

Storm Data

Dataset Discovery Day

Stuart Hinson

Meteorologist

National Climatic Data Center – Asheville, NC

Climate Services Division



1

NOAA's National Climatic Data Center

NCDC – Dataset Discovery Day
Asheville, NC November 2012



National Climatic Data Center

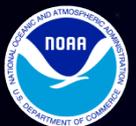
- **Mission:**

NCDC's mission is to manage the Nation's resource of global climatological in-situ and remotely sensed data and information to promote global environmental stewardship; to describe, monitor and assess the climate; and to support efforts to predict changes in the Earth's environment. This effort requires the acquisition, quality control, processing, summarization, dissemination, and preservation of a vast array of climatological data generated by the national and international meteorological services.



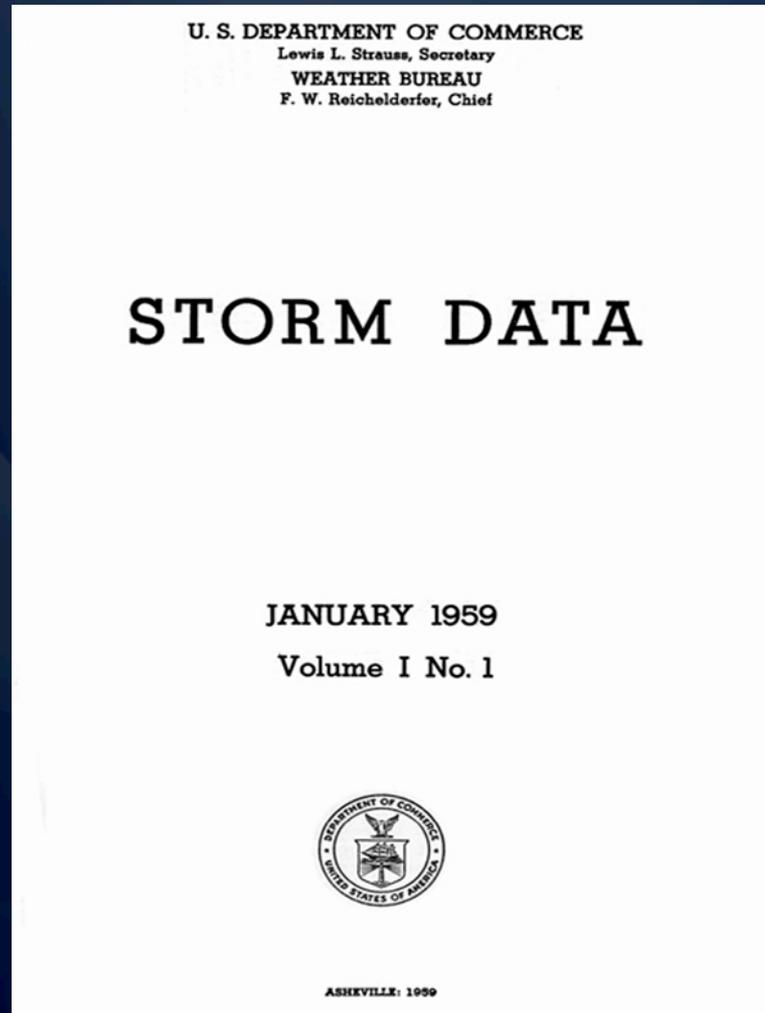
History of Severe Weather Data

- Severe weather data has been gathered since 1826 when observations were recorded in several texts. Some of these sources are listed below:
 - Meteorological Register 1826 – 1860
 - Results of Meteorological Observations 1843 – 1859
 - Report to the Chief Signal Officer 1870 – 1891
 - Monthly Weather Review 1872 – 1892
 - Reports to the Chief of the Weather Bureau 1893 – 1935
 - US Meteorological Yearbook 1935 – 1945
 - Climatological Daily National Summary 1950 – 1980
 - Storm Data 1959 – Current
 - F8 Typed/Printed format 1959 – 1992
 - WordPerfect V5.0 format 1993 – 1995
 - Paradox V7.0 format 1996 – 09/2006
 - Windows SQL Server 2003 10/2006 – Current



The Storm Data Publication

Storm Data began with the January 1959 issue ...



