

Climate Change and the Gulf Coast

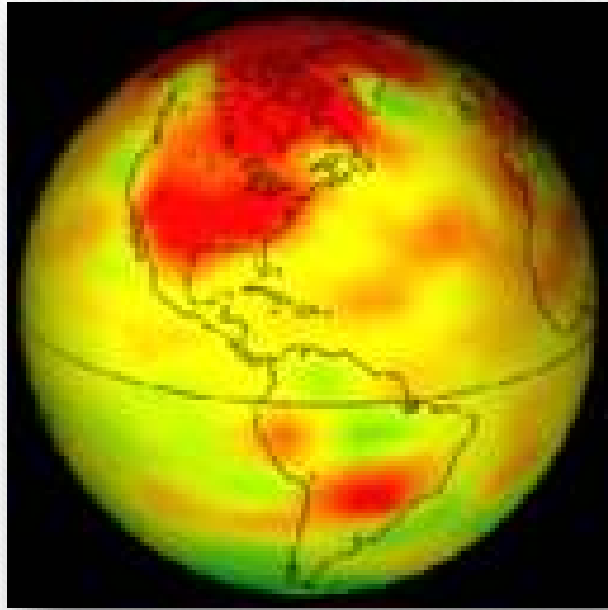
Beverly L. Wright, PhD

Founding Director



March 2021

Climate Change is Real...



<http://www.silverbearcafe.com/private/images/...>

- There is now overwhelming scientific evidence that climate change is “real” and that it poses a serious global threat that cannot be ignored.

Global Warming

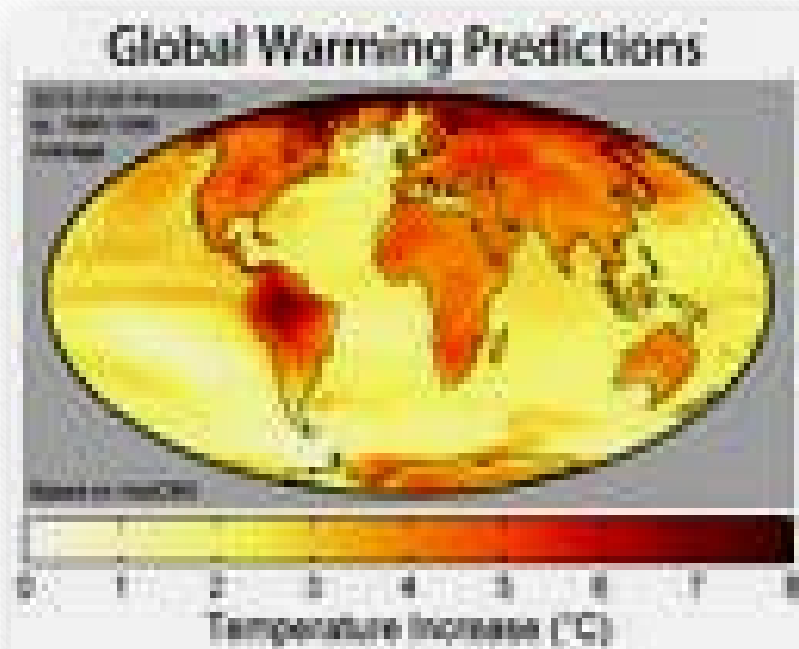


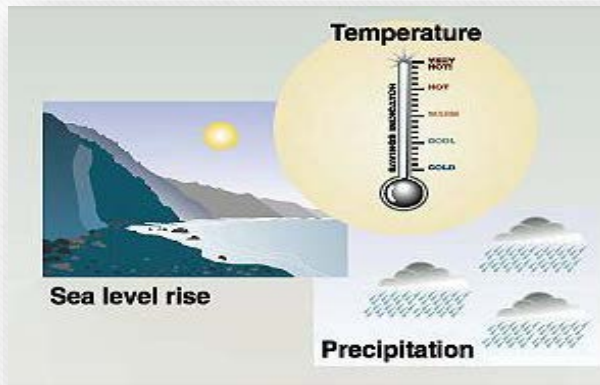
Image Source: Global Warming Art

- The International Panel on Climate Change Plenary XXVII predicts further warming of the climate system which can induce change in the global climate in this century far greater than what has been observed in previous centuries.

Increase in Impacts

We can expect the impacts of climate change to continue even with the current climate change mitigation policies.

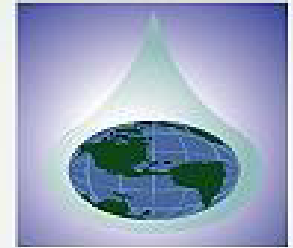
- Increased flooding
 - Higher mean atmospheric temperatures
 - Higher global mean sea levels
-
- Increased precipitation
 - Increased droughts
 - Increased atmospheric moisture-holding capacity
 - Increased heat waves
 - Increased strength of storms



GRID 
Arendal  **UNEP**

Source: United States environmental protection agency (EPA).

Water resources



Water supply
Water quality
Competition for water

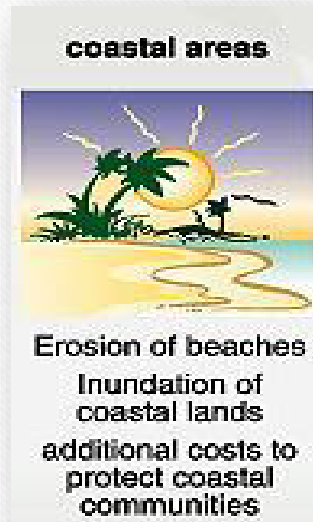
Agriculture



Crop yields
Irrigation demands

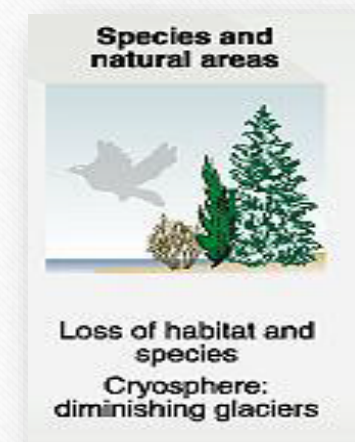
And the List Goes On...

- More energetic waves
- Storm surges that reach further inland
- Under-capacity of urban sewerage and drainage systems
- Increased blight
- Increased vulnerability of port cities
- **Disproportionate impacts on disadvantaged population segments**



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Arendal UNEP

Source: United States environmental protection agency (EPA).



2005 Statistics

- The year 2005 saw the worst Atlantic hurricane season since record keeping began in 1851.

An average season produces 10 named hurricanes with 2 or 3 becoming major storms.

In 2005 there were 27 named storms topping the previous record of 21 in 1933.



2010 Statistics

- The **2010 Atlantic hurricane season** was the third most active season on record, tying with:
 - 1887 Atlantic hurricane season,
 - 1995 Atlantic hurricane season
- The 2010 Atlantic hurricane season:
 - had the most number of named storms since the 2005 season
 - tied with the 1969 Atlantic hurricane season for the second largest number of hurricanes.

In 2010, 14 to 23 named storms were projected, with 3 to 7 major storms predicted.



Earthquake in Haiti

A massive earthquake struck Haiti on Jan. 12, 2010 killing more than 200,000 people and leveling 38% of the capitol of Port-au-Prince. The magnitude 7.0 quake, the most powerful to hit Haiti in a century, was felt strongly in eastern Cuba, more than 200 miles away.

