Sea Grant VIRGINIA BRIDGE ocean science education DATA Series

Haunted by Hurricanes

Lesson Time : 45 minutes
Grade Level : 9-12
Vocabulary: hurricane, Coriolis force, evaporation, centrifugal force

Summary
Determine if the frequency and intensity of hurricanes are changing using data from the National Hurricane Center.

Objectives

- Describe the conditions that can lead to hurricane formation.
- Explain how a hurricane forms.
- Judge trends in hurricane patterns over 10 years.

Introduction

In 2004 a rash of category 3, 4 and 5 hurricanes battered Florida one right after the other, with Hurricane Ivan even looping around to hit the U.S. a second time. In 2005, four category 5 hurricanes formed in the Atlantic including one the United States will never forget — Hurricane Katrina. Hurricane Ike tore through Cuba in 2008 before hitting the United States becoming the third costliest hurricane. With these recent intense hurricane seasons, many questions come to mind. Are hurricanes getting more intense? Lasting longer? More frequent? The answers may be blowing in the wind, but we'll look at hurricane data from the National Hurricane Center to try and elicit answers to these questions. But first, let's look at how hurricanes form.

Hurricanes require certain conditions to form. First, the ocean water down to a depth of about 200 feet must be 80°F or warmer. For this reason, hurricane season in the north Atlantic runs mostly from June 1 through November 30. Secondly, there must be sufficient force from the earth's rotation (known as the Coriolis Force) to create the hurricane's spin. This will only occur at a latitude of 5° or higher. Once these conditions have been met, the atmospheric conditions must be right. The air needs to be cooler the higher in the atmosphere you go, and the wind speed and direction must be the same from sea level to a height of about 9 kilometers. If all these conditions are met, a hurricane *may* form.

Assuming the conditions are right, how does a hurricane actually develop? Warm ocean water heats the air above it adding moisture through evaporation. This warm moist air rises leaving a low-pressure area at the bottom of the air column. Trade winds rush into this low-pressure area, and

become part of the column of rising warm air. This column of air twists because of the earth's rotation. In the northern hemisphere, the rotation is toward the right creating a counterclockwise circulation pattern. As the speed of the spiraling air column picks up, the winds and clouds are pushed to the outer edge of the column (due to centrifugal force) creating a tube with a fairly still center – this is the eye of the storm. The strongest winds are found as part of the eyewall. At the top of the hurricane, around 40,000 feet, the air begins to circulate in the opposite direction. This acts as a release for the storm and helps prevent it from petering out. Also at this height, some of the colder high air slowly sinks back down via the eye. As it sinks, it is compressed causing it to warm, perpetuating the cycle.

The energy in a hurricane comes from the heat and water vapor from the ocean water. As the air rises, it cools and the water vapor condenses forming clouds and precipitation. These processes release the stored energy and fuel the hurricane. In one day, the heat released by a mature hurricane is equivalent to about half the world-wide electrical generating capacity.

Select areas of the earth are more likely to produce hurricanes. In general, hurricanes move in a westerly direction. In the north Atlantic, many hurricanes form off the coast of Africa and head toward the Caribbean and United States. In the Pacific Ocean, hurricanes form in the eastern portion of the ocean and head toward Asia rather than threatening the U.S. This is why the U.S. attention is focused mainly on Atlantic storms and not Pacific storms. The National Hurricane Center has identified monthly hurricane zones. These show where hurricanes are most likely to develop and the tracks they are likely to take throughout the hurricane season.

Data Activity

Using archived hurricane data from the National Hurricane Center, we'll look at the hurricane seasons over a 20 year period to determine whether or not hurricanes are becoming more intense and/or more frequent.