4

NOAA's National Climatic Data Center

NCDC – Dataset Discovery Day
Asheville, NC November 2012



NWS Form F8

NWS Form F2

WS FORM F-8 (11-81) STORM DATA AND UNUSUAL WEATHER PHENOMENA U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE

STATE Puerto Rico NO. _____ MONTH AND YEAR February 1995

PLACE	DATE	TIME	LENGTH OF PATH (MILES)	WIDTH OF PATH (YARDS)	NO. OF PERSONS		ESTIMATED DAMAGE		CHARACTER OF STORM
					KILLED	INJURED	PROPERTY	CROPS	
TYPING EXAMPLE	08	1825CST	27	150	0	0	2	0	Tornado (F2)
40	PUERTO RICO (SJU) February 1995								
35	Mayaguez	22 1720AST			0	0	0	0	Urban Flood
	Minor flooding of low lying areas was reported in Guanajibo, Valle Hermoso, and along highway 2 near the Mayaguez Mall.								
30	PRZ001	23 0705AST			0	0	0	0	Waterspout Funnel Cloud
	A waterspout was reported by a pilot 5 miles northeast of the Luis Munoz Marin International Airport. The waterspout was moving west northwest. Three funnel clouds were also sighted in the area.								
20	Rio Piedras	23 PM			0	0	0	0	Urban Flood
	Heavy rain fell over the inland sections of the San Juan Metropolitan area producing minor street flooding in Puerto Nuevo. River Rio Piedras reached near overflow stage.								
15	Caguas	25 PM			0	0	0	0	Urban Flood
	Several streets were reported flooded in the town of Caguas.								
10	Canovanas	25 PM			0	0	0	0	Landslide
	Heavy rain caused a mudslide on Highway 186 in Barrio Cubuy which damaged a house and forced the family to abandon it.								
5	Gurabo	25 PM			0	0	0	0	River Flood
	Heavy rains of 3-4 inches in the headwaters of River Gurabo caused the river level to rise nearly 12 feet and to overtop the bridge. River Loiza was also reported out of its banks at the Navarro Road, Santa Barbara sector.								

WS FORM F-2 (1-88) PRES. BY WSOM F-42 U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE

STATE Kentucky MONTH February YEAR 1996

STORM SUMMARY REPORT

TYPE OF STORM	NUMBER	DAYS	DEATHS	INJURIES	DAMAGE*	
					PROPERTY	CROPS
TORNADOES	0	0	0	0	0	0
HAIL			0	0	0	0
THUNDERSTORM WINDS			0	0	0	0
HIGH WINDS			0	0	0	0
LIGHTNING			0	0	0	0
FLASH FLOODS			0	0	0	0
FLOODS	1		0	0	0	0
HEAVY SNOWSTORMS AND BLIZZARDS			0	0	0	0
ICE STORMS #			0	0	0	0
HURRICANES & TROPICAL STORMS			0	0	0	0
ALL OTHERS	0	0	0	0	0	0

* Total damage for month, by categories.
Freezing drizzle and freezing rain, commonly known as glaze.

SUPERSEDES WS FORM F-2 WHICH SHOULD BE DESTROYED

U.S. GPO: 1986-554-485



Outstanding Storms of the Month - July 1981

CONTENTS

	Page
Outstanding Storms of the Month -----	3
Storm Data and Unusual Weather Phenomena -----	9
Storm Summary -----	36
Tropical Storm Arlene - Brent - Cindy -----	37
Late Reports and Corrections -----	40

Storm Data, which had been slated to end with the June 1981 issue, is given a new lease on life in a revised and expanded format. Coordination among the National Climatic Center, the National Weather Service, and Dr. T. Theodore Fujita, Professor of Meteorology at Chicago University and an acknowledged tornado authority, has made this possible.

