

Global Warming & Climate Change



Role of Government in Managing Climate Change:

- **Climate Change is a global phenomena, so it must be addressed by all countries. In 2016, Obama signed agreements with 200 countries in Paris to “do more” and reduce CO2 emissions.**
- **EPA assumes national responsibility to implement federal laws to improve quality. This is complicated by the “divided government” of the Congress since both chambers are controlled by Republicans who do believe it or think it should be a priority.**
- **Texas is led by GOP leaders who also do not believe in environmental protection because it will jeopardize jobs and increase consumer prices. Much of their support is loyalty to the petroleum industry who lobby heavily not to change anything, especially alternative fuels that would erode petroleum dominance. These positions are further supported by actions of the state regulatory body, TCEQ Texas Commission on Environmental Quality, governed by Republican political appointments .**
- **Locally, City of Houston and Harris County have laws and departments that regulate various aspects of environmental protection in a non-partisan way, most importantly recycling.**
- **Separately, there are local and nation non-profits that raise money for education and promotion of environment programs. These include: Earth Day, Sierra Club, Citizen’s Environmental Coalition, Green Peace, etc.**

Climate change damages already felt here, beyond



Matt Rourke / Associated Press



Toby Talbot / Associated Press



Tory Gutierrez / Associated Press

Flooding: More scenes like this are expected as the world's seas rise.

Tropical storm: Widespread destruction could become common.

Drought: Some regions may get too much rain. Others will get none.

Report: Climate change already affecting US

Terry Renna/AP

Global warming is rapidly turning America into a stormy and dangerous place, with rising seas and disasters upending lives from flood-stricken Florida to the wildfire-ravaged West, the National Climate Assessment concluded Tuesday, May 6, 2014.

Controversy of climate change stems from political and religious beliefs of our leaders.

Global warming is a literal warning of the climate, but also more extreme variations in climates and more frequent occurrences.

Conditions of:

- Drought / Floods
- Hurricanes / tornadoes
- Snow storms
- Wildfires
- Mud slides



Religious, Republican congressmen do not believe mankind has the power to alter the “plan of God” in any way, which is contrary to that of scientists who have proof. However, powerful people like SCOTUS Justice Scalia did not believe in science, which explains some of his rulings.

Opinions on climate change depend on political views, essentially Democrats vs. Republicans.

Democrats

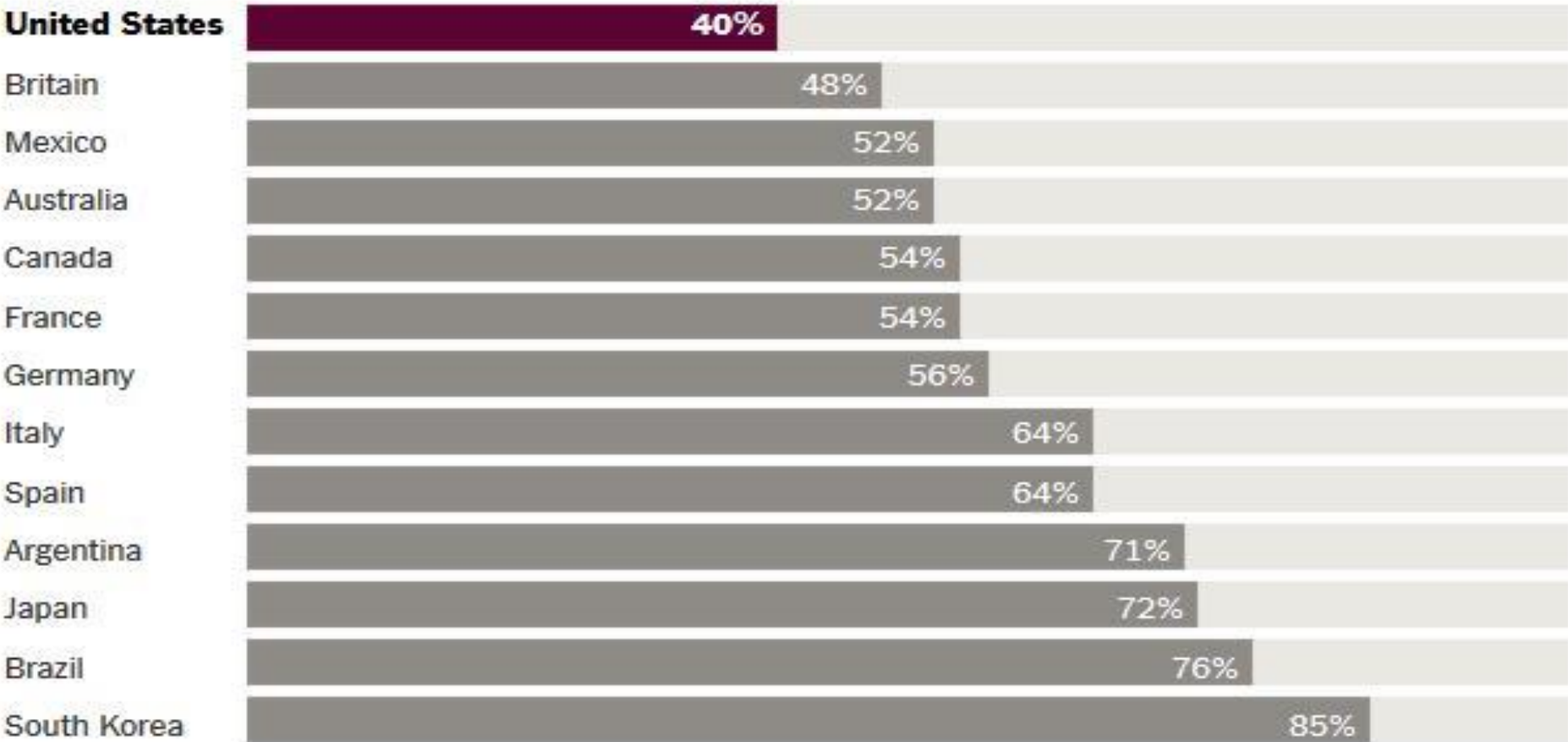
Republicans



Other Countries accept the Idea except the US

How the World Sees Climate Change

Percentage of residents of each country who say "global climate change is a major threat" to their country

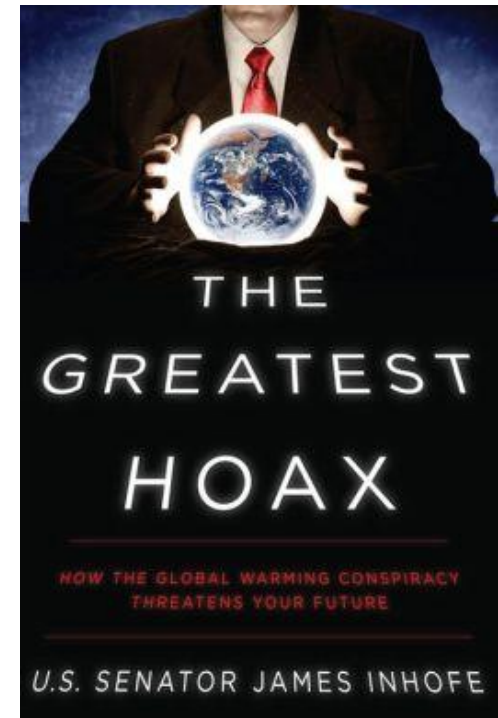


Source: Pew Research Center, June 2013

56 % of Congressional Republicans Who Deny Climate Change

Climate change is happening, humans are the cause, and a shocking number of congressional Republicans — **over 56% — deny or question the science.** CAP Action conducted a fresh analysis of public statements from current Representatives and Senators from the 114th Congress on climate change. Roll over any state on the map below for information on its resident climate science deniers, or click on the state to be taken to a new tab with full quotes and figures for each state.

All told, **170 elected representatives in the 114th Congress have taken over \$63.8 million from the fossil fuel industry that's driving the carbon emissions which cause climate change. They deny what over 97 percent of scientists say is happening** — current human activity creates the greenhouse gas emissions that trap heat within the atmosphere and cause climate change. And their constituents are paying the price, with Americans across the nation suffering 500 climate-related national disaster declarations since 2011.



February 28, 2015

Sen. James Inhofe, Republican from Oklahoma, throwing a snowball to prove that global warming isn't really happening.

"We keep hearing that 2014 has been the warmest year on record," Inhofe said. "So I ask the chair," — referring to Sen. Bill Cassidy (R-LA) — "Do you know what this is? **It's a snowball, from just outside here. So it's very, very cold out... very unseasonable.**" He then lobbed said snowball to a page and lapsed into deep silence, a smile across his face.

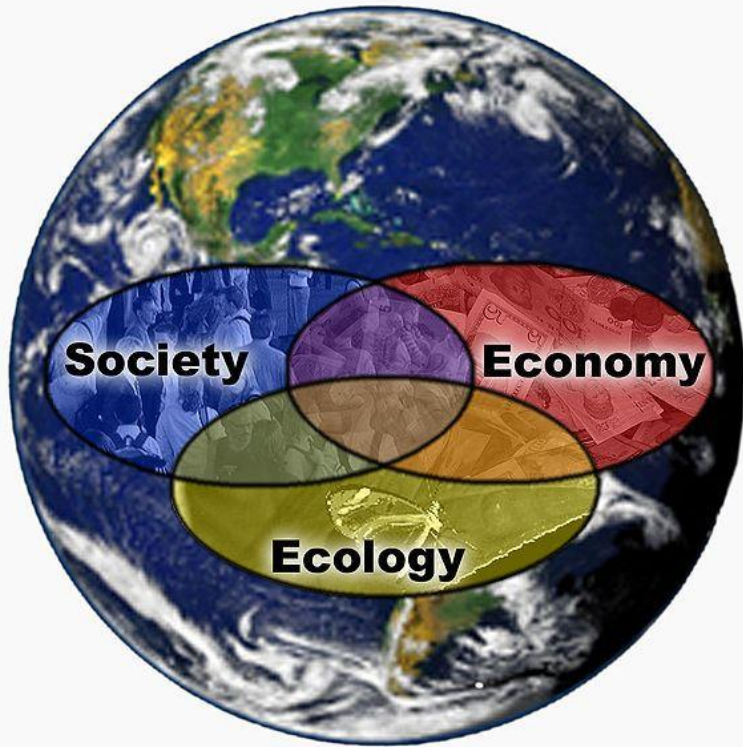
Inhofe, by the way, isn't some random nut off the street. He's currently chair of the Senate's Environment and Public Works committee. You want Congress to do something about global warming? For the next two years, at least, any bill would have to go through him.



<http://www.vox.com/2015/2/26/8116981/james-inhofe-global-warming>

Americans are over-regulated and over-taxed. When regulation escalates, the result is an increase in regulators. In other words, bigger government is required to enforce the greater degree of regulation. Bigger government means bigger budgets and higher taxes. More simply doesn't mean better. A perfect example is the entire global warming, climate-change issue, which is an effort to dramatically and hugely increase regulation of each of our lives and business, and to raise our cost of living and taxes. In ***The Greatest Hoax*, Senator James Inhofe will reveal the reasons behind those perpetuating the Hoax of global warming, who is benefitting from the general acceptance of the Hoax and why the premise statements are blatantly and categorically false.**

There must be balance between global economic growth, creature comfort, and the world in which we live.



“We will respond to the threat of climate change, knowing that the failure to do so would betray our children and future generations.”

*—President Barack Obama
January 21, 2013*



We the People

still believe that our obligations as Americans are not just to ourselves, but to all posterity. We will respond to **the threat of climate change**, knowing that the failure to do so would betray our **children and future generations**. Some may *still deny* the overwhelming judgment of science, but none can avoid the devastating impact of raging fires, and crippling drought, and more powerful storms. The path towards sustainable energy sources will be long and sometimes difficult. But America cannot resist this transition; ***we must lead it.***

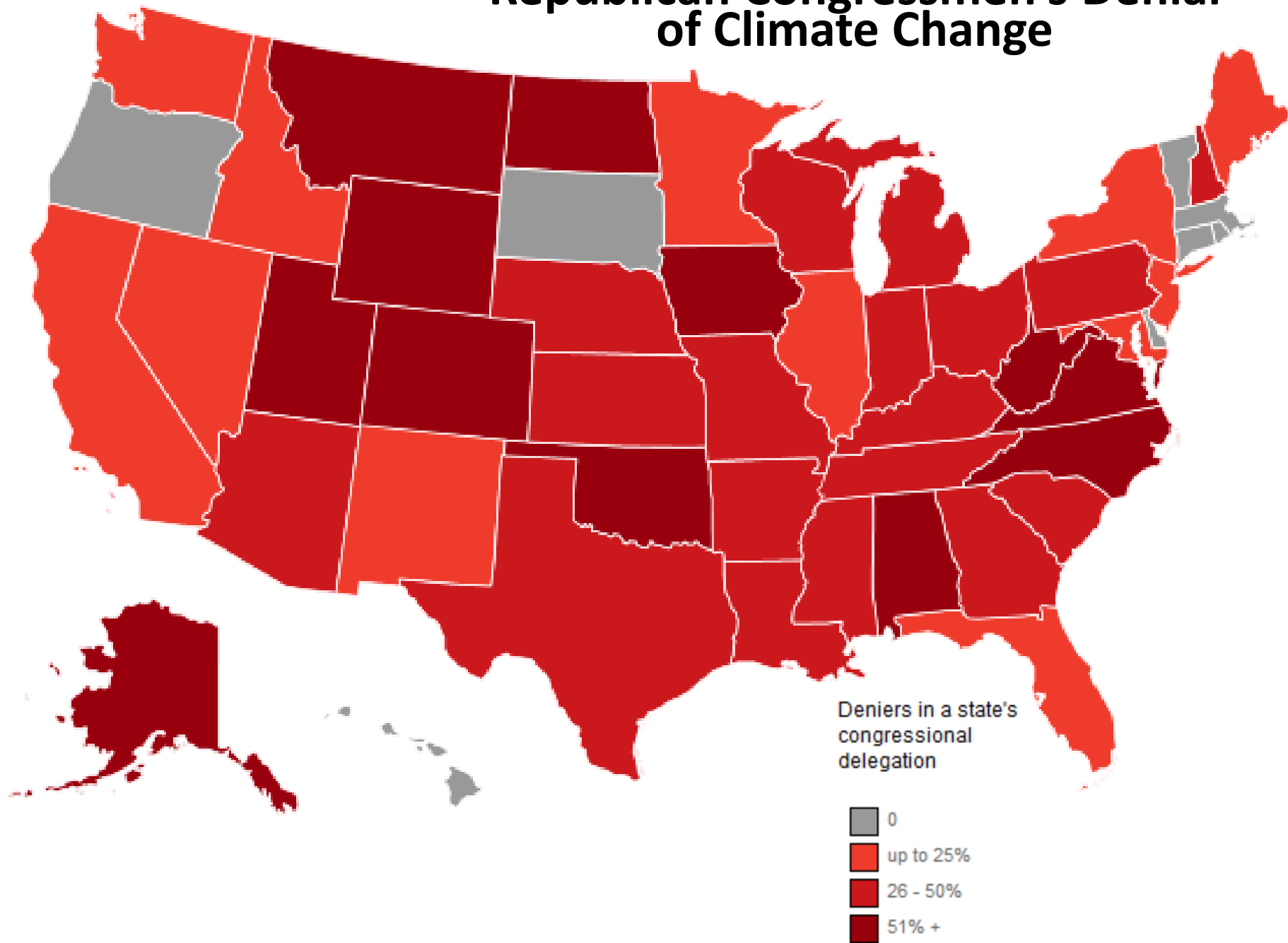


“Climate change is not a hoax. More droughts and floods and wildfires are not a joke -- they are a threat to our children’s future and in this election you can do something about it.”

*~Barack Obama 9/6/2012
DNC*



Republican Congressmen's Denial of Climate Change



Both NOAA and NASA confirm that 2014 was the hottest year in 135 years of record-keeping, and scientists say humans are to blame. January 16th 2015, 5:41 pm

<http://www.nbcnews.com/nightly-news/2014-was-hottest-year-ever-recorded-n287891>

The heat is on: Globe sizzles to record average in 2014

By Seth Borenstein
ASSOCIATED PRESS

WASHINGTON — For the third time in a decade, the globe sizzled to the hottest year on record, scientists announced Friday.

Both the National Oceanic and Atmospheric Administration and NASA calculated that in 2014 the world had its hottest year in 135 years of record-keeping. Earlier, Japan's weather agency and an independent group out of University of California Berkeley also gauged 2014 as the hottest on record.

NOAA said 2014 averaged 58.24 degrees Fahrenheit, 1.24 degrees above the 20th-century average.

But NASA, which calculates temperatures slightly differently, put 2014's aver-

age at 58.42 degrees, which is 1.22 degrees above the average of the years 1951-1980.

Earth broke NOAA records set in 2010 and 2005. The last time the Earth set an annual NOAA record for cold was in 1911.

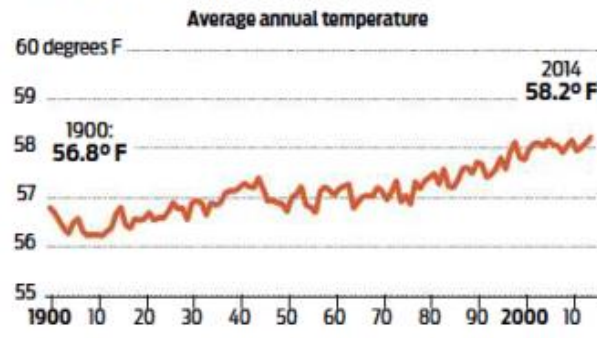
No 'wisps of doubts'

NOAA also said last month was the hottest December on record. Six months in 2014 set marks for heat. The last monthly cold record was set in December 1916.

"The globe is warmer now than it has been in the last 100 years and more likely in at least 5,000 years," said climate scientist Jennifer Francis of Rutgers University, who wasn't part of either research team. "Any wisps of doubt that human ac-

2014 warmest year on record

For the third time in a decade, the globe sizzled to the hottest year on record, federal scientists announced Friday. NOAA said 2014 averaged 1.24 degrees Fahrenheit above the 20th-century average.



Source: NOAA

Associated Press

tivities are at fault are now gone with the wind."

Texas A&M University climate scientist Andrew Dessler and other experts said the latest statistics should end claims by non-scientists that warming

has stopped. It didn't, as climate denial sites still claim the world has not warmed in 18 years.

2014's heat was driven by record warmth in the world's oceans that didn't just break old marks: It shattered them. Record

high temperatures spread across far eastern Russia, the western United States, interior South America, much of Europe, northern Africa and parts of Australia. One of the few cooler spots was in the central and eastern U.S.

"Every continent had some aspect of record high temperatures" in 2014, said Tom Karl, director of NOAA's National Climatic Data Center.

Increase 'unrelenting'

Nine of the 10 hottest years in NOAA global records have occurred since 2000. The odds of this happening at random are about 650 million to 1, according to University of South Carolina statistician John Grego. Two other statisticians confirmed his calculations.

Every year in the 21st century has been in the top 20 warmest years on record, according to NOAA.

Temperatures have risen by about 1.6 degrees since the mid-19th century and pre-industrial times, said Gavin Schmidt, director of NASA's Goddard Institute for Space Studies, where the space agency tracks warming temperatures.

"We are witnessing, before our eyes, the effect of human-caused climate change," said Pennsylvania State University professor Michael Mann.

NASA's Schmidt said he wouldn't be surprised if 2015 breaks 2014's record.

"The increase in greenhouse gases is unrelenting, and that in the end is going to dominate most things going on," he said.

<http://www.nbcnews.com/nightly-news/study-sea-levels-are-now-rising-faster-rate-n287201>

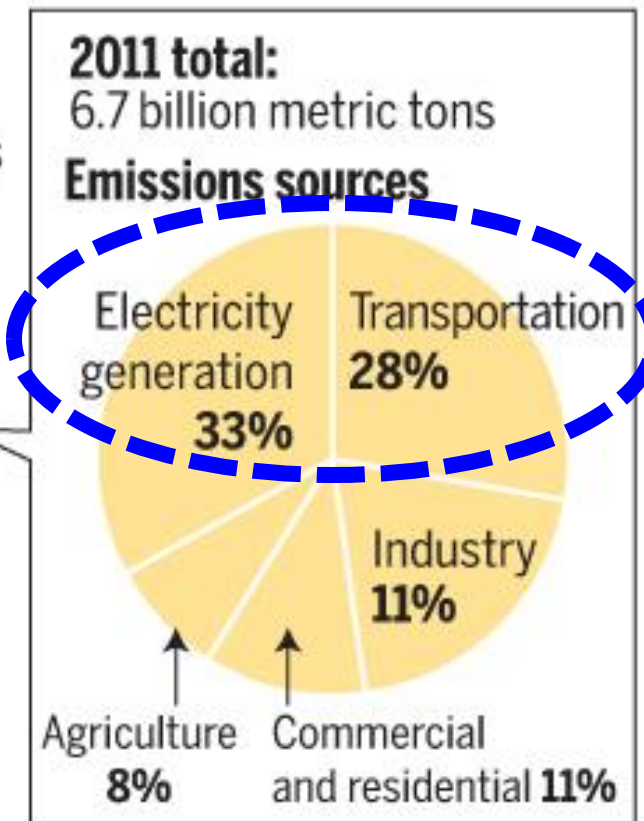
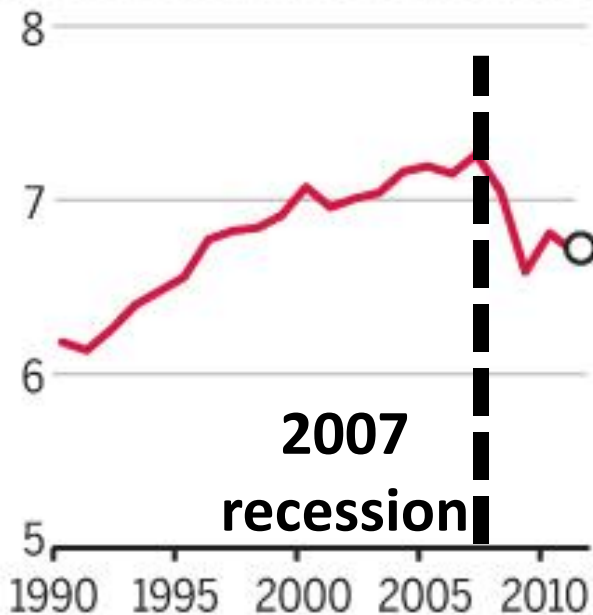
Source of Greenhouse Emissions

U.S. greenhouse gas emissions

Emissions have fallen 8 percent since 2007 because of the recession, more solar and wind power, and higher gas mileage standards, but are still above targets the White House and scientists have set.

