.



2. Now comes the research. Place map icons at the proper geographic locations and provide the following information in the icon dialog box. Make sure you put your names in your icons as well.

What are the most extreme weather events we can find?

Where did they occur?

When did they occur?

How much damage did they do?

Rules: do not use Wikipedia (it is not a scholarly source and will not be accepted in our college courses), make sure you properly document all your sources, do not use copyrighted images without permission.

Here are some resources that might be helpful:

- Good advice on [how to do effective Google Searches](#)
- These are government agency and university websites that provide information to the TV weather stations and commercial websites:
 - [Kansas Weather Data Library](#)
 - [Weather records for Kansas](#)
 - [National Climate Data Center](#)
 - [NOAA Extreme Weather Events](#)
 - [WaterWatch](#)
 - [Community Collaborative Rain, Hail and Snow Network](#)

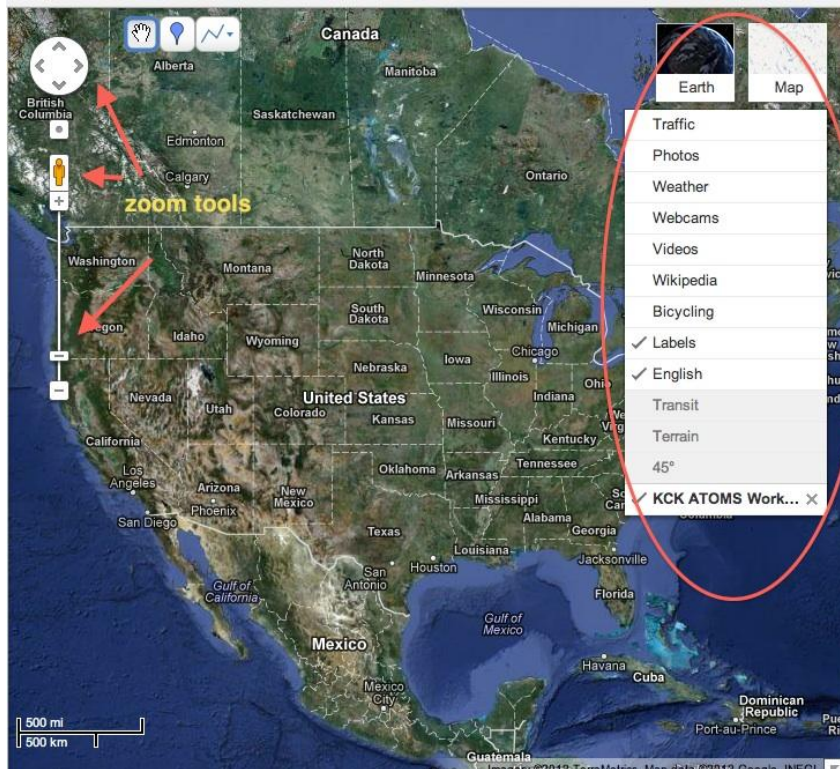
These are commercial websites that report the weather:

- [Wunderground.org Extreme Weather Records](#)
- [Weather Channel Storm Encyclopedia](#)
- [KMBC](#)
- [KCTV](#)
- [Fox4 Weather Almanac](#)

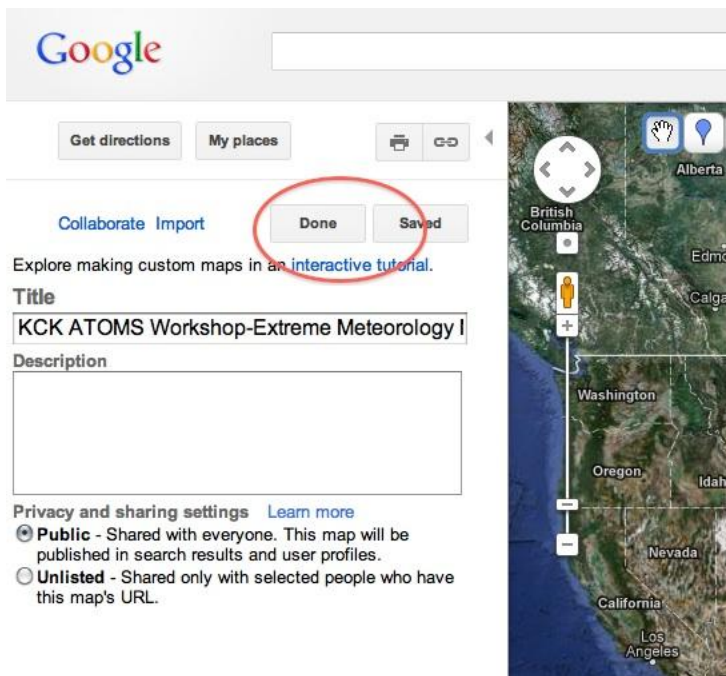
3. You can also add paths and shapes to your maps. This is especially helpful for showing the tracks of hurricanes or tornadoes, or the areas affected by large scale events.