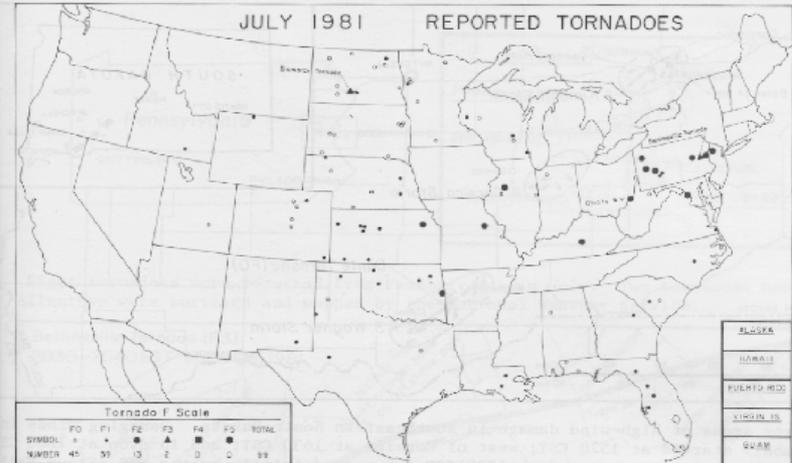
Beginning with the July 1981 issue, Dr. Fujita will review the reports provided by the National Weather Service; assign tornado F scale numbers, and add narratives and pictures on outstanding storms. NWS narratives on tropical storms will also be carried. The National Severe Storm Forecast Center will also participate in the review. Storm Data will be published by the NCC after these reviews, but likely with a slightly longer time lag.

Storm Summary reports that normally appeared in the Climatological Data National Summary are included in the Late Reports and Corrections for January through June 1981. The December issue will include an annual general summary of tornadoes and lightning, hailstorm and wind losses.

NOTE: This publication contains our best information on storms, but due to the difficulties inherent in collection of this type of data, it is not all-inclusive. Late Reports and Corrections will be carried in the month following receipt of these data.

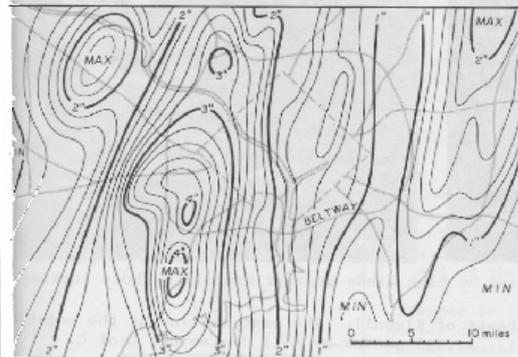
SEVERE WEATHER - (USPS 363-010) is published monthly by the National Climatic Center, Environmental Data and Information Service, NOAA, Federal Building, Asheville, NC 28801.

OUTSTANDING STORMS OF THE MONTH



REPORT RECEIVED										NO REPORT RECEIVED													
#12L	#56L	#101Q	#156T	#206J	#251E	#30WY	#320E	#372J	#417X	#456E	#506J	#12L	#56L	#101Q	#156T	#206J	#251E	#30WY	#320E	#372J	#417X	#456E	#506J
#26Z	#66L	#111L	#161A	#211L	#261E	#311E	#361E	#411E	#461E	#511E	#561E	#12L	#56L	#101Q	#156T	#206J	#251E	#30WY	#320E	#372J	#417X	#456E	#506J
#36L	#76E	#121E	#171E	#221E	#271E	#321E	#371E	#421E	#471E	#521E	#571E	#12L	#56L	#101Q	#156T	#206J	#251E	#30WY	#320E	#372J	#417X	#456E	#506J
#42L	#82L	#131L	#181L	#231L	#281L	#331L	#381L	#431L	#481L	#531L	#581L	#12L	#56L	#101Q	#156T	#206J	#251E	#30WY	#320E	#372J	#417X	#456E	#506J
#47L	#87L	#141L	#191L	#241L	#291L	#341L	#391L	#441L	#491L	#541L	#591L	#12L	#56L	#101Q	#156T	#206J	#251E	#30WY	#320E	#372J	#417X	#456E	#506J

RAINSTORM in Washington D.C. and Vicinity on July 3 - 4.



The 4th of July was the fireworks day in Washington D.C. Rain fell intermittently on the 3rd, becoming heavy before dawn of the 4th. Rain ended around noon and skies remained cloudy until early evening. Clearing took place in time for good firework displays in Downtown Washington.