Print the Bridge Hurricane Data Sheets appended to this lesson. Form 10 student groups and assign each group a year. Please note: While archived National Hurricane Center data is available through 2016, our data sheets currently summarize the named Atlantic storms from 1995 through 2011. Data sheets include:

- Maximum wind speed in knots/hour (1 knots = 1.15 miles/hour)
- Highest hurricane category attained by the storm (according to the Saffir-Simpson scale)
- Storm duration in days
- Total estimated damage costs given in US dollars (includes damage estimates outside of the US)

Each group of students should count the number of named storms, number of hurricanes, and number of category 3, 4, and 5 storms for their year; then calculate the average maximum wind speed and average storm duration. Record these data in the summary table at the end of the Data

Sheets. To get a graphic image of the trends over the past decade, create bar or line graphs for each data category in the summary table (e.g., number of storms, hurricanes, categories, wind speed, duration). Note: for each graph, Years should be on the X axis and the variable should be on the Y axis.

- What trends, if any, do you see in the number of total storms and the number of severe storms over time? Are the numbers markedly increasing or decreasing?
- What trends, if any, do you see in the wind speeds and storm durations? Are these increasing or decreasing?
- What societal factors influence the total estimated damage (in US$) caused by hurricanes, and why is it illogical to judge a hurricane's intensity by the cost of its damages? (Think about the affected area's population size, wealth of population, property values, etc.)

Discussion

Compare your data sheet answers to the Bridge's data sheets. We looked at data from the past decade only, but the National Hurricane Center's reliable Atlantic storm data goes back to 1943 (the beginning of routine aircraft flights into hurricanes). Recently, scientists have been conducting the same analyses of hurricane activity as we just did. Their findings indicate that hurricane activity cycles between high and low activity over the course of decades. So, although recent hurricane seasons may be getting worse, this is part of a natural fluctuation and not increased activity due to global climate change. See these related articles:

Bridge Hurricane Data Sheets

1995 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Allison	65	1	9	$1,700,000
Barry	60	TS	6	No reports
Chantal	60	TS	10	$0
Dean	40	TS	7	$500,000
Erin	85	2	7	$700,000,000
Felix	120	4	18	Minor
Gabrielle	60	TS	3	Minor
Humberto	95	2	11	$0
Iris	95	2	14	No figure given
Jerry	35	TS	7	$26,500,000
Karen	45	TS	9	$0
Luis	120	4	16	$2,500,000,000
Marilyn	100	3	11	$4,050,000,000
Noel	65	1	12	$0
Opal	130	4	9	$3,000,000,000
Pablo	50	TS	5	$0
Roxanne	100	3	15	$1,500,000,000
Sebastien	55	TS	6	$0
Tanya	75	1	6	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

1996 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arthur	40	TS	5	Minor
Bertha	100	3	10	$270,000,000
Cesar	70	1	6	No figure given
Dolly	70	1	7	No figure given
Edouard	125	4	16	Minor
Fran	105	3	17	$3,200,000,000
Gustav	40	TS	8	$0
Hortense	120	4	14	Large, but no exact figure
Isidore	100	3	8	No reports
Josephine	60	TS	5	$130,000,000
Kyle	45	TS	2	Minor
Lili	100	3	14	Large, but no exact figure
Marco	65	1	9	Some, but no exact figure
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

1997 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Ana	40	TS	5	$0
Bill	65	1	3	$0
Claudette	40	TS	4	$0
Danny	70	1	9	$100,000,000
Erika	110	3	13	Minor
Fabian	35	TS	4	No reports
Grace	40	TS	2	$0
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

1998 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Alex	45	TS	7	$0
Bonnie	100	3	12	$720,000,000
Charley	60	TS	4	$50,000,000
Danielle	90	2	11	No figure given
Earl	85	2	4	$79,000,000
Frances	55	TS	6	$500,000,000
Georges	135	4	17	$5,900,000,000
Hermine	40	TS	4	No reports
Ivan	80	1	9	$0
Jeanne	90	2	11	No reports
Karl	90	2	6	$0
Lisa	65	1	5	$0
Mitch	155	5	15	$40,000,000
Nicole	75	1	8	$0
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