4. Check out the different map views and zoom tools.



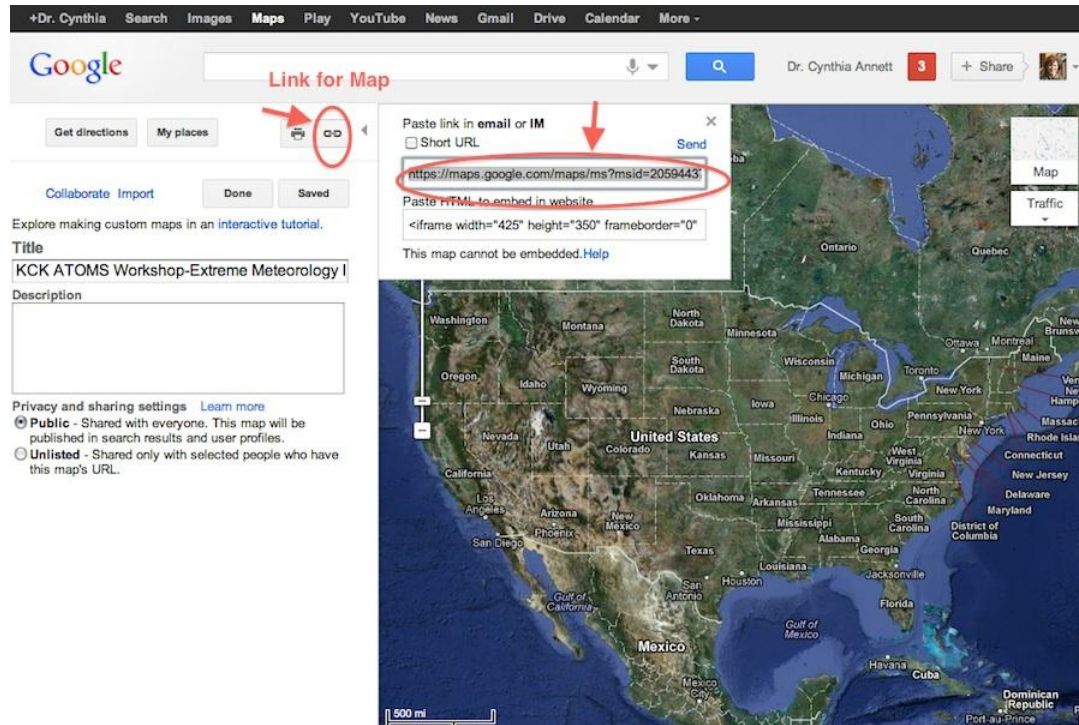
5. When you are finished click Done.



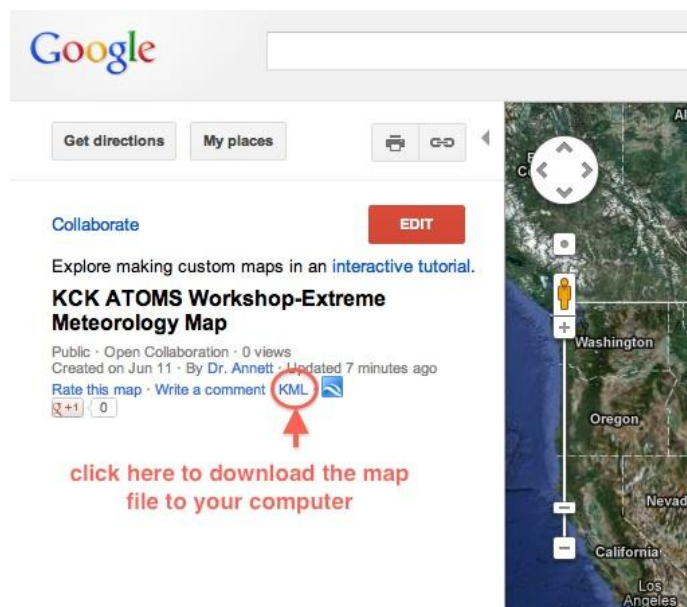
Step 5: Save Your Map

Now we can get the map file and use it in different ways.

