



November 7, 2017

**MEMORANDUM FOR:** Derek S. Arndt  
Chief, Climate Monitoring Section, Center for Weather and Climate  
National Centers for Environmental Information

**FROM:** Karin Gleason  
Meteorologist, Monitoring Section, Center for Weather and Climate

**SUBJECT:** SCEC Report for Illinois Hailstone on 10 June 2015

### Summary:

On 23 October 2017, a State Climate Extremes Committee (SCEC) convened to verify / validate a report of a 4.75 inch hailstone which fell near Minooka, Illinois on the afternoon of 10 June 2015. If verified, this would become the SCEC's inaugural state record hailstone for Illinois, as no previous stone was vetted for such purposes.

The committee considered the following factors in their decision: the genuine nature of the reported hailstone, meteorological plausibility, and methods of handling and measurement. After reviewing the observational evidence, the SCEC unanimously agreed that the hailstone would establish a new record for the State of Illinois. In particular, the committee found that the following were true and valid:

- **LOCATION:** Approx. 2 miles north-northwest of Minooka, Illinois
- **TIME:** Approx. 7:20 pm CDT on 10 June 2015
- **DIAMETER:** 4.75 inches
- **WEIGHT:** Not considered for this record

No prior official record was compared, even though one previous potentially-competing report was examined during this evaluation. Although this historical report was larger, it lacked sufficient and credible documentation and was therefore determined not to be a contender for the record during the convening of this SCEC meeting.

### Sequence of Events, Examination & Decision

#### Background

During the late afternoon and early evening of 10 June 2015, multiple storms produced large hail and very heavy rainfall along the I-80 corridor south and southwest of the Chicago metro area. Many reports of severe weather and hail in excess of 2.5 inches were reported across Minooka, Illinois by





emergency management, law enforcement and the public. Multiple accounts of vehicle damage, including shattered windshields, were also reported via social media in and around the city of Minooka.

The hailstone discussed in this report was ultimately discovered approximately two miles north-northwest of Minooka, Illinois, at the residence of Joe and Lauren Geiselman in their backyard.

### Storm Environment & Meteorological Plausibility

Many areas across northern Illinois and northwestern Indiana experienced their first 90°F day of the summer on 10 June. Coupled with the hot temperatures were high amounts of low level moisture. Dew point temperatures were in the upper 60s and low 70s. Precipitable water (PWAT) analyzed by the Storm Prediction Center (SPC) at 6pm CDT on 10 June showed an axis of very moist air across central and northeastern Illinois with PWAT values in excess of 1.5 inches (Figure 1). In addition, the atmosphere was very unstable. The Mixed Layer Convective Available Potential Energy (MLCAPE) analyzed by the SPC indicated that values were in excess of 3,000J/Kg across a portion of north central Illinois and northwestern Indiana (Figure 2). A “rule of thumb” threshold for the potential to support severe weather is typically 1,000+ J/Kg. While the environment was not highly sheared, it had enough shear for supercell storm development, especially given the explosive instability. This shear was enough for intense updrafts supporting the weight of giant hailstones. Figure 3 illustrates the intense radar reflectivity core near the location of the hailstone in question at the approximate time the stone was retrieved and measured. Intense radar reflectivity values in excess of 60dbz are often indicative of a possible mixture of hail and heavy rainfall. This was illustrated in a three dimensional Doppler radar analysis, as indicated in Figure 4, showing possible hail near the location of the Minooka hailstone in question.

### Hailstone Collection, Measurement and Report

The stone was collected and photographed at approximately 7:20 pm local time by the Geiselman’s in their backyard as soon as the storm passed and it was safe to go outside. They handled the stone with their bare hands and immediately brought it in the house, laying it out, measuring and taking a photograph of it prior to sharing the picture with NWS Chicago on social media. They estimate that the stone was on the ground for up to 5 or 10 minutes before retrieval. The stone was measured using a tape measure at the time of collection and was 4.75 inches in diameter along the longest axis (Figure 5). Although the handling of the hailstone was not optimal for preserving the size of the stone, measurement of the stone was consistent with techniques [recommended by the SCEC](#). This hailstone was not preserved for posterity.

The stone’s weight was not measured and was not considered by the SCEC.

### Prior Observations

Members of the SCEC researched the NCEI *Storm Data* database to see if any archived hail events at or above 4.75” diameter could be verified. See Table 1 for the NCEI *Storm Data* web page for all hailstones equal to or in excess of 4 inches.