1999 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arlene	50	TS	8	$0
Bret	125	4	8	$60,000,000
Cindy	120	4	13	$0
Dennis	90	2	15	$157,000,000
Emily	45	TS	5	$0
Floyd	135	4	11	$6,000,000,000
Gert	130	4	13	Minor
Harvey	50	TS	4	$15,000,000
Irene	95	2	7	$800,000,000
Jose	85	2	9	$5,000,000
Katrina	35	TS	5	No reports
Lenny	135	4	11	$330,000,000
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2000 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Alberto	110	3	21	$0
Beryl	45	TS	3	$0
Chris	35	TS	3	$0
Debby	75	1	6	$500,000
Ernesto	35	TS	3	$0
Florence	70	1	8	$0
Gordon	70	1	5	$10,800,000
Helene	60	TS	11	No figure given
Isaac	120	4	11	$0
Joyce	80	1	8	No reports
Keith	120	4	9	$225,000,000
Leslie	40	TS	4	$700,000,000
Michael	85	2	3	Minor
Nadine	50	TS	3	$0
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2001 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Allison	50	TS	13	$5,000,000,000
Barry	60	TS	6	$30,000,000
Chantal	60	TS	9	$4,000,000
Dean	60	TS	7	$2,000,000
Erin	105	3	15	$0
Felix	100	3	13	$0
Gabrielle	70	1	9	$230,000,000
Humberto	90	2	7	$0
Iris	125	4	6	$66,200,000
Jerry	45	TS	3	No reports
Karen	70	1	4	No figure given
Lorenzo	35	TS	5	$0
Michelle	120	4	8	$28,000,000
Noel	65	1	3	$0
Olga	80	1	11	Minor
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2002 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arthur	50	TS	3	$0
Bertha	35	TS	6	Minor, no figure available
Cristobal	45	TS	4	$0
Dolly	50	TS	7	$0
Edouard	55	TS	6	Minor, no figure available
Fay	50	TS	7	$3,500,000
Gustav	85	2	5	$100,000
Hanna	50	TS	4	$20,000,000
Isidore	110	3	14	$330,000,000
Josephine	35	TS	3	$0
Kyle	75	1	23	$5,000,000
Lili	125	4	14	$860,000,000
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2003 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Ana	50	TS	5	$0
Bill	50	TS	4	$50,000,000
Claudette	80	1	10	$180,000,000
Danny	65	1	6	$0
Erika	65	1	4	Not given
Fabian	125	4	13	$300,000,000
Grace	35	TS	4	Not given
Henri	50	TS	6	Minor
Isabel	145	5	14	$3,370,000,000
Juan	90	2	6	Not given
Kate	110	3	13	No reports
Larry	55	TS	6	$0
Mindy	40	TS	5	No reports
Nicholas	60	TS	11	$0
Odette	55	TS	4	Not given
Peter	60	TS	5	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2004 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Alex	105	3	7	$5,000,000
Bonnie	55	TS	10	No reports
Charley	130	4	6	$14,000,000,000
Danielle	95	2	9	No reports
Earl	45	TS	3	No figure given
Frances	125	4	17	$9,000,000,000
Gaston	65	1	6	$130,000,000
Hermine	50	TS	5	No reports
Ivan	145	5	23	$18,050,000,000
Jeanne	105	3	16	$6,900,000,000
Karl	125	4	9	No reports
Lisa	65	1	15	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2005 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arlene	60	TS	6	No reports
Bret	35	TS	3	No reports
Cindy	65	1	5	$320,000,000
Dennis	130	4	10	$2,230,000,000
Emily	140	5	11	No reports
Franklin	60	TS	9	No reports
Gert	40	TS	3	No reports
Harvey	55	TS	7	No reports
Irene	90	2	15	No reports
Jose	45	TS	2	No reports
Katrina	150	5	8	$81,000,000,000
Lee	35	TS	6	No reports
Maria	100	3	10	No reports
Nate	80	1	6	No reports
Ophelia	75	1	12	$70,000,000
Philippe	70	1	7	No reports
Rita	155	5	9	$10,000,000,000
Stan	70	1	5	No reports
Tammy	45	TS	2	< $25,000,000
Vince	65	1	4	No reports
Wilma	160	5	11	$20,600,000,000
Alpha	45	TS	3	No reports
Beta	100	3	6	No reports
Gamma	45	TS	8	$18,000,000
Delta	60	TS	7	No reports