Emissions since 1990

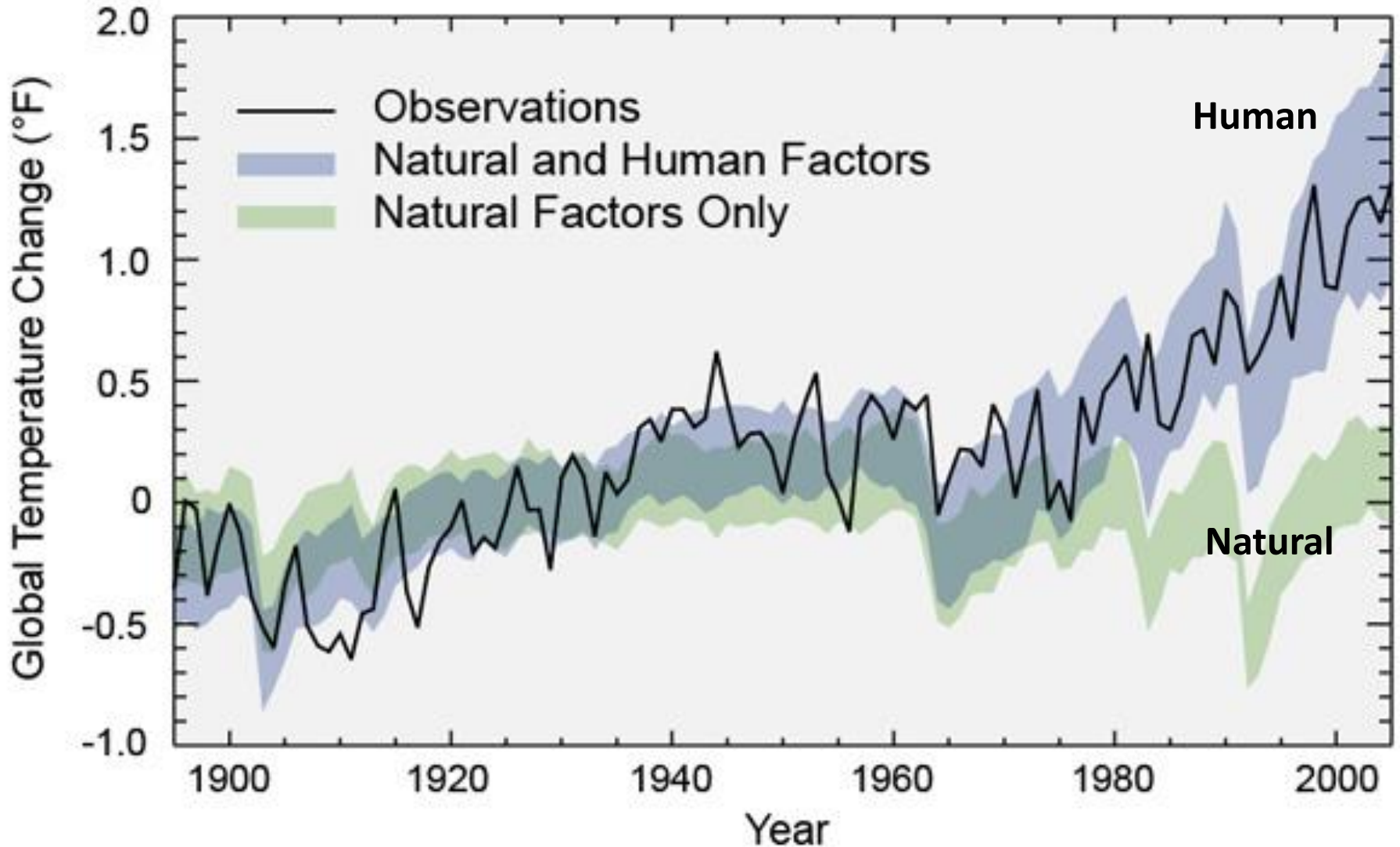
Total U.S. greenhouse gas emissions in billions of metric tons



Electrical generation and exhaust fumes are the leading causes.

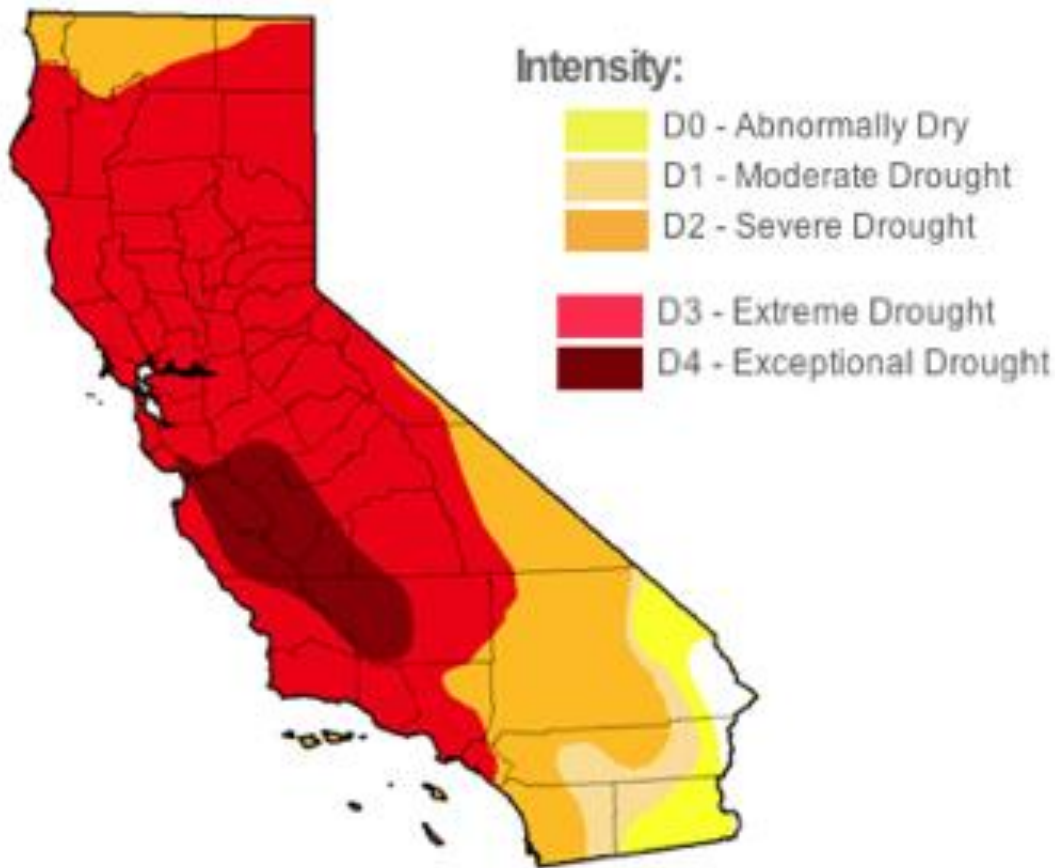
Human v. Natural Causes

Separating Human and Natural Influences on Climate



Central Valley of California is where most of America's crops are grown, so the drought affects food prices nationwide.

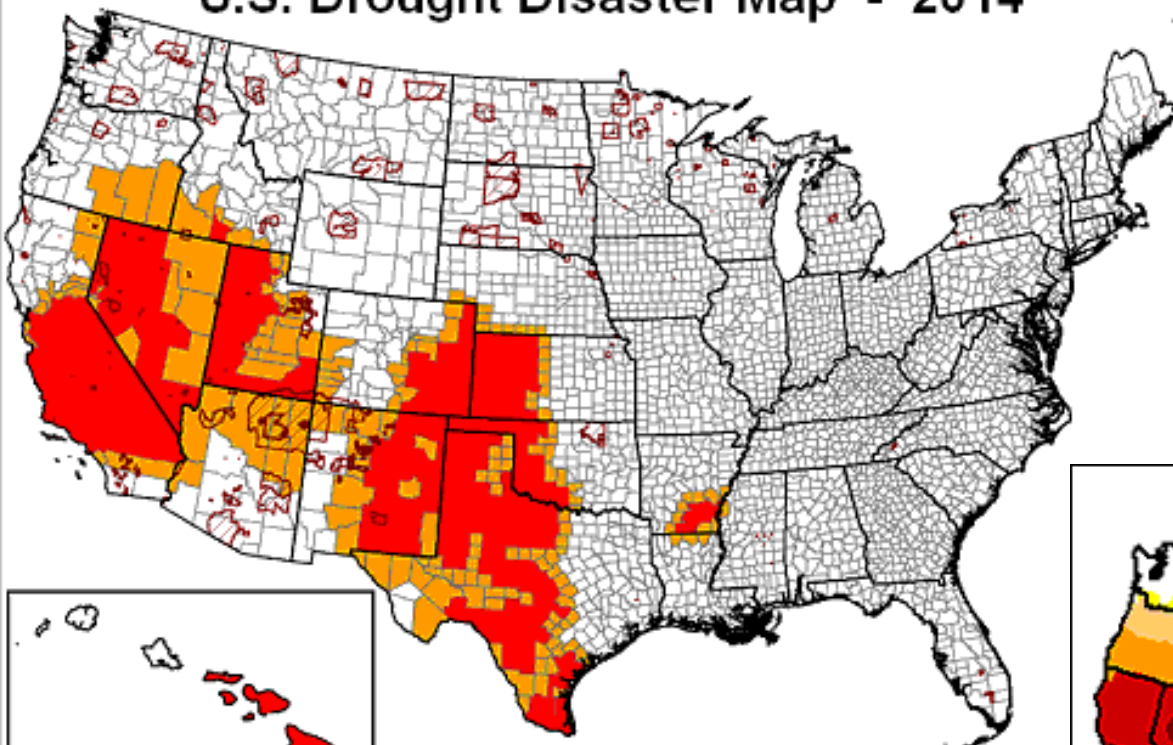
Drought Intensity



Central Valley



U.S. Drought Disaster Map - 2014



Secretarial Drought Designations for 2014

Disaster Incidents as of January 15, 2014

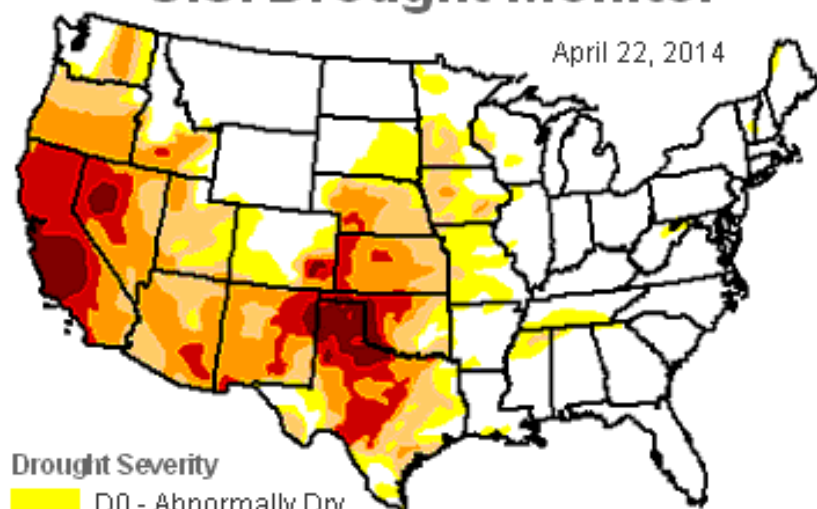
- State Boundary
- County Boundary
- Tribal Lands
- January 15, 2014
- Primary Counties: 252
- Contiguous Counties: 177



USDA Farm Service Agency
Production, Emergencies and Compliance Division
Washington, D.C.
January 15, 2014

U.S. Drought Monitor

April 22, 2014



Drought Severity

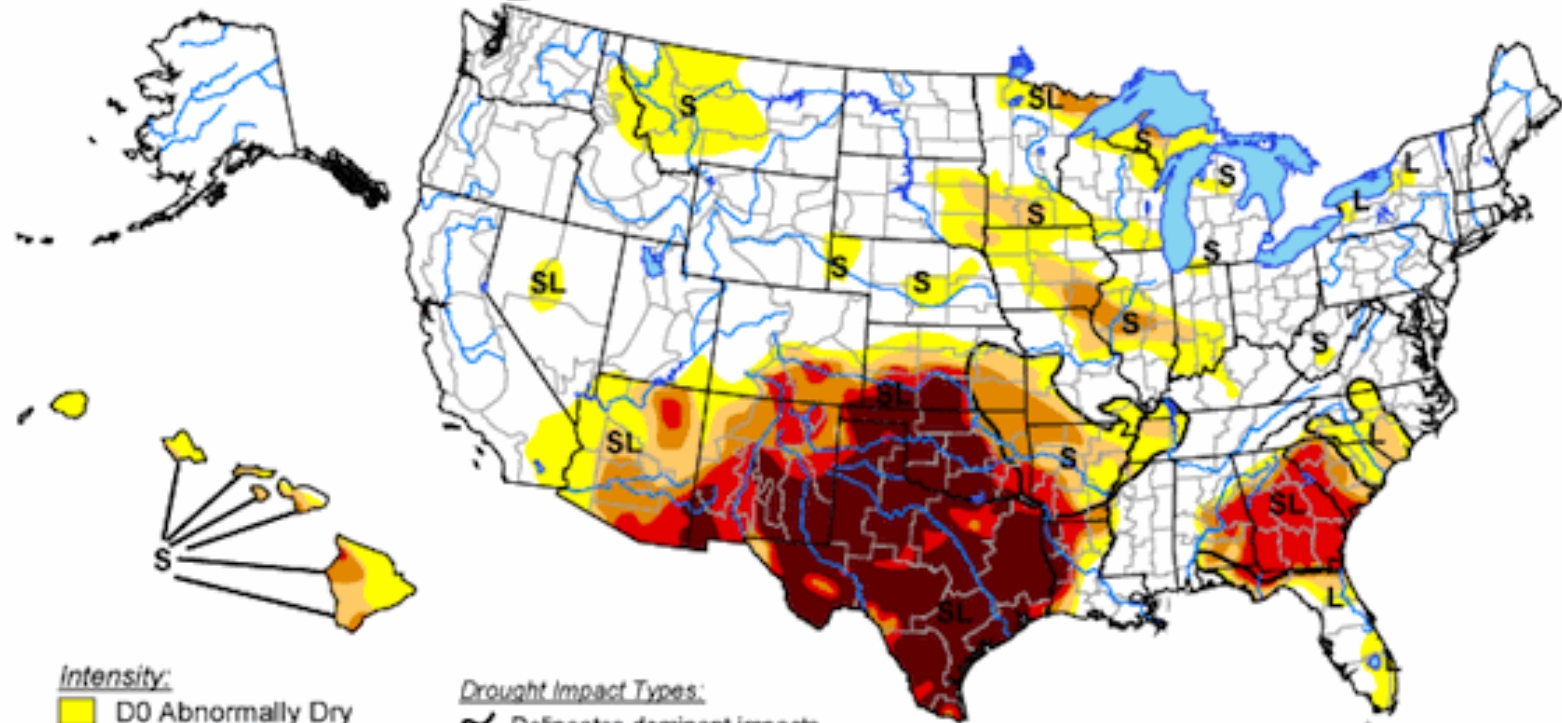
- D0 - Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Week	Nothing	D0-D4	D1-D4	D2-D4	D3-D4	D4
4/22/2014	49.83	50.17	38.43	26.2	11.48	3.26
4/15/2014	51.54	48.46	37.88	25.2	10.11	2.83






2011 Drought Hit Texas the Hardest

U.S. Drought Monitor


September 27, 2011
Valid 8 a.m. EDT



Intensity:

-  D0 Abnormally Dry
-  D1 Drought - Moderate
-  D2 Drought - Severe
-  D3 Drought - Extreme
-  D4 Drought - Exceptional

Drought Impact Types:

-  Delineates dominant impacts
- S = Short-Term, typically <6 months
(e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months
(e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions.
Local conditions may vary. See accompanying text summary
for forecast statements.