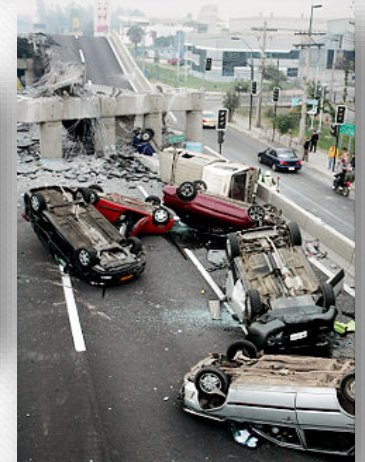


http://articles.cnn.com/2010-01-12/world/haiti.earthquake_1_earthquake-haiti-2010-peacekeeping-mission-president-rene-preval-haiti?_s=PM:WORLD

http://www.bbc.co.uk/news/world-101012022/20100112_haiti_earthquake.html

Earthquake in Chile

On February 27, 2010 a powerful 8.8-magnitude earthquake one of the largest ever recorded, tore apart houses, bridges and highways in central Chile and sent a tsunami racing halfway around the world.



Flooding in France

- On June 16, 2010, an Atlantic storm that killed at least 47 people on the western coast of France was declared a national disaster.

- According to Meteo France, the national forecaster, the region had not seen such floods since 1827.



The storm also hit the western coasts of Portugal and Spain, then moved towards Germany, Belgium and the Netherlands.

2011 Statistics



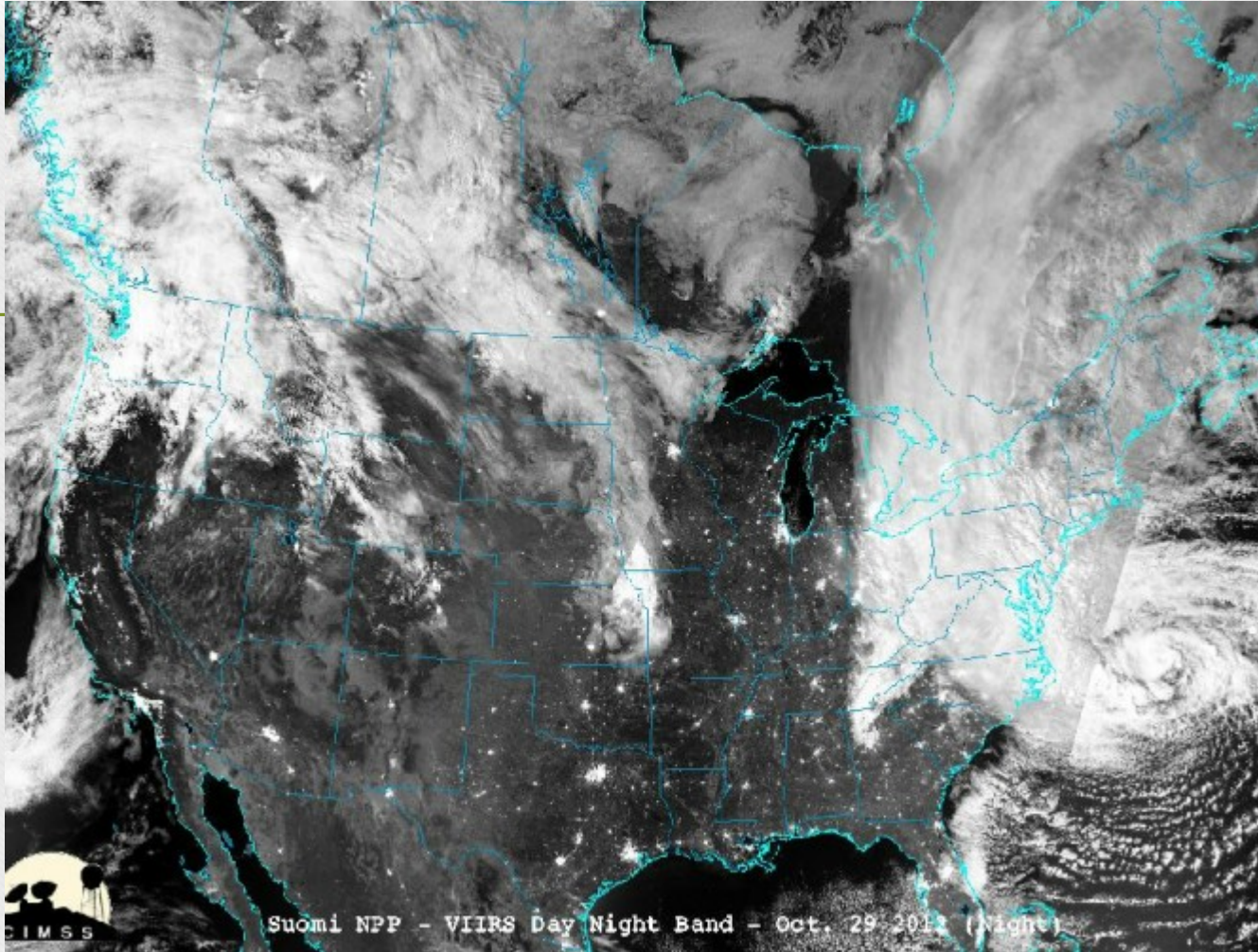
- The 2011 Atlantic hurricane season produced a total of 19 tropical storms
 - 7 became hurricanes,
 - Close to the average of 6
 - 4 of which were major hurricanes
 - Above the average of 2
- This level of activity matched NOAA's predictions and continues the trend of active hurricane seasons that began in 1995.
- The 19 tropical storms represent the third-highest total
 - tied with 1887, 1995, and 2010) since records began in 1851
 - Above the average of 11

2012 Statistics

- The 2012 Atlantic hurricane season produced a total of 19 tropical storms
 - 10 became hurricanes,
 - Well above the average of 6
 - 1 of which were major hurricanes
 - Below the average of 2
- This level of activity matched NOAA's predictions and continues the trend of active hurricane seasons that began in 1995.
- The 19 tropical storms represent the third-highest total (tied with 1887, 1995, 2010 and 2011) since records began in 1851
 - Above the average of 11



Hurricane Sandy in 2012



Hurricane Sandy made a historic landfall on the New Jersey coast during the night of Oct. 29, 2012 .

This image provided by University of Wisconsin-Madison is a composite of several satellite passes over North America taken 16 to 18 hours before Sandy's landfall.

Hurricane Sandy's Impacts

- **Sandy rescue efforts on Staten Island led to grim discoveries**
 - Nineteen bodies were found on Staten Island alone in the days immediately following Hurricane Sandy.
- Staten Island residents were outraged by what they describe as the slow response from relief organizations.
 - This echoed the experiences of residents of poor communities in New Orleans and the Gulf Coast after Hurricane Katrina



