

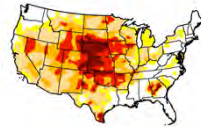
CoCoRaHS (Community Collaborative Rain, Hail and Snow) Network

The CoCoRaHS Network is a volunteer, manual precipitation observation network born out of a need for high density precipitation data following a significant flood in Colorado. From its inception, CoCoRaHS has followed a two-pronged approach of educating the public in climate literacy topics and collecting high quality, high-density precipitation data for use by educational, governmental, and private organizations.



Partners

- NSF (National Science Foundation)
- NOAA (National Oceanic and Atmospheric Administration)
 - NWS (National Weather Service)
 - RFC (River Forecast Centers)
 - NCDC (National Climatic Data Center)
 - NIDIS (National Integrated Drought Information System)
- PRISM Climate Group
- Universities
- AASC (American Association of State Climatologists)
- Local governments (Fort Collins, Highlands Ranch, Golden, Pueblo, Greeley, Loveland)
- NASA GPM (Global Precipitation Monitoring)
- UDFCD (Urban Drainage and Flood Control District)
- MMCD (Metropolitan Mosquito Control District)
- DataONE
- CAISE (Center for the Advancement of Informal Science Education)
- NEON (National Ecological Observatory Network)
- Poudre School District
- NEEF (National Environmental Education Foundation)
- TV Meteorologists
- New York City Office of Emergency Management



Project Audiences

CoCoRaHS data is available to anyone under the Creative Commons Attribution 3.0 license. The project audiences fall into three general categories.

Participants: Anyone in the US, Puerto Rico, and ten Canadian Provinces with the ability to site a rain gauge can submit precipitation observations. CoCoRaHS attempts to track precipitation in its many forms. The types of observations participants can record are rain, snow, evapotranspiration, hail, significant weather, drought impacts, frost, optical events, snowflake type, and thunder. Over 31,000 observers have participated, submitting over 25 million daily precipitation observations.

Non-participants: Anyone can access the data and educational materials that CoCoRaHS and its observers provide. Some people would like to participate but do not have the ability to site a rain gauge. Even without participation they can enhance their climate literacy through a variety of education materials offered by CoCoRaHS, including *The Catch* newsletter, CoCoRaHS blog, training presentations, topical climate animations, water festivals, school presentations, and the *Wx Talk* webinar series.

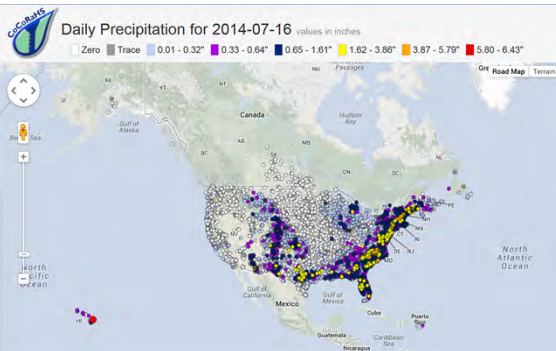
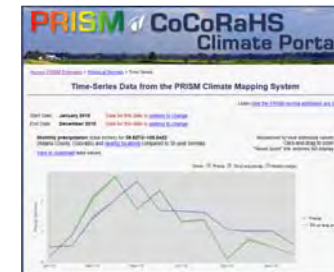
Data Users: CoCoRaHS facilitates the usage of the data by individuals and institutional data users through a Web API and via the fulfillment of custom data requests. Many institutional data users ingest CoCoRaHS throughout each day using automated processes. CoCoRaHS data are utilized in fields such as snow hydrology, geology, extreme precipitation event analysis, civil engineering, and radar algorithm evaluation. To date, the CoCoRaHS network and its data have been included in 18 dissertations and theses.

* The fact that many data users are also observers enhances the data usage, data quality, and perceived validity of the data. Data users drive the modifications and additions of protocols to insure that the observational data collected will be scientifically valuable.



Challenges encountered

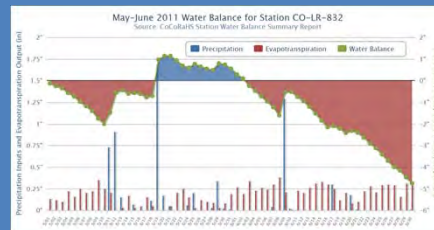
CoCoRaHS has faced several challenges during the course of the project. Scaling up the project, both geographically and demographically, has created several opportunities. Increasing the demographic reach of the project has been done through CoCoRaHS' participation in water festivals, school presentations, mobile apps, and outreach via social media networks. Expanding the geographic availability of the network has required technical solutions, such as the support for metric data submission and display, but most importantly via the amazing support of over 240 state and regional coordinators, many of whom work for CoCoRaHS' institutional data users. Managing such a large group of volunteer coordinators presents its own challenges, but those are vastly outweighed by the benefits of their local expertise to assist and encourage participants. Project sustainability will be an ongoing challenge as the project seeks to continue to promote climate literacy through the collection of valuable precipitation data indefinitely. CoCoRaHS is working to meet this challenge by diversifying its funding sources across grants, donations from data users, and donations from observers.



The primary project question is: "How much precipitation fell in your backyard?"

The types of questions data users seek to answer using the resulting data are:

- How can radar algorithms be improved?
- What will the stream flow be based on precipitation rates?
- What level of drainage is needed to prevent urban flooding in an area?
- What was the water content of the snowfall?
- Should the NWS issue a severe weather warning in an area?
- What should the irrigation schedule of farmland be given the current water balance?
- How accurate are satellite precipitation estimates?
- How to best direct mosquito control efforts?



* The core question of the project is relatively simple and easy to explain, however, the resulting data informs more complex questions from data users across a diverse set of fields.

Project evaluation

Formative and summative evaluations have been conducted by David Heil & Associates, Inc. (DHA). Findings from the summative evaluation study demonstrated that:

- Engagement, enrollment and overall data submitted have all increased over the four-year period.
- New improvements and activities such as webinars resulted in nominal increases in participants' understanding of the scientific process, and weather and climate concepts.
- After participating in CoCoRaHS, respondents suggested they were "somewhat more" or "much more" engaged in science activities such as: observing weather phenomena, discussing weather and climate, teaching others about weather and climate, and watching or reading climate/weather related programming.
- Teacher surveys indicated the CoCoRaHS K-12 education program resulted in improved attitudes toward science and science learning for students and encouraged engagement and interest in science among students - specifically weather and climate concepts.
- New improvements and activities only made a slight impact on recruiting a more diverse audience. Students from underrepresented groups in science were reached through K-12 education outreach events and more teachers are participating compared to data from before the grant.



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