Weather Resources for Forensics

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Overview

US Climate Services Structure

The Indiana State Climate Office

Weather records in forensic meteorology

- NWS cooperative weather stations
- CoCoRaHS
- Automated Surface Observation Stations (ASOS)

Storm event data

Astronomical tables

Go to see the WSSRD (of NOAA not Oz)

Useful weather data web sites

US Climate Services Structure

a 3-tier hierarchy

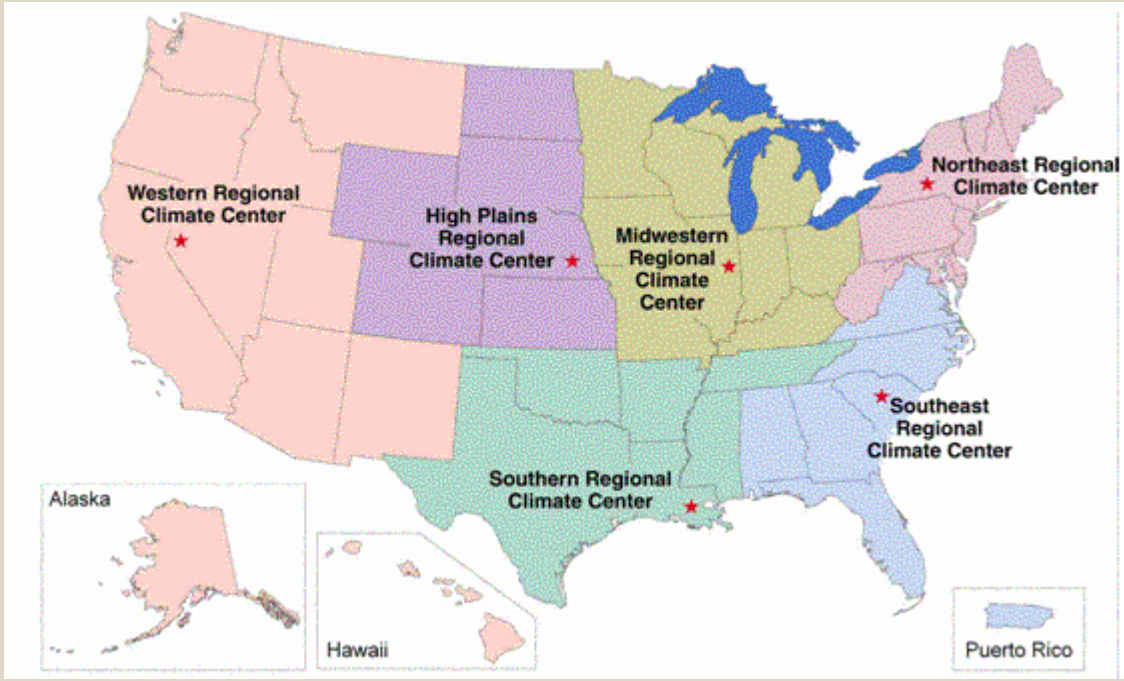
national tier
- National Climatic Data Center
- located in Asheville NC

regional tier
- Regional Climate Data Center (six)

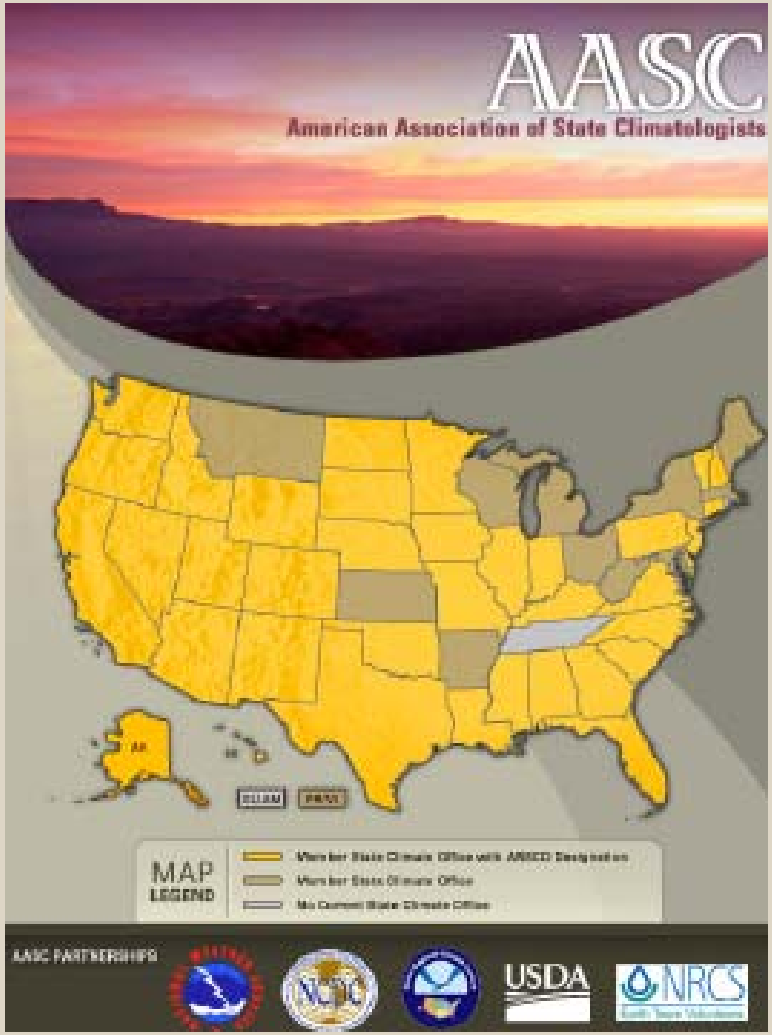
state tier
- State Climate Offices (most states)

US Climate Services – regional tier

Regional Climate Centers



US Climate Services – state tier



State Climate Office

one per state

purpose is to document and study the climate of the state

the state archive of official daily and hourly weather observations recorded throughout the state

provides unique local climate observations and summaries

understands very localized climate features

interprets and applies this data to solve client climate related problems

Current/Ongoing Office Activities

Archive and QC data

Timely response to information requests

Weekly and Monthly Climate Summary

Frost Climatology

Indiana Climate Atlas

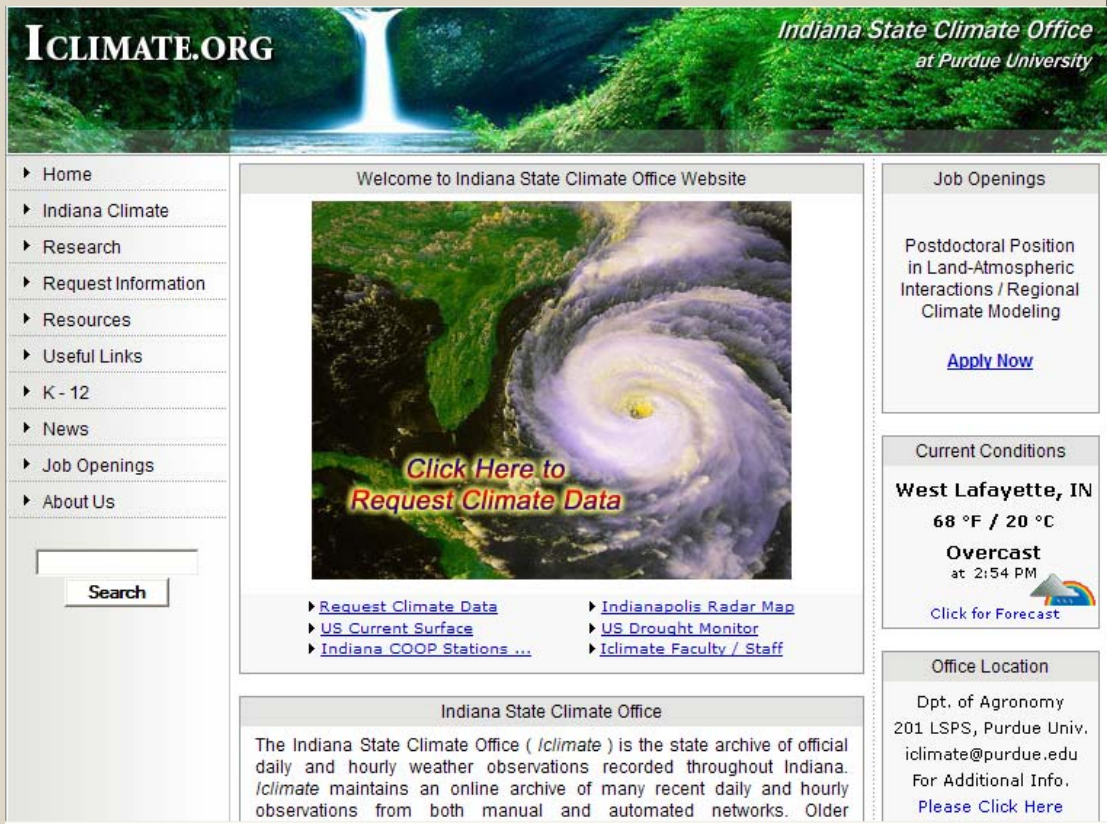
Evapotranspiration Study

CoCoRaHS

Soil Moisture Climatology

Most requests for climate information come from…

- Agriculture
- Research and Education
- Environmental Agencies
- Government Agencies
- Attorneys
- Construction
- Forensics
- Insurance Adjustors
- Utilities Companies
- News Media
- Interested Citizens



What is forensic meteorology

process of reconstructing weather events for a certain location using evidence such as

- eyewitness accounts
- local weather reports
- radar and satellite images
- expert analysis and interpretation of weather conditions

often used in

- civil and criminal trials (eg, homocide)
- insurance claims
- verify compliance with environmental regulations

problems with eyewitness accounts

eyewitness is under stress
different versions of the same event
different physical viewpoint of the incident
too many details to capture in a split second
focus may be limited to a threatening item
memory of an event can begin to fade immediately
attempts to fill in the gaps where lapses occur
inaccuracies
biases
assumptions
agendas

Why weather records are helpful

- usually a permanent archived written record
- (human) weather observer is not an eyewitness
  - unaware of the concurrent incident
  - unbiased
- weather observer can be a machine (data logger)
  - able to capture many weather parameters
    - accurate, and very fast
    - multiple focal points (simultaneous recording)
    - can be accurately reviewed / replayed at a later time
    - no assumptions or agendas

Where can weather records be found

- short term archival
  - available on many web sites
    - updated hourly, daily, and monthly
    - caveat: preliminary data, not fully quality controlled
- long term archival
  - available at only a few web sites
    - both preliminary and final edited data, quality controlled
    - final data can lag a few months after observation time
    - available at public and government climatology centers
    - electronic and hard copy

How are weather records classified

Classes of weather records are based on

- time scale
  - daily
  - hourly
  - by minute

- and primary application
  - monitoring the climate
  - pilot information
  - public warning

- All classes are useful in research
- These classes are defined into observation networks

Weather observation networks

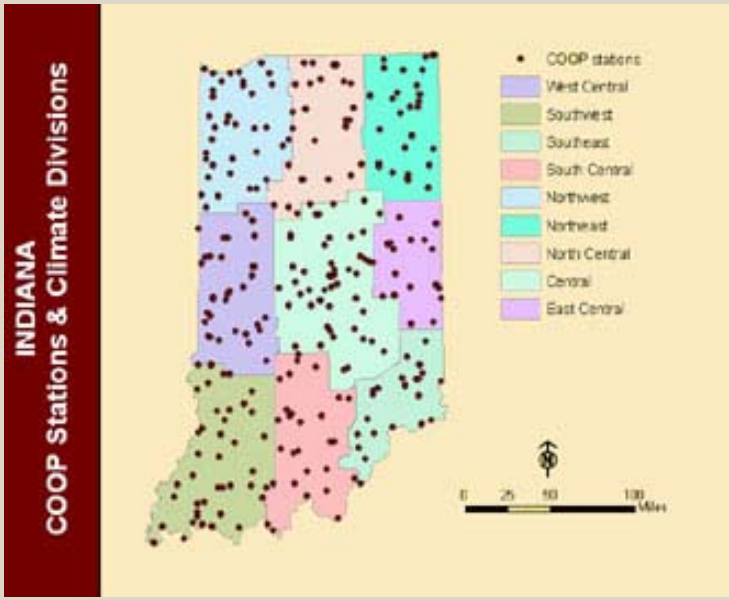
Examples of weather observation networks

Cooperative station
- Volunteers for long term committment
- Monitor long term climate changes
- Provides data for short term needs

CoCoRaHS
- Grass-roots, backyard, volunteers of all ages
- Monitors precipitation for many uses

ASOS
- Automated sensors and data loggers
- Weather monitoring for pilots
- Research of past weather events