2005 Named Storms Cont'd.	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Epsilon	75	1	10	No reports
Zeta	55	TS	8	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

Bridge Hurricane Data Sheets

2006 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Alberto	60	TS	5	No reports
Beryl	50	TS	4	No reports
Chris	55	TS	4	No reports
Debby	45	TS	6	No reports
Ernesto	65	1	9	$500,000,000
Florence	80	1	10	No reports
Gordon	105	3	11	No reports
Helene	105	3	13	No reports
Isaac	75	1	6	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2007 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Andrea	65	STS	3	No reports
Barry	50	TS	2	No reports
Chantal	60	TS	2	No reports
Dean	150	5	11	$100,000,000
Erin	35	TS	3	< $25,000,000
Felix	150	5	6	No reports
Gabrielle	50	TS	4	No reports
Humberto	80	1	3	No reports
Ingrid	40	TS	6	No reports
Jerry	35	TS	2	No reports
Karen	65	1	5	No reports
Lorenzo	70	1	4	No reports
Melissa	35	TS	3	No reports
Noel	70	1	6	$500,000,000
Olga	50	TS	2	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2008 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arthur	40	TS	2	No reports
Bertha	110	3	18	No reports
Cristobal	55	TS	5	No reports
Dolly	85	1	9	$1,050,000,000
Edouard	55	TS	5	No figure given
Fay	60	TS	10	$560,000,000
Gustav	125	4	11	$4,300,000,000
Hanna	75	1	11	$160,000,000
Ike	125	4	14	$24,900,000,000
Josephine	55	TS	5	No reports
Kyle	75	1	5	No reports
Laura	70	TS	3	No reports
Marco	55	TS	2	No reports
Nana	35	TS	3	No reports
Omar	115	4	6	No reports
Paloma	125	4	5	$300,000,000
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2009 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Ana	35	TS	6	No reports
Bill	115	4	10	No reports
Claudette	50	TS	2	No reports
Danny	50	TS	4	No reports
Erika	45	TS	3	No reports
Fred	105	3	6	No reports
Grace	55	TS	3	No reports
Henri	45	TS	3	No reports
Ida	90	2	7	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

Bridge Hurricane Data Sheets

2010 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Alex	95	2	8	$1,510,000,000
Bonnie	40	TS	3	No reports
Colin	50	TS	7	No reports
Danielle	115	4	10	No reports
Earl	125	4	11	$45,000,000
Fiona	55	TS	5	No reports
Gaston	35	TS	2	No reports
Hermine	60	TS	5	$240,000,000
Igor	135	4	14	$200,000,000
Julia	120	4	9	No reports
Karl	110	3	5	$206,000,000
Lisa	75	1	7	No reports
Matthew	50	TS	4	No reports
Nicole	40	TS	2	$235,000,000
Otto	75	1	5	No reports
Paula	90	2	5	No reports
Richard	85	2	6	$80,000,000
Shary	65	1	3	No reports
Tomas	85	2	10	$339,000,000
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

www.marine-ed.org/bridge

Bridge Hurricane Data Sheets

2011 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arlene	55	TS	4	No reports
Bret	60	TS	6	No reports
Cindy	60	TS	3	No reports
Don	45	TS	4	No reports
Emily	45	TS	6	No reports
Franklin	40	TS	2	No reports
Gert	55	TS	4	No reports
Harvey	55	TS	4	No reports
Irene	105	3	8	$15,300,000,000
Jose	40	TS	2	No reports
Katia	120	4	13	No reports
Lee	50	TS	4	$315,000,000
Maria	70	1	11	No reports
Nate	65	1	5	No reports
Ophelia	120	4	5	No reports
Philippe	80	1	15	No reports
Rina	100	3	6	No reports
Sean	55	TS	4	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

www.marine-ed.org/bridge

Bridge Hurricane Data Sheets

Year	No. of Named Storms	No. of Hurricanes	No. of Cat. 3 Storms	No. of Cat. 4 Storms	No. of Cat. 5 Storms	Total Major Storms (Cat. 3, 4, 5)	Avg. Max. Winds (knots)	Avg. Storm Duration (Days)
1995								
1996								
1997								
1998								
1999								
2000								
2001								
2002								
2003								
2004								
2005								
2006								
2007								
2008								
2009								
2010								
2011								

