All Log Contents

[pressure spikes](#)

Steve Oncley posted on Sep 17, 2013

Of course, I now think that many pressure spikes are now real events (e.g. dust devils). However, I've seen other spikes (mostly upwards) that aren't real. Further tracking finds that most are (only?) spikes in the Paro's temperature measurement. These spikes are always positive. During 10 Aug, most of these were with t.8b, however I also see them on 5b, 9b, 10b, 7t, and 8t. These are not exclusively on pressure2, nor are they all the channels on pressure2. Also, there is a pattern of most (but not all) spikes at night. I <think> these started in the last, narrow, configuration, but I'm not yet sure.

Since Paro t changes slowly (essentially a Tcase), it is trivial to despike these. However, despiking would best be applied upstream of Gordon's code to apply calibrations, and I think it would be a lot of work to redo this at the moment. (But it should be done before preparing the final data set.)

- pressure

[test](#)

Steve Oncley posted on Apr 13, 2012

[Resolving confusion about the wide array sonics 4b,5b,6b](#)

Gordon Maclean posted on Oct 06, 2011

For the wide array, from Jun 26 to Jul 18, there is some confusion about the bottom level downwind sonic anemometers on towers 4, 5 and 6. The variable names from these sonics have suffixes of 4b, 5b and 6b, indicating what tower they were on.

Intended Configuration for 4b,5b,6b

The intended configuration for the sonics is as follows, along with the serial numbers that Kurt wrote in his setup notes:

location	serial port	sensor id	serial number
4b	ttyS6	2040	744
5b	ttyS7	2050	745
6b	ttyS8	2060	376

The samples are archived with the sensor ids, so after the data has been sampled, knowing the relation between location and sensor id is critical, and is what needs to be determined for these sonics.

So far nothing has indicated any error in Kurt's setup notes of the relation between location and serial number.

The configuration of the later arrays also confirms Kurt's notes for the wide array, because when the sonics were moved to the medium and narrow arrays, care was taken to keep them in their respective locations.

Tom's documentation of the serial number/serial port relation for the medium spaced array, https://wiki.ucar.edu/x/OYWgAQ, agrees with the above serial port to serial number relation.

SteveO's entry for the narrow array, https://wiki.ucar.edu/x/W4CqAQ, also agrees with the above.

In setting up these arrays, care was presumably taken to get the cabling right, so that we're also confident of the mapping from serial port to location during those configurations.

Possible Cross-cabling in Wide Array

In log entry https://wiki.ucar.edu/x/tBR_AQ, Tom used rserial to record the sonic serial numbers at each serial port for the wide array, and noted the following results:

serial port	serial number
ttyS6	745
ttyS7	376
ttyS8	744

From this he concluded that the cabling from serial ports to the sonics was crossed up from the intended configuration.

The XML specifies what sensor id is assigned by the DSM to each sample received on a serial port. I believe the XML was checked at that time, and it contained the intended mapping from serial port to sensor id. So at that time it appeared that the actual relation between sensor id and location on the wide array was as follows:

location	serial port	sensor id	serial number
4b	ttyS8	2060	744
5b	ttyS6	2040	745
6b	ttyS7	2050	376

If the above relation of sensor id to location was true, then our data processing, which used the intended configuration, assigned wrong location suffixes to the data from those sonics for the wide array.

Evidence of Actual Sonic Location

There are several counter-arguments to the above, indicating that Tom somehow confused the serial ports in his log message, and that the cabling matched the intended configuration in the wide array.

First, the serial number to sensor id relation can be read from the data archive, since the rserial output is archived. The serial number messages from the archive of the wide array are shown here, with their sample times:

date time UTC	sensor id	serial number
2008 06 29 22:30: 34.0640	2,2040	SN0744
2008 06 29 22:33: 09.7736	2,2050	SN0745
2008 06 29 22:34: 38.8956	2,2060	SN0376

Assuming Tom progressed through the serial ports in order, they show the serial number sequence to be 744, 745, 376, and not 745, 376, 744. The sensor ids are also in time order: 2040, 2050, 2060, and the mapping of sensor id to serial number matches the intended configuration, and not the crossed configuration.

Perhaps two mistakes were made which cancelled each other: cross-cabling, and the complement association between serial port and sensor id in the XML? Or perhaps the XML on the DSM was corrected to match the cabling shortly after the wide array started, and then corrected back for the medium spaced array? Both seem unlikely. The sequence of the above serial numbers suggest that neither of the above occurred, and that the serial ports were recorded incorrectly in Tom's log message.

The sensor ids have not been altered in the archive after it was recorded, since the modification times of the files have been preserved and match the original recording times.

Steve Oncley also looked at data during dust devil events from these sonics during the wide array, and the spacial continuity of the relative wind directions indicate that the sonics were in the intended configuration.

The tt_adjust program has been run on the AHATS unsorted raw data. One of the results of the processing is a linear fit of the relation of the sample time tag to the sample number, for every 1/2 hour. The slope of the fit is the sampling period of the sensor, which for sonics at 60Hz, should be about 16666.7 microseconds. Systematic differences between the sample periods of individual sonics can be seen, which provide another indication of the relation between the sensor id and the sonic serial numbers.

The sampling rates show a diurnal temperature dependence, but one can distinguish the individual sonics. Below is a plot of sample delta-T for sensor ids 2040, 2050 and 2060 for the entire project, showing that the serial number to sensor id mapping did not change for these sonics during the project. The sensor id is shown in the trace legend.
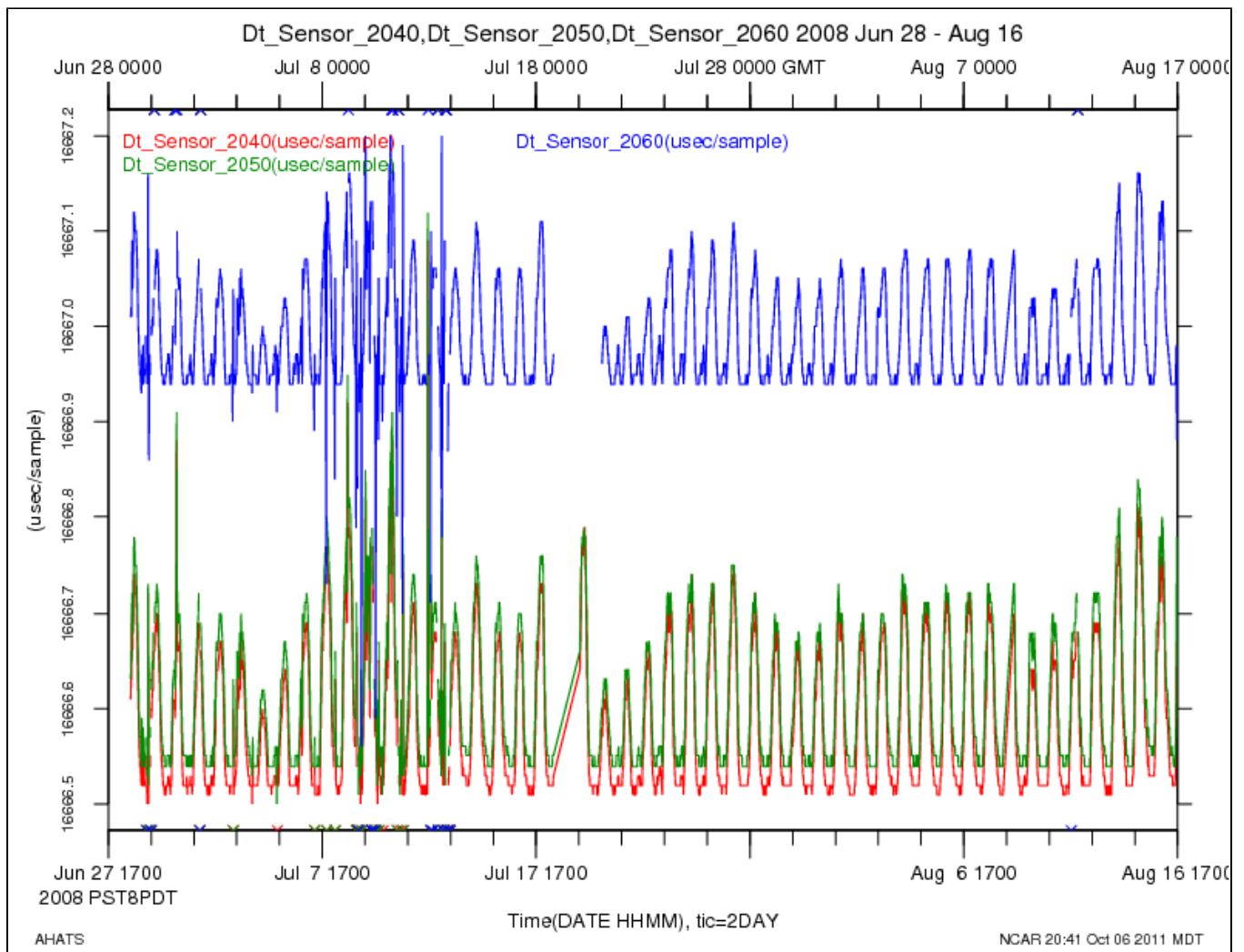
The data is a bit noisy during the wide array, but it seems quite certain that the relation of serial number to sensor id did not change:

Dt_Sensor_2040, Dt_Sensor_2050, Dt_Sensor_2060 2008 Jun 28 - Jul 18
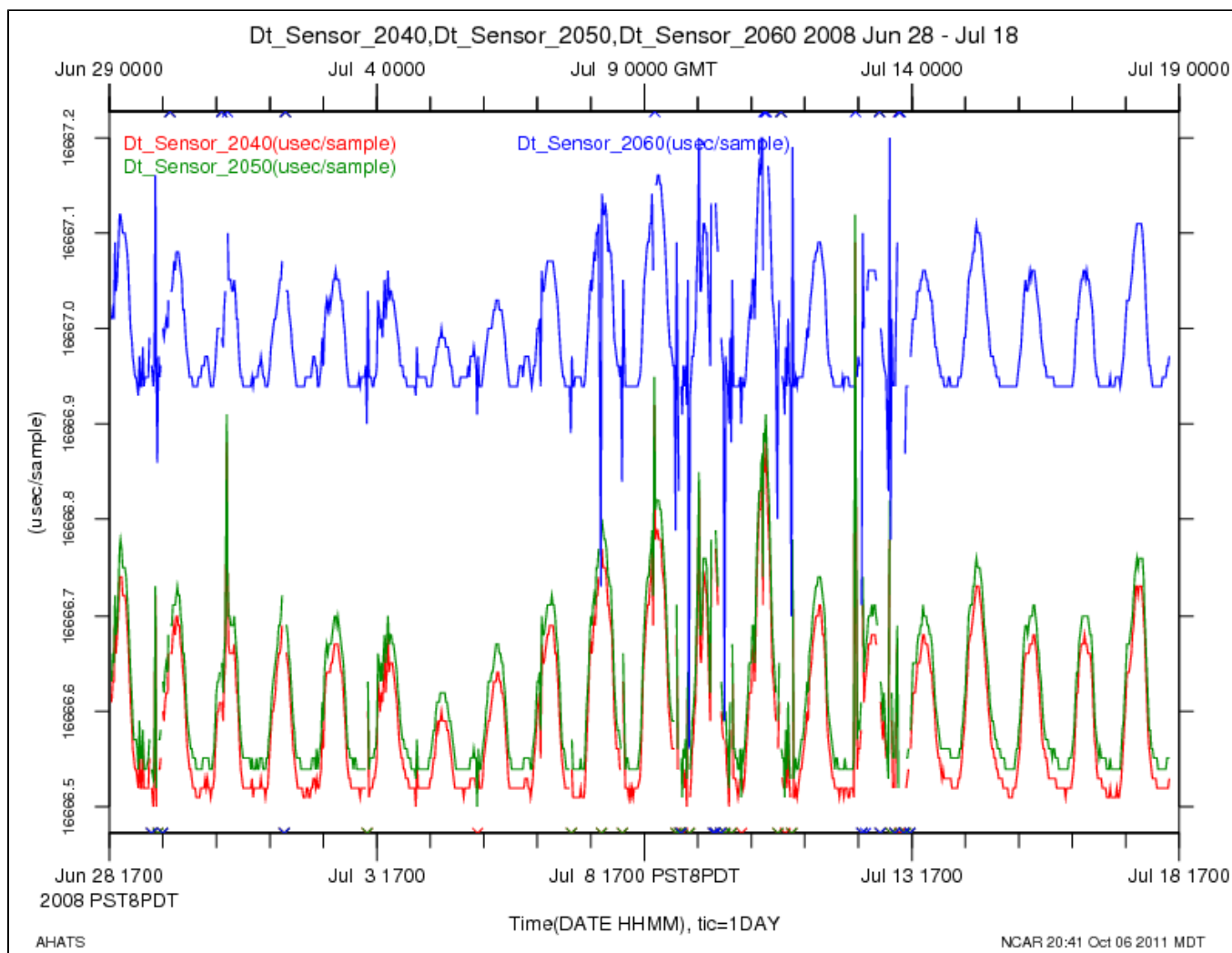
Serial Number vs Sensor ID History

For all sonics connected to downwind1, here is the serial number information in the archive:

date time UTC	sensor id	serial number	presumed location	notes
2008 06 29 21:43: 30.5690	2,2010	SN0853	1b	
2008 06 29 21:44: 06.8606	2,2010	SN0853	1b	
2008 06 29 21:49: 02.5737	2,2020	SN1117	2b	
2008 06 29 21:52: 02.6381	2,2020	SN1117	2b	
2008 06 29 21:53: 49.3434	2,2030	SN0800	3b	
2008 06 29 22:30: 34.0640	2,2040	SN0744	4b	
2008 06 29 22:33: 09.7736	2,2050	SN0745	5b	
2008 06 29 22:34: 38.8956	2,2060	SN0376	6b	

2008 06 29 22:36: 25.1529	2,2010	SN0853	1b	
2008 06 29 22:37: 50.2269	2,2020	SN1117	2b	
2008 06 29 22:38: 16.8077	2,2030	SN0800	3b	
2008 06 29 22:46: 31.9746	2,3030	SN0738	3t	
2008 06 29 22:48: 33.8801	2,3040	SN0856	4t	
2008 06 29 22:49: 30.2804	2,3050	SN0712	5t	
2008 06 29 22:50: 11.3536	2,3060	SN0672	6t	
2008 07 19 18:59: 35.9615	2,2010	SN0853	1b	
2008 07 19 19:01: 06.9888	2,2030	SN0800	3b	
2008 07 19 19:03: 07.5053	2,2040	SN0744	4b	
2008 07 19 19:04: 48.1197	2,2050	SN0745	5b	
2008 07 19 19:07: 07.0574	2,3030	SN0738	3t	
2008 07 19 19:09: 16.3050	2,3030	SN0738	3t	
2008 07 19 19:10: 44.4320	2,3040	SN0856	4t	
2008 07 19 19:11: 40.2070	2,3050	SN0712	5t	
2008 07 19 23:22: 39.9607	2,2020	SN0741	2b	sonic was replaced
2008 07 21 16:49: 07.5003	2,2060	SN0376	6b	
2008 07 21 16:49: 58.4540	2,3060	SN0672	6t	
2008 08 11 22:56: 47.7955	2,2010	SN0853	1b	
2008 08 11 22:57: 46.2450	2,2020	SN0741	2b	
2008 08 11 22:58: 11.5836	2,2030	SN0800	3b	
2008 08 11 22:58: 39.3355	2,2040	SN0744	4b	
2008 08 11 22:59: 02.7667	2,2050	SN0745	5b	
2008 08 11 23:00: 23.5102	2,2060	SN0376	6b	
2008 08 11 23:00: 47.0487	2,3030	SN0738	3t	

| 2008 08 11 23:01: 29.3204 | 2,3040 | SN0856 | 4t | |
| 2008 08 11 23:02: 29.9896 | 2,3060 | SN0672 | 6t | |

- [sonic]

[Removed Vazimuth data from boom_normal cal_files]
Tom Horst posted on Mar 16, 2010
Some of the boom_normal cal_files have values for Vazimuth for some configurations. This is inconsistent with most of the boom_normal files and the intent for boom_normal data. Consequently, I set those Vazimuths to 0.0.

Files changed:

-rw-rw-r-- 1 6072 Mar 16 12:01 csat_8m.dat
-rw-rw-r-- 1 6185 Mar 16 11:56 csat_8u.dat
-rw-rw-r-- 1 6532 Mar 16 11:54 csat_7u.dat
-rw-rw-r-- 1 6362 Mar 16 11:53 csat_6u.dat
-rw-rw-r-- 1 6388 Mar 16 11:52 csat_11t.dat
-rw-rw-r-- 1 6732 Mar 16 11:50 csat_6t.dat
-rw-rw-r-- 1 6351 Mar 16 11:46 csat_9b.dat
-rw-rw-r-- 1 6721 Mar 16 11:44 csat_6b.dat
-rw-rw-r-- 1 6385 Mar 16 11:42 csat_5b.dat
-rw-rw-r-- 1 6552 Mar 16 11:36 csat_2b.dat
-rw-rw-r-- 1 5258 Mar 16 11:35 csat_1b.dat

- [sonic]

[Sonic Offset Corrections]
Tom Horst posted on Jan 11, 2010
After correction of the sonic orientations using the sonic boom angles measured with the Data Scope, there were still systematic differences in the sonic wind directions across the arrays that were broadly correlated with the post-project sonic zero wind offsets measured in the wind tunnel. Therefore we subtracted offset corrections from the sonic horizontal wind components u and v.

The offsets were determined by assuming that the time-averaged wind field was uniform across each sonic array. First the mean values of the horizontal wind components were calculated for each sonic over the period of each configuration (or sub-configuration), only using data with wind directions within 45 degrees of normal to the array and wind speeds exceeding 1 m/s. The wind offset corrections were then derived by selecting one or more reference sonics in each array with small post-project-measured offsets. These were sonic 8u (s/n 0673) in the upwind array, sonic 6t (0672) in the top array, and sonics 4b (0744), 5b (0745) and 6b (0376) in the bottom array.   The u and v offsets for each sonic were calculated as the differences between its mean values for u and v and the mean values for the corresponding reference sonic. To these offsets were added the wind-tunnel offsets measured for the reference sonics. Note that this procedure does not account for the variation of sonic wind offsets with temperature, but simply removes the mean offset irrespective of temperature.

u offsets (cm/s) for **upwind** arrays wrt CSAT **8u** + 4.4 cm/sec

Sonic \ Config	1.1 *	1.51 *	1.52 *	2	3	4
3u	2	8	11	14	13	13
4u	-5	-7	-3	-4	-1	-3
5u	-7	-3	-2	-2	-2	-1
6u	10	16	16	18	21	15
7u	-2	-6	-7	0	0	-3
8u	4	4	4	4	4	4
9u	-7	-3	-4	-3	0	-3
10u	2	6	0	-4	-8	-12
11u	-9	-5	1	3	9	3

* Configuration 1 was divided into sub-periods because of its length and the expectation that the offsets may have changed with time.