NWS cooperative stations



a resource for daily weather observations

NWS Cooperative station example

NWS Cooperative station elements

Weather elements observed

Primarily temperature, rainfall, snowfall

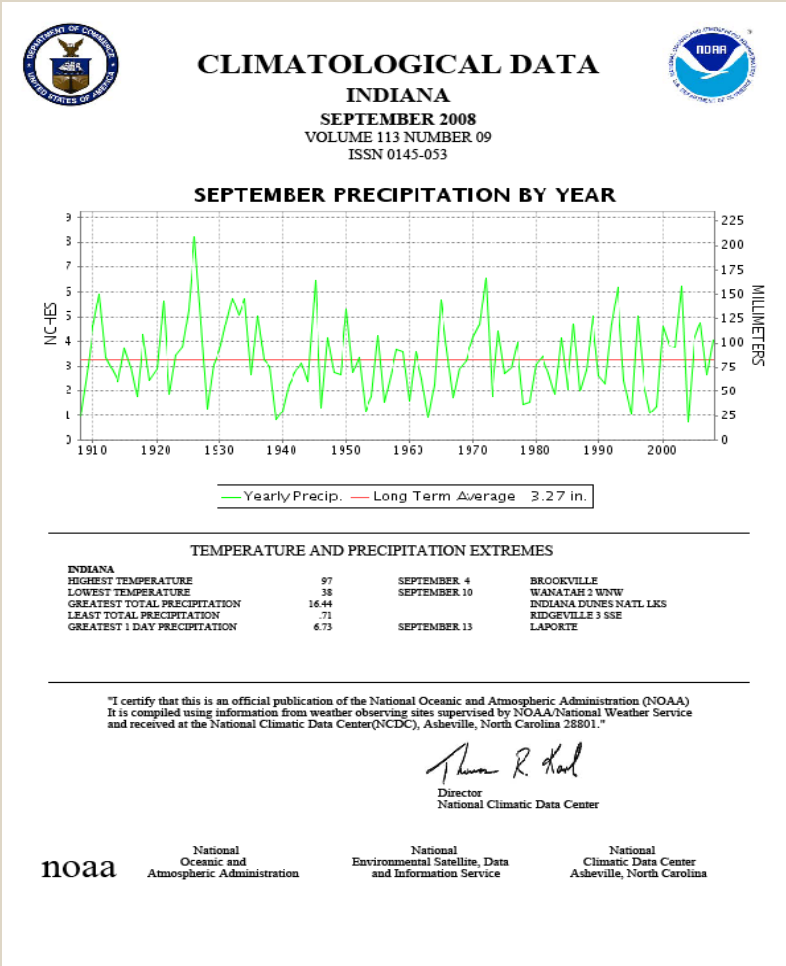
a handful of stations measure soil temperature, relative humidity, evaporation, solar radiation, wind

Offline hard copy resource

Data are published monthly in

Climatological Data (Indiana)

Climatological Data - Indiana (cover)



CLIMATOLOGICAL DATA
INDIANA
SEPTEMBER 2008
VOLUME 113 NUMBER 09
ISSN 0145-053

SEPTEMBER PRECIPITATION BY YEAR

TEMPERATURE AND PRECIPITATION EXTREMES

INDIANA			
HIGHEST TEMPERATURE	97	SEPTEMBER 4	BROOKVILLE
LOWEST TEMPERATURE	38	SEPTEMBER 10	WANATAH 2 WNW
GREATEST TOTAL PRECIPITATION	16.44		INDIANA DUNES NATL LKS
LEAST TOTAL PRECIPITATION	.71		RIDGEVILLE 3 SSE
GREATEST 1 DAY PRECIPITATION	6.73	SEPTEMBER 13	LAPORTE

"I certify that this is an official publication of the National Oceanic and Atmospheric Administration (NOAA) It is compiled using information from weather observing sites supervised by NOAA/National Weather Service and received at the National Climatic Data Center(NCDC), Asheville, North Carolina 28801."

Director
National Climatic Data Center

noaa National Oceanic and Atmospheric Administration | National Environmental Satellite, Data and Information Service | National Climatic Data Center Asheville, North Carolina

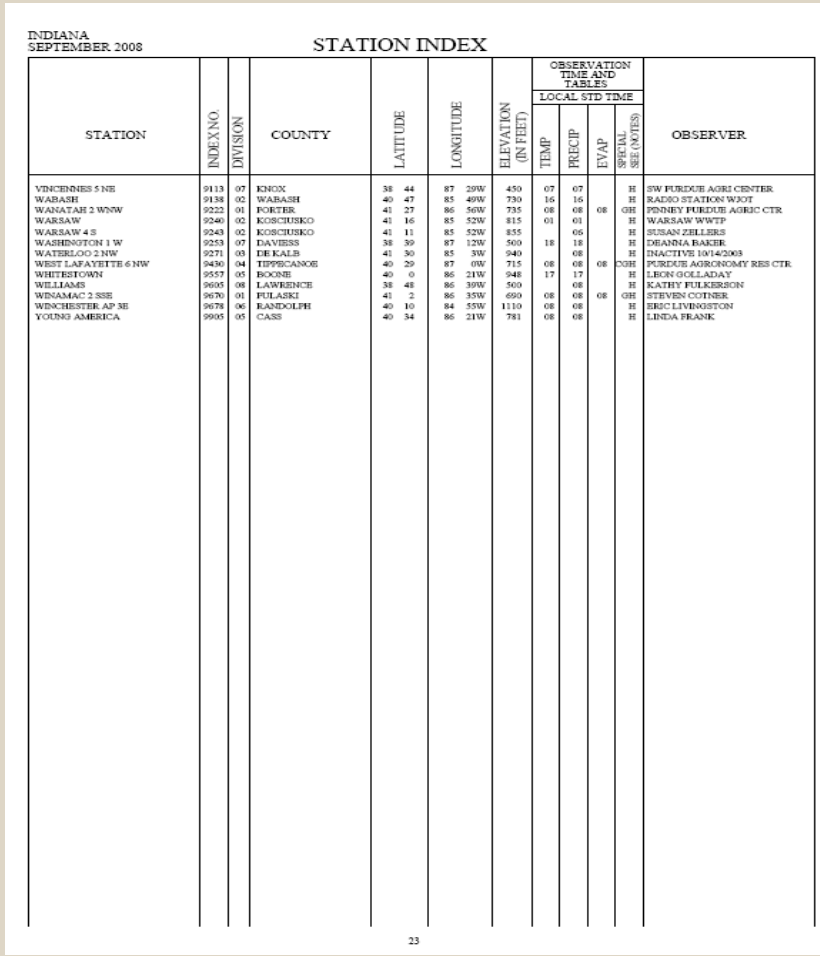
certification statement is on this page

Climatological Data – Indiana (station index)

Go first to the end of the publication to pages titled “Station Index”.

- an inventory of active cooperative substations in Indiana at the time of publication and gives valuable information
  - station name, index number and climate division
  - station location
    - county, latitude, longitude, elevation
    - weather elements observed and time of observation
    - observer’s name

Climatological Data – Indiana (station index)



INDIANA
SEPTEMBER 2008

STATION INDEX

STATION	INDEX NO.	DIVISION	COUNTY	LATITUDE	LONGITUDE	ELEVATION (IN FEET)	OBSERVATION TIME AND TABLES (LOCAL STD TIME) TEMP	PRECIP	EVAP	SPECIAL SEE (NOTES)	OBSERVER
VINCENNES 5 NE	9113	07	KNOX	38 44	87 29W	450	07	07		H	SW PURDUE AGRI CENTER
WABASH	9138	02	WABASH	40 47	85 49W	730	16	16		H	RADIO STATION WOT
WANATAH 2 WNW	9222	01	PORTER	41 27	86 56W	735	08	08	08	GH	PINNEY PURDUE AGRIC CTR
WARSAW	9240	02	KOSCIUSKO	41 16	85 52W	815	01	01		H	WARSAW WWTP
WARSAW 4 S	9243	02	KOSCIUSKO	41 11	85 52W	855		06		H	SUSAN ZELLERS
WASHINGTON 1 W	9253	07	DAVIESS	38 39	87 12W	500	18	18		H	DEANNA BAKER
WATERLOO 2 NW	9271	03	DE KALB	41 30	85 3W	940		08		H	INACTIVE 10/14/2003
WEST LAFAYETTE 6 NW	9430	04	TIPPECANOE	40 29	87 0W	715	08	08	08	CGH	PURDUE AGRONOMY RES CTR
WHITESTOWN	9557	05	BOONE	40 0	86 21W	948	17	17		H	LEON GOLLADAY
WILLIAMS	9605	08	LAWRENCE	38 48	86 39W	560		08		H	KATHY FULKERSON
WINAMAC 2 SSE	9670	01	PULASKI	41 2	86 35W	690	08	08	08	GH	STEVEN COTNER
WINCHESTER AP 3E	9678	06	RANDOLPH	40 10	84 55W	1110	08	08		H	ERIC LIVINGSTON
YOUNG AMERICA	9905	05	CASS	40 34	86 21W	781	08	08		H	LINDA FRANK

Climatological Data – Indiana (temperature)

INDIANA
SEPTEMBER 2008

DAILY TEMPERATURES (°F)

STATION	OB. TIME	MAX/MIN	DAY OF MONTH 01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	AVERAGE
INDIANA																																		
NORTHWEST 01																																		
BOSWELL 4WNW	08	MAX	87	87	91	86	71	68	76	73	71	69	71	76	73	87	71	70	75	80	77	79	79	81	83	83	85	83	80	80	79	74		78.2
		MIN	54	55	58	63	58	51	51	52	50	45	45	50	67	68	55	51	46	53	50	49	54	55	55	53	54	50	50	50	50	48		53.0
CHALMERS 5 W	06	MAX	86	87	92	87	74	70	75	75	74	69	73	80	72	88	72	73	74	81	77	80	80	82	83	86	86	84	80	80	80	74		79.1
		OBS												70																				
		MIN	55	54	56	63	62	52	51	55	54	46	45	50	67	70	54	50	49	49	49	48	54	55	55	52	53	51	49	48	50	49		53.2
FRANCESVILLE	07	MAX	86	86	91	83	72	68	74	72	72	68	72	77	74	85	67	65	70	80	76	77	81	82	81	82	83	83	79	78	76	70		77.0
		MIN	54	57	60	64	61	50	54	56	49	43	46	52	66	67	55	51	50	52	49	49	54	54	53	54	54	50	48	49	52	48		53.4
INDIANA DUNES NATL LKS	08	MAX	89	89	91	73	69	67	75	73	70	66	72	78	73	82	67	65	71	80	74	78	78	79	82	82	82	77	72	74	69	69		75.5
		MIN	63	61	69	63	63	53	58	57	55	45	54	68	68	67	59	56	54	57	56	55	57	62	59	58	64	56	50	55	56	57		58.5
		OBS												59																				
KENTLAND	07	MAX		89	93	85	71	70		77	72	72		79	80		86	78	78	82	78	80				84	86	85	80		81	73		80.0
		MIN		51	67	63	58	51		54	48	42		50	67		54	48	48	53	50	53				54	55	47	46		49	47		52.5
KNOX WWTP	07	MAX	85	85	90	79	70	68	74	71	69	66	70	76	71	80	67	64	67	76	73	75	77	78	78	78	78	78	76	76	73	69		74.6
		MIN	54	55	59	64	63	49	51	54	54	43	43	49	67	66	55	53	50	50	48	49	53	53	52	52	54	50	47	50	51	50		52.9
LAPORTE M	MID	MAX	87	92	76	69	69	74	72	72	66	71	78	72	82	71	64	71	80	74	77	79	80	80	81	83	83	77	76	72	71	59		75.3
		MIN	62	62	66	64	50	53	58	55	51	52	53	68	67	60	56	55	53	57	60	49	58	59	56	58	58	56	53	57	57	55		57.3
		OBS				48																												
LOWELL	07	MAX	88	87	93	76	69	69	75	73	69	67	72	77	73	83	67	65	71	82	76	79	82	81	82	83	83	83	78	77	73	68		76.7
		MIN	57	59	64	64	60	51	58	55	48	44	50	56	68	67	55	47	47	56	52	53	53	56	55	56	54	51	49	52	53	48		54.6
RENSSELAER	07	MAX	87	87	92	82	72	70	76	74	73	68	73	79	72	86	68	66	72	81	77	80	82	81	83	83	85	84	71	80	78	72		77.8
		MIN	58	59	61	64	60	52	53	56	49	47	50	66	67	68	55	51	50	51	52	53	56	57	55	56	56	52	52	52	53	50		55.4
		OBS												54																				
VALPARAISO 5NNE	07	MAX	86	87	92	72	68	68	73	73	69	66						65	69	79	74	76	78	79	80	80	81				68			75.4
		MIN	60	60	62	61	61	53	53	56	50	46						52	52	56	53	53	55	55	56	55	57				54			55.2
WANATAH 2 WNW	08	MAX	88	88	94	76	70	69	75	74	71	71	72	79	73	83	68	66	70	81	75	79	82	82	82	83	85	82	80	78	75	70		77.4
		MIN	51	51	55	61	61	48	53	53	47	38	39	61	65	65	55	51	50	51	46	49	48	50	51	50	51	45	43	45	45	49		50.9
		OBS							42					51																				
WINAMAC 2 SSE	08	MAX	88	87	92	85	72	72	75	72	72	68	73	78	73	86	71	67	70	79	75	78	82	80	82	83	84	82	78	79	77	77		77.9
		MIN	56	60	60	65	62	52	53	55	54	49	49	51	67	67	55	53	49	50	51	50	53	58	55	54	53	52	48	48	48	49		54.2
NORTH CENTRAL 02																																		
DELPHI 2 N	18	MAX	87	88	92	75	72	76	74	75	70	72	80	73	86	77	71	72	79	79	79	80	80	83	83	85	81	77	79	80	76	65		78.2
		OBS				89																												
		MIN	52	51	54	64	62	52	58	53	55	43	43	67	68	61	56	51	46	53	46	51	54	54	52	50	51	47	47	47	51	52		53.0
GOSHEN 3W	17	MAX	89	93	87	75	73	74	73	71	68	72	77	72	83	77	65	70	80	74	77	80	80	79	81	83	81	78	77	76	72	63		76.7
		MIN	56	58	66	66	64	52	58	55	51	45	49	66	67	61	57	50	51	52	49	54	54	55	52	54	54	50	48	52	54	52		55.1
LAKEVILLE	08	MAX	88	87	91	81	82	70	74	71	70	68	71	76	76	82	65	65	69	78	75	77	80	72	80	81	83	83	78	78	75	71		76.6
		OBS	87	91	81	82	70	74	71	70	68	71	76	76	82	65	65	69	78	75	77	80	72	80	81	83	83	78	78	75	71	61		
		MIN	60	54	56	65	63	49	57	53	50	43	48	64	64	65	55	52	49	49	47	49	50	65	49	50	52	49	47	51	52	53		53.7
		OBS	54	56	65	63	49	57	53	50	43	43	64	64	65	55	52	49	49	47	47		65	49	50	52	49	47	51	52	53	48		

Climatological Data – Indiana (precipitation)

INDIANA
SEPTEMBER 2008

DAILY PRECIPITATION (INCHES)

