

EENS 204	Natural Disasters
Tulane University	Prof. Stephen A. Nelson
Homework Assignment V. Weather Exercises	

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1. Go to the following link to download and print a hurricane tracking map to be used for this exercise - <http://www.tulane.edu/~sanelson/geol204/trackingmap.pdf> In order to print this file you will first need to obtain the Adobe Acrobat reader (see EENS 204 homepage). Be sure to set your printer to print this file in Landscape mode.
 - a. Once you have the tracking map, plot the following hurricane coordinates for Hurricane Loco on the map. Note that the coordinates refer to the position of the center of the eye of the hurricane. At each latitude and longitude also write the wind velocity in red and the storm center velocity in blue. Make sure you write them as small as you can and still read them. **(2 points)**

Track of Hurricane Loco					
Date	Time	Latitude (N)	Longitude (W)	Max Wind Velocity (miles/hr)	Storm Center Velocity (miles/hr)
Sept. 3	12:00 PM	10.3	26.9	41	8
Sept. 4	12:00 PM	11.0	33.1	43	8
Sept. 5	12:00 PM	12.2	39.4	52	8
Sept. 6	12:00 PM	13.6	45.8	66	8
Sept. 7	12:00 PM	15.2	52.9	74	6
Sept. 8	12:00 PM	16.8	59.5	76	10
Sept. 9	12:00 PM	19.1	64.7	77	12
Sept. 10	12:00 PM	21.2	68.1	88	10
Sept. 11	06:00 AM	21.2	70.0	110	15
Sept. 11	06:00 PM	21.2	74.0	128	15
Sept. 12	06:00 AM	22.0	78.0	135	18
Sept. 12	06:00 PM	23.0	80.0	144	18
Sept. 13	06:00 AM	24.0	84.0	155	18
Sept. 13	06:00 PM	25.0	86.0	160	15
Sept 13	09:00 PM	26.0	87.0	166	20
Sept.14	03:00AM	28.0	89.0	166	20
Sept. 14	06:00 AM	28.5	88.0	167	18
Sept 14	12:00 PM	28.5	84.0	165	20
Sept. 14	06:00 PM	28.5	83.0	155	15
Sept. 15	01:00 AM	28.5	81.5	135	15
Sept 15	06:00 AM	30.0	80.0	135	15
Sept. 15	12:00 PM	33.0	79.0	135	20
Sept 15	06:00 PM	34.0	78.0	133	25
Sept. 16	00:00 AM	35.0	77.0	135	30
Sept. 16	06:00 AM	37.0	76.0	110	35
Sept. 16	12:00 PM	38.0	75.0	105	38
Sept. 16	6:00 PM	39.0	73.0	65	35

- b. After you have plotted all of the points on the map, connect the points with lines using the following color codes: **(1 point)**

Wind Velocity (miles/hr)	Safir-Simpson Scale Category	Minimum Storm Surge Height near Landfall (feet)	Line Color
39-73	Tropical Storm		Black
74-110	1 - 2	4 - 8	Green
111-130	3	9 - 12	Blue
131-155	4	13 - 18	Orange
>155	5	>18	Red

Note that information to help answer these questions that follow is contained in your lecture notes. **Make sure you turn the map in with your homework.**

- c. What was the likely minimum height of the storm surge at Tampa Florida on the afternoon of Sept 14? **(1 point)**
- d. What were the maximum sustained winds at Tampa Florida during the evening of Sept 14? (Be sure to take into account both wind velocity and storm center velocity) **1 point)**
- e. What were the maximum sustained winds on the Florida Gulf Coast at 29.0 North latitude during the evening of Sept 14? **(1 point)**
- f. As the Hurricane crossed Florida between Tampa and Orlando it lost intensity. Explain why this is occurred. **(1 point)**
- g. Describe what the weather would have been like in Disney World (Orlando, Florida, 28.5°N, 81.5°W) at **exactly** 1:00 AM on Sept. 15. **(1 point)**
- h. What would have been the maximum sustained wind speed at Charleston, South Carolina as the Hurricane passed by there on Sept. 15? **(1 point)**
- i. Hurricane tracks can be described as coast-normal and coast-parallel. What kind of track did the storm take with respect to the west coast of Florida during most of the day on Sept. 14? What kind of track did the storm during the afternoon of Sept. 15? **(1 point)**
- j. What would have been the minimum storm surge at Wilmington, North Carolina just before the storm hit there? **(1 point)**
- k. New Orleans is located at 30° North Latitude, 90° West Longitude. What would the National Hurricane Center have been saying about New Orleans after the report of the hurricane's location and storm center velocity on Sept. 14 at 03:00 hours? **(0.5 point)** What would have been the wisest thing you could have possibly done if you were living in New Orleans at this time? Why? **(0.5 point)**
- l. In the year Hurricane Loco occurred, how many named tropical storms/hurricanes

