

ILLINOIS WATER AND CLIMATE SUMMARY November 2004

2004 Overview (Bob Scott)

Temperatures and precipitation in Illinois during November were well above average: 14th warmest and 8th wettest November since 1895. Soil moisture within the top 40 inches of soil was above the long-term statewide average. Mean streamflows were well above median heights. Shallow groundwater levels were above long-term average depths.

Temperatures across Illinois (Figure 1) for November were well above average (a +3.4-degree departure). Crop Reporting District (CRD) temperatures ranged from 2.9 degrees above average (west-southwest) to 3.9 degrees above average (southwest).

Precipitation amounts were well above average (Figure 1). The statewide average of 4.98 inches represents a +1.67-inch departure or 150 percent of average. Rainfall totals were lowest in the northwest CRD (3.25 inches or 127 percent of average) and highest in the southwest CRD (7.22 inches or 169 percent of average).

Soil moisture conditions in Illinois at the end of November were generally near normal to above normal in all layers, except for dryness in deeper soils in northeastern and far southern Illinois.

Mean provisional streamflow statewide was well above the median flow in November, 479 percent of median (Figure 1). Beginning last month, a different method was used to calculate this percentage; the past year's values in Figure 1 were revised accordingly. Rivers in Illinois recorded monthly mean discharges generally in the above normal to much above normal range this month. Peak stages on major rivers were below flood stage.

Water surface levels at the end of November were below the normal pool/target operating level at 5 of 38 reporting reservoirs. Levels at Rend Lake, Lake Shelbyville, and Carlyle Lake were more than 2 feet above their seasonal target levels. Lake Michigan's mean level remains below the long-term average.

Statewide, **shallow groundwater levels** were above normal for November. Deviations averaged 1.7 feet above normal for the month. Levels averaged 2.2 feet higher than October levels and approximately 2 feet above November levels one year ago.

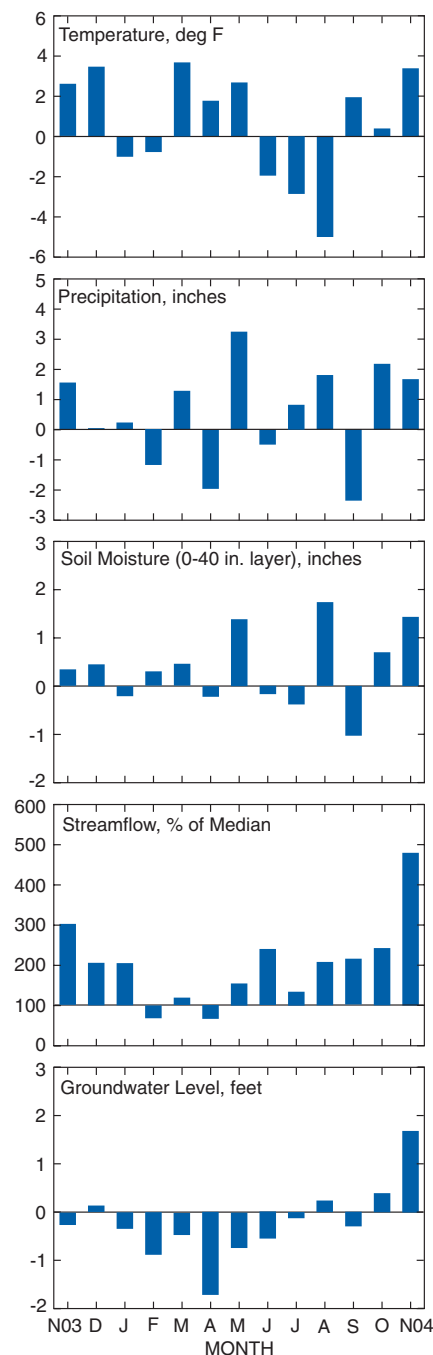


Figure 1.
Statewide departures from normal

Note: Extended network descriptions appear in the January and July issues. Network maps are available upon request.

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Weather/Climate Information (Jim Angel and Bob Scott)

Temperatures across Illinois for November were well above average (Figure 2 and Table 1). This was the 14th warmest November and the 19th warmest fall (September–November) since 1895. Extremes ranged from 86°F at Grand Tower on November 1 to 9°F at Monmouth on November 25.

Precipitation for November also was much above normal statewide (Figure 2 and Table 1) for the second consecutive month, resulting in the 8th wettest November since 1895. It was the 5th wettest November in the southwest CRD, with 7.22 inches; the 8th wettest November in the west-southwest and southeast CRDs, with 5.48 and 6.87 inches, respectively; the 9th wettest November in the west, central, and east-southeast CRDs, with 4.30, 4.60, and 5.61 inches, respectively; and the third to fifth wettest October–November period in all western, central, and southern Illinois CRDs. Pittsfield reported the highest one-day precipitation (3.46 inches on November 1). Waterloo reported the highest monthly total (7.84 inches).

