CoCoRaHS: The Community Collaborative Rain, Hail and Snow Network

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CoCoRaHS, the Community Collaborative Rain, Hail and Snow Network is a unique, non-profit, community-based network of volunteers working together to measure and map precipitation (rain, hail and snow). By using low-cost measurement tools, stressing training and education, and utilizing an interactive website, the aim of CoCoRaHS is to provide the highest quality data for natural resource, education and research applications. CoCoRaHS is currently operating in twelve states: Colorado, the District of Columbia, Indiana, Kansas, Maryland, Missouri, Nebraska, New Mexico, Pennsylvania, Texas, Virginia and Wyoming (Figure 15a).

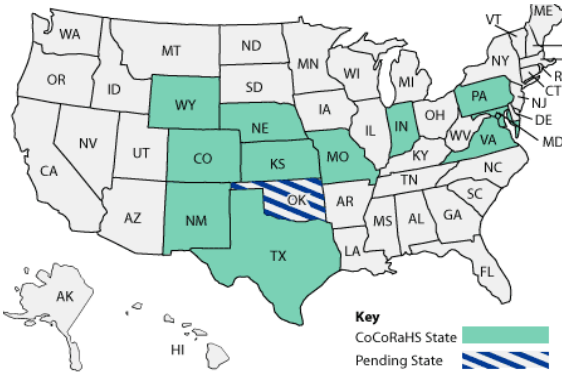

Figure 15a: U.S. map showing the states that have volunteers participating in the CoCoRaHS program.

The network originated with the Colorado Climate Center at Colorado State University in 1998. CoCoRaHS came about because of a devastating flash flood that hit Fort Collins, Colorado in July 1997. A very localized storm dumped over a foot of rain in several hours while other portions of the city had only modest rainfall. The ensuing flood killed five people and caused $200 million in damages. The storm was too localized for forecasters to anticipate using the current spatial distribution of weather stations. With that in mind, CoCoRaHS was born in 1998 with the aim of providing more detailed information about local weather events for both forecasters and the general public. Volunteers record the precipitation falling at their home, and scientists at the Colorado Climate Center can produce rainfall maps for every storm showing fascinating local patterns that were valuable both for scientists and for local residents. In the years since, CoCoRaHS has expanded rapidly with over 2,500 observers in twelve states, while the function of the Colorado Climate Center remains coordinating and displaying data on the CoCoRaHS website: http://www.cocorahs.org.

At first the project was very small with only a few dozen volunteers in Northern Colorado reporting precipitation on a website created by local high school students. Each year since then the project has grown as more people and organizations get involved. People in many parts of the country have shown interest in having their state join the CoCoRaHS Network. In 2003, thanks to a National Science Foundation Informal Science Education grant, the network took its largest step and expanded into the Central Great Plains.

CoCoRaHS is an example of a "Citizen Science" project where volunteers help collect data important to scientists and not readily available from other sources. Volunteers of any age and background, but with a common interest in watching the weather, take daily measurements of rain, hail, and snow using low-cost measurement tools: 4-inch diameter high capacity plastic rain gauges (Figure 15b) and aluminum foil-wrapped Styrofoam hail pads. With the help of basic instruction and frequent interaction with participating scientists, volunteers are able to collect and share data of considerable scientific value. There are very few sources of reliable snowfall observations in the U.S. and very little quantitative data on hail stone properties, so CoCoRaHS is quickly becoming a popular source of data that supports remote sensing, weather forecasting, and other atmospheric and hydrologic research (Cifelli, et al, 2005).

Figure 15b: This type of rain gauge is used by CoCoRaHS volunteers. It is a simple, inexpensive device that is very accurate at measuring the amount of rainfall from a storm event.

All volunteers, in order to collect and share precipitation data on the CoCoRaHS website, are required to learn the basics of data collection including: how to set up a backyard rain gauge and hail pad, the critical importance of instrument location and exposure, common errors and how to

On the Web

The information for this focus page came from posters and presentations located on the CoCoRaHS website. If you would like more information visit the website at: http://www.cocorahs.org. You can sign up to help measure rain, hail, and snow by clicking on "Join CoCoRaHS."

The Intermountain West Climate Summary is published monthly by Western Water Assessment, a joint project of University of Colorado and NOAA Climate Diagnostics Center, researching water, climate and societal interactions.