STATION	TOTAL	DAY OF MONTH																													
		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
INDIANA																																
NORTHWEST 01																																
BOSWELL 4WNW	7.40				1.66	1.57		.45		.11			.42	.42	T	2.69														.08		
CHALMERS 5 W	M				.29	.46	T	.13		.17			.30	.42	.08	1.85														.15		
CROWN POINT 1N	13.38			.23	2.93		.10			.79			.42	4.18	4.73																	
FRANCESVILLE	6.17				.21	1.03		.46	.01	.13			.08	.94	.30	2.99	.02													T		
INDIANA DUNES NATL LKS	16.44				1.70	2.35		.08		1.42			.06	4.75	2.89	3.07														.12		
KENTLAND	6.86				.66	1.40		*	.37	.17		*	.22	.98	*	2.90														.16		
KINGSBURY 1 N	13.06				.14	2.17	.02	.13		.74		.01	.11	4.12	2.36	3.13	.02													.11		
KNOX WWTP	9.29				.08	1.86		.19		.43			.10	2.00	.80	3.80	.03															
LAKE VILLAGE 7SE	11.45				1.13	2.75		.14		.37				1.87	1.72	3.40	.03													.04		
LAPORTE	15.29				2.19	.24		.18	1.00	.09		.15	.35	6.73	4.06	.01	T												.20	.09		
LOWELL	11.65			.10	.35	2.86		.13		.70			.08	1.81	2.59	2.95	.08													T		
MOROCCO 2 S	9.42				.72	2.25	.02	.20		.22			.11	.65	.87	4.30					.03									.05		
NORTH JUDSON 3 S	8.31				.14	1.79	T	.27		.27			.07	1.27	.78	3.72	T													T		
REMINGTON 2NNW	6.15				.37	1.44		.38		.18			.22	.53	.15	2.88														T		
RENSSELAER	6.98				.25	1.61		.41	.01	.12			.12	.78	.51	3.17						T										
VALPARAISO 5NNE	14.86				.45	3.07	.05	.12		1.36		*	.20	4.01	2.30	3.29	.01															
WANATAH 2 WNW	12.04				.21	2.20	.02	.17		.85			.06	2.59	2.53	3.39														.02		
WINAMAC 2 SSE	5.45				.69	.57		.37		.12			.13	1.08	.19	2.25	.03													.02		
NORTH CENTRAL 02																																
DELPHI 2 N	4.20				1.36	.23	.10						.78		.73	1.00																
ELKHART PUB WKS & UTIL	10.01				.60	.19		.15	.65	.05		.01	.20	3.30	4.46	.07													.09	.24		
FLORA	2.43				.22	.30		.14		.16			.72	.15	*	*	*	*	*	*	.74											
GOSHEN 3W	8.62				1.27	.36		.20	.19	.36			.14	2.61	3.31	.11														.07		
LAKEVILLE R	10.29			.58	1.31	.44	.16		.56			.05	.28	3.35	3.52														.04			
LOGANSPORT CICOTT ST	3.69			.63	.32			.10	.16	.16		.41	.89	.06	.89	.05	.01													.01		
NORTHERN INDIANA WFO	6.01				.17	.09		.45	.14	.07		T	.76	1.98	2.13	.13														.09		
NORTH MANCHESTER WWTP	3.17			.15	.36	.02	.20		.16			.17	.80	.38	.89	.01														.03		
PERU WWTP	2.25			.10	.23		.12		.06			.30	.57	.03	.74														.10			
PLYMOUTH	7.40					.97	.16	.21		.50			.05	1.50	1.04	2.96														.01		
ROCHESTER	3.90				.10	.60		.24		.15			.14	.95	.07	1.65																
SOUTH BEND WSO AP //R	13.92				1.44	.19	T	.16	.93	.04		.01	.23	6.58	4.07	.03													.20	.04		
WABASH	M	-			.73	.12	*	.03	*	.03		*	.76	1.07	*	.06			-	-	-	-		-	-	-	-	-	-		.06		
WARSAW	5.14				.20	.21	.01		.31	.10			.66	1.26	.45	1.89	.05															
WARSAW 4 S	4.28				.04	.26	.02	.23	.01	.09			.19	1.72	.20	1.52	T															
NORTHEAST 03																																
ANGOLA	6.32				.37	.16		.30		.41			.03	1.42	2.06	1.37														.20		
BERNE WWTP	1.64				.37		T		.08			.50	.16	.01	.52																	
BLUFFTON 1 N	2.27					.31		.02		.12			.35	.50		.59														.38		
BUTLER 1 SE	4.76				.42	.10		.26		.15			.04	2.23	.67	.89																

Climatological Data – Tips

Be careful with time of observation !!

This can trip up an investigation.

Each daily observation is for the 24 hour period ENDING at the time of observation.

Example:

Station Index says time of observation is 8 am for this station

then data listed for July 20 are for the 24 hour period

8 am on July 19 → 8 am on July 20

What are “official” weather data

Cooperative stations are designated as official data

- operated by volunteers
- supervised by the National Weather Service
  - uses NWS approved equipment
  - often equipment is supplied by NWS
  - at least once annual on site visits by NWS
  - data are quality controlled by federal agencies
- endorsed by climatologists worldwide
- are more readily accepted in court

Cooperative station data online

Portal web sites for cooperative station data

Locate a cooperative station
http://lwf.ncdc.noaa.gov/oa/climate/stationlocator.html

Recent cooperative station data
http://www.weather.gov

Historical cooperative station data
http://www.iclimate.org

Let's try these now (live demo)

CoCoRaHS

a resource for daily precipitation data

What is CoCoRaHS

CoCoRaHS is a grassroots volunteer network of backyard weather observers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow) in their local communities. By using low-cost measurement tools, stressing training and education, and utilizing an interactive Web-site, our aim is to provide the highest quality data for natural resource, education and research applications. The only requirements to join are an enthusiasm for watching and reporting weather conditions and a desire to learn more about how weather can effect and impact our lives.

Why CoCoRaHS

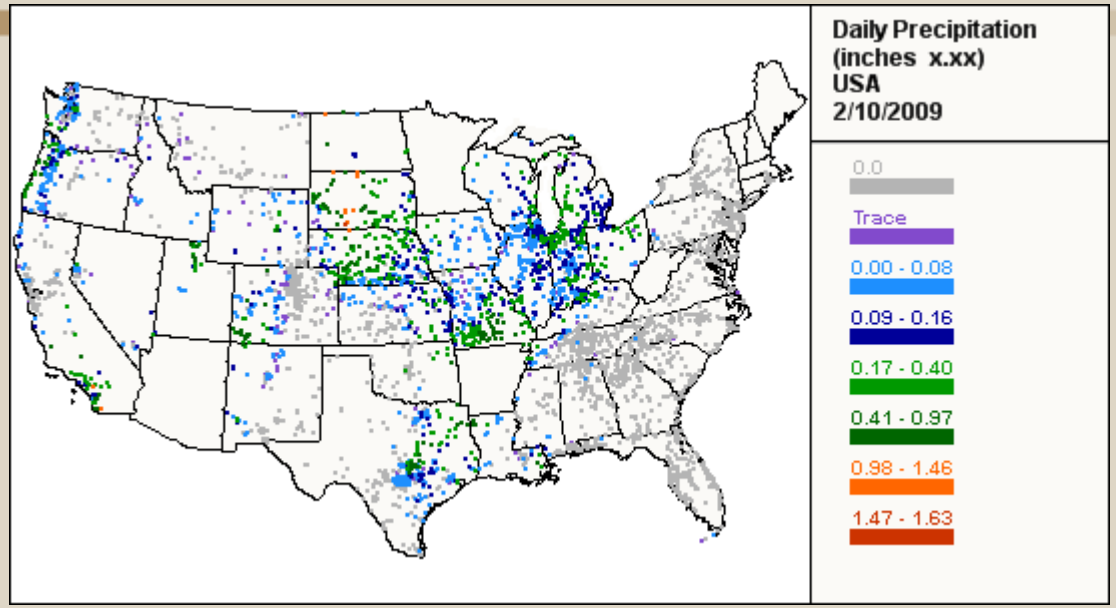
Cooperative station network precipitation data should be supplemented because

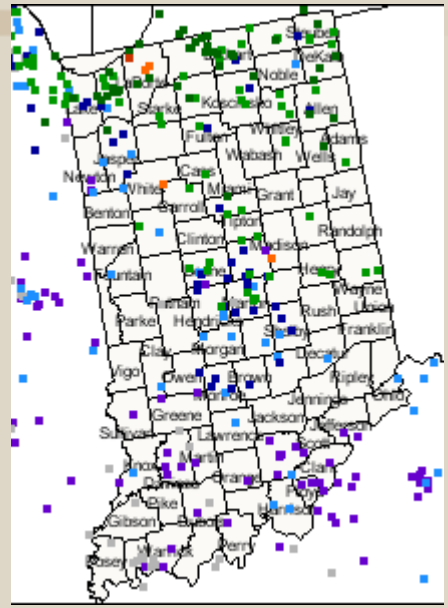
- Precipitation is highly variable over short distances
- Stations are few and far between
  - typically only one or two stations per county

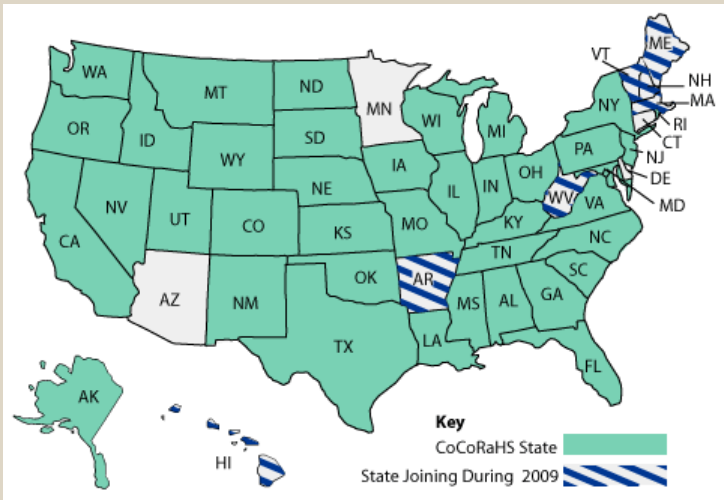
CoCoRaHS objectives

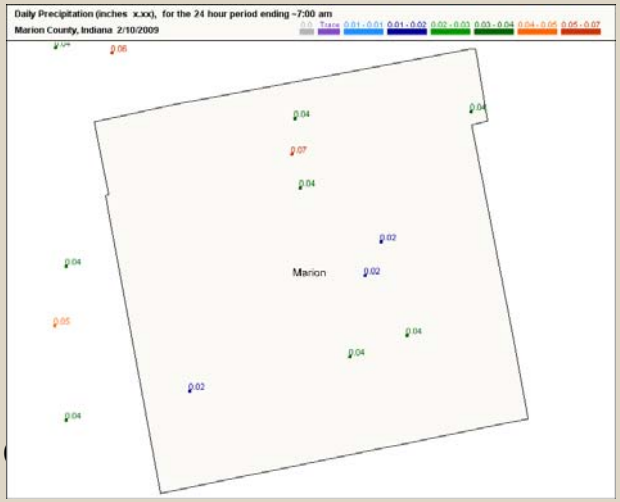
- Preferred station density would be 20 times
- Consistency insures high data quality
  - standard equipment
  - standard measurement technique
  - standard reporting site and procedure

Where is CoCoRaHS



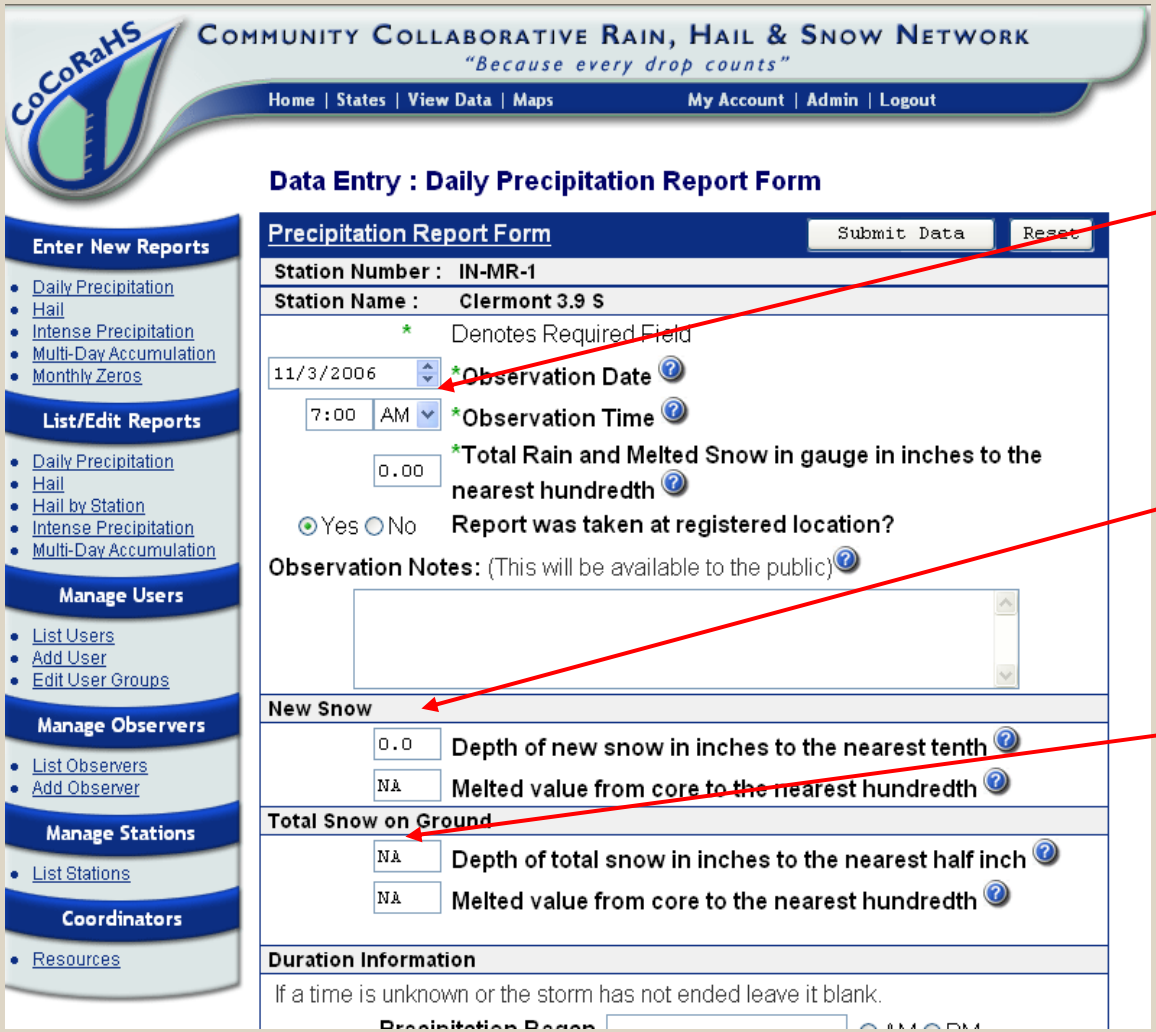






Indiana has 1033 Observers!