Snowfall was reported across the northern two-thirds of Illinois in November (Figure 2). A pre-Thanksgiving storm dumped 2–8 inches of snow across central and northern Illinois on November 24. Havana reported 8 inches of snowfall compared to its average November snowfall of 1.5 inches.

Severe weather reported in Illinois included two small tornadoes on November 1. One storm damaged trees near Sparta. A second tornado tore the roofs from three barns, destroyed a fourth barn, and damaged a house near Sidney.

Illinois Climate Network (ICN) Data. Average daily wind speeds across Illinois for November (Figure 3) ranged from 4 mph at Dixon Springs to near 11 mph at Bondville and Stelle. The highest wind gusts for the month were 59 mph at Bondville on November 24. The prevailing wind direction was quite complex: southeasterly in northwestern and southeastern Illinois, southwesterly in southwestern Illinois, and a strong northerly component across central Illinois. Wind speeds in excess of 8 mph ranged from 90 hours at Dixon Springs to 445 hours at Monmouth and Stelle. (November has 720 hours.) Average air temperatures for November ranged from the low 40s to the low 50s from north to south across the state.

Solar radiation totals in November showed a strong seasonal decrease, plus numerous cloudy days, varying from 170 Mega-Joules per meter squared (MJ/m²) at St. Charles to 211 MJ/m² at Dixon Springs, Belleville, and Carbondale. Potential evapotranspiration observations varied from 1.1 inches at St. Charles to 1.5 inches at Dixon Springs, Belleville, and Carbondale. Soil temperatures at the 4- and 8-inch levels ranged from the middle to upper 40s in northern Illinois to the middle 50s in southern Illinois.

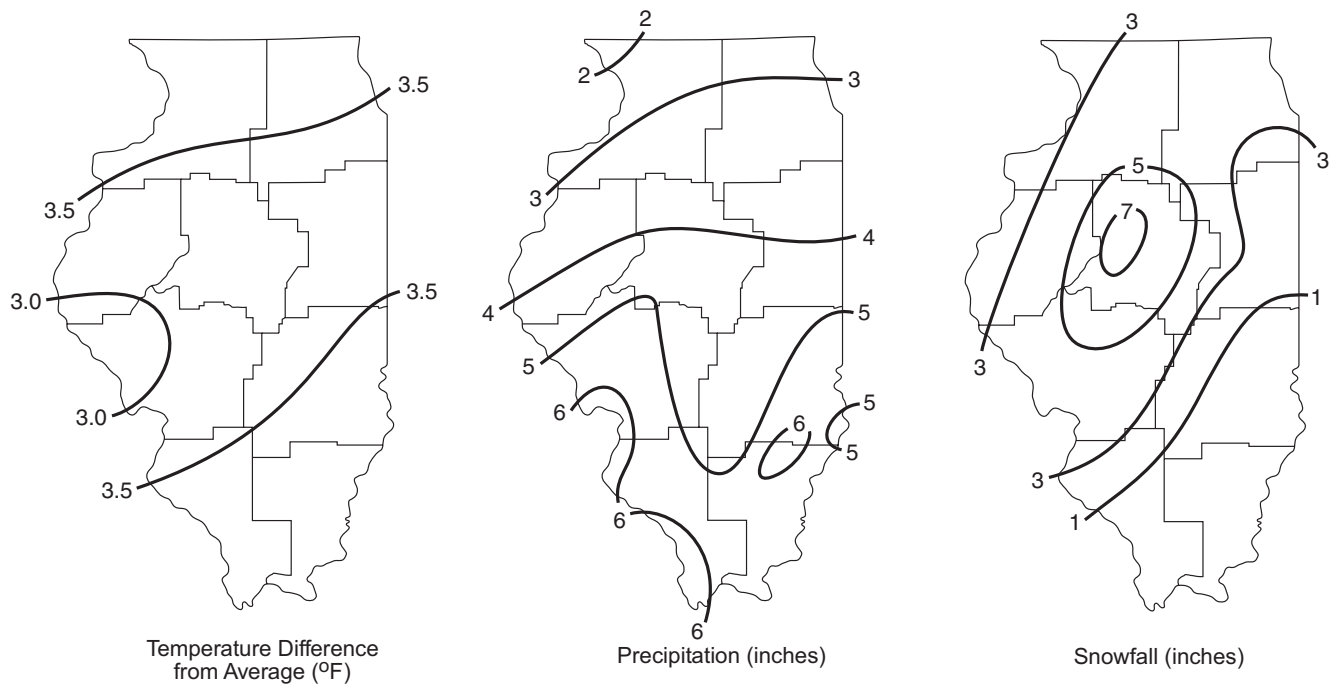


Figure 2. Illinois temperature, precipitation, and snowfall during November 2004

Table 1. Illinois Precipitation (inches) and Temperature (°F) by Crop Reporting District