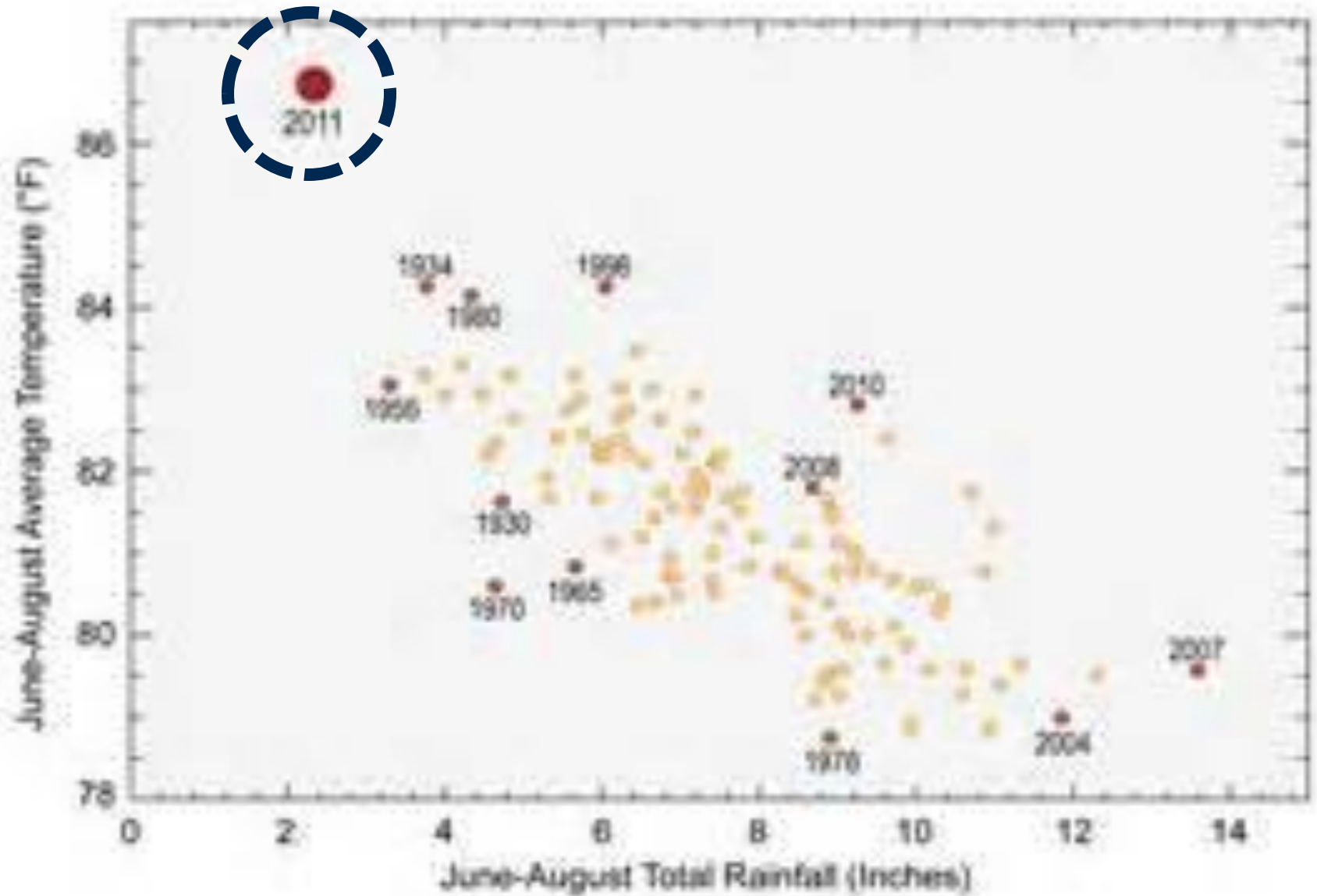
<http://droughtmonitor.unl.edu/>



Released Thursday, September 29, 2011

Author: Michael Brewer/Liz Love-Brotak, NOAA/NESDIS/NCDC

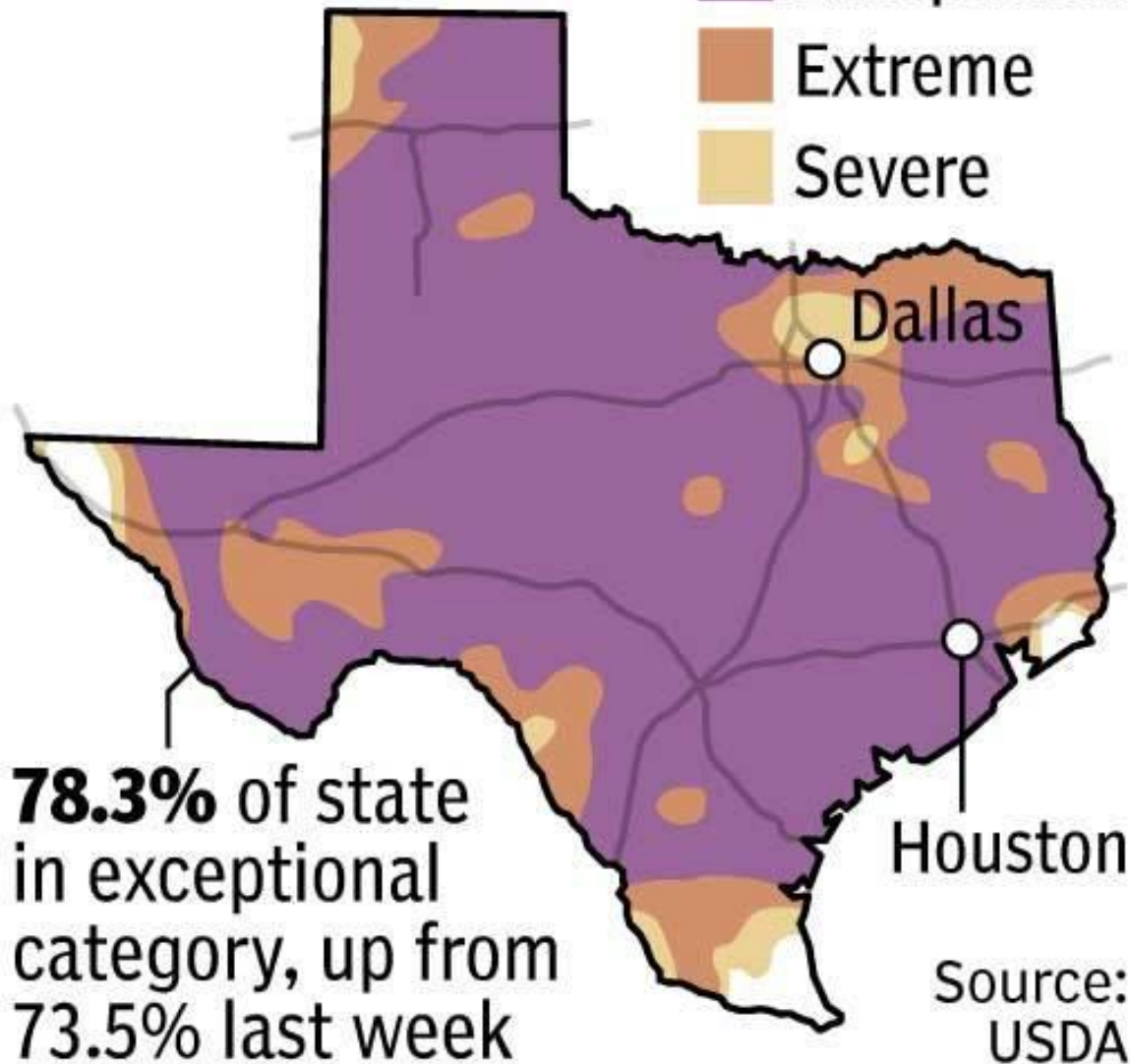
Texas Summer 2011: Record Heat and Drought





STILL PARCHED

Statewide drought conditions, through Thursday:

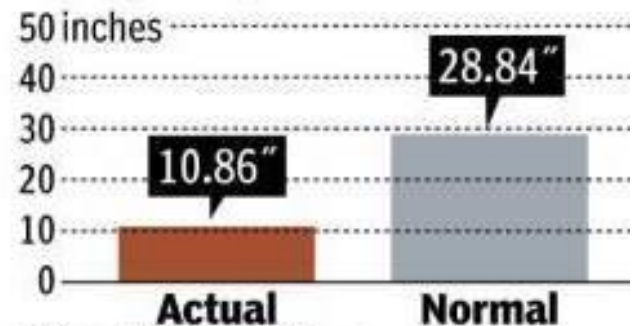


August 2011

Houston has received only 2/3 of its normal rainfall amount.

HOUSTON RAINFALL

Since Jan. 1, in inches:*



* Through Sunday at 7 p.m.

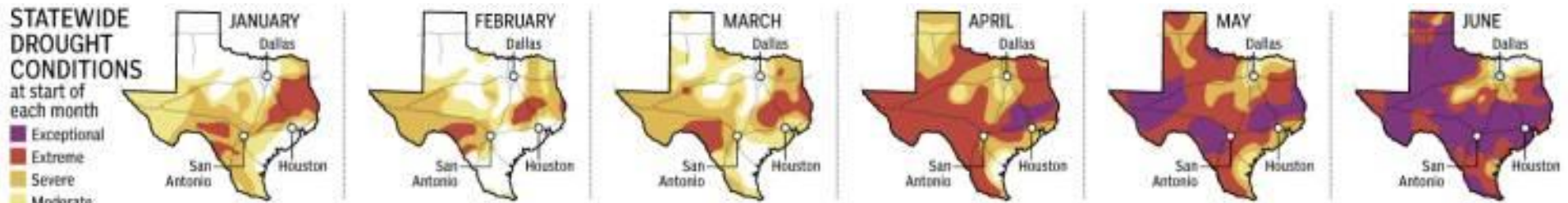
Note: Houston's official rainfall is measured at George Bush Intercontinental Airport

Statewide Drought Conditions by Month

STATEWIDE DROUGHT CONDITIONS at start of each month

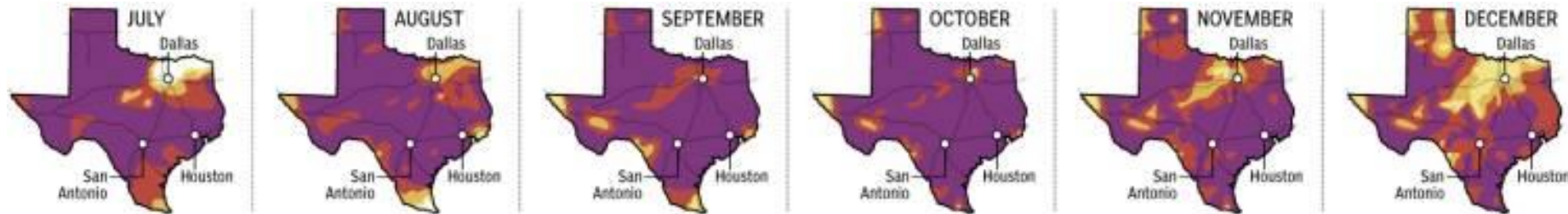
- Exceptional
- Extreme
- Severe
- Moderate

Sources: National Weather Service, Houston/Galveston Weather Forecast Office; U.S. Department of Agriculture; Office of the State Climatologist, Texas A&M University



Sources: National Weather Service, Houston/Galveston Weather Forecast Office; U.S. Department of Agriculture; Office of the State Climatologist, Texas A&M University

Note: All temperature and rainfall data reported from Bush Intercontinental Airport.



Statistics based on 30-year period (1981-2010)

Note: Rainfall total through 7 p.m. Friday

For a downloadable PDF of this graphic, go to blog.chron.com/sciguy/

JAY CARR : CHRONICLE

**Memorial Park has massive
tree destruction.**

**Water your trees !!
The drought may
last another year.**



The nonprofit organization ***Trees for Houston***, who estimated that 66 million trees - about 10 percent of the entire canopy in the eight-county Houston area - would die within two years as a result of the worst drought in Houston's history.



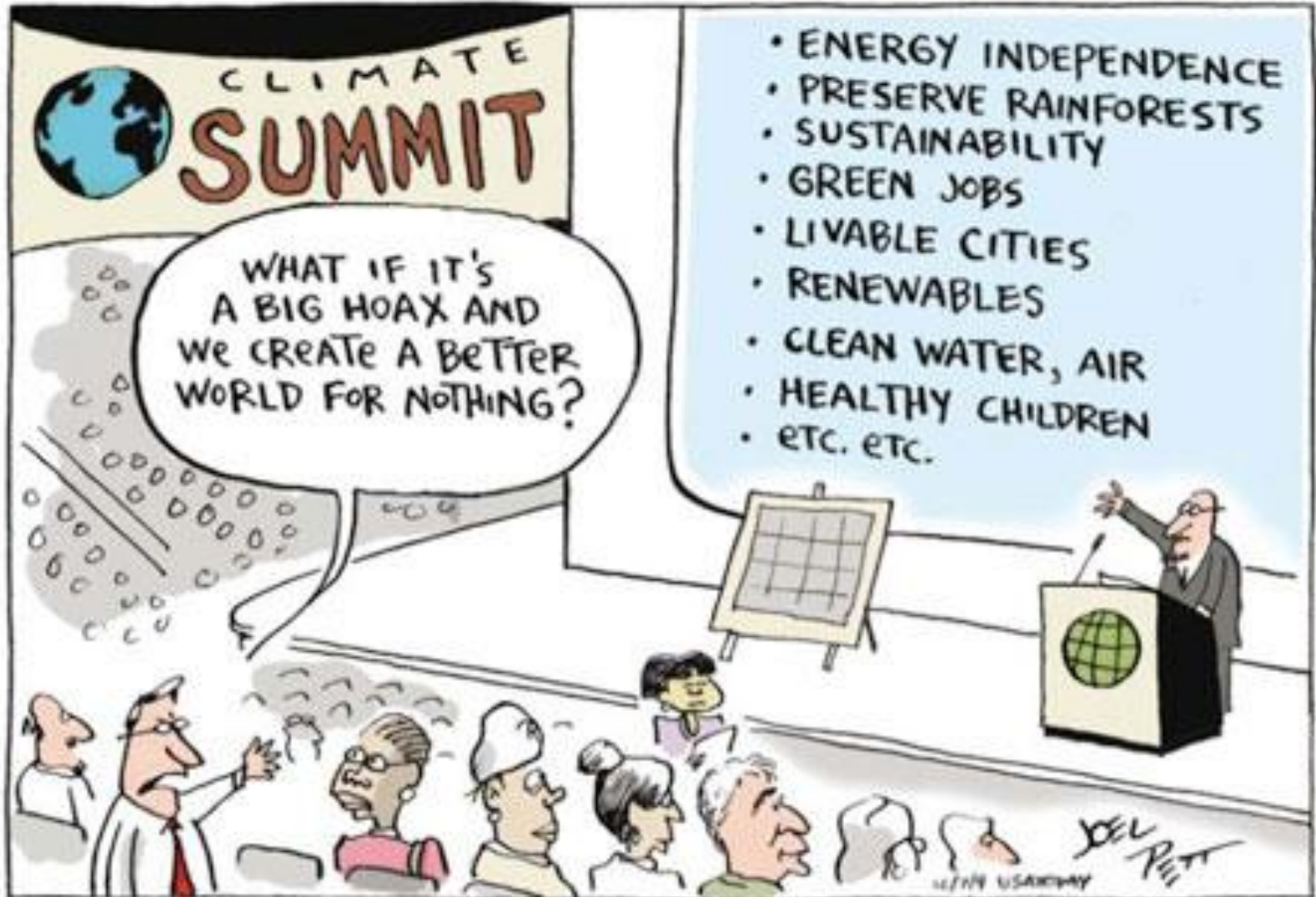
A rollerblader passes by dead trees in Memorial Park, **Sept. 26, 2011**, in Houston. The city is preparing to spend **\$4.5 million to remove dead trees** from city parks and esplanades. "Dead and diseased trees have risen to a catastrophic level," according to a report sent to the City Council from the Parks Department asking for the money. It will allow the city to bring in its disaster debris contractor to **remove 15,000 trees**. The city will be removing only those on city public land.



Aerial photos show massive destruction in Memorial Park



Logically not disrupting the global balance is the right thing to do so there should be no controversy.



The federal government released its new U.S. National Climate Assessment May 2014. The White House described it as "the most comprehensive scientific assessment ever generated of climate change and its impacts across every region of America and major sectors of the U.S. economy."

— PRESIDENT OBAMA'S PLAN TO —
ADDRESS CLIMATE CHANGE

- ✓ **Reduce carbon pollution from power plants and build cars that burn less fuel.**
- ✓ **Cut energy waste from our homes and businesses.**
- ✓ **Help states and cities prepare for the impacts of climate change.**
- ✓ **Lead global efforts to address climate change.**

The report says that climate change is real and it's here — and conditions will worsen if policymakers and the public do not take action.

Most Republicans think it is a hoax and do not believe it is caused by man. Until this condition is recognized and action is taken, the world will continue to be threatened by an accumulation of irreversible climate change.

Major Tornado Storms 2011:

Tornado Alley



- Tuscaloosa, AL
- Joplin, MO
- Oklahoma City, OK

SPC Storm Reports for 04/27/11

Map updated at 1140Z on 04/28/11

Tornadoes Kill 300+ people

By end of May, death toll rose to over 500.



TORNADO REPORTS.. (160)
WIND REPORTS/HI..... (295/2)
HAIL REPORTS/LG..... (178/19)
TOTAL REPORTS..... (633)

- High Wind Report (65KT +)
- ▲ Large Hail Report (2" dia. +)

PRELIMINARY DATA ONLY



The perils of tornadoes are known to everyone via the movies.



STORMS SO STRONG THERE WAS NO ESCAPE

DEADLIEST IN 40 YEARS: Toll soars to nearly 300 across six states
WARNINGS FUTILE: Twisters likely mile wide, 200 mph



ROBERT RAY : ASSOCIATED PRESS

NOW WHAT?: Francine Rollins and Rondroka Long emerged unscathed Thursday from the tornado that raked Tuscaloosa, Ala. What once was their neighborhood, though, is now a vast sea of debris.

By **GREG BLUESTEIN**
and **HOLBROOK MOHR**
ASSOCIATED PRESS

PLEASANT GROVE, Ala. — Firefighters searched one splintered pile after another Thursday, digging through the remains of houses and neighborhoods pulverized by the nation's deadliest tornado outbreak in almost four decades. At least 291 people were killed across six states — more than two-thirds of them in Alabama.

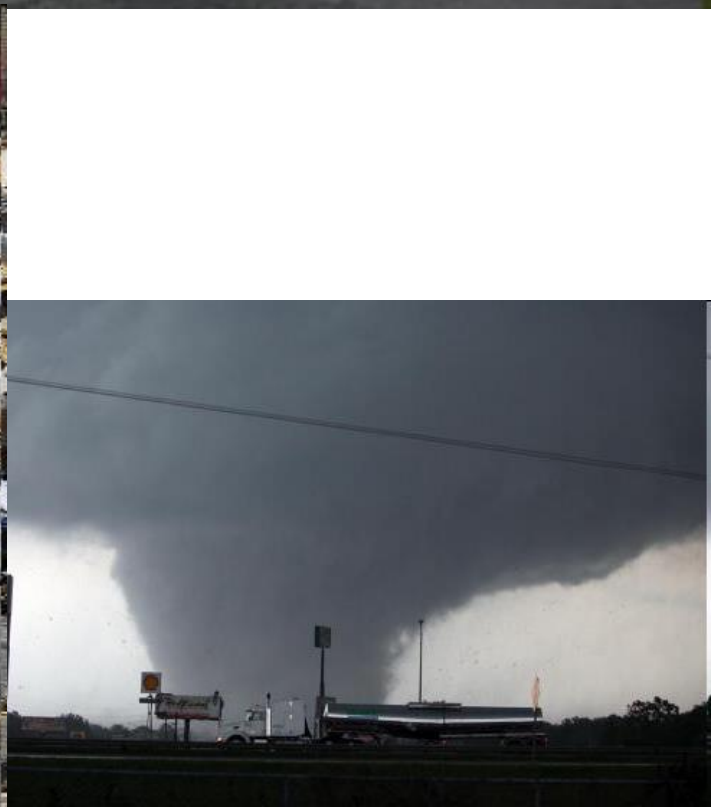
The death toll from Wednesday's storms seems like something from a bygone era, before Doppler radar and satellite forecasts were around to warn of severe weather. Residents were given up to 24 minutes notice that the tornadoes were coming, but they were just too wide, too powerful and too locked onto populated areas not to leave a horrifying body count.

"These were the most intense super-cell thunder-

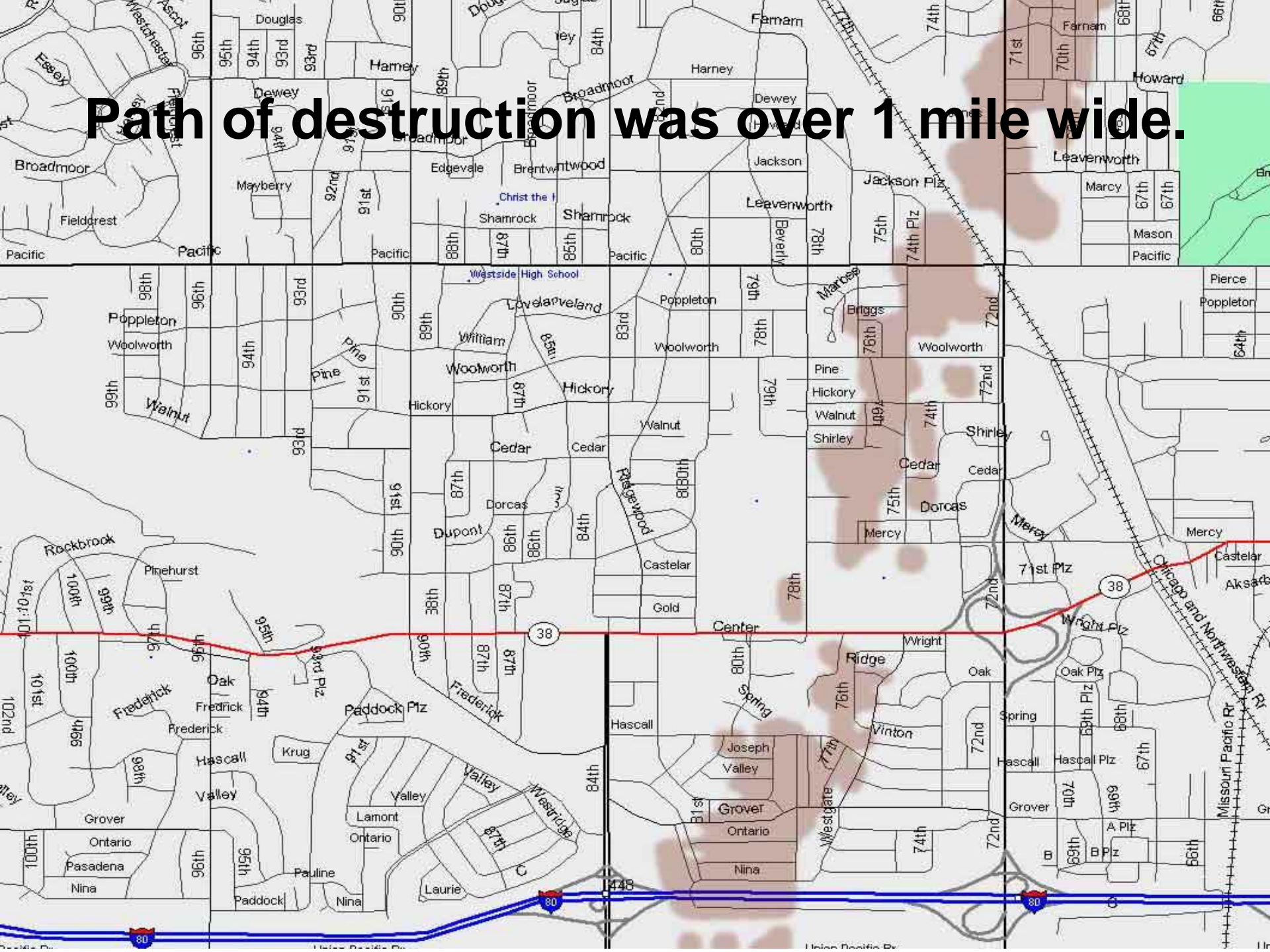


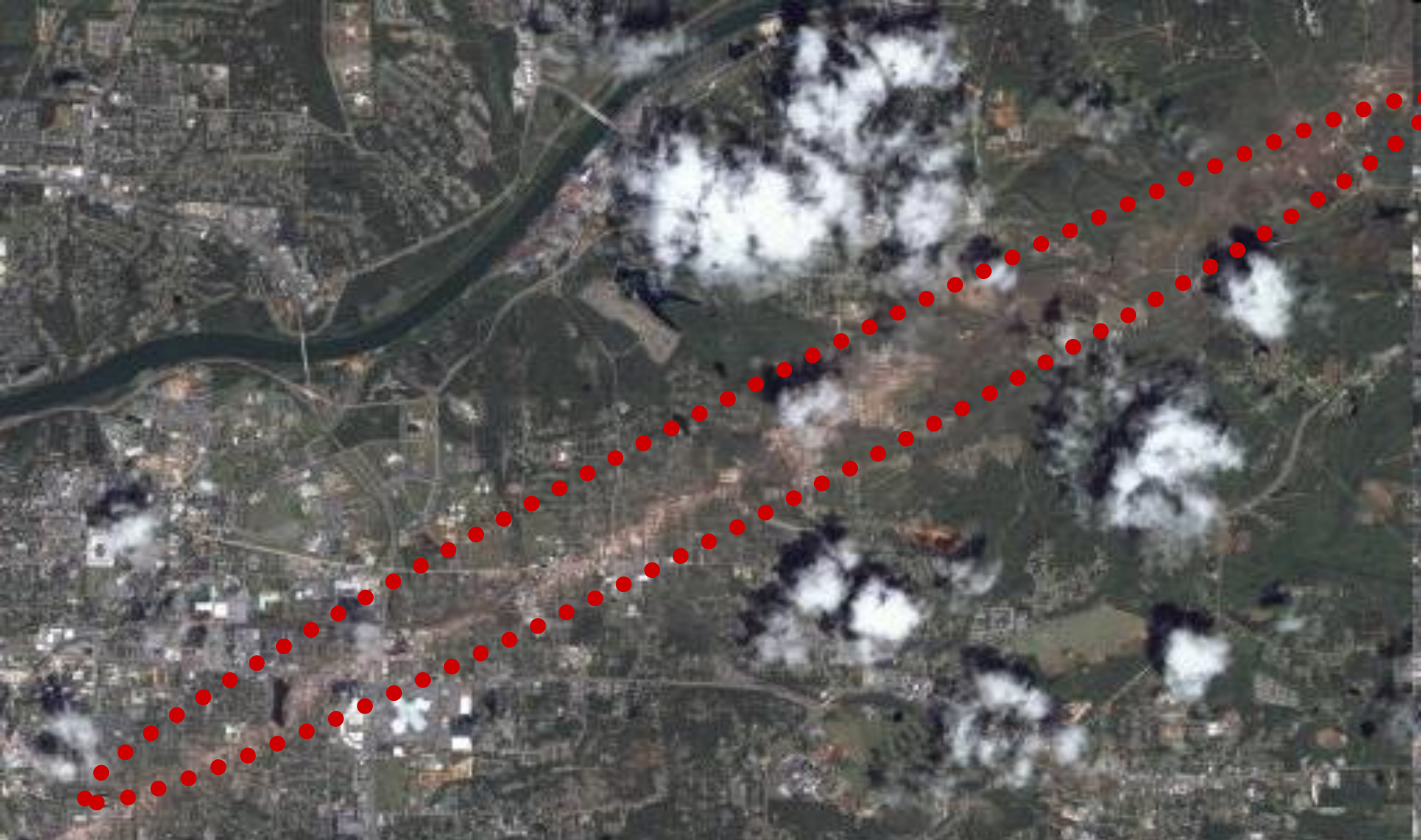
**Often modest safety is offered
in interior stairs and bathtubs.**





Path of destruction was over 1 mile wide.