Observers enter data to the CoCoRaHS web site



Water Content of Melted Snow and ice That Fell in the Last 24 Hours

Depth of new snow and ice in the last 24 hrs.

Total Depth of Snow on the ground (new + old)

Other Reports

- Hail Report
- Intense Precipitation Report
- Monthly Zeros
- Multi-Day Precipitation Report
- Daily Precipitation Report

Photo by Henry Reges

CoCoRaHS station data online

The portal web site for CoCoRaHS

http://www.cocorahs.org

This web site is used by observers to enter data and by the public to retrieve CoCoRaHS data

Let's visit this web site now (live demo)

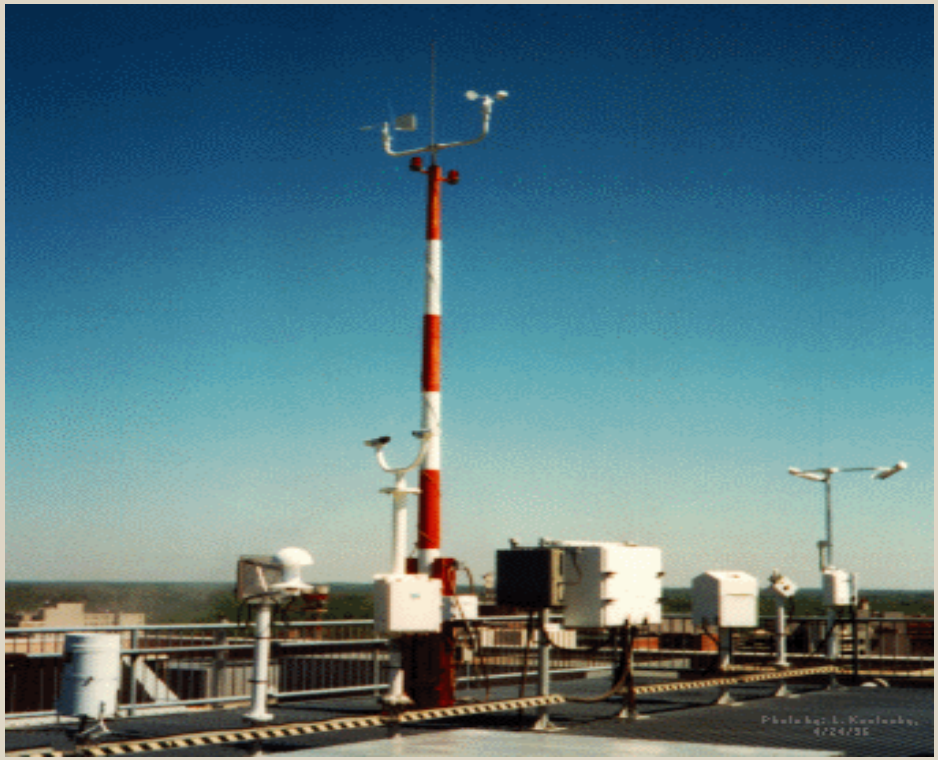
CoCoRaHS - Tips

There is no offline data publication

CoCoRaHS data is not official

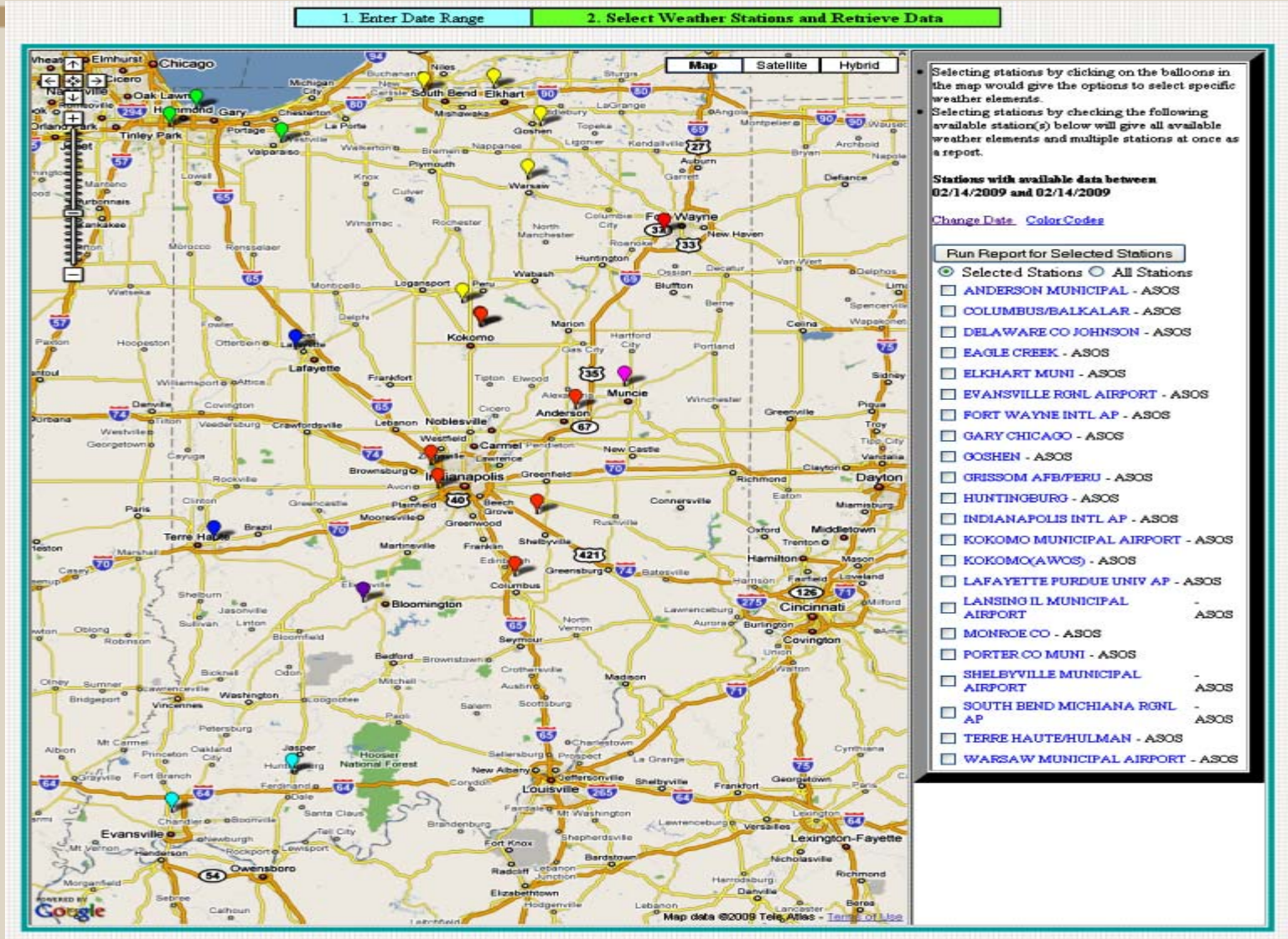
- No NWS annual visits to verify proper station setup and observation procedure but observers are trained to assure a high quality dataset

Automated Surface Observing Stations (ASOS)



a resource for hourly weather data

ASOS stations in Indiana



ASOS station elements

Weather elements observed

- Sky conditions - cloud height and cloud amount up to 12,000 feet
- Surface visibility up to at least 10 statute miles
- Basic present weather information such as the type and intensity for rain, snow, and freezing rain
- Obstructions to vision like fog, haze, and/or dust
- Sea-level pressure and altimeter settings
- Air and dew point temperatures
- Wind direction, speed and character (gusts, squalls)
- Precipitation accumulation
- Selected significant remarks including- variable cloud height, variable visibility, precipitation beginning/ending times, rapid pressure changes, pressure change tendency, wind shift, peak wind.

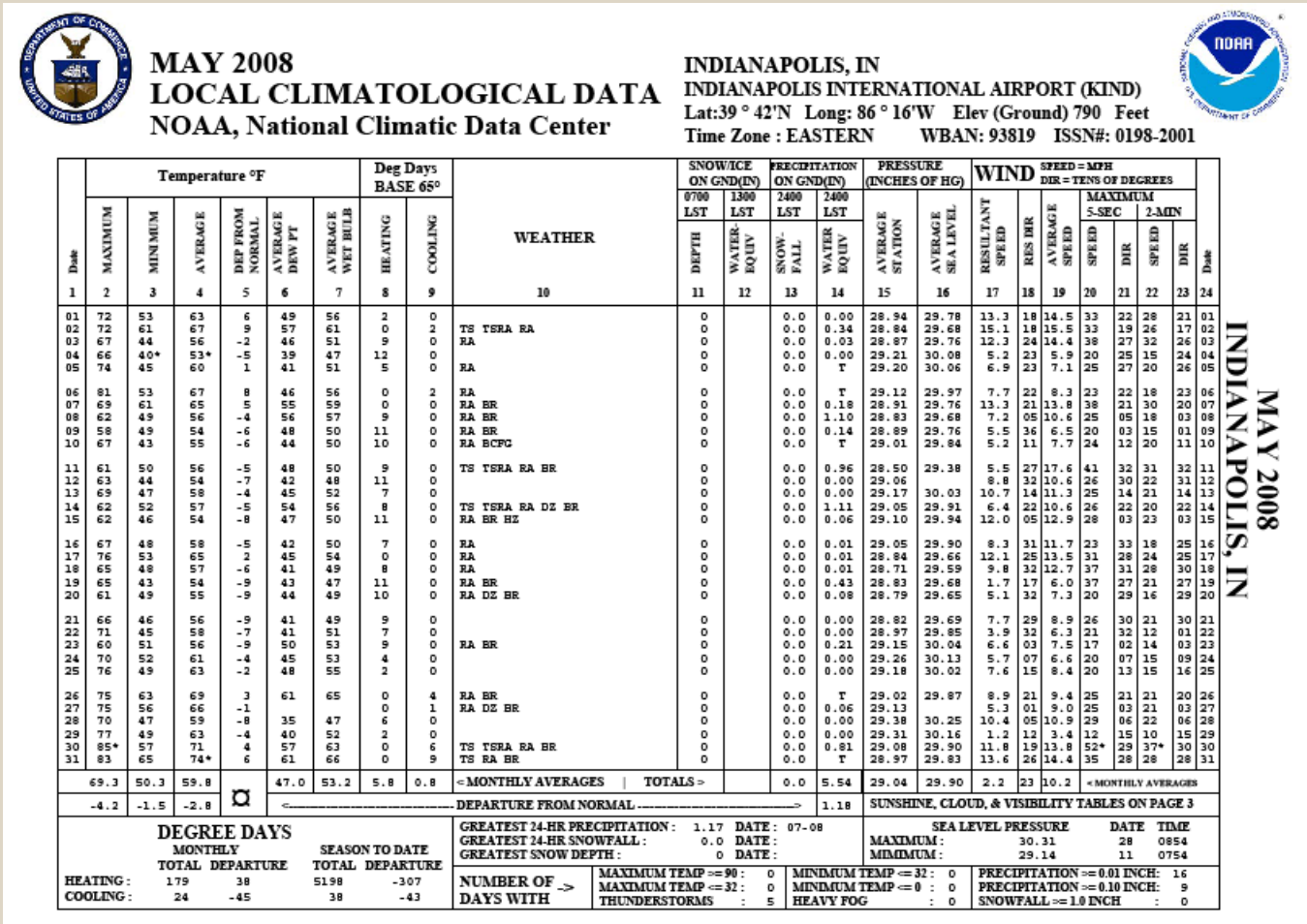
ASOS data publication

Offline hard copy resource

Data are published monthly in

Local Climatological Data (station name)

Local Climatological Data – IND (p 1)



MAY 2008
LOCAL CLIMATOLOGICAL DATA
NOAA, National Climatic Data Center

INDIANAPOLIS, IN
INDIANAPOLIS INTERNATIONAL AIRPORT (KIND)
Lat:39 ° 42'N Long: 86 ° 16'W Elev (Ground) 790 Feet
Time Zone : EASTERN WBAN: 93819 ISSN#: 0198-2001