Crop Reporting District	Last Month			Last 3 Months			Last 6 Months			Last 12 months		
	Nov 04	%	Temp	Sep 04-	%	Temp	Jun 04-	%	Temp	Dec 03-	%	Temp
	Amount	Avg	Dev	Nov 04	Avg	Dev	Nov 04	Avg	Dev	Nov 04	Avg	Dev
Northwest	3.25	127	3.6	8.72	100	2.0	19.18	90	-0.4	38.41	106	1.0
Northeast	3.56	123	3.5	7.23	80	2.1	19.16	91	-0.4	37.76	103	0.6
West	4.30	150	3.3	12.00	127	1.6	25.36	120	-1.0	41.49	111	0.5
Central	4.60	156	3.2	10.92	121	1.6	22.24	108	-0.9	38.76	104	0.5
East	4.74	155	3.4	9.38	105	1.9	24.58	118	-0.7	42.04	112	0.5
West-southwest	5.48	162	2.9	11.47	124	1.2	22.08	111	-1.2	39.61	105	0.3
East-southeast	5.61	146	3.6	12.34	124	1.7	24.89	116	-0.6	46.38	113	0.7
Southwest	7.22	169	3.9	13.41	127	1.8	26.16	121	-0.5	47.33	111	0.7
Southeast	6.87	158	3.7	13.10	126	2.1	25.42	119	-0.1	47.09	106	0.9
State Average	4.98	150	3.4	10.84	115	1.8	23.00	110	-0.7	41.84	108	0.6

Note: Data are provisional. Complete, quality controlled data are available about six months after a given month.

Extended climate outlooks issued by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Climate Prediction Center for December call for a slightly increased chance of above normal precipitation and an even chance of temperatures at, above, or below normal. The long-range forecast calls for an increased chance of a drier-than-normal winter in Illinois with an even chance of temperatures at, above, or below normal.

Soil Moisture Information (Bob Scott)

Precipitation in Illinois during November was well above average statewide for the second consecutive month. This resulted in near-surface soil moisture conditions that were generally near normal to above normal across Illinois (Figure 4). Moisture values in the 0- to 6-inch layer ranged from 107 percent of normal at Freeport and Peoria to 165 percent at Olney. Similarly, values in the 6- to 20-inch layer ranged from 95 percent at DeKalb and Springfield to 145 percent at Bondville. Conditions in deeper layers showed greater variability, and reflected higher precipitation in recent months. Values 20 to 40 inches deep ranged from 49 percent at DeKalb to 160 percent at Belleville. Values in the 40- to 72-inch layer varied from 45 percent of normal at DeKalb to more than 200 percent at Belleville and Rend Lake. Overall, soil moisture in Illinois at the end of November was above normal (Figure 1).

Compared to the end of last month, soil moisture in the 0- to 6-inch layer increased at most Illinois sites (Table 2). Greatest increases occurred at Brownstown and Dixon Springs (42 percent) and DeKalb (50 percent). Small decreases were observed at Topeka and Rend Lake. Increases observed at scattered locations in the 6- to 20-inch layer ranged from 24 to 61 percent, but with changes of less than 10 percent at eight sites. In a pattern atypical for the 20- to 40-inch layer, most sites showed strong moisture increases from last month, with the largest increases at Dixon Springs (52 percent) and Topeka (38 percent). Small changes occurred at just four sites.