The largest rainfall measured was 4.15". One station measured 1.20" in 25 min between 0635 and 0700 EST. (data from Metropolitan Climatological Summaries, National Capital Area - rainfall map plotted by Angela Byers).



The 1st Generation Storm Events Database

- Began as a project to be able to compare radar images with aftermath
- Once online, became one of the most popular websites at NCDC
- Written in cgi scripts using Visual FoxPro 3.0 in 1996-97
 - Started with Storm Data in Paradox format, exported to FoxPro.
 - Added the 1993-1995 data from the WordPerfect disks received at NCDC
 - Limited Narratives, No lat/lon data provided
 - Added the Tornado Archive DSI-9617 (1950-1992)
 - Added SPC Thunderstorm Wind and Hail data (1955-1992)
 - Added NWS Storm Data in Windows SQL Server 2003
- Also use the database to produce the Storm Data Archive DSI-3910, the Lightning Archive DSI-9417 and the Tornado Archive DSI-9617
- The National Weather Service Performance Branch developed a new, web-based version of Storm Data using Windows SQL Server 2003



7

NOAA's National Climatic Data Center

NCDC – Dataset Discovery Day
Asheville, NC November 2012



Original Web Access

- Very heavily used
- A few limitations
 - Limited functionality
 - Latitude/Longitude
 - Limited search
 - Missing data
 - County based events vs. Zone based events
 - Forecast zone changes
 - Damage amounts
 - Event types not standard

Storm Events

Select State

Select Desired State or *All
State: <input type="text" value="*All"/>
<input type="button" value="Continue"/>

Search the NCDC Storm Event database to find various types of storms recorded in your county or use other selection criteria as desired. The database currently contains:

The Storm Events Database contains data from the following sources:

All Weather Events from 1993 - 1995, as entered into Storm Data. (Except 6/93 - 7/93, which is missing) (NO Latitude/Longitude)

All Weather Events from 1996 - Current, as entered into Storm Data. (Including Latitude/Longitude)

Plus additional data from the Storm Prediction Center; Including
Tornadoes 1950-1992
Thunderstorm Winds 1955-1992
Hail 1955-1992

The Storm Events database does not search by National Weather Service Forecast Zone number. However, if the name of the county is contained in the zone name, then you will get results for queries of large scale events by county name. This is not the case for states with very large forecast zones, such as: Alaska, Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Washington and Wyoming. For large scale events in those states, such as flooding, winter storms, hurricanes and extreme temperatures, it is easier to search by state and/or date instead of by county name.

[List of NWS Forecast Zones by State](#)

[List of NWS Forecast Zones Maps](#)

The Storm Events Database is updated when the data becomes available to NCDC. The data is updated on a monthly basis and is usually 90-120 days behind the current month

Please read the [Storm Events Database FAQ](#) page for more information. The State and County FIPS numbers associated with the maps are located here: [State and County FIPS](#). Click the link for more information. Please do not contact NCDC with requests for information about specific weather events. All of the data is received from the National Weather Service and is made available as soon as possible. If you cannot locate a particular event 120 days after the end of the month of occurrence, contact [Stuart Hinson](#).

Note To Webmaster: [Link directly to Events Database](#)



The 1st Generation Storm Events Database

- Property and Crop Damages
 - NWS Form F8 used “Damage Categories” (1959-1995)
 - When imported, had to replace category with data value
 - Used pseudo-median (divide upper limit by 2)
 - Cat 6 would be 2.5M (no data are adjusted for inflation)

Image from Storm Data publication

- ◊ Includes crop damage.
- C Crop damage.
- ★ Miles instead of yards.
- ★★ Yards instead of miles.
- † Storm damages are placed in categories varying from 1 to 9 as follows:
 - 1 Less than \$50
 - 2 \$50 to \$500
 - 3 \$500 to \$5,000
 - 4 \$5,000 to \$50,000
 - 5 \$50,000 to \$500,000
 - 6 \$500,000 to \$5 Million
 - 7 \$5 Million to \$50 Million
 - 8 \$50 Million to \$500 Million
 - 9 \$500 Million to \$ 5 Billion