It was determined that the unofficial 6.0 inch diameter hailstone reported in Kankakee County on 23 April 1961 could not be reasonably validated or verified. Research into the synoptic conditions on 23 April 1961 indicated that the surface CAPE values were less than 2,000J/Kg, which would likely not support the formation of a 6.0 inch diameter hailstone. CAPE values in this range could support hail formation in the 3.0 inch diameter range, which is consistent with other reports noted in the NCEI *Storm Data* record on that date. The unofficial 6.0 inch stone is still considered part of the NCEI *Storm Data* database, but has not sufficiently passed the metrics and rigorous analysis noted above. No other hailstone equal to or in excess of 4.75" is carried in the *Storm Data* database for Illinois. Research of other large hail events in the area failed to turn up sufficient documentation of any hailstones larger than 4.75".

### Finding of Committee

All of the above evidence was shared with the SCEC by electronic mail leading to a one-hour teleconference call on 23 October 2017. The SCEC solicited input from additional local WFO employees familiar with this event as well as other regional climate experts to assist with the analysis of the evidence.

The storm and storm environment supported the probability of very large hail. In addition to the largest hail stone, several other stones with diameters exceeding 3 inches were noted on 10 June 2015.

Based upon the thoroughly-documented evidence (photographic and field notes), the SCEC agreed unanimously (by a vote of 5-0) that all measurements associated with the hailstone were valid and **recommends the NCEI Climate Monitoring Chief approve the SCEC action to acknowledge the 4.75 inch Minooka, IL hailstone on 10 June 2015 as the state record for Illinois.**

### Issues Raised:

The lack of a prior record for Illinois made the vetting process more challenging than that for an existing record. Hail was not one of the five original state record types established by the SCEC, due largely to the general condition of hail observations over time. It is generally recognized that larger stones have surely fallen within the state borders since statehood. Thorough investigation of past events and future events will help solidify the record.





**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL ENVIRONMENTAL SATELLITE DATA  
AND INFORMATION SERVICE  
NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION  
151 PATTON AVE ROOM 120  
ASHEVILLE NC 28801-5001

## **NCEI Climate Monitoring Chief Decision**

Approved (as recommended in boldface above):

Signed \_\_\_\_\_ Date: \_\_\_\_\_

Not approved (will be returned to SCEC with no action taken):

Signed \_\_\_\_\_ Date: \_\_\_\_\_

## **Voting Members of the State Climate Extremes Committee:**

Matt Friedlein, Senior Meteorologist, National Weather Service (NWS) Chicago/Romeoville, IL

Dr. Jim Angel, Illinois State Climatologist

Mike Timlin, Regional Climatologist, Midwestern Regional Climate Center (MRCC)

Barbara Mayes Boustead, Meteorologist, Interim Climate Services Program Manager, NWS Central Region

Karin Gleason, Meteorologist, National Centers for Environmental Information (NCEI)