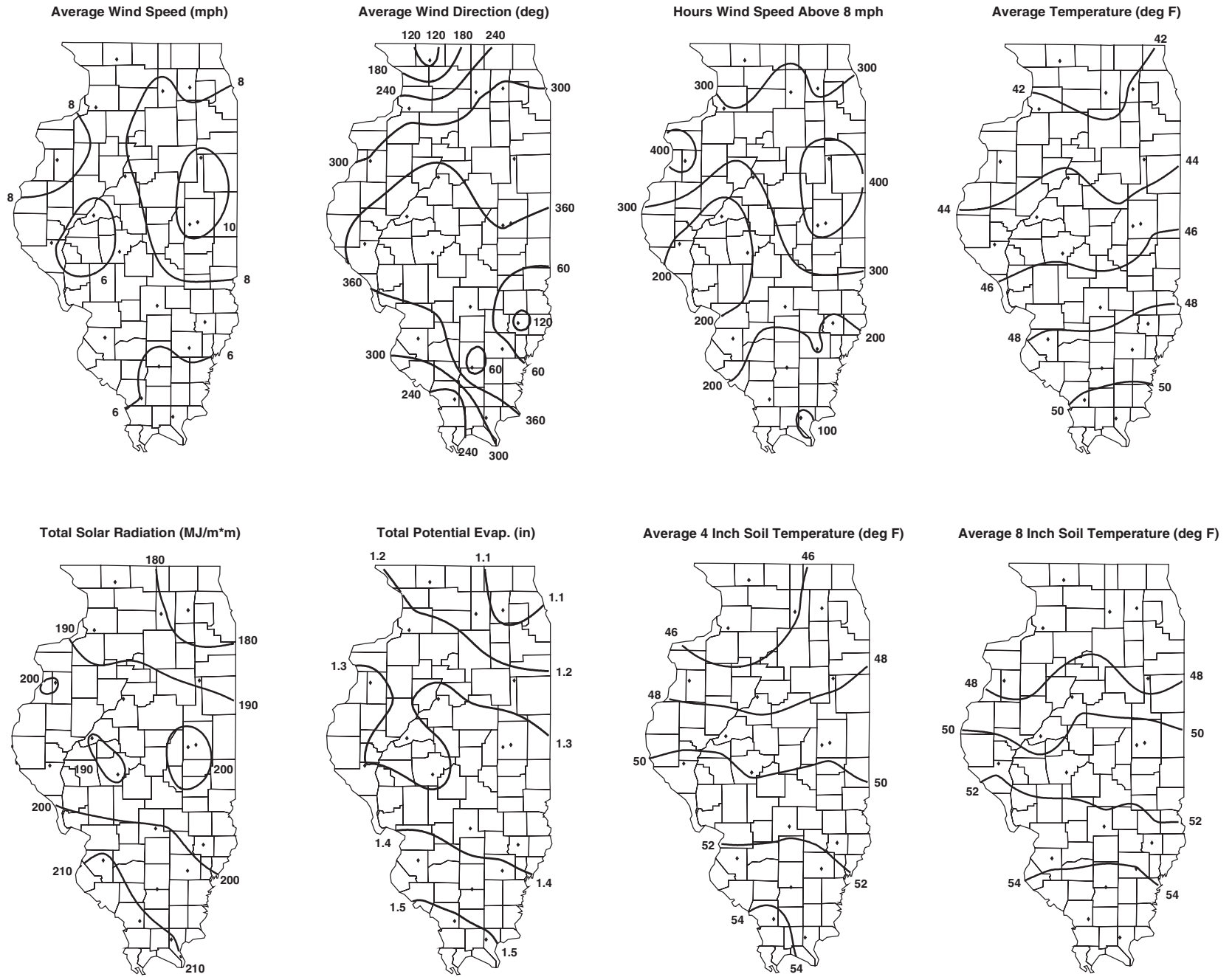


Figure 3. November monthly averages and totals as collected by the Illinois Climate Network

