

Volunteer Precipitation Monitoring

WERA-1012 (2008-2013)

Precipitation Data in Demand

Recent widespread droughts and severe floods in the U.S. are reminders that fluctuations—especially extremes—in precipitation seriously impact the environment and society. For almost 125 years, the National Oceanic and Atmospheric Administration has monitored precipitation types and amounts, making it possible to prepare for variability and extremes. Using real-time and historic precipitation data, city planners and civil engineers can design better sewers, roofs, and other infrastructure; farmers can adapt growing practices; and water providers can ensure steady supplies for agricultural, industrial, and municipal uses. Understanding precipitation allows everyday citizens to go about their daily lives comfortably and safely.

Over the years, satellites and ground RADAR have become popular because they can detect precipitation without physically being in an area. Though these systems can estimate the intensity and motion of precipitation, on-the-ground measurements are still needed to calibrate the equipment and confirm precipitation type and accumulation. Collecting on-the-ground data all across the country takes a lot of rain gauges and a lot of manpower. To cover more ground and gather more data, some programs have enlisted volunteers to record observations with simple, plastic rain gauges often used right in their backyards.

As federal budgets for climate monitoring flatline, there is a new push to make the most of these low-tech, low-cost volunteer networks. But counting on volunteers to collect precipitation data comes with concerns. Recruiting volunteers can be tricky, leaving some areas with no volunteers—and no precipitation data. Volunteers also need training and coordination to ensure they use sound methods and adhere to the same quality control standards.

Multistate Research Project Makes a Difference

Since 2008, members of the WERA-1012 multistate research and extension project have conducted research and outreach to support volunteer precipitation observation networks. The group's efforts have raised awareness about the value of precipitation data collected by volunteer networks, boosting involvement and strengthening long-term support. The number of volunteer weather observers has jumped to over 20,000, producing a rich data source. Greater involvement in these programs has enhanced science literacy in the U.S., especially among students who gain real-world experience collecting and analyzing data.

Emphasizing low-cost ways to mobilize volunteers and collect data, WERA-1012's work has turned volunteer networks into an economically sustainable resource for national weather monitoring. Researchers have also shed light on how to train and coordinate volunteers, making volunteer observations more reliable. Furthermore, the WERA-1012 committee has standardized the tools and protocols used by volunteers, making it easier to combine data from different volunteer networks. This has resulted in the most extensive national precipitation monitoring network in U.S. history.

Accurate, real-time data at the local scale has made it possible to:

- issue warnings, giving the public time to reach safety in floods, winter storms, and other severe weather events;
- supply enough water for municipal, agricultural, and industrial uses;
- irrigate crops more efficiently so that water isn't wasted and crops stay healthy;
- administer federal crop insurance and reduce fraud, saving farmers and taxpayers tens of millions of dollars;
- calibrate RADAR and satellites.



With the right training and easy-to-use, reliable equipment, everyday citizens of all ages can become volunteer precipitation observers. Simple rain gauges like the one below used by CoCoRaHS volunteers can be set up in diverse locations to measure precipitation amounts in different areas. Photos by Henry Reges.



Collaborative Research & Extension Provides Coordination, Training & Tools

Over the years, WERA-1012 coordination fostered open interaction between the National Weather Service, the National Climatic Data Center, universities, and other organizations that use climate data. Working together, these organizations addressed critical observational and funding issues and identified specific strategies that sustain effective volunteer networks. Based on this work, existing volunteer networks like the National Weather Service Cooperative Observer Program and the Community Collaborative Rain, Hail & Snow Network (CoCoRaHS) picked up new tactics to recruit volunteers, such as partnerships with school science programs, media announcements, and recruitment blitzes. Over 1,200 new volunteers joined CoCoRaHS during the “March Madness” program in 2013. The WERA-1012 committee also focused on engaging minority populations and volunteers in specially targeted areas.

To help volunteers take accurate measurements, researchers compared rain gauges for ease-of-use, durability, and reliability and set guidelines for placing gauges where they will not be damaged. The committee also coordinated the distribution of “ETgages,” enabling the CoCoRaHS volunteers in 34 states to measure evapotranspiration.

To bring volunteer observations in line with regional, national, and international quality standards, the committee developed new protocols for volunteer networks. WERA-1012 working groups also helped regional and national agencies refine their observation guidelines. For example, project members enabled a special Snow Data workshop for FEMA that firmed up their policies on verifying snow disaster declarations across the country.

In addition, the committee developed better training materials, including a series of videos available for download from the CoCoRaHS website, some of which use animation to illustrate cumbersome procedures and potential observation scenarios. Project members also participated in monthly WxTalk Webinars. About 175 people joined each of the 25 talks to date, all of which are archived on the CoCoRaHS YouTube channel.

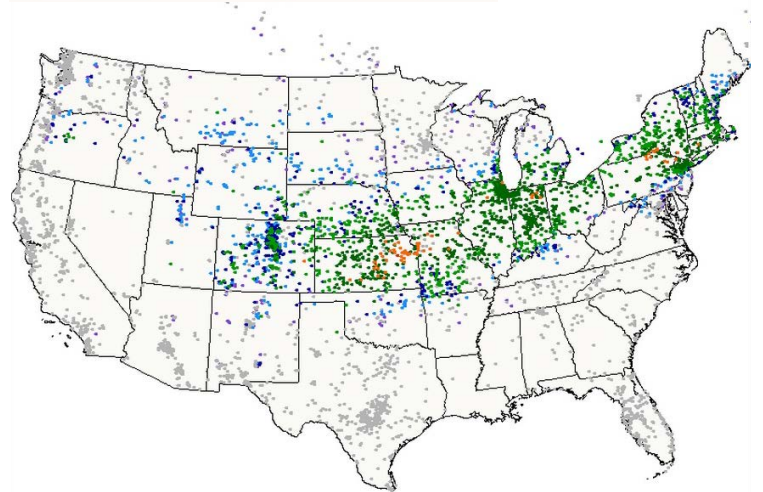
To combat data entry errors, project members teamed up with the Midwest Regional Climate Center and developed a system that allows volunteer network coordinators to flag suspicious values and track how they are resolved. Six states (Illinois, Colorado, Florida, New Jersey, South Dakota, and Wyoming) already rolled out the system. The committee also began sending “Quality Control Tips of the Week” to the CoCoRaHS network. Other committee members suggested ways to eliminate some data entry errors by improving the user interface for the CoCoRaHS website.



As a multistate project, WERA-1012 has brought together scientists with diverse expertise from institutions across the U.S. Their efficiency and dedication have spurred many advances in volunteer precipitation observation networks. Photo by Henry Reges.

Daily Snow (inches) for 2/5/2014

0.0 Trace 0.0 - 0.8 0.9 - 1.6 1.7 - 3.9 4.0 - 9.3 9.4 - 14.0 14.1 - 15.5



CoCoRaHS volunteers record their precipitation measurements in an online database. Once in the system, the data can be displayed as maps like the one above, which shows new snow accumulation over one day. Screenshot from <http://www.cocorahs.org/Maps/>.

Want to know more?

National Weather Service Cooperative Observer Program:
<http://www.nws.noaa.gov/om/coop/what-is-coop.html>

Community Collaborative Rain, Hail & Snow Network:
<http://www.cocorahs.org/>

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This Impact Summary was compiled and designed by Sara Delheimer.