### **Also participating in the verification:**

Beth Hall, Director, MRCC

Steve Hilberg, Climatologist, Director Emeritus, MRCC

Mike Bardou, Warning Coordination Meteorologist, NWS Chicago/Romeoville, IL

Amy Seeley, Meteorological Technician, NWS Chicago/Romeoville, IL

Ricky Castro, Meteorologist Intern, NWS Chicago/Romeoville, IL

See attachments below





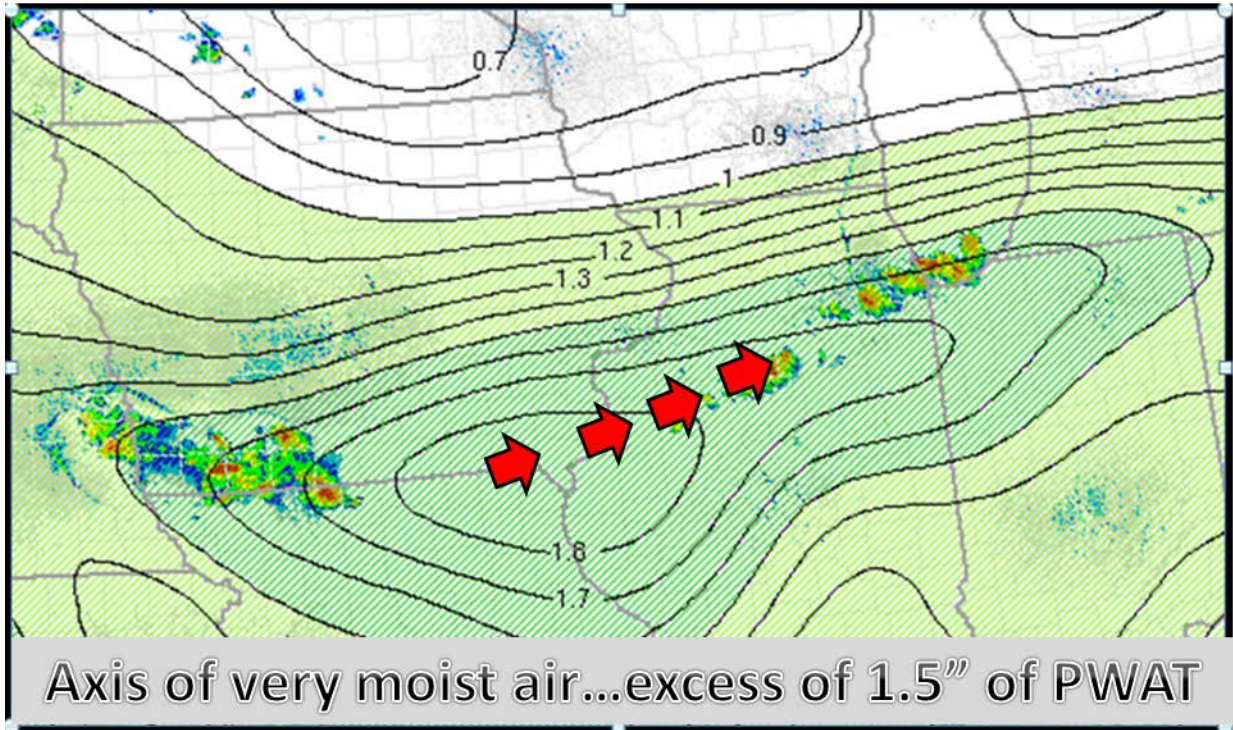


Figure 1. Precipitable Water (PWAT) prognostic chart for the Midwest on 10 June 2015.