2013 Flooding in Colorado



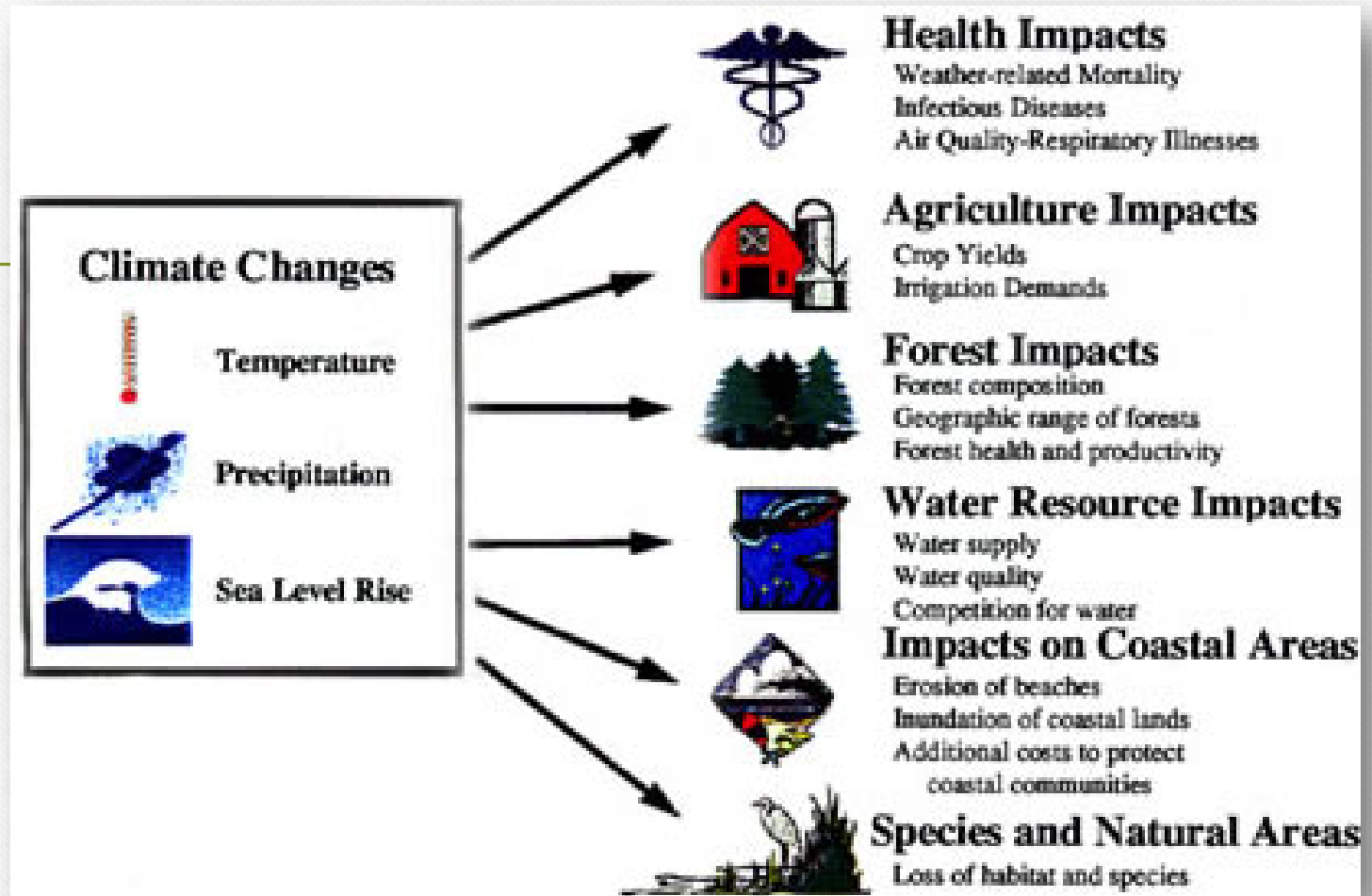
Days of torrential rains along a 130-mile stretch in the foothills west of Colorado's urban corridor triggered widespread flooding across 19 counties, from mountain towns to farming communities in mid-September 2013.

Flooding Impacts in Colorado

- About 11,700 people were evacuated by air and truck.
 - Almost 2,000 people remained in the 26 shelters established around the state.
-
- About 17,500 residential structures were damaged and at least 1,500 were destroyed.
 - In Larimer County alone, officials reported 398 people unaccounted for, and 4,500 homes and 500 businesses damaged or destroyed.
 - The flooding has devastated a swath of about 200 miles from the north to the south of the state.
 - Parts of at least 15 counties were hit.

Managing Weather Impacts

- Societies have always had to manage the impacts of weather and climate related events.

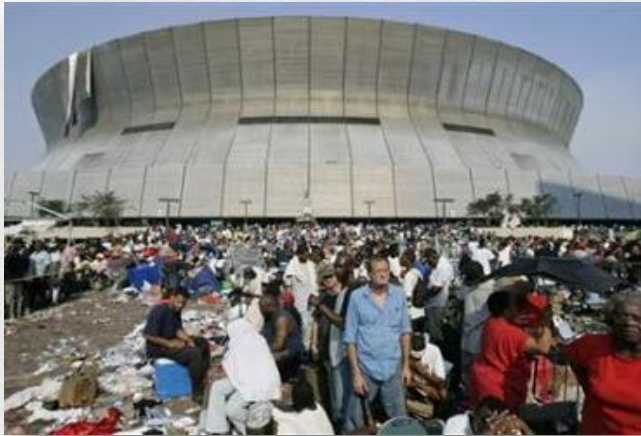


A Question of Equity...

- Disadvantaged populations around the world already bear inequitable environmental burdens
- There is inadequate knowledge of what new disproportionate impacts will emerge under climate change



The Differential Effects of Weather & Man-Made Disasters



The differential effects of catastrophic weather disasters are consistent with a pervasive continuum in which low-income and minority communities suffer from both higher socio-economic stress and greater environmental exposure to toxins, hazardous wastes and other environmental burdens.

Such was the case in New Orleans after Hurricanes Katrina and Rita as well as the BP Oil Spill.

Impact on Poor & Minorities

- Before, during and after Hurricane Katrina, it was largely African-American, Vietnamese and poor populations who lived in the areas most vulnerable to the collapse of the levees, and who were unable to secure transportation for evacuation.

Both the impacts and the response to the disaster it seemed were compounded by income and race