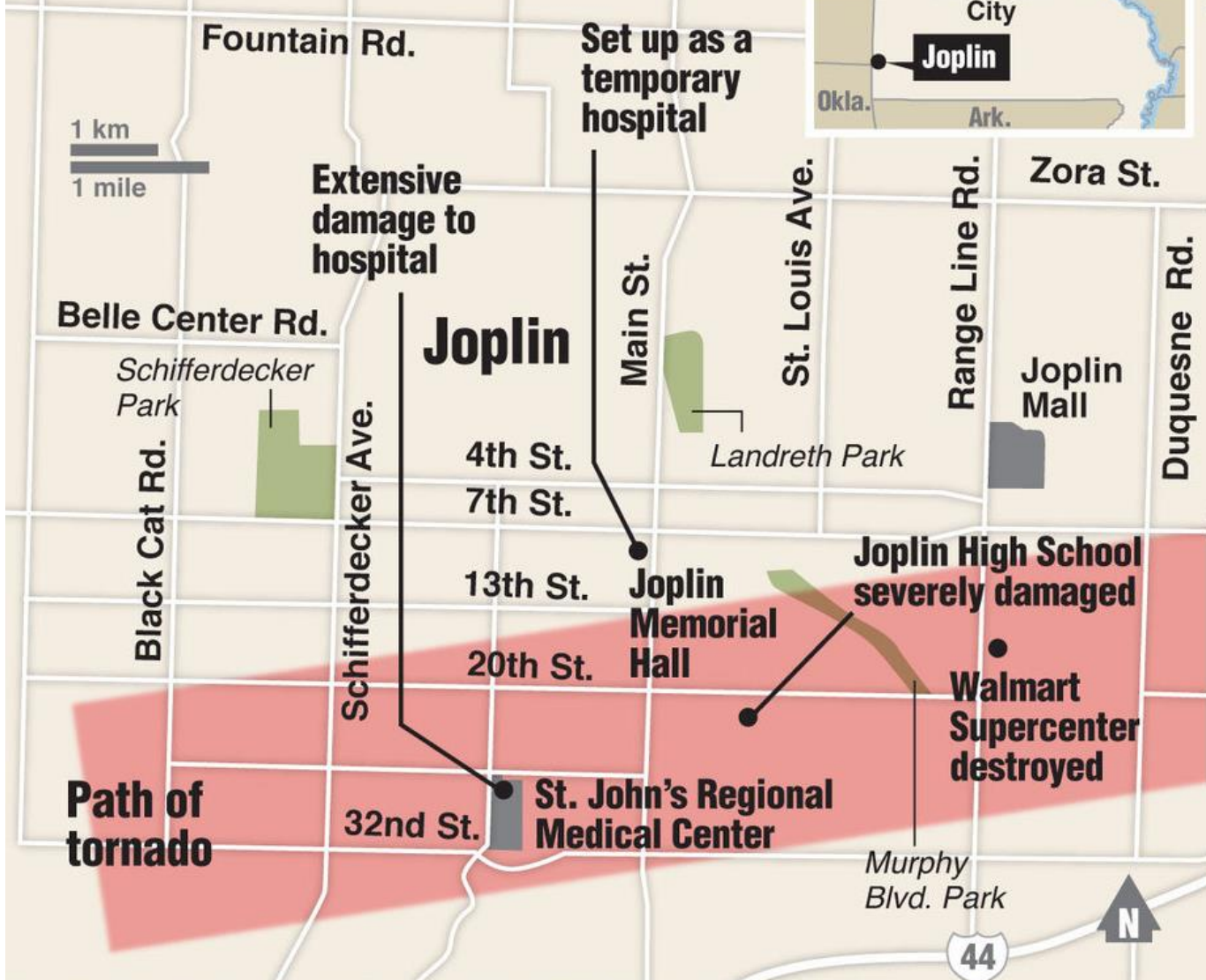


Apr 30 2011 AP

This Thursday, April 28, 2011 satellite image provided by GeoEye shows the path of a tornado, a brown streak running diagonally from lower left to upper right, that struck Tuscaloosa, Ala. on April 27.

Tornado's path

The path of a deadly tornado through Joplin, Mo., on Sunday:



Source: The Weather Channel, Joplin EMS Radio Traffic, KOAM-TV Joplin
Graphic: Neil Nakahodo, The Kansas City Star



Storm descends on Joplin

'It's just gone'



**United Arab Emirates
UAE is a petroleum-
rich Muslim country
of the Middle East.**

US foreign aid to other countries is constantly criticized, but rarely are their good deeds recognized by the media.

August 9, 2011


UAE donates \$500,000 toward Joplin High laptops

By Kelsey Ryan
Globe Staff Writer

JOPLIN, Mo. — Representatives from the United Arab Emirates (UAE) embassy in Washington, D.C., announced an initial donation of \$500,000 to provide MacBook laptops for every Joplin high school student. The announcement was made today at Joplin High School's temporary 11th and 12th-grade campus at Northpark Mall.

In addition to the initial \$500,000 donation, "One-to-One" laptop donations will be matched up to an additional \$500,000 for a total of \$1 million to be contributed by the embassy.


The One-to-One initiative allows every high school student to have a laptop and continuous curriculum as Joplin students transition to temporary schools and eventually permanent schools. The laptops will help integrate cooperative learning in the classroom through software programs and to replace traditional textbooks.

A historical black and white photograph showing a massive dust storm, known as a 'dust bowl', engulfing a farmstead. The dust is thick and billowing, obscuring the sky and the surrounding landscape. In the foreground, several small, simple houses are visible, with a few people standing near them, looking towards the approaching storm. The overall scene is one of devastation and environmental crisis.

1930s across the plains states, due to destructive farming practices that literally uprooted the soil and allowed it to become air born.



“Dust Bowl” occurred in the 1930s when high winds eroded soils across the plains. Note the video portrayal of these events in Phoenix in 2011 and the massive size: 100 miles in length and 10,000 ft. high.

A video still showing a massive dust storm in Phoenix, Arizona, in 2011. The dust is thick and billowing, obscuring the sky and the surrounding landscape. In the foreground, a residential area with many small, single-story houses is visible. The dust is so thick that it completely obscures the sky and the surrounding landscape, creating a sense of being trapped in a sea of dust. The overall scene is one of devastation and environmental crisis.

2011 Phoenix and American southwest

Similar massive dirt storms hit Phoenix 3 times in summer 2011, closing airports and shutting down the city without electricity.

The storm was 50 miles wide and 10,000 ft. high.

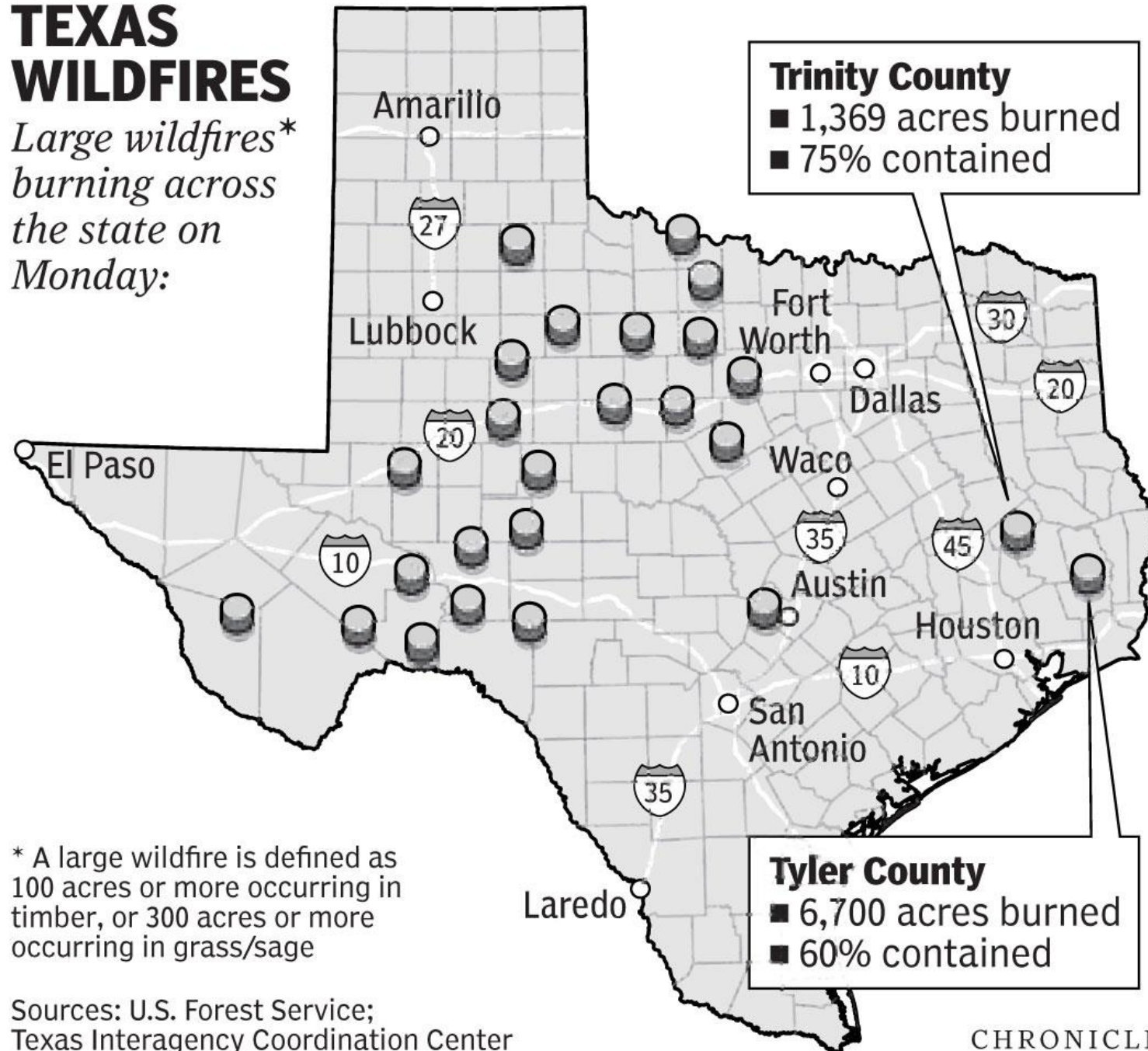


Arizona Department of Public Safety Officers and other emergency personnel make their way around a 16 car pile up on Interstate 10 between Tucson and Phoenix Tuesday, **Oct. 4, 2011**. A blinding dust storm rolled across the Arizona desert, causing three pileups involving dozens of vehicles on the interstate. A 70-year-old man was killed and at least 15 other people were injured, authorities said. Photo: Associated Press, Darryl Webb / FR170361 AP



TEXAS WILDFIRES

Large wildfires burning across the state on Monday:*



* A large wildfire is defined as 100 acres or more occurring in timber, or 300 acres or more occurring in grass/sage

Sources: U.S. Forest Service; Texas Interagency Coordination Center





JERRY LARA : SAN ANTONIO EXPRESS-NEWS

AUSTIN: Paul Galletti, 7, plays near a burned-out home Monday in his west Austin neighborhood, where a wildfire destroyed or damaged 20 houses. Authorities have charged a homeless man with arson, saying he defied a burning ban with an untended campfire.



Apr 18 2011 Jack Plunkett / AP
An emergency worker watches a **Travis Co. Star Flight helicopter** after it dropped water on a wildfire that destroyed homes in southwest Austin, Texas on Sunday.

LOST TO ASHES

ONE of the driest spells in Texas history has left most of the state in extreme drought, and various wildfires have burned more than 1,000 square miles — an area that together would equal the size of Rhode Island. Officials say the threat of new wildfires remains high, especially in the western part of the state. **PAGE B2**

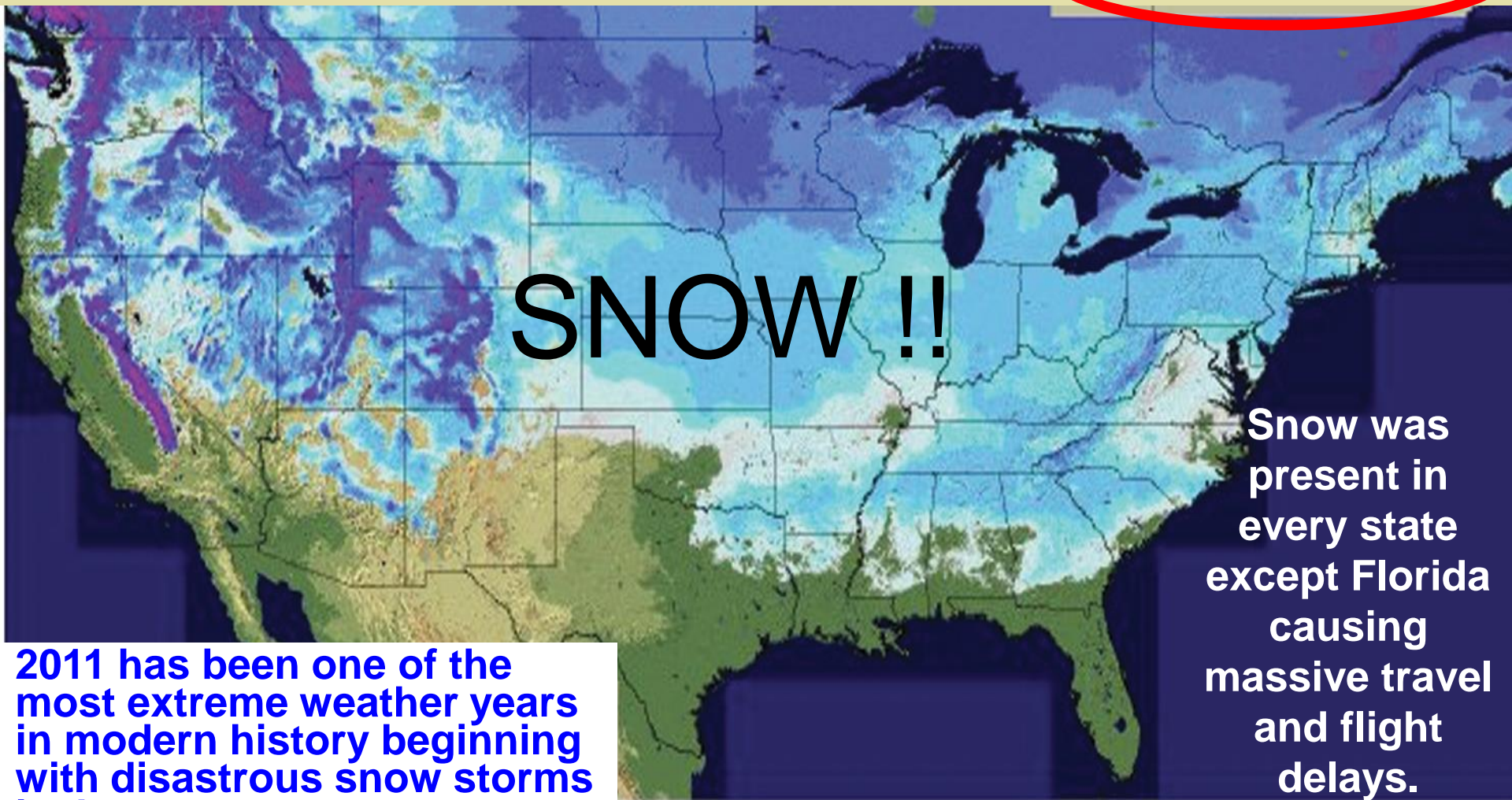


NICK de la TORRE : CHRONICLE

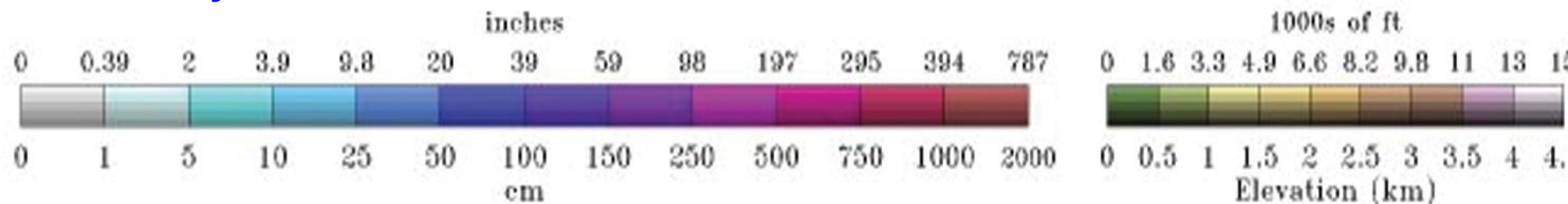
HARDIN COUNTY: National Park Service worker Tim McClung puts out spot fires Monday in the Big Thicket National Preserve north of Beaumont. About 3,000 acres have burned in the area, Texas Forest Service officials say.



US Weather Service, Snow Map, January 12, 2011



2011 has been one of the most extreme weather years in modern history beginning with disastrous snow storms in January.



Snow removal is a major cost to cities, but necessary to insure public safety and economic continuity for business. Thus, geographic location determines economic opportunity or disadvantage, determined by weather conditions.



Winter 2011 brought huge snows to the Northeast over New Years Eve in Times Square, threatening the festivities and the economic impact of tourism during the Holiday season.