  Config 1.1: June 25 12:00 to July 1 12:17 (upwind height = 3.74m)

  Config 1.51: July 1 12:55 to July l 9 09:25 (upwind height = 3.24m)

  Config 1.52: July 9 09:25 to July 18 05:55 (upwind height = 3.24m)

v offsets (cm/s) for **upwind** arrays wrt CSAT **8u** + 3.3 cm/sec

Sonic \ Config	1.1	1.51	1.52	2	3	4
3u	7	-3	3	17	18	18
4u	3	-6	-7	2	-3	-4
5u	6	-1	3	20	17	14
6u	17	21	24	24	19	19
7u	5	-3	-8	2	-11	-7
8u	3	3	3	3	3	3
9u	11	7	7	16	11	14
10u	7	3	1	1	2	4
11u	20	23	22	19	18	22

u offsets for **top** arrays wrt CSAT **6t** + 2.3 cm/sec

Sonic \ Config	1.2 *	1.6 *	2	3	4
3t	1	-1	-7	-16	-11
4t	1	7	12	14	13
5t	-1	5	6	3	2
6t	2	2	2	2	2
7t	-1	4	4	3	3
8t	2	4	5	10	6
9t	2	4	9	13	9
10t	7	10	9	13	10
11t	5	11	17	13	12

* Config 1.2: June 25 12:00 to July 6 12:00

  Config 1.6: July 6 12:00 to July l8 05:55

v offsets for **top** arrays wrt CSAT **6t** + 2.2 cm/sec

Sonic \ Config	1.2	1.6	2	3	4
3t	7	11	10	5	15
4t	7	6	14	10	6
5t	-23	-26	-6	2	0
6t	2	2	2	2	2
7t	-9	-14	-15	-17	-19
8t	10	12	-1	-4	3
9t	3	4	0	7	3
10t	5	4	-4	-4	-5
11t	1	0	-3	-3	-5

u offsets for **bottom** arrays wrt CSAT **4,5,6b** + 1.33 cm/sec

Sonic \ Config	1.2	1.6	2	3	4
1b	10	12	21	7	8
2b	2	0	18	13	12
3b	6	6	6	9	2
4b	5	5	1	3	2
5b	0	0	-2	-2	0
6b	-1	-1	5	3	2
7b	9	9	5	6	5
8b	2	3	-4	-3	-4
9b	-12	14	-13	-6	-6
10b	2	1	-2	-4	-14
11b	0	5	5	2	0
12b	16	23	26	19	15
13B	3	12	11	2	0

v offsets for **bottom** arrays wrt CSAT **4,5,6b** + 0.67 cm/sec

Sonic \ Config	1.2	1.6	2	3	4
1b	14	18	13	23	25
2b	4	-4	-1	-3	4

3b	-3	-6	-16	-13	-10
4b	-14	-16	1	3	-1
5b	-16	-15	3	2	5
6b	32	34	-2	-4	-2
7b	-8	-9	-13	-10	-9
8b	-4	-2	-6	-6	-2
9b	-2	8	2	5	10
10b	5	16	10	10	14
11b	1	-2	-8	-11	-11
12b	3	0	-3	-8	-8
13b	1	-4	-14	-19	-2

Sonic boom sag

Tom Horst posted on Jan 07, 2010

We intend to estimate advection by taking the differences between data from the upwind sonic array and data from the downwind, bottom array. Therefore I have calculated the height difference between the sonic measurement volume and the nominal sonic heights measured at the base of the boom. The nominal heights were closely matched between the upwind and downwind arrays. I calculated the height difference as

sonic height above height measured at base of boom = boom-length*sin(pitch-angle) = boom-length*sin(lean*cos(leanaz))

where lean and leanaz were determined with the planar fit technique and recorded in the sonic cal files. The boom-length is the distance from the base of the boom to the sonic measurement volume = 1.765 cm.

In the following tables, a positive height difference indicates that the sonic is higher than the base of the boom. The height differences are in cm. The Date /time in the first column is when the new height difference takes effect.

Upwind array

Date/time (PDT)	Config	boom ht	3u	4u	5u	6u	7u	8u	9u	10u	11u	mean
June 25 00:00	1	3.74 m	1.7	-0.5	-2.4	-2.3	3.0	0.6	0.9	-1.0	-0.6	-0.1
July 1 13:00*	1	3.24	1.0	-0.8	-3.3	-3.4	2.2	0.5	0.3	-2.1	-0.8	-0.7
July 20 16:00	2	3.64	0.4	6.1	0.4	3.0	4.0	3.1	1.5	0.2	-0.2	2.1
July 29 12:30	3	4.83	0.9	1.6	-3.3	1.5	1.8	1.2	2.5	2.2	0.2	1.0
Aug 9 18:00	4	6.98	6.1	7.7	7.3	4.1	4.1	7.7	2.8	4.6	1.1	5.0

* changed upwind array height from 3.74m to 3.24m

Bottom, downwind array

Date/time (PDT)	Config	boom ht	1b	2b	3b	4b	5b	6b	7b	8b	9b	10b	11b	12b	13b	mean
June 25 00:00	1	3.24 m	1.4	-0.2	-1.4	0.4	0.2	-2.7	-0.6	-4.0	2.4	1.0	-1.5	-1.3	0.9	-0.4
July 20 16:00	2	3.64	-1.8	-7.7	-11.4	-7.2	-4.8	2.2	-2.5	-7.9	-9.6	-10.7	-7.6	-1.3	-2.7	-5.6
July 29 12:30	3	4.83	-2.4	-8.7	-12.3	-8.4	-7.0	0.3	-4.2	-10.5	-11.2	-11.3	-7.9	-3.3	-0.5	-6.7
July 31 17:00*	3	4.83	5.9	3.3	0.9	2.1	3.0	1.1	2.4	-1.4	0.3	-1.2	-1.8	-2.0	-0.5	0.9
Aug 9 18:00	4	6.98	5.4	3.5	2.5	2.4	3.0	1.9	2.9	2.4	3.1	-0.7	-0.4	1.0	3.1	2.3

* adjusted height of downwind array sonics to decrease boom sag

Top, downwind array

Date/time (PDT)	Config	Boom ht	3t	4t	5t	6t	7t	8t	9t	10t	11t	mean
June 25 00:00	1	4.24 m	-2.1	-0.9	-0.9	0.6	-0.6	-2.1	0.7	2.1	0.4	-0.3
July 20 16:00	2	4.64	-3.4	-2.9	-0.9	3.2	-3.3	-4.5	-5.4	-5.0	-4.6	-3.0
July 29 12:30	3	5.83	-4.4	-5.1	-3.1	0.6	-4.7	-6.9	-6.8	-5.7	-4.7	-4.5
July 31 17:00*	3	5.83	2.6	0.8	0.3	2.1	2.2	5.8	7.2	4.3	3.5	3.2
Aug 9 18:00	4	7.98	3.8	2.5	3.5	2.6	2.0	2.1	3.6	3.1	4.6	3.1

* adjusted height of downwind array sonics to decrease boom sag

Profile sonics

Date/time (PDT)	Config	1.5 m	3m	4m	5.5 m	7m	8m
June 25 00:00	1	-1.1	-2.2	-1.0	-1.0	-0.7	1.0
July 20 16:00	2	-0.6	-2.7	-0.2	0.0	-0.8	0.9
July 29 12:30	3	0.2	-3.1	-0.5	-1.3	-1.5	0.6

Aug 3 09:00*	3	0.2	-3.1	-0.5	-1.3	-1.5	-1.0
Aug 3 09:41**	3	0.2	-3.1	-0.5	-1.3	0.2	-1.0
Aug 5 15:25*	3	0.2	-3.1	-0.5	-1.3	1.4	-0.2
Aug 9 18:00	4	-0.8	-3.7	-2.3	-2.5	-1.4	0.3
Aug 11 12:15*	4	-0.8	-3.7	-2.3	-2.5	-1.4	-2.1

* replaced 7m and/or 8m sonics

** moved 7m sonic up

[Reconciliation of sensor height measurements](#)
Tom Horst posted on Dec 14, 2009
Steve Oncley and I are reviewing the measurement of sensor heights with the goal of perhaps reconciling ambiguities in the sensor heights.

Configuration 1 dimensions

The horizontal arrays sonic heights were measured relative to the mean of the heights agl of the reference marks for both the upwind (1.534 m) and downwind (1.53 m) arrays. The profile heights appear to have been measured relative to the height of the reference mark on the profile towere (1.52 m).

Configuration 2 dimensions

The reference mark height for all configuration 2 sensor heights was measured at the NE tower of the downwind horizontal array (goalposts) = 1.76 m.   Sonic 1b at the NE end of the array was 1.91m+0.05m = 1.96 m above the reference mark and sonic 12b at the SW end of the array was 1.92m+0.05m = 1.97 m above the reference. Sonic spacing was 1.29 m.

The mean heights above the reference mark of the upwind sonics was 1.92m+0.05m = 1.97 m. The heights agl of the upwind reference marks or the profile reference marks do not appear to have been measured. Assuming a reference height of 1.76m for the horizontal arrays, gives array heights of 1.76 m+1.97m = 3.73m agl

Following are the new profile sensor heights.

nominal height	sonic*	+1.76+0.053m	+1.68+0.053**	SHT*	+1.76-0.37 m	+1.68-0.37 m**
3m	1.96m	3.77m	3.69m	2.36m	3.75m	3.67m
4m	2.90m	4.71m	4.63m	3.33m	4.72m	4.64m
5.5m	3.99m	5.80m	5.72m	4.43m	5.82m	5.74m

* heights above configuration 2 reference mark

**corrected reference mark height implied by continuity of 3m profile sensors through configurations 2-4 (see Discussion at end).

Configuration 3 dimensions

The reference mark height for configuration 3 was not measured agl, but was measured to be 15.2 cm below the reference mark for configuration 2 or 1.76 m-0.15m = 1.61 m. (BUT the height of the configuration 3 reference mark on the profile tower was later measured to be either 1.51m or 1.53m!) The heights of the downwind array sonic booms above the reference mark were measured to be

5b	6t(?)	6b	12b
3.254 m	3.252m (?)	3.250 m	3.275m

These heights were measured again on Aug 4 :

1b	5b	5t	7b	7t	11b	11t
3.263	3.262	4.260	3.261	4.264	3.262	4.264

for mean sonic heights of 3.262m+1.61m+0.053m = 4.93 m and 5.93 m agl.   The heights of the upwind sonics appear to be 3.254m+0.053m+1.61m = 4.92 m agl.

The profile sonic (?) heights were measured on Aug 3 :

	8/3/08 boom hts*	+1.61m +0.05m	+1.51m +0.05m	+1.53m +0.05m
8m	6.468m	8.13m	8.03m	8.05m
7m	5.544m	7.20m	7.10m	7.12m
5.8m	4.256m	5.92m	5.82m	5.84m
4.8m	3.316m	4.98m	4.88m	4.90m
3.3m	2.110m	3.77m	3.66m	3.68m
1.5m	-0.026m	1.63m	1.53m	1.55m

Configuration 4 dimensions

There are several statements about the heights of the reference marks in this logbook entry. It is stated that the profile reference mark for configuration 3 = 1.505 m agl, but also that it is 0.027 m "above top of 1.55m sonic" (boom?), implying a height of 1.50m+0.027m = 1.53 m agl. Then it says the reference mark for configuration 4 is 0.040 m above the reference mark for configuration 3, which could be 1.65m, 1.55m or 1.57m agl.

The 1b sonic boom was measured to be 5.37m above the reference mark for configuration 4.

This logbook entry also measures the sonic and SHT heights wrt the 1.55m sonic boom. Note that these heights were not changed between configurations 3 and 4, and are consistent within 1cm of the last column of the preceding table.

nominal ht	sonic*	+1.55m	SHT*	+1.55m-0.42 m
8m	6.508m	8.06m	6.878	8.01
7m	5.582m	7.13m	5.886m	7.02m
5.5m	4.286m	5.84m	4.710m	5.84m
4m	3.352m	4.90m	3.749m	4.88m
3m	2.140m	3.69m	2.542m	3.67m
1.5m	0.0m	1.55m	0.376m	1.51m

- measured wrt the 1.5m sonic boom (at 1.50m agl)

Discussion

The 3m profile sensors were not moved through configurations 2-4, so that a discrepancy remains between the heights of the 3m profile sensors during configuration 2 (sonic:=3.77m and SHT=3.75m) and those for configurations 3 and 4 (sonic=3.69m and SHT=3.67m). This implies that the reference mark height for configuration 2, measured at the NE horizontal array tower to be 1.76m, did not apply at the profile tower, but should rather have been 1.68 m. (Note that simple transposing the last two digits of 1.76m gives 1.67m, which is within 1 cm of the implied value.) Kurt very carefully kept the baseplates of the 6 towers for the horizontal array at the same elevation using a 4' carpenters level and presumably did the same for the profile tower. It seems unlikely that there was an 8 cm difference between the elevations of the 7 AHATS Roan towers. Assuming 1.67m for the height of the reference mark for configuration 2 gives the following heights:

	Sonic 1	SHT 1		Sonic 2	SHT 2		Sonic 3	SHT 3		Sonic 4	SHT 4
reference ht	1.52m	1.52m		1.67m	1.67m		1.52m	1.52m		1.56m	1.56m
upwind	3.74/3.24	na		3.64	na			na		6.98	na
top	4.24	na		4.64	na		5.83	na		7.98	na
bottom	3.24	na		3.64	na		4.83	na		6.98	na
8m	8.05	8.01		unch	unch		8.04	8.01**		8.06	8.01
7m	7.08	7.01		unch	unch		7.12 *	7.02**		7.13	7.02
5.5m	5.53	5.47		5.71	5.73		5.83	5.84**		5.84	5.84
4m	4.24	4.23		4.62	4.63		4.89	4.88**		4.90	4.88
3m	3.30	3.26		3.68	3.66		3.68	3.67**		3.69	3.67
1.5m	1.55	1.51		unch	unch		1.55	1.51**		1.55	1.51

unch: Profile heights not measured for configuration 2, but same as configuration 1

Height changed for profile sensors at start of configuration

* 7m sonic moved up on Aug 3 at 09:41

** The configuration 3 SHT heights were not measured, but copied from configuration 4

- sonic
- sht

Reconciliation of profile sonic boom angles
Tom Horst posted on Dec 09, 2009
Following are the profile sonic boom angles measured for the four configurations.

Sonic	Cnfg 1	cal		Cnfg 2	cal		Cnfg 3a	Cnfg 3b	cal		Cnfg4	cal
	twh			srs			spo	jm			spo	
	july 6-14			july 28			aug 1	aug 6			aug 12	
1.5 m	132.3	0.6		131.6	-0.1		135.1	132.4	0.7		132.3	0.6
3 m	136.0	4.3		132.5*	0.8		137.0	134.2	2.5		133.1	1.4
4 m	133.6	1.9		129.8*	-1.9		136.1*	132.5*	0.8		131.8	0.1

5.5 m	134.6	2.9		133.7*	2.0		138.2*	134.8*	3.1		133.4	1.7
7 m	134.0	2.3		132.2	0.5		136.2*	134.4*#	2.7		133.8	2.1
8m	132.6	0.9		133.7	2.0		137.0	133.0#	1.3		134.3#	2.6

*: sonic height changed from previous configuration

#: changed sonic since previous azimuth measurement

cal: azimuth entry in calibration file = measured magnetic azimuth - 131.7

For configuration 3, the 3b azimuths are more consistent with previous and

following azimuths than are 3a. I (twh) used 3b for the profile cal_files.

Both Semmer and Oncley measured azimuths for the horizontal arrays in configuration

2, and Militzer and Oncley measured azimuths for the horizontal arrays in

configuration 3. In both cases, Oncley's azimuth measurements were ~4 degrees

larger than the others. Thus we will use Semmer's azimuths for configuration2

and militzer's for configuration 3 . Also oncley recommends using the 'surveyed'

horizontal array azimuths for configuration 4, which in this case are mostly very close to Oncley's measurements.

- sonic

Test of shooting boom angles
Steve Oncley posted on Nov 02, 2009

I just set up a test with the digital theodolite in the far east parking lot. I chose to shoot SN0853, which had been used as "1b" in AHATS. In Tom/Rudy's plots, this shows a mean wind direction anomaly of about 4 degrees.

I set the sonic up on the TRAM tower, facing the gate.

I set the theodolite up near the gate (about 34m according to GoogleEarth).

For my reference heading, I shot a recognizable tree on the Olde Stage ridgeline (about 6km away). I moved the theodolite generally along the bearing to this tree, say within 10cm, so this reference heading should be good to atan(0.1/6000) = 3.5" of arc.

The array obviously was not exactly square, so I shot it three different ways, to be more-or-less representative of the variations that might be used.

Shooting the "u" transducer pair, I got 94d 38' 35" for the relative angle to the tree.

Shooting the top tube, I got 94d 43' 49" (essentially the same as the transducer pair).

Shooting the center of the bottom "u" transducer 90degree bend with the bracket at the bottom of the vertical strut, I got 93d 55' 39" -- just 0.7degree different.

Thus, I conclude that, although the array is not perfect, the magnitude of the geometry variations are less than 1 degree, which cannot explain the 4 degree differences that were observed in the field.

- sonic

Checked sonic 8b, sn 0364, for cycle slip
Tom Horst posted on Mar 05, 2009

Laboratory checks of sonic S/N 0364 found "cycle slip" at temperatures below 20 C, in particular a temperature jump of about 1 deg C in path a around 16-18 deg C. (Other jumps occurred below 10 deg C, and thus at temperatures not attained during AHATS.) The temperature jump was an increase of about 1.8 deg C as temperature decreased and thus the sonic temperature would change by 0.6 deg C, since all three paths are averaged to give the output temperature.

I plotted the sonic temperature difference (sonic 8b - sonic 7b) versus sonic 7b temperature (5-minute covars) for the four AHATS configurations. Between 15 and 20 deg C, the temperature difference between the two sonics ranged from 0.2 to 0.4 deg C and I could not detect any systematic discontinuity in the plots, much less a temperature discontinuity of 0.6 deg C.

- sonic

AHATS tower layout
Steve Oncley posted on Jan 28, 2009

Here is the (designed) layout of all the towers. As built, the array was a mirror image of this, with the wide spacing towers to the West. Also, the upwind, non-staggered line of towers (in the medium spacing) was at the closer position of 5.12m upwind, rather than ~7m upwind that we had as an option in this design.

AHATS Tower Layout

325°

Guy wire layout

PAM tripod

Profile Tower

Horizontal Rohn Tower(s)

Removed sonic data with bad 'diag' values
Tom Horst posted on Dec 30, 2008

Today I finished a first edit of the AHATS sonic data, putting NA's in the cal_files when the 5-minute averages of the sonic diagnostic variable exceeded ~0.5. During the first configuration, these usually occurred simultaneously on all channels of one of the four sonic adams, suggesting that the adam could not keep up with data ingest when there were transmission problems back to the base. After the first configuration, simultaneous problems on all channels of an adam occurred less frequently and with smaller 'diag' values. Then most of the high 'diag' values were associated with the beginning or end of a period of lost data.

 For configuration 4, after August 8, sonic 6u had recurring continuous periods in the middle of the day with 'diag' values between 0.05 and 0.1. I did not edity these out because it would have removed a significant fraction of the data from 6u during configuration 4.

- sonic

Post cals on temperature and humidity
Steven Semmer posted on Nov 13, 2008

Post cals were conducted on the SHT probes. Temperature results were within +/- 0.1C. All sensors were within .05C except for sensors SHT001 (error: -.08C) and SHT006 (error: .07C). The humidity is a different story. Over the range of 10% to 90% the average error for all the sensors went from 1% to -8%. The figure below is an example. There was no obvious reason for the change in the calibration. One possibilty is the fine dust at the AHATS site.

SHT008
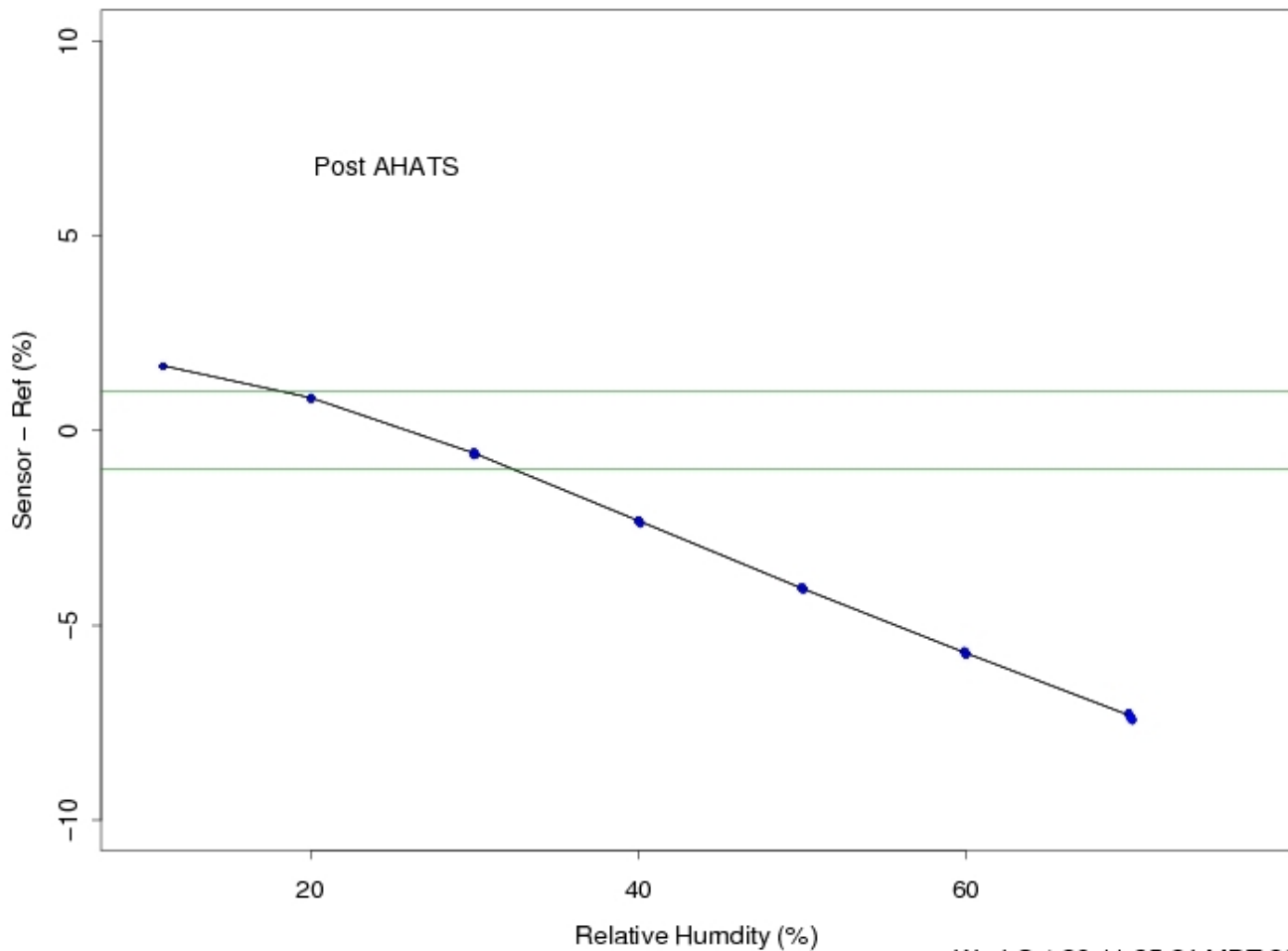
Wed Oct 29 11:35:24 MDT 2008

A set of tests were conducted to try and restore the sensors. This was based on information from Sensirion. Two sensors were cleaned with distilled water then baked for 24 hours at 90C. The sensors were then run in the humidity chamber at 25C, 90% for 48 hours. This reduced the error to about -4% at 90%. A second test was conducted using a sonic cleaner before the baking test. This thought was the fine dust was imbedded in the sensor. The results were similar to the previous test. The third test was to similar to the first one except that the sensors were baked at 90C for 72 hours then put in the humidity chamber at 25C, 90 %. The figure below shows the result from this test. Based on this result we will perform the same procedure on the remaining sensors and hope to have similar results. Unfortunately there is no way to determine when the sensors started going bad.