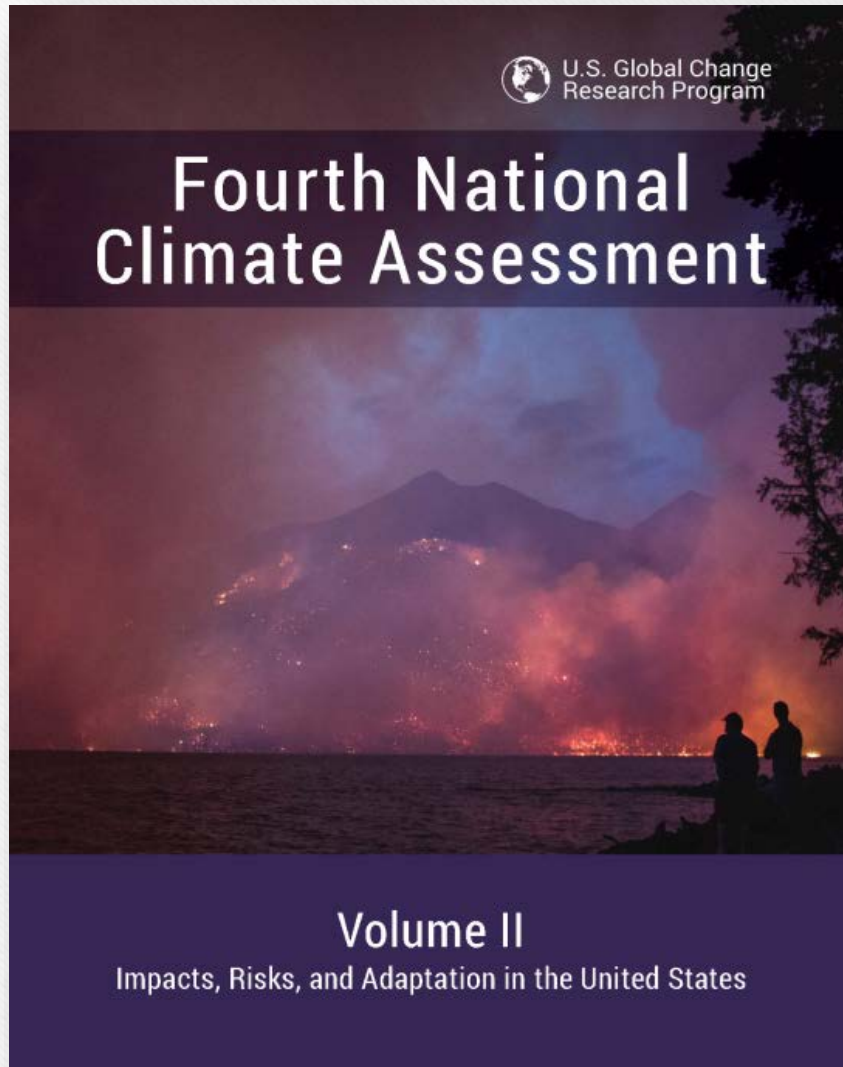






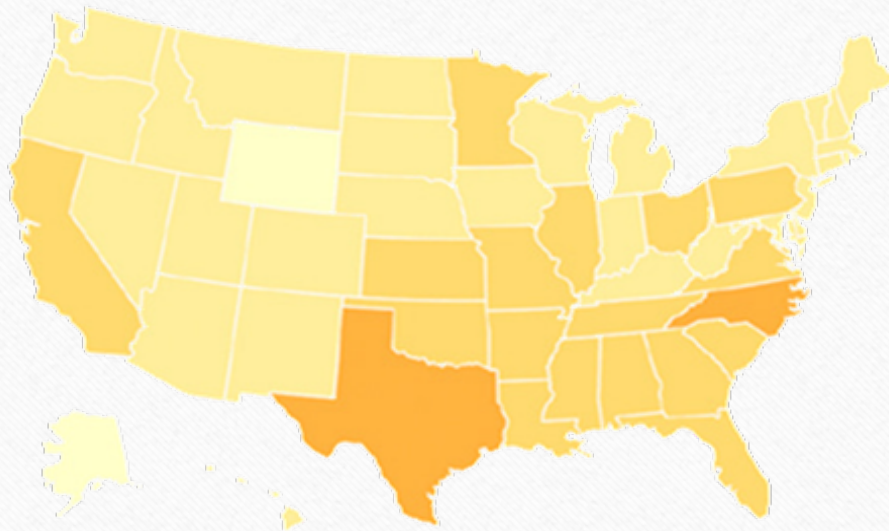


Most Vulnerable Regions in United States



- The 2018 *National Climate Assessment* (NCA4) states, “climate change creates new risks and exacerbates existing vulnerabilities in communities across the United States, presenting growing challenges to human health and safety, quality of life, and the rate of economic growth.”
- Severe weather events and climate-related disasters in the **South** have outnumbered similar events in other areas of the U.S. annually in both scale and magnitude by a **ratio of almost 4:1** during the past 10 years.
- The **South** for the period 1980-2012 had more billion-dollar disasters than all other regions combined.

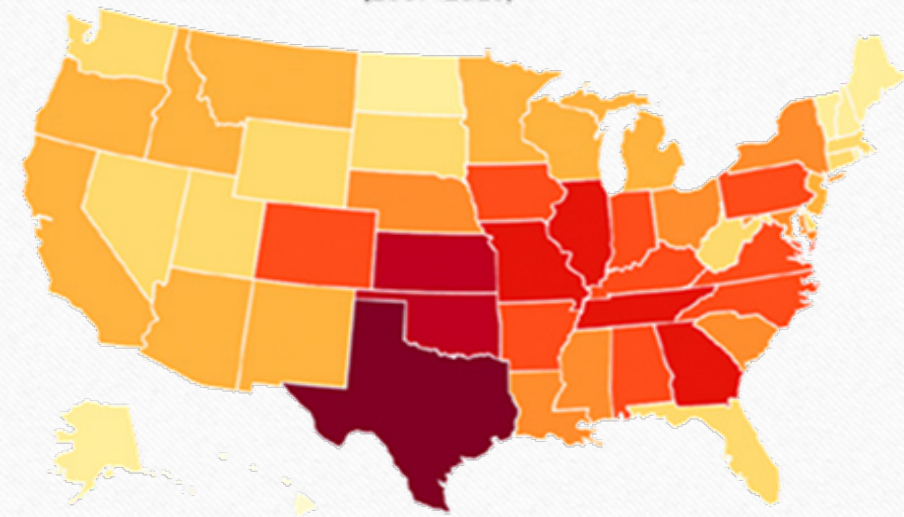
Extreme weather events causing at least \$1 billion in economic losses by state: **1990s**



0 events 1-5 events 6-10 events 11-15 events

Source: NOAA NCEI, U.S. Billion-Dollar Weather and Climate Disasters (2017). <https://www.ncdc.noaa.gov/billions>

Extreme weather events causing at least \$1 billion in economic losses by state: **Last decade** (2007-2016)

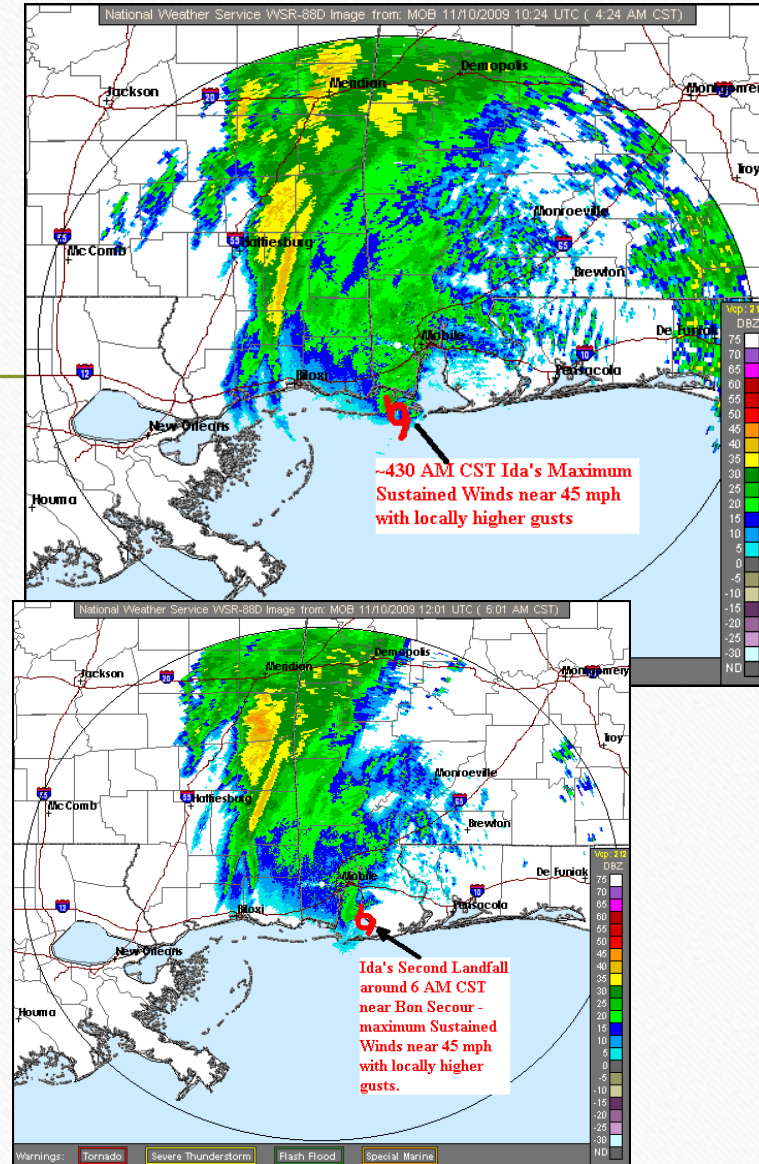


0 events 1-5 events 6-10 events 11-15 events 16-20 events 21-25 events
26-30 events 31-35 events >40 events

Source: NOAA NCEI, U.S. Billion-Dollar Weather and Climate Disasters (2017). <https://www.ncdc.noaa.gov/billions>