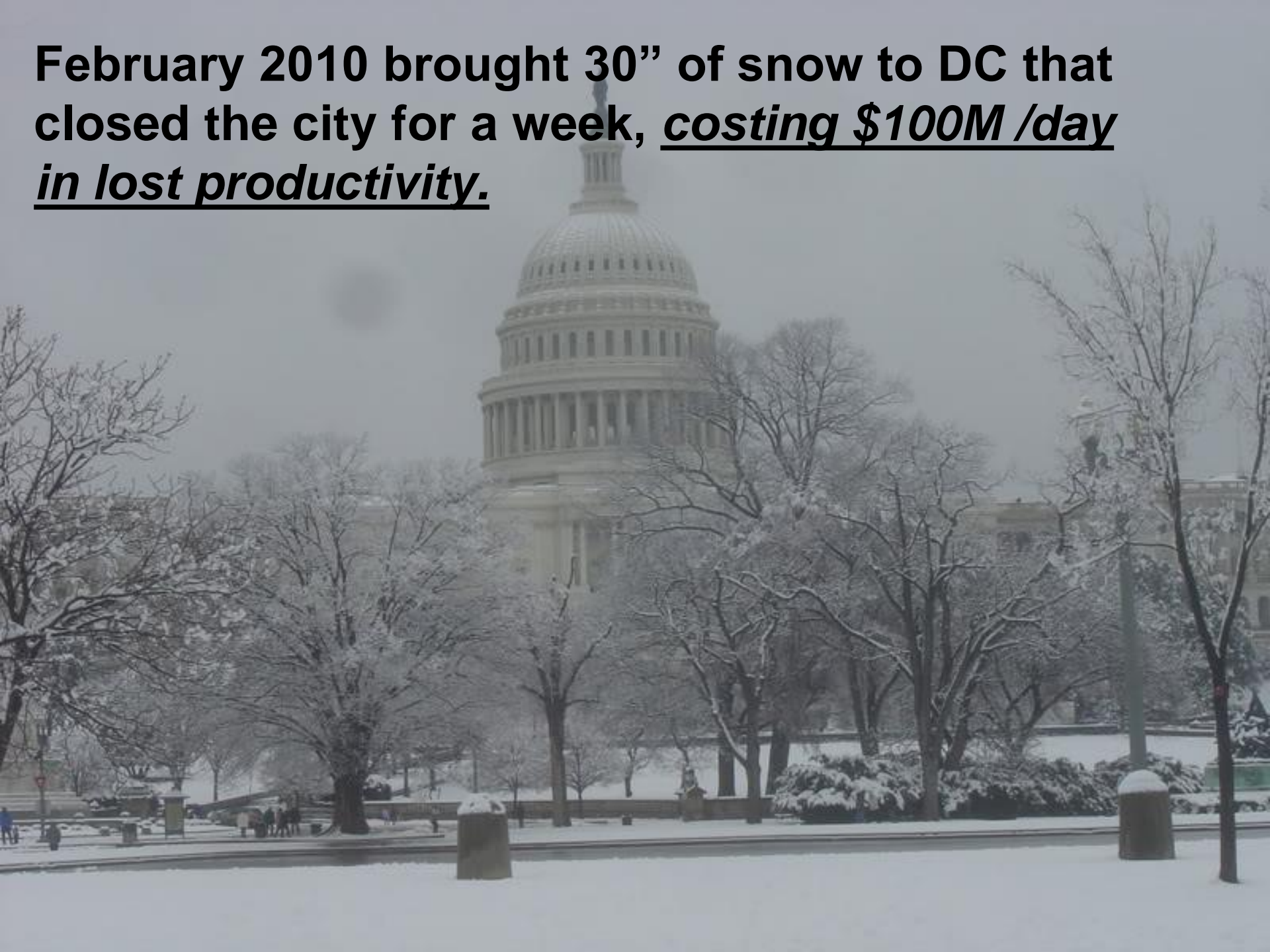
1/3 of all US air traffic begins, ends, or connects through NYC area airports, so delays and cancellations here disrupt airline schedules nationwide that can take days to overcome.





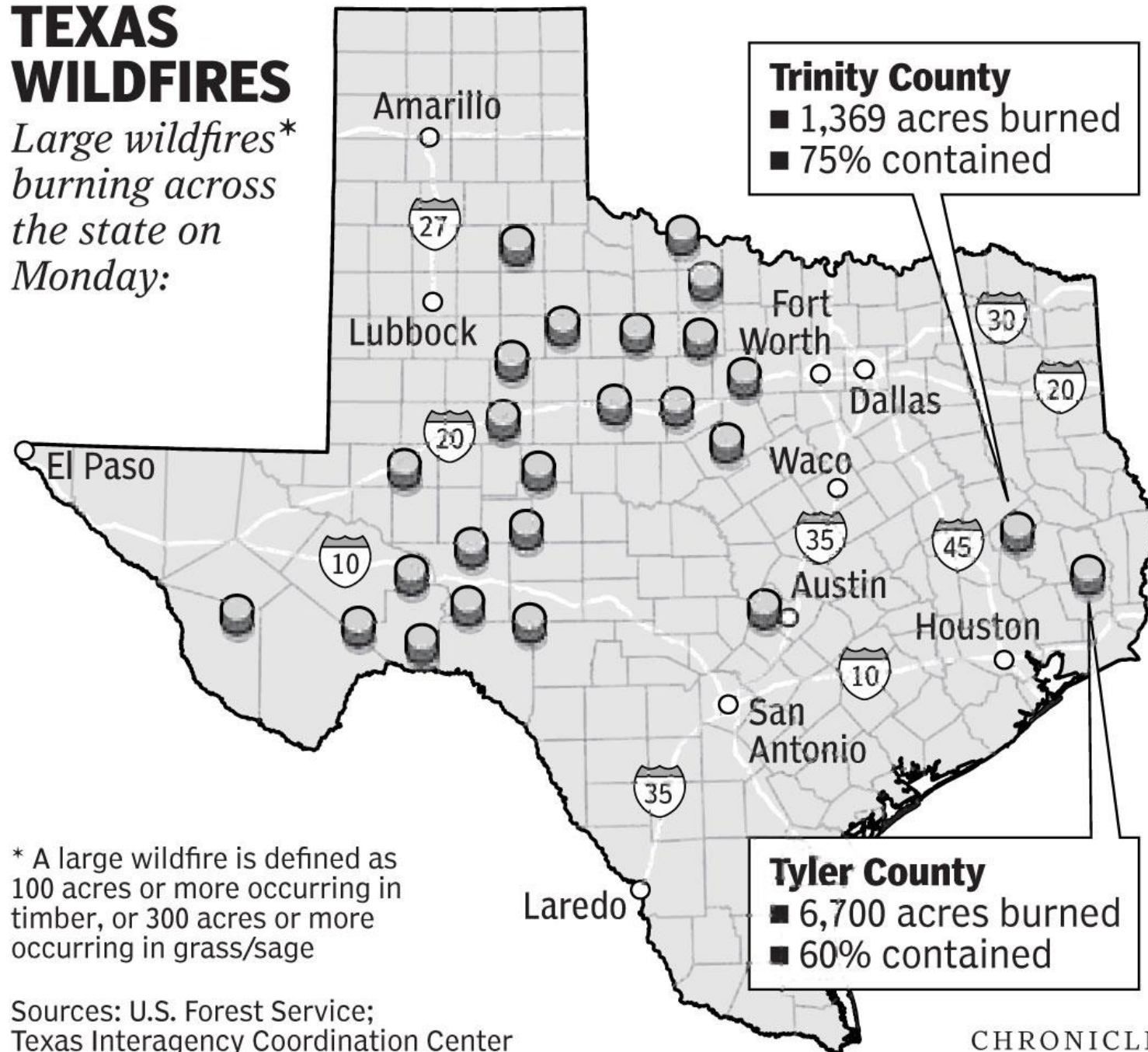
Neighborhood streets can be blocked for days, preventing residents from getting to work or access of emergency vehicles. There is also no place for the shoveled snow.

February 2010 brought 30" of snow to DC that closed the city for a week, costing \$100M /day in lost productivity.



TEXAS WILDFIRES

Large wildfires burning across the state on Monday:*



Trinity County
■ 1,369 acres burned
■ 75% contained

Tyler County
■ 6,700 acres burned
■ 60% contained

* A large wildfire is defined as 100 acres or more occurring in timber, or 300 acres or more occurring in grass/sage

Sources: U.S. Forest Service; Texas Interagency Coordination Center

CHRONICLE





JERRY LARA : SAN ANTONIO EXPRESS-NEWS

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An emergency worker watches a **Travis Co. Star Flight helicopter** after it dropped water on a wildfire that destroyed homes in southwest Austin, Texas on Sunday.

LOST TO ASHES

ONE of the driest spells in Texas history has left most of the state in extreme drought, and various wildfires have burned more than 1,000 square miles — an area that together would equal the size of Rhode Island. Officials say the threat of new wildfires remains high, especially in the western part of the state. **PAGE B2**

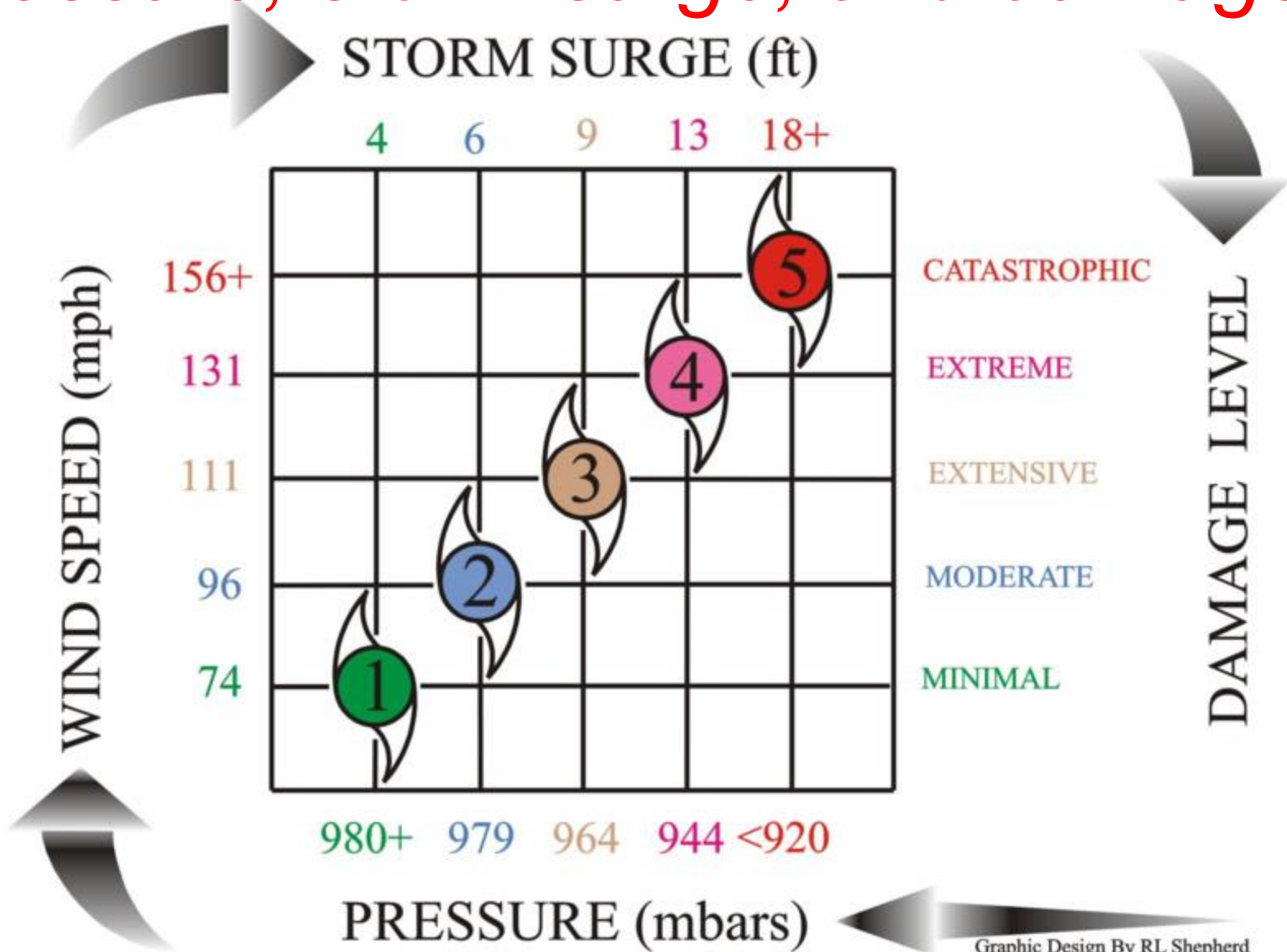


NICK de la TORRE : CHRONICLE

HARDIN COUNTY: National Park Service worker Tim McClung puts out spot fires Monday in the Big Thicket National Preserve north of Beaumont. About 3,000 acres have burned in the area, Texas Forest Service officials say.



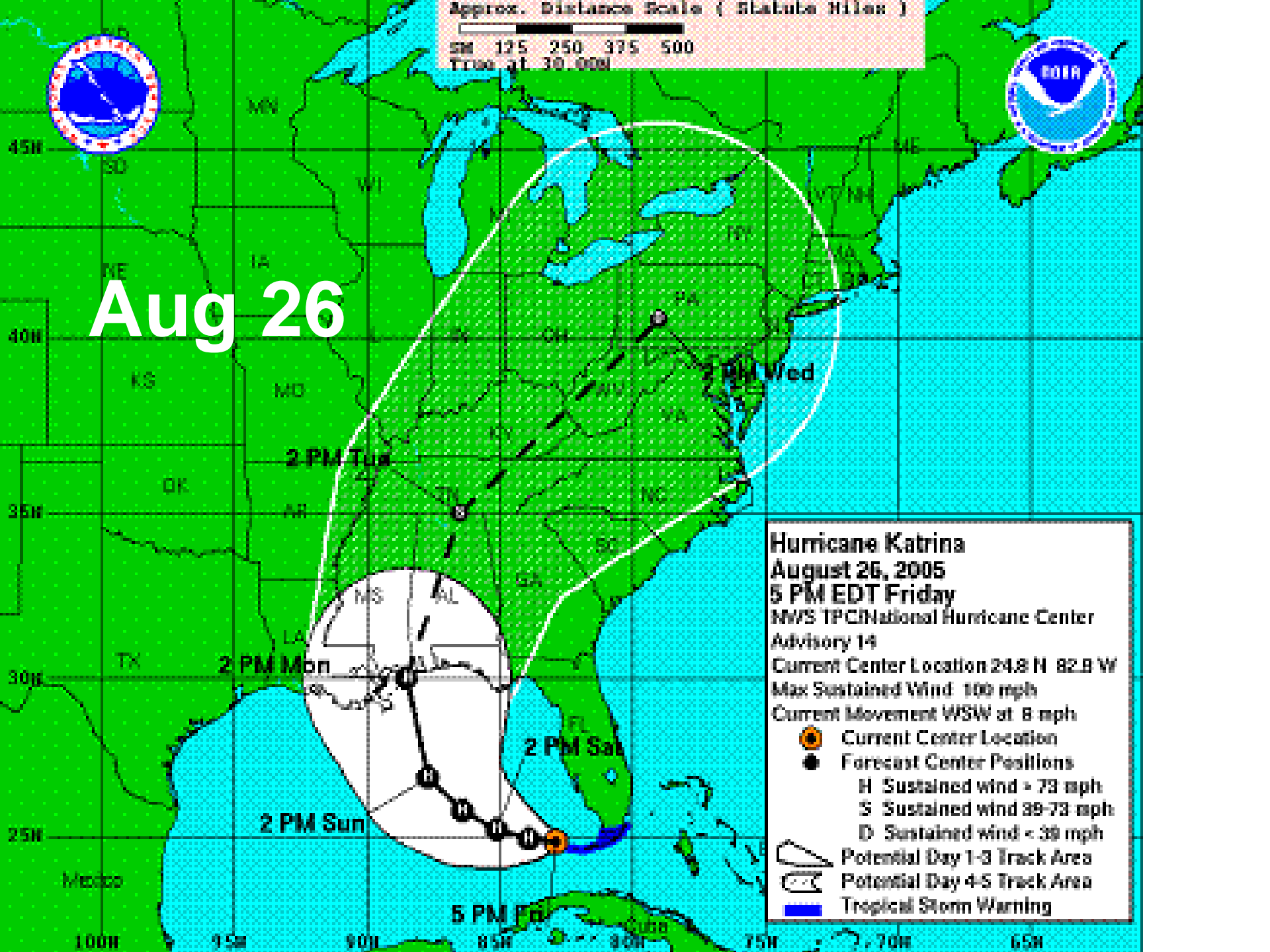
Hurricane intensity is measured by Categories 1-5 based on *wind speed, pressure, storm surge, and damage.*



Approx. Distance Scale (Statute Miles)
 0 125 250 375 500
 True at 30,000'



Aug 26



Hurricane Katrina
August 26, 2005
5 PM EDT Friday
 NWS TPC/National Hurricane Center
 Advisory 14

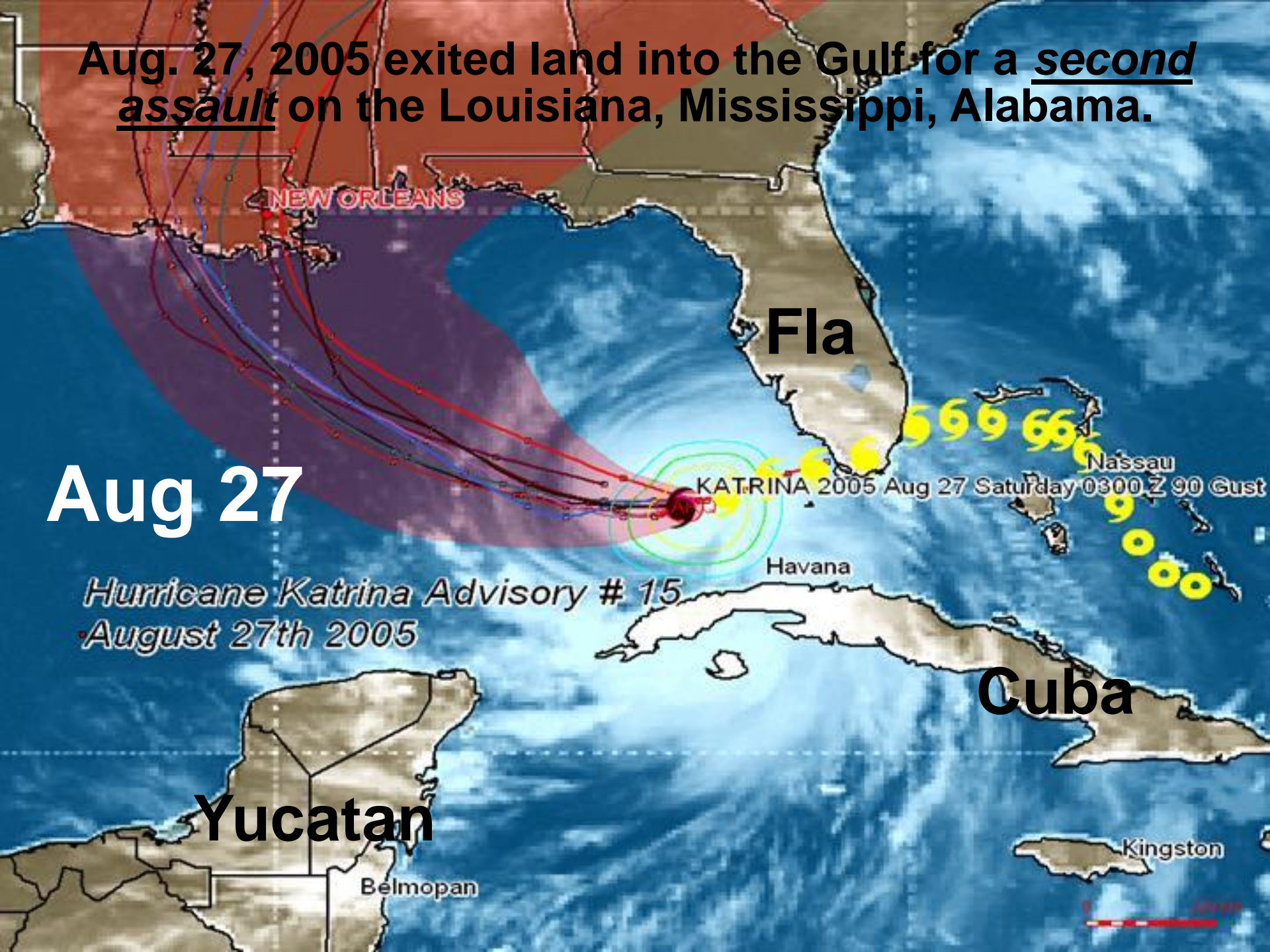
Current Center Location 24.8 N 82.8 W
 Max Sustained Wind 100 mph
 Current Movement WSW at 8 mph

- Current Center Location
- Forecast Center Positions
 - H Sustained wind > 73 mph
 - S Sustained wind 39-73 mph
 - D Sustained wind < 39 mph
- Potential Day 1-3 Track Area
- Potential Day 4-5 Track Area
- Tropical Storm Warning

Aug. 27, 2005 exited land into the Gulf for a second assault on the Louisiana, Mississippi, Alabama.