MAY 2008
INDIANAPOLIS, IN

Date	Temperature °F MAXIMUM	MINIMUM	AVERAGE	DEP FROM NORMAL	AVERAGE DEW PT	AVERAGE WET BULB	Deg Days BASE 65° HEATING	COOLING	WEATHER	SNOW/ICE ON GND(IN) 0700 LST DEPTH	1300 LST WATER-EQUIV	PRECIPITATION ON GND(IN) 2400 LST SNOW-FALL	2400 LST WATER EQUIV	PRESSURE (INCHES OF HG) AVERAGE STATION	AVERAGE SEA LEVEL	WIND SPEED = MPH DIR = TENS OF DEGREES RESULTANT SPEED	RES DIR	AVERAGE SPEED	MAXIMUM 5-SEC SPEED	5-SEC DIR	2-MIN SPEED	2-MIN DIR	Date
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
01	72	53	63	6	49	56	2	0		0		0.0	0.00	28.94	29.78	13.3	18	14.5	33	22	28	21	01
02	72	61	67	9	57	61	0	2	TS TSRA RA	0		0.0	0.34	28.84	29.68	15.1	18	15.5	33	19	26	17	02
03	67	44	56	-2	46	51	9	0	RA	0		0.0	0.03	28.87	29.76	12.3	24	14.4	38	27	32	26	03
04	66	40*	53*	-5	39	47	12	0		0		0.0	0.00	29.21	30.08	5.2	23	5.9	20	25	15	24	04
05	74	45	60	1	41	51	5	0	RA	0		0.0	T	29.20	30.06	6.9	23	7.1	25	27	20	26	05
06	81	53	67	8	46	56	0	2	RA	0		0.0	T	29.12	29.97	7.7	22	8.3	23	22	18	23	06
07	69	61	65	5	55	59	0	0	RA BR	0		0.0	0.18	28.91	29.76	13.3	21	13.8	38	21	30	20	07
08	62	49	56	-4	56	57	9	0	RA BR	0		0.0	1.10	28.83	29.68	7.2	05	10.6	25	05	18	03	08
09	58	49	54	-6	48	50	11	0	RA BR	0		0.0	0.14	28.89	29.76	5.5	36	6.5	20	03	15	01	09
10	67	43	55	-6	44	50	10	0	RA BCFG	0		0.0	T	29.01	29.84	5.2	11	7.7	24	12	20	11	10
11	61	50	56	-5	48	50	9	0	TS TSRA RA BR	0		0.0	0.96	28.50	29.38	5.5	27	17.6	41	32	31	32	11
12	63	44	54	-7	42	48	11	0		0		0.0	0.00	29.06		8.8	32	10.6	26	30	22	31	12
13	69	47	58	-4	45	52	7	0		0		0.0	0.00	29.17	30.03	10.7	14	11.3	25	14	21	14	13
14	62	52	57	-5	54	56	8	0	TS TSRA RA DZ BR	0		0.0	1.11	29.05	29.91	6.4	22	10.6	26	22	20	22	14
15	62	46	54	-8	47	50	11	0	RA BR HZ	0		0.0	0.06	29.10	29.94	12.0	05	12.9	28	03	23	03	15
16	67	48	58	-5	42	50	7	0	RA	0		0.0	0.01	29.05	29.90	8.3	31	11.7	23	33	18	25	16
17	76	53	65	2	45	54	0	0	RA	0		0.0	0.01	28.84	29.66	12.1	25	13.5	31	28	24	25	17
18	65	48	57	-6	41	49	8	0	RA	0		0.0	0.01	28.71	29.59	9.8	32	12.7	37	31	28	30	18
19	65	43	54	-9	43	47	11	0	RA BR	0		0.0	0.43	28.83	29.68	1.7	17	6.0	37	27	21	27	19
20	61	49	55	-9	44	49	10	0	RA DZ BR	0		0.0	0.08	28.79	29.65	5.1	32	7.3	20	29	16	29	20
21	66	46	56	-9	41	49	9	0		0		0.0	0.00	28.82	29.69	7.7	29	8.9	26	30	21	30	21
22	71	45	58	-7	41	51	7	0		0		0.0	0.00	28.97	29.85	3.9	32	6.3	21	32	12	01	22
23	60	51	56	-9	50	53	9	0	RA BR	0		0.0	0.21	29.15	30.04	6.6	03	7.5	17	02	14	03	23
24	70	52	61	-4	45	53	4	0		0		0.0	0.00	29.26	30.13	5.7	07	6.6	20	07	15	09	24
25	76	49	63	-2	48	55	2	0		0		0.0	0.00	29.18	30.02	7.6	15	8.4	20	13	15	16	25
26	75	63	69	3	61	65	0	4	RA BR	0		0.0	T	29.02	29.87	8.9	21	9.4	25	21	21	20	26
27	75	56	66	-1			0	1	RA DZ BR	0		0.0	0.06	29.13		5.3	01	9.0	25	03	21	03	27
28	70	47	59	-8	35	47	6	0		0		0.0	0.00	29.38	30.25	10.4	05	10.9	29	06	22	06	28
29	77	49	63	-4	40	52	2	0		0		0.0	0.00	29.31	30.16	1.2	12	3.4	12	15	10	15	29
30	85*	57	71	4	57	63	0	6	TS TSRA RA BR	0		0.0	0.81	29.08	29.90	11.8	19	13.8	52*	29	37*	30	30
31	83	65	74*	6	61	66	0	9	TS RA BR	0		0.0	T	28.97	29.83	13.6	26	14.4	35	28	28	28	31
	69.3	50.3	59.8		47.0	53.2	5.8	0.8	< MONTHLY AVERAGES | TOTALS >			0.0	5.54	29.04	29.90	2.2	23	10.2	< MONTHLY AVERAGES				
	-4.2	-1.5	-2.8		< DEPARTURE FROM NORMAL >								1.18	SUNSHINE, CLOUD, & VISIBILITY TABLES ON PAGE 3									

DEGREE DAYS

	MONTHLY TOTAL	MONTHLY DEPARTURE	SEASON TO DATE TOTAL	SEASON TO DATE DEPARTURE
HEATING :	179	38	5198	-307
COOLING :	24	-45	38	-43

GREATEST 24-HR PRECIPITATION : 1.17 DATE : 07-08
GREATEST 24-HR SNOWFALL : 0.0 DATE :
GREATEST SNOW DEPTH : 0 DATE :

SEA LEVEL PRESSURE		DATE	TIME
MAXIMUM :	30.31	28	0854
MINIMUM :	29.14	11	0754

NUMBER OF DAYS WITH ->

MAXIMUM TEMP >= 90 :	0	MINIMUM TEMP <= 32 :	0
MAXIMUM TEMP <= 32 :	0	MINIMUM TEMP <= 0 :	0
THUNDERSTORMS :	5	HEAVY FOG :	0

PRECIPITATION >= 0.01 INCH :	16
PRECIPITATION >= 0.10 INCH :	9
SNOWFALL >= 1.0 INCH :	0

Local Climatological Data – IND (p 2)

HOURLY PRECIPITATION
(WATER EQUIVALENT IN INCHES)

INDIANAPOLIS, IN (KIND)
MAY 2008
WBAN # 93819

Date	FOR HOUR (LST) ENDING AT												Date	FOR HOUR (LST) ENDING AT												Date	Sum of Hourly Data	2400 LST Water Equiv.
	1	2	3	4	5	6	7	8	9	10	11	12		13	14	15	16	17	18	19	20	21	22	23	24			
01													01													01	0.00	0.00
02	T	T	0.01	T	T		T	T	T	T	T	T	02	0.09	0.02	T	T			T	0.02	0.01	0.01	T	0.18	02	0.34	0.34
03	0.03	T	T										03													03	0.03	0.03
04													04													04	0.00	0.00
05													05								T	T				05	T	T
06	T	T											06													06	T	T
07				T	T	T		T	T	T	T	T	07	0.02	0.08	T		0.01		T	0.01	0.01	0.02	0.01	0.02	07	0.18	0.18
08	0.01	T	T	0.01	T	0.01	0.03	0.04	0.02	0.06	0.11	0.05	08	0.26	0.12	0.17	0.14	0.06	0.01	T	T	T				08	1.10	1.10
09													09			T	0.02	0.04	0.01	0.02	0.05					09	0.14	0.14
10													10										T	T		10	T	T
11	0.04	0.15	0.07	0.12	0.12	T	0.22	0.08	0.01	0.02	T	T	11	0.03	T	0.03	0.04	0.02	0.01							11	0.96	0.96
12													12													12	0.00	0.00
13													13													13	0.00	0.00
14	T	0.23	0.18	0.23	0.38	0.09						T	14	T	T	T	T	T	T							14	1.11	1.11
15													15					T	0.01	0.03	0.02	T	T	T	T	15	0.06	0.06
16	0.01	T											16													16	0.01	0.01
17											T	T	17												0.01	17	0.01	0.01
18	0.01	T											18													18	0.01	0.01
19													19	T	0.03	0.15	0.15	0.09	T	T	0.01					19	0.43	0.43
20	0.02	T	T	0.05	0.01								20													20	0.08	0.08
21													21													21	0.00	0.00
22													22													22	0.00	0.00
23		T	0.01	0.01	0.06	0.06	T	T				T	23	0.03	0.03	T	0.01	T			T	T				23	0.21	0.21
24													24													24	0.00	0.00
25													25													25	0.00	0.00
26						T						T	26	T	T	T										26	T	T
27								T	T	T			27						0.01	0.03	0.02	T	T	T		27	0.06	0.06
28													28													28	0.00	0.00
29													29													29	0.00	0.00
30													30										T	0.68	0.13	30	0.81	0.81
31	T	T											31													31	T	T

* Indicates sum of Hourly and Daily disagree.

MAXIMUM SHORT DURATION PRECIPITATION (See Note)

Time Period (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
Precipitation (Inches)	0.36	0.58	0.65	0.69	0.71	0.73	0.77	0.80	0.81	0.81	0.81	0.81
Ending Date	30	30	30	30	30	30	30	30	30	30	30	30
Ending Time (Hr/Min)	2251	2255	2258	2304	2309	2309	2343	2347	2347	2347	2347	2347

Date and time are not entered for TRACE amounts.

Note : The hourly and daily precipitation totals are printed in the last 2 columns and hi-lighted in red when they disagree. NWS does not edit ASOS hourly values but may edit daily and monthly totals. Hourly, daily, and monthly totals are printed as reported by the ASOS site.

NOAA, National Climatic Data Center

PAGE 2

Local Climatological Data – IND (p 6)

OBSERVATIONS AT 3-HOURLY INTERVALS

INDIANAPOLIS, IN
MAY 2008 KIND WBAN # 93819

HOUR (LST)	SKY COVER	CEILING (100's of FT)	SATELLITE: Observation Time (LST)	SATELLITE: EFF Cld Amt Oktas	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F: DRY BULB	TEMPERATURE °F: DEW POINT	TEMPERATURE °F: WET BULB	RELATIVE HUMIDITY (pCT)	WIND: SPEED (MPH)	WIND: DIRECTION Tens of Deg	PRESSURE (INCHES, HG): STATION	PRESSURE (INCHES, HG): SEA LEVEL
SUNRISE: 0523						MAY 25						SUNSET: 2001		
01	SCT	230			10.00		56	42	49	60	0	00	29.24	30.10
04	FEW	230			10.00		51	42	47	71	7	12	29.24	30.10
07	FEW	230			10.00		55	44	49	67	8	12	29.24	30.11
10	BKN	250			10.00		67	47	56	49	11	15	29.24	30.10
13	OVC	250			10.00		73	47	59	40	9	16	29.19	30.05
16	OVC	180			10.00		76	51	61	42	10	16	29.13	29.98
19	OVC	230			10.00		73	52	61	48	9	15	29.06	29.91
22	BKN	230			10.00		69	52	59	55	9	16	29.03	29.87
SUNRISE: 0523						MAY 26						SUNSET: 2001		
01	OVC	180			10.00		68	53	59	59	9	18	29.01	29.85
04	OVC	160			10.00		69	58	62	68	13	22	29.02	29.86
07	BKN	200			10.00		68	60	63	76	6	22	29.03	29.87
10	BKN	140			10.00		74	61	66	64	14	20	29.04	29.88
13	OVC	130			10.00	-RA	71	64	67	79	14	20	29.02	29.86
16	OVC	150			10.00		72	65	68	79	7	24	29.03	29.87
19	BKN	180			10.00		72	64	67	76	8	21	29.02	29.86
22	SCT	180			10.00		66	63	64	90	3	23	29.04	29.88
SUNRISE: 0522						MAY 27						SUNSET: 2002		
01	CLR	NC			2.50	BR	63	62	62	97	6	24	29.05	29.89
04					0.12						3	21		
07					0.50						5	24		
10	OVC	004			3.00	BR	61	59	60	93	10	34	29.13	29.99
13	OVC	130			10.00		69	57	62	66	8	02	29.16	30.02
16	OVC	200			10.00		71	56	62	59	15	36	29.18	30.03
19	OVC	130			4.00	-RA	63	58	60	84	11	03	29.21	30.07
22	OVC	130			10.00	-RA	58	53	55	84	10	04	29.29	30.16
SUNRISE: 0521						MAY 28						SUNSET: 2003		
01	OVC	250			10.00		55	43	49	64	18	07	29.33	30.19
04	SCT	200			10.00		50	33	42	52	13	06	29.36	30.23
07	FEW	080			10.00		48	32	41	54	14	05	29.42	30.29
10	CLR	NC			10.00		55	34	45	45	11	04	29.43	30.30
13	CLR	NC			10.00		64	38	51	38	13	04	29.42	30.28
16	CLR	NC			10.00		70	37	53	30	13	06	29.37	30.24
19	CLR	NC			10.00		68	33	51	27	10	04	29.35	30.21
22	CLR	NC			10.00		60	35	48	39	6	02	29.36	30.23
SUNRISE: 0521						MAY 29						SUNSET: 2004		
01	CLR	NC			10.00		55	39	47	55	8	03	29.35	30.21
04	CLR	NC			10.00		53	38	46	57	5	VR	29.34	30.21
07	FEW	250			10.00		55	39	47	55	3	06	29.37	30.23
10	FEW	250			10.00		67	40	53	37	5	VR	29.37	30.23
13	SCT	250			10.00		73	37	55	27	0	00	29.32	30.18
16	BKN	250			10.00		76	39	56	26	0	00	29.26	30.12
19	BKN	250			10.00		70	44	56	39	6	20	29.22	30.09
22	BKN	250			10.00		67	44	55	44	0	00	29.21	30.07
SUNRISE: 0520						MAY 30						SUNSET: 2005		
01	FEW	250			10.00		64	43	53	47	11	16	29.16	30.02
04	BKN	250			10.00		61	46	53	58	6	17	29.16	30.02
07	OVC	250			10.00		61	49	55	65	6	15	29.15	30.01
10	BKN	250			10.00		74	63	67	69	15	20	29.10	29.96
13	BKN	250			10.00		81	63	69	54	15	20	29.06	29.90
16	SCT	250			10.00		84	62	70	48	20	20	28.97	29.81
19	BKN	250			10.00		79	62	68	56	16	20	28.94	29.78
22	OVC	060			10.00	-TSRA	69	61	64	76	17	32	28.95	29.79