SHT008
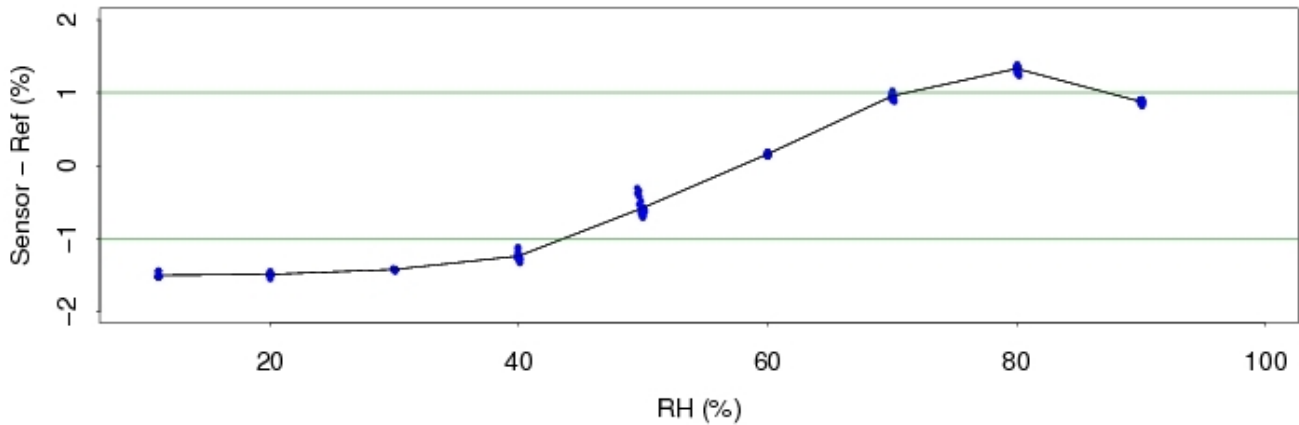
SHT004
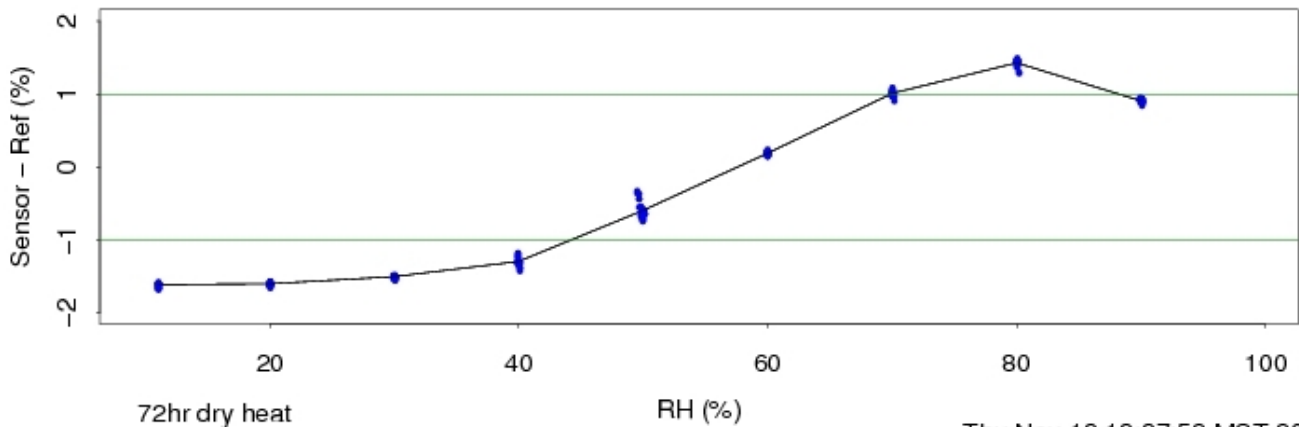
72hr dry heat

Thu Nov 13 13:37:52 MST 2008

Teardown Begins
John Militzer posted on Aug 16, 2008
FINAL AHATS status 8/16/08

TEARDOWN BEGINS NOW

Staff: Chenning, Militzer, Nguyen, Verstraete with ISS.

Temps: 105F/67F yesterday, for period 8/14 8:00 - 8/15 8:00

FINAL Good wind direction:
array#4 (aug 9 20:00 - Aug16 08PDT) has 39.5 hours (10.5 unstable, 29 stable).

Local data storage:

Filesystem   1K-blocks   Used Available Use% Mounted on
upwind:/dev/sda1 57685532 7714060 49971472 13% /var/tmp/usbdisk
downwind1:/dev/sda1 57685532 16330816 41354716 28% /var/tmp/usbdisk
downwind2:/dev/sda1 57685532 17895232 39790300 31% /var/tmp/usbdisk
profile:/dev/sda1 57685532 11617692 46067840 20% /var/tmp/usbdisk
pressure1:/dev/sda1 3940812 1812112 2128700 46% /var/tmp/usbdisk
pressure2:/dev/sda1 3940812 1737824 2202988 44% /var/tmp/usbdisk

aster:/dev/sdb1 721075720 489152132 231923588 68% /media/isff2
isff: /dev/sdb1 1922890480 669008640 1156204636 37% /media/isff15

All systems had remained up and operational and performing basically the same as since the last daily status.

-See Also: boom azimuths for array4.   I'll be adding the 'triginometric measured angles' to that log entry soon....

Pressure2 dsm outage
John Militzer posted on Aug 14, 2008
Aug14, 08:00 - 14:20

Pressure2's dsm wasn't recording/ingesting data.   The adam itself was running.   System and adam logs do not show any indication of an event at that time.   I was in the middle of daily status at that point and it had been running when I arrived.   Around 9:30 I went to the array for some azimuth measurements and failed to catch the problem before going out.   'adn' / 'aup' restarted daq.   Unclear why it died.   I had not logged on, or anything other than 'ds' and 'lsu' on aster according to the /var/log/isff at ~7:54

Daily status Aug14
John Militzer posted on Aug 14, 2008
AHATS status 8/14/08

Staff: Chenning, Militzer, Nguyen, Verstraete with ISS.

Temps: 104F/65F yesterday, for period 8/13 8:00 - 8/14 8:00

Activity highlights:
- array4.
- See profile note on 11th: diamond board problem, but staying up.   crontab reset notes past 2 days
  were erroneous because the command lacked complete path to script.   Interrupts still occuring.
  but adam was staying up. Some short looking files around the normal '12' hour restarts.
  Will adjust Crontab to avoid extra restarts at 0:15,12:15.
-
- https://wiki.ucar.edu/display/ahatslogbook

Good wind direction:
array#4 (aug 9 20:00 - Aug14 08:00PDT) has 25.5 hours (6 unstable, 19.5 stable).

Local data storage:

Filesystem   1K-blocks   Used Available Use% Mounted on
upwind:/dev/sda1   57685532 5122360 52563172 9% /var/tmp/usbdisk
downwind1:/dev/sda1 57685532 13454468 44231064 23% /var/tmp/usbdisk
downwind2:/dev/sda1 57685532 14443516 43242016 25% /var/tmp/usbdisk
profile:/dev/sda1   57685532 9705720 47979812 17% /var/tmp/usbdisk
pressure1:/dev/sda1 3940812 1212932 2727880 31% /var/tmp/usbdisk
pressure2:/dev/sda1 3940812 1217320 2723492 31% /var/tmp/usbdisk

aster:/dev/sdb1 721075720 477200804 243874916 67% /media/isff2
isff: /dev/sdb1 1922890480 656609548 1168603728 36% /media/isff15

Pressure:

(+/- = ~1 std deviation among variables at the same height)

'p.ref' is measuring AHATS ref p with the 202BG connected between the
AHATS and CHATS references.
P.bedard now is the portable Paroscientific standard with reasonable resolution, but
low sampling rate connected to the Bedard pressure port now installed on boom 13b.

Profile: [,select.p]

[Need to swap new 8P board with an old version 8M, but none available.]

Heights of sensors are the same as array3.
Intended to move trh sensors, but tower/collars didn't work well for exact placement

T: ok.
RH: sensor that is at 5.8m is still up to 2% off.

h2o: normal, 2 g/m^3 offset from dat("Q"), except in afternoon.
w'h2o': ok, 0.020 m/s g/m^3 at midday, spiking to .04 in afternoon
co2: ok, 14-20 mmol/m^3
w'co2': ok, min. -0.012 m/s mmo/m^3 at middayProfile

Sonics:
Profile
----
diag: ok, spike on 8m at 13
samples.sonic: ok. Seeing 'spikes' as expected with cron restart. Large spread between sensors during startup; from 2-25, or mor\
e missing on 8m
spd: ok.
dir: ok
w: ok. 8m seems maybe tilted up a bit
tc: ok
w'w': ok
u*: ok, some imaginary values with light winds
sigma_w/u*:
w'tc': ok (lowest near the ground?)
tc'tc': ok

Upwind [,select.u]
----
diag: ok, again, 6u has lots of spiking in daytime, up to .06, ok at night....
samples.sonic: ok?
spd: ok, low winds yesterday
dir: ok, needs new angles
w: ok, +20/-0 cm/s, appears tilted down perhaps
tc: ok, +/- 0.2-6 deg, biases somewhat larger, 3u,4u again highest
w'w': ok, +/- 0.01 m^2/s^2 in day (30 min avg for second moments)
u*: ok, +/- 10 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Lower [,select.b]

Relatively large differences with east winds.

diag: ok, 6b spike in daytime ~13:00 occassionally (Birds, spiders?)
samples.sonic: ok
spd: ok, +/- 5 cm/s, with 12b,13b up to .5m higher, and 2b next in daytime with SWearly winds
dir: ok, new boom angles improved things at ~19z last night, but 1b, 10b still appear out.
w: ok, +/- .2 m/s, pitch looks better for some reason
tc: ok, +/- 0.3 deg, biases up to 1, some curious shift .3-.4 up/down from ~2-3:00 in 1b,2b,3b,4b
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- .1 m/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Upper [,select.t]
----

diag: ok, .002-.01 spikes occassionally
samples.sonic: ok
spd: ok, again low winds, highest <1.5ms 1-3am
dir: ok, +/- 2 deg, need boom angles
w: ok, +/- 10 cm/s
tc: ok, +/- 0.4 degC, offsets up to 1 degC, again shift as on 'b' for 3t,4t,5t when winds slightly higher
w'w': ok, up to +.15-0.2 m^2/s^2 in day (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Daily status Aug13
John Militzer posted on Aug 13, 2008
AHATS status 8/13/08

Staff: Chenning, Militzer, Partial-Oncley, Nguyen, Verstraete with ISS.

Temps: 100F/60F yesterday

Activity highlights:
- now in array4.
- See profile note on 11th: diamond board problem, but crontab reset working.
- SteveO is bringing a partial set of the data (essentially all of array3 and up to today)
  home with his pc. Along with the disk SteveC returned, this gives a 3rd copy of
  the data through today.
- https://wiki.ucar.edu/display/ahatslogbook

Good wind direction:
array#4 (aug 9 18:00 - present) has 16.8 hours (2 unstable, 14.8 stable).

Local data storage:
----
upwind:/dev/sda1 57685532 3886424 53799108 7% /var/tmp/usbdisk
downwind1:/dev/sda1 57685532 12082788 45602744 21% /var/tmp/usbdisk
downwind2:/dev/sda1 57685532 12797440 44888092 22% /var/tmp/usbdisk
profile:/dev/sda1 57685532 8793928 48891604 15% /var/tmp/usbdisk
pressure1:/dev/sda1 3940812 927192 3013620 24% /var/tmp/usbdisk
pressure2:/dev/sda1 3940812 931580 3009232 24% /var/tmp/usbdisk

aster:/dev/sdb1 721075720 471463780 249611940 66% /media/isff2
isff: /dev/sdb1 1922890480 651612524 1173600752 36% /media/isff15

Pressure:

(+/- = ~1 std deviation among variables at the same height)

'p.ref' is measuring AHATS ref p with the 202BG connected between the
AHATS and CHATS references.
P.bedard now is the portable Paroscientific standard with reasonable resolution, but
low sampling rate connected to the Bedard pressure port now installed on boom 13b.

p: ok, +/- 0.03 mb, overall spread between sensors ~.15
p'p': ok?, +/- 0.0004 mb^2 max in daytime, <.0001 at night
w'p': ok, +/- 0.0015 m/s mb in day
t: ok, 1 degC,
Pref: ok, reconnected to volume at start of this config.
P: ok

Profile: [,select.p]

[Need to swap new 8P board with an old version 8M, but none available.]

Heights of sensors are the same as array3.

T: ok. Intended to move trh sensors, but tower/collars didn't work well for exact placement
RH: sensor that is at 5.8m is still up to 2% off esp at night.

h2o: normal, 2 g/m^3 offset from dat("Q"), except in afternoon.
w'h2o': ok, 0.025 m/s g/m^3 at midday
co2: ok, 14-20 mmol/m^3
w'co2': ok, <-0.01 m/s mmo/m^3 at midday

Sonics:
Profile
----
diag: ok
samples.sonic: ok
spd: ok.
dir: ok
w: ok
tc: ok
w'w': ok
u*: ok, some imaginary values with light winds
sigma_w/u*:
w'tc': ok (lowest near the ground?)
tc'tc': ok

Upwind [,select.u]
----
diag: ok, 6u noticable spiking in daytime, up to .06, ok at night
samples.sonic: ok?
spd: ok, +/- 20 cm/s, 3u,4u seem highest in day, they're best exposed to the NE in 'bad' cond\
itions.
dir: ok, obviously need new angles
w: ok, +20/-0 cm/s, appears tilted
tc: ok, +/- 0.2-6 deg, biases somewhat larger, 3u,4u again highest
w'w': ok, +/- 0.005 m^2/s^2, 3u highest (30 min avg for second moments)
u*: ok, +/- 10 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Lower [,select.b]

Relatively large differences with east winds.

diag: ok, 2b spiking in daytime some, upto .05 occassionally (Birds, spiders?)
samples.sonic: ok
spd: ok, +/- 5 cm/s, with 1b upto to 1m higher, and 2b next in daytime with NEearly winds
dir: ok, new boom angles improved things at ~19z last night, but 1b, 10b still appear out.
w: ok, +/- 10 cm/s, pitched up a bit (we tightened it a bit too much)
tc: ok, +/- 0.3 deg, biases up to +/-0.6
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- .1 m/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Upper [,select.t]
----
diag: ok, misc brief spikes, more likely birds than the notes above
samples.sonic: ok
spd: ok, +/- 50 cm/s, 3t much higher up to 1.1-5m during daytime (NE winds)
dir: ok, +/- 2 deg, need boom angles
w: ok, +/- 10 cm/s
tc: ok, +/- 0.4 degC, offsets up to 0.6 degC
w'w': ok, up to +.15-0.2 m^2/s^2 in day (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

----

 changed profile adn aup crontab
Steve Oncley posted on Aug 13, 2008
Since there is no evidence of profile interrupt failures during the last several days, we've decreased the frequency of adnaup commands to every 3 hours, rather than every hour. The adnaup sequence appears to remove 16s of data.

Update (Militzer): I'm not sure where Steve got the '16s' other than when we did test the script a couple days ago.   The script was not running at all because the full path wasn't included in the crontab statement.....fixed now.   Also, the kernel log does show regular spurios interrupts since we looked at the box on the 11th. Apparently they aren't enough to cause the lock-up problem....ie the adam has been staying up on it's own.   Was this the result of reinserting the resistor pack on the viper; not sure but could be that is true.

Now the crontab will run and we'll see those '16s' outages beginning at 18:15 every 3 hours...

  * adam

 array 4 boom angles
Steve Oncley posted on Aug 12, 2008
Here are angles I shot today with the DataScope from 1030-1130 today. John and I don't completely trust datascope readings, but they did seem internally consistent (i.e. when I thought the angle should have been more southerly than the previous reading, it was).

 Note that the 3 sonics on each trident are <reasonably> consistent -- especially 9/10/11u. Trident 6/7/8u is definitely rotated with respect to trident 9/10 /11u.

11t of 130 degrees and 3t and 10t of 134 are not typos.

Finally, note that the relatively close agreement of the horiz array angles are not coincidence -- it is easier to see and adjust (a bit) angles when they are on the horiz array with a close spacing. Also, the EMT conduit now links all of them together.

P.S. These have now been entered in the cal_files (less 131.7 degrees, as before).

Note Aug14 ~9:30-10:30PDT, I JohnM decided to take a 'shot' myself.   These are in column 'U8-14.   The differences with Steves are in 'UD8-14 '.   When I took these, it was further away than I'd tried before (well beyond the berm), and nominally I had the horizontal reference of the datascope on the horizon with the sonic still in view at the top...ie tried to minimize the tilt angle as best i could.   I aligned visually using symmetry between the 'left-right' probes balanced on either side of the square box.   I only did the upwind at this time because later on the winds were good and I didn't want to mess them up.   From these readings, difference was substantial but consistent with Steve's.....may need to 'cal?'   I'm hoping KK will be able to do a few proper theadolite sun-angle shots tomorrow.