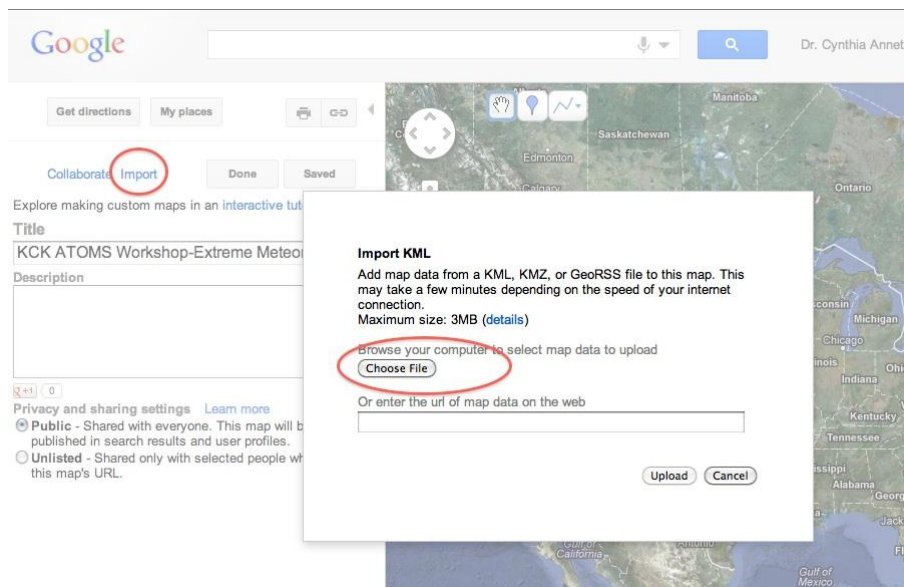
1. You can get a link to the map to share with others.



2. And you can download the map file as a kml file. This will allow you to add it to other maps or open it in Google Earth.



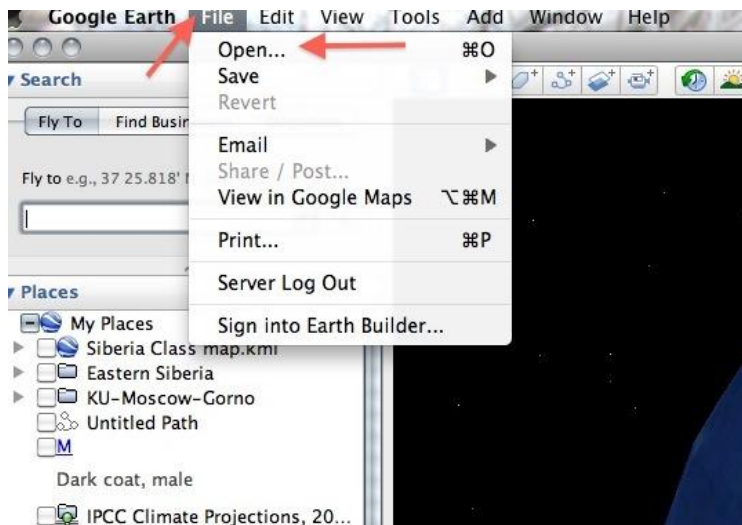
3. To import your file into another Google Map click Import and then browse your computer for the file. Click Upload.



Step 6: Open in Google Earth

Now let's try this with Google Earth. This is a high powered version of what we were just doing, and it has a lot of great tools that we can use to expand our project.

1. To import your map kml file into Google Earth you open Google Earth on your computer and click File>Open.



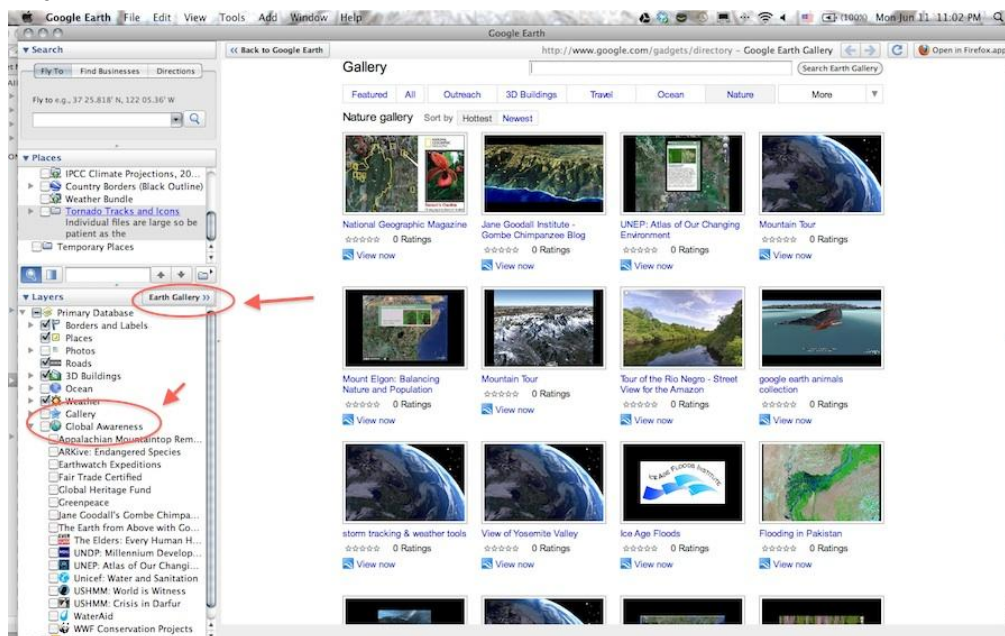
2. You can also use other people's kml files in your Google Earth. Check these out:

[Google Earth Weather Bundle](#)
[kml file of tornado tracks](#)

3. To use the weather layer in Google Earth make go into Layers and click on the Weather layer.

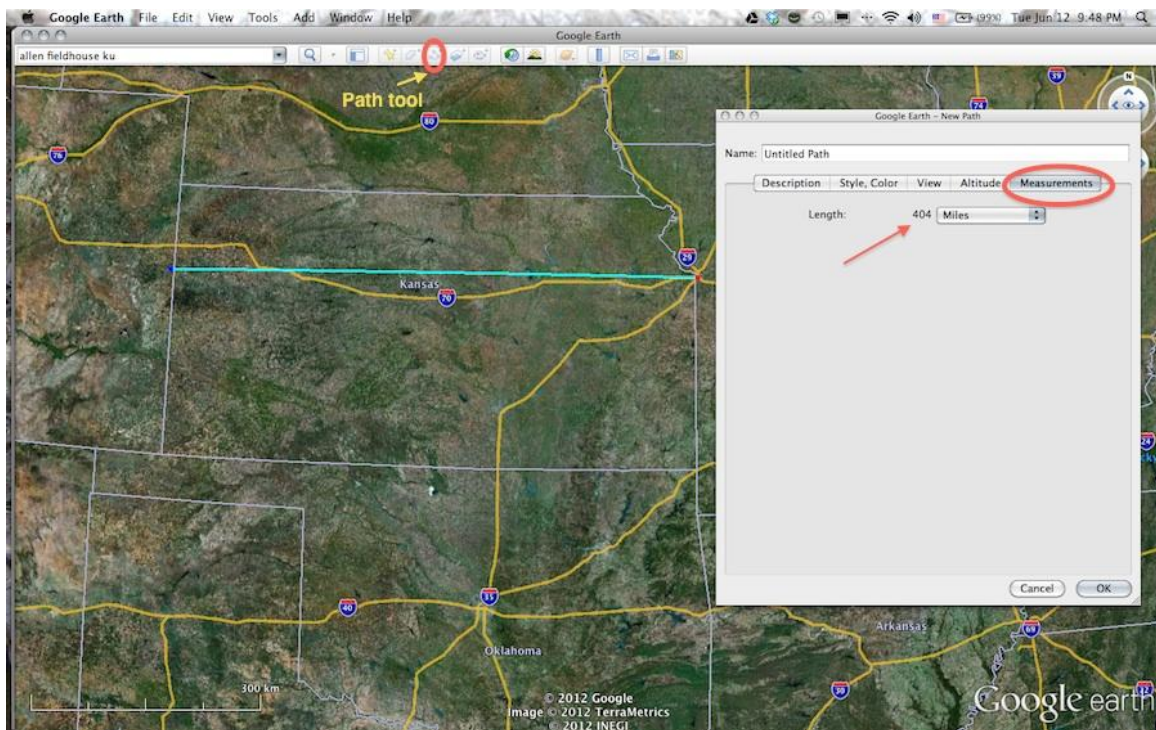


4. Explore the Google Earth Gallery and other resources to find amazing things for your projects.

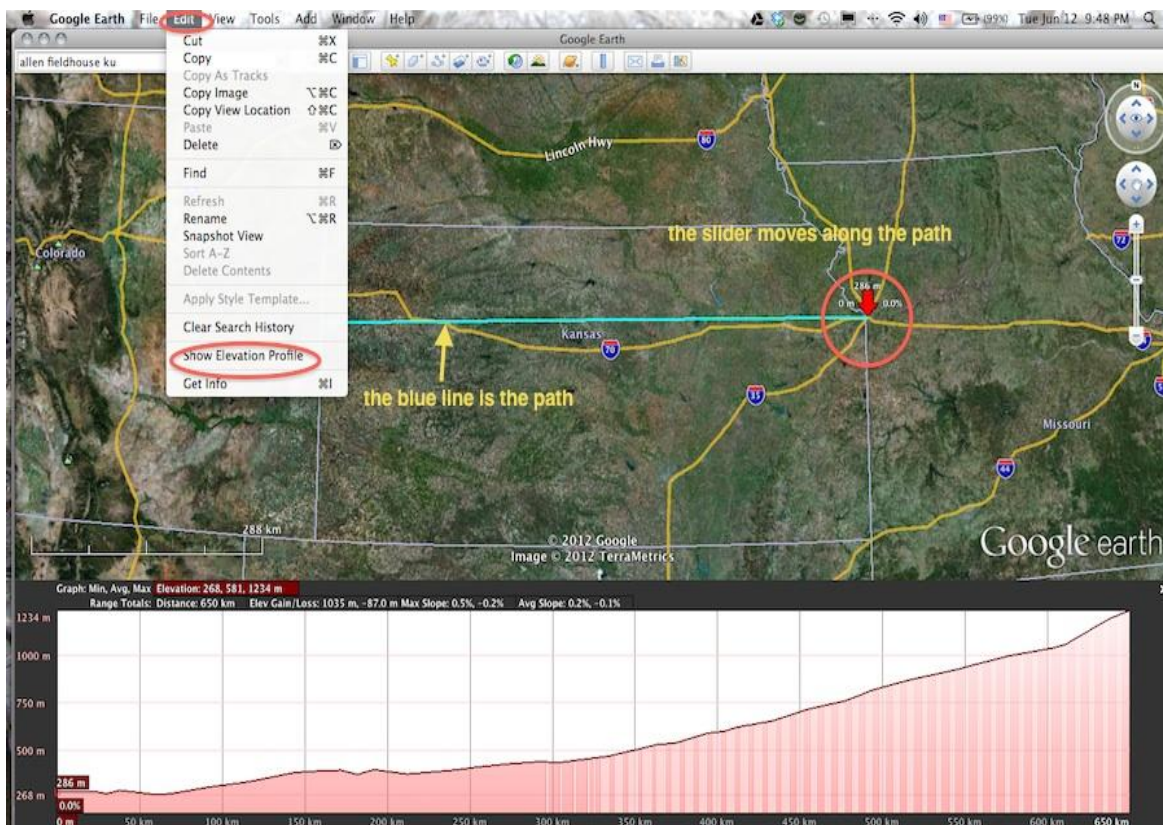


Google Earth is a much more powerful program. Although it calls down imagery from the web, it does not load your data up onto the web. Since your content is stored locally on your computer, it is a safer environment for younger students. There are tools in Google Earth that you can

incorporate into math lessons. For example, you can measure the length of a path:



And you can look at an elevation profile along a path:



Here is an example of a lesson that used measurement tools to [measure stormwater runoff](#).
Here's a [complete lesson plan for Google Earth](#).
[Here's a middle school lesson](#).

Day 2: Having fun with large and unruly datasets

A. There are many existing data sets that you can use for your lessons that can be found online and downloaded for your use. These are a rich source of information and can give students experience in handling realworld data. Here are some examples of both visual mapping data and numerical data:

1. Examples of map files compatible with Google Earth and Google Maps
 - a. Climate and weather maps
Data sets for [Google Earth](#)
[Wunderground.org full screen weather map in Google Maps](#)
 - b. Streamflow and drought maps
[WaterWatch](#) and [download streamflow data as a kml file](#) to import into your own Google Map or Google Earth
 - c. Pollutants