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

1995 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Allison	65	1	9	$1,700,000
Barry	60	TS	6	No reports
Chantal	60	TS	10	$0
Dean	40	TS	7	$500,000
Erin	85	2	7	$700,000,000
Felix	120	4	18	Minor
Gabrielle	60	TS	3	Minor
Humberto	95	2	11	$0
Iris	95	2	14	No figure given
Jerry	35	TS	7	$26,500,000
Karen	45	TS	9	$0
Luis	120	4	16	$2,500,000,000
Marilyn	100	3	11	$4,050,000,000
Noel	65	1	12	$0
Opal	130	4	9	$3,000,000,000
Pablo	50	TS	5	$0
Roxanne	100	3	15	$1,500,000,000
Sebastien	55	TS	6	$0
Tanya	75	1	6	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

1996 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arthur	40	TS	5	Minor
Bertha	100	3	10	$270,000,000
Cesar	70	1	6	No figure given
Dolly	70	1	7	No figure given
Edouard	125	4	16	Minor
Fran	105	3	17	$3,200,000,000
Gustav	40	TS	8	$0
Hortense	120	4	14	Large, but no exact figure
Isidore	100	3	8	No reports
Josephine	60	TS	5	$130,000,000
Kyle	45	TS	2	Minor
Lili	100	3	14	Large, but no exact figure
Marco	65	1	9	Some, but no exact figure
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

1997 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Ana	40	TS	5	$0
Bill	65	1	3	$0
Claudette	40	TS	4	$0
Danny	70	1	9	$100,000,000
Erika	110	3	13	Minor
Fabian	35	TS	4	No reports
Grace	40	TS	2	$0
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

1998 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Alex	45	TS	7	$0
Bonnie	100	3	12	$720,000,000
Charley	60	TS	4	$50,000,000
Danielle	90	2	11	No figure given
Earl	85	2	4	$79,000,000
Frances	55	TS	6	$500,000,000
Georges	135	4	17	$5,900,000,000
Hermine	40	TS	4	No reports
Ivan	80	1	9	$0
Jeanne	90	2	11	No reports
Karl	90	2	6	$0
Lisa	65	1	5	$0
Mitch	155	5	15	$40,000,000
Nicole	75	1	8	$0
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