Note: Aug15. Sun-Angle Sanity Check:

Kurt, Chris and I took sunangle method shots of 2 sonics to compare with the data-scope readings.   We aligned the theadolite to the sun for 36:01.27N, 119:53.59W and using the sunangle program obtained the offset angle.   The magnetic declination for this latitude/date = 13.6.   From the sun angle readings: U6 = 144.:49:06 ~ 144.8deg true - 13.6 = 131.2 magnetic;   U11 = 148:19:50 ~ 148.3deg true - 13.6 = 134.7 magnetic. NOTICE that these magnetic readings for U7, U11 match SteveO's within about .5deg, but mine don't match. Conclusion: Use Steve's readings.....

	upwind	U8-14	UD8-14	bottom	top
1				131.0	
2				132.9	
3	135.1	141.0	5.9	131.9	134.7
4	133.4	140.1	6.7	132.7	132.5
5	132.7	139.3	6.6	131.5	132.7
6	131.6	138.5	6.9	131.8	131.5
7	131.3	138.4	7.1	132.4	132.2
8	129.9	136.3	6.4	132.1	132.2
9	135.7	141.6	5.9	131.6	132.9
10	135.9	141.8	5.9	132.6	134.6
11	135.3	141.2	5.9	132.3	130.2
12				132.9	
13				131.5	

	profile	cal
1.5 m	132.3	0.6
3.9 m	133.1	1.4
4.9 m	131.8	0.1
5.9 m	133.4	1.7
7.0 m	133.8	2.1
8.0 m	134.3	2.6

Note: Aug15. Triginometric Sanity Check:

SteveO, Chenning, Khuong, and I setup a reference line parallel to array, with a perpendicular from the NE most rohn tower to a point 75.59m to a stake on that parallel line.   We used triangles from the array to establish the perpendicular, and from the reference stake used the theodolite to shoot the parallel line. We determined the distance to the stake by triangulation using the theodolite setup on the parallel 100' away from the reference and shooting back to the rohn tower.   From this reference stake and reference line, we aligned the theodolite to the upwind sonics and measured the distance D from the stake to the alignment point.   Using these dimension, adjusting the 75.59 distance to 72.47 by the 3.12m difference from the rohn to the pam tripod and subtracting the .43 sonic spacing and 1.87m offset of the tripod to the rohn tower (for D'), we took the asine and added the array alignment (325-180=145deg true looking back toward the sonics) to determine the sonic angles; and substracted 13.6 for the magnetic declination. Note we visually aligned to the sonics using the "Horst method" which balances the back two transducers on either side of the square sonic head assembly.   This technique should work, although for the upwind array in particular there are several tolerance assumptions that we can't measure directly (ie the 1.87, 3.12, etc) which makes it a bit awkward.   Note the sunangle readings for u7 were within .1 deg, but for u11 it was 1deg (Chris used the 'front transducer alignment method which could account for a slight additional difference).

	upwind / SteveO	IX	D	D'	Angle	BoomDirTrue	BoomDirMagn	cal
3u	135.1	7	9.65	4.77	3.80	148.8	135.2	3.5
4u	133.4	6	6.71	2.26	1.79	146.8	133.2	1.5
5u	132.7	5	6.1	2.08	1.65	146.7	133.1	1.4

6u	131.6	4	3.35	-.24	-.19	144.8	131.2	-0.5
7u	131.3	3	2.82	-.34	-.27	144.7	131.1	-0.6
8u	129.9	2	-.3	-3.03	-2.41	142.6	129.0	-2.7
9u	135.7	1	6.68	4.38	3.45	148.5	134.9	3.2
10u	135.9	0	6.42	4.55	3.61	148.6	135.0	3.3
11u	135.3	-1	4.39	2.95	2.34	147.3	133.7	2.0

cal: azimuth entered in cal_file = **BoomDirMagn** - 131.7

Later in the day I took readings for the Horizontal Array.   In this case 'D' is the distance from the reference stake to the SW direction (positive).   The distance from the rohm tower leg to the first sonic was measured as .6m, and the length of the boom to the head bolt as 1.37m, the sonic spacing is .43m.   D' = D - the index number (sonic#-1) * .43m.   The angle is asine (D' / (75.59 - 1.37))

	BOTTOM /SteveO's	IX	D	D'	Angle	BoomDirTrue	BoomDirMagn	cal		TOP /Steve'S	D	D'	Angle	BoomDirTrue	Boom
1b	131.0	0	.92	.32	-.25	144.7	131.1	-0.6							
2b	132.9	1	-1.05	.02	-.072	145.0	131.4	-0.3							
3b	131.9	2	.92	-.54	.42	145.9	132.3	0.6		3t	134.7	-1.70	.24	-.19	144.8	131.2
4b	132.7	3	.10	-1.79	1.38	146.4	132.8	1.1		4t	132.5	1.4	-.49	.38	145.4	131.8
5b	131.5	4	2.47	.15	-.12	144.9	131.3	-0.4		5t	132.7	1.77	-.55	.42	145.4	131.8
6b	131.8	5	2.50	-.25	.19	145.2	131.6	-0.1		6t	131.5	2.50	-.25	.19	145.2	131.6
7b	132.4	6	2.48	-.70	.54	145.5	131.9	0.2		7t	132.2	3.11	-.07	.05	145.1	131.5
8b	132.1	7	2.50	-1.11	.86	145.8	132.2	0.5		8t	132.2	3.43	-.18	.14	145.1	131.5
9b	131.6	8	4.64	.6	-.46	144.5	130.9	-0.8		9t	132.9	3.49	-.53	.42	145.4	131.8
10b	132.6	9	3.41	-1.06	.82	145.8	132.2	0.5		10t	134.6	1.38	-3.09	2.39	147.4	133.8
11b	132.3	10	4.47	-.43	.33	145.3	131.7	0.0		11t	130.2	6.62	1.72	-1.37	143.6	130.0
12b	132.9	11	3.65	-1.67	1.3	146.3	132.7	1.0								
13b	131.5	12	5.14	-.62	.4	145.4	131.8	0.1								

- [sonic](#)

[Daily status 12 aug](#)
[Steve Oncley](#) posted on Aug 12, 2008
AHATS status 8/12/08

Staff: Militzer, Oncley, Nguyen, Verstraete with ISS.

Temps: 99F/59F yesterday

Activity highlights:

- now in array4.
- See profile note on 11th: diamond board problem.
  no outages last night, crontab reset working.
- Logbook Wiki and NCAR Web server finally up this morning.

https://wiki.ucar.edu/display/ahatslogbook
...but wiki.ucar.edu has been down this weekend...

Good wind direction:
array#4 (aug 9 18:00 - present) has 11.92 hours (.42 unstable, 11.5 stable).
(Darn, winds have not cooperated for a couple of days!)

Local data storage:
----
upwind:/dev/sda1 57685532 2605580 55079952 5% /var/tmp/usbdisk
downwind1:/dev/sda1 57685532 10661244 47024288 18% /var/tmp/usbdisk
downwind2:/dev/sda1 57685532 11091504 46594028 19% /var/tmp/usbdisk
profile:/dev/sda1 57685532 7848016 49837516 14% /var/tmp/usbdisk
pressure1:/dev/sda1 3940812 631080 3309732 16% /var/tmp/usbdisk
pressure2:/dev/sda1 3940812 635460 3305352 16% /var/tmp/usbdisk

aster:/dev/sdb1 721075720 465517532 255558188 65% /media/isff2
isff: /dev/sdb1 1922890480 645615008 1179598268 36% /media/isff15

Pressure:

(+/- = ~1 std deviation among variables at the same height)

P.bedard had a pinched hose overnight so data is bogus until fixed today @~10pdt.

'p.ref' is measuring AHATS ref p with the 202BG connected between the
AHATS and CHATS references.
P.bedard now is the portable Paroscientific standard with reasonable resolution, but
low sampling rate connected to the Bedard pressure port now installed on boom 13b.

p: ok, +/- 0.03 mb plot scale too large to tell
p'p': ok?, +/- 0.0005 mb^2 small but perhaps okay some variance 'spike' in 5b in 20z
w'p': ok, +/- 0.001 m/s mb in day
t: ok, 1 degC,
Pref: ok, reconnected to volume at start of this config.
P: ok

Profile: ,select.p

Need to swap new 8P board with an old version 8M, but none available.

Heights of sensors are the same as array3.

T: ok. Intended to move trh sensors, but tower/collars didn't work well for exact placement
RH: sensor that is at 5.8m is up to 2% off. Didn't change throughout array #3 period,
now is not important in array #4.
h2o: normal, 2 g/m^3 offset from dat("Q"), except in afternoon.
w'h2o': ok, 0.025 m/s g/m^3 at midday
co2: ok, 14-18 mmol/m^3 (some nights have large values, some don't)
w'co2': ok, -0.01 m/s mmo/m^3 at midday

diag: ok
samples.sonic: ok
spd: ok. Swapped sonic at 8m yesterday, corrected abnormal looking profile
dir: ok
w: ok
tc: ok
w'w': ok
u*: ok, some imaginary values with light winds
sigma_w/u*:
w'tc': ok (lowest near the ground?)
tc'tc': ok

Upwind ,select.u
----

diag: ok, 8u spikes and 6u more
samples.sonic: ok?
spd: ok, +/- 20 cm/s
dir: ok, obviously need new angles
w: ok, +20/-10 cm/s, maybe tilted
tc: ok, +/- 0.2-4 deg, biases somewhat larger
w'w': ok, +/- 0.005 m^2/s^2, 3u highest (30 min avg for second moments)
u*: ok, +/- 5 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Lower ,select.b

Relatively large differences with east winds.

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s, much larger variance yesterday with winds off dir
dir: ok, need new boom angles
w: ok, +/- 10 cm/s, pitched up a bit (we tightened it a bit too much)
tc: ok, +/- 0.3 deg, biases up to +/-0.6
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Upper ,select.t
----

diag: ok, spikes around 18, 23PDT last night
samples.sonic: ok
spd: ok, +/- 40 cm/s, higher in 3t yesterday up to 1.1-5m, and in general higher
dir: ok, +/- 2 deg, need boom angles
w: ok, +/- 10 cm/s
tc: ok, +/- 0.4 degC, offsets up to 0.6 degC
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, som imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

- status

[misc stuff](link)
Steve Oncley posted on Aug 12, 2008
When wiki.ucar.edu was down I put misc entries here:

6-4-09 (twh) NOTE: I found (see below) that the 8m sonic swap on the profile tower appears to have occurred on 8-11 rather than 8-12. Oncley looked at photos of his jaunt to Moro Bay and found that he went there on 8-10. So the dates on the entries below should be changed to the previous day.

8/11 (twh: actually 8/10):
New heights were 5.37m above ref4 level (which is 0.04m above ref3 level).
Thus, the new heights should be 5.37+1.65=7.02m and 8.02m. upwind was setup
this way.
These are close enough to the existing profile 7.08 and 8.05, that we're not planning
to move them.

Yesterday (8/10), measured guy wire tensions on east horizontal array (with all the sonics now)
in a 6 m/s wind from the N:
SE 250
SW 220
NW 190
NE 240
These seem a bit low to us, but are reasonably consistent.

~12:00: Found that the interface board to 11b had pulled out of pressure2's
motherboard. Reset.

12:10-12:30:

- Cycled power twice to upwind to get Pocketec running. Replaced the
  Pocketec in the process.
- Swapped 4G sticks in pressure1 and pressure2
- Have now downloaded all of these drives/sticks still need merge

~13:00 changed config. Restarted statsproc. covar_redo to go back to beginning
of this config. Config has new horiz array heights and new names for
some pressure sensors. Still need new heights for profile...

~13:30 We're off to Moro Bay for some R&R&R...

I sometimes get the following error when trying "aup", but a second "aup" always works:
Starting adam code.../usr/local/isff/scripts/adam/start_adam: line 30: 11238 Illegal instruction dsm '$ISFF/projects/$PROJECT/ISFF/config/'$CONFIG_XM
L
.
[Gordon says that this is an artifact of moving code from Viper RAM to SD card. If second
"aup" works, live with it.]

8/12 (twh: actually 8/11):

0945 - unpinched tubing to P.bedard
0950 - turned "profile" adam off to swap serial card
1005 - turned "profile" back on - don't have 8M card (rather than 8P)
1020-1030 - moved bedard port from on stake near ground to 13b boom (back a bit
from sonic)
1106 - added "adnaup" crontab on profile to restart every hour at 15 min after the hour.
~1130-1230:

- measured all heights on profile:

1150-1210: replaced CSAT 720 with 733 at profile.8m (since high? speeds). (733 was the original "low" sonic at 8m when I arrived here, I think...)

6-4-09 (twh) I found a corresponding break in the 8m sonic data on 8/11, not 8/12

1210-1215: decided that it wasn't worth moving TRH's by 2cm in height. (7m wouldn't fit 2cm lower anyway.)
1215: secured profile adam box

- status

Daily status 11 aug
Steve Oncley posted on Aug 12, 2008
AHATS status 8/11/08

Staff: Militzer, Oncley, Nguyen, Verstraete with ISS.

Temps: 97F/57F yesterday

Activity highlights:

- now in array4.
- See profile note, some outages last night, board problem
- Logbook Wiki and NCAR Web server is still down.
  [The work on a sql server update on saturday caused the problem.
  The vendor/ncar staff expect a patch by midnight tonight will allow
  'logbook' to be back up by tomorrow morning.]

https://wiki.ucar.edu/display/ahatslogbook
...but wiki.ucar.edu has been down this weekend...

Good wind direction:
array#4 (aug 9 18:00 - present) has 11.42 hours (.42 unstable, 11 stable).

Local data storage: (swapped pressure1/2 sticks,upwind pocketec yesterday)
----
upwind:/dev/sda1 57685532 1594044 56091488 3% /var/tmp/usbdisk
downwind1:/dev/sda1 57685532 9538676 48146856 17% /var/tmp/usbdisk
downwind2:/dev/sda1 57685532 9744300 47941232 17% /var/tmp/usbdisk
profile:/dev/sda1 57685532 7100640 50584892 12% /var/tmp/usbdisk
pressure1:/dev/sda1 3940812 398016 3542796 10% /var/tmp/usbdisk
pressure2:/dev/sda1 3940812 401564 3539248 10% /var/tmp/usbdisk

aster:/dev/sdb1 721075720 460821376 260254344 64% /media/isff2
aster:/dev/sdb1 1922890480 640618164 1184595112 36% /media/isff15

Pressure:

(+/- = ~1 std deviation among variables at the same height)

P.bedard had a pinched hose overnight so data is bogus until fixed today @~10pdt.

'p.ref' is measuring AHATS ref p with the 202BG connected between the
AHATS and CHATS references.
P.bedard now is the portable Paroscientific standard with reasonable resolution, but
low sampling rate connected to the Bedard pressure port now installed on boom 13b.

p: ok, +/- 0.03 mb plot scale too large to tell
p'p': ok, +/- 0.0005 mb^2 small but perhaps okay -- only stable data to look at
w'p': ok, +/- 0.002 m/s mb
t: ok, 1 degC
Pref: ok, reconnected to volume at start of this config.
P: ok

Profile: ,select.p

Diamond board problems overnight and today. Lost ~8hours.
Need to swap new 8P board with an old version 8M, but none available.
Started crontab to 'adn / aup' every hour to force a restart. Seems to be helping
and we've gotten data since doing this ~11pdt.
Heights of sensors are the same and array3.

T: ok
RH: sensor that is at 5.8m is up to 2% off. Didn't change throughout array #3 period,
now is not important in array #4.

h2o: normal, 2 g/m^3 offset from dat("Q"), except in afternoon.
w'h2o': ok, 0.025 m/s g/m^3 at midday
co2: ok, 14-17 mmol/m^3 (some nights have large values, some don't)
w'co2': ok, -0.01 m/s mmo/m^3 at midday

diag: ok? spikes in 4.8m.
samples.sonic: ok
spd: ok?, Swapped sonic at 8m.
Replaced 720 with 733. 720 had been reporting a bit too high. Had been at
7m, and when we swapped it to 8m the high reading showed up.
dir: ok
w: ok
tc: ok, still strange 7m/8m ordering.

Note: From here on the specific sensor comments are removed because we
began a rerun of all of the covars which caused display/naming issues with
running the 'daily.qq' plots. From the brief looks, everything was up and
running in down1,2, pressure1,2 upwind and profile.

- status

[array 4 heights](.)
Steve Oncley posted on Aug 12, 2008
ref3 is ~1.505m above top of profile's plate.
center of sonic is 0.053m above top of boom
TRH is 0.37m below top of boom, thus top of TRH boom should be 0.42m above top of sonic boom.

In array 4:

- East side of array is has height of the top of 1b's boom 5.37m above ref4
- We set upwind's sonics to this same top of boom (plate) being 5.37m above Ref4
- Ref4 is 0.040m above Ref3
- Ref3 is 0.027m above top of "1.55m" sonic
- THUS,
  + profile "7m" top of sonic boom should be 5.447m above "1.55m" sonic.
  + profile "8m" top of sonic boom should be 6.447m above "1.55m" sonic.
  + profile "7m" top of TRH boom should be 5.447m + 0.42m = 5.867 above "1.55m" sonic.
  + profile "8m" top of TRH boom should be 6.447m + 0.42m = 6.867 above "1.55m" sonic.

Our measurements of profile:

- 1.55m top sonic boom is -0.027m below ref3
  (remaining entries are with respect to top of 1.55m sonic boom)
  sonic TRH
  1.55 0.000 0.376
  3.x 2.140 2.542
  4.x 3.352 3.749
  5.x 4.286 4.710
  7.x 5.582 5.886
  8.x 6.508 6.878

Note that 7.x TRH of 5.886m is 2.1cm higher than desired and 8.x TRH of 6.787 is 1.1cm higher than
desired. We can't move the 7.x TRH lower due to Rohn internal braces, thus, we'll leave both
of these.

Numbers "AGL":
1.55 1.555 1.511
3.x 3.695 3.677
4.x 4.907 4.884
5.x 5.841 5.845
7.x 7.137 7.021
8.x 8.063 8.013
others 7.002

Tabulating the profile heights:

nominal ht	sonic*	+1.55m	SHT*	+1.55m-0.42m
1.5m	0.0	1.55m	0.376	1.51m
3m	2.140m	3.69m	2.542	3.67m
4m	3.352m	4.90m	3.749	4.88m
5.5m	4.286m	5.84m	4.710	5.84m
7m	5.582m	7.13m	5.886	7.02
8m	6.508m	8.06m	6.878	8.01

- height wrt 1.5m sonic boom

- sonic

sonic IDs

Steve Oncley posted on Aug 12, 2008

array4 list, collected 8/11/08 (after replacing 8m sonic)

profile:

rs 1 profile
EEProm_sig=39009. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=112a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=ebb d TNb=cbb JD= 007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0732 16nov07 JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=39009 &=1 os=

rs 2 profile
ET= 60 ts=i XD=d GN=122a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 0
2600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=009 009 010 ELb=009 009 010 TNo=dcb d TNb=ecb JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=7 7 8 tlb=7 7 8 CA=1 TD= duty=
090 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0739 05jun08 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0
f cs=43113 &=1 os=

rs 5 profile
nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600
02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=acc d TNb=aca JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty
=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0740 15nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev
3.0f cs=26065 &=1 os=

rs 6 profile
EEProm_sig=33258. Prom_sig=17263. \n>??D\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000
HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 009 010 ELb=010 010 010 TNo=ded d TNb=dcd JD= 007\r\nC0o=-2-2-2 C0b=-2-2
-2 RC=0 tlo=8 7 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0537 01sep06 JC=3 CB=3 MD=5 DF=0500
0 RNA=1 sa=1 rev 3.0f cs=33258 &=1 os=

rs 7 profile
EEProm_sig=33920. Prom_sig=46426. \n>??\r\nSN0369 24oct07 rev 4.0t &=1 AC=1 AF=050 AH=1 AO=00300 ar=0 AQ= 60 BR=0 BX=0\r\n CF=1 C0o=
0 0 00 C0b= 0 0 0 CA=1
CD=0 cs=33920 DC=4 dl=015 DM=c DR=03465\r\n duty=087 DT=16240 ET= 60 FA=00050 FL=007 FX=038 GN=212a GO=00000 HA=0\r\n HG=01560
HH=02700 KT=0 LG=00832 LH
=00100 MA=-020 MS=-010 MX=0 ND=1 NI=2\r\n ns=00203 OR=1 os=0 PD=2 RA=00020 RC=0 RF=00900 RH=015 RI=1 RS=1 RX=002 SD=0\r\n
SL=035 SR=1 ss=1 T0123=1000 TD=
a TF=02600 02600 02600 TK=1 TO= 0 0 0 TP=t\r\n ts=i UX=0 WM=o WR=006 XD=d xp=2 XX=00875 ZZ=0

rs 8 profile
EEProm_sig=43188. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=121a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 H
A=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 008 ELb=010 010 008 TNo=bcf d TNb=ccc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-
2 RC=0 tlo=8 8 6 tlb=8 8 6 CA=1 TD= duty=089 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0733 25oct07 JC=3 CB=3 MD=5 DF=05000
RNA=1 sa=1 rev 3.0f cs=43188 &=1 os=

upwind:
rs 1 upwind
EEProm_sig=05088. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=323a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=bda d TNb=cbb JD= 007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0539 06nov07 JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=05088 &=1 os=

rs 2 upwind
ET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d tf=02600 02600 0
2600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=bbb d TNb=cbc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8
CA=1 TD= duty=
095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0536 06nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev
3.0f cs=40143 &=1 os=

rs 5 upwind
EEProm_sig=06092. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=dcd d TNb=dbb JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0677 30oct07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=06092 &=1 os=

rs 6 upwind
EEProm_sig=60317. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=223a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 009 ELb=009 009 010 TNo=7de d TNb=6ec JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 7 tlb=7 7 8 CA=1 TD= duty=092 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0674 09nov07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=60317 &=1 os=

rs 7 upwind
ET= 60 ts=i XD=d GN=332a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0?d tf=02600 02600 02
600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=99c d TNb=bac JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8
CA=1 TD= duty=0
97 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1119 19nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0
f cs=59940 &=1 os=

rs 8 upwind
EEProm_sig=59504. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=334a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=009 010 010 ELb=009 010 009 TNo=ddb d TNb=ecc JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=7 8 8 tlb=7 8 7 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0673 13nov07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=59504 &=1 os=

rs 9 upwind
EEProm_sig=52525. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=8b8 d TNb=9c7 JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1121 26jun06
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=52525 &=1 os=

rs 10 upwind
EEProm_sig=59030. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=111a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=ccd d TNb=bdc JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1123 06nov07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=59030 &=1 os=

rs 11 upwind
EEProm_sig=29356. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=242a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 011 010 ELb=010 011 010 TNo=a7b d TNb=b9a JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 9 8 tlb=8 9 8 CA=1 TD= duty=096 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1122 19jun06
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=29356 &=1 os=

downwind1:
rs 1 downwind1
EEProm_sig=20347. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=223a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 H
A=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=ccc d TNb=bcc JD=
007\r\nC0o=-2-2-2 C0b=-2-2-
2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=096 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0853 12jun08 JC=3
CB=3 MD=5 DF=05000
RNA=1 sa=1 rev 3.0f cs=20347 &=1 os=