[EPA MyEnvironment map](#)- download kml file
2. Examples of data formatted as spreadsheets and graphs
[Google Public Data Explorer](#)
[Wyandotte County](#)-- there are several pages in this section under the dropdown in the left sidebar

B. We can use datasets for different purposes, and its important to explain to students that scientists do more than just experimentally test hypotheses-- especially in ecology, environmental sciences, and earth sciences. I have written a brief overview of [Hypothesis testing \("the scientific method"\) vs. exploratory analysis](#) for your use.

Today we will do an exploratory analysis of the Kansas Weather Library longterm weather record. We are not going to do any formal hypothesis testing, but rather, we will look for patterns and explore different potential lines of research.

Step 1: Choose Your Decade

1890's Dom and Sara	1950's
1900's Steve and Arnold	1960's Harry and Debbie
1910's	1970's Joe, Jackie, Patricia
1920's Sam and John and MaryAnn	1980's Larry, Leontra and Lourdes = L^3
1930's Tyrun and Jasmine Christian	1990's Debbie and Julissa
1940's	2000's

1. Download the Excel spreadsheet for your decade from the [KCK Teacher's Website](#). They are in the attachment section at the bottom of the page. You can work in Excel or you can upload your spreadsheet to Google Spreadsheets.

To download the files click on the arrow and save it to your computer.

Longterm Weather Data for Lawrence Kansas

Go to the attachment section at the bottom of the page to download Excel spreadsheets for each decade. These can be uploaded into Google Spreadsheets for

Subpages (2): [Dust Bowl](#) [More Fun With Data](#)