HOUR (LST)	SKY COVER	CEILING (100's of FT)	SATELLITE: Observation Time (LST)	SATELLITE: EFF Cld Amt Oktas	VISIBILITY (MILES)	WEATHER	TEMPERATURE °F: DRY BULB	TEMPERATURE °F: DEW POINT	TEMPERATURE °F: WET BULB	RELATIVE HUMIDITY (pCT)	WIND: SPEED (MPH)	WIND: DIRECTION Tens of Deg	PRESSURE (INCHES, HG): STATION	PRESSURE (INCHES, HG): SEA LEVEL
SUNRISE: 0520						MAY 31						SUNSET: 2005		
01	OVC	080			10.00		73	67	69	82	22	23	28.92	29.76
04	OVC	031			10.00		69	64	66	84	14	25	28.94	29.77
07	SCT	120			7.00		69	65	66	87	13	23	28.98	29.83
10	BKN	016			9.00		74	66	69	76	14	26	29.01	29.85
13	SCT	065			10.00		81	61	68	51	23	27	29.00	29.84
16	BKN	230			10.00		81	55	65	41	20	30	29.01	29.85
19	SCT	230			10.00		78	55	64	45	13	28	29.00	29.84
22	SCT	230			10.00		70	56	62	61	5	24	29.04	29.88

3-HOURLY OBSERVATION NOTES

Sky Cover is the amount of the sky obscured. CLR or SKC = 0, FEW = 1/8-2/8, SCT = 3/8-4/8, BKN = 5/8-7/8, OVC = 8/8, W = Vertical Visibility = 8/8

Ceiling is reported in hundreds of feet above ground level for clouds at or below 12,000 feet. NC = No Ceiling detected.

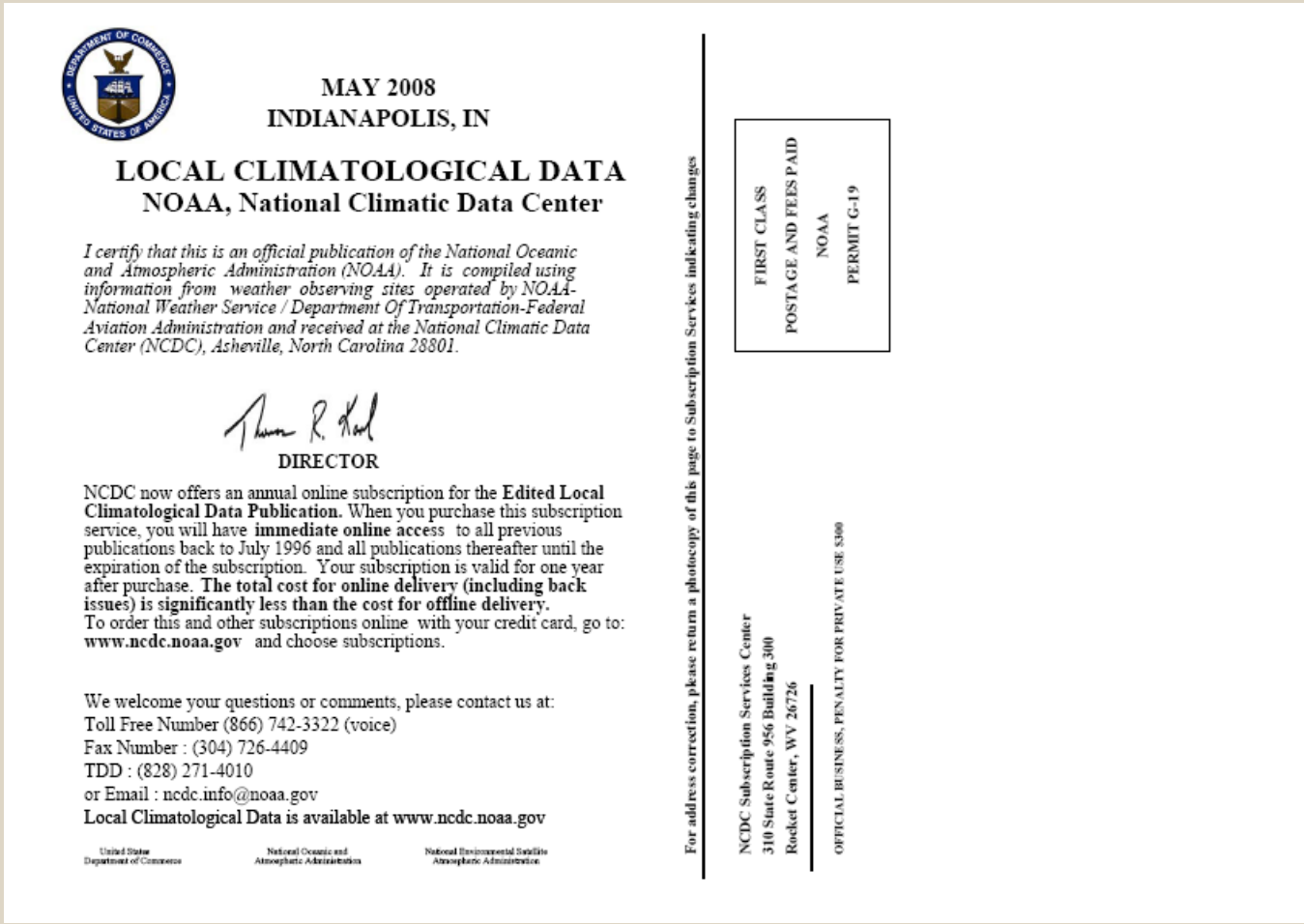
& = Original observation contained additional weather elements. See page 3 for additional notes.

SUMMARY BY HOUR

HOUR (LST)	AVERAGES: CHLOMETER	AVERAGES: EFF CLD AMT	AVERAGES: DRY BULB	AVERAGES: DEW POINT	AVERAGES: WET BULB	AVERAGES: RELATIVE HUMIDITY	AVERAGES: PRESSURE (Inches, HG): STATION	AVERAGES: PRESSURE (Inches, HG): SEA LEVEL	AVERAGES: VISIBILITY (Miles)	AVERAGES: WIND SPEED (MPH)	RESULTANT WIND (MPH): SPEED	RESULTANT WIND (MPH): DIRECTION
01			56	47	51	74	29.01	29.87	9.24	9	1	20
02			55	47	51	75	29.00	29.86	9.27	9	1	18
03			54	46	50	77	29.00	29.85	9.04	9	1	18
04			53	46	49	76	29.00	29.85	9.00	9	1	18
05			52	46	49	79	29.00	29.85	8.94	7	1	17
06			52	46	49	80	29.01	29.86	9.03	7	1	17
07			54	47	50	77	29.02	29.87	8.73	8	1	19
08			57	48	53	72	29.03	29.88	9.14	9	1	21
09			60	47	53	65	29.02	29.88	8.87	11	2	22
10			62	48	55	62	29.03	29.88	9.13	12	3	25
11			64	48	55	59	29.03	29.88	9.45	12	4	25
12			65	48	56	56	29.02	29.87	9.45	13	4	25
13			66	48	56	56	29.01	29.86	9.42	12	5	25
14			67	48	57	55	29.01	29.86	9.45	12	5	25
15			67	48	57	55	29.00	29.85	9.61	12	6	26
16			66	48	56	55	28.99	29.84	9.10	13	5	25
17			66	47	56	56	28.99	29.84	8.84	13	4	25
18			65	48	56	57	28.99	29.84	9.29	12	3	25
19			64	47	55	58	28.99	29.85	9.26	11	2	24
20			62	47	54	62	29.00	29.85	9.45	9	1	21
21			60	47	53	65	29.00	29.86	9.84	9	1	18
22			59	47	53	67	29.01	29.87	9.77	9	1	19
23			58	47	52	68	29.01	29.87	9.44	8	2	21
24			57	48	52	71	29.02	29.87	9.52	9	2	22

PAGE 6

Local Climatological Data – IND (p 8)



MAY 2008
INDIANAPOLIS, IN

LOCAL CLIMATOLOGICAL DATA
NOAA, National Climatic Data Center

I certify that this is an official publication of the National Oceanic and Atmospheric Administration (NOAA). It is compiled using information from weather observing sites operated by NOAA-National Weather Service / Department Of Transportation-Federal Aviation Administration and received at the National Climatic Data Center (NCDC), Asheville, North Carolina 28801.

DIRECTOR

NCDC now offers an annual online subscription for the **Edited Local Climatological Data Publication.** When you purchase this subscription service, you will have **immediate online access** to all previous publications back to July 1996 and all publications thereafter until the expiration of the subscription. Your subscription is valid for one year after purchase. **The total cost for online delivery (including back issues) is significantly less than the cost for offline delivery.**
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Local Climatological Data – Tips

Note that the Observations page displays data for every third hour to conserve page space.

Data for every hour are available online.

Hourly precipitation data are recorded using a tipping bucket rain gauge which is unreliable in winter. It is best to find a nearby cooperative station for comparison when using wintertime precipitation.

ASOS are official data

Local Climatological Data from ASOS sites are designated as official data

- data collection by automated equipment
- operated by the National Weather Service
  - uses NWS installed equipment
  - NWS technicians are assigned routine ASOS maintenance
  - data are quality controlled by NWS in near real time
  - further quality control is by National Climatic Data Center
- endorsed by climatologists worldwide
- are more readily accepted in court

ASOS station data online

Portal web sites for ASOS station data

Locate an ASOS station
http://www.faa.gov/AIRPORTS_AIRTRAFFIC/WEATHER/ASOS/?state=IN

Recent ASOS station data
http://www.weather.gov/IND (previous 3 days)

Historical ASOS station data
http://www.iclimate.org (since 1940s)
http://weather.uwyo.edu (previous month)

Let's try these now (live demo)


STORM
DATA

Storm Data – what is it

Storm data is the official federal collection of severe and unusual weather events

This collection is entered into an online database and is printed monthly as a NOAA publication titled *Storm Data and Unusual Weather Phenonema*

Who collects Storm Data

Each of the NWS's Weather Forecast Offices is responsible for collecting data from storm events.

They collect these reports from:

- Official NWS storm surveys
- Emergency managers
- Official NWS observations
- CoCoRaHS reports
- Amateur radio operators
- Newspaper clippings / Media outlets
- Other sources

Weather Forecast Offices have up to 60 days from the end of a month to transmit storm data to NWS headquarters

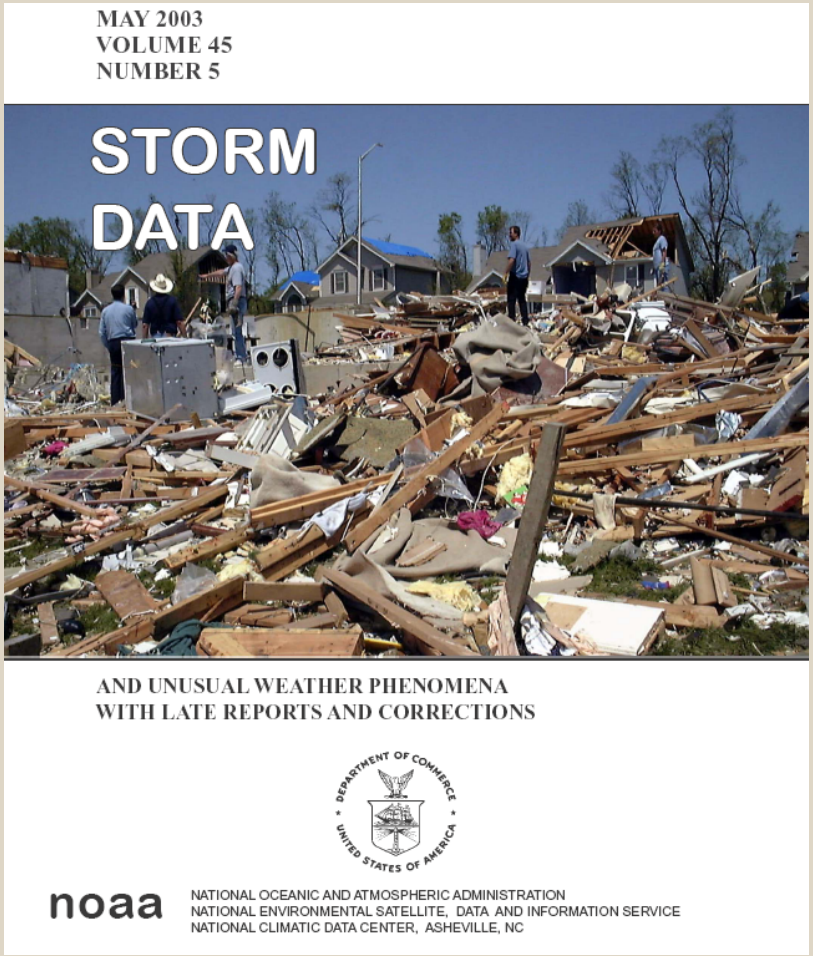
What facts are included in Storm Data

Event Type (ex. tornado, winter storm, flood)
Beginning and Ending time of event
Beginning and Ending location (state, county, location)
Source of the report
Event magnitude (tornado ef-scale, hail size, wind gust)
Injuries and deaths associated with the event
Crop and property damage estimates
Narrative description of the event

What is Storm Data used for

Storm Data publication
Storm Prediction Center's official severe weather database
NWS short fuse warning verification statistics
NWS internal service assessments
Army Corp of Engineers (structure design)
academic research studies
disaster reports
Congressional and other government data requests
public data requests

Storm Data and Unusual Weather Phenomena



published by National Climatic Data Center
chronological listing by state
events documented
- hurricanes
- tornadoes
- thunderstorms
- hail
- floods
- drought
- lightning
- high winds
- snow
- temperature extremes
- other weather phenomena

statistics on personal injuries
- and damage estimates

Storm Data (Outstanding Storms)

OUTSTANDING STORMS OF THE MONTH

Tornadoes in May 2003

May 4

A major tornado outbreak occurred across the Kansas City area from late afternoon into the evening of May 4, 2003. A dry line moved into eastern Kansas and initiated severe thunderstorm development. Several thunderstorms became tornadic with a total of five distinct tornado touchdowns in the Kansas City metropolitan area. Two of the tornadoes received a rating of F4, two a rating of F2, and one that was rated F1, as defined by the Fujita Tornado Scale. Four other tornadoes affected areas south and southeast of Kansas City. Significant tornado damage was observed from Kansas City, Kansas, to Gladstone and Liberty, in Missouri. Total damage exceeded $144 million dollars. The tornadoes resulted in one death and fifty injuries.

