Why CoCoRaHS Requires Manual Measurements

We are often asked why CoCoRaHS does not accept data from automated rain gauges to report daily 24-hour precipitation totals. After all, many weather enthusiasts already have electronic home weather stations with automated rain gauges that record precipitation. Do they really need to acquire a manual CoCoRaHS gauge?

Unfortunately, rain gauges are not all created equal and do not all report the same. The Colorado Climate Center has been involved in rain gauge studies for many years and have had dozens of volunteers like you test their automated gauges against either the CoCoRaHS 4" diameter manual gauge or the National Weather Service (NWS) 8" diameter manual Standard Rain Gauge. We have also tested National Weather Service Automated Surface Observing System automated tipping bucket rain gauges (not unlike the tipping bucket gauges that come with many home weather stations, but larger, sturdier and a lot more expensive).

The NWS and CoCoRaHS manual gauges compare very well with each other over wide ranges of weather conditions. Tests conducted in Colorado over three decades indicate that the CoCoRaHS gauge has a collection efficiency of 101-105% compared to the standard NWS gauge in side by side measurements. Nearly all daily differences were small – usually 0.02" or less with much of the difference attributed to greater wetting required by NWS gauges before registering the first 0.01".

Because of the performance and accuracy of the 4" diameter high capacity manual precipitation gauge, the National Weather Service and its parent agency, NOAA, accept data from CoCoRaHS as comparable to their official instrumentation. By comparison, the majority of automated rain gauges report less precipitation than the reference NWS Standard manual rain gauge, especially when summed over several months or years. Daily differences are larger – sometimes 10% or more – especially for storms with high intensity rainfall. Moreover, none of the automated gauges work well in areas that receive snow. This is not acceptable for our project because we are interested in observing and understanding natural precipitation variability, as accurately as possible, under all precipitation types and intensities. If we permit the use different kinds of gauges with different abilities to catch and report precipitation, it becomes difficult to determine if differences in rain or snowfall are "real" or due to the kind of instrument that was used to report the measurement.

Therefore, we require all of our observers to set up a CoCoRaHS 4" diameter manual gauge and use that for your daily reports.

We do recognize the value of automation and certainly don't discourage the use of electronic instrumentation. They are great for showing the timing and relative intensity of precipitation along with other weather conditions, whether or not you are home to experience it. They can be used in combination with the CoCoRaHS manual gauge to show when precipitation began and

ended and was most intense. You may include the measurement from your automated gauge in your observation notes, but all CoCoRaHS measurements must be done using the 4-inch manual gauge.

For those of you who already own a good quality automated weather station and decide it's too much trouble to purchase a CoCoRaHS gauge and take manual measurements you may still be able to share your data with the National Oceanic and Atmospheric Administration (NOAA - the organization that oversees the NWS) via their Citizen Weather Observation Program (CWOP). This program makes home weather station data available to the NWS for certain real time applications. WeatherUnderground is another system for web-based data sharing.

For climate data and research applications, as well as supporting the "NowCasting" goals of NOAA, we encourage you to obtain the 4" diameter high capacity manual rain gauge and join CoCoRaHS.