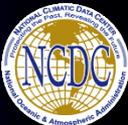
Data Sources

Amateur Radio	Buoy	State Official	Broadcast Media
Other Federal Agency	Storm Chaser	Trained Spotter	Official NWS Observations
Post Office	ASOS	Cocorahs	Coop Observer
Mariner	Newspaper	Park/Forest Service	Social Media
Insurance Company	Law Enforcement	River/Stream Gage	Airplane Pilot
Emergency Manager	NWS Employee	Coop Station	Mariner
Law Enforcement	Amateur Radio	Official NWS Obs.	Trained Spotter
General Public	Unknown	Dept Of Highways	Coastal Observing Station
Utility Company	Shave Project	Newspaper	Broadcast Media
Post Office	Snotel	Govt Official	Meteorologist (Non-NWS)
NWS Storm Survey	AWOS,ASOS	Drought Monitor	911 Call Center
Mesonet	Fire Dept/Rescue Squad	RAWS	NWS Employee (Off Duty)
Other Federal Agency	Public	County Official	Airplane Pilot
Park/Forest Service	C-Man Station	Coast Guard	Fire Department/Rescue
Unknown	Buoy	Department of Highways	NWS Storm Survey
Utility Company	Emergency Manager	Insurance Company	Other Federal



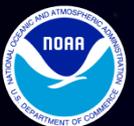
Storm Data Disclosure

Storm Data is an official publication of the National Oceanic and Atmospheric Administration (NOAA) which documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. In addition, it is a partial record of other significant meteorological events, such as record maximum or minimum temperatures or precipitation that occurs in connection with another event. Some of the information appearing in Storm Data may have been provided by or gathered from sources outside the National Weather Service (NWS), such as the media, law enforcement and/or other government agencies, private companies, individuals, etc. **An effort is made to use the best available information, but because of time and resource constraints, information from these sources may be unverified by the NWS. Therefore, when using information from Storm Data, customers should be cautious as the NWS does not guarantee the accuracy or validity of the information.** Further, when it is apparent information appearing in Storm Data originated from a source outside the National Weather Service (frequently credit is provided), Storm Data customers requiring additional information should contact that source directly. In most cases, NWS employees will not have the knowledge to respond to such requests. In cases of legal proceedings, under Department of Commerce regulations and/or rules of the court, NWS employees are not legally obligated to provide written or verbal testimony



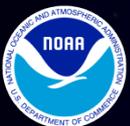
The Enhanced Storm Events Database

- NCDC uses Oracle database platform
 - All data from old system had to be reformatted
 - Dates fields were in text format, etc...
 - Times were 2359, 23:59, 11:59 PM etc
 - All event types had to be “normalized” into standards (48)
 - Data from 1996-1999 had “free text” field for Event Types
 - Over 950 unique values had to be correctly categorized
 - Multiple Event Types per record had to be “split” into two
 - Thunderstorm Wind/Hail, Hail/Tornado, etc



The Enhanced Storm Events Database

- Expected Results
 - Higher quality data by fixing erroneous/questionable data
 - Possible Integration using radar, satellite, lightning products
 - Multi-point tornado tracks, polygons for flash floods
- Future Enhancements by the NCDC
 - Map based queries
 - Added query functionality
 - Search by hail size, wind speed, number of injuries/fatalities, amount of property/crop damage
 - Enhanced query output options (csv text and PDF - F8 format)
 - Adding damage/evidence photographs to web application and output
- Current Access
 - Web Access (presently only Oct 2006 - current)
 - <http://www.ncdc.noaa.gov/stormevents/>
 - Entire Storm Data in MS Access format
 - <ftp://ftp.ncdc.noaa.gov/pub/data/swdi/stormevents/StormData.zip>



The Enhanced Storm Events Database

- Caveats

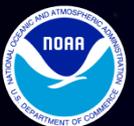
- Data are entered by 124 unique WFOS (Weather Forecast Offices)
- Damage amounts are “Best Guess Estimates” as received from the NWS (plus the damage category issue with pre-1993 data)
- Number of events has dramatically increased due to advances in technology and population density in previously sparse areas
- Hurricane Katrina (August 2005)
 - It took more than a year to collect the fatality statistics
 - It also occurred during a transition from Paradox to Windows SQL Server 2003 (October 2006)
 - Will manually update fatalities/injuries and Property/Crop damage amounts