Above Left: A map depicts the 5 tornado tracks across the Kansas City metropolitan area. **Above Right:** F4 damage was noted around 91st and Leavenworth Road. *(Map and photo courtesy: Mike Hudson, WCM, NWS Kansas City, MO.)*

May 8

On May 8, 2003, a long track F4 tornado, as defined by the Fujita Tornado Scale, moved through the Oklahoma City metropolitan area. This tornado began in Moore, OK, moved generally in a northeasterly direction for 17.3 miles, affected areas of Oklahoma City, Midwest City and Choctow. This tornado caused 134 injuries with no fatalities. The General Motors Corporation Assembly Plant was one of the hardest hit with several buildings severely damaged along with 600 new sport utility vehicles and approximately 100 employee vehicles thrown around and damaged or destroyed. This was the first of two consecutive days with a tornado in the Oklahoma City metropolitan area.

Left: F3 damage occurred in Moore, Oklahoma. *(Photo courtesy: Mike Branick, WFO Norman, OK.)*

Storm Data (storm event listing)

Storm Data and Unusual Weather Phenomena

May 2003

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons Killed	Number of Persons Injured	Estimated Damage Property	Estimated Damage Crops	Character of Storm
INDIANA, Central									
Tippecanoe County									
Romney	14	1855EST			0	0			**Hail (0.88)**
Warren County									
Williamsport	14	1910EST 1922EST			0	0			**Hail (0.75)**
Clinton County									
Antioch	14	1915EST			0	0			**Hail (1.00)**
Tippecanoe County									
1 SE Monroe	14	1918EST			0	0			**Hail (0.88)**
Fountain County									
Attica to Mellott	14	1935EST 1945EST			0	0			**Hail (1.75)**
Clinton County									
Frankfort	14	1950EST 2000EST			0	0			**Hail (1.00)**
Clinton County									
Frankfort	14	1950EST			0	0			**Thunderstorm Wind (G65)**
Montgomery County									
Crawfordsville	14	2000EST			0	0			**Hail (0.75)**
Putnam County									
Roachdale	14	2025EST			0	0			**Hail (0.88)**
Boone County									
2 S Advance to 3 SE Advance	14	2045EST 2055EST	3	50	0	0	50K		**Tornado (F1)**
Marion County									
Indianapolis	14	2104EST 2110EST			0	0			**Hail (1.00)**
Hendricks County									
1 E Pittsboro to Pittsboro	14	2116EST			0	0			**Hail (0.75)**
Hamilton County									
Carmel	14	2119EST			0	0			**Hail (1.00)**
Howard County									
3 E Kokomo	14	2125EST			0	0			**Hail (0.88)**
Morgan County									
Mooresville	14	2130EST			0	0			**Hail (0.88)**
Shelby County									
7 N Shelbyville to Shelbyville	14	2150EST			0	0			**Hail (1.00)**
Hancock County									
Greenfield	14	2155EST 2210EST			0	0			**Hail (1.00)**
Johnson County									
Needham	14	2200EST			0	0	1.5K		**Lightning**
Rush County									
Rushville	14	2218EST			0	0			**Hail (1.00)**
Johnson County									
Greenwood	14	2300EST			0	0	15K		**Lightning**

A few supercells moved across central Indiana during the evening of May 14. The storms produced widespread large hail along their paths. Also, an F1 90 mph tornado cut a 3 mile and 10 minute long and 50 yard wide path just south of Advance in southwestern Boone County. The tornado damaged a school roof, outbuildings and several large trees. Damage was at 50K.

Shelby County									
3 SE Shelbyville	28	1500EST			0	0			**Thunderstorm Wind (G60)**
Rush County									
3 N Rushville	28	1530EST			0	0			**Thunderstorm Wind (G60)**
Montgomery County									
Crawfordsville	28	1830EST			0	0	30K		**Lightning**
Parke County									
Rockville	28	1906EST			0	0			**Hail (0.75)**
Morgan County									
Eminence	28	1930EST 2000EST			0	0	5K		**Thunderstorm Wind (G60)**

Storm Data - Tips

Small storm events are often not listed

- impact was in a small area (eg, local hail event)
- no information from the public (rural area)

Because a storm is not listed in Storm Data does not necessarily mean it didn't occur.

This is a critical fact for insurance adjusters to know. Try to find related data sources that mention thunderstorms, or use radar data.

By its very nature, *Storm Data* publication lags the event by six or more months. So what if we can't wait that long?

Storm event online databases

Recent Storm events (since 2 Jan 2000)

NWS Local Storm Reports

hosted by the Storm Prediction Center

best if you already know the approximate date

http://www.spc.noaa.gov/climo/online/

Historical storm events (most data since 1950s)

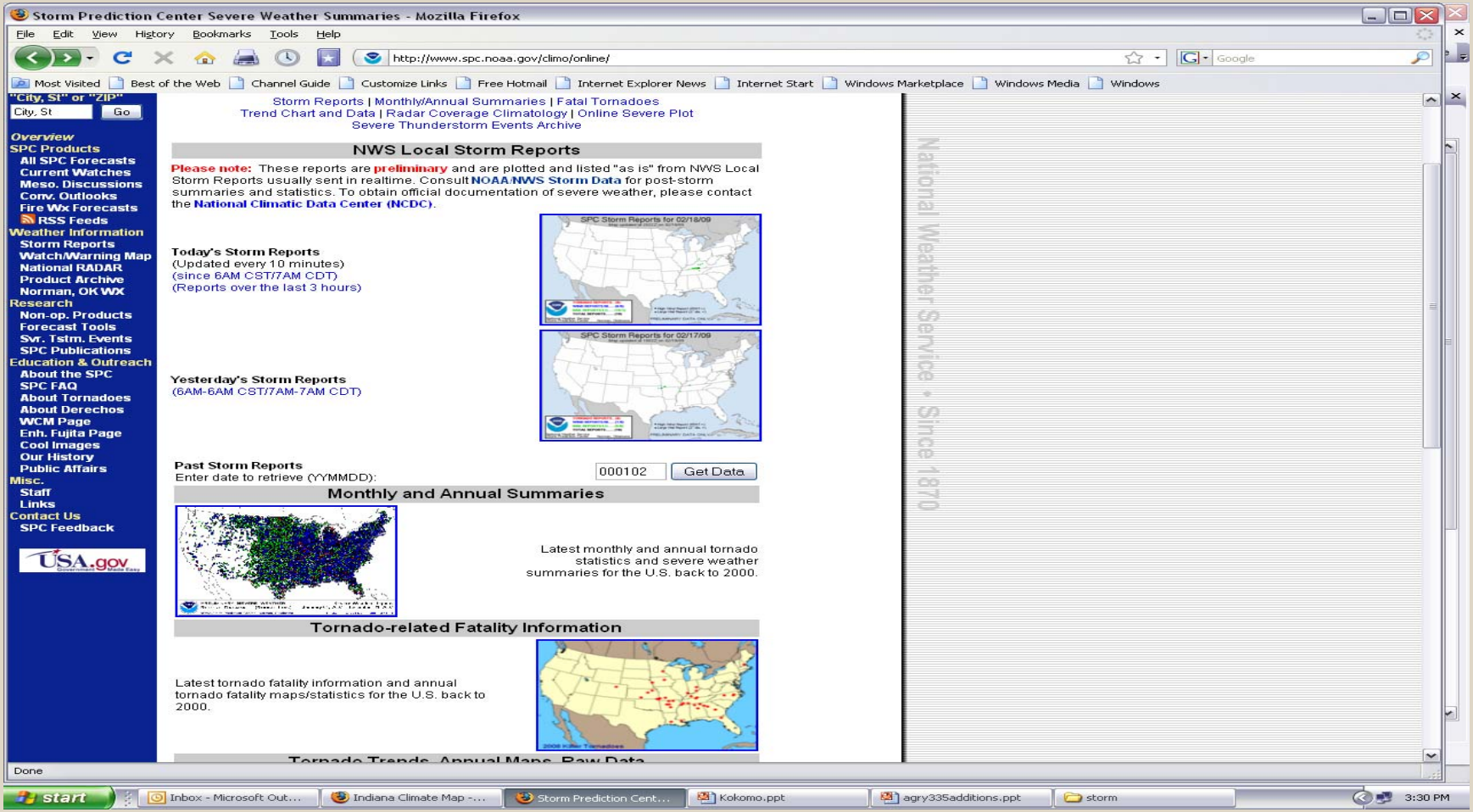
NCDC Storm Events

hosted by National Climatic Data Center

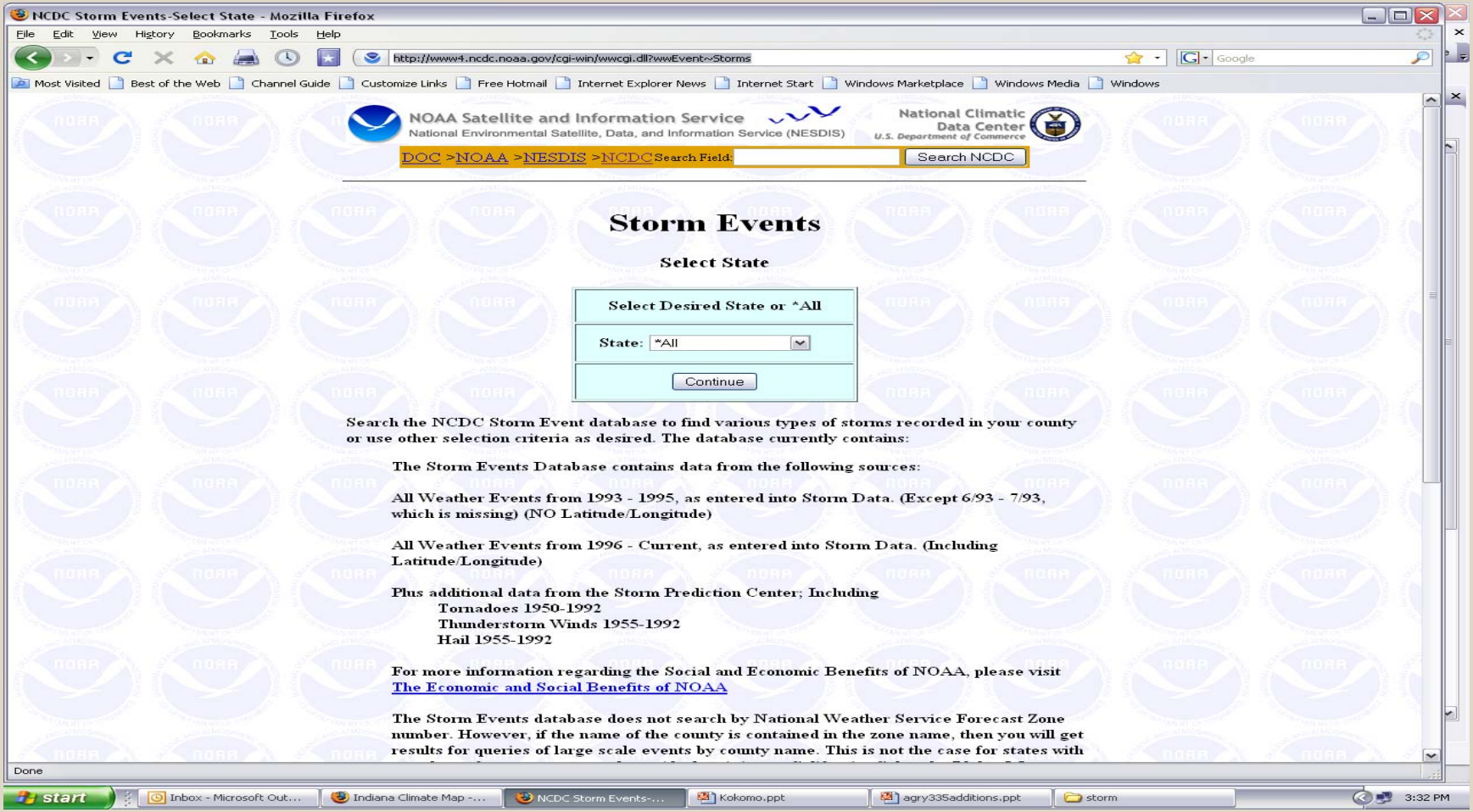
http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms

Let's try these now (live demo)