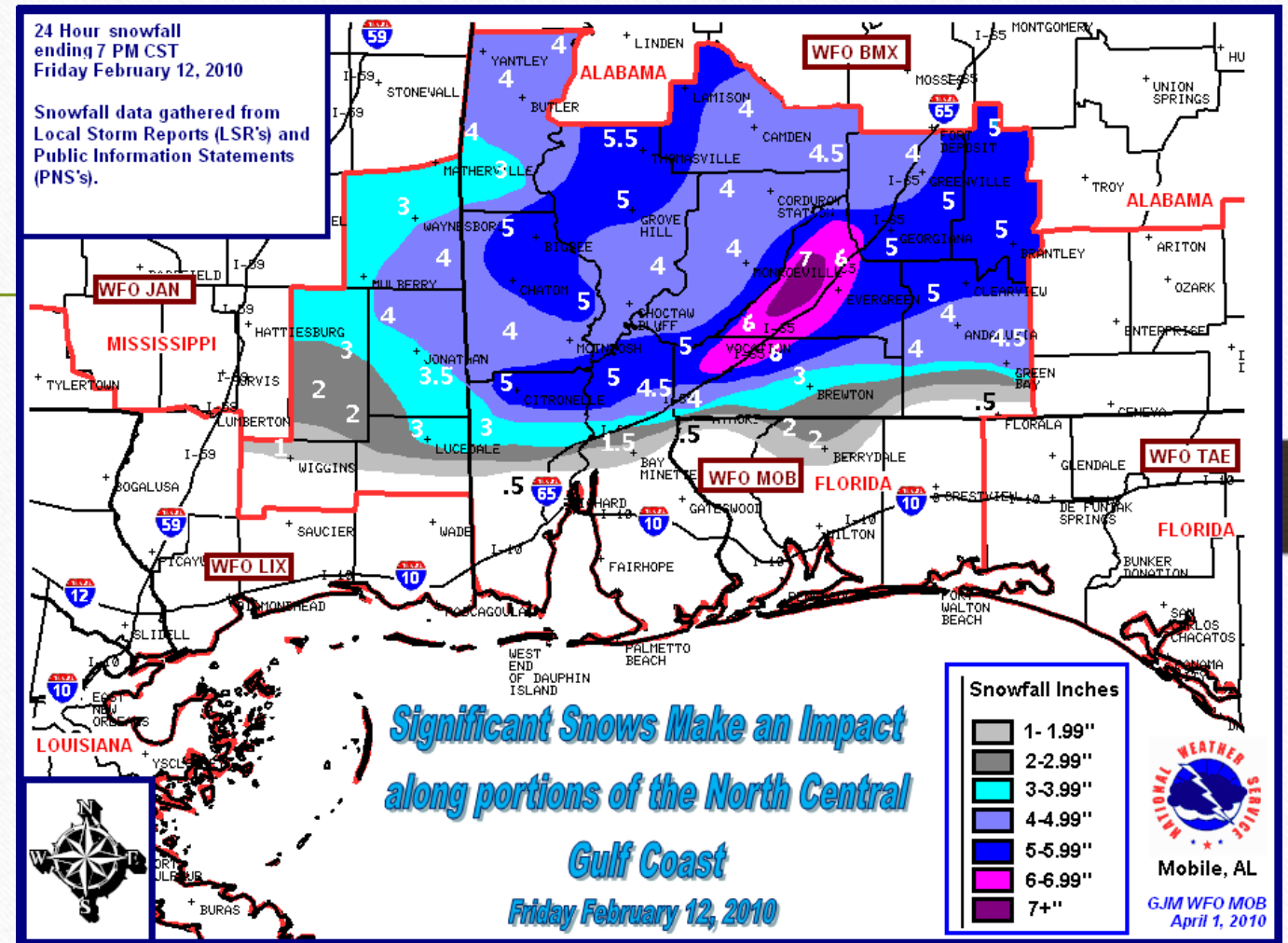
Tropical Storm Ida hit Alabama Twice in 2009

- During the early morning hours of November 10th, 2009, Tropical Storm Ida made its first landfall near Dauphin Island in Mobile County, AL at approximately 540am. Maximum sustained winds were approximately 45mph with locally higher gusts during this first landfall. The full track of Hurricane Ida can be seen in the image to the right (courtesy of NOAA, Office for Coastal Management, Digital Coast).
- Ida made yet another landfall around 7am just northwest of Bon Secour in Baldwin County, AL after slowly crossing over the southern part of Mobile Bay. Radar imagery around the time of the first and second landfall can be seen in the imagery here.



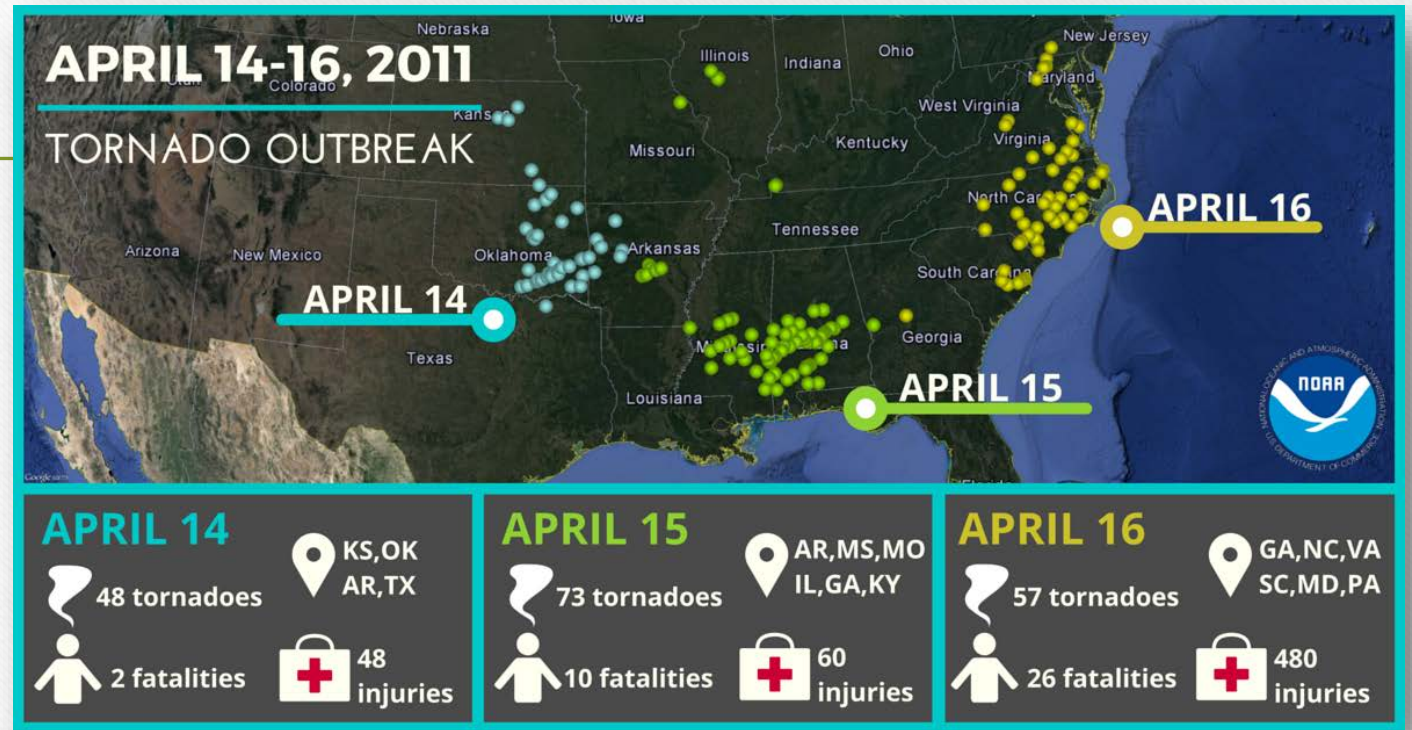
Snow in the Deep South in 2010

- On February 12, 2010 a rare swath of wet, heavy snow fell over a large part of the Deep South, including portions of southeast Mississippi, southwest Alabama and the western Florida panhandle. Total accumulations ranged from a trace near the coast to a maximum of seven inches over interior southwest Alabama.