rs 2 downwind1
T= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0?d tf=02600 02600 026
00\r\nWM=o ar=0 ZZ=0 DC=1 ELo=008 010 010 ELb=010 010 008 TNo=bba d TNb=c9a JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=6 8 8 tlb=8 8 6
CA=1 TD= duty=09
1 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0741 31oct07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f
cs=04641 &=1 os=

rs 5 downwind1
EEProm_sig=22282. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=221a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 011 ELb=010 010 008 TNo=cdd d TNb=cdc JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 9 tlb=8 8 6 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0800 14sep06
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=22282 &=1 os=

rs 6 downwind1
EEProm_sig=10244. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=212a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=008 010 010 ELb=010 010 010 TNo=dec d TNb=edd JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=6 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0744 07nov07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=10244 &=1 os=

rs 7 downwind1
EEProm_sig=46481. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=211a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=cce d TNb=ccd JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0745 05nov07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=46481 &=1 os=

rs 8 downwind1
EEProm_sig=28394. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=322a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=ced d TNb=ded JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0376 09nov07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=28394 &=1 os=

rs 9 downwind1
ET= 60 ts=i XD=d GN=333a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d sa=1\r\nWM=o ar=
0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=bed d TNb=ddb JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 DTR=01740 CA=1
TD= duty=087
AQ= 60 AC=1 CD=0 SR=1 UX=0 DMX=0 DTU=02320 DTC=01160 RD=o ss=1 XP=2 RF=018 DS=007 SN0738 28mar03 HF=005 JC=3 CB=3 MD=5
DF=05000 RNA=1 rev 3.0a cs=18961
&=1 os=

rs 10 downwind1
EEProm_sig=30038. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=321a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=9b9 d TNb=aba JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0856 14nov07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=30038 &=1 os=

rs 11 downwind1
EEProm_sig=45643. Prom_sig=46426. \n>\r\n>??\r\nSN0370 24oct07 rev 4.0t &=1 AC=1 AF=050 AH=1 AO=00300 ar=0 AQ= 60 BR=0 BX=0\r\n CF=1
C0o= 0 0 0 C0b= 0 0
0 CA=1 CD=0 cs=45643 DC=4 dl=015 DM=c DR=03465\r\n duty=086 DT=16240 ET= 60 FA=00050 FL=007 FX=038 GN=111a GO=00000 HA=0\r\n
HG=01560 HH=02700 KT=0 LG=00
832 LH=00100 MA=-020 MS=-010 MX=0 ND=1 NI=2\r\n ns=00203 OR=1 os=0 PD=2 RA=00020 RC=0 RF=00900 RH=015 RI=1 RS=1 RX=002 SD=0\r\n
SL=035SR=1 ss=1 T0123=100
0 TD=a TF=02600 02600 02600 TK=1 TO= 0 0 0 TP=t\r\n ts=i UX=0 WM=o WR=006 XD=d xp=2 XX=00875 ZZ=0

rs 12 downwind1
ET= 60 ts=i XD=d GN=433a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d tf=02600 02600 0
2600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=009 010 009 ELb=009 010 009 TNo=acd d TNb=bce JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=7 8 7 tlb=7 8 7
CA=1 TD= duty=
091 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0672 14nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev
3.0f cs=62873 &=1 os=

downwind2:
rs 1 downwind2
EEProm_sig=49554. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=232a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 009 010 ELb=010 009 010 TNo=cdb d TNb=bbb JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 7 8 tlb=8 7 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0671 31oct07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=49554 &=1 os=

rs 2 downwind2
ET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2
PD=2SD=0 ?d sa=1\r\nWM=o ar=0
ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=cdc d TNb=bdb JD= 007\r\nC0o=-2-D2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 DTR=01740 CA=1
TD= duty=085
AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 DTC=01160 RD=o ss=1 XP=2 RF=018 DS=007 SN0364 27may04 HF=005 JC=3 CB=3 MD=5
DF=05000RNA=1 rev 3.0a cs=14725 &=
1 os=

rs 5 downwind2
EEProm_sig=21246. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=512a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=007 010 010 ELb=010 010 010 TNo=7cd d TNb=6bc JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=5 8 8 tlb=8 8 8 CA=1 TD= duty=091 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0743 07nov07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=21246 &=1 os=

rs 6 downwind2
EEProm_sig=27043. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=232a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=9dd d TNb=aac JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0538 02aug06
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=27043 &=1 os=

rs 8 downwind2
EEProm_sig=47381. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=221a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 011 010 ELb=011 010 010 TNo=dad d TNb=ebc JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 9 8 tlb=9 8 8 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0855 01nov07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=47381 &=1 os=

rs 9 downwind2
EEProm_sig=60173. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=cbd d TNb=dcd JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0377 12jan07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=60173 &=1 os=

rs 10 downwind2
EEProm_sig=38395. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=200a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=ded d TNb=eed JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1120 05jun08
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=38395 &=1 os=

rs 11 downwind2
EEProm_sig=38472. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=232a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=abb d TNb=aab JD=
007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0540 14nov07
JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=38472 &=1 os=

rs 12 downwind2
EEProm_sig=38141. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=232a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=bbc d TNb=dcb JD= 007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0378 01nov07 JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=38141 &=1 os=

rs 13 downwind2
EEProm_sig=29072. Prom_sig=47942. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d sa=1\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=cbd d TNb=b9c JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=
8 8 8 tlb=8 8 8 DTR=01740 CA=1 TD= duty=085 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 DTC=01D160 RD=o ss=1 XP=2 RF=018 DS=007 SN0367 28may04 HF=005
JC=3 CB=3 MD=5 DF=05000 RNA=1 rev 3.0a cs=29072 &=1 os=

rs 15 downwind2
EEProm_sig=27999. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=322a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=009 010 010 TNo=ddd d TNb=eec JD= 007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=7 8 8 CA=1 TD= duty=092 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0366 05nov07 JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=27999 &=1 os=

rs 16 downwind2
EEProm_sig=51601. Prom_sig=17263. \n>\r\n>??\r\nET= 60 ts=i XD=d GN=223a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00
000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=cbc d TNb=bba JD= 007\r\nC0o=-2-2-2 C0b=
-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0247 20oct06 JC=3 CB=3 MD=5 DF=
05000 RNA=1 sa=1 rev 3.0f cs=51601 &=1 os=

- sonic

[Daily status aug 10]
Steve Oncley posted on Aug 12, 2008
AHATS status 8/10/08

Staff: Militzer, Oncley, Nguyen, Verstraete with ISS.

Temps: 94F/57F yesterday

Activity highlights:

- now in array4!!!

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook
...but wiki.ucar.edu has been down this weekend...

Good wind direction:
array#3 (jul 29 12:30 - aug 8 06:00) had 66 hours (13 unstable, 53 stable).
array#4 (aug 9 18:00 - present) has 8 hours (0 unstable, 8 stable).

Local data storage: (we downloaded everything on 30 July)
----
upwind: DOWN -- we'll reset today (WiFi data okay
downwind1:/dev/sda1 57685532 7813940 49871592 14% /var/tmp/usbdisk
downwind2:/dev/sda1 57685532 7655580 50029952 13% /var/tmp/usbdisk
profile:/dev/sda1 57685532 6183912 51501620 11% /var/tmp/usbdisk
pressure1:/dev/sda1 3940812 1666816 2273996 42% /var/tmp/usbdisk
pressure2:/dev/sda1 3897204 1397804 2499400 36% /var/tmp/usbdisk

aster:/dev/sdb1 721075720 447126872 273948848 63% /media/isff2
isff:/dev/sdb1 1922890480 627207052 1198006224 35% /media/isff15

Pressure:

(+/- = ~1 std deviation among variables at the same height)

11.b now measuring p with the 202BG connected between the Bedard port and CHATS reference. P.0m poor name now is the portable Paroscientific standard with reasonable resolution, but low sampling rate.

p: ok, +/- 0.03 mb plot scale too large to tell
p'p': ok, +/- 0.0001 mb^2 small but perhaps okay -- only stable data to look at
w'p': ok, +/- 0.001 m/s mb
t: ok, 1 degC
Pref: ok, reconnected to volume at start of this config.
P: ok

Profile: ,select.p

Was kept on during reconfig. Heights of sensors are the same.

T: ok
RH: sensor that is at 5.8m is up to 2% off. Didn't change throughout array #3 period, now is not important in array #4.

h2o: normal, 2 g/m^3 offset from dat("Q"), except in afternoon.
w'h2o': ok, 0.025 m/s g/m^3 at midday
co2: ok, 14-17 mmol/m^3 (some nights have large values, some don't)
w'co2': ok, -0.01 m/s mmo/m^3 at midday

diag: ok? spikes in 4.8m.
samples.sonic: ok
spd: ok?, 8m now mostly higher than 7m, but could mean 8m is too high (after swap)
We proved that the WiFi antenna was not bothering it...
dir: ok
w: ok
tc: ok, still strange 7m/8m ordering.
w'w': ok
u*: ok, some imaginary values with light winds
sigma_w/u*:
w'tc': ok (lowest near the ground?)
tc'tc': ok

Upwind: ,select.u
----

diag: ok, 6u spikes
samples.sonic: ok
spd: ok, +/- 20 cm/s
dir: ok, obviously need new angles
w: ok, +/- 5 cm/s, 11u differs a bit
tc: ok, +/- 0.2 deg, biases somewhat larger
w'w': ok, +/- 0.005 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Lower: ,select.b

Relatively large differences with east winds.

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s, 13b outlier early this morning
dir: ok, need new boom angles
w: ok, +/- 5 cm/s, pitched up a bit (we tightened it a bit too much)
tc: ok, +/- 0.2 deg, biases up to +/-0.8
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Upper: ,select.t
----

diag: ok
samples.sonic: ok
spd: ok, +/- 10 cm/s, 11t/10t differences (like 13b/12b above)
dir: ok, +/- 2 deg, need boom angles
w: ok, +/- 5 cm/s, a bit pitched up as well
tc: ok, +/- 0.2 degC, offsets up to 0.6 degC
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, som imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

- status

waves
Steve Oncley posted on Aug 12, 2008
Starting ~21:00 on 8/10, I see waves in some of the data. Unfortunately, "profile" died shortly thereafter, but this might be an interesting period to look at.

- weather

wiki down
Steve Oncley posted on Aug 12, 2008
From 11:00AM on Sat until early this morning, the UCAR WWW servers (including this wiki server) were down due to a software <upgrade> done in Boulder. I'm just starting to upload some text files we've written in the meantime.

- status

final reconfig
Steve Oncley posted on Aug 12, 2008
Starting 06:00 today, John, Khuong, Lou, and I started the reconfig to array 4. This marks the end of array3.

- shutdown all adams except profile

- dropped horiz arrays

- split into 2 teams:

S&K: shifted sensors to east array; set EMT/up-guy system on bottom 13 [note new sonic installed for 13b; 5t replaced since array appeared bent]

J&L: dropped upwind 3-8

- lunch

S&K: mostly installed Pref tubing; moved downwind1&pressure1; cabled east side of array; rerouted power&e-net to upwind

J&L: dropped upwind 9-11; roughly placed trident tripods

Left at 18:00 -- turned downwind1&pressure1 to check, but array is still down.

A long day, but we're on schedule...

Still to do:

- horiz array:

  - cable west side

  - drill holes to set top EMT boom guys

  - raise and attach top boom guys

- tridents:

  - level/orient tripods

  - build last 2 trident masts

- add sonics

- erect

final reconfig

Steve Oncley posted on Aug 08, 2008

Starting 06:00 today, John, Khoung, Lou, and I started the reconfig to array 4. This marks the end of array3.

- shutdown all adams except profile

- dropped horiz arrays

- split into 2 teams:

S&K: shifted sensors to east array; set EMT/up-guy system on bottom 13 [note new sonic installed for 13b; 5t replaced since array appeared bent]

J&L: dropped upwind 3-8

- lunch

S&K: mostly installed Pref tubing; moved downwind1&pressure1; cabled east side of array; rerouted power&e-net to upwind

J&L: dropped upwind 9-11; roughly placed trident tripods

Left at 18:00 -- turned on downwind1&pressure1 to check them out, but array is still close to ground.

A long day, but we're on schedule...

Still to do:

- horiz array:

   - cable west side

   - drill holes to set top EMT boom guys

   - raise and attach top boom guys

- tridents:

   - level/orient tripods

   - build last 2 trident masts

   - add sonics

   - erect

   - status

heights

Steve Oncley posted on Aug 07, 2008

For my own sanity, I try here to document all the heights so far:

 (These are now updated with the array 4 values. Not all of these make sense [different measurements when things weren't moved]. I'm working now to resolve them.)

Array:	1 sonic	AGL*	1 TRH	AGL		2 sonic	AGL	2 TRH	AGL		3 sonic	AGL	3 TRH	AGL		4 sonic	AGL	4 T
ref (AGL)	+0.055	1.52 (1.53)	1.52	-0.37		+0.05	1.76	-0.37	1.76		x	1.61	x	x		-0.027	1.65	x
"8m"	6.475	**8.05**	6.855	**8.005**		-	-	-	-		6.468	**8.128**	-	-		6.508	**8.063**	6.8
"7m"	5.505	**7.08**	5.855	**7.005**		-	-	-	-		5.544**	**7.204****	-	-		5.582	**7.137**	5.8
"5.5m"	3.955	**5.53**	4.315	**5.465**		3.99	**5.80**	4.43	**5.82**		4.256	**5.916**		5.845		4.286	**5.841**	4.7
"4m"	2.665	**4.24**	3.08	**4.230**		2.90	**4.71**	3.33	**4.72**		3.316	**4.976**		4.884		3.352	**4.907**	3.7
"3m"	1.725	**3.30**	2.105	**3.255**		1.96	**3.77**	2.36	**3.75**		2.110	**3.770**	-	-		2.140	**3.695**	2.5
"1.5m"	-0.02	**1.55**	0.355	**1.505**		-	-	-	-		-0.026	**1.634**	-	-		0.000	**1.555**	0.3
top	2.66	**4.25**	x	x		2.91	**4.72**	x	x		4.260	**5.920**	x	x		x	**8.060**	x
bottom	1.66	**3.25**	x	x		1.91	**3.72**	x	x		3.262	**4.922**	x	x		x	**7.062**	x
upwind	2.17->1.67	**3.75->3.25**	x	x		1.92	**3.73**	x	x		3.254	**4.914**	x	x		x	**7.062**	x

*3/18/09, TWH added the height of the sonic measurement volume above the top of the boom (5.5? cm).

**Note that the 7m sonic was moved up "about 4-5 cm" on Aug 3 at 09:41 (see logbook entry)

 "-" means shouldn't have changed from last

"x" means value not needed

TRH at "5m" and "4m" were moved between array 2 and array 3, but measured during array 4.

final values to be used in **bold**

ref4 was 0.040m above ref3, but for the profiles, the reference was the top of the lowest sonic boom, which was 0.027m below ref3.

- config

quickie status
Steve Oncley posted on Aug 07, 2008
We plan to change from array 3 to array4 tomorrow. Currently 60 hours, with 13 unstable for array3 (since Steve&I leveled it).

No <major> issues known. <minor> issues are:

- The sonic that is now at 8m (formerly 7m) appears to have been high. We'll replace it during the reconfig.

- Sonic at 5t appears to have top arm bent (though data look okay in daily plots?) We'll replace it during the reconfig.

- Pressure system has pref that varies with heat convection -- presumably real. We've been measuring pref using one of the 14 p' transducers (11b) so that this "error" can be removed from the data.

- We also have an independent 15th p' sensor, but it is only being recorded at coarse resolution at 1sps.

- Humidity on the TRH at 5.8m is still a bit odd, but it has been a very low priority. (Steve and I already swapped sensors once.)

Wish us luck on the reconfig beginning at 6am tomorrow! We'll start by dropping the horiz array and then split into two groups to work on both the horiz array and upwind array reconfigurations. John and I tried erecting a trident today (without sonics) and it went <okay>, though we're still a bit nervous about adding an extra 50 lbs and $24,000 to it...

- status

array 4 dimensions
Steve Oncley posted on Aug 07, 2008
John and I started some preliminary work on array4:

- x-y dimensions from middle of east rohn tower to baseline pins for new tripods 10u, 7u, and 4u:

4u, x=3.055-1/2 rohn tube diam, y=7.778-6.379

7u: x=3.053-1/2 tube, y=9.066-6.379

10u: x=3.050-1/2 tube, y=10.374-6.379

Better estimates of y: 10u-7u= 1.288, 10u-4u=2.585

Existing 7u tripod is set up ~21.5cm upwind of baseline 7u pin (intended to be double the distance between mast and tripod center tube centers).

Confirmed that tripod 7u azimuth is close to perpendicular to crosswind line.

Shot array 4 reference to 7u tripod and east rohn tower -- ref 4 is 4.0cm above ref 3 (closer to ref 2).

- config

more pressure tests
Steve Oncley posted on Aug 06, 2008
To follow-up on the leak check yesterday (which showed a slow leak), I repeated this test today:

1033 P=1004.88 (pinched off)

1034 unpinched Pref (so I could read pressure easily) P=1007.29

1037 installed tee, P=1007.32

1038 blew in, P= 1029 dropping

1039 pinched entire array, P=1025 still dropping

1041 tighten tee, P=1021.5 still dropping

1043 pinched off 11b P=1018.9, still dropping

~1100-1113 reseated both reservoir endcaps with more Teflon tape and plumbers' grease. Was able to screw in at least 3 whole turns more (due to grease lubrication)., P=1007.29 (had been open to outside)

1114 blow in, P=1048.3, dropping slowly

1117 P=1046.9, dropping slowly

1119 open 11b, P=1046.6, no obvious change in rate of dropping

1120 open entire array, P=1046.3, again no obvious change

1127 disconnect tee

1129 back to normal, P=1007.27

1134 backfill hole (again!) P=1007.6

Conclusion: reservoir had leak with 10min constant due to not-completely-seated endcaps. They are now seated better, with a much smaller leak (though the decrease in P could have been moderated by a change in temperature, that should have increased P).

We still have the wind correlation to investigate...

- pressure

spd 8m now highest
Steve Oncley posted on Aug 05, 2008
John and Khoung just swapped 7m and 8m sonics. Now 8m speeds are higher. 7m speeds are perhaps a bit low. Now S/N720 is at 8m and 369 is at 7m. (I just interrupted the data stream to determine this.)

I guess this means that 720 has been reading high all this time (and still is)?

6-4-09 (twh) swap occurred from 14:45 - 15:25

- sonic

pressure tests
Steve Oncley posted on Aug 05, 2008
between 1440 - 1522, Khoung tried the pinch test again, removing all of the array of tubing. During this test, the overall noise in p[ref].11b was significantly less, indicating that part (but not all) of the p' problems still are tubing related.

At 1525, he sucked on the reservoir and reconnected the (entire) tubing. It appears that the tubing has a leak with a time constant of about 10min. This was actually desirable(!), but indicates that we still have some sleuthing to do.

- pressure

8m speed problems
Steve Oncley posted on Aug 05, 2008
I finally been able to look at the data from when John removed the etherant yesterday. During the entire 5-hour period, the speeds from 7m are higher than those at 8m. Thus, the difference is not due to flow around the etherant. (I had suspected that this would be the case several days ago when I noted that the speed difference (all u-component) was not a function of wind direction.)

John and Khoung are now swapping the 7m & 8m sonics to diagnose this problem further.

- sonic

pressure reconfig
Steve Oncley posted on Aug 05, 2008
Still trying to work several problems:

1. P.0m is only 1Hz, only about same resolution as Pref, so not much help monitoring Pref after all. Thus, change back to monitor Pref with 11b's 202BG
2. Data from P.0m yesterday showed Pref fluctuations. Try to damp these by removing potential leak (old capillary leak) and add more steel wool.

~0900: opened ref volume

- - removed cap with capillary leak
- - stuffed more steel wool (about double) in this side
- - replace cap with solid cap
- - removed sample cap
- - stuffed more steel wool in this side
- - replaced cap

0925-0937: sat in this configuration to allow P.0m to monitor Pref

0937:

- - removed garden hose from CHATS system, noted that big hose fitting was somewhat loose, repaired with teflon tape?
- - changed P.0m from AHATS Pref to garden hose/Bedard
- - plumbed Pref back to CHATS system (using 11b.4.8m 202BG)

0955: covered up with dirt/space blanket again

- pressure

pocketecs (mostly) downloaded

Steve Oncley posted on Aug 04, 2008

To test the 8m sonic data, we removed the etherant at about 0800 today. We reinstalled it about 1330. Between these times, we were recording data from downwind1, profile, and pressure1 only on their usb drives. Therefore, we downloaded all drives today. However, our "spare" for upwind wouldn't mount (after we had successfully retrieved data from it off of profile or downwind1). We're working to revive the drive (my Mac was able to reformat it with a FAT filesystem), but in the meantime, upwind's old pocketec was reinstalled.

