

NWS-CR-TA-88-18

CRH SSD  
APRIL 1988

CENTRAL REGION TECHNICAL ATTACHMENT 88-18

AWS TECHNICAL LIBRARY  
FL 4414  
SCOTT AFB IL 62225

UNOFFICIAL ANEMOMETERS - AN UNTAPPED SOURCE OF SEVERE WEATHER REPORTS

2 MAY 1988

John T. Curran  
National Weather Service Forecast Office  
Indianapolis, Indiana

Anemometers used in homes or businesses can reliably augment the existing network of NWS, FAA and SAWRS wind gust reports, providing more complete information during severe local storms.

A pilot program in central Indiana, dubbed "Mr. Gust," successfully demonstrated the usefulness of unofficial anemometer sources on December 15, 1987, when state-wide gradient winds of 55 to 70 mph occurred. Figure 1 shows the location of the December 15th peak gusts. NWS, FAA and SAWRS anemometer peak gusts are circled and provide a measure of reliability of the surrounding unofficial anemometers.

The unofficial anemometers appeared to be quite reliable, provided the sensor is adequately exposed. On the other hand, sensors mounted too close to roof tops or buildings tend to indicate inflated wind speeds. The air diverted by the building must accelerate around and over the building in order to arrive at a downstream point at the same time as unimpeded air. Several sensors that registered unrealistically high gusts were mounted only five to six feet above the roof, whereas the anemometers mounted ten feet or so above the roof of one or two story houses were very reliable. For example, a 93 mph gust reported in northeast Marion County was from an anemometer located five feet above a penthouse on a building 92 feet high, 100 feet wide and 150 feet long. This resulted in a reported gust 50% higher than the surrounding reports.

Anemometers that were checked out as reliable during this high gradient wind event should also effectively measure severe local storm gusts, as well. In addition, over a third of the unofficial anemometer systems store peak gusts and time of occurrence information for later recall. This makes reports from these systems especially useful.

Observers to participate in this unofficial network were recruited by placing announcements on NOAA Weather Radio (NWR). Since most amateur weather observers listen to NWR, this medium proves to be an excellent source for recruitment. Those who responded to the NWR appeal were provided an application (Figure 2) that asked for basic information. Upon the receipt of the application, the amateur observers were enrolled with a welcoming letter (Figure 3).

The "Mr. Gust" program was "worth all the effort in setting it up," according to the lead forecaster on duty the morning of December 15th, when damaging winds developed in Indiana. Gusts of 55 to 70 mph blew down signs and trees, cars were crushed from falling trees and widespread power outages resulted.

Additional observers will be recruited from NWR listeners, small airport operators and other sources during the next few months. As the number of peak gust observers increases, the detection of damaging downbursts and microbursts should increase, resulting in improved thunderstorm warnings. Numerous sources of measured wind speeds will decrease the need for estimated wind speeds, which are often unreliable.

A comprehensive network of reliable, unofficial anemometers for Indiana is planned for the 1990's. A dense network of anemometers could assist in the interpretation of NEXRAD velocity displays. Forecasters who have access to ground truth data on wind speeds might increase their confidence in the NEXRAD capabilities to detect microbursts. In addition, the networks of anemometers may improve warning capabilities in areas beyond the effective range of NEXRAD downburst detection.