Tornado Supercells April 14 -16 of 2011

- The 15 April 2011 Tornado Outbreak across the Deep South was part of a 3-day violent weather outbreak.
- In total, there were 178 tornadoes over this 3 day period with 73 tornadoes on April 15 alone. 18 of the 73 tornadoes occurred across the NWS Mobile/Pensacola County Warning Area (CWA).



https://www.weather.gov/mob/2011_April15_Tornado

Hurricane Isaac made landfall twice in 2012

- On the afternoon of August 28, 2012, Isaac strengthened to a hurricane with winds of 80 mph just off the southeast Louisiana coast (approximately 75 miles south-southeast of the mouth of the Mississippi River).
- At 6:45pm on August 28th, Hurricane Isaac made a brief landfall along the coast of southeast Louisiana in Plaquemines Parish. Maximum sustained winds were 80mph during landfall.
- Hurricane Isaac made a 2nd landfall along the coast of southeast Louisiana (just west of Port Fourchon) around 2:15am on August 29th, again with maximum sustained winds of 80mph.

<https://www.weather.gov/mob/isaac>

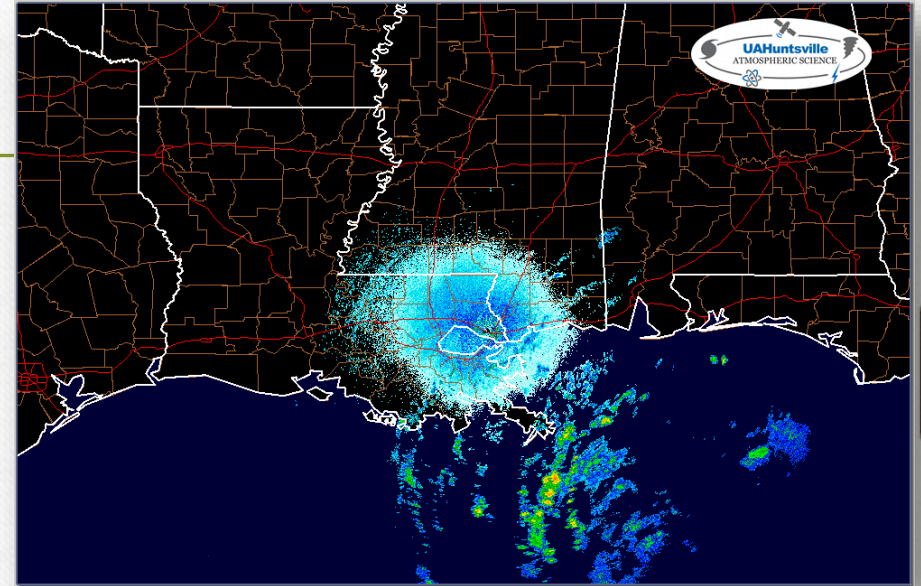
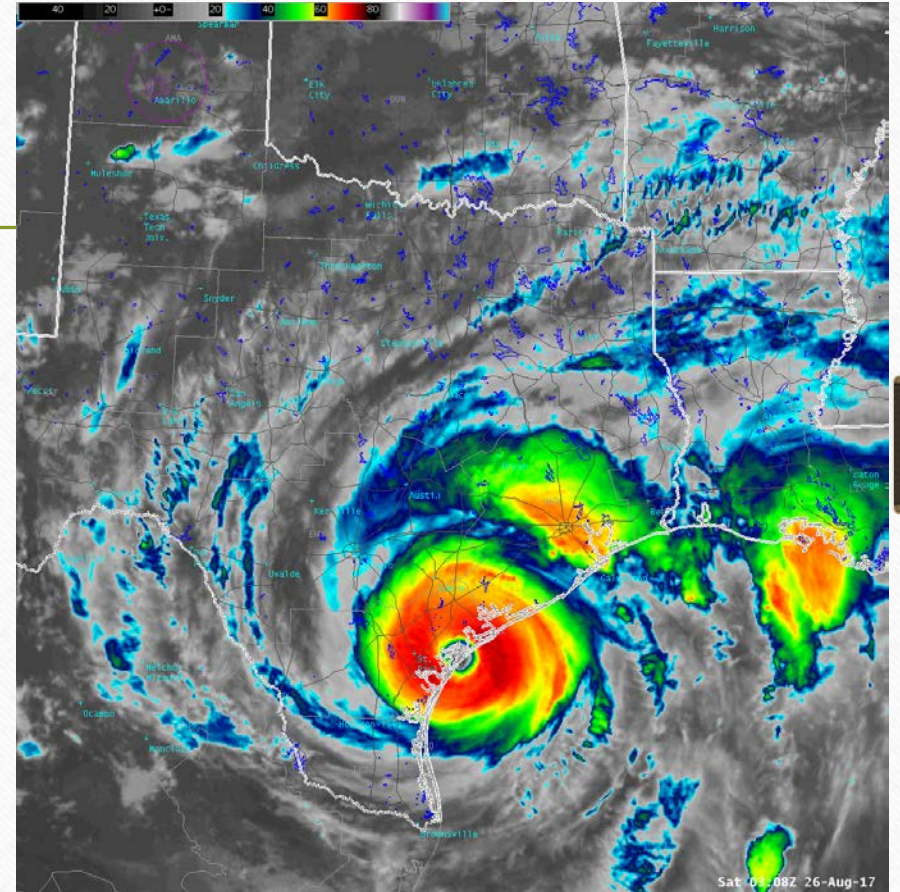


Image taken from a University of Alabama in Huntsville storm progression

Hurricane Harvey made 3 Landfalls in 2017

- Harvey made landfall along the Texas coast near Port Aransas around 10:00 p.m. on August 25th as a category 4 storm and brought devastating impacts of flooding, loss of life and property damage.
- The center of Harvey slowly moved east-southeast and back offshore causing extensive flooding, catastrophic drainage issues and made rivers rise greatly.
- Harvey maintained tropical storm intensity the entire time while inland over the Texas coastal bend and southeast Texas and moved offshore maintaining strength.
- After moving offshore, Harvey made its final landfall just west of Cameron, Louisiana.