1999 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arlene	50	TS	8	$0
Bret	125	4	8	$60,000,000
Cindy	120	4	13	$0
Dennis	90	2	15	$157,000,000
Emily	45	TS	5	$0
Floyd	135	4	11	$6,000,000,000
Gert	130	4	13	Minor
Harvey	50	TS	4	$15,000,000
Irene	95	2	7	$800,000,000
Jose	85	2	9	$5,000,000
Katrina	35	TS	5	No reports
Lenny	135	4	11	$330,000,000
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2000 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Alberto	110	3	21	$0
Beryl	45	TS	3	$0
Chris	35	TS	3	$0
Debby	75	1	6	$500,000
Ernesto	35	TS	3	$0
Florence	70	1	8	$0
Gordon	70	1	5	$10,800,000
Helene	60	TS	11	No figure given
Isaac	120	4	11	$0
Joyce	80	1	8	No reports
Keith	120	4	9	$225,000,000
Leslie	40	TS	4	$700,000,000
Michael	85	2	3	Minor
Nadine	50	TS	3	$0
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2001 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Allison	50	TS	13	$5,000,000,000
Barry	60	TS	6	$30,000,000
Chantal	60	TS	9	$4,000,000
Dean	60	TS	7	$2,000,000
Erin	105	3	15	$0
Felix	100	3	13	$0
Gabrielle	70	1	9	$230,000,000
Humberto	90	2	7	$0
Iris	125	4	6	$66,200,000
Jerry	45	TS	3	No reports
Karen	70	1	4	No figure given
Lorenzo	35	TS	5	$0
Michelle	120	4	8	$28,000,000
Noel	65	1	3	$0
Olga	80	1	11	Minor
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2002 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arthur	50	TS	3	$0
Bertha	35	TS	6	Minor, no figure available
Cristobal	45	TS	4	$0
Dolly	50	TS	7	$0
Edouard	55	TS	6	Minor, no figure available
Fay	50	TS	7	$3,500,000
Gustav	85	2	5	$100,000
Hanna	50	TS	4	$20,000,000
Isidore	110	3	14	$330,000,000
Josephine	35	TS	3	$0
Kyle	75	1	23	$5,000,000
Lili	125	4	14	$860,000,000
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2003 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Ana	50	TS	5	$0
Bill	50	TS	4	$50,000,000
Claudette	80	1	10	$180,000,000
Danny	65	1	6	$0
Erika	65	1	4	Not given
Fabian	125	4	13	$300,000,000
Grace	35	TS	4	Not given
Henri	50	TS	6	Minor
Isabel	145	5	14	$3,370,000,000
Juan	90	2	6	Not given
Kate	110	3	13	No reports
Larry	55	TS	6	$0
Mindy	40	TS	5	No reports
Nicholas	60	TS	11	$0
Odette	55	TS	4	Not given
Peter	60	TS	5	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2004 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Alex	105	3	7	$5,000,000
Bonnie	55	TS	10	No reports
Charley	130	4	6	$14,000,000,000
Danielle	95	2	9	No reports
Earl	45	TS	3	No figure given
Frances	125	4	17	$9,000,000,000
Gaston	65	1	6	$130,000,000
Hermine	50	TS	5	No reports
Ivan	145	5	23	$18,050,000,000
Jeanne	105	3	16	$6,900,000,000
Karl	125	4	9	No reports
Lisa	65	1	15	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2005 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arlene	60	TS	6	No reports
Bret	35	TS	3	No reports
Cindy	65	1	5	$320,000,000
Dennis	130	4	10	$2,230,000,000
Emily	140	5	11	No reports
Franklin	60	TS	9	No reports
Gert	40	TS	3	No reports
Harvey	55	TS	7	No reports
Irene	90	2	15	No reports
Jose	45	TS	2	No reports
Katrina	150	5	8	$81,000,000,000
Lee	35	TS	6	No reports
Maria	100	3	10	No reports
Nate	80	1	6	No reports
Ophelia	75	1	12	$70,000,000
Philippe	70	1	7	No reports
Rita	155	5	9	$10,000,000,000
Stan	70	1	5	No reports
Tammy	45	TS	2	< $25,000,000
Vince	65	1	4	No reports
Wilma	160	5	11	$20,600,000,000
Alpha	45	TS	3	No reports
Beta	100	3	6	No reports
Gamma	45	TS	8	$18,000,000
Delta	60	TS	7	No reports

2005 Named Storms Cont'd.	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Epsilon	75	1	10	No reports
Zeta	55	TS	8	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

Bridge Hurricane Data Sheets

2006 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Alberto	60	TS	5	No reports
Beryl	50	TS	4	No reports
Chris	55	TS	4	No reports
Debby	45	TS	6	No reports
Ernesto	65	1	9	$500,000,000
Florence	80	1	10	No reports
Gordon	105	3	11	No reports
Helene	105	3	13	No reports
Isaac	75	1	6	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2007 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Andrea	65	STS	3	No reports
Barry	50	TS	2	No reports
Chantal	60	TS	2	No reports
Dean	150	5	11	$100,000,000
Erin	35	TS	3	< $25,000,000
Felix	150	5	6	No reports
Gabrielle	50	TS	4	No reports
Humberto	80	1	3	No reports
Ingrid	40	TS	6	No reports
Jerry	35	TS	2	No reports
Karen	65	1	5	No reports
Lorenzo	70	1	4	No reports
Melissa	35	TS	3	No reports
Noel	70	1	6	$500,000,000
Olga	50	TS	2	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2008 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arthur	40	TS	2	No reports
Bertha	110	3	18	No reports
Cristobal	55	TS	5	No reports
Dolly	85	1	9	$1,050,000,000
Edouard	55	TS	5	No figure given
Fay	60	TS	10	$560,000,000
Gustav	125	4	11	$4,300,000,000
Hanna	75	1	11	$160,000,000
Ike	125	4	14	$24,900,000,000
Josephine	55	TS	5	No reports
Kyle	75	1	5	No reports
Laura	70	TS	3	No reports
Marco	55	TS	2	No reports
Nana	35	TS	3	No reports
Omar	115	4	6	No reports
Paloma	125	4	5	$300,000,000
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>