Aug 27

Hurricane Katrina Advisory # 15
August 27th 2005



Aug 28

28 AUG 2005 2:07pm — 28 AUG 2005 4:04pm

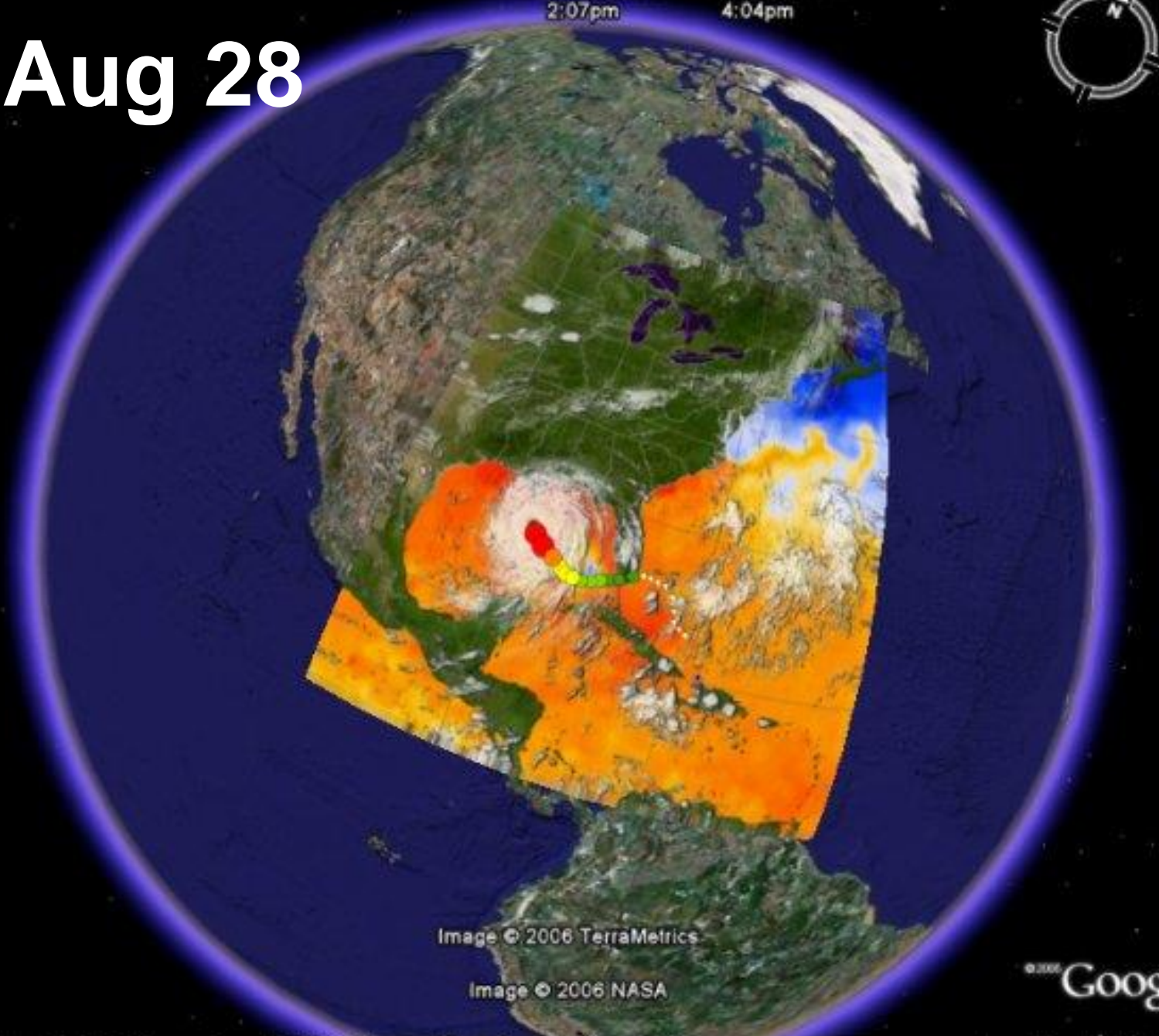


Image © 2006 TerraMetrics

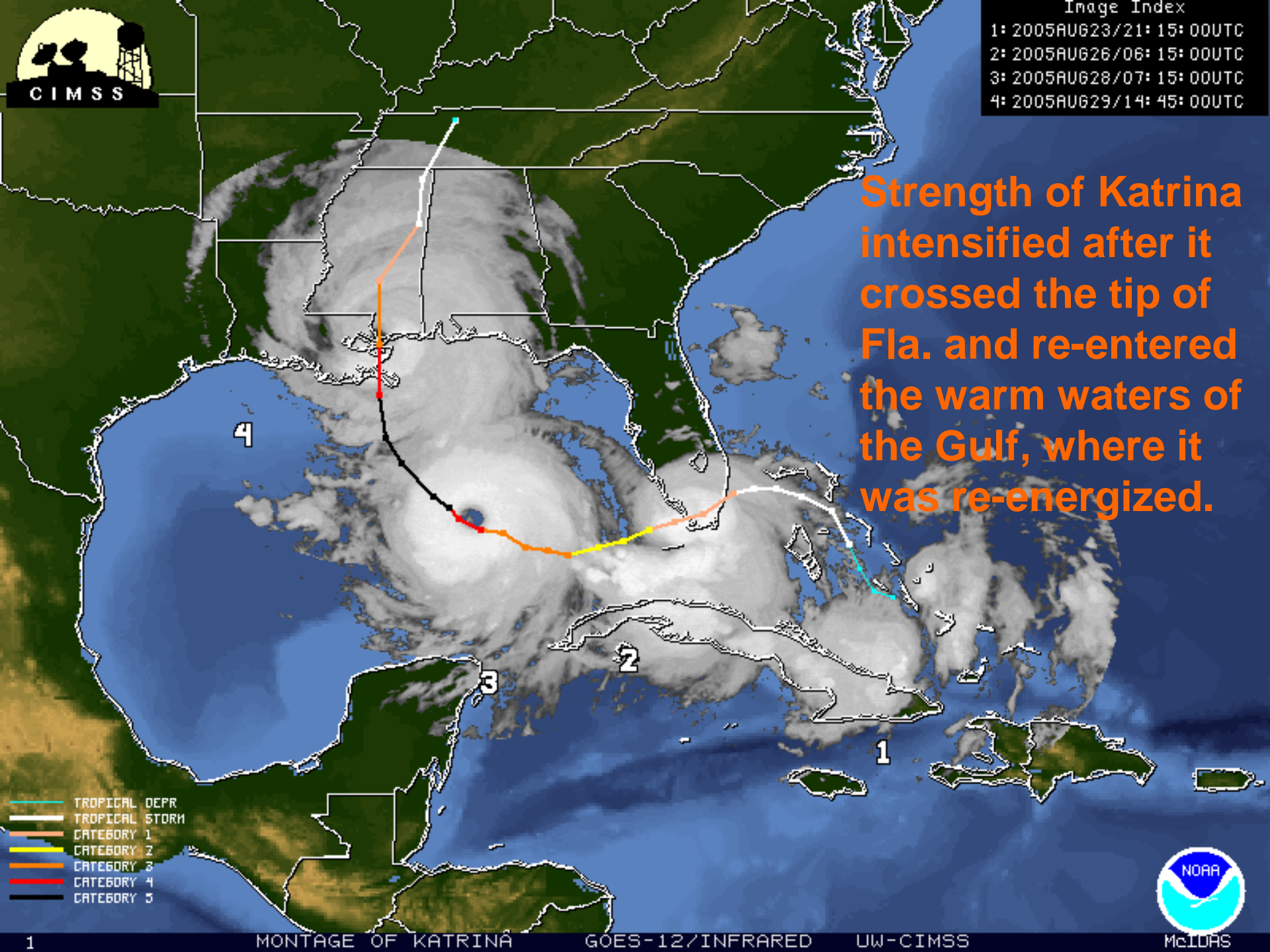
Image © 2006 NASA

© 2006 Google™



Image Index
 1: 2005AUG23/21: 15: 00UTC
 2: 2005AUG26/06: 15: 00UTC
 3: 2005AUG28/07: 15: 00UTC
 4: 2005AUG29/14: 45: 00UTC

Strength of Katrina intensified after it crossed the tip of Fla. and re-entered the warm waters of the Gulf, where it was re-energized.



- TROPICAL DEPR
- TROPICAL STORM
- CATEGORY 1
- CATEGORY 2
- CATEGORY 3
- CATEGORY 4
- CATEGORY 5



A satellite image showing a large tropical storm system over the Gulf of Mexico. The storm has a well-defined eye and a dense, swirling cloud structure. The surrounding area shows scattered clouds and the outlines of the Gulf of Mexico and the United States coastline. A grid of latitude and longitude lines is overlaid on the image. The text 'AUG 28' is prominently displayed in the center-right. A red text box on the left side contains the text 'massive size and wind increase due to warm Gulf waters.' The bottom of the image features a black bar with white text: 'VISIBLE 8 km 8 28 2005 1345Z NOAA HTTP://WWW.GOES.NOAA.GOV'.

AUG 28

**massive size and
wind increase due to
warm Gulf waters.**



The impact of Katrina was wide-spread; dumping huge amounts of rain as far north as Canada days after it made landfall on the Gulf.



Ultimate Chase's Location
During Hurricane Katrina



Gulfport Biloxi

Aug 29

Hurricane Katrina
GOES-12 Infrared
August 29, 2005 @ 0755 to 1640 UTC

Eastern Eyewall Intercept:
Gulfport Beach, Mississippi

August 29-Sept. 1

Landfall at 6.10 a.m. near Buras, LA about 60 miles southeast of New Orleans, Category 4
Maximum winds were estimated at 140 mph.



Image © 2005 EarthSat
© 2005 Sanborn

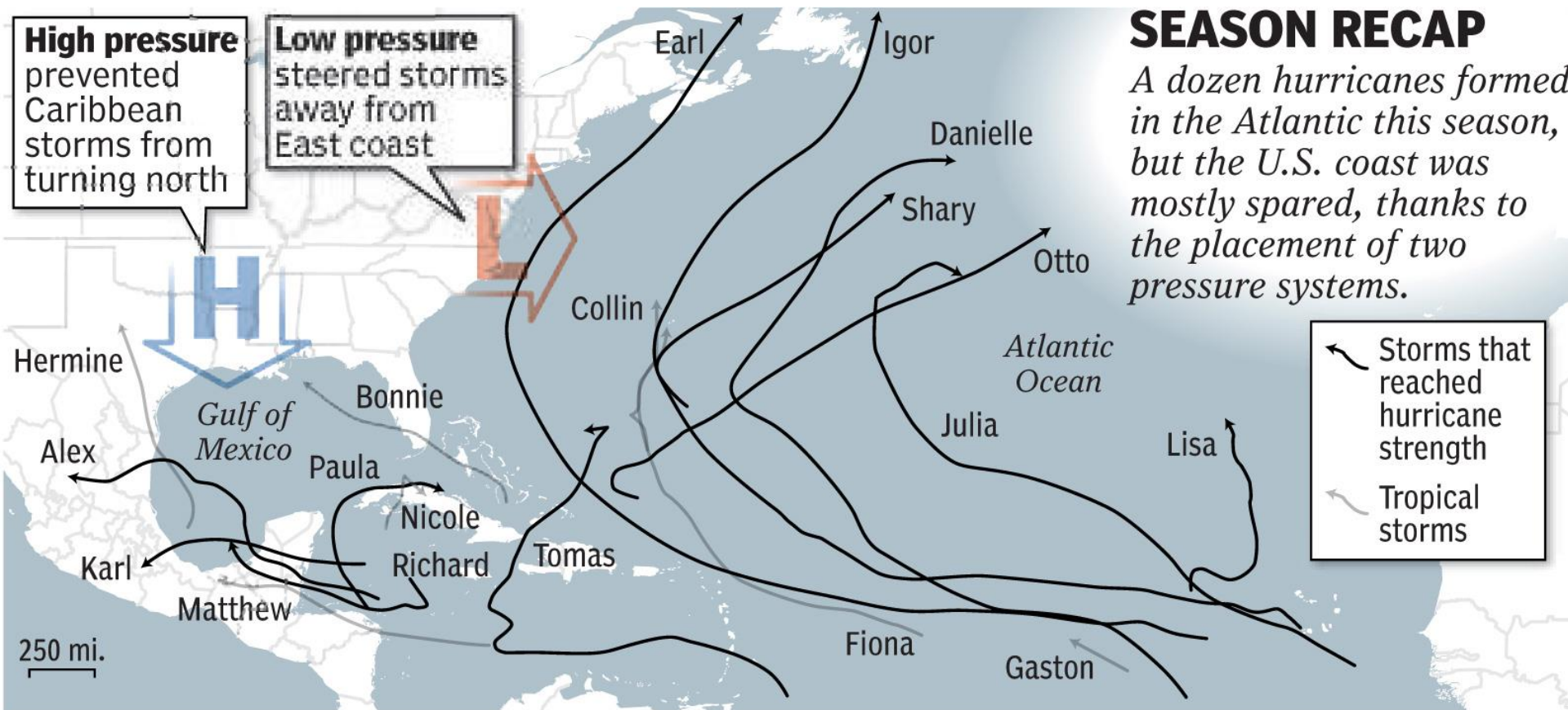
© 2005 Google

Pointer 29°23'30.37" N 89°36'24.00" W

Streaming ||||| 100%

Eye alt 52.79 mi

2010 Hurricane season had 19 named storms but no impact.



2011 Hurricane Irene



SPAGHETTI MODELS

- GFDL
- GFS
- GFDL
- HWRF
- TVCN
- GUNA
- CMC
- BAMM

6"-10" rain on areas already saturated; slow moving, so rain intensity compounds

Preparing for the Worst

Areas that could experience flooding should a hurricane make landfall close to New York City. The city uses the information to determine hurricane evacuation zones.

-  Any hurricane
-  Moderate (Category 2 or higher)
-  Major (Category 3 or higher)



Source: New York City Office of Emergency Management

NYC
boroughs,
8 million
population

Flooding is caused by a massive surge or backwash of water thrust by the wind (compounded by high tides at 3am).



Storm Surge and Low-lying Evacuation Areas



Hierarchical evacuation designations.

Flooding threats to Manhattan were triggered by fears of storm surge at high tide to low-lying areas from multiple directions.



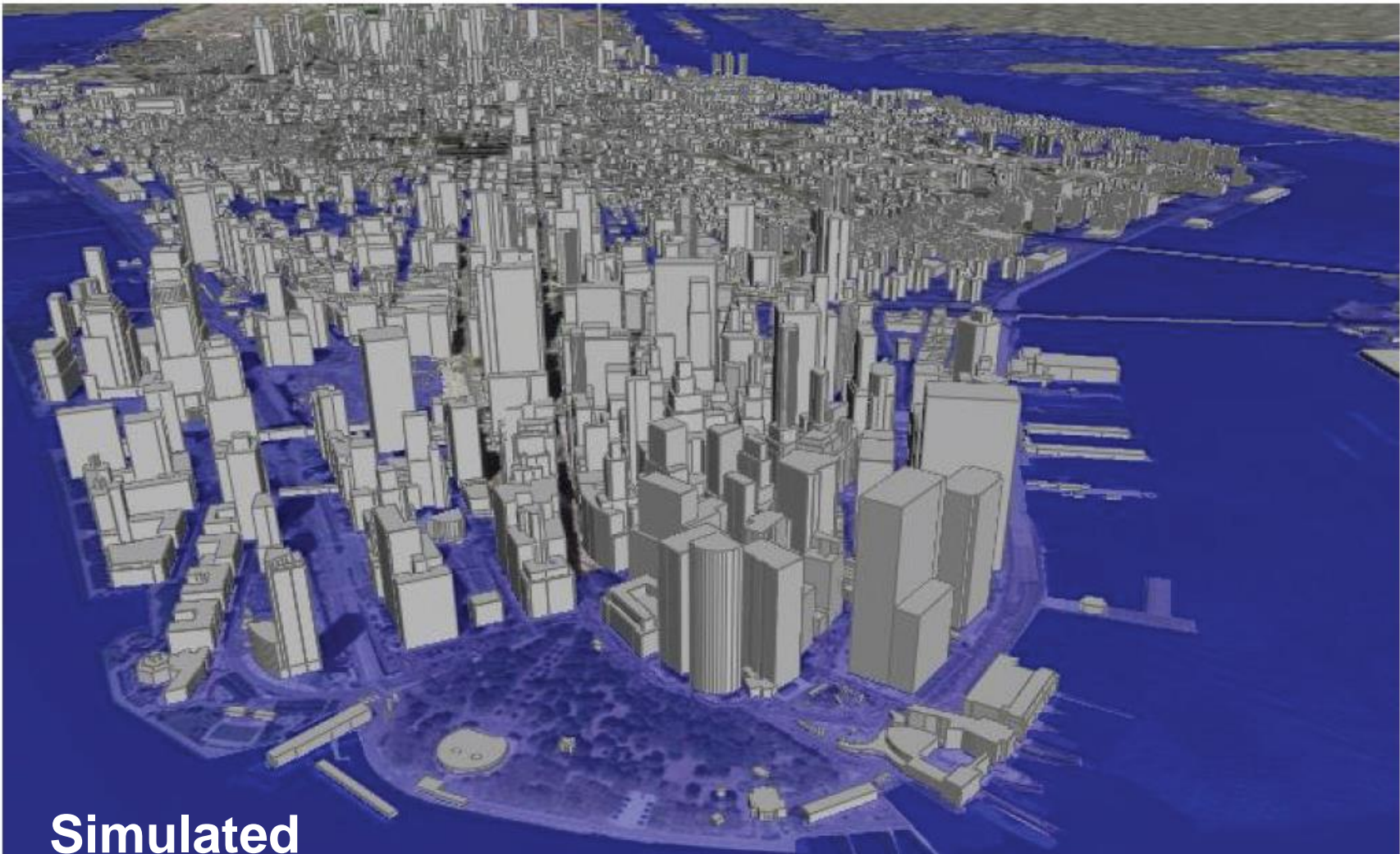
Disaster scenarios for NYC that portray the impact of rising sea levels due to melting polar ice are a popular theme on History Channel.



Image © 2007 New York City
Image © 2007 DigitalGlobe
Image © 2007 TerraMetrics
Image © 2007 SanGeronimo
Map data © 2007 Google

Google

Direct hit on New York City by a Category 3 hurricane at high tide



**Simulated
impact**

Image MassGIS, Commonwealth of Massachusetts EOE
© 2005 Sanborn
Image © 2005 Sanborn
Image © 2005 DigitalGlobe

© 2005 Google

Pointer 40°42'19.92" N 74°00'40.28" W

Streaming ||||| 100%

Eye alt 2197 ft

Hypothetical flooding scenarios to lower Manhattan.



NYC: Today's 100-Year Flood Could Occur Every 10 Years under the Higher-Emissions Scenario

Who pays for cleanup and recovery?

Typically natural disasters are declared federal disaster areas by the president so residents can be eligible for federal relief appropriated by Congress and paid by taxpayers nationwide.

However, under current attitudes towards excessive government spending and desire for a balanced budget amendment, such funds are questionable.

DisasterAssistance.gov
ACCESS TO DISASTER HELP AND RESOURCES



2012 Hurricane Sandy

<http://www.youtube.com/watch?v=J3kHMYxM888>

2 minute video showing *turn into open water and then blowing back onto land with greater force as it merged with another storm.*

H. Sandy is the largest Atlantic hurricane on record (as measured by diameter, with winds spanning 1,100 miles. Preliminary estimates assess damage at nearly \$75 billion (2012 USD), which would make it the second-costliest Atlantic hurricane, behind only Hurricane Katrina.

At least 288 people were killed along the path of the storm in seven countries. The severe and widespread damage the storm caused in the United States, as well as its unusual merge with a frontal system, led the media and several government agencies to nickname the hurricane "Superstorm Sandy". Much of the damage was caused by storm surge, intensified by rising sea levels due to melting polar ice.



Electrical outages before & after H. Sandy

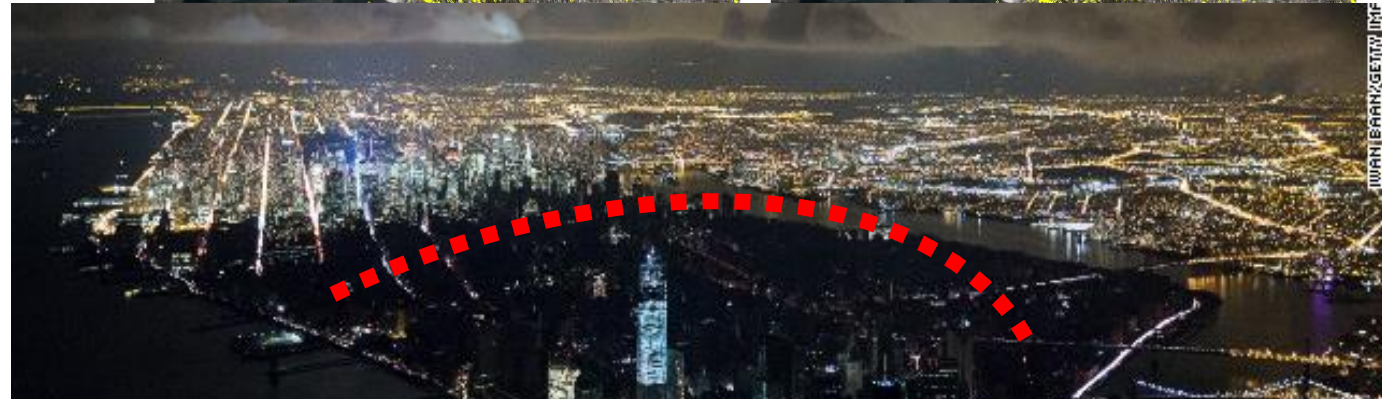
NYC transportation was closed and many areas evacuated. Power loss caused near-complete darkness over the city south of 42nd St.

foursquare

PRE-SANDY CHECK-INS SATURDAY, 10/27



POST-SANDY CHECK-INS WEDNESDAY, 10/31



IWAN BAAN/GENTRY IMF



November 1: An aerial view of New York reveals a wide-spread power outage after Superstorm Sandy. Photographer Iwan Baan credits his camera for allowing him to capture the memorable image from a helicopter at night.