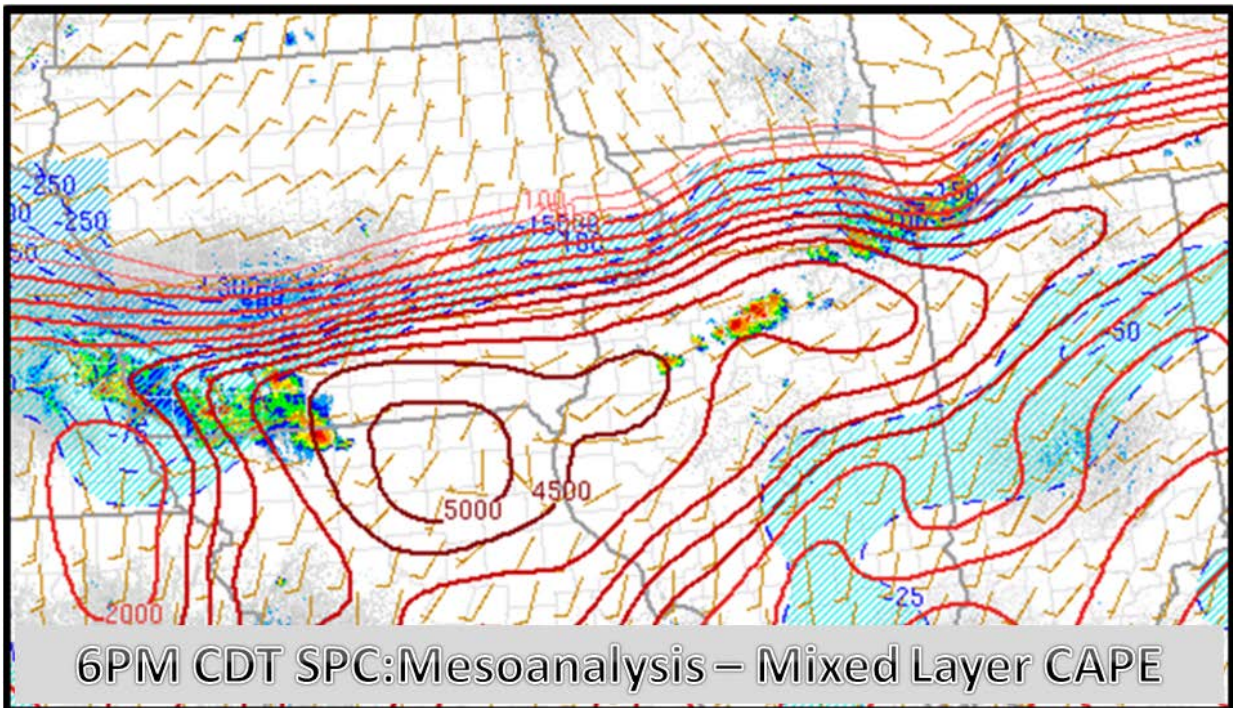


Figure 2. Convective Available Potential Energy (CAPE) prognostic chart for the Midwest on 10 June 2015.





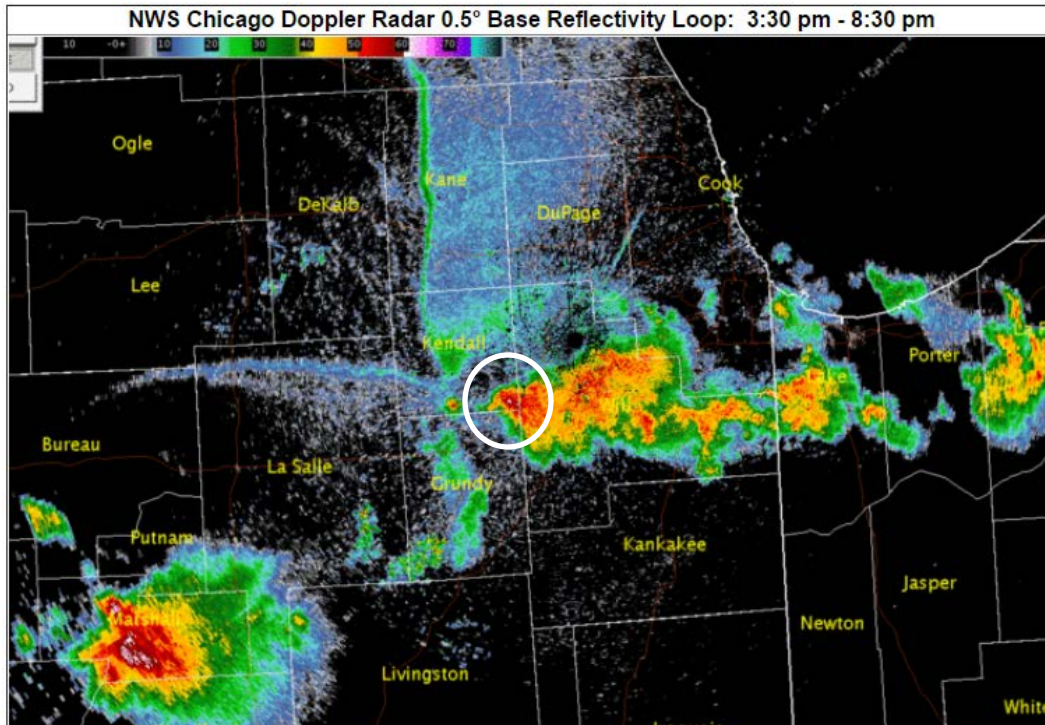


Figure 3. Base Reflectivity Frame showing intense reflectivity core approximately 2 miles north northwest of Minooka around 7:20pm CDT on 10 June 2015.