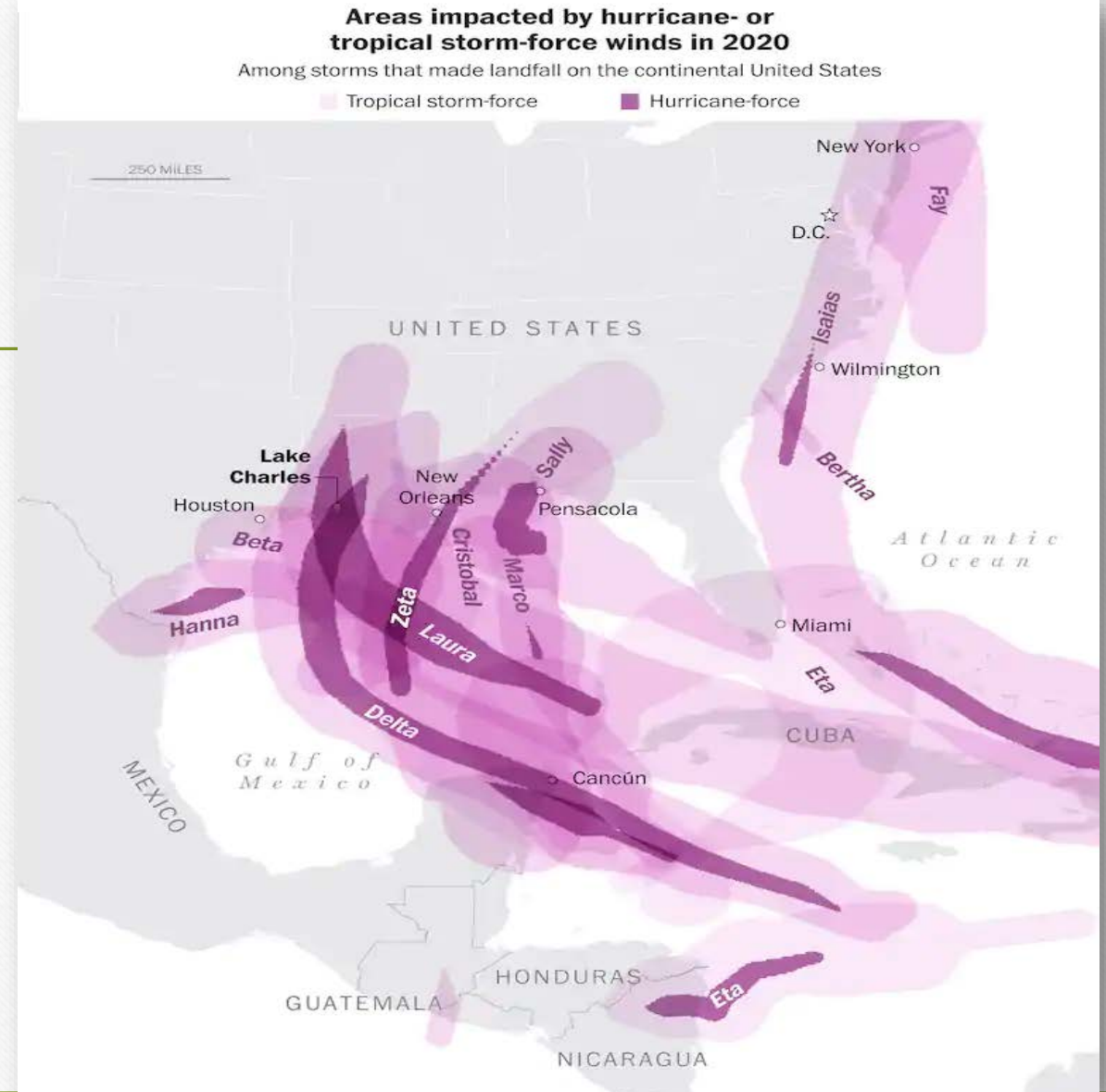
<https://www.weather.gov/hgx/hurricaneharvey>



2020: an Extremely Active Storm Season

- The 2020 Atlantic hurricane season, hit coastal communities **from Texas to New England**, with **29 named storms**. No previous season since reliable records began nearly 170 years ago has seen this many named storms.
- The 29 storms mark an unprecedented season statistically, but also left behind a devastating toll on the economy and people's lives.
- An unmatched **12 named storms**, including a **record-tying six hurricanes**, made **landfall in the United States in 2020**, leaving few areas on the Gulf and East coasts untouched.
- **Parts of the Gulf Coast were hit repeatedly, the state of Louisiana seeing a record five storms make landfall alone.**

(Tim Meko and Hannah Faith Dormido)



2020: Gulf Coastal Storms

Tropical Storm Cristobal

- June 2, 2020 - Tropical Storm Cristobal forms in the southern Gulf of Mexico.
- June 3, 2020 - Makes landfall in southern Mexico
- **June 7, 2020 - Makes landfall in Louisiana.**

Hurricane Hanna

- July 23, 2020 - Tropical Storm Hanna forms in the Gulf of Mexico.
- **July 25, 2020 - Hanna strengthens into a Category 1 hurricane and later makes landfall on Padre Island, Texas.**

Hurricane Laura

- August 21, 2020 - Tropical Storm Laura forms in the Caribbean.
- August 23, 2020 - Over 35 people are killed in the Caribbean, including the Dominican Republic and Haiti, due to rain and flooding caused by Tropical Storm Laura.
- August 26, 2020 - Strengthens into a Category 4 hurricane.
- **August 27, 2020 - Makes landfall near Cameron, Louisiana, killing at least 27 people.**

Hurricane Marco

- August 21, 2020 - Tropical Storm Marco forms over the Northwestern Caribbean.
- August 23, 2020 - Marco strengthens into a Category 1 hurricane. Later in the day, Marco weakens to a tropical storm.
- **August 24, 2020 - Makes landfall near the mouth of the Mississippi River.**

Hurricane Sally

- September 12, 2020 - Tropical Storm Sally forms.

- September 14, 2020 - Sally strengthens into a hurricane.
- **September 16, 2020 - Sally makes landfall near Gulf Shores, Alabama, as a Category 2 hurricane. Later in the night, Sally weakens to a tropical depression.**

Tropical Storm Beta

- September 18, 2020 - Tropical Storm Beta forms.
- **September 21, 2020 - Beta makes landfall as a tropical storm on the Eastern coast of Texas.**

Hurricane Delta

- October 5, 2020 - Tropical Storm Delta forms. Strengthens to a hurricane later in the day.
- October 7, 2020 - Hurricane Delta makes landfall on the Yucatan Peninsula.
- **October 9, 2020 - Makes landfall near Creole, Louisiana, as a Category 2 hurricane. At least four people are reported to have died in the US.**

Hurricane Eta

- October 31, 2020 - Tropical Storm Eta forms in the Caribbean.
- November 2, 2020 - Strengthens to a hurricane and intensifies to a Category 4 hurricane throughout the day.
- November 3, 2020 - Eta makes landfall in northeastern Nicaragua as a Category 4 storm. Over 150 people have died in Central America due to the storm.
- November 8, 2020 - Makes landfall on the south-central coast of Cuba as a tropical storm. **Later in the day, Eta makes landfall in the Florida Keys.**