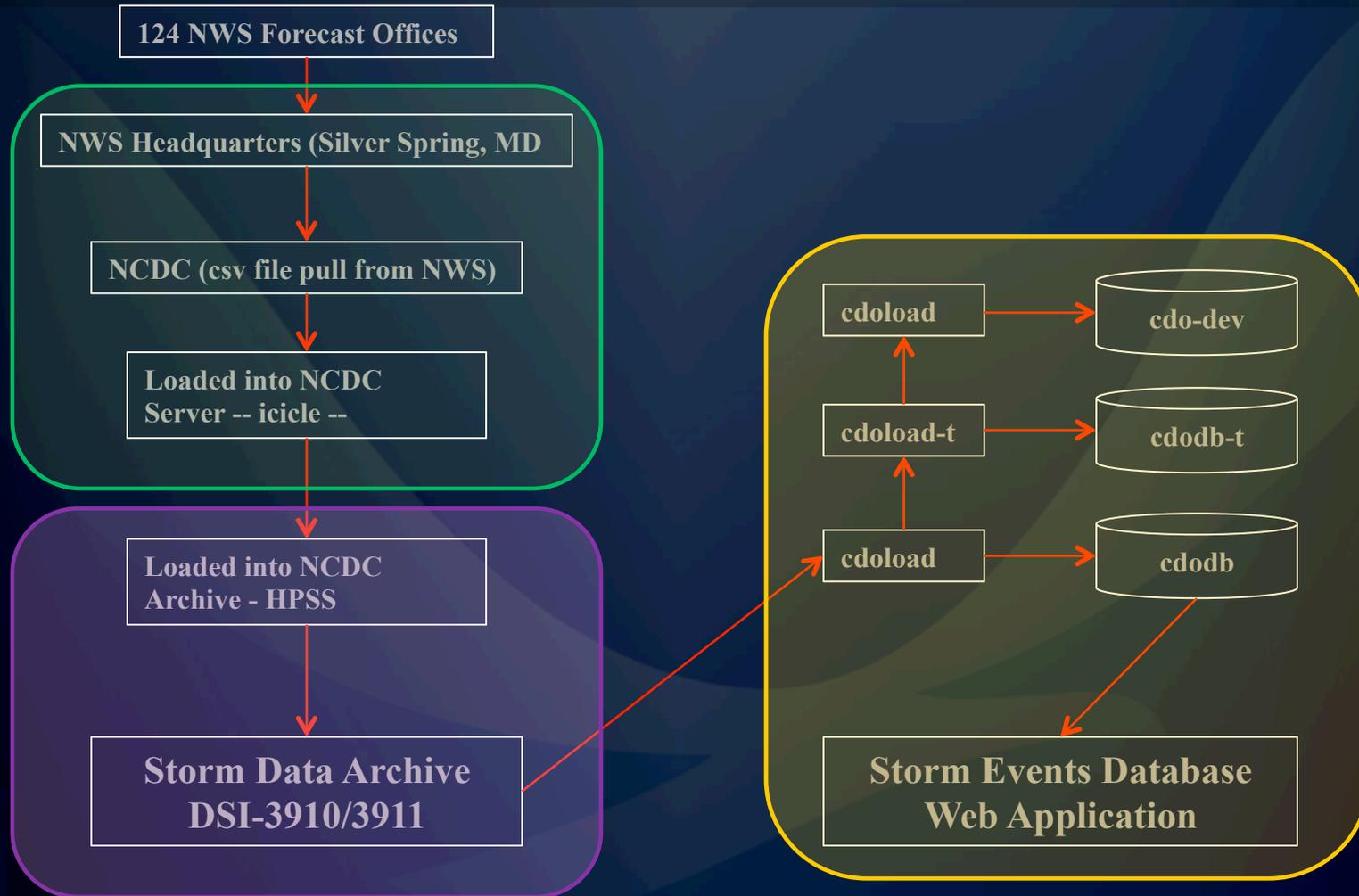
The Enhanced Storm Events Database

- Progress and Timeline

- Started with the latest data and working backwards
- Oct 2006 – Currently loaded into new web application
- Jan 2000 – Sep 2006 are currently being tested and loaded (by end of year)
- Jan 1996 – Dec 1999 are currently “under repair” (early 2013)
 - Event Type had a free-text field allowing user to input non-standard event types
 - Systematically able to repair most of the event types by writing code to match/replace non-standard event types
 - Manually adjust those that are unable to be programmatically replaced
- Jan 1993 – Dec 1995 (mid 2013)
 - Reducing from “ALL” event types to Thunderstorm Winds, Tornadoes and Hail.
 - Splitting multiple event types into individual events
 - Mostly “TSTM WIND/HAIL”
- 1950 – 1992 (mid 2013)
 - Will import the Thunderstorm Wind and Hail databases from the SPC (Storm Prediction Center)
 - Will import the Tornado Archive DSI-9714 from the NCDC Archive
 - csv text files will be easily imported (damage categories, no values)



Data Flow



Enhanced Storm Events Database

NOAA HOME WEATHER OCEANS FISHERIES CHARTING SATELLITES CLIMATE RESEARCH COASTS CAREERS



NOAA

NATIONAL CLIMATIC DATA CENTER
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



[Home](#) [Contact Us](#) [About NCDC](#) [Help](#)

NCDC > Storm Events Database

Storm Events Database

Data Access

- [Search](#)
- [FTP Access](#)
- [Database Download](#)

External Resources

- [Tornado EF Scale](#)
- [NOAA's SPC Reports](#)
- [NOAA's SPC WCM Page](#)
- [SHELDUS](#)

Storm Events Database

Search the NCDC Storm Events Database to find various types of storms recorded in your county. The database currently contains data from Oct. 2006 to Present, as entered by NOAA's National Weather Service (NWS).

Select State or Area

ALL

Search

Notice:

The Storm Events Database is undergoing an upgrade. This is the first version of the new access system. Some previous functionality is not yet available. If you have questions, please [Contact NCDC](#).

[Privacy Policy](#) | [FOIA](#) | [Information Quality](#) | [Disclaimer](#) | [Contact Us](#)