download file

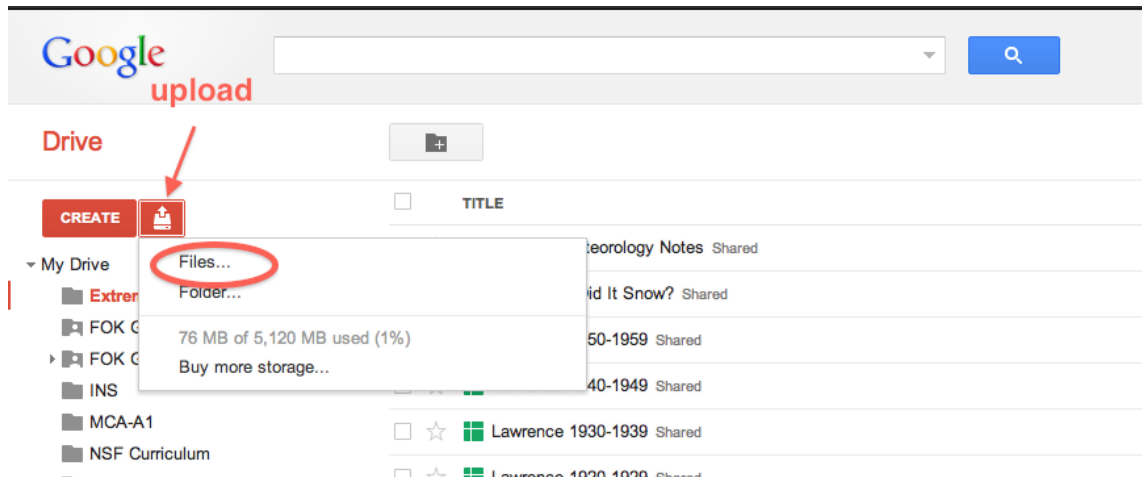
File Name	Version	Download Icon	Delete Icon
Lawrence 1890s.xlsx (163k)	v.1	Download	X
Lawrence 1900-1909.xlsx (171k)	v.1	Download	X
Lawrence 1910-1919.xlsx (160k)	v.1	Download	X
Lawrence 1920-1929.xlsx (159k)	v.1	Download	X
Lawrence 1930-1939.xlsx (162k)	v.1	Download	X
Lawrence 1940-1949.xlsx (159k)	v.1	Download	X
Lawrence 1950-1959.xlsx (158k)	v.1	Download	X
Lawrence 1960-1969.xlsx (159k)	v.1	Download	X

[Add files](#)

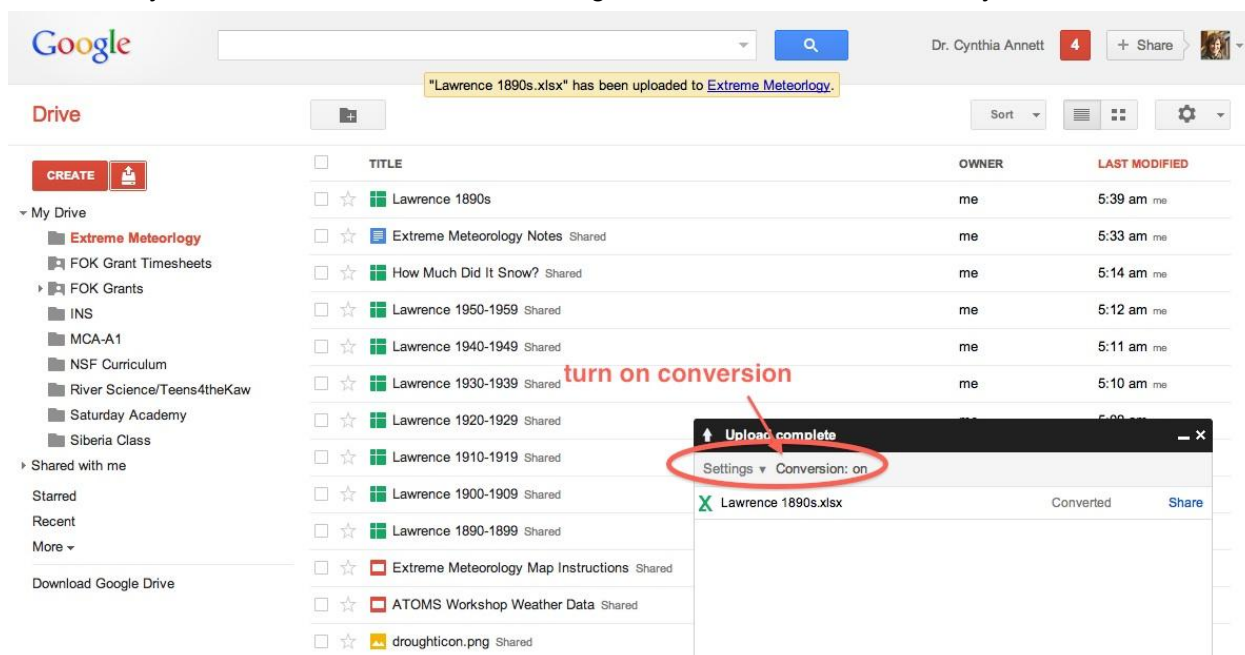
Comments

[Add comment](#)

2. To upload to Google Spreadsheets go to your Google Documents/Google Drive and click on the upload icon.



Make sure you turn on the conversion to Google Documents format so that you can edit it.



3. Use the tools in Google Spreadsheet (or Excel) to explore your decade. You will be using your exploratory analysis to engage in a dialog with the other teams about who had the most interesting weather. We will enter your data into a class Google Presentation and then use it to discuss what we have found in the various data sets.

