

Lab 8 GEO 302C

Goals:

1. To understand the basics of what hurricanes are, why they form, and how they behave.
2. To consider how extreme weather events affect society.
3. To address the ways in which global warming might alter hurricane formation and behavior.

In class, we'll discuss what hurricanes are, why they form, and why they move along the paths that they do. We'll also watch a brief NOVA video clip that aired in early 2005.

For section discussion and homework:

Hurricane data (<http://www.infoplease.com/spot/hurricanes.html>)

Deadliest Hurricanes in the United States (U.S. Mainland)¹

Rank	Hurricane	Year	Category ²	Deaths
1.	Galveston, Tex.	1900	4	8,000 ³
2.	Lake Okeechobee, Fla.	1928	4	1,836
3.	Katrina (La./Miss.)	2005	4	1,200
4.	Florida Keys/S. Tex.	1919	4	600 ⁴
5.	New England	1938	3	600
6.	Florida Keys	1935	5	408
7.	Audrey (SW La./N. Tex.)	1957	4	390
8.	NE U.S.	1944	3	390 ⁵
9.	Grand Isle, La.	1909	4	350
10.	New Orleans, La.	1915	4	275
10.	Galveston, Tex.	1915	4	275

NOTE: Katrina's death toll is estimated.

1. 1900–2000.

2. Saffir-Simpson Hurricane scale: Cat. 1 = weak; Cat. 5 = devastating.

3. May actually have been as high as 10,000 to 12,000.

4. Over 500 of these lost on ships at sea; 600–900 estimated deaths.

5. Some 344 of these lost on ships at sea.

Source: National Oceanic and Atmospheric Administration (NOAA).

Costliest Hurricanes in the United States (U.S. Mainland)¹

Rank	Hurricane	Location	Year	Category ²	Damage (in billions)
1.	Katrina	La./Miss.	2005	4	\$80.0 ³
2.	Andrew	Fla./La.	1992	5	26.5
3.	Charley	Fla.	2004	4	15.0
4.	Wilma	Fla.	2005	3	14.43
5.	Ivan	Ala./Fla.	2004	3	14.2
6.	Rita	Tex./La.	2005	3	\$9.43
7.	Frances	Fla.	2004	2	8.9
8.	Hugo	S.C.	1989	4	7.0
9.	Jeanne	Fla.	2004	3	6.9
10.	Allison	Tex.	2001	TS ⁴	5.0

NOTE: Damages are listed in U.S. dollars and are not adjusted for inflation.

1. 1900–2005.

2. Saffir-Simpson Hurricane scale: Cat. 1 = weak; Cat. 5 = devastating.

3. Estimated.

4. Tropical storm intensity.

Source: National Oceanic and Atmospheric Administration (NOAA).

Most Intense¹ Hurricanes in the United States² (U.S. Mainland)

Rank	Hurricane	Year	Category ³
1.	Florida Keys	1935	5
2.	Camille (Miss./La./Va.)	1969	5
3.	Katrina (La./Miss.) ⁴	2005	4
4.	Andrew (Fla./La.)	1992	5
5.	Indianola, Tex.	1886	4
6.	Florida Keys/Tex.	1919	4
7.	Lake Okeechobee, Fla.	1928	4
8.	Donna (Fla./Eastern U.S.)	1960	4
9.	New Orleans, La.	1915	4
9.	Carla (Tex.)	1961	4
11.	Last Island, La.	1856	4
11.	Hugo (S.C.)	1989	4

1. Intensity is for time of landfall. May have been stronger at other times.

2. 1851–2005.

3. Saffir-Simpson Hurricane scale: Cat. 1 = weak; Cat. 5 = devastating.

4. Preliminary data indicate that while Katrina's wind speed at landfall was slower than Andrew's (140 mph vs. 165), its barometric pressure was lower (27.11 inches vs. 27.23). The former is used to determine a hurricane's category; the latter, its intensity.

Sources: NOAA and National Weather Service.

Lab 8 Homework GEO 302C

Your name:

1a. (15 points) Select any north Atlantic hurricane and on the attached map plot the track of a North Atlantic hurricane. (Plot a dot for the location of the hurricane on each day, starting when it was first developing as a tropical storm) On this map, also plot typical location of high and low pressure systems in the region.



Here is a link that will give you the dates and location of any hurricane through 2004:

<http://weather.unisys.com/hurricane/atlantic/index.html>

1b. (10 points) Discuss how the location of the pressure systems and the wind patterns affected the path of the hurricane.

2. (60 points total; 10 points each segment) What, if any, effect might global warming have on each of the six conditions required for the initiation and intensification of hurricanes? For each of the six conditions, state whether you think that warmer average conditions could possibly have an effect on the process/condition. If the condition is subject to change in response to global warming, hypothesize how you think warmer average conditions or other environmental changes linked to global warming might affect the condition. If not, explain why not.

The six conditions generally accepted as necessary for the initiation and intensification of hurricanes are:

1. (10 points) The existence of low pressure areas at the surface
 2. (10 points) A warm, moist tropical atmosphere that promotes rising air
 3. (10 points) Ocean surface temperatures greater than 26–27°C
 4. (10 points) Very little change in wind speed and wind direction with height in the atmosphere.
 5. (10 points) A sufficiently strong Coriolis force
 6. (10 points) A strong anticyclone aloft (over the surface low) that can allow the winds to leave the center of the developing hurricane faster than they enter it near the surface.
3. (15 points) Look at the provided list of the deadliest hurricanes, the strongest hurricanes, and the costliest hurricanes on record (see previous pages). Explain in one paragraph why these lists are not identical.