had occurred in the Atlantic prior to this storm? **(1 point)**

2. Visit the National Hurricane Center web site at: <http://www.nhc.noaa.gov/>, Find the answers to the following questions (hint - many, but not all, answers can be found in the Frequent Questions section):
 - a. List the 10 Hurricanes that have caused the most deaths in the **United States** since 1900. Give the estimated death toll for each. **Make sure you only include hurricanes since 1900 (1 point)**
 - b. List the top ten hurricanes that have been the most costly in the U.S. between 1900 and 2006. Give the name of the storm, states affected, year of the storm, and dollar amounts **in 2006 dollars** for each. **(1 point)**
 - c. During a hurricane are you supposed to have the windows and doors on the storm side closed and the windows and doors on the lee side open? Explain your answer. **(1 point)**
 - d. In the southern Atlantic Ocean, hurricanes are almost non-existent. What reasons can you find for this? **(1 point)**
 - e. Why do hurricanes hit the East coast of the U.S., but not the West coast? **(1 point)**
 - f. Has a hurricane ever hit the west coast of the United States? If so, where, and when what are the implications of this considering the earth appears to be undergoing a warming cycle? **(1 point)**
 - g. What are the chances (probability) that New Orleans will receive a direct hit from a hurricane or tropical storm in any given year? **(1 point).**
 - h. Which part of the United States has the highest probability of direct hit from a hurricane or tropical storm in any given year? **(1 point)**
3. Back in June of 2003, the New Orleans Times Picayune newspaper published a series of articles, entitled "Washing Away" on the hurricane threat to New Orleans. These were exceptionally well-researched and well-written articles that are still available on the Times Picayune web site (linked on the EENS 204 home page). If you have not already done so, it would be worth your while to read the articles. For now, however, we will just concentrate on one section of the articles available at the following site: <http://www.nola.com/hurricane/content.ssf?/washingaway/goingunder.html>
 On that page are links to larger versions of the graphic. In order to actually read the text on the graphic you should look at the PDF version, and in order to more efficiently be able to pan and zoom through the graphic, it would be much easier if you downloaded the file to your computer, at least on a temporary basis. Again, the Adobe Acrobat Reader will have to be installed on your computer in order to read the file after it is downloaded. To download the file, right-click on the link and select "Save Target As" from the drop-down menu, then specify a location on your computer where you want the download to go.

The graphic shows some of the effects of Hurricane Betsy (1965) (along the left), the

reasons the Louisiana Coast has become more vulnerable (along the right), and the effects that New Orleans would have experienced if Hurricane Georges (1998) or any similar storm had or does actually hit New Orleans (in the central part of the graphic). Look at the graphics and answer the following questions:

- a. Why has the New Orleans area become more vulnerable to Hurricanes over the last 40 years? (give 7 reasons) **(1 point)**
 - b. What is the major threat from a hurricane that is discussed here, and why does it occur? **(1 point)**
 - c. What size hurricane taking the path shown in the graphics would be necessary to cause overtopping of the levees along Lake Pontchartrain (note that the cross-section at the bottom of the page shows the Lakefront levees with an elevation of 14.5 feet.)? **(1 point)**
 - d. What parts of the city would be least likely to flood as a result of such a hurricane? **(1 point)**
 - e. During Hurricane Katrina, much of the city of New Orleans flooded. Go to the following site - www.tulane.edu/~sanelson/Katrina and look at figure Figure 9 on page 8 of the field trip guide. Compare this map with the map for the effects of the hypothetical hurricane shown in the large map from the Times Picayune 2003 article. What differences do you see in terms of the areas that were actually flooded by Katrina and the areas that were hypothesized to flood in the 2003 article? **(1 point)**.
 - f. What reasons can you give to explain the difference in flooded areas between the actual flooding during Katrina and the hypothesized flooding discussed in the 2003 article? **(1 point)**.
4. The president of Denyallclaims Insurance Company, I. Won Pei, is considering moving into the state of Oklahoma hoping to make some excessive profits by selling a lot of tornado insurance. He is in the process of writing a prospectus for the board of directors, but has some questions about tornadoes. He asks you for answers to these questions, knowing that you have taken a course on natural disasters. Because you see this as an opportunity to get a promotion to a coveted position as regional manager in Fargo, North Dakota, you willing agree to provide the answers to his questions. You know that the answers probably can be found on internet at sites like the WhyFiles twister site - <http://whyfiles.org/013tornado/> and the NOAA tornado FAQ page-<http://www.spc.noaa.gov/faq/tornado/index.html> so you go to these sites to find the answers to the following questions:
- a. What is the difference between a water spout and a tornado? **(1 point)**
 - b. How long can a tornado last? **(1 point)**
 - c. Which is the most important energy source in a tornado? **(1 point)**
 - d. Why are tornadoes most frequent in the afternoon and evening? **(1 point)**

- e. What is the maximum death toll from a single tornado in the U.S.? **(1 point)**
- f. Where and when did this occur, and what was the estimated cost of the damages (in current dollars)? **(1 point)**
- g. What is difference between a "Tornado watch" and a "Tornado Warning"? **(1 point)**
- h. Is it true that one of the safest places to go if you are on the highway during a tornado is under a bridge or highway overpass? Explain your answer. **(1 point)**

[Return to EENS 204 Homepage](#)