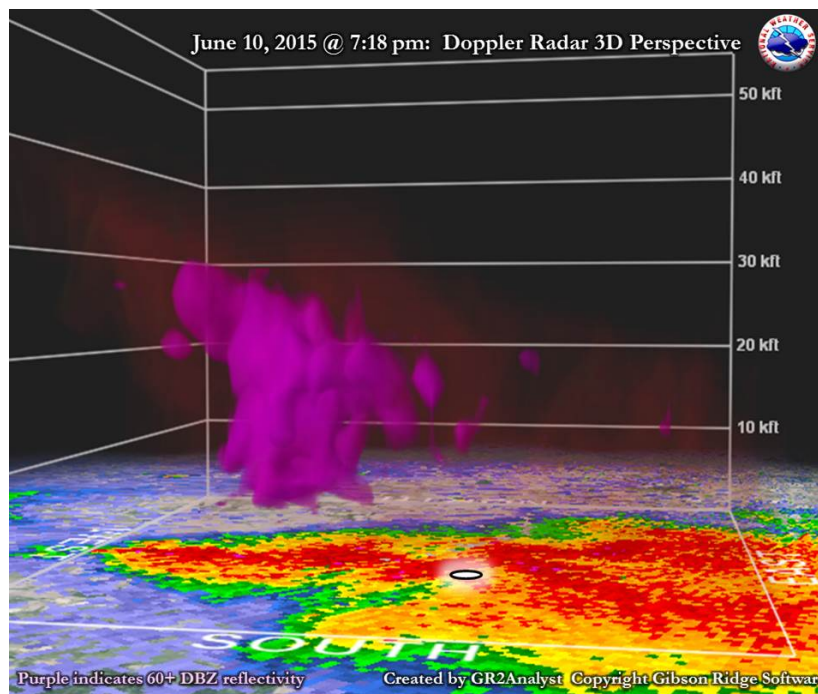


Figure 4. Three dimensional radar reflectivity snapshot illustrating the location of hydrometeors with reflectivity values in excess of 60 DBZ. Values exceeding this threshold typically contain a mixture of hail and heavy rain.





**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL ENVIRONMENTAL SATELLITE DATA  
AND INFORMATION SERVICE  
NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION  
151 PATTON AVE ROOM 120  
ASHEVILLE NC 28801-5001



Figure 5. 4.75 inch diameter hailstone measured by Laura Geiselman's husband near Minooka, IL on 10 June 2015.





**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
 NATIONAL ENVIRONMENTAL SATELLITE DATA  
 AND INFORMATION SERVICE  
 NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION  
 151 PATTON AVE ROOM 120  
 ASHEVILLE NC 28801-5001

EVENT_ID	CZ_NAME_STR	BEGIN_LOCATION	BEGIN_DATE	BEGIN_TIM	EVENT_TYP	MAGNITUDE
10007630	KANKAKEE CO.		4/23/1961	1600	Hail	6
10006948	RANDOLPH CO.		3/20/1976	1455	Hail	4
10006466	KANKAKEE CO.		6/8/1981	1615	Hail	4
10320297	KNOX CO.	Galesburg	5/9/1995	1645	Hail	4.5
10320754	HENDERSON CO.	Terre Haute	5/13/1995	1540	Hail	4.5
10322655	MCDONOUGH CO.	Macomb	5/13/1995	1625	Hail	4
10322656	MCDONOUGH CO.	Macomb	5/13/1995	1628	Hail	4
5641459	DOUGLAS CO.	ARTHUR	4/7/1998	1805	Hail	4.5
5650732	SCHUYLER CO.	LITTLETON	5/12/1998	1720	Hail	4.5
5172860	PIATT CO.	BEMENT	8/26/2000	2010	Hail	4
5239925	SHELBY CO.	COWDEN	4/10/2001	652	Hail	4.5
5359128	HENDERSON CO.	GLADSTONE	5/8/2003	2002	Hail	4
5355407	MCLEAN CO.	STANFORD	5/9/2003	1927	Hail	4.5
5401464	WOODFORD CO.	METAMORA	5/30/2004	1600	Hail	4
5412819	LEE CO.	DIXON	7/13/2004	1040	Hail	4
5418319	BUREAU CO.	LA MOILLE	7/13/2004	1140	Hail	4
5412048	MCLEAN CO.	NORMAL	7/13/2004	1355	Hail	4.25
106981	CHAMPAIGN CO.	PHILO	5/30/2008	1715	Hail	4.25
323339	MONTGOMERY CO.	LAKE LOU YAEGER	5/28/2011	1325	Hail	4.5
323344	MONTGOMERY CO.	IRVING	5/28/2011	1340	Hail	4.5
373175	WASHINGTON CO.	OKAWVILLE	4/28/2012	1620	Hail	4.5
483572	MCLEAN CO.	COVEL	11/17/2013	1200	Hail	4
518901	DOUGLAS CO.	TUSCOLA	5/21/2014	1525	Hail	4
582669	KENDALL CO.	MINOOKA	6/10/2015	1820	Hail	4.75

Table 1. NCEI Storm Data database query results for Illinois hail diameter  $\geq 4$  inches.