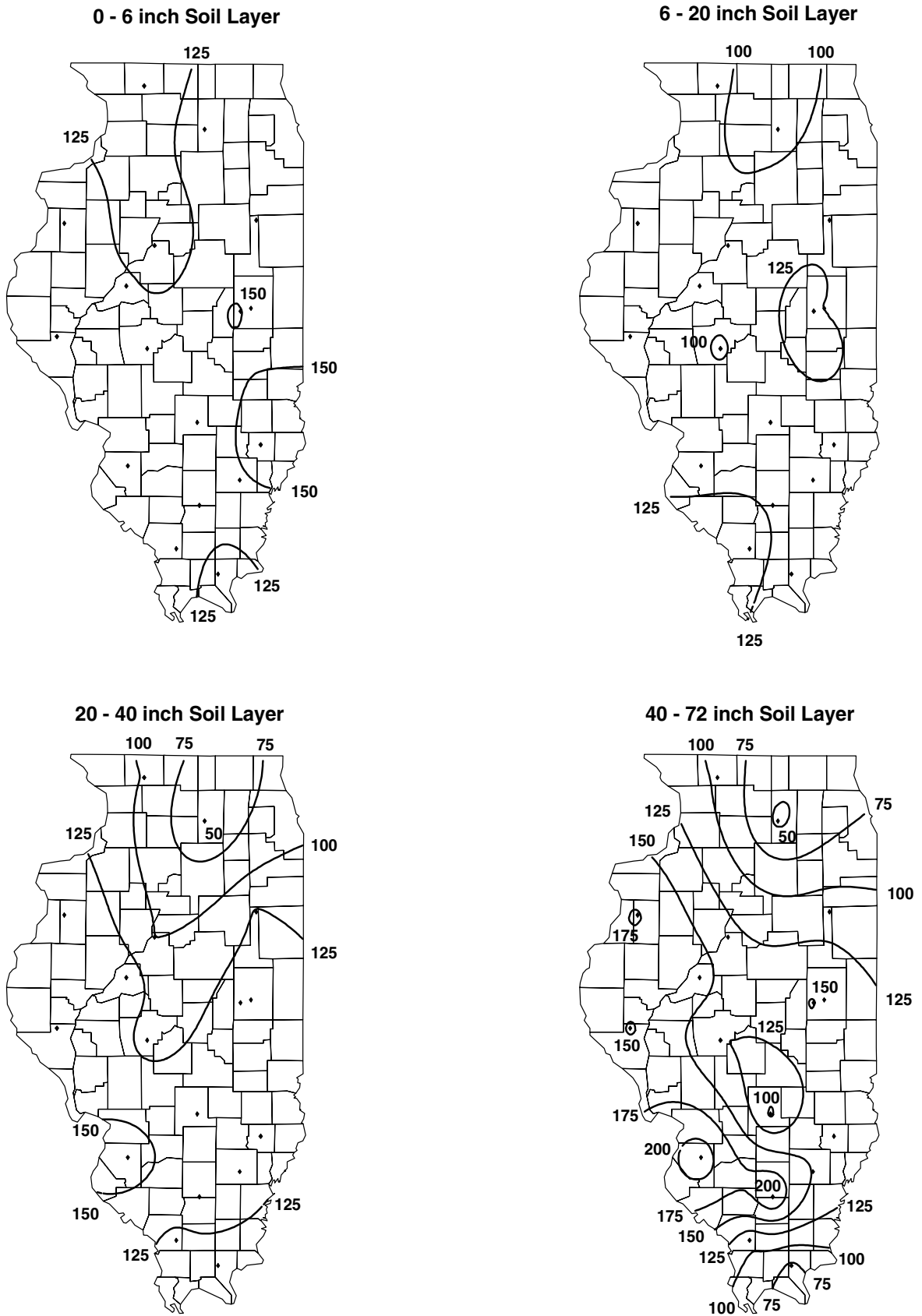


Figure 4. December 1 observed percent-of-normal soil moisture based on 1985-1995 mean

Table 2. Soil Moisture in Various Layers on December 1, 2004

<i>Location</i>	<i>Dec. 1 0 - 6 (inches)</i>	<i>Change from Nov 1 (%)</i>	<i>Dec. 1 6 - 20 (inches)</i>	<i>Change from Nov 1 (%)</i>	<i>Dec. 1 20 - 40 (inches)</i>	<i>Change from Nov 1 (%)</i>
Freeport (NW)	2.2	18	4.7	46	7.0	20
DeKalb (NE)	2.6	50	4.9	57	6.0	14
Monmouth (W)	2.7	17	5.0	5	7.1	3
East Peoria (C)	2.2	3	5.2	26	8.0	27
Topeka (C)	1.3	-7	2.8	-1	3.7	38
Stelle (E)	2.7	34	6.1	39	7.1	16
Champaign (E)	2.6	6	5.8	8	7.2	28
Bondville (E)	3.0	26	6.4	53	8.6	17
Pery (WSW)	2.5	9	5.6	6	8.4	15
Springfield (WSW)	2.3	6	5.1	3	8.2	29
Brownstown (ESE)	2.6	42	4.8	40	8.2	22
Olney (ESE)	3.0	31	4.8	5	7.2	2
Belleville (SW)	2.5	16	5.4	61	8.8	29
Carbondale (SW)	2.9	29	5.4	44	7.8	28
Ina (SE)	2.7	-8	5.5	0	7.8	0
Fairfield (SE)	3.3	25	5.6	2	7.4	1
Dixon Springs (SE)	2.6	42	5.6	24	8.1	52

Surface Water Information (Bill Saylor and Vern Knapp)

River and stream discharge and stage data are obtained from gaging stations operated by the U.S. Geological Survey (USGS) or the U.S. Army Corps of Engineers (USACE). The USGS gaging station network is supported, in part, by the Illinois Department of Natural Resources Office of Water Resources and the Illinois State Water Survey (ISWS), and the USACE. Provisional discharge data are obtained from the USGS.

Table 3 lists selected streamgaging stations located on the Illinois, Mississippi, and Ohio Rivers, flood stage, and the provisional peak stage for the current month. The peak stage is determined from the daily morning readings posted by the National Weather Service and/or the USACE. November peak stages were below flood stage at all Table 3 stations.

Provisional monthly mean flows for 26 streamgaging stations located throughout Illinois are shown (Table 4). Data posted by the USGS are listed if available; otherwise, daily mean discharge data posted by the USGS were used to estimate the mean flow for the month. Long-term mean flows for each month are published by the USGS. The month's median flow for each station listed in Table 4 was determined by ranking the November mean flow for each year of record, and selecting the middle value, 50 percent exceedence probability.

The statewide percent of historical mean flow and percent of historical median flow are calculated by dividing the sum of the average flows this month at stations in Table 4 by the sum of the historical mean and median flows calculated for the month, respectively, at the same stations. This method is intended to weight individual observations proportionately in the aggregate comparison. (The Illinois River and Rock River stations are excluded from the statewide calculation because other rivers listed in Table 4 contribute to their flow.)

Mean provisional flow statewide was well above the median this month (479 percent of the median) and above the long-term mean (261 percent of the mean). Mean streamflows were above normal to much above normal throughout the state, except for normal mean flows in northern Illinois.