The covars are still rerunning on the merged data, so I haven't yet been able to check on whether the sonic was affected.

- adam

yet more pressure tests

Steve Oncley posted on Aug 04, 2008

At 1512, I pinched off the entire reference pressure tubing so that both Pref and P.0m measured just the reference volume. (It turned out that P.0m's RS232 connector fell off, so we didn't get data from it for any of these tests 😞 .)

At 1618, I opened the above, but pinched off lines to only connect 6b.

At ~1745, I opened the above connecting the entire tubing system, but pinched off Pref (after reconnecting the P.0m signal).

A first look at the Pref data shows no difference -- the pressure fluctuations are still coming from the volume?

- pressure

more config3 dimensions

Steve Oncley posted on Aug 04, 2008

We just made several more measurements:

1. Heights of sensors on the horizontal array (between top of boom and Ref 3 mark, to check if the arrays are level and at the same heights):

1b	3.263
5b	3.262
5t	4.260
7b	3.261
7t	4.264

11 b	3.262
11t	4.264

 Looks like everything is within a 4mm range of each other -- pretty good to me!.

2. Distance between end of boom clamps and boom pins is 3.5cm for the PAM clamps and 3.2cm for the ASTER clamps. Thus, the longitudinal spacing would be 3mm less than I reported in an earlier message [I'll try to revisit this and actually produce numbers.]

3. x-y spacing between upwind and downwind arrays:

x between middle of downwind Rohn tower and middle of square upwind masts: 512.5-1.6+3.1=5.140m (10u) and 511.3-1.6+3.1cm=5.128m (3u).

y between middle of boom for 1b and center of square mast for 11u: (12.76-2.585)-(5.84-0.30)=4.64m

4. Distance perpendicular to array to berm: 18.62m to 11u, 10.85m to 3u

- array

[Daily Status, Aug 3](#)
Steve Oncley posted on Aug 03, 2008
AHATS (sometime)daily status 8/3/08

Staff: Militzer, Oncley, Nguyen, Tudor&Verstraete with ISS.
John replaced Steve yesterday. Lou arrived the day before and
Laura leaves tomorrow.

Temps: 99F/57F yesterday

Activity highlights:
- Changed sensor to monitor Pref to free up the fast-response sensor to
make a completely independent measurement. All measurements appear to
agree...
- I noticed dust devils in the pressure signal yesterday -- these
probably are the first ever with a tight array of pressure measurements!
- We <think> we've completed documentation of array 3.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction:
array#3 (jul 29 12:30-present) now has 40 hours (8 unstable, 32 stable).
We're planning on switching to array #4 on Tom's schedule on 6-7 Aug.

Local data storage: (we downloaded everything on 30 July)
----
upwind:/dev/sda1 57685532 7961492 49724040 14% /var/tmp/usbdisk
downwind1:/dev/sda1 57685532 8849776 48835756 15% /var/tmp/usbdisk
downwind2:/dev/sda1 57685532 10443500 47242032 18% /var/tmp/usbdisk
profile:/dev/sda1 57685532 5801844 51883688 10% /var/tmp/usbdisk
pressure1:/dev/sda1 3897204 1800328 2096876 46% /var/tmp/usbdisk
pressure2:/dev/sda1 3897204 1857176 2040028 48% /var/tmp/usbdisk

aster:/dev/sdb1 721075720 368028044 353047676 52% /media/isff2
isff: /dev/sdc1 1922890480 544537872 1280675404 30% /media/isff15

Pressure:

(+/- = ~1 std deviation among variables at the same height)

11.b now measuring p with the 202BG connected between the
Bedard port and CHATS reference. P.0m [poor name] now is the
portable Paroscientific standard with reasonable resolution, but
low sampling rate.

p: ok, +/- 0.03 mb
p'p': ok, +/- 0.0005 mb^2
w'p': ok, +/- 0.001 m/s mb
t: ok, 2 degC
Pref: ok, glitch yesterday ~noon when opened to install new sensor

P: ok

Profile: [,select.p]
----
glitches on 8m when we replaced it today (0900-0930)

T: ok
RH: sensor that is now at 5.8m is strange. Since sonics are now at this
level, we may work to fix it.

diag: ok
samples.sonic: ok
spd: ok?, 8m still lower than 7m sometimes. (Even after the swap today!)
Maybe the WiFi antenna is bothering it...
dir: ok
w: ok
tc: ok, 8m low by ~0.3 degC? (related to the speeds being low as well?)
w'w': ok
u*: ok, some imaginary values with light winds
sigma_w/u*:
w'tc': ok
h2o: normal, 2 g/m^3 offset from dat("Q"), except in afternoon.
w'h2o': ok, 0.03 m/s g/m^3 at midday
co2: ok, 15-20 mmol/m^3 (some nights have large values, some don't [last
night]). Presumably related to shallow nocturnal boundary layers,
but I haven't gone through the sodar data yet.
w'co2': ok, -0.01 m/s mmo/m^3 at midday

Upwind (hts=4.8): [,select.u]
----

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s
dir: ok, why isn't this better now that angles are shot??
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 deg, biases somewhat larger
w'w': ok, +/- 0.005 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Lower (hts=4.8): [,select.b]
----

diag: ok
samples.sonic: ok

spd: ok, +/- 20 cm/s
dir: ok, why isn't this better now that angles are shot??
w: ok, +/- 5 cm/s, leveling helped!
tc: ok, +/- 0.2 deg, biases up to +/-0.8
w'w': ok, +/- 0.005 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Upper (hts=5.8): [,select.t]
----

diag: ok
samples.sonic: ok
spd: ok, +/- 10 cm/s, 3t outlier
dir: ok, +/- 2 deg, why isn't this better now that angles are shot??
11t outlier
w: ok, +/- 5 cm/s, leveling helped!
tc: ok, +/- 0.2 degC, offsets up to 0.6 degC
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, som imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

- status

pressure serial numbers
Steve Oncley posted on Aug 03, 2008

pressure1	pressure2
w302859	w302821
w302828	w302829
w302832	w302826
w302871	w302874
w302835	w302842

This is the list with viper on the top and the power supply on the bottom.

Also see https://wiki.ucar.edu/display/ahatslogbook/2008/07/17/GPIO+boards+in+pressure+systems

- pressure

profile heights
Steve Oncley posted on Aug 03, 2008
Profile boom heights from top of boom (inside of clamp on the other side) to the ref 3 mark:

8m	6.468m
7m	5.544m
5.8 m	4.256m
4.8 m	3.316m
3.3 m	2.110m
1.5 m	-0.026m

- sonic

moved 7m sonic
Steve Oncley posted on Aug 03, 2008
We noticed that a guy wire was rubbing on the bottom of the 7m sonic array, so we moved it up by about 4-5cm. In the process, we tightened the setscrew which pitched the array up a bit. This was done at 0941.

- sonic

replaced 8m profile sonic
Steve Oncley posted on Aug 03, 2008
Since the winds (u-component) have seemed to be about 0.3m/s low (since the beginning of this experiment), we replaced it (~0830-0930 this morning). We removed S/N 733 and installed S/N 369.

- sonic

dust devil
Steve Oncley posted on Aug 02, 2008
I notice in the p' time series a drop of pressure at 1323 this afternoon. This looks like the signature of a dust devil to me (and I saw one earlier today near the trailer).

- pressure

[pressure reconfiguration (yet, yet, again)](#)
Steve Oncley posted on Aug 02, 2008
To further diagnose the p' system, I've been wanting to set up an independent system like CHATS. Now that John has brought out another pressure sensor, we made the following changes between 1030-1200:

- Installed the cal-lab field reference Paro 760 to measure Pref (in lieu of the 14th 202BG). Added it to profile:ttyS17 as P.0m.

- Changed the 14th 202BG (still known as p.11b.4.8m) to measure just like CHATS, between the Bedard port through the hose and the CHATS reference.

My initial look at the data show the signals 11b.4.8m and 6b.4.8m+P.0m to be roughly the same. I'll keep watching them.

- [pressure](#)

[array3 boom angles](#)
Steve Oncley posted on Aug 01, 2008
I just shot angles for all sonics. I'll enter into the cal_files after lunch.

P.S. These are now entered (subtracting 131.7) and statsproc restarted.

Note0: that some of the times I entered as 29 jul and some as 31 jul, depending on when the sonic was last moved.

NOTE1: Sonic U5 s/n 712's upper arm was bent / misaligned with the lower claw when checked on 8/6/08. The value shown is for the lower arm alignment. jwm

Note2: On 8/6/08 beginning at 10:20PDT, JohnMilitzer, took a second set of readings as noted '2'. These were completed by 14:30PDT. In the middle of the afternoon, it was optically more difficult to see the alignment angle. I also took repeated readings and noticed some variance in those, but used the common value. The large difference between our readings is disturbing, although I verified that the data-scope still has a deviation setting of 0.0
Note3: On 8/7/08, SteveO and I returned to the site and tried once more, performing a calibration of the data-scope and doing a spot check. We noticed that the cell phones, as well as metal do cause errors on the scope. Before and after the cal, my spot check on U3 showed 137.2 vs 137.7 after cal. On the profile tower my post-cal readings for the lowest 3 were within .2.

Note4: Procedurally there are problems with the approach and our ability to hold the scope plumb on the camera tripod. Tilt-angle is extremely important and can introduce many degrees of error between level and ~20deg tilt for the 7 and 8m sonics. We can establish plumb optically using the verticle

RECOMMENDATION: reconsider putting a high quality electronic compass mounted under the theadolite on our surveyor's tripod instead of using the data-scope. That would allow us to setup a quick and reliable level, and eliminate the tilt-angle issue of the data-scope when looking aloft.

	b	b2	cal (b2)		b-b2		t	t2	cal (t2)		t-t2		u	u2	cal (u2)		u-u2	
1	134.7	130.4	-1.3		4.3													
2	137.0	133.7	2.0		3.3													
3	136.0	132.4	0.7		3.6		137.1	133.6	1.9		3.5		141.0	137.2	5.5		3.8	
4	136.3	132.7	1.0		3.6		135.9	132.7	1.0		3.2		139.0	135.2	3.5		3.8	
5	135.2	132.7	1.0		2.5		134.4	128.1	-3.6		6.3		139.2	135.3	3.6		3.9	
6	134.6	131.1	-0.6		3.5		134.3	130.3	-1.4		4.0		141.4	138.3	6.6		3.1	
7	135.5	131.6	-0.1		3.9		136.6	132.0	0.3		4.6		134.6	131.4	-0.3		3.2	
8	136.8	133.5	1.8		3.3		138.3	135.1	3.4		3.2		136.5	132.4	0.7		4.1	
9	135.3	131.7	0.0		3.6		137.9	133.0	1.3		4.9		141.0	138.3	6.6		2.7	
10	134.7	132.4	0.7		2.3		135.9	132.6	0.9		3.3		135.8	132.7	1.0		3.1	
11	136.7	133.4	1.7		3.3		137.0	133.2	1.5		3.8		134.5	131.2	-0.5		3.3	
12	137.2	133.4	1.7		3.8													
13	(4.8's)																	

	profile	profile2	cal (p2)	p-p2
1.5	135.1	132.4	0.7	2.7
3.3	137.0	134.2	2.5	2.8
4.8	136.1	132.5	0.8	3.7
5.8	138.2	134.8	3.1	3.4
7.0	136.2	134.4	2.7	1.8
8.0	137.0	133.0	1.3	4.0

cal: azimuth entered in cal_file; measured magnetic azimuth - 131.7

- [sonic](#)

[13b rewired](#)
Steve Oncley posted on Aug 01, 2008
We just realized that 13b was still "Tee" wired into the 3.3m sonic, where it should have been changed during the array2->array3 shift to the sonic now at 4.8m. I just did this at 1136am. Unfortunately, Gordon will have to do his magic to fix this for the first 3 days of array3. Sorry...

- sonic

[Daily status, August 1](#)
Steve Oncley posted on Aug 01, 2008
AHATS (sometime)daily status 8/1/08 (4 days since the last status...)

Staff: Semmer, Oncley, Nguyen, Tudor with ISS
Bruce (and Amy) Roberts visited yesterday (July 31).

Temps: 99F/61F yesterday, even a bit cooler 2-3 days ago.

Sorry, we've had major activities since the last status:
- July 29 we reconfigured to array #3, though it is lower than
originally planned (now 5&6m) as a hedge against getting good
pressure data from array #2.
- July 29/30 we had (good) visits by Roger Wakimoto and
John Wyngaard, including good discussions about pressure with John.
- I had to take an AHATS break on July 30 to get the revisions
on my TRAM paper done. It is now resubmitted!
- Yesterday we pulled down the horizontal array to (better) level
the sonics and to implement John's suggestion of foam insulation
around the Pref tubing.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction:
array#2 (jul 20 16:00-jul 29 06:00) ended up with 67 hours (22 unstable,
45 stable). It was lengthened a bit to allow more time in the <better>
pressure configuration. There also had been some data system failures
resulting in the loss of ~5 hours of data.
array#3 (jul 29 12:30-present) now has 18 hours (2 unstable, 16 stable).
We shouldn't have lost much during yesterday's work since directions were
bad. [this statistic actually is low since need covar_redo]

Local data storage: (we downloaded everything on 30 July)
----
upwind:/dev/sda1 57685532 5281796 52403736 9% /var/tmp/usbdisk
downwind1:/dev/sda1 57685532 5875748 51809784 10% /var/tmp/usbdisk
downwind2:/dev/sda1 57685532 6874668 50810864 12% /var/tmp/usbdisk
profile:/dev/sda1 57685532 3836724 53848808 7% /var/tmp/usbdisk
pressure1:/dev/sda1 3897204 1180848 2716356 30% /var/tmp/usbdisk
pressure2:/dev/sda1 3897204 1242284 2654920 32% /var/tmp/usbdisk

aster:/dev/sdb1 721075720 355606092 365469628 50% /media/isff2
isff:/dev/sdc1 1922890480 532559304 1292653972 30% /media/isff15
(although big, isff15 now has essentially 3 copies (WiFi, local storage,
and merge) of the entire data set.)

We'll send a few DVD's of data back with Steve tomorrow.

Pressure:

(+/- = ~1 std deviation among variables at the same height)

- 11.b is still measuring Pref with the 202BG connected between the
AHATS and CHATS references. We've just added insulation to the Pref
tubing, but it seems to only have a minor effect.
- pressure2 crashed yesterday

p: ok, +/- 0.03 mb
p'p': ok, +/- 0.0005n mb^2
w'p': ok, +/- 0.002 m/s mb
t: 6b&6t are outliers by 3degC during day, others +/- 1.5 degC
Pref: ok -- has moved a lot during several changes
P: ok

Profile: [,select.p]

T: ok
RH: sensor that is now at 5.8m is strange. Since sonics are now at this
level, we may work to fix it.

diag: ok
samples.sonic: ok
spd: ok?, 8m still lower than 7m sometimes. We'll change 8m out during
the next configuration switch.
dir: ok
w: ok
tc: ok, 8m low by ~0.3 degC? (related to the speeds being low as well?)
w'w': ok
u*: ok, some imaginary values with light winds
sigma_w/u*:
w'tc': ok
h2o: normal, 2 g/m^3 offset from dat("Q"), except in afternoon.
w'h2o': ok, 0.03 m/s g/m^3 at midday
co2: ok, 15-20 mmol/m^3 (some nights have large values, some don't [last
night]). Presumably related to shallow nocturnal boundary layers,
but I haven't gone through the sodar data yet.
w'co2': ok, -0.01 m/s mmo/m^3 at midday

Upwind (hts=4.8): [,select.u]

Has crashed each of the last 5 nights at about 10pm. Last night stayed
down due to a certain SE trying to help. We've replaced the Viper CPU
board so hopefully it will work tonight.

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s
dir: ok, need new angles again...
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 deg, biases somewhat larger
w'w': ok, +/- 0.005 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Lower (hts=4.8): [,select.b]
----

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s, perhaps less scatter after move
dir: ok, need new angles again... (not seeing big changes since
move yesterday)
w: ok, +/- 15 cm/s [need to check tilt angles]. Most negative.
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Upper (hts=5.8): [,select.t]
----

diag: ok
samples.sonic: ok
spd: ok, +/- 10 cm/s, perhaps less scatter after move
dir: ok, +/- 2 deg, need new angles again...(not seeing big changes since
move yesterday)
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 degC, offsets up to 0.6 degC
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, som imaginary
sigma_w/u*:
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

- status

[clouds](#)
Steve Oncley posted on Aug 01, 2008
Yesterday afternoon and early this morning, there were scattered cirrus clouds. Probably not enough even to affect Rsw.in, but it was different. They are gone now 😞

- [weather](#)

[bird](#)
Steve Oncley posted on Aug 01, 2008
A bird (small hawk?) was sitting on the top of the array of 11u this morning as we arrived at about 0800.

- [sonic](#)

[pressure tubing](#)
Steve Oncley posted on Aug 01, 2008
All of the reference line tubing was insulated between 0800-0840 this morning.

Based on one spectrum, it doesn't look like this has made much of a difference. Does this mean <yet> something else is going on to cause these Pref fluctuations?

Tonight we should receive another Pref sensor. Tomorrow I intend to use it as the new Pref sensor and configure my current Pref sensor (the 11b 202BG) exactly as done in CHATS. This should allow a comparison of a single sensor ala CHATS to the AHATS system measurements.

- [pressure](#)

[profile went down](#)
Steve Oncley posted on Aug 01, 2008
Between the 0650am and 0740am the profile emerald board went down. It revived with adn/aup.

- [data-system](#)

[some Pref tubes insulated](#)
Steve Oncley posted on Jul 31, 2008
After discussions with John Wyngaard over the last 2 days (and a wake-up call this morning), we decided to try to lower at least the high frequency fluctuations in Pref by trying to add a sleeve around the tubing. John had the great idea to use foam pipe insulation. We found some in Hanford and added it to the horizontal sections of the array when it was down for sonic leveling today. Unfortunately, I had only purchased enough for a test this morning, so we were one piece short (between 7t and 8t) and only did the vertical run between 5b and 5t. I now have more insulation and will add it first thing tomorrow. I'll try to add a P.S. tonight to see if there is any effect on the spectra.

Note that at 1140, I opened up the reference tubing to re-route a piece near 5b.

P.S. Spectra from yesterday (7/30) and today (7/31) at 17:00 and 21:00 show that there is some modest improvement even with only this partial tubing. (In these plots, 11b is Pref and 6b is p-Pref.) We'll see tomorrow when the rest are done.
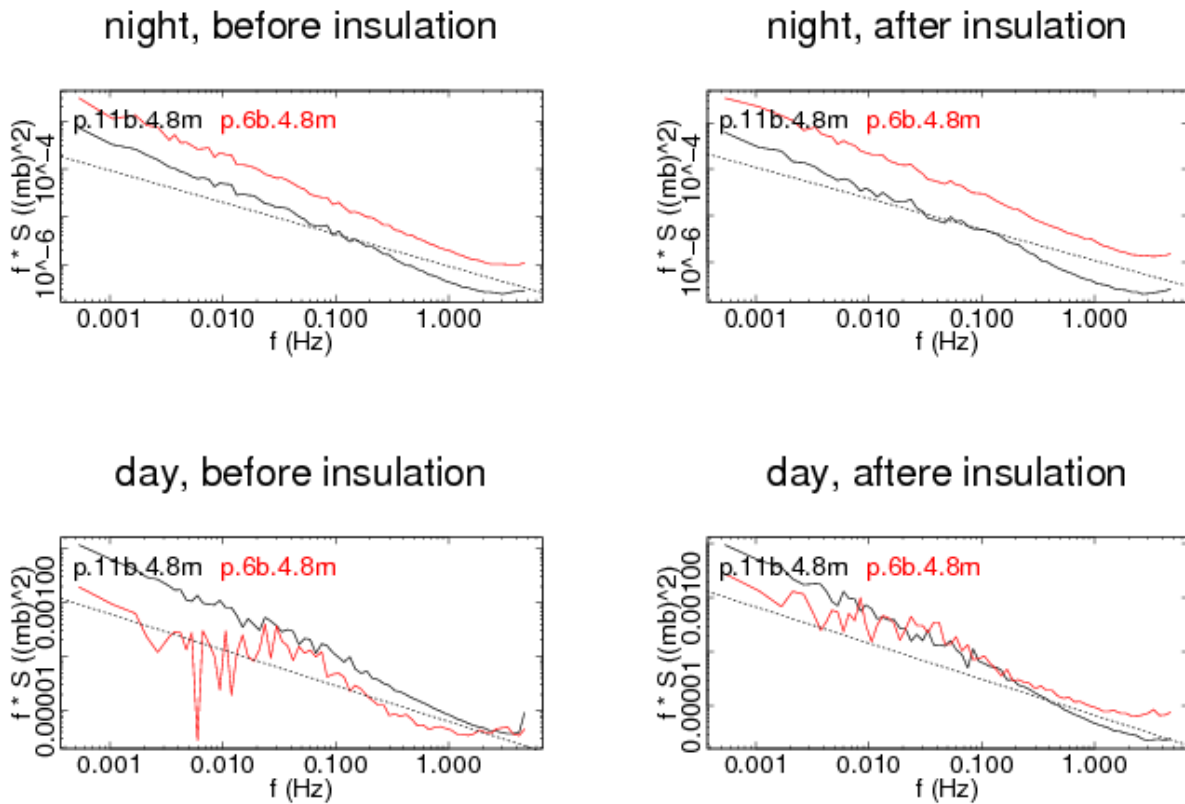
- pressure

H-frame sonics moved

Steve Oncley posted on Jul 31, 2008

Today, since the winds were too easterly and since we wanted to work on the pressure tubing anyway, we lowered both horizontal arrays to adjust the sonics to be more level. We dropped the east array ~1030 and worked on it until ~1400. We then dropped the west array and worked on it until ~1700. A long, hot, day...