Recent storm events - online



Historical Storm Events - online



Astronomical Tables

The most commonly used in the forensics field are

- Sunrise and Sunset tables
- Moonrise and Moonset

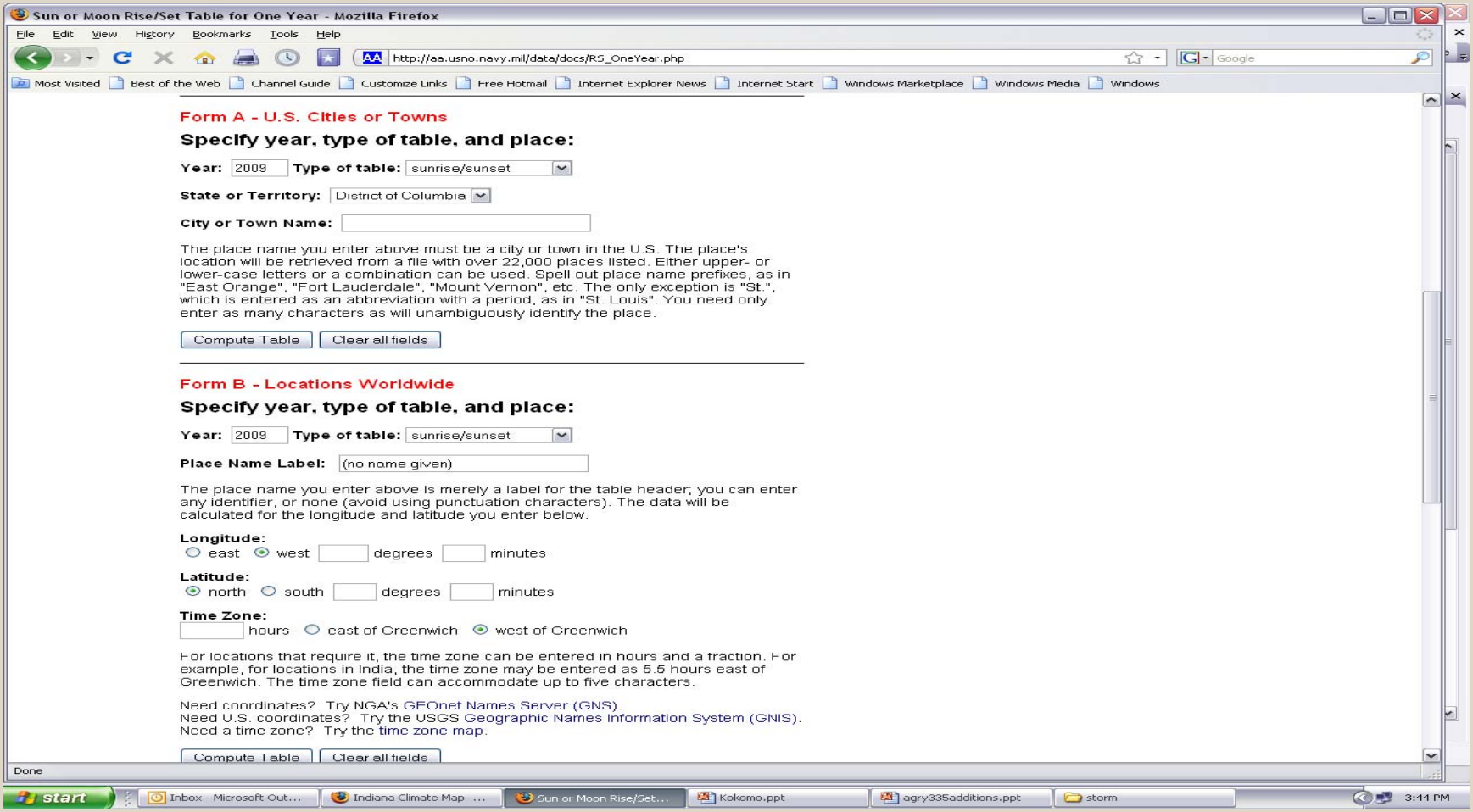
Cases usually involve crime scenes where visible identity of suspects is dependant on natural light levels (sun or moon)

The best portal for astronomical tables is

http://aa.usno.navy.mil/data/

Let's try this web site now (live demo)

Sunrise and Sunset tables (request)



Sunrise / Sunset for 2009 at Kokomo

Location: W086 08, N40 29

KOKOMO, INDIANA
Rise and Set for the Sun for 2009

Eastern Standard Time

Astronomical Applications Dept.
U. S. Naval Observatory
Washington, DC 20392-5420

	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
Day	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
01	0808	1729	0754	1803	0718	1836	0628	1909	0543	1940	0516	2009	0518	2019	0542	1959	0612	1916	0641	1826	0715	1741	0749	1718
02	0808	1730	0753	1804	0716	1837	0626	1910	0542	1942	0516	2010	0518	2019	0543	1958	0613	1914	0642	1825	0716	1740	0750	1718
03	0808	1731	0752	1805	0715	1839	0625	1911	0541	1943	0515	2010	0519	2018	0544	1957	0614	1913	0643	1823	0717	1739	0751	1718
04	0808	1731	0751	1807	0713	1840	0623	1912	0540	1944	0515	2011	0520	2018	0545	1956	0615	1911	0644	1821	0718	1738	0752	1718
05	0808	1732	0750	1808	0712	1841	0621	1914	0538	1945	0515	2012	0520	2018	0546	1955	0616	1910	0645	1820	0719	1736	0753	1718
06	0808	1733	0749	1809	0710	1842	0620	1915	0537	1946	0514	2012	0521	2018	0547	1953	0617	1908	0646	1818	0721	1735	0754	1718
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08	0808	1735	0746	1812	0707	1844	0617	1917	0535	1948	0514	2013	0522	2017	0549	1951	0619	1905	0648	1815	0723	1733	0755	1718
09	0808	1736	0745	1813	0705	1845	0615	1918	0534	1949	0514	2014	0523	2017	0550	1950	0620	1903	0649	1813	0724	1732	0756	1718
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11	0807	1738	0743	1815	0702	1847	0612	1920	0532	1951	0514	2015	0524	2016	0552	1947	0622	1900	0651	1810	0726	1730	0758	1718
12	0807	1739	0742	1816	0701	1848	0610	1921	0531	1952	0514	2015	0525	2015	0553	1946	0623	1858	0653	1809	0728	1729	0759	1718
13	0806	1741	0740	1818	0659	1849	0609	1922	0530	1953	0513	2016	0526	2015	0554	1944	0624	1856	0654	1807	0729	1729	0759	1718
14	0806	1742	0739	1819	0657	1851	0607	1923	0529	1954	0513	2016	0526	2014	0555	1943	0625	1855	0655	1806	0730	1728	0800	1718
15	0806	1743	0738	1820	0656	1852	0606	1924	0528	1954	0513	2017	0527	2014	0555	1942	0625	1853	0656	1804	0731	1727	0801	1719
16	0805	1744	0736	1821	0654	1853	0604	1925	0527	1955	0514	2017	0528	2013	0556	1940	0626	1851	0657	1803	0732	1726	0802	1719
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19	0804	1747	0732	1825	0649	1856	0600	1928	0524	1958	0514	2018	0530	2011	0559	1936	0629	1846	0700	1758	0736	1724	0803	1720
20	0803	1749	0731	1826	0648	1857	0558	1929	0524	1959	0514	2018	0531	2010	0600	1935	0630	1845	0701	1757	0737	1723	0804	1721
21	0803	1750	0730	1827	0646	1858	0557	1930	0523	2000	0514	2018	0532	2009	0601	1933	0631	1843	0702	1755	0738	1723	0804	1721
22	0802	1751	0728	1828	0644	1859	0555	1931	0522	2001	0515	2019	0533	2009	0602	1932	0632	1841	0703	1754	0739	1722	0805	1722
23	0801	1752	0727	1829	0643	1900	0554	1932	0521	2002	0515	2019	0534	2008	0603	1930	0633	1840	0705	1753	0740	1721	0805	1722
24	0801	1753	0725	1831	0641	1901	0553	1933	0521	2003	0515	2019	0535	2007	0604	1929	0634	1838	0706	1751	0741	1721	0806	1723
25	0800	1754	0724	1832	0639	1902	0551	1934	0520	2003	0515	2019	0536	2006	0605	1927	0635	1836	0707	1750	0742	1720	0806	1723
26	0759	1756	0722	1833	0638	1903	0550	1935	0519	2004	0516	2019	0536	2005	0606	1926	0636	1835	0708	1749	0744	1720	0807	1724
27	0758	1757	0721	1834	0636	1904	0549	1936	0519	2005	0516	2019	0537	2004	0607	1924	0637	1833	0709	1747	0745	1720	0807	1725
28	0757	1758	0719	1835	0634	1905	0547	1937	0518	2006	0517	2019	0538	2003	0608	1922	0638	1831	0710	1746	0746	1719	0807	1725
29	0757	1759			0633	1906	0546	1938	0518	2007	0517	2019	0539	2002	0609	1921	0639	1830	0711	1745	0747	1719	0807	1726
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31	0755	1802			0630	1908			0517	2008			0541	2000	0611	1918			0714	1742			0808	1728

Add one hour for daylight time, if and when in use.

Back to form

Where to find weather data publications

Paper or microform copy

most libraries designated as federal depository libraries should carry past issues of *Climatological Data* and *Local Climatological Data.* Both have been published for many years.

Online web access

Go to see the WSSRD (of NOAA not Oz) !

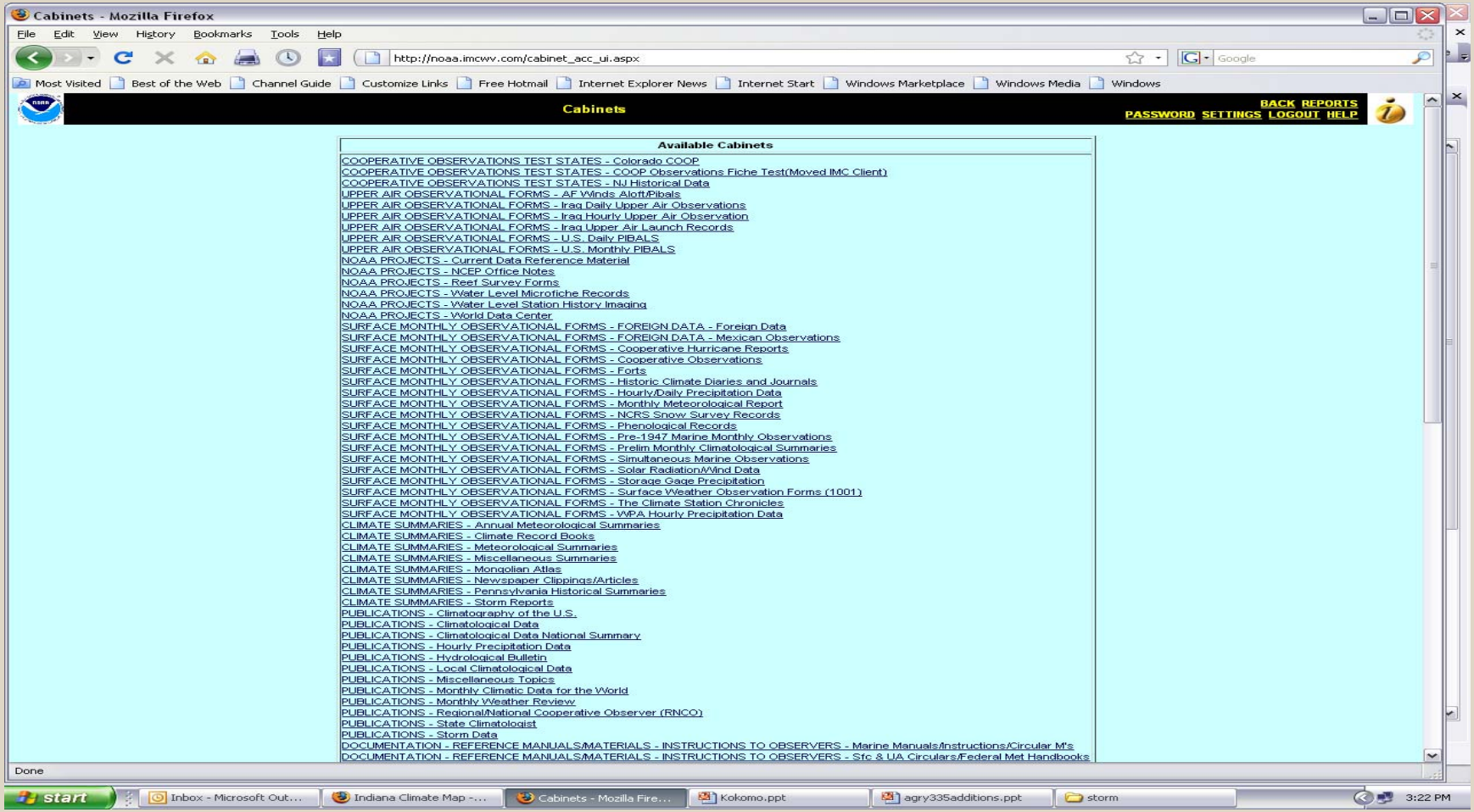
WSSRD is an exhaustive online archive of most all federal weather data documents ever printed (since 1800s).

You will need a username and password to access WSSRD, but this is easy to get and access is free. Ask Ken for contact information if you would like to get access to WSSRD. This is a federal website run by an independent contractor for now.

http://noaa.imcwv.com/

Let's try this web site now (live demo)

WSSRD – printed federal weather documents



Other useful weather web sites (1)

Current weather

Citizen Weather Observer Program
http://www.wxqa.com/

Current local weather conditions
http://www.weather.gov/ind

Current local weather warnings
http://www.uswx.com/us/wx/IN/

Lightning data
http://www.weathermatrix.net/lightning/us/

Other useful weather web sites (2)

Archived weather data

Daily weather map archive
http://www.hpc.ncep.noaa.gov/dailywxmap

National Lightning Detection Network (by subscription)
http://thunderstorm.vaisala.com/

Monthly weather summaries (Indiana since 2005)
http://www.agry.purdue.edu/climate/summary.asp

National radar image archive (since 1995)
http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwNexrad~Images2~20050713

National daily observed precipitation maps
http://www.cpc.ncep.noaa.gov/cgi-bin/disp_realtime.sh

Other useful weather web sites (3)

Climatology and weather education

The “ultimate weather education website”

http://www.theweatherprediction.com/

Precipitation Frequency data server

http://hdsc.nws.noaa.gov/hdsc/pfds/

- web site to determine intense rainfall return periods for many towns in Indiana and the nation

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iclimate@purdue.edu

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Thank you !