Table 3. Peak Stages for Major Rivers, November 2004

<i>River</i>	<i>Station</i>	<i>River mile*</i>	<i>Flood stage (feet)*</i>	<i>Peak stage (feet)**</i>	<i>Date</i>
Illinois	Morris	263.1	13	10.2	29
	La Salle	224.7	20	18.3	30
	Peoria	164.6	18	13.6	30
	Havana	119.6	14	13.1	30
	Beardstown	88.6	14	13.8	08
	Hardin	21.5	25	22.1	30
Mississippi	Dubuque	579.9	17	10.1	07
	Keokuk	364.2	16	5.6	07
	Quincy	327.9	17	11.8	27
	Grafton	218.0	18	16.5	28
	St. Louis	180.0	30	16.8	29
	Chester	109.9	27	19.0	30
	Thebes	43.7	33	24.3	30
Ohio	Cairo	2.0	40	35.0	30

Notes:

*River mile and flood stage from *River Stages in Illinois: Flood and Damage Data*, Illinois Department of Natural Resources, Office of Water Resources, August 2004.

**Peak stage based on daily a.m. readings, not instantaneous peak.

Note: Last month (October 2004) was the first month for use of a new method of calculating the statewide percentages of historical mean and median flows. Accordingly, the percentage of median flows for the past months shown in Figure 1 were recalculated using this method.

Water-Supply Lakes and Major Reservoirs. Table 5 lists reservoirs in Illinois, their normal pool or target water surface elevation, and other data related to observed variations in water surface elevations. Reservoir levels are reported in terms of their difference from normal pool (or target level). Reservoir levels are obtained from a network of cooperating reservoir operators who are contacted each month by ISWS staff for the current water levels. The average of the month-end readings for the period of record is reported in terms of the difference from normal pool or target level (column 6 of Table 5), and the number of years of record for each reservoir also is given (column 7). Most reservoirs serve as public water supplies, with the exceptions noted in the last column.

Compared to end-of-October levels at 37 reservoirs, by the end of November the water surface elevation had decreased at 4 reservoirs, had risen at 27 reservoirs, and was the same as last month at 6 reservoirs. For the 38 reservoirs with observations reported at the end of November, the water surface level at 25 reservoirs was above normal pool (or target operating level), 8 reservoirs were at normal pool, and 5 reservoirs were below normal pool.

Major Reservoirs. Water levels at the three major reservoirs increased during November. At the end of the month, Carlyle Lake was more than 2 feet above its seasonal target level, and Lake Shelbyville and Rend Lake were each about 4 feet above their seasonal target levels.

Great Lakes. Current month mean and end-of-month values are provisional and are relative to International Great Lakes Datum 1985. The November mean level for Lake Michigan was 577.8 feet, compared to a mean level of 577.1 feet in November 2003. The long-term average lake level for November is 578.8 feet, based on 1918–2003 data. Historically, the lowest mean level for Lake Michigan in November occurred in 1964 at 576.3 feet, and the highest level occurred in 1986 at 582.0 feet. The month-end level of Lake Michigan was 577.7 feet.

Table 4. Provisional Mean Flows, November 2004

Station	Drainage area (sq mi)	Years of record	2004 mean flow (cfs)	Long-term flows		Flow condition	Percent chance of exceedence	Days of data this month
				Mean* (cfs)	Median (cfs)			
Rock River at Rockton	6363	69	3109	3525	3199	normal	51	29
Rock River near Joslin	9549	61	4663	5184	4821	normal	51	30
Pecatonica River at Freeport	1326	85	733	748	608	normal	38	30
Green River near Geneseo	1003	65	402	452	327	normal	40	30
Edwards River near New Boston	445	66	368	168	85	above normal	13	30
Kankakee River at Momence	2294	86	2237	1552	1182	above normal	22	30
Iroquois River near Chebanse	2091	80	2700	945	423	much above normal	10	25
Fox River at Dayton	2642	84	1365	1479	1280	normal	47	26
Vermilion River at Pontiac	579	60	936	224	58	much above normal	8	30
Spoon River at Seville	1636	87	1832	604	301	much above normal	7	30
LaMoine River at Ripley	1293	80	2269	506	193	much above normal	6	30
Bear Creek near Marceline	349	59	622	147	26	much above normal	7	26
Mackinaw River near Congerville	767	55	1281	261	62	much above normal	5	30
Salt Creek near Greenview	1804	62	3457	754	264	much above normal	5	30
Sangamon River at Monticello	550	91	1063	237	80	much above normal	5	30
South Fork Sangamon near Rochester	867	54	960	256	84	much above normal	7	25
Illinois River at Valley City	26,743	65	30,582	14,290	11,462	much above normal	9	22
Macoupin Creek near Kane	868	75	760	311	95	above normal	12	30
Vermilion River near Danville	1290	82	2747	569	221	much above normal	5	26
Kaskaskia River at Vandalia	1940	34	1875	984	708	above normal	19	30
Shoal Creek near Breese	735	60	865	289	123	much above normal	10	30
Embarras River at Ste. Marie	1516	90	2337	736	317	much above normal	8	30
Skillet Fork at Wayne City	464	84	1219	258	68	much above normal	6	30
Little Wabash below Clay City	1131	89	1724	571	198	much above normal	10	26
Big Muddy at Plumfield	794	33	1018	394	113	above normal	11	30
Cache River at Forman	244	80	233	189	74	above normal	28	30

Notes:

N/A = not available.