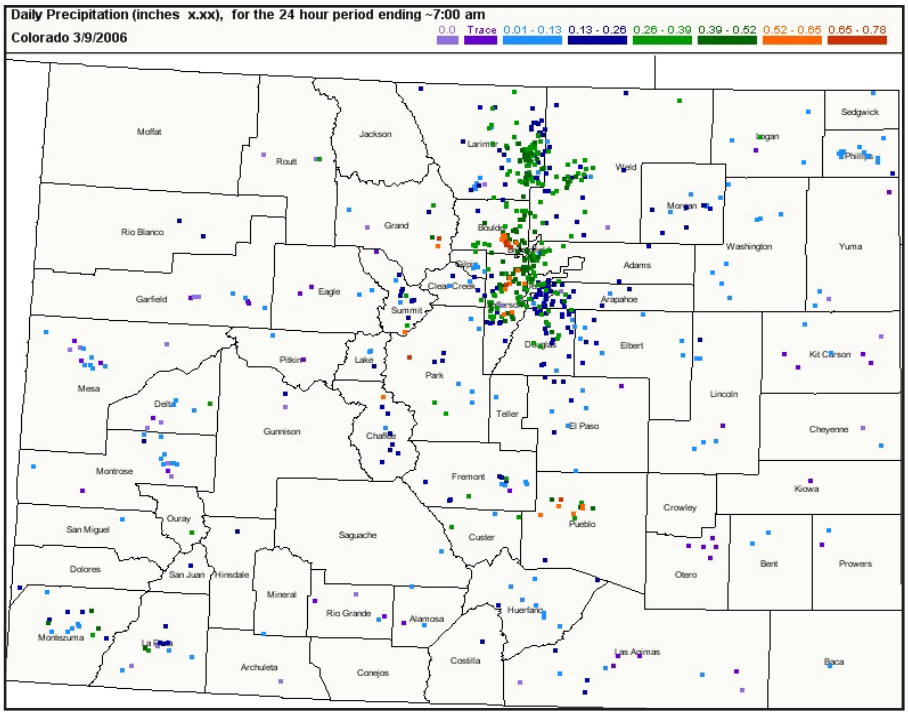

Figure 15c: Map showing the location of CoCoRaHS volunteers' weather stations in Colorado. This map also shows precipitation data collected on March 9, 2006.

avoid them, units of observation, and how to deal with the difficulties of measuring hail and the challenges of melting, settling and drifting snow. By providing high quality, accurate measurements on the internet, the observers are able to supplement existing official weather networks with very detailed local data from their neighborhoods. Data collected in Colorado since 1998 show that to be able to accurately map rainfall patterns from summer convective storms, a density of at least one station per 3-4 square kilometers is needed. Over sparsely populated rural areas at least one station per 100 square kilometers is desirable. Volunteers are strongly encouraged to attend group training sessions lead by CoCoRaHS staff or trained trainers. CoCoRaHS staff are working to implement a simple certification process that will assure that all volunteers entering data on the website have learned the basic elements of observation.

Volunteer participation is now increasing spontaneously, mostly by word of mouth, with new applications arriving every day. Volunteers can report by phone, but most enter data on-line using an interactive web site: http://www.cocorahs.org. Current observations as well as past data are immediately available in map and table form for participants, project scientists, and the public to view (Figure 15c).

One of the very satisfying parts of CoCoRaHS, for both the staff and volunteers, is seeing how scientists use the data. Several dozen organizations have become CoCoRaHS local or regional sponsors because accurate and timely precipitation measurements provide valuable data that help thier organizations. Examples of some current sponsors and data users include:

- NOAA's National Weather Service uses reports of heavy rain and hail to help issue severe weather warn ings or to verify local forecasts.

- The US Dept. of Agriculture utilize rain, hail and snow reports to assess crop conditions, determine drought severity, and predict crop production and yield.

- The U.S. Bureau of Reclamation is supporting the expansion of CoCoRaHS in order to track precipita tion patterns and snow melt more carefully in order to provide better forecasts of stream levels and flow volumes.

Many other local and state agencies and business are also interested in using and helping collect local rainfall data including several state natural resource departments, local water and storm water utilities, agricultural organizations, and local conservation districts. Anytime there is a storm, there are many organizations who benefit from CoCoRaHS data by knowing precisely where the moisture fell.

References: Cifelli, R., N. Doesken, P. Kennedy, L.D. Carey, S.A. Rutledge, C. Gimmestad and T. Depue, 2005: The Community Collaborative Rain, Hail, and Snow Network: Informal education for scientists and citizens. *Bull. Amer. Meteor. Soc.*, Vol. **86**, 8(Aug), 1069-1077.