You will choose what you wish to explore in your decade-long weather record and how you will present your data to your colleagues. Some possibilities include the snowiest day, the wettest year, the lowest/highest temperature, average January low temperatures, average July high temperatures...come up with the summary statistics that you believe are the most informative and be prepared to explain your choice during the class presentation.

You will all be given a link to the class Google Presentation. Google Presentations work a lot like a simplified version of Powerpoint (and can be downloaded as Powerpoint files). Create 2-3 slides summarizing the weather in your decade and why it is interesting. When you are finished we will give a group presentation and discuss your findings.

Step 2: Explore Your Decade

Explore your decade by sorting and summarizing your data. Google Spreadsheets are essentially a simplified form of Excel. They can be downloaded into Excel by click File>Download As>Excel. Likewise, Excel spreadsheets can be uploaded into Google Spreadsheets.

To sort a column:

Lawrence 1990-1999 ☆

File Edit View Insert Format Data Tools Help Last edit was made 27 hours ago by cynthia.annett

3. restore the original order to the data

1. sort column by clicking on the down arrow

2. choose how you want it sorted

low to high

high to low

	A	B	C	D	E	F	G
	year	month	day	T-High F	T-Low F	Precip inches	Snow inches
1							
2	1990	1	1	39	19	0	
3	1990	1	2	52	33	0	
4	1990	1	3	54	40	0	
5	1990	1	4	52	31	0.36	
6	1990	1	5	48	25	0	
7	1990	1	6	50	25	0	
8	1990	1	7	52	25	0	
9	1990	1	8	56	30	0	
10	1990	1	9	56	44	0	
11	1990	1	10	59	33	0	
12	1990	1	11	59	39	0	
13	1990	1	12	49	26	0	
14	1990	1	13	44	19	0	
15	1990	1	14	57	34	0	
16	1990	1	15	64	30	0	
17	1990	1	16	65	53	0	
18	1990	1	17	65	37	0.45	
19	1990	1	18	45	30	0	
20	1990	1	19	36	29	0	
21	1990	1	20	36	29	0.65	
22	1990	1	21	46	23	0	
23	1990	1	22	57	32	0	
24	1990	1	23	57	41	0	
25	1990	1	24	55	33	0	
26	1990	1	25	51	25	0.03	0.5

You can find the sum or average of a subset of your data by highlighting the values, then looking in the lower right hand corner for the sum-- you click on the popup for the average.