Did Global Warming Contribute to Hurricane Sandy's Devastation?

By JUSTIN GILLIS



NASA

Sandy, a massive hybrid of a once-tropical storm and a mid-latitude storm, moved inland Tuesday.



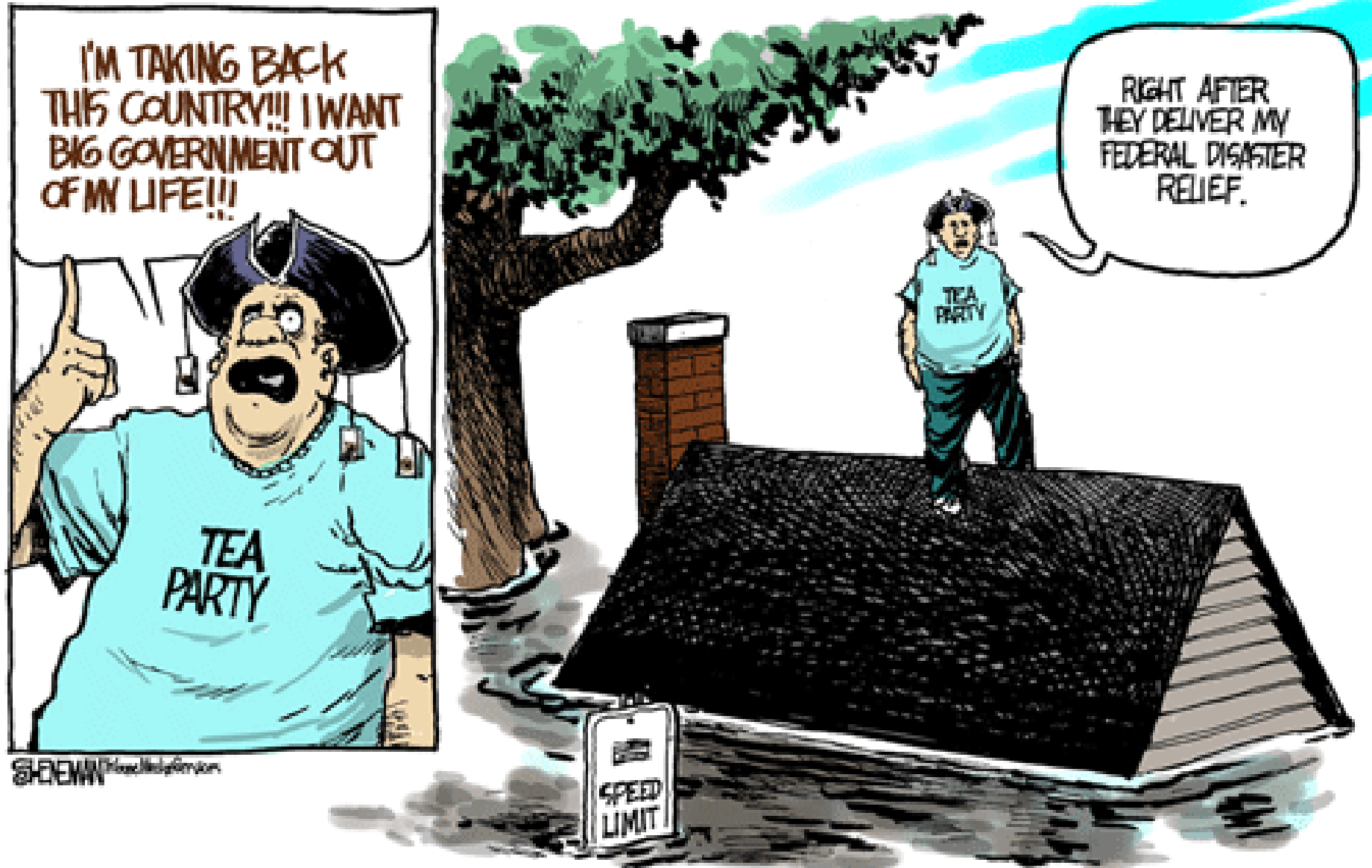
Science

Was the bizarre storm called Sandy a product, in whole or in part, of human-induced [climate change](#)?

That may not be a top-of-mind issue for the millions of people who will spend coming weeks recovering from the damage. But it is an important scientific question, one whose answers

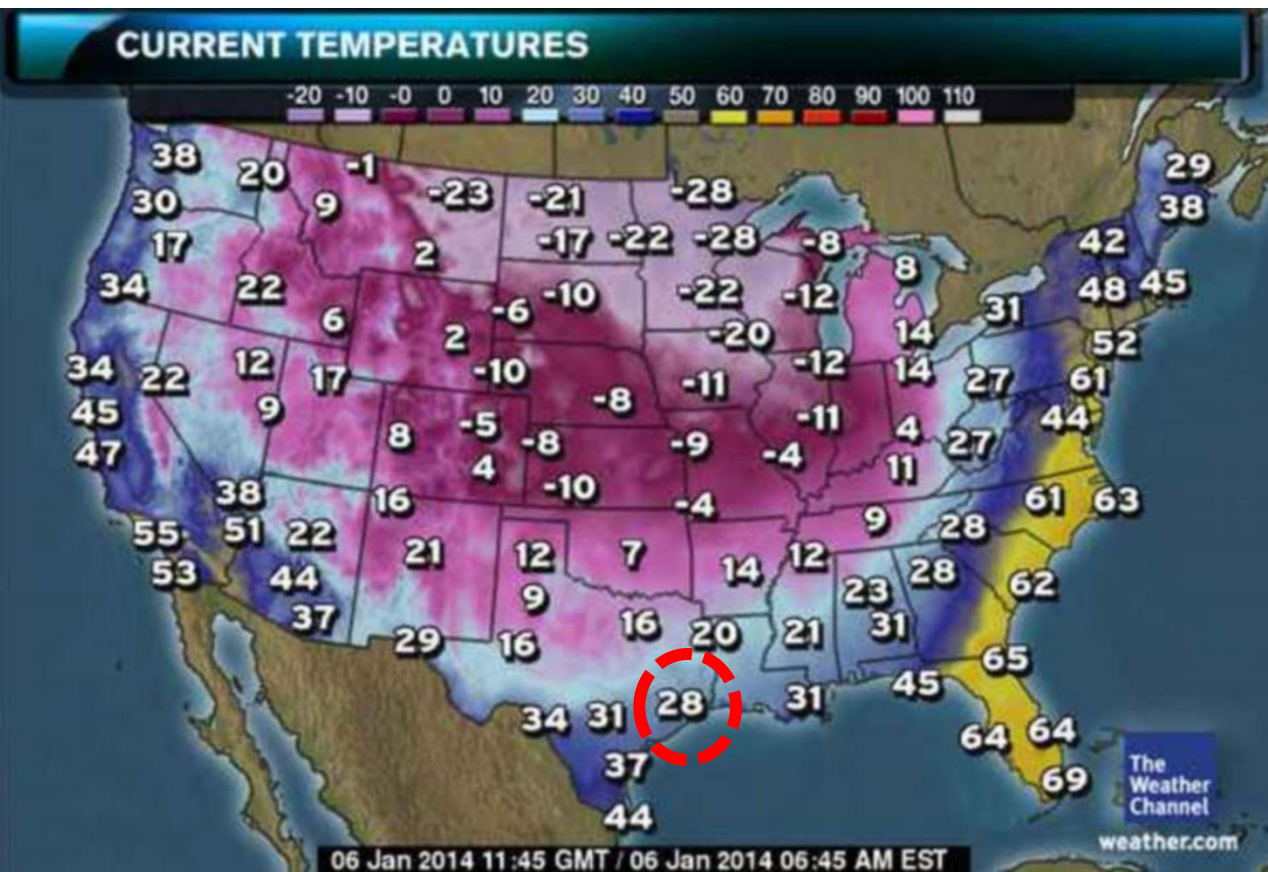
Most scientists offered Hurricane Sandy as unequivocal proof that manmade climate change is real because of the severity of damage to areas that had never before had such.

Tea Party activists are notorious for hypocrisy, claiming to reject the need for “big government”, but also wanting the personal benefits without paying the taxes.



January 2014 Polar vortex and freak winter storms. Who pays for snow removal and to clean up the mess?

2 minute video: <http://www.nbcnews.com/id/3032619/#54016259>



Dec 5 2010 8:00PM Eduardo Verdugo / AP

Members of the group World Wildlife Fund stand around candles that form the shape of the earth to protest the

United Nations Climate Change Conference in Cancun, Mexico. According to the UN weather agency, **2010 is almost certain to rank among the three hottest years on record, and the 2001-2010 decade is undoubtedly the warmest period since the beginning of weather records in 1850.**



ipcc

INTERGOVERNMENTAL PANEL ON climate change



Annual Conference in different countries



2011

COP17/CMP7
UNITED NATIONS
CLIMATE CHANGE CONFERENCE 2011
DURBAN, SOUTH AFRICA

IPCC – Intergovernmental Panel on Climate Change

Adopt mutual policies for
energy conservation and
reduction for members



The next week, 150 world leaders assembled in Paris for the annual climate change conference.

30 November - 11 December 2015



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11



**Pres. Hollande,
France**



United Nations
Framework Convention on
Climate Change

30 November - 11 December 2015

Hollande, activists gear up for climate talks

Environmentalists seek ambitious global pact on emissions

By Thomas Adamson
ASSOCIATED PRESS

PARIS — French President Francois Hollande met with environmental groups Saturday, pushing for an ambitious global deal to reduce man-made emissions blamed for global warming — with emphasis on helping developing countries adapt to a changing world.

The talks in the Elysee Palace came as President Barack Obama and the leaders of China, Russia and more than 140 other nations prepare to converge on Paris for two weeks of high-stakes talks.

Leaders and climate negotiators from 196 countries meeting at the U.N. talks Nov. 30-Dec. 11 will try to hash out the broadest, most lasting deal to date to slow global warming.

Almost a thousand barred

Saturday's meeting and the talks are taking place under ex-



Thibault Carnus / Associated Press

Greenpeace anchored a hot air balloon next to the Eiffel Tower on Saturday in support of global talks in coming weeks that activists hope will result in an ambitious deal to reduce man-made emissions blamed for global warming.

Figueres, speaking at a joint news conference, evoked a moral, economic and technological imperative "to act now on climate change."

"On the 11(th) of December (when the conference closes) I want to be able to pronounce six simple words that will be the outcome of unprecedented efforts," Fabius said. "The Paris agreement has been approved."

State of emergency

The last global climate treaty, the 1997 Kyoto Protocol, required only rich countries to lower emissions and the U.S., the world's biggest emitter, didn't take part.

The changing of the guard for the climate conference means that U.N. security now takes over the watch inside the vast conference site outside Paris, while 2,800 French forces guard surrounding zones during the two-week conference.

The talks are happening with France in a state of emergency and thousands of troops and police fanned out to ensure security after the Paris attacks.

A big march by environmental

WORLD

New global pact on climate change urged

'Future of the planet' at stake as leaders try to hash out plan

By Coral Davenport and Gardiner Harris
NEW YORK TIMES

LE BOURGET, France — The largest gathering of world leaders in history on Monday began a multinational effort toward forging what many called the planet's last, best hope to stave off the worst consequences of climate change.

"Never have the stakes of an international meeting been so high, since what is at stake is the future of the planet, the future of life," President François Hollande of France told a packed United Nations plenary session at a convention center in this suburb north of Paris.

Urgency and optimism



Evan Vucel / Associated Press

The climate talks in Le Bourget, France, began Monday with numerous world leaders in attendance, including President Barack Obama and Chinese President Xi Jinping. After striking a deal last year to jointly reduce emissions, they are asking other leaders to take similar steps.

prelude to the global conference.

Still, huge hurdles remain ahead of striking a deal, which must be agreed to unanimously by the nearly 200 countries in order to be legally binding.

The greatest threat to reaching a binding climate accord may be a loose coalition of developing nations, led by India, who argue that they should not be asked to limit their economic growth as a way of fixing a problem that was largely created by the others. Obama conceded that point.

'Not of our making'

With India the world's third-largest greenhouse gas polluter, Obama has invested heavily in his relationship with Modi in hopes of securing his cooperation for a deal here.

Modi said that poor nations had the right to burn carbon to grow their economies.

"Climate change is not of our

Obama and President Xi of China agree on climate change compromises at the annual UN Paris conference.

Business as well as for AIO | Wednesday, December 2, 2015 | Houston Chronicle | HoustonChronicle.com and chron.com ★★

WORLD

Obama: Climate change talks a U.S. obligation

President says 'this one trend' affects all others

By Gardiner Harris
NEW YORK TIMES

PARIS — President Barack Obama said Tuesday that the United States was obligated to undertake climate talks in the midst of a war in Syria "because this one trend, climate change, affects all trends."

Speaking at a news conference in Paris, where he was attending the climate talks, Obama said that much of the United States' spending on the military and other matters would have to be devoted to dealing with rising sea levels

a low-carbon global economy; it must be transparent; and it will require periodic reviews of whether emissions targets need to be adjusted.

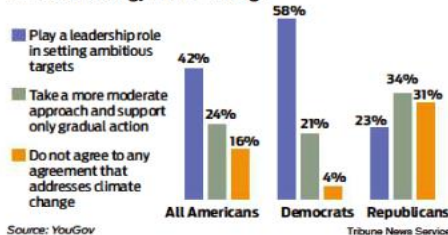
Concerns about current pledges to reduce growth in carbon emissions not being sufficient to prevent catastrophic change are misplaced, Obama said, because a new agreement would create the architecture and consensus needed to continue ratcheting up those targets.

'A massive problem'

Obama's comments echoed the findings of a Pentagon report released last year that said climate change posed an immediate threat to national security. The report identified

What should America do?

Countries from around the world, including the United States, are meeting in France to discuss how they can work together to reduce emissions of gases that cause climate change. Which of the following do you think should be the American strategy in this meeting?



Source: YouGov

problem. It's a problem that by definition is just about the hardest thing for any political system to absorb" because the effects are gradual and dif-

Referring to the Islamic State, Obama also said that, despite repeated meetings with President Vladimir Putin of Russia, "I don't think you should

Video of the president's speech at the climate summit is at HoustonChronicle.com/Obamacimate

change anytime soon. He added that weeks of Russian airstrikes in the region had not led to substantial changes in the Syrian conflict, and he said that at some point Putin would recognize that he did not want to be involved in another quagmire, Obama said.

Undercut by House

But hours after Obama pledged in Paris that the U.S. would be in the vanguard of nations seeking a global response to climate change, Congress approved two measures aimed at undercutting him.

In a provocative mes-

existing and future coal-fired power plants.

The House votes — by 242-180 and 235-188, mostly along party lines — expanded to a global level the already profound gulf between Obama and the Republican-controlled Congress on domestic issues. Obama has said he will veto the measures.

Obama seemed untroubled Tuesday by the idea that a Republican successor might overturn anything he accomplishes in Paris.

"Let me first of all say, I'm anticipating a Democrat succeeding me," he said, drawing laughter, adding that any president

Beijing air quality readings go beyond pollution scale

Dangerous levels reached despite 'war' on smog

LOS ANGELES TIMES

BEIJING — In the space of an afternoon, Beijing vanished.

For days, the city was crisp and clear. Wind whipped down its ancient alleys and sprawling, 12-lane thoroughfares; an electric blue sky reflected in the glass walls of its postmodern office buildings. But by evening, all was gone, engulfed in a gauzy-white miasma. Buildings rose into hazy oblivion, and the sun became a dull yellow orb, like a flashlight shining from under a blanket.

That was Friday, when levels of PM_{2.5} — particularly noxious particulate matter, small enough to enter the bloodstream through the lungs — reached 429 micrograms per cubic meter, 17 times the World Health Organization's recommended limit. By Monday, schools were closed; drivers were using their headlights at noon.



Kevin Frayer / Getty Images
Smog obscures the Great Hall of the People in Tiananmen Square on Tuesday in Beijing. A strong wind clears the record-breaking pollution, bringing visibility back to normal the next day.

haze.

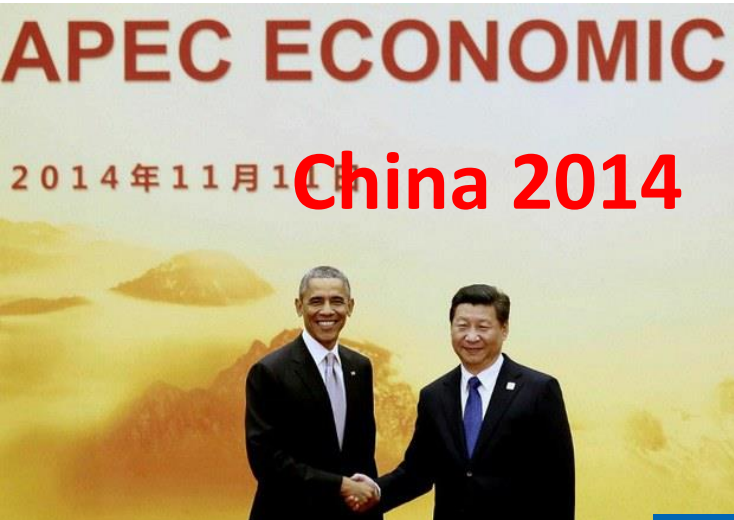
On Sunday, President Xi Jinping traveled to the international climate change conference in Paris. In advance of his arrival, China's environment minister, Chen Lin, —

ly suspending some factories and ordering schools to keep children indoors.

For years, the government blocked reporting on the smog, until a similar stretch of record-breaking pollution in 2013 —



Obama had made previous advances with China in 2014 to some limits on their CO2 emissions that will lessen their impact on climate change.



Beijing pollution

GAME CHANGER THE US-CHINA DEAL



40%
The US and China together account for about 40% of global carbon emissions



2025
The US has promised to cut emissions by 26%-28% from 2005 levels by 2025



20%
of China's energy production will be in renewables by 2030*

*by which time China has promised that its emissions will peak (if not sooner)

NATION | WORLD

India smog cutting 660 million lives short

By Katy Daigle
ASSOCIATED PRESS

NEW DELHI — India's filthy air is cutting 660 million lives short by about three years, according to research published Saturday that underlines the hidden costs of the country's heavy reliance on fossil

fuels to power its economic growth with little regard for the environment.

While New Delhi last year earned the dubious title of being the world's most polluted city, India's air pollution problem is extensive, with 13 Indian cities now on the World Health Organization's list

of the 20 most polluted.

That nationwide pollution burden is estimated to be costing more than half of India's population at least 3.2 years of their lives, according to the study led by Michael Greenstone of the University of Chicago and involving environmental economists from Harvard

and Yale universities. It was published in *Economic & Political Weekly*.

It estimates that 99.5 percent of India's 1.2 billion people are breathing in pollution levels above what the WHO deems as safe.

"The extent of the problem is actually much larger than what we normally

understand," said one of the study's co-authors, Anant Sudarshan, the India director of the Energy Policy Institute of Chicago. "We think of it as an urban problem, but the rural dimension has been ignored."

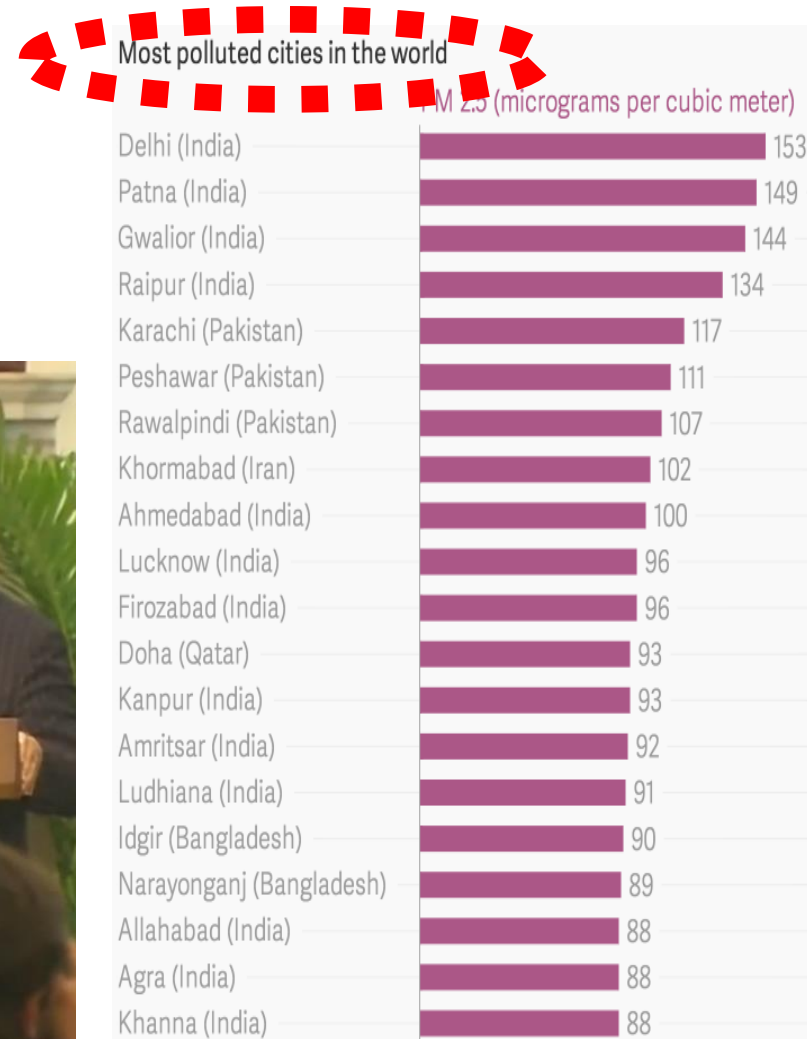
Added up, those lost years come to a staggering

2.1 billion for the entire nation, the study says.