Currently under construction



17

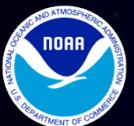
NOAA's National Climatic Data Center

NCDC – Dataset Discovery Day
Asheville, NC November 2012

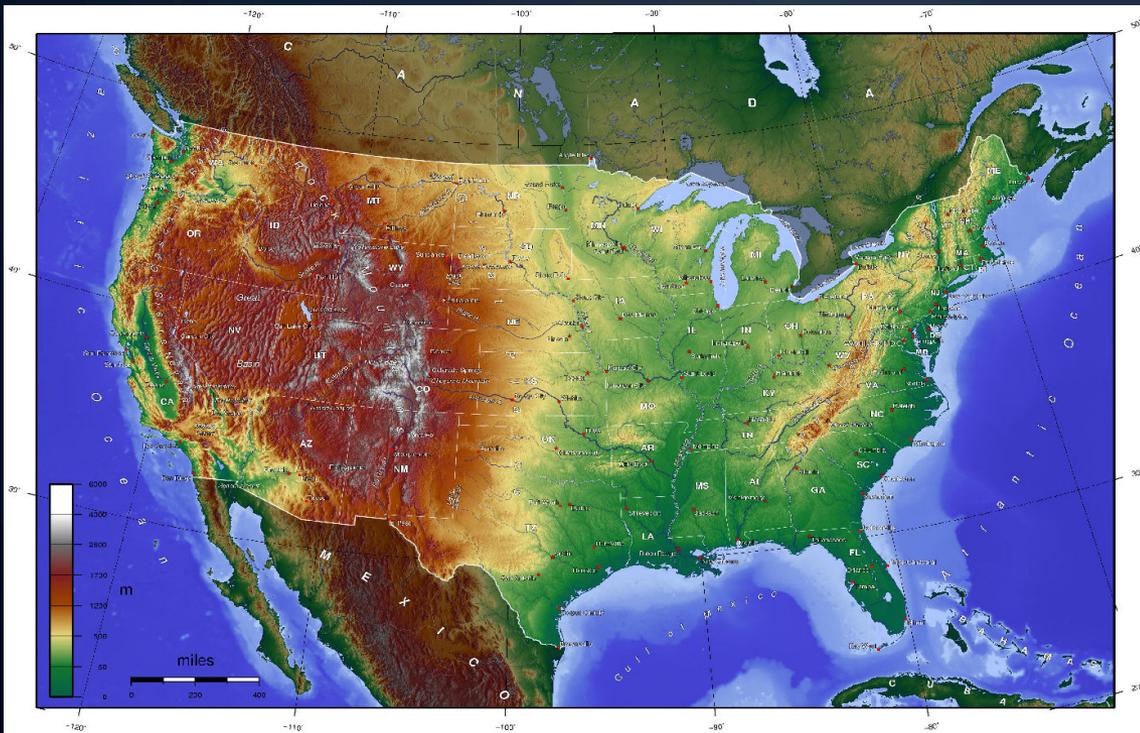


Notes/Links

- NWS Directive 10-1605
 - <http://www.nws.noaa.gov/directives/sym/pd01016005curr.pdf>
- Storm Events Database
 - <http://sansari.dev.ncdc.noaa.gov/stormevents-dev/>
- Development Server
 - [Tuscaloosa Tornado](#)
- Storm Data Publication
 - <http://www7.ncdc.noaa.gov/IPS/sd/sd.html>
- Related Research
 - SWDI (Severe Weather Database Inventory)
 - <http://www.ncdc.noaa.gov/swdi/#Intro>
 - WDSSII (The Warning Decision Support System – Integrated Information)
 - <http://www.wdssii.org/>
 - SHAVE (Severe Hazards Analysis & Verification Experiment)
 - <http://ewp.nssl.noaa.gov/projects/shave/index.php>
 - HVRI SHELDUS (Hazards Vulnerability Research Institute - Spatial Hazard Events and Losses Database for the United States)
 - <http://webra.cas.sc.edu/hvri/products/sheldus.aspx>



U.S. Storm Events Database



Location

- US
- AK
- HI
- PR
- VI
- PAC

Begin Date

Aug 22 2007

End Date

Aug 22 2007

State: Alabama

Submit Query

County Based Event Types

County: *All

- Tornado EF: 0 to EF: 0
- Tstm Winds MPH: 0 to MPH: 0
- Hail In: 0 to In: 0
- Flash Floods

Zone Based Event Types

Zone: *All

- Hurricanes and Tropical Storms
- Winter Weather Snow & Ice
- Wild Fires & Forest Fires
- Temperature Extremes
- Drought
- High Winds (non-convective)
- Floods
- Precipitation
- Fog



The Future of Storm Events Database

- Can we improved data entry consistency?
 - Starts at the point of entry – the NWSFO...
- Can we improve the timeliness?
 - Possible ingest from NWS in near real-time
 - Direct input from NWS LSR (Local Storm Reports)
- Can we improve data dissemination?
 - GIS-based
 - Web Map services
 - Multiple data export formats



20

NOAA's National Climatic Data Center

NCDC – Dataset Discovery Day
Asheville, NC November 2012



Conclusion

- An increase in new technology will allow for a much more robust, user-friendly system
- Understand the importance of the need for recording high quality data.
- Consistency is the key
 - In-depth training
 - Damage estimation
- Multiple Product Generation requires consistency
 - Storm Data Publication
 - Storm Events Database
 - Storm Data Archive (DSIs 3910/9714/9617)
 - Storm Data Users - Database export
 - Property damage amounts should be used if at all possible



Thanks!

Questions?

Contact: Stuart Hinson – Storm Data

<http://www.ncdc.noaa.gov/stormevents/>

Stuart.Hinson@noaa.gov

828-271-4800 x3169



22

NOAA's National Climatic Data Center

NCDC – Dataset Discovery Day
Asheville, NC November 2012

