

The Messy Meter

Recommended Grades:
Grades 6-8

Estimated Time:
1 Hour

Subject:
**GIS Mapping -
Tracking Hurricanes**

WHAT YOU'LL NEED

PANTRY STAPLES:

- Ruler
- Pen

SPECIALTY SUPPLIES:

- 2 blank printouts of the Atlantic Basin Hurricane Tracking Chart
- 1 copy of Hurricane Katrina coordinates
- 1 copy of Hurricane Rita coordinates

Hurricane Mapping

Meteorologists and scientists plot the paths of hurricanes and try to predict their trajectories to help governments and communities prepare for and respond to the destruction that hurricanes cause. In this activity kids will be introduced to using Geographic Information Systems (GIS) by tracking the paths of two of the most destructive storms to hit the U.S. in recent history. Kids will learn how to combine maps with data and to draw comparisons between two sets of geographic information and analyze how this data can inform important lifesaving decisions.

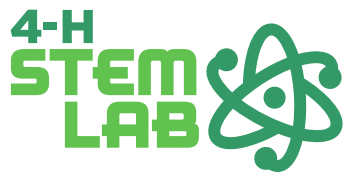


STEPS

1. Handwrite in a larger size the numbers of the latitude and longitude lines next to those markers at the edge of the printed map sheets.
2. Using the Hurricane Katrina coordinates sheet, plot the four coordinates on one of the two printed map sheets.
3. Choose one point, recorded at the same interval, for each 24-hour period. For instance, if you choose the first data point for Katrina (recorded at 18GMT), choose that point for each subsequent day.
4. Mark out each point of those 24-hour intervals.
5. Use the ruler to connect each point.
6. Repeat this process on the other map for Hurricane Rita.
7. Once complete, compare and analyze the different paths of the two hurricanes

BONUS FUN!

Repeat the mapping process, but instead of choosing one point from each 24-hour period, map out all four coordinates from each day. Then compare the second set of maps to the first and analyze the changes in trajectory that can happen within a single 24-hour period.



QUESTIONS TO ENGAGE YOUTH

- What environmental/weather-related factors could meteorologists study to determine what creates a hurricane's trajectory?
- How can first responders use maps like these to prepare their responses?
- GIS is the combination of geographic data, like a specific location, with attribute data, like the name or description tied to that location. Do you use GIS in your life now, and if so, how?
- Think about your response to No. 3 and then ask yourself, how might first responders use GIS technologies to create more efficient responses to hurricane destruction and help save people's lives?



EXPLANATION

About the activity: Hurricane season in the Atlantic Ocean runs from June through November. These two destructive hurricanes occurred less than a month apart from each other in the late summer of 2005. Each created massive destruction on the Gulf Coast of the U.S. Historically, emergency responders have mapped hurricanes to try to prepare and target their responses, but relying on traditional physical maps that are not updated in real time can limit how effective those responses are.

About GIS: Geographic Information Systems (GIS) can change that, allowing locals and responders to work together to create real-time maps and data systems to help save lives. In 2017, survivors of Hurricane Harvey in Texas created pins on Google maps and added attribute data like 'Woman in Labor' to help first responders. GIS was used after Hurricane Maria devastated Puerto Rico in 2017 to track which parts of the island had lost power, cell service and access to potable water, and after Hurricane Irma, also in 2017, to map out flooded parts of Florida's Gulf Coast.

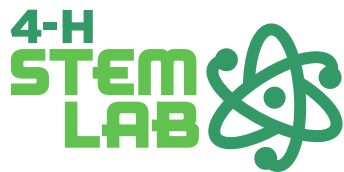
About hurricanes: Hurricanes form when thunderstorms suck up warm air near the ocean's surface and convert it into high-intensity, circular winds higher in the atmosphere. This occurs in the North Atlantic in the late summer and early fall, when the ocean is warmest in this part of the world. The winds of a hurricane spin around a core of low-pressure air, called the eye of the hurricane. A hurricane's path is determined by global winds as well as the high- and low-pressure systems around it. Hurricanes begin as low-pressure tropical depressions; as they grow in force they are upgraded to tropical storms, and when these storm systems obtain sustained winds of 74 mph or higher, they are categorized as hurricanes. Hurricanes are rated on a scale of one to five based on their wind speeds and the potential damage they can cause. Wind speeds are just one factor in the damage a hurricane can cause—the other is the water that a storm can push onto land, called a storm surge, which can cause flooding. Most hurricane deaths are caused by storm surges.