Much below normal flow = 90-100% chance of exceedence.

Below normal flow = 70-90% chance of exceedence.

Normal flow = 30-70% chance of exceedence.

Above normal flow = 10-30% chance of exceedence.

Much above normal flow = 0-10% chance of exceedence.

*As reported in U.S. Geological Survey (USGS) Water Resources Data, Illinois, Water Year 2003.

Table 5. Reservoir Levels in Illinois, November 2004

For security considerations, statewide tabular reservoir data are not available on the Internet. Specific data requests may be made to Bill Saylor at: wsaylor@sws.uiuc.edu.

Groundwater Information (Ken Hlinka)

Comparison to Average Levels. Shallow groundwater levels in 15 observation wells, which are remote from pumping centers, were above average levels for November by 1.7 feet. Site values ranged from 3.6 feet below to 9.2 feet above average (see Table 6).

Comparison to Previous Month. Shallow groundwater levels this month were above those of October. Levels averaged 2.2 feet higher and ranged from 0.9 feet below to 6.8 feet above last month's values.

Comparison to Same Month, Previous Year. Shallow groundwater levels in November were above levels of a year ago. Levels averaged 2.0 feet higher and ranged from 4.0 feet lower to 8.8 feet above last November's levels.

Table 6. Month-End Shallow Groundwater Level Data Sites, November 2004

Number	Well name	County	Well depth (feet)	This month's reading (depth to water, feet)	Deviation from			
					15-year avg. level (feet)	Period of record avg. (feet)	Previous month (feet)	Previous year (feet)
1	Galena	JoDaviess	25.00	21.45	-0.14	+0.08	-0.09	+0.30
2	Mt. Morris	Ogle	55.00	23.67	-4.33	-3.61	-0.41	+8.81
3	Crystal Lake	McHenry	18.00	5.83	-0.44	-0.17	+0.03	+0.94
4	Cambridge	Henry	42.00	36.51*	N/A	N/A	N/A	N/A
5	Fermi Lab	DuPage	17.00	10.10	-3.34	-3.13	-0.94	-3.98
6	Good Hope	McDonough	30.00	3.08	+6.20	+6.25	-0.09	+4.63
7	Snicarte	Mason	42.00	37.27	-0.37	-0.09	+1.34	+1.61
8	Coffman	Pike	28.00	3.56	+7.77	+9.23	+6.79	+4.54
9	Greenfield	Greene	20.70	10.92	+3.13	+3.38	+4.79	+7.21
10	Janesville	Cumberland	11.00	3.36	+1.86	+2.05	+1.47	+0.36
11	St. Peter	Fayette	15.00	0.99	+1.74	+1.83	+1.45	+0.32
12	SWS #2	St. Clair	80.00	N/A	N/A	N/A	N/A	N/A
13	Boyleston	Wayne	23.00	0.73	+5.15	+5.45	+5.14	+0.86
14	Sparta	Randolph	27.00	5.48	+3.11	+3.99	+3.49	+3.54
15	SE College	Saline	10.19	2.36	+3.02	+2.85	+5.88	+3.32
16	Dixon Springs	Pope	8.63	4.69	+0.69	-0.97	+3.94	+0.37
17	Bondville	Champaign	21.00	6.11	-0.82	-1.32	+0.29	-2.37
Averages					+1.55	+1.72	+2.21	+2.03

Notes:

N/A = Data not available.

*Well not used for analyses.

Addendum

Long-Term Precipitation Networks (Nancy Westcott)

Imperial Valley Precipitation. November 2004 precipitation amounts (Figure 5a) were heavy. Gage amounts were greatest in the network's southwestern portion and lightest along its southeastern and northwestern borders. Individual gage totals ranged from 5.46 inches at site #24 to 3.44 inches at site #8. The 30-year, 1971–2000, average precipitation amounts for November at Havana and Mason City are 3.26 and 2.95 inches, respectively. The November 2004 network average of 4.54 inches was about 174 percent of the 12-year (1992–2003) November network average of 2.31 inches.

Cook County Precipitation. November 2004 precipitation amounts (Figure 5b) also were heavy. Precipitation was heaviest in the network's southeastern region and lightest in its northern portion. Precipitation values ranged from 5.22 inches at site #25 (Chicago Heights) to 3.36 inches at site #1 (Northbrook). The November 2004 network average of 4.36 inches was about 145 percent of the 15-year (1989–2003) November network average of 3.00 inches.

