Significant Wind Driven Hail - FAQs

1. **What is Significant Wind Driven Hail (SWDH)?**
   We define SWDH as a severe thunderstorm which simultaneously produces significant wind (≥65 kt) and golf ball or larger size hail (≥ 1.75" diameter).

2. **Why haven't I heard of SWDH?**
   *To our knowledge, there has been little explicit research investigating significant wind-driven hail. A few case studies date back a couple of decades (Lemon and Parker 1996, Klimowski et al. 1998), and more recent studies of post-event satellite analysis have included SWDH events (Gallo et al. 2012, Molthan et al. 2013). The lack of research is likely due to the difficulties in determining if a storm produced wind and hail **simultaneously**, especially when events occur in areas with low population densities.*

3. **Why is it difficult to develop a SWDH database? How did you do it?**
   We started by downloading all hail and wind reports from 2010-2019, then used ArcGIS to query for instances of hail & wind occurring within 10 miles and 15 minutes. From there, we manually investigated each case using a variety of methods. Of the several hundred potential cases, only 202 have made it to our database!

4. **Where does SWDH typically occur?**
   In general, SWDH most frequently occurs across the Great Plains, though a handful of cases have occurred east of the Mississippi River. Though events in the Ohio Valley/Mid-Alantic/Northeast are less common, this does not mean they are less destructive! Scan the QR code for a map.

SCAN ME

5. **When is the most common time of year for SWDH to occur?**
   In general, these events occur in warm-season months (MJJA), during the afternoon and evening hours (21-03z). There have been very few cases between 12-18z, and only a handful of events after 06z.

6. **What does the standard environment look like in these events? Radar?**
   Using the SPC Mesoanalysis Archive in GEMPAK format, we parsed the nearest grid point to an event and calculated a variety of variables. In general, the near-storm environment was supportive of supercells. These are briefly summarized on the table on the reverse side.

NATIONAL WEATHER SERVICE
OCEANIC AND ATMOSPHERIC ADMINISTRATION

Table 1: Environment Characteristics

Parameter	MLCAPE (MUCAPE)	Effective Bulk Shear	Effective SRH	500-700mb Lapse Rate	Mixed Layer LCL
Median Value	1685 Jkg^{-1} 2185 Jkg^{-1}	46.7 kt	149.5 m^{2}s^{-2}	7.1 °Ckm^{-1}	1320 m

Unsurprisingly, a vast majority of events were supercells (90%), with only a handful of marginal supercell (7.5%) and non-supercell (6 total events, 2.5%) events noted. A brief summary of radar characteristics is given in the table below. Additional information can be found by scanning the QR code.

SCAN ME

Table 2. Radar Characteristics

Parameter	V$_r$	STD	50 dBZ Height	65 dBZ Height
Median Value	42.7 kt	139.9 kt	40209 ft ARL	28959 ft ARL

7. Can you share an example case or two?

Date	Location	Max Hail	Max Wind	Event Description
06/14/2010	Benton County, IN (LOT)	4.25"	87 kt	*A massive supercell developed over southern Benton County during the mid afternoon hours of June 14th. This storm produced grapefruit sized hail and wind speeds estimated to 100 mph. Thousands of acres of corn and other crops were destroyed.*
06/03/2014	Blair, NE (OAX)	2.75"	79 kt	*Baseball or larger hail and wind gusts estimated to be as much as 100 mph produced a significant swath of wind-driven hail damage near Uehling and Blair, NE*
08/10/2017	Sheridan County, KS (GLD)	4.25"	87 kt	*The wind driven hail ranged from baseball to softball in size. A nearby corn field was chopped down to six inches tall.*
04/28/2021	Norman, OK (OUN)	3.00"	65 kt	*...renewed storm development led to an isolated supercell which tracked across southern portions of the OKC metro area with 2-3 diameter hail and damaging winds. Extensive damage was reported with this storm, with the most significant damage concentrated in Norman*

8. How can I learn more? What if I know of an event in my area?

Email Zach Hiris (zachary.hiris@noaa.gov) and Michael Fowle (michael.fowle@noaa.gov)! Additional info is also available at https://meteor.geol.iastate.edu/~zhiris/swdh or by scanning the QR code above.

NATIONAL WEATHER SERVICE
OCEANIC AND ATMOSPHERIC ADMINISTRATION