

The Catch

COCORAHS—THE MYSTERY OF THE INCREASING SWE

FORT COLLINS, CO — Friday, December 8, 2006

Greetings.

It's been a quiet day in CoCoRaHS for the most part. Some rain in TX and a little snow in PA, but for most of us the weather is dry again. The monster storm of last week left a lasting impression as some of our Missouri volunteers are just now getting their reports in. What a workout they had with many stations measuring more than 4" of water content—rain, freezing rain, and then snow. Even our observers in TX and OK got to measure snow—and lots of it in parts of Oklahoma. When I looked at total snow remaining on the ground this morning, parts of Missouri still had more snow than most of Wyoming and Colorado except for the higher mountains.

Here at our house in Fort Collins, we're now down to about 2" of snow from our nearly 8" that fell last Tuesday night. It's been nice seeing this bright white linger—seems appropriate for December especially after last winter when we got hardly any. But here is where the mystery begins.

The Mystery

Some of us are trying to measure SWE. What, you might ask, is SWE? SWE simply means "Snow Water Equivalent" and it is the depth of water in the snow that remains on the ground. Here in the Rockies, SWE is measured religiously by the Natural Resources Conservation Service and their many collaborators. SWE in the mountains is equivalent to liquid gold. It is our water supply for the coming year -- held in a frozen reservoir of white until next spring's snowmelt begins. But even at lower elevations and in areas where snow cover is intermittent, SWE (Snow Water Equivalent) is interesting and fun to study.

We measure SWE by taking a core sample with our rain gauge outer cylinder and melting and measuring the water content. I've done this each morning since the snow fell last week. Since then, the skies have been mostly clear and we've had no additional precipitation. The snow depth has steadily decreased and the snow is now icy and granular. BUT THE WATER CONTENT OF THE CORE

SAMPLE HAS INCREASED!! Originally I had about 0.56" in my core samples, but now it's climbed to 0.60". Curiously, several of you have written to me wondering what you were doing wrong. Your core sample water contents were also going up. Where is this extra moisture coming from?

It turns out that for those of us who have done measurements of SWE for a long time, we've seen this before. In the cold of midwinter (not so much in spring or fall), there is a tendency for the snow water content to go up gradually until the snow reaches a point where it is between 25% and 40% water (i.e. 2" of old snow could have 0.50" or more of water content before it finally melts). But we STILL DON'T KNOW for sure where the extra water is coming from.

I've heard several theories. Perhaps there is frost deposition on the surface at night. Maybe water vapor from the warmer soil below is moving upward and then condensing on the colder snow crystals. Maybe as nearby snow begins to melt and bare spots appear, melt water is being wicked horizontally into the snow crystal structure rather than soaking into the ground below. Or maybe it's even simpler. Maybe as the snow structure changes, our coring techniques and catch efficiency changes. Maybe the fresh snow was still stuck down in the grass when we took those first cores but now we're doing a better job of getting all the snow into our sample. I have many ideas, but I really don't know the answer.

For you snow hounds in cold places, I challenge you to discover this mystery on your own by taking core samples each day of the old snow remaining on the ground. Plot out your data and see what you come up with. Then, if you experience increasing SWE let me know and provide me your theory for why this is happening. Perhaps, together, we can figure this out.

A Great Web site for Snow and Water

If you like tracking mountain snowpack and water content, try this website. This is the favorite of many water managers here in our part of the country.

<http://www.wcc.nrcs.usda.gov/snow/>

Illinois Goes Wild!

As of this evening, we've received 119 applications from willing volunteers in Illinois interested in joining CoCoRaHS and 15 already sent in reports today. Montana is starting a bit slower—only 3 so far. But it's thrilling and amazing to see our team grow. Welcome aboard, join the fun and make a difference! Every drop counts!!

Have a great weekend,
Nolan Doesken