Lawrence 1990-1999 ☆

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Dr. Cynthia Annett

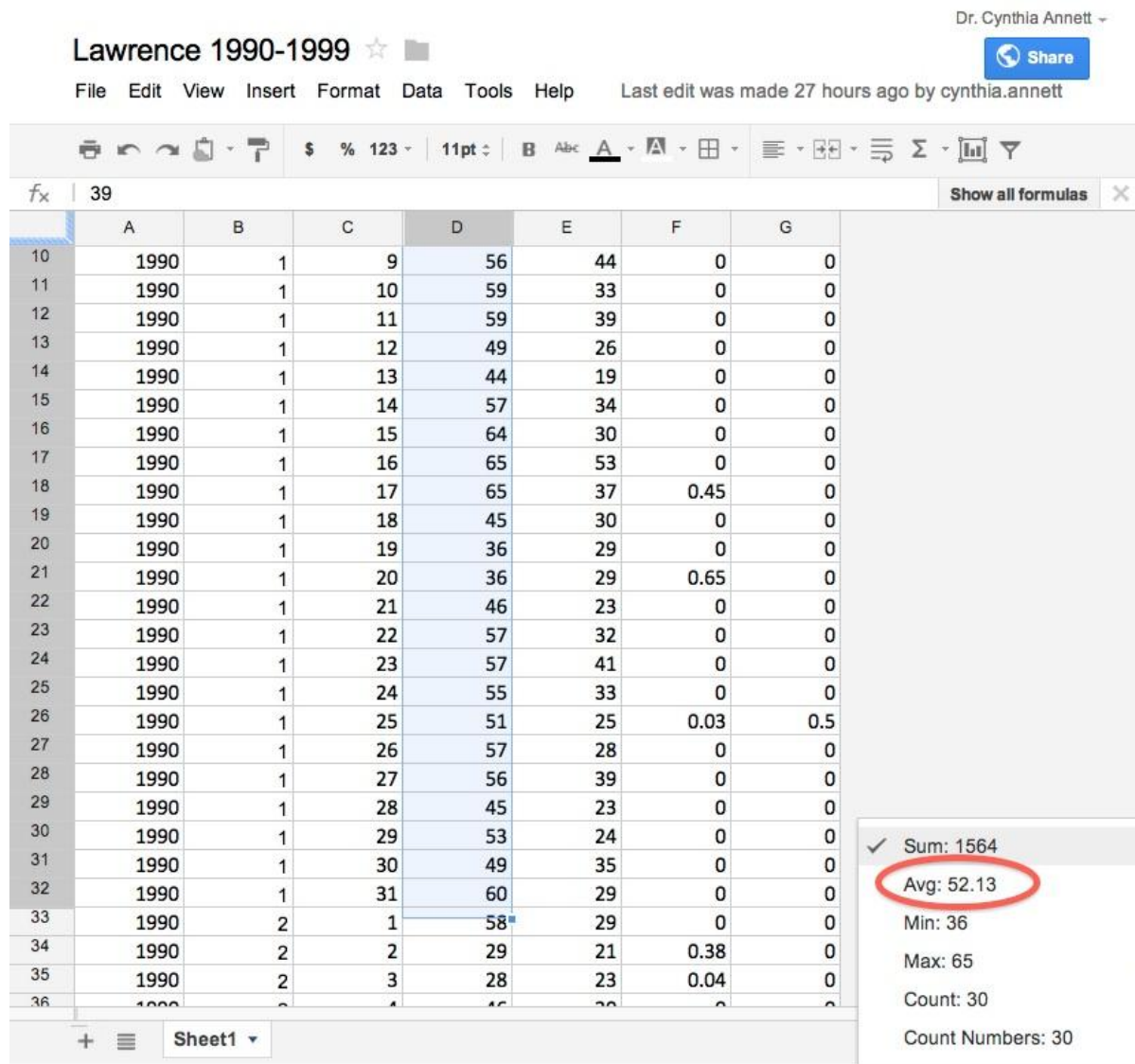
Share

fx | 39 select the values you want to summarize Show all formulas X

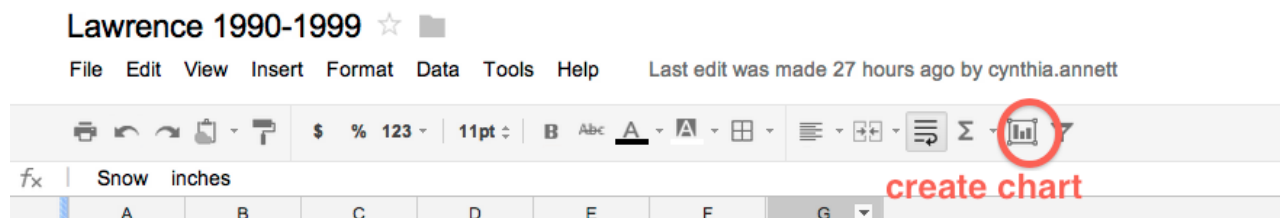
	A	B	C	D	E	F	G
10	1990	1	9	56	44	0	0
11	1990	1	10	59	33	0	0
12	1990	1	11	59	39	0	0
13	1990	1	12	49	26	0	0
14	1990	1	13	44	19	0	0
15	1990	1	14	57	34	0	0
16	1990	1	15	64	30	0	0
17	1990	1	16	65	53	0	0
18	1990	1	17	65	37	0.45	0
19	1990	1	18	45	30	0	0
20	1990	1	19	36	29	0	0
21	1990	1	20	36	29	0.65	0
22	1990	1	21	46	23	0	0
23	1990	1	22	57	32	0	0
24	1990	1	23	57	41	0	0
25	1990	1	24	55	33	0	0
26	1990	1	25	51	25	0.03	0.5
27	1990	1	26	57	28	0	0
28	1990	1	27	56	39	0	0
29	1990	1	28	45	23	0	0
30	1990	1	29	53	24	0	0
31	1990	1	30	49	35	0	0
32	1990	1	31	60	29	0	0
33	1990	2	1	58	29	0	0
34	1990	2	2	29	21	0.38	0
35	1990	2	3	28	23	0.04	0
36	1990	2	4	45	30	0	0

then click here to find the average

Sum: 1564



The chart editor is simple to use-- but lately it has not always worked, so try it out but don't worry if it doesn't pop up.



Step 3: Prepare Your Presentation

You will now create 3-4 slides in the class Google Presentation to summarize the weather in your decade. Everyone will then present their slides in a round-robin style presentation.

1. Using online resources, research out interesting weather events (or just something fun) about your decade. Were there any extreme events like droughts, floods, heat waves, cold snaps, etc. that are of historical significance? You can add that information to your presentation. Make sure to cite your sources (including all images).
 2. Summarize the data from your database investigation in Step 2. You can use means, ranges, charts, and other summary statistics to make it easy for your audience to understand your overview.
 3. Sign into your Google Account and use the instructions that you were given in the workshop to log onto the class Google Docs-Presentation. Everyone will be working online together to co-create the same slideshow, so please be respectful and be careful not to accidentally delete or change others work.
 4. Be prepared to give a 5 minute oral presentation when your turn comes up in the slideshow. Try to develop a cogent argument based on your data and the research you have done for why your decade was the hottest or coldest or snowiest or driest...what extreme event was most noteworthy? Or was your decade simply the most boring in Kansas history?
-