Bridge Hurricane Data Sheets

2009 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Ana	35	TS	6	No reports
Bill	115	4	10	No reports
Claudette	50	TS	2	No reports
Danny	50	TS	4	No reports
Erika	45	TS	3	No reports
Fred	105	3	6	No reports
Grace	55	TS	3	No reports
Henri	45	TS	3	No reports
Ida	90	2	7	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

Bridge Hurricane Data Sheets

2010 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Alex	95	2	8	$1,510,000,000
Bonnie	40	TS	3	No reports
Colin	50	TS	7	No reports
Danielle	115	4	10	No reports
Earl	125	4	11	$45,000,000
Fiona	55	TS	5	No reports
Gaston	35	TS	2	No reports
Hermine	60	TS	5	$240,000,000
Igor	135	4	14	$200,000,000
Julia	120	4	9	No reports
Karl	110	3	5	$206,000,000
Lisa	75	1	7	No reports
Matthew	50	TS	4	No reports
Nicole	40	TS	2	$235,000,000
Otto	75	1	5	No reports
Paula	90	2	5	No reports
Richard	85	2	6	$80,000,000
Shary	65	1	3	No reports
Tomas	85	2	10	$339,000,000
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

www.marine-ed.org/bridge

Bridge Hurricane Data Sheets

2011 Named Storms	Maximum Wind Speed (knots)	Hurricane Category	Duration (Days)	Estimated Damage Costs (US $)
Arlene	55	TS	4	No reports
Bret	60	TS	6	No reports
Cindy	60	TS	3	No reports
Don	45	TS	4	No reports
Emily	45	TS	6	No reports
Franklin	40	TS	2	No reports
Gert	55	TS	4	No reports
Harvey	55	TS	4	No reports
Irene	105	3	8	$15,300,000,000
Jose	40	TS	2	No reports
Katia	120	4	13	No reports
Lee	50	TS	4	$315,000,000
Maria	70	1	11	No reports
Nate	65	1	5	No reports
Ophelia	120	4	5	No reports
Philippe	80	1	15	No reports
Rina	100	3	6	No reports
Sean	55	TS	4	No reports
AVERAGE				
TOTAL				

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

www.marine-ed.org/bridge

Bridge Hurricane Data Sheets

Year	No. of Named Storms	No. of Hurricanes	No. of Cat. 3 Storms	No. of Cat. 4 Storms	No. of Cat. 5 Storms	Total Major Storms (Cat. 3, 4, 5)	Avg. Max. Winds (knots)	Avg. Storm Duration (Days)
1995	19	11	2	3	0	5	77	10
1996	13	9	4	2	0	6	80	9
1997	7	3	1	0	0	1	57	6
1998	14	10	1	1	1	3	83	9
1999	12	8	0	5	0	5	91	9
2000	14	8	1	2	0	3	71	7
2001	15	9	2	2	0	4	76	8
2002	12	4	1	1	0	2	64	8
2003	16	7	1	1	1	3	71	7
2004	12	9	2	3	1	6	102	11
2005	27	15	2	1	4	7	78	7
2006	9	5	2	0	0	2	71	8
2007	15	6	0	0	2	2	67	4
2008	16	8	1	4	0	5	79	7
2009	9	3	1	1	0	2	66	5
2010	19	12	1	4	0	5	79	6
2011	18	7	2	2	0	4	68	6

Data from the National Hurricane Center <www.nhc.noaa.gov>. Hurricane category is based on the Saffir-Simpson scale. TS = tropical storm

<www.marine-ed.org/bridge>