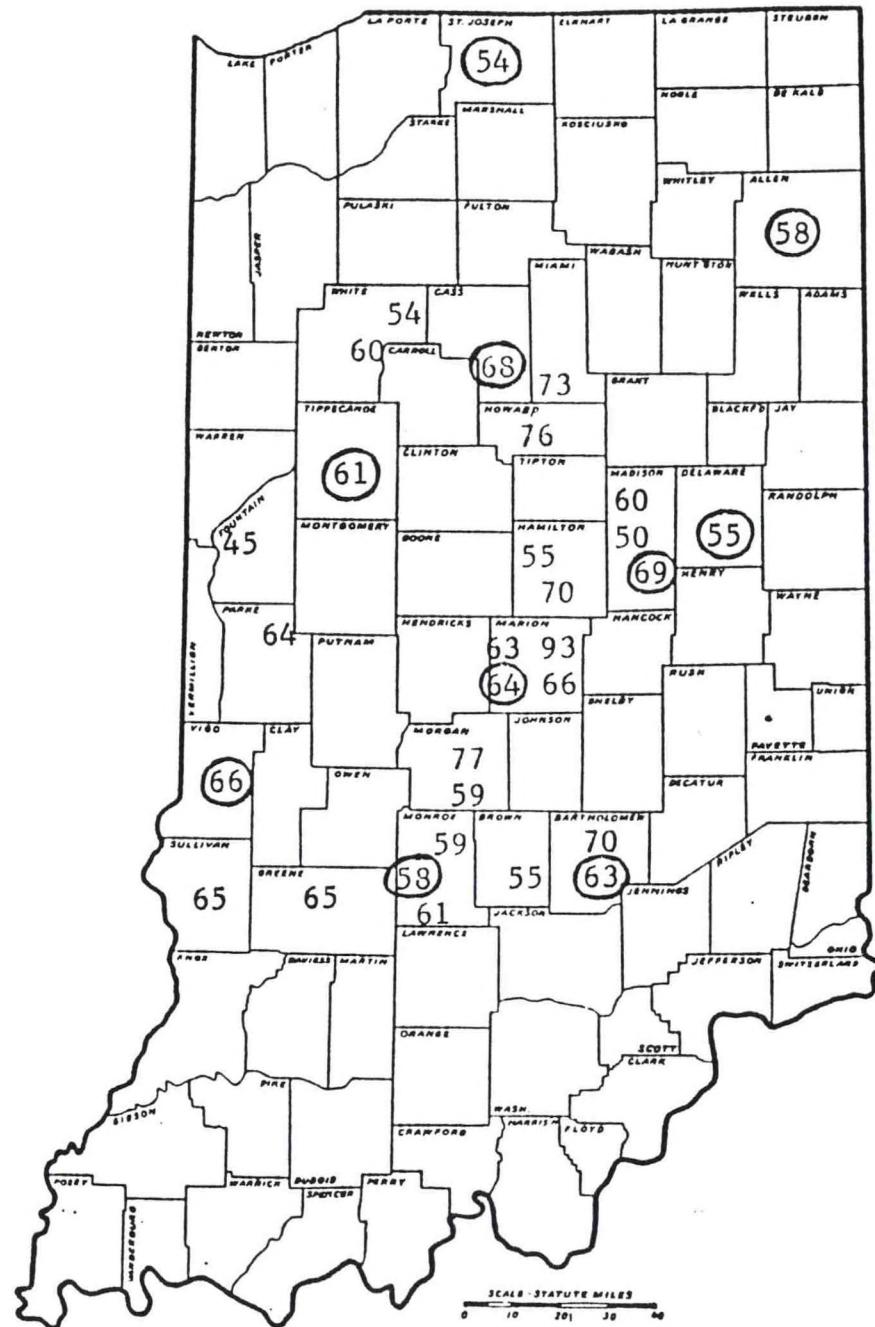


Fig. 1. Peak gusts received on December 15, 1987. Circled gusts are from official sources.

APPLICATION  
Volunteer Storm Gust Observer  
National Weather Service

NAME: \_\_\_\_\_  
STREET ADDRESS: \_\_\_\_\_  
CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_  
PHONE: \_\_\_\_\_

Definition of Anemometer: An instrument for measuring and indicating the speed of the wind.

Location of Anemometer (Number of Miles N or S, E or W, from Center of nearest town)  
Example: 2 miles N, 1/2 mile E from Fowler, Indiana

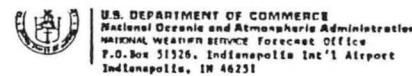
Your anemometer location: \_\_\_\_\_  
Does your anemometer record and save the peak gust of Yes \_\_\_\_\_ No \_\_\_\_\_  
Does your anemometer record and save the time of the peak gust Yes \_\_\_\_\_ No \_\_\_\_\_  
Make and model of anemometer: \_\_\_\_\_  
Briefly describe your anemometer's exposure; height above ground; height above the top of the nearest buildings; nearness and height of surrounding hills, trees, and buildings.  
Example: Mounted on chimney 10 feet above roof ridge line on two-story home.  
Higher trees in neighboring yards - 200 feet away.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If your application is accepted, would you be willing to call the National Weather Service collect, anytime the peak gust is greater than 50 mph?  
Yes \_\_\_\_\_ No \_\_\_\_\_  
In addition, would it be permissible for the National Weather Service to call you to inquire what your wind gusts have been when there is a need for additional information? Yes \_\_\_\_\_ No \_\_\_\_\_  
If "yes", list the times when you do NOT want to be called. \_\_\_\_\_

If your equipment and exposure is adequate and there is a need for wind information from your area we will correspond with additional instructions.

PLEASE RETURN THE APPLICATION IN THE  
ENCLOSED, FRANKED ENVELOPE.  
Thank You.

Fig. 2. Application for volunteer storm gust observer.



August 19, 1987

Dear

Congratulations. You are now enrolled as a storm gust observer for the Indianapolis National Weather Service.

Your site has been accepted for wind observations and is one of 20 sites scattered around the state. You may ignore future requests for wind observers on National Weather Service Radio, as we already have you on file.

Now, here's what we'd like you to do:

Anytime your anemometer registers a wind speed of 50 mph or more, call the Indianapolis National Weather Service. If you are local the number is 244-4039, our severe weather reporting line. If you are long distance, call on our toll free number, 1-800-392-3438. Tell the person who answers you are a "Storm Gust Observer" and give the following information:

1. Your Name
2. Location (Town and County)
3. Speed of the highest wind (gust) observed
4. Time of the peak gust (if known).

Do not give the unlisted phone numbers to others, they are only for reporting Severe Weather (Definition of severe weather: Tornado, hail 3/4" in diameter, wind gusts of 50 mph or more, or winds that damage.)

Ironically, you are more likely to observe a wind greater than 50 mph in Indiana in the winter time than in the summer time. We would like to receive your reports during all seasons. Your winter storm reports will help us with blizzard and high wind warnings and allow us to compare your observations with others. The high winds that you observe associated with thunderstorms will be a tremendous help to our severe thunderstorm and tornado warning program.

We have on file the hours you indicated it would be ok for the National Weather Service to call you. If at any time you want those hours changed, let us know. If you wish to be dropped from the program at any time, just let us know.

Your participation in this program is greatly appreciated.

Sincerely,

John T. Curran (Mr. Gust)  
Meteorologist In Charge  
Area Manager

Fig. 3. Welcome letter to new storm gust observers.