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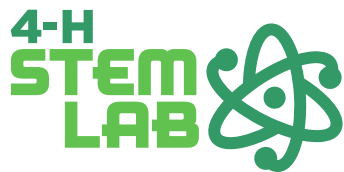
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Hurricane Katrina | August, 2005

Time (GMT)	Date	Latitude	Longitude	Wind (mph)	Pressure	Storm Type
8	8/24/05	23.1N	75.1W	35	1008	Tropical Depression
0	8/24/05	23.4N	75.7W	35	1007	Tropical Depression
6	8/24/05	23.8N	76.2W	35	1007	Tropical Depression
12	8/24/05	24.5N	76.5W	40	1006	Tropical Storm
18	8/24/05	25.4N	76.9W	45	1003	Tropical Storm
0	8/25/05	26.0N	77.7W	50	1000	Tropical Storm
6	8/25/05	26.1N	78.4W	60	997	Tropical Storm
12	8/25/05	26.2N	79.0W	65	994	Tropical Storm
18	8/25/05	26.2N	79.6W	70	988	Tropical Storm
0	8/26/05	25.9N	80.3W	80	983	Category 1 Hurricane
6	8/26/05	25.4N	81.3W	75	987	Category 1 Hurricane
12	8/26/05	25.1N	82.0W	85	979	Category 1 Hurricane
18	8/26/05	24.9N	82.6W	100	968	Category 2 Hurricane
0	8/27/05	24.6N	83.3W	105	959	Category 2 Hurricane
6	8/27/05	24.4N	84.0W	110	950	Category 2 Hurricane
12	8/27/05	24.4N	84.7W	115	942	Category 3 Hurricane
18	8/27/05	24.5N	85.3W	115	948	Category 3 Hurricane
0	8/28/05	24.8N	85.9W	115	941	Category 3 Hurricane
6	8/28/05	25.2N	86.7W	145	930	Category 4 Hurricane
12	8/28/05	25.7N	87.7W	165	909	Category 5 Hurricane
18	8/28/05	26.3N	88.6W	175	902	Category 5 Hurricane
0	8/29/05	27.2N	89.2W	160	905	Category 5 Hurricane
6	8/29/05	28.2N	89.6W	145	913	Category 4 Hurricane
12	8/29/05	29.5N	89.6W	125	923	Category 3 Hurricane
18	8/29/05	31.1N	89.6W	90	948	Category 1 Hurricane
0	8/30/05	32.6N	89.1W	60	961	Tropical Storm
6	8/30/05	34.1N	88.6W	45	978	Tropical Storm
12	8/30/05	35.6N	88.0W	35	985	Tropical Depression
18	8/30/05	37.0N	87.0W	35	990	Tropical Depression
0	8/31/05	38.6N	85.3W	35	994	Extratropical Storm
6	8/31/05	40.1N	82.9W	30	996	Extratropical Storm

Hurricane coordinates courtesy of Weather Underground. To access coordinates from other hurricanes, visit <https://www.wunderground.com/hurricane>



Hurricane Rita | September, 2005

Time (GMT)	Date	Latitude	Longitude	Wind (mph)	Pressure	Storm Type
0	9/18/05	21.3N	69.9W	30	1009	Tropical Depression
6	9/18/05	21.6N	70.7W	30	1009	Tropical Depression
12	9/18/05	21.9N	71.5W	35	1007	Tropical Depression
18	9/18/05	22.2N	72.3W	40	1005	Tropical Storm
0	9/19/05	22.4N	73.0W	50	1002	Tropical Storm
6	9/19/05	22.6N	---	60	999	Tropical Storm
12	9/19/05	22.5N	---	65	997	Tropical Storm
18	9/19/05	23.1N	74.7W	70	994	Tropical Storm
0	9/20/05	23.3N	75.9W	70	992	Tropical Storm
6	9/20/05	23.7N	77.2W	70	990	Tropical Storm
12	9/20/05	23.9N	78.8W	80	985	Category 1 Hurricane
18	9/20/05	24.1N	81.6W	100	975	Category 2 Hurricane
0	9/21/05	24.2N	82.7W	110	967	Category 2 Hurricane
6	9/21/05	23.4N	84.0W	125	955	Category 3 Hurricane
12	9/21/05	24.3N	85.2W	140	941	Category 4 Hurricane
18	9/21/05	24.5N	86.2W	165	920	Category 5 Hurricane
0	9/22/05	24.5N	86.9W	175	897	Category 5 Hurricane
6	9/22/05	25.2N	87.6W	180	897	Category 5 Hurricane
12	9/22/05	25.6N	88.3W	160	908	Category 5 Hurricane
18	9/22/05	---	89.1W	145	913	Category 4 Hurricane
0	9/23/05	---	89.9W	140	915	Category 4 Hurricane
6	9/23/05	26.5N	90.7W	135	924	Category 4 Hurricane
12	9/23/05	---	91.5W	135	927	Category 4 Hurricane
18	9/23/05	27.5N	92.3W	125	930	Category 3 Hurricane
0	9/24/05	28.6N	93.0W	120	931	Category 3 Hurricane
6	9/24/05	29.4N	93.6W	115	935	Category 3 Hurricane
12	9/24/05	30.5N	94.1W	75	949	Category 1 Hurricane
18	9/24/05	31.6N	94.1W	50	974	Tropical Storm
0	9/25/05	32.7N	94.0W	40	982	Tropical Storm
6	9/25/05	33.7N	93.6W	35	989	Tropical Depression
12	9/25/05	34.7N	92.5W	30	995	Tropical Depression
18	9/25/05	35.5N	91.4W	30	1000	Tropical Depression
0	9/26/05	37.0N	90.1W	25	1003	Tropical Depression
6	9/26/05	39.5N	88.0W	25	1006	Subtropical Depression

Hurricane coordinates courtesy of Weather Underground. To access coordinates from other hurricanes, visit <https://www.wunderground.com/hurricane>



Atlantic Basin Hurricane Tracking Chart

National Hurricane Center, Miami, Florida