I now estimate that the heights of these sonics are within +/- 3cm of each other and with the upwind sonics. The most different sonics are now the fixed ones on the profile mast. This is at least a factor of 5 better than they were. Moreover, they are now close to level. (I'll try tilt plots when I get a chance.)

We accomplished this feat by:

0. Lowering the array to the ground

1. Moving the 1/2" EMT conduit to below the booms, rather than on top

2. Connecting the EMT pieces with the dowel in the middle and with EMT screw couplers

3. Drilling holes in the EMT to accomodate S-hooks at 4 places (not evenly spaced due to flex in the EMT).

4. Attaching short guywire pieces (used to extend the former upwind guys) to the EMT

5. Attaching ratchet straps to each pair of guywires on the bottom array that was secured to the top array ASTER tower

6. Lifting the horizontal array back in place.

7. Attaching ratchet straps to each pair of guywires on the top array to the top crosspiece of the H-frame support.

We're pretty pleased with ourselves and only wish that we'd done this in CHATS!

Note that it is quite likely that at least some of the boom angles are different now. We'll reshoot everything sometime soon. Note that we think that the last (*twh: first?*) 2 days in config3 could use the config2 boom angles, since these sonics should not have shifted direction.

P.S. 2 examples of sonic tilts:

	lean,azimuth [before]	lean,azimuth [after]
1b.4.8 m	4.0, -14	0.2, -124
3b.4.8 m	1.4, +30	1.7, +141

 Note that 1b is at the end and 3b is the middle of the east array. The middle has become almost perfect. The end is different from vertical by the same amount, but is now in the opposite direction (in pitch angle). The difference between them actually hasn't changed much: 3.8 before and 3.1 after.

- sonic

Checking GPS units
Steven Semmer posted on Jul 31, 2008
How to verify the ADAM GPS units are getting satellite lock via Gordon feedback

FYI, "ntpq -p" from aster is a good check of the network and GPS's. This shows
that all the adams are happy (with either a leading * or +) except for pressure2
which is getting its clock from the base.

```
[aster@aster ~]$ ntpq -p
     remote        refid    st t when poll reach   delay   offset  jitter
==============================================================================
+profile.isff.uc GPS_NMEA(0)    3 u   22  64 377   2.426  -0.319  1.428
*downwind1.isff. GPS_NMEA(0)    3 u   47  64 377   2.540  -0.255  1.270
+downwind2.isff. GPS_NMEA(0)    3 u   58  64 377   2.555  -0.171  0.677
+upwind.isff.uca GPS_NMEA(0)    3 u   22  64 377   2.547  -0.141  6.876
+pressure1.isff. GPS_NMEA(0)    3 u   39  64 377   2.437  -0.257  0.375
 pressure2.isff. 192.168.13.1   5 u    2  64 377   2.538   0.126  2.289
 LOCAL(0)        .LOCL.        10 l   46  64 377   0.000   0.000  0.002
```

- gps

pressure spectra examples
Steve Oncley posted on Jul 30, 2008

Here is an example from yesterday (1700-1730) of spectra (top panel) and cospsectra (bottom). The black line in the top panel is the spectrum of just the reference pressure (not connected to the atmosphere in any way). The red lines are all the sensors at 5m. Low frequencies in the reference pressure are due to drift in the CHATS reference volume due to changing soil temperature. Note that the signal-to-noise ratio from 0.01 to 1 Hz is on the order of one. (Actually, much better that the factor of 10 I've seen earlier in this case.) Also note that the high frequencies appear to be dominated by instrument noise for frequencies above 1Hz. Unfortunately, this is the frequency range of the subgridscale fluctuations.

The bottom panel has the w'p' cospectra for all of the 5m sensors (no significance to the color change -- sorry). The thick black line again is w'p' cospectrum of the reference pressure. It has noise, but definitely is a smaller signal than for real pressure. Note the "ringing" (change from - to +) at high frequencies that looks like a phase lag. I played with the data a bit and found that It would take about a 2 second lag to replicate this. I have no idea how such a lag could get into our system.
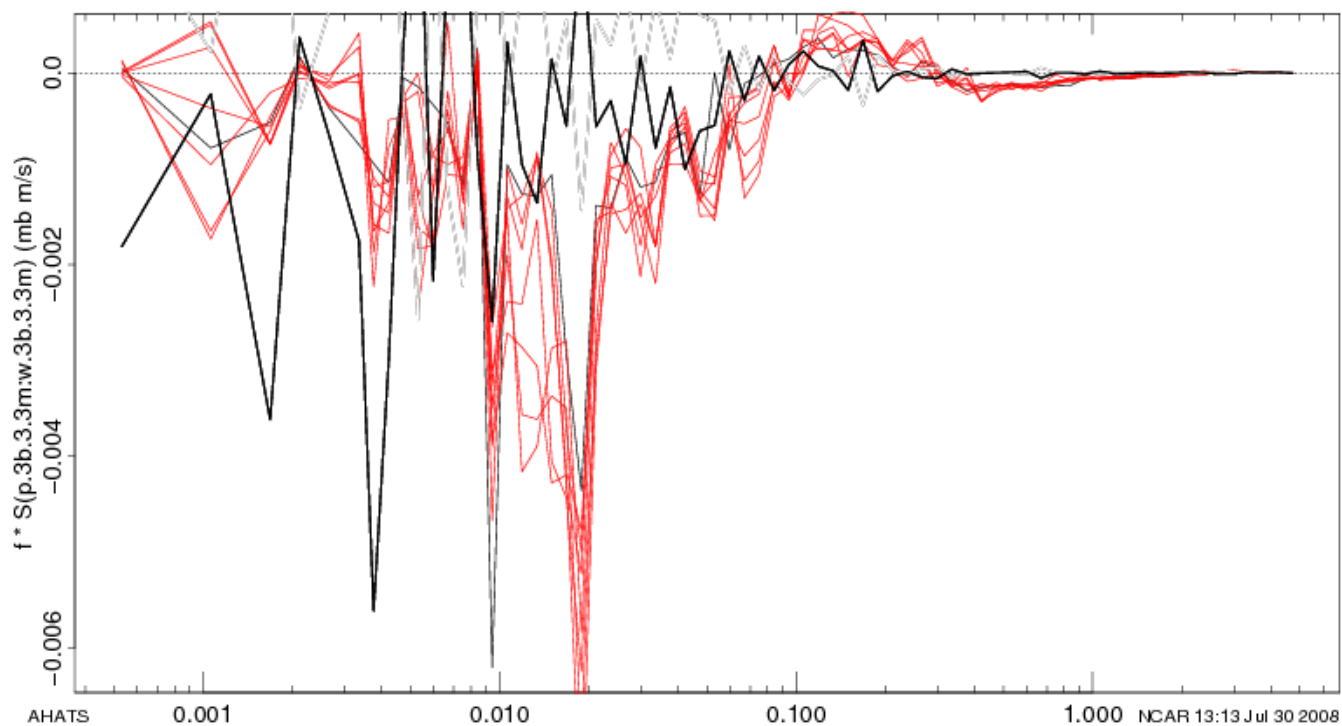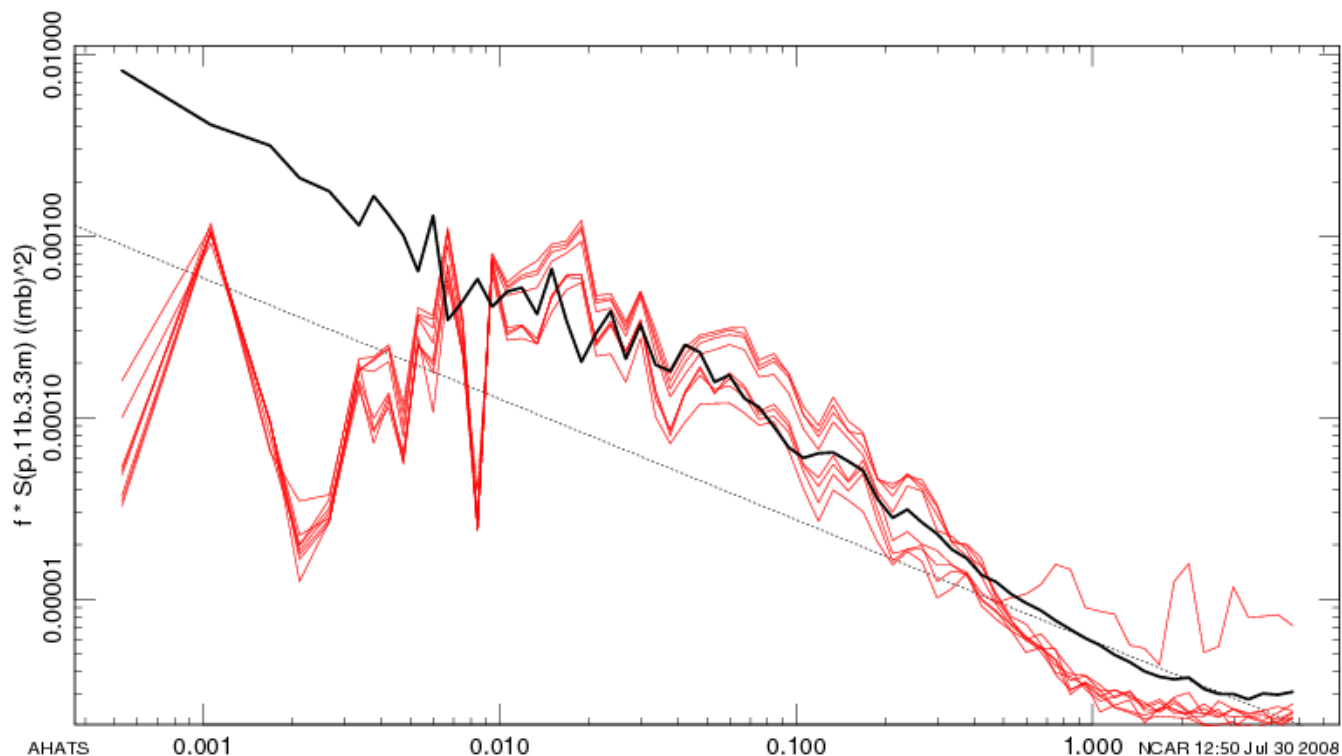
- pressure

pressure2 crash

Steve Oncley posted on Jul 30, 2008

pressure2 crashed sometime after 7am. I revived it a bit after 9am. Cause unknown, but Steve was out there and may have knocked a cable.

- data-system

alfalfa bales

Steve Oncley posted on Jul 30, 2008

The farm baled up the alfalfa from the fields to the east of our site yesterday. They were stacked in piles ~6m high (I took some photos) as of the start of config 3 ops. They were along the n-s road (on the east side of the irrig ditch) , from 1miles to 2miles north. The bales were moved to the corner 2 miles to the north this morning.

- status

config 3 dimensions

Steve Oncley posted on Jul 30, 2008

The config3 transition yesterday went:

1. Move the east horiz array up 3 slots.   (This measured at ~4.87m for the top of 5b's boom to the base plate.) [started ~0600]

2. Move the west horiz array up 3 slots.

3. Move 6t and 6b up.

4. Move 12b up.

5. Move 5.5m and 4.3m up to ~5.8m and ~4.8m (also T/RHs) [done by 0830]

6. Tear-down upwind and move to staggered upwind, sequence 11u -> 3u [done by 1230]

7. Remove upwind bases [1530-1630]

When we started to build config 3, we measured 3.254m from the config 3 reference line to the top of 5b's boom (of course, after raising it to its position). New measurements for other sensors:

6t: 3.252m

6b: 3.250m

12b: 3.275m

(I didn't record new measurements of the 2 profile sensors.)

All of the upwind sensors were set to 3.261 = 3.254+0.7 to the top of the clamp +/-1mm.

P.S. The reference height mark #3 is 15.2cm below the mark for #2.

P.P.S. Some spacings:

5t 133.4cm 6t 127.4cm 7t

5b 133.7cm 6b 127.8cm 7b

11b 128.3cm 12b 132.0cm 13b

- sonic

config 2 dimensions

Steve Oncley posted on Jul 30, 2008

Tom asked us to remeasure heights of the config2 upwind array as we tore it down yesterday:

3	191.1

4	190.8
5	190.8
6	193.7
7	191.7
8	191.9
9	191.3
10	192.2
11	192.6

There were some stray marks on the towers. I wouldn't rule out the possibility that we chose the wrong reference line on some of the towers (note the the marks ended up underneath the masts sometimes). In particular, I wonder if 6u's measurement was wrong.

Also note that we ended up measuring to the top of the clamp, rather than the top of the boom since this was much easier to get to. The values above all have had an additional 0.7cm subtracted to compensate for this.

P.S. On x-spacing:

Distance from end of boom bracket to center of PAM (square) mast, which was aligned to stakes: 12.4cm

Distance from end of boom bracket to center of horiz array base plate, which was aligned to stakes: ~9cm

Distance between upwind stake line and horiz array stake line: was supposed to be 5.16m.

Distance between end of boom bracket to center of sonic arrays: ~177.7cm [but should be the same for either upwind or horiz array]

Thus, distance between upwind sensors and horiz array sensors: 5.16m + 12.4cm - 9cm = 5.13m.

Note that config 3 x-spacing should be the same.

- sonic

config 3 started!
Steve Oncley posted on Jul 29, 2008
We changed from config 2 to config 3 between 0600-1230 today. There still are a few PAM tripod bases left from config 3, so the surface is rougher than it should be. We'll remove them this afternoon after a well-deserved lunch!

 P.S. John Wyngaard and Roger Wakimoto are now here as well.

- operations

8m sonic data
Steve Oncley posted on Jul 28, 2008
I've looked a bit at the data from the 8m sonic. I plotted u,v,w components from 7m&8m as a function of wind direction. If the etherant were causing flow distortion, I would expect a signature that depends on wind direction. I also would expect vertical velocity to have a negative bias for winds into the array. What I see is u.8m being lower than u.7m, v.8m being equal to v.7m, and w.8m being higher than w.7m, all independent of wind direction. Thus, I do not believe that the etherant is the source of the low winds at 8m that we've been seeing.

The next step is to replace this sonic.

- sonic

pocketecs exchanged
Steve Oncley posted on Jul 28, 2008
During the last 10 minutes, we swapped Pocketecs on upwind, downwind1, pressure2, and pressure1 (in that order). Obviously, there

will be brief data outages.

The pocketec units from profile and downwind2 were changed at about 12:45 local.

- data-system

upwind now okay?
Steve Oncley posted on Jul 28, 2008
upwind stayed up with no hiccups overnight using the spare Viper board. Hopefully it is now fixed...

- data-system

Daily status, July 27
Steve Oncley posted on Jul 27, 2008
AHATS daily status 7/27/08

Staff: Semmer, Oncley, Nguyen, Tudor with ISS
Cohn visited yesterday.
Temps: 103F/66F yesterday

Again, a bi-daily report. Yesterday played with the pressure
system some more. Also have had upwind crashes every night.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: The standard function reports 53 hours (23
unstable, 30 stable) in this configuration, all but 3 segments shorter
than 2.5 hours. Note that our longest segment changed from 820 min
to 650 min now that I've entered boom angles -- a big change for only
a few degrees of reorientation! However we have had some sensors and
data systems down so the actual numbers would be lower.

Local data storage: (we're getting ready to download these)
----
upwind:/dev/sda1 57685532 8441508 49244024 15% /var/tmp/usbdisk
downwind1:/dev/sda1 57685532 11579060 46106472 20% /var/tmp/usbdisk
downwind2:/dev/sda1 57685532 13765456 43920076 24% /var/tmp/usbdisk
profile:/dev/sda1 57685532 7746824 49938708 13% /var/tmp/usbdisk
pressure1:/dev/sda1 3940812 2157556 1783256 55% /var/tmp/usbdisk
pressure2:/dev/sda1 3940812 2045904 1894908 52% /var/tmp/usbdisk

aster:/dev/sdb1 721075720 277274000 443801720 39% /media/isff2
isff:/dev/sdc1 1922890480 403213996 1421999280 23% /media/isff15

The isff3 backup disk should now be back in Colorado via Steve Cohn.

Pressure:

(+/- = ~1 std deviation among variables at the same height)

We've made lots of adjustments to the pressure system over the past few
days to improve the spectra.   We're now using a 25 liter reservoir
that we built from ABS pipe and stuffed with steel wool. However,
variation of the reference pressure (presumably due to tubing temperature
changes) still is about 3 times the variation of the static pressure.
We sacrificed the sensor at 11b to have it measure the reference pressure
so that we might be able to recover this signal.
p: ok, +/- 0.03 mb [still]
p'p': ok, +/- 0.001 mb^2
w'p': ok, +/- 0.002 m/s mb
t: 6b&6t are outliers by 3degC during day, others +/- 1.5 degC
Pref: ok -- has moved a lot during several changes

Profile: [,select.p]

T: ok
RH: sensor that is now at 5.5m is strange, but we're going to live with it.
P: okay

diag: ok
samples.sonic: ok
spd: ok?, 8m still lower than 7m sometimes. We'll change 8m out during
the next configuration switch.
dir: ok
w: ok
tc: ok, 8m low by ~0.3 degC? (related to the speeds being low as well?)
w'w': ok
u*: ok, some imaginary values with light winds
sigma_w/u*: ok (1.3 at night)
w'tc': ok
h2o: normal, 2 g/m^3 offset from dat("Q"), except in afternoon.
w'h2o': ok, 0.03 m/s g/m^3 at midday
co2: ok, 15-20 mmol/m^3 (some nights have large values, some don't [last
night]). Presumably related to shallow nocturnal boundary layers,
but I haven't gone through the sodar data yet.
w'co2': ok, -0.01 m/s mmo/m^3 at midday

Upwind (hts=3.3): [,select.u]

Has crashed each of the last 5 nights at about 10pm. Last night stayed
down due to a certain SE trying to help. We've replaced the Viper CPU
board so hopefully it will work tonight.

diag: ok
samples.sonic: ?????ok
spd: ok, +/- 20 cm/s
dir: ok, angles much better now that they have been shot
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 deg, biases somewhat larger
w'w': ok, +/- 0.005 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, again some imaginary values
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Lower (hts=3.3): [,select.b]
----

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s
dir: ok, +/- 3 deg
w: ok, +/- 15 cm/s [need to check tilt angles]. Most negative.
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary mid-day
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Upper (hts=4.3): [,select.t]
----

diag: ok
samples.sonic: ok
spd: ok, +/- 10 cm/s, 3t lower by 20cm/s
dir: ok, +/- 2 deg, better now with boom angles shot
w: ok, +/- 5 cm/s, 5t&6t outliers
tc: ok, +/- 0.2 degC, offsets up to 0.6 degC
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, again imaginaries
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.005 m/s degC
tc'tc': ok, +/- 0.05 degC^2

- [status](#)

[Tripods down](#)
[Steven Semmer](#) posted on Jul 27, 2008
The wide array downwind tripods were dis-assembled this morning.

[p' leak closed](#)
Steve Oncley posted on Jul 27, 2008
At my request, Steve just pinched closed the leak I added yesterday to the AHATS pressure reference system. I hadn't seen much reduction of the high frequency temperature fluctuations in the Pref signal since this leak was introduced. (Though it definitely had an affect on the low frequencies, where P and Pref were perfectly correlated.

This was done about 10:11am.

- pressure

[upwind rebuilt](#)
Steve Oncley posted on Jul 27, 2008
upwind now has the Viper board from spare and has just been restarted. Also the Ethernet cable was changed to a different port on the hub located in downwind2. We'll see whether it stays up tonight!

- data-system
- upwind

[upwind crash](#)
Steve Oncley posted on Jul 27, 2008
upwind serial boards crashed again about 9:30pm last night. I noted that there were long ping times to it, though Gordon believes that this is just a symptom of a generally sick adam. Gordon actually tried to download a fix about 11pm that ended up crashing the adam.

