

About the Iowa AWOS calibration issues:

Daryl Herzmann

25 January 2004

On 21 November 2003 I gave a presentation about the Iowa Mesonet to the National Weather Service Forecast Office in Sioux Falls, SD. During the talk, forecasters at the office voiced concerns over the abnormally high dew points coming from the AWOS sensors in Northwest Iowa, particularly Orange City (ORC). I said that I would look into the issue.

After closely watching data for a week, it was easy to determine that a bias had shown up at the ORC site and at Sheldon (SHL), which are both in Northwest Iowa. On 2 Dec 2003, I opened two trouble tickets for the ORC and SHL problems. The best evidence I had at the time was a large error showing up in the Forecast System Lab's MADIS QC system and the forecasters feedback from the FSD office. On 3 Dec 2003, I opened a ticket for Algona (AXA) which was having similar errors in dewpoint that ORC and SHL were showing. I really could not figure out why these errors were occurring.

On 31 Dec 2003, I got a phone call from the FAA about the dew point problems I had reported to them a few weeks prior. They assured me that the current discrepancies were due to local effects and other problems not related to instrument failure. A key piece of information they gave me was that the AWOS contractor was at ORC on 6 November 2003 and calibrated the site. The contractor told the FAA that the readings from the site checked out just fine (within standards) during that visit. This prompted me to check our data archive for the raw reports during that day.

Aside: The Iowa Department of Transportation graciously provides the Iowa Mesonet with a 1 minute interval archive of data from their AWOS network each month. Using this archive, I was able to reconstruct the calibration visits by the AWOS contractor. It would be nice to compare the raw data with the calibration information, but the later is not made publically available.

So I began to look at the 1 minute data for 6 November 2003 and noticed this strange sequence of observations from the ORC site.

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
17:59Z	37	19	
18:00Z	37	19	
18:01Z	37	19	
18:14Z	39	29	<-- 10 degree jump
18:15Z	39	30	
18:16Z	39	30	

The 10 degree jump in dew point immediately stood out. The 13 minute outage of data is assumed to be the time during which the station was offline for maintainance by the contractor. I immediately looked at our archive of data plots to try and rationalize this data jump. There was no discernable phenomena in the area to explain this jump. While looking at the various plots, I noticed that SHL seemed to experience a major jump around the same time as ORC. So I looked at its one minute data and found this just an hour after the event in ORC.

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
18:53Z	36	22	
18:54Z	36	22	
18:55Z	36	22	
19:20Z	39	29	<-- 7 degree jump
19:21Z	39	29	
19:22Z	39	29	

Again I noticed a strange dew point jump after a period of being offline for assumed maintainance. Once I knew when these data jumps occurred, I started to compare data between these sites and surrounding sites from other networks. It became extremely clear that these 'calibration' events started the inconsistant temperature and dew point reports from these sites. Knowing this happened at two sites, I became suspicious that it was happening at other sites. Sure enough, it has. Here is a listing of events I have found for just this previous fall.

Harlan (HNR), 2 Oct 2003:

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
17:42Z	57	24	
17:43Z	57	25	
17:44Z	57	25	
18:08Z	63	36	<-- 11 degree jump
18:09Z	63	36	
18:10Z	63	36	

Denison (DNS), 2 Oct 2003:

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
19:33Z	64	32	
19:34Z	64	32	
19:35Z	65	33	
19:48Z	67	37	<-- 4 degree jump
19:49Z	66	37	
19:50Z	66	37	

Algona (AXA), 6 Nov 2003:

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
20:58Z	36	22	
20:59Z	36	22	
21:00Z	36	22	
21:20Z	40	26	<-- 4 degree jump
21:21Z	41	26	
21:22Z	41	25	

Newton (TNU), 2 Dec 2003: (This one is very distrubing)

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
20:25Z	39	15	
20:26Z	39	15	
20:27Z	39	15	
20:41Z	39	28	<-- 13 degree jump!
20:42Z	39	28	
20:43Z	39	28	

Ankeny (IKV), 2 Dec 2003:

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
21:37Z	38	21	
21:38Z	38	21	
21:39Z	38	21	

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
21:55Z	38	30	<-- 9 degree jump
21:56Z	38	30	
21:57Z	38	30	

LeMars (LRJ), 15 Dec 2003:

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
19:37Z	35	28	
19:38Z	35	28	
19:54Z	35	34	<---6 degree jump
19:55Z	35	34	
19:56Z	35	34	

Fairfield (FFL), 17 Dec 2003:

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
19:17Z	34	23	
19:18Z	34	23	
19:19Z	34	23	
19:34Z	37	30	<-- 7 degree jump
19:35Z	37	30	
19:36Z	37	30	

Fort Madison (FSW), 17 Dec 2003:

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
21:43Z	37	24	
21:44Z	37	24	
21:45Z	38	24	
22:17Z	34	28	<-- 4 degree jump
22:18Z	34	28	

<i>Time</i>	<i>Temperature</i>	<i>Dew Point</i>	
22:19Z	34	28	

I wrote a script to find these 'calibration' type events from the 1 minute archive and it did a good job finding these events. Many of the events are denoted by an uptick in temperature as well, which may be part of the cause of the high dew points. It is really hard to tell when the calibration information is not available.

If you have any questions, please let me know.

Daryl Herzmann (akrherz@iastate.edu)

515.294.5978