2021: Record Low Temperatures in TX and LA

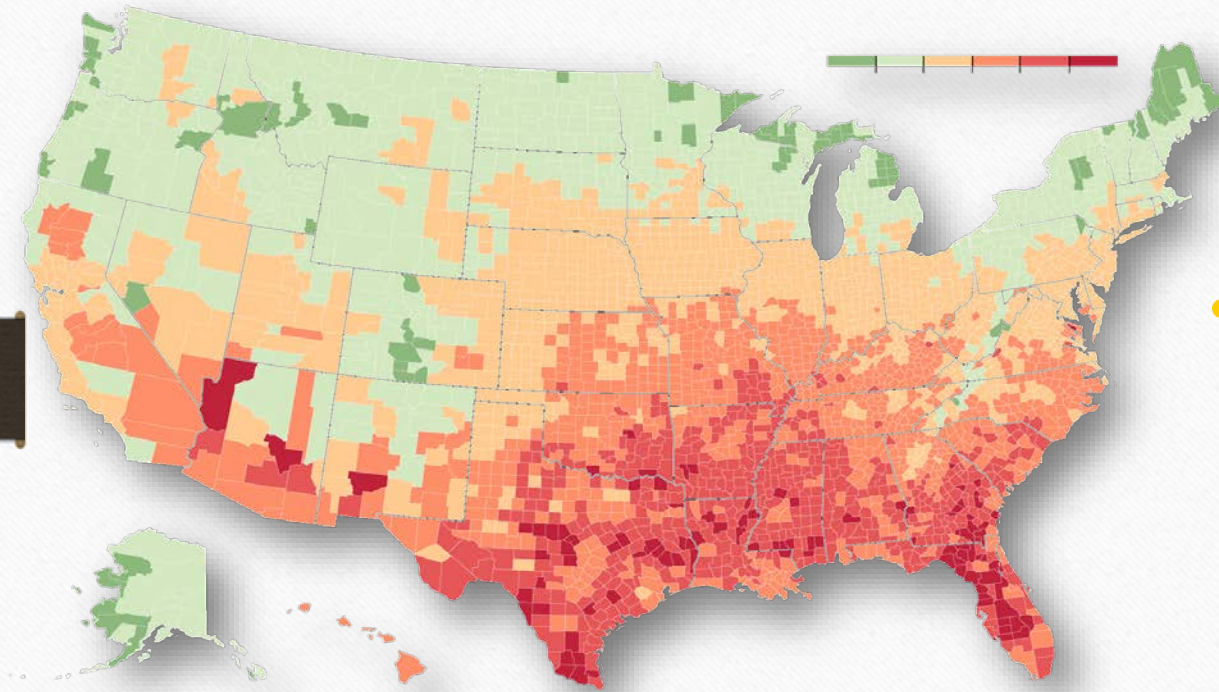
STATE	LOCATION	STATION TYPE	LOW	STATE	LOCATION	STATION TYPE	LOW
• LA	ALEXANDRIA	COOP	11	• LA	NEW IBERIA AIRPT-	WBAN	18
• LA	ALEXANDRIA 5 SSE	COOP	8	• LA	SALT POINT	WBAN	20
• LA	ALEXANDRIA ESLER FIELD	WBAN	12	• LA	VERNON	RAWS	8
• LA	ALEXANDRIA INTL AP	WBAN	11	• TX	KIRBYVILLE	RAWS	11
• LA	BOYCE 3 WNW	COOP	7	• TX	LUMBERTON	COOP	12
• LA	BUNKIE	COOP	13	• TX	MCFADDEN	RAWS	14
• LA	EVANGELINE/GARDNER	RAWS	10	• TX	ORANGE 9 N	COOP	14
• LA	FORT POLK FULLERTON	WBAN	10	• TX	PORT ARTHUR SE TX	WBAN	14
• LA	FRANKLIN 3 NW	COOP	19	• TX	SOUTHERN ROUGH	RAWS	10
• LA	GRAND COTEAU	COOP	13	• TX	TOWN BLUFF DAM	COOP	9
• LA	JEANERETTE 5 NW	COOP	17	• TX	WOODVILLE TEXAS	RAWS	8
• LA	JENNINGS	COOP	13				
• LA	LAFAYETTE 13 SE	WBAN	18				
• LA	LAFAYETTE REGIONAL AP	WBAN	16				
• LA	LAKE CHARLES REGIONL AP	WBAN	16				
• LA	LEESVILLE	COOP	8				
• LA	MOSS BLUFF 2 NNW	COOP	12				

Webpage by: Donovan Landreneau

Data collection by: WFO LCH Staff

Climate Change Hits Poor & People of Color in the South Hardest

- A 2017 UC Berkeley study found without effective climate action the nation as a whole could see as much **6%** shaved off of its GDP by the end of this century
- Parts of the American South hit hardest with more than a **20%** drop in economic activity due to global warming by the end of the century

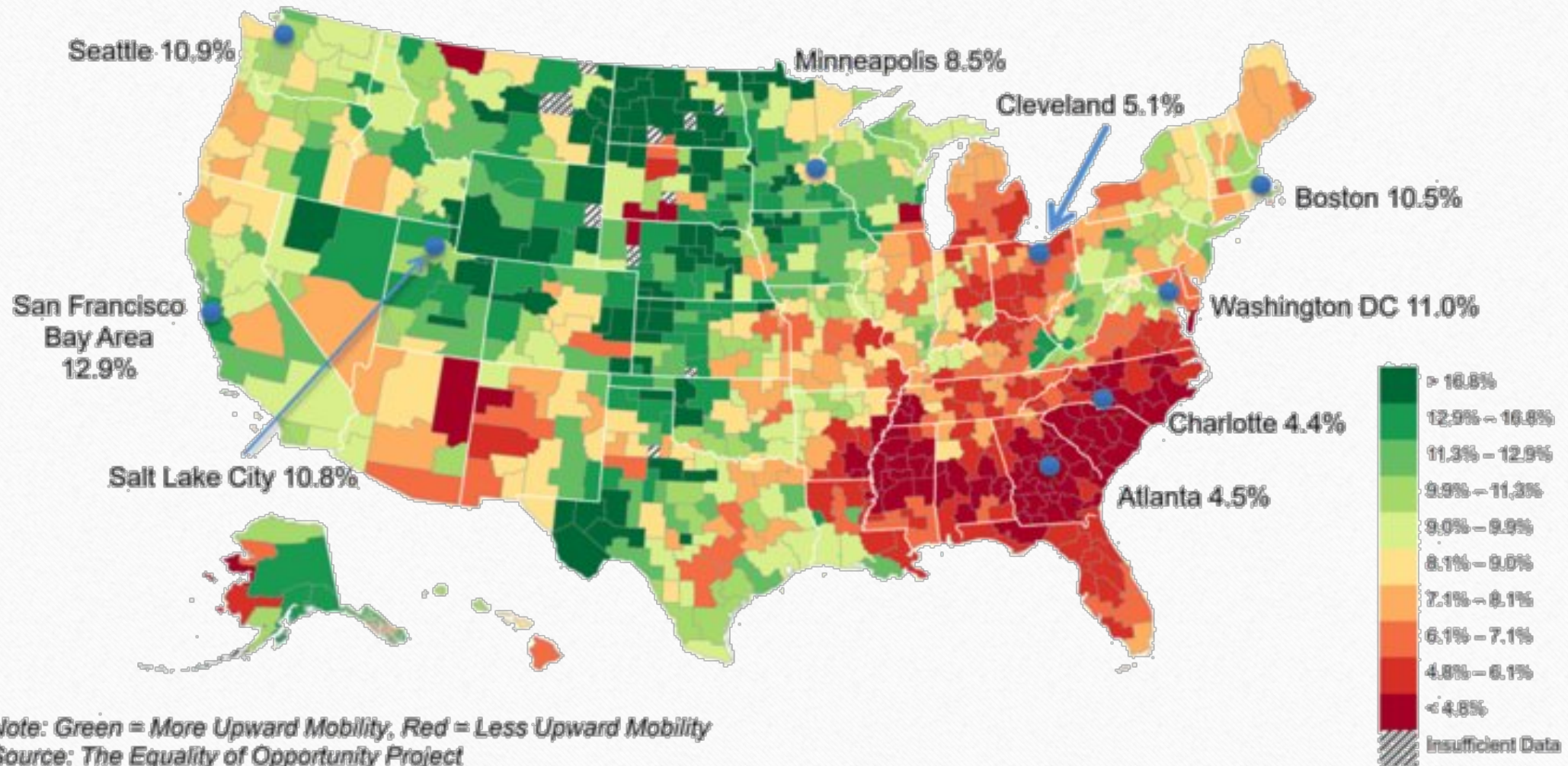


Source: Hsiang, Kopp, Jena, Rising, et al. (2017)

**CLIMATE CHANGE WILL
WIDEN INCOME GAP**

The Geography of Upward Mobility in the United States

Chances of Reaching the Top Fifth Starting from the Bottom Fifth by Metro Area



Climate Change is here!

Let's get to work and be prepared!

Learn More about the Work of DSCEJ



Website

www.dscej.org



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