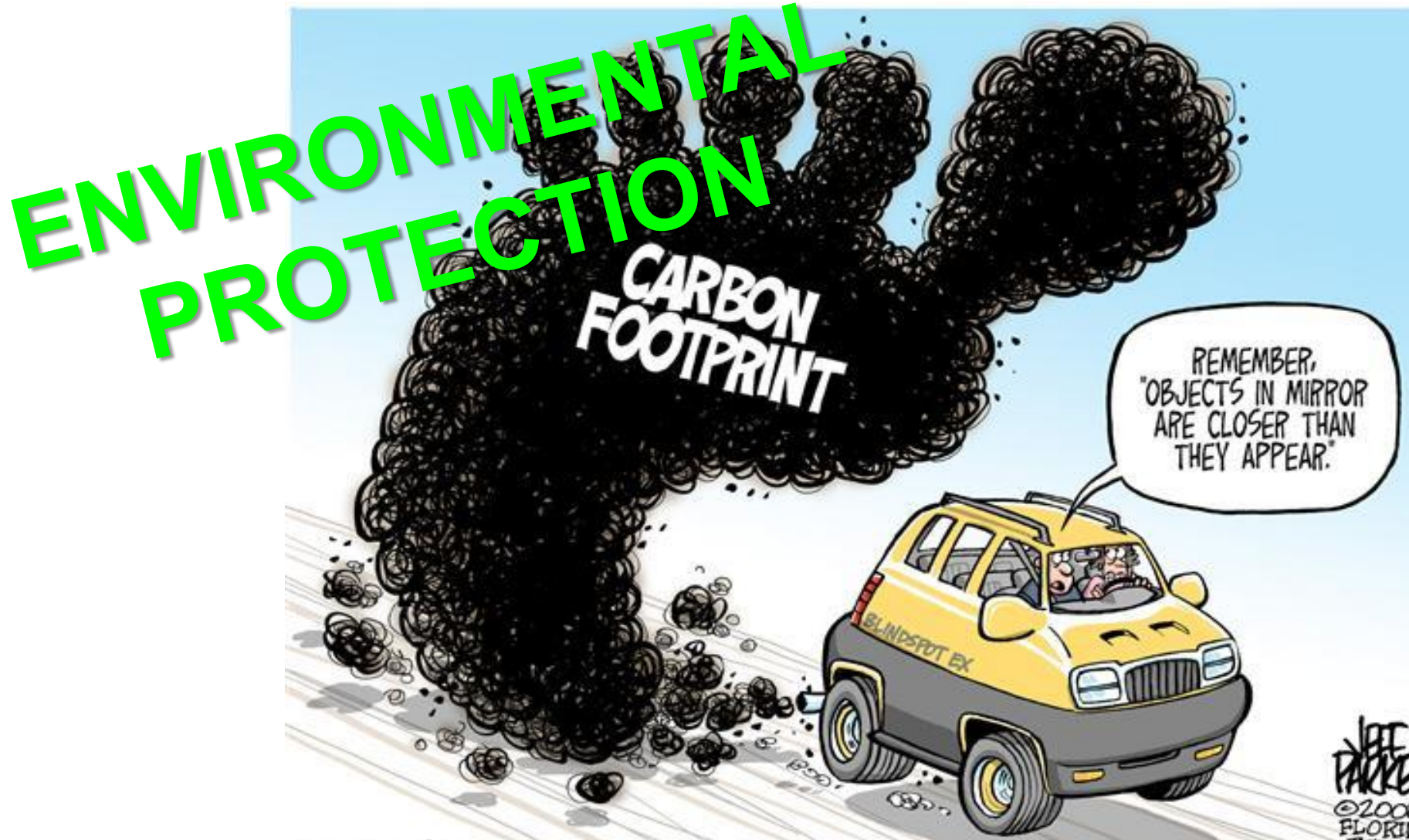
While "the conventional definition of growth has ignored the health consequences of air pollution, this study demonstrates that air pollution retards growth by causing people to die prematurely," Greenstone said in a statement.

January 2015, Obama visits India to talk about climate change. India has 13 of the world's most polluted cities.

<http://www.nbcnews.com/nightly-news/obama-indian-pm-seize-personal-bond-n293276>



The creation of CO2 and its impact on earth is known as the 'carbon footprint', which is the cause of global warming, climate change, and freak weather.



Despite annual conferences to address global issues, there has yet to be meaningful commitment for change by any of the world leaders.

© 2009
HORSEY
REACT
SCHAFFNER
SCIENCE MEDIA SERVICE



IT'S SETTLED...
WE AGREE TO SIGN
A PLEDGE TO HOLD
ANOTHER MEETING
TO CONSIDER CHANGING
COURSE AT A DATE
YET TO BE DETERMINED.



Melting of Arctic sea ice is especially intensified from 2005 to 2007, and again in 2012.

Ice sheets melting at poles faster than before

by SETH BORENSTEIN Updated 11/29/2012

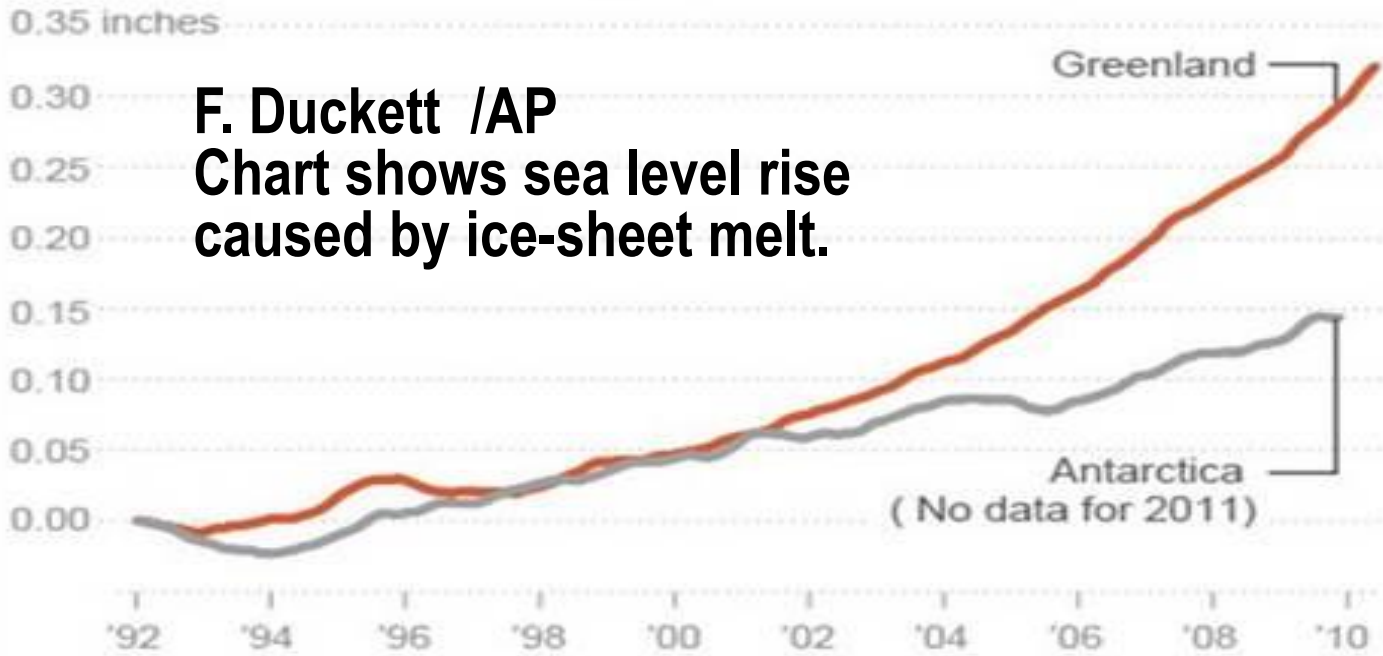
WASHINGTON — Fueled by global warming, polar ice sheets in Greenland and Antarctica are now melting three times faster than they did in the 1990s, a new scientific study says.

So far, that's only added about half an inch to rising sea levels, not as bad as some earlier worst case scenarios. But the melting's quicker pace, especially in Greenland, has ice scientists worried.

Ice melt contributes to sea level rise

Greenland and Antarctica ice sheets are melting at an accelerating pace causing seas globally to rise.

Ice sheet contribution to global sea levels



F. Duckett /AP
Chart shows sea level rise caused by ice-sheet melt.

The severity of Hurricane Sandy in 2012 significantly re-focused the attention of everyone on climate change and the vulnerability of coastal cities on rising sea levels.



MASSIVE ICE MELT

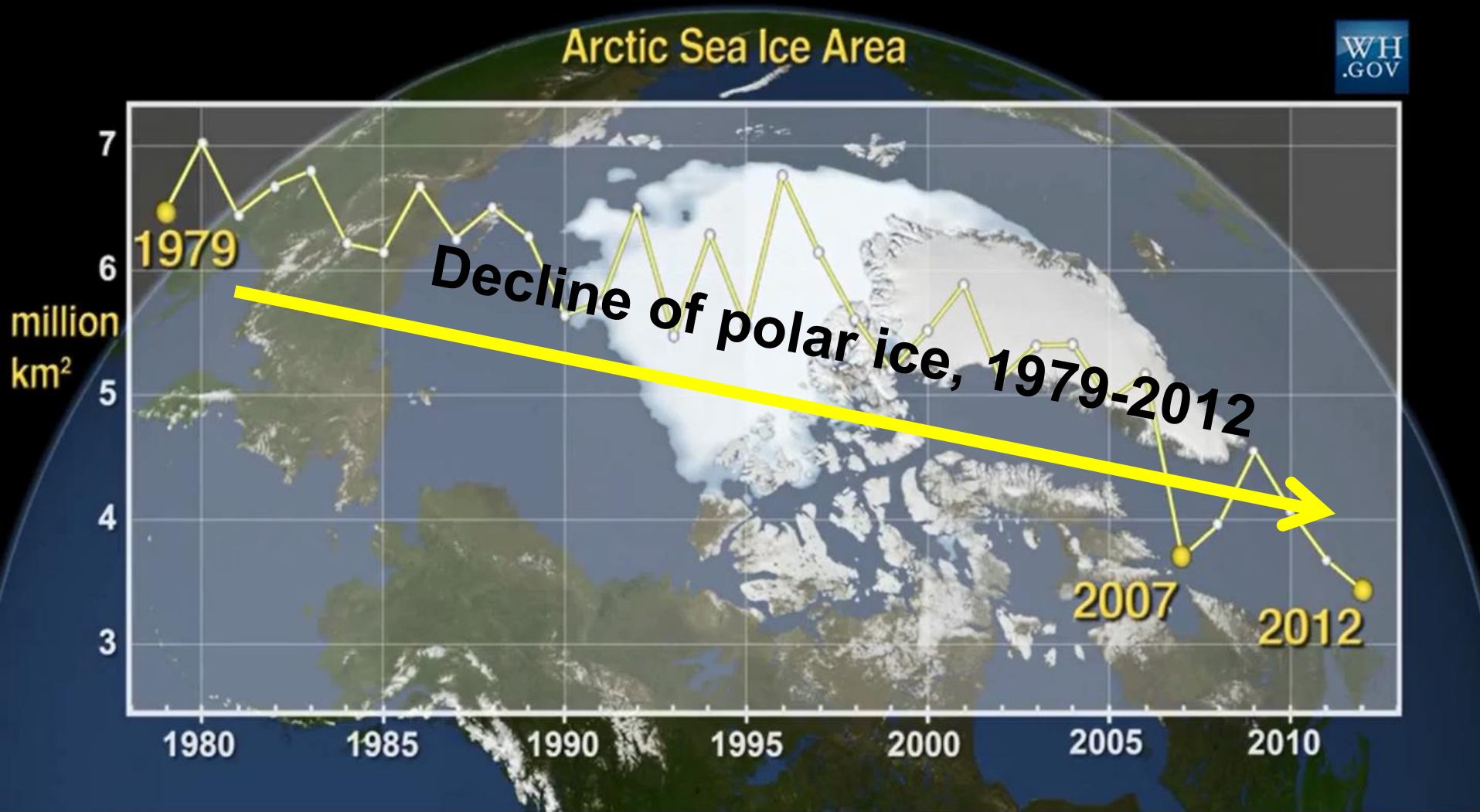
in Greenland within 1 week,
July 12, 2012

Measurements from three satellites showed that on July 8, about 40 percent of the ice sheet had undergone thawing at or near the surface. In just a few days, the melting had dramatically accelerated and an estimated 97 percent of the ice sheet surface had thawed by July 12.

In the image, the areas classified as “probable melt” (light pink) correspond to those sites where at least one satellite detected surface melting. The areas classified as “melt” (dark pink) correspond to sites where two or three satellites detected surface melting. Nearly every part of the massive Greenland ice sheet suddenly and strangely melted a bit this month in a freak event that concerned scientists had never witnessed before. NASA says three different satellites saw what it calls unprecedented melting from July 8 to July 12. Most of the thick ice remains, but what was unusual was the widespread area where some melting occurred.

The volume of polar ice has been declining significantly since 1979.

2 minute video: <http://www.nbcnews.com/id/3032619/#54016372>



POLLUTION

EPA says **Texas No. 1** in heat-trapping gases

By Matthew Tresaugue
HOUSTON CHRONICLE

As the nation's light switch and gas pump, Texas releases far more greenhouse gases into the air than any other state, according to federal data released Wednesday.

Texas' coal-fired power plants and oil refineries generated 294 million tons of carbon dioxide and other heat-trapping gases in 2010, more than the next two states — Pennsylvania and Florida — combined, the data shows.

The Environmental Protection Agency released the data by industrial facility for the first time as part of a broader effort to reduce emissions linked to global warming.

The agency collected data from more than 6,700 industrial facilities that release at least 25,000 tons of greenhouse gases into the air a year. The threshold is comparable to the emissions from burning 131 railcars of coal, the EPA said.

While industry-heavy Texas' ranking did not surprise, environmental groups said data

Gases continues on A9

Greenhouse gas emission sources

Reported sources of greenhouse gas emissions in Texas, by industry sector in 2010:

	Total reported emissions, in kilometric tons of carbon dioxide equivalent
Power plants	237,185
Refineries	56,848
Chemicals	49,015
Other industrial	18,983
Landfills	11,995
Minerals	9,930
Metals	1,935
Pulp and paper	715
Government and commercial	326

Note: Data does not reflect total greenhouse gas emissions; only facilities that emit at least 25,000 metric tons per year are included

Source: U.S. Environmental Protection Agency
Chronicle

Chron.com

► **Check your area:** Use an interactive map to see where 150 greenhouse gas-producing plants are located in Houston and surrounding counties. chron.com/greenhouse

Texas is NOT an environmentally friendly state because it ranks #1 in release of greenhouse gas emissions that cause climate change.

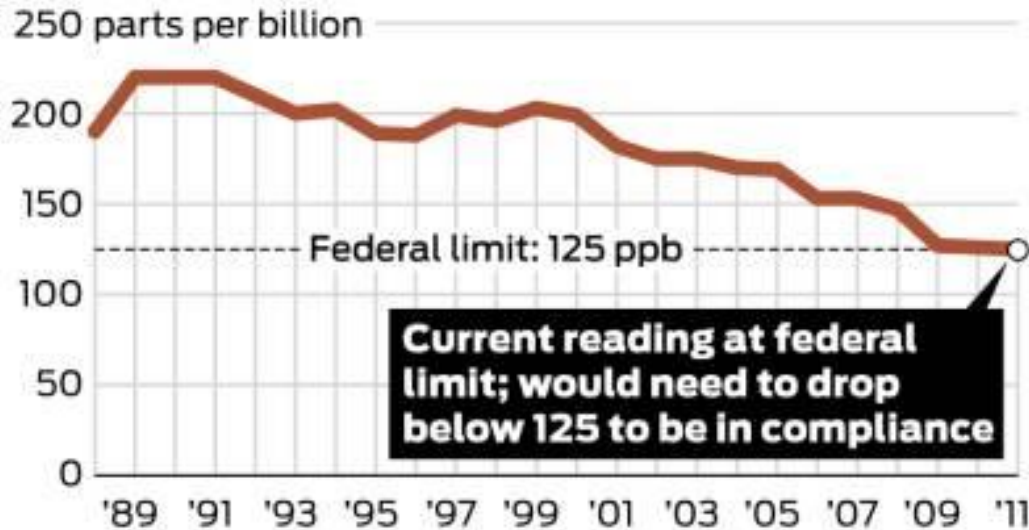
USA has state and federal environmental protection regulations, but many countries do not, so the Earth is threatened on many fronts with actions that intensify global warming.

Houston faces penalties for failure to meet 1970s smog limits after 30 years because of ineffective management of state government.

Ozone trends

Despite improvements in air quality, the eight-county Houston region has failed to meet federal smog standards set in 1979.

One-hour ozone concentration, 1988-2011:



Note: One-hour measurements show spikes in smog-forming pollution, such as from upset events – accidental releases that occur during plant startups and shutdowns, equipment malfunctions and other unforeseen events.

Source: U.S. Environmental Protection Agency

Houston Chronicle

February 1, 2012

The EPA (US Environmental Protection Agency) concluded that Houston has failed to meet 30-year-old limits on smog-forming pollution, a decision that could lead to hefty fines for as many as 300 oil refineries, chemical plants and other large industrial facilities.

10 Worst Smog Cities in America

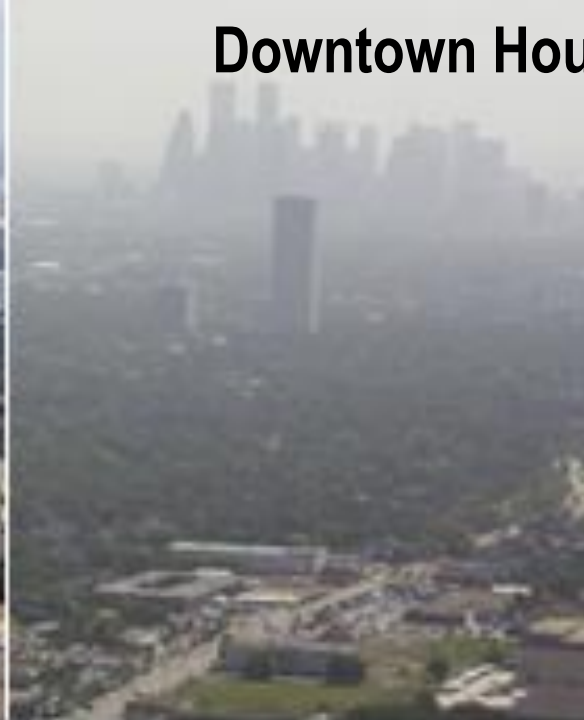
No. 7: Houston, Texas

Houston is known as the Energy Capital of the World -- and all that energy hasn't helped its air quality. Ozone days have climbed as shale gas drilling has boomed and refineries and plants have expanded. The EPA now has stronger rules on new oil and gas drilling and processing that may help keep the air cleaner in the future.

However, tailpipe emissions and freeway congestion contribute as much as industry.



Downtown Houston on a polluted day.



Ozone is the most common form of air pollution and *Houston Clean Air Network* website provides daily measurements of the severity of the condition.



Air Quality Index Values (ozone parts per billion)	Levels of Health Concern
>135	Hazardous
116-135	Very Unhealthy
96-115	Unhealthy
77-95	Warning
61-76	Moderate
0-60	Good

Local & national environmental groups fight for saving the planet: Houston chapters of world organizations.

visions for a greener houston



2012

CITIZENS' ENVIRONMENTAL COALITION



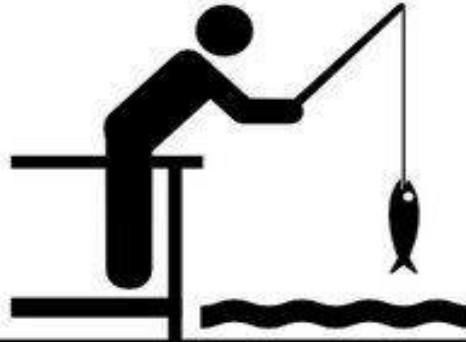
MY job is to teach you “stuff”, but also how to **THINK**
and to become empowered to control your own life!

IF YOU
GIVE SOME-
ONE A FISH,



**THEY EAT
FOR A DAY.**

IF YOU
TEACH SOME-
ONE TO FISH,



**THEY CAN FEED THEM-
SELVES UNTIL THE
WATER IS CONTAMINATED
OR THE SHORELINE IS
SEIZED FOR DEVELOPMENT.**

IF YOU TEACH
SOMEONE TO
THINK CRITICALLY
AND BE POLITICALLY
CONSCIOUS,



**THEN WHATEVER THE
CHALLENGE, THEY CAN
ORGANIZE WITH THEIR
PEERS AND STAND UP
FOR THEIR INTERESTS.**



The End