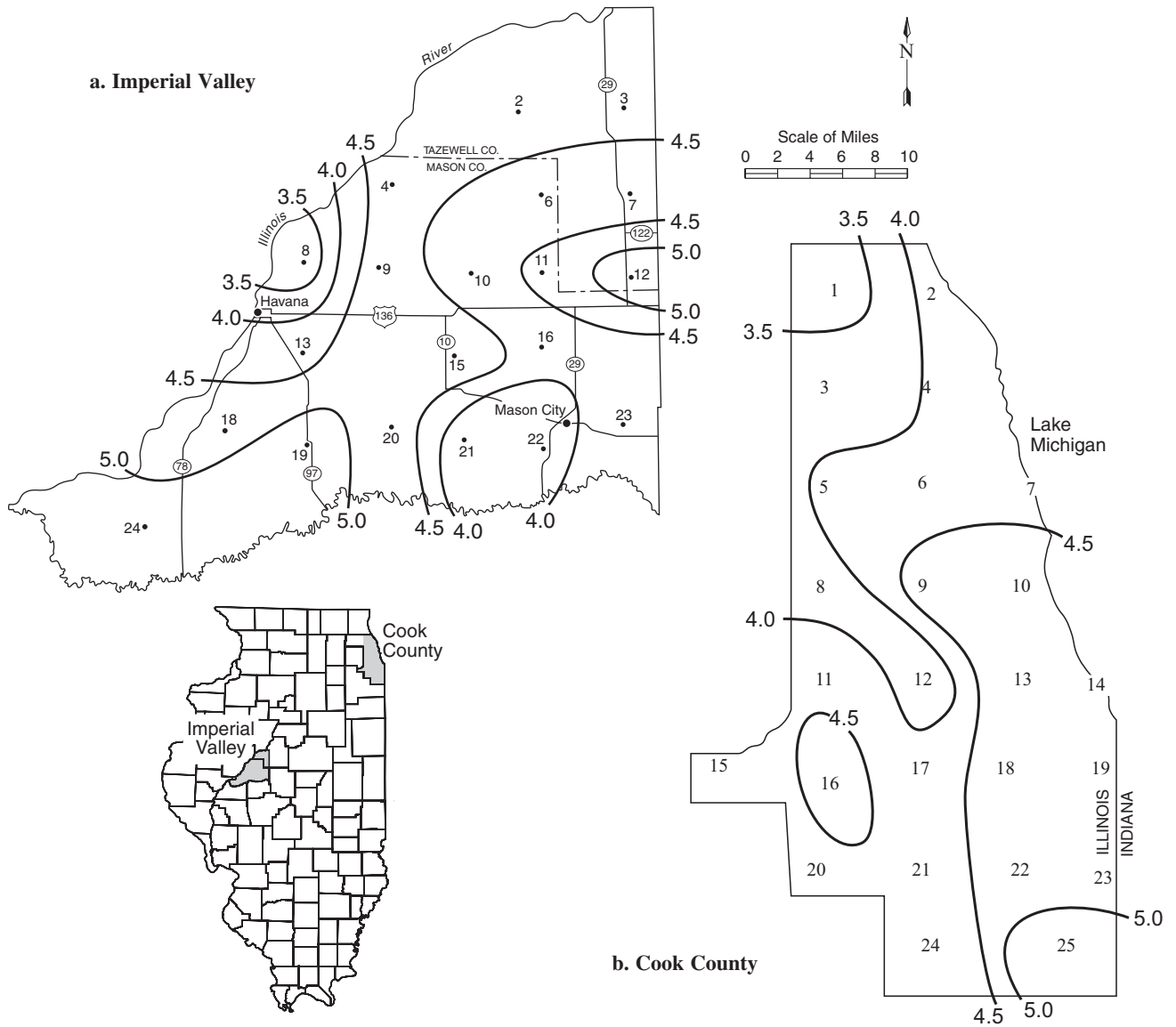


Figure 5. Long-term raingage network precipitation totals (inches) for November 2004

Data sources for information in this publication include the following:

CPC - Climate Prediction Center, <http://www.cpc.ncep.noaa.gov/products/predictions/>

ISWS - Illinois State Water Survey, <http://www.sws.uiuc.edu/>

MRCC - Midwestern Regional Climate Center, <http://mrcc.sws.uiuc.edu/>

NCDC - National Climate Data Center, <http://www.ncdc.noaa.gov/>

NWS - National Weather Service, <http://www.nws.noaa.gov/>

USACE - U.S. Army Corps of Engineers, <http://www.rivergages.com>

USGS - U.S. Geological Survey, <http://water.usgs.gov/>

WARM - Water and Atmospheric Resources Monitoring Program, <http://www.sws.uiuc.edu/warm/>

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