We drove out about 8am this morning and got it running again by cycling power.

Steve and Gordon are now configuring "spare" in preparation for swapping it with upwind.

I note that winds were too much to the south all last night, so we didn't miss much data.

- data-system

[p' reconfigure](#)
Steve Oncley posted on Jul 26, 2008
From about 1635-1735 I reconfigured pressure yet again. (See 11b signal for exact times.)

- 11b transducer removed and inserted into the CHATS system (which was buried yet again) to monitor Pref (in parallel with the Vaisala PTB220).

- a leak installed into the far end of the AHATS reservoir (black tube). About 4m of the 1/16" line is attached, mostly coiled up in the ground, but the open end is exposed.

We'll see what <this> looks like...

- pressure

[more config2 dimensions](#)
Steve Oncley posted on Jul 26, 2008
Tom asked that we measure the crosswind spacings between the Rohn towers. I think these are what he wanted:

5t 1.327m 6t 1.279m 7t

5u 1.325m 6u 1.282m 7b

11b 1.283 12b 1.283m 13b

- sonic

[config2 boom angles](#)
Steve Oncley posted on Jul 26, 2008
Steve Cohn and I just shot boom angles for config#2. A few notes:

- We were standing upwind of the sonics near the berm from about 12:00-13:30 doing this, during a period when the winds were good. A critical investigator may want to remove these data.

- Where there are 2 values, Cohn's are listed second (no reflection on him or his measurements)

- 3u and 8u are not misprints--they really did look quite different

- 5t was behind 5u's PAM mast, but I think I got a good reading by centering the visible outside of the "claws".

	b	t	u
1	134.7 134.7		
2	136.3 136.1		
3	135.3 136.1	137.3	140.3
4	136.2 136.4	136.3	136.2
5	134.8 134.7	[133.6]	136.1
6	133.9 134.1	133.3	134.1
7	135.3 135.8	135.2	134.5
8	136.4 136.8	137.5	130.4
9	134.7 135.1	136.3	132.2
10	135.4 135.2	134.9	133.1
11	137.4 136.8	136.1	134.9
12	136.5 135.8		
13	136.5 136.1		

P.S. Today (the following morning) I've entered all of the Oncley angles -131.7 degrees into each of the cal_files in boom_normal. We'll see if the wind azimuths start falling into place.

A new set of angles shot by Semmer on 7/28.

	b	cal		t	cal		u	cal		Profile		cal
1	131.7	0.0								1.5m	131.6	-0.1
2	131.1	-0.6								3.2m	132.5	0.8
3	131.8	0.1		132.4	0.7		137.4	5.7		4.2m	129.8	-1.9
4	131.5	-0.2		131.5	-0.2		132.4	0.7		5.5m	133.7	2.0
5	131.7	0.0		130.4	-1.3		133.0	1.3		7.0m	132.2	0.5
6	129.9	-1.8		130.2	-1.5		131.1	-0.6		8.0m	133.7	2.0
7	131.5	-0.2		131.5	-0.2		130.6	-1.1				
8	132.1	0.4		133.9	2.2		127.7	-4.0				
9	132.0	0.3		133.6	1.9		129.0	-2.7				
10	132.1	0.4		132.2	0.5		130.2	-1.5				
11	133.3	1.6		133.2	1.5		131.8	0.1				
12	132.3	0.6										
13	132.5	0.8										

cal: entry in calibration file = measured magnetic azimuth - 131.7

- sonic

Phase 3 configuration
Steven Semmer posted on Jul 26, 2008
The horizontal plane marks were put on the tower structures this morning.

Upwind status

Steven Semmer posted on Jul 26, 2008

After the 10:30 pm event, Upwind kept running throughout the night. Gordon had a chance to look at the log messages and thinks the problem may be with the seating of the micro-drive on the Viper board. The micro-drive was re-seated this morning.

- upwind
- data-system

swapped TRHs

Steve Oncley posted on Jul 26, 2008

To evaluate the problem with the 4m TRH, I swapped it with 5.5m between ~0915-0925. It appears that S/N 10 (the one formerly at 4m, now at 5.5m, that we swapped in as our "spare" a few days ago) has a bias. We'll leave it in this configuration, since 5.5m RH is not a critical measurement.

- trh

UPWIND status

Steven Semmer posted on Jul 25, 2008

Upwind has gone down a few times tonight. It started around 9:30pm. I did notice while monitoring the kernel log that the serial locked up after a string of error messages.

example: Jul 26 05:01:14 upwind kernel: viper_irq_handler: irq=2 spurious= 101001, #/sec=100000

The last crash occurred about 30 minutes ago. I will hang around the base for another hour or so.

- upwind
- adam

p' reconfiguration

Steve Oncley posted on Jul 25, 2008

We built a 26-liter volume out of 2 5' lengths of 4" ABS pipe, stuffed it with steel wool and buried it in the ground (after checking that there were no leaks). We disinterred the N2 cylinder. After the usual 2 hours, Pref has settled down. I <do> think the signal is better behaved than for any of the other volumes, however there still are fluctuations that are larger than the static pressure signal (by about an order of magnitude in the power spectra between 0.01 and 1.0 Hz).

I have attempted to despike the Pref signal (similar spikes don't occur on P for some reason) and "add" it back to get the "actual" pressure. This procedure undoubtedly alters the high-frequency information in the signal.

At Tom's suggestion, I also have computed a w'p' cospectrum with the resulting signal. This cospectrum looks <okay>, with a peak at 0.03 Hz for the last 30-min of data. There is some change of sign at high frequencies, indicative of a phase lag. I can mostly get rid of this by (arbitrarily) shifting the pressure data forward by 2 seconds. Again, my manipulation using Pref may be causing some of this, though there is a hint of a phase lag using the original p' signal as well.

The only explanation I can come up with is that much of the Pref fluctuations are still due to temperature changes of the 1/16" tubing. (I also am a bit concerned that the "curly" tubing on the "+" side of the ports could be filtering the real signal, but I've removed this from 6b and it agrees quite well with 7b.) Let's see: if 50 ml of tubing changes temperature by 5 degC connected to a 25 l reservoir at 300 K, the pressure change would be (1000 mb) * (5 K /300 K) * (0.05 l/25 l) = 0.03 mb. The standard deviation that I'm seeing is 0.015 mb now!

I can see 4 possible actions:

1. Keep the present configuration and hope that the tubing temperature fluctuations are not correlated with w (though other p' statistics might have errors). It would be best if we could get a better sensor (another 202BG) to monitor Pref, but our spare 202BG is now dead. (Should we sacrifice one of the 14?)
2. Treat the tubing so that the temperature changes are smaller. (This was the reason I chose clear tubing originally. Perhaps simply washing it would reduce temperature changes?) It isn't clear what else I could do (wrap it all in foil?).
3. Make an even bigger reservoir! (Home depot has lots of pipe!)
4. Rebuild the entire array with individual reservoirs. (How would they be made thermally stable? The reservoirs would have to be on the towers [and cause <more> flow distortion].)

- pressure

Daily status, July 25

Steve Oncley posted on Jul 25, 2008

AHATS daily status 7/25/08

Staff: Semmer, Oncley, Nguyen, Tudor with ISS
Temps: generally 99F/59F

I took a break in status reports since we have been working to figure
out how to get good pressure measurements. Also, ADAMs upwind, profile,
and now pressure2 have died (of course at night, in some cases after we've
gone to bed). Solutions to these problems are still progressing.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: The standard function reports 36 hours (14
unstable, 22 stable) in this configuration, with small segments the
last 2 days. However we have had some sensors and data systems down
(and still don't know about pressure measurements) so the actual
numbers would be lower.

Local data storage: (all still low)
----
upwind:/dev/sda1 57685532 6106140 51579392 11% /var/tmp/usbdisk
downwind1:/dev/sda1 57685532 8354176 49331356 14% /var/tmp/usbdisk
downwind2:/dev/sda1 57685532 9895484 47790048 17% /var/tmp/usbdisk
profile:/dev/sda1 57685532 5623556 52061976 10% /var/tmp/usbdisk
pressure1:/dev/sda1 3940812 1485784 2455028 38% /var/tmp/usbdisk
pressure2:/dev/sda1 3940812 1376288 2564524 35% /var/tmp/usbdisk

aster:/dev/sdb1 721075720 264374616 456701104 37% /media/isff2
isff:/dev/sdc1 1922890480 390811412 1434401864 22% /media/isff15

We now have a 2Tb drive for the backup! We'll send the old backup
to Boulder soon -- we'll see if Steve-Cohn-courier-service is available.]

Pressure:

(+/- = ~1 std deviation among variables at the same height)
pressure2 ADAM died last night at ~0030 local. Also, lots of playing around
with plumbing yesterday.

[redo, smaller time period]

It appears that most of the "signal" is variation of the reference pressure.
We changed its character (for the better?) by changing from the nitrogen
cylinder to the CHATS 1 liter reservoir yesterday, however there still is
too much variation. We'll try building yet another reservoir today.
p: ok, +/- 0.03 mb
p'p': ok, +/- 0.002 mb^2
w'p': ok, +/- 0.001 m/s mb
t: 6b&6t are outliers by 3degC during day, others +/- 1.5 degC
(may be orientation of sun shields?)
Pref: still steadily drifting low, though a bit of a diurnal cycle now.
(might be cooling of the reservoir)
now 14mb below ambient.

Profile: [,select.p]

Serial boards crashed 3 nights ago at ~1AM and was restarted the next morning.
Okay since then.

T: ok
RH: 4m looks different even after the sensor swap 3 days ago. We'll try
exchanging sensors between levels next.
P: okay

diag: ok
samples.sonic: ok
spd: ok?, 8m still lower than 7m sometimes.
dir: ok
w: ok
tc: ok, 8m low by ~0.3 degC? (related to the speeds being low as well?)
w'w': ok
u*: ok, lots of imaginary values with light winds
sigma_w/u*: ok (1.3 at night)
w'tc': ok
h2o: ok?, 2 g/m^3 offset from dat("Q"), except in afternoon.
w'h2o': ok, 0.03 m/s g/m^3 at midday
co2: ok, 15-20 mmol/m^3 (Large values at night except for the period
11-21 July. Does this indicate shallow stable boundary layers sometimes?
We should check ISS data.)
w'co2': ok, -0.013 m/s mmo/m^3 at midday

Upwind (hts=3.3): [,select.u]

Has crashed each of the last 3 nights at about 10pm. Didn't fix it until
the next morning on the first night. Have been able to get it running
by midnight the last 2 nights.

diag: ok
samples.sonic: ok
spd: ok, +/- 10 cm/s
dir: ok, mean offsets of up to 13deg -- need to enter new Vazimuths??
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 deg,
w'w': ok, +/- 0.005 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, again some imaginary values
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Lower (hts=3.3): [,select.b]
----

diag: ok
samples.sonic: ok
spd: ok, +/- 30 cm/s
dir: ok, +/- 3 deg
w: ok, +/- 15 cm/s [need to check tilt angles]
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary mid-day
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Upper (hts=4.3): [,select.t]
----

diag: ok
samples.sonic: ok
spd: ok, +/- 10 cm/s, 3t lower by 20cm/s
dir: ok, +/- 2 deg, 3t now outlier
w: ok, +/- 5 cm/s, 5t&6t outliers
tc: ok, +/- 0.2 degC, offsets up to 0.6 degC
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, again imaginaries
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.005 m/s degC
tc'tc': ok, +/- 0.05 degC^2

- status

  [pressure2 died]
  Steve Oncley posted on Jul 25, 2008
  Although upwind stayed up after a terrible evening, pressure2 died at midnight last night. We just restarted it. Even GPS was down, so it is as if data acquisition just stopped.

  - data-system

  [upwind really sick]
  Steve Oncley posted on Jul 25, 2008
  For the last two hours, upwind's serial board has been crashing. I've lost count of the number of adn/aups and reboots I've done. Last I checked, it stayed up for more than 3 minutes, so I'm going to bed.

  If it helps to diagnose this:

  1. The last 3 nights, these failures occurred in the 10pm-12am timeslot. sonic temps dropped from 29 to 25C during this time.

  2. I had rserial running several times during these failures. It would appear that the data rate slowed down and became erratic (like dropped samples) beginning one second to half second before the crash.

  - data-system

[yet another p' system configuration](#)
Steve Oncley posted on Jul 24, 2008
The results of this morning's tests indicate that the "medium frequency" signals we've been seeing in the pressure spectra are from the reference! This may be caused by convection in the cylinder that Jim Wilczak warned us about. Since we don't have a perfect alternative at the moment, we've just plumbed all the references to the CHATS reference. Unfortunately, we had to disinter and rebury this reference in order to connect to it.

6b and 6t are now returned to their original configurations.

This work was done between 1500-1600 local. (6t should go offline and then online [was briefly online before being in the final config]).

I'm hopeful that earlier data can be recovered using Pref, but it will take some work (including despiking Pref) to work this all out.

- [pressure](#)

[upwind power](#)
Steve Oncley posted on Jul 24, 2008
Gordon suggested that the problems with upwind might be due to power. Measuring at the power frontpanel (both inside and outside the box) I see 12.93 V, which I would say is fine. We need another explanation...

- [data-system](#)

[Towers for configuration 3](#)
Steven Semmer posted on Jul 24, 2008
The pam towers for configuration 3 are now setup. Tomorrow we will mark them for height measurents.

[p' system in test mode](#)
Steve Oncley posted on Jul 24, 2008
To diagnose our strange p' spectra problem, I've made 2 changes:

6b - the + side is now plumbed through the CHATS garden hose to the Bedard quad-disk-probe, which I've lashed to the top of the tripod in the middle pitchfork position. Good winds at this location are bit restricted due to the config#3 towers that Steve has erected, but should give us some idea. Changes done 0915-0930.

6t - I've removed this transducer and placed it inside my CHATS sensor tube which is now in buried in the ground near the middle of the horizontal array and covered with a space blanket. The + side is connected to the AHATS reference system and the - side is connected to the reference volume inside this tube. Changes done 0940-1020. Note that the AHATS reference system was open to the world a couple of times during this work.

NOTE THAT THIS DESTROYS THE AHATS p' ARRAY, since no center sensor at either height. I think these tests are worth it, though.

- [pressure](#)

[more upwind crashes](#)
Steve Oncley posted on Jul 24, 2008
Last night about 10pm, upwind's serial boards crashed again. "adn/aup" worked, but crashed again after ~10min. I "reboot"ed from the apartments and got it working. However, the usbdrive wasn't working this morning, so it probably died in the reboot. About 9:30 this morning, I cycled power on upwind and all seems well at the moment.

We would change this serial board, but it isn't clear to us which board to swap with.

- [data-system](#)

[serial board failure](#)
Steve Oncley posted on Jul 23, 2008
We lost data from the serial boards in both profile and upwind last night.

profile died at 20:20 local and upwind at 03:05. Both were restarted with "adn" and "aup" at 09:43.

Sorry it took so long to fix this.

 I guess we now should take seriously the "To Do" task of swapping profile's serial board!

- data-system

pressure puzzles
Steve Oncley posted on Jul 22, 2008
Okay, I've been looking at pressure data and I can't figure out some things:

1. The reference pressure is slowly ramping away from P. My best guess is that the soil surrounding the reservoir is actually cooling now that it has the space blanket on top of it, thus making the pressure go down. I believe that this is consistent with the sequence of operations (from Khuong) when the cylinder was reburied (hole dug Fri AM, old hold dug up Fri AM, cylinder moved to new hole Fri AM, pressure lines sealed & checked Sat AM, hole backfilled and space blanket added Sat AM). Although Pref is now 14mb lower than P, this is well within the 150mb range of the 202BGs, so I'm not excessively concerned. *We'll keep on monitoring this signal.*

2. I've now looked at selected pressure spectra from two periods, one in config#1 and one in config#2. The two periods have spectra that are quite similar to each other and the 3 sensors I've looked at also are similar to each other. However, these spectra are completely different than those seen in CHATS. CHATS p spectra followed $f^{-5/3}$ reasonably well from a peak more-or-less at 0.1Hz until a digitizing white noise floor at ~7Hz. The amplitude of the noise was about 2.5e-6 (mb^2).

Here, we are seeing a nice peak at about 0.02 Hz, but with a roll-off that goes more like $f^{-3.5}$ and thus intersects the noise floor (of about 2.5e-7 mb^2) at a frequency of only about 1Hz. It is gratifying that the noise floor is lower (given all the hard work on our counter boards), though I thought we would gain more than this factor of 3 (the square root of 2.5e-6/2.5e-7). The amplitude of the signal at 0.01 Hz is actually about the same as the CHATS cases but, with this sharper roll-off at high frequencies, there is a lot less energy at, say, 1 Hz.

I don't understand the sharper roll-off. At first, I thought that the low frequencies might be contaminated by tower wakes in our configuration #2, but I would have expected energy at high frequencies as well and I see the same roll-off in configuration #1 data. However, I can't see how filtering like f^2 (the approximate difference between -5/3 and -3.5) could be caused by a physical process (say, too small tubing). My best guess is that it is a signal processing artifact, though I can't imagine what. The cut-off frequency of such a filter would be about 0.1 Hz (10 s period).

I don't know at the moment what the calibration code is doing. Since the variables "pper" and "p" are almost perfectly correlated, I'm assuming that the temperature correction, if it is being applied, is quite small (at least at these frequencies). In any case, since this "filtering" appears in "pper", I'm assuming that it hasn't been introduced by post-processing.

Did anyone else look at pressure spectra before I arrived? If so, did you see similar behavior??

I might try changing the sample-side tubing on one of the transducers, in a long-shot attempt to figure this out, but otherwise I'm stumped.

I got the following replies from Tom and Gordon:

Steve:

Perhaps you have already considered the averaging of the counter board output. It is counting for approximately 0.1 second, which is applying a low-pass filter equal to sin❌/x where x = 2/pi*f*dt/2 and dt=0.1 sec. This does not nearly correspond to the attenuation you are seeing at high frequencies. At the Nyquist frequency, 5 Hz, the attenuation is 0.637 (0.405 for the power spectrum: a rough anti-aliasing filter) and at 1 Hz the attenuation is 0.984 (0.968).

Still not much help. It is perhaps worth noting this in the logbook for future users of the pressure data.

Tom

We can alter that averaging period. It is the NumPulses parameter in the XML, currently set to 3000 for pressures and 10,000 for temperatures.

Gordon

- pressure

sonic data issues
Steve Oncley posted on Jul 22, 2008
My status reports have noted issues with 4u and 8m.

8m: By just playing with offsets, I'm able to get better looking profiles by adding 0.3 m/s to dat("u"). As yet, I have no justification for doing this. Tom wondered about flow distortion around the etherant, but this seems only a remote possiblity after looking at it today. *The next step would be to move the etherant.*

4u: At 09:10 on 20 July, tc on this jumps by 0.25 degC. I can see no evidence of a similar step in any of the wind components. Tom confirmed that an upwind sensor might have been "bumped" by a ladder at this time, but his recollection was that it was one at the southwest end, whereas 4u would be at the northeast end. *I don't see any reason for further action with 4u.*

- sonic

[Setting up for config3](#)
Steve Oncley posted on Jul 22, 2008
Steve, Kuong, and I moved the upwind tripods from their config1 to config3 positions. During the period ~0845-0930 we walked in front of the config2 towers to avoid doubling the length of carry. Unfortunately, there were some good winds during this period. I'll reduce our unstable data inventory by about an hour when considering when to change.

- [status](#)

[Daily status, July 22](#)
Steve Oncley posted on Jul 22, 2008
AHATS daily status 7/22/08

Staff: Semmer, Oncley, Knguyen, Tudor with ISS
Temps: 92F/57F yesterday

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: Now have almost 26 hours of data (10 unstable, 16 stable)
in this configuration. We're already half way!

Local data storage: (all now quite low)
----
upwind:/dev/sda1 57685532 3898500 53787032 7% /var/tmp/usbdisk
downwind1:/dev/sda1 57685532 4346968 53338564 8% /var/tmp/usbdisk
downwind2:/dev/sda1 57685532 5086676 52598856 9% /var/tmp/usbdisk
profile:/dev/sda1 57685532 3163852 54521680 5% /var/tmp/usbdisk
pressure1:/dev/sda1 3940812 651032 3289780 17% /var/tmp/usbdisk
pressure2:/dev/sda1 3940812 645516 3295296 16% /var/tmp/usbdisk

aster:/dev/sdb1 721075720 248687612 472388108 35% /media/isff2
isff:/dev/sdb1 961432072 374897584 586534488 39% /media/isff3

replacement for isff3 should be at Hanford by now.

Pressure:

(+/- = ~1 std deviation among variables at the same height)

The spectra I looked at yesterday were strange. I have to look at more
examples to figure out what is wrong. It could simply be turbulent wakes
in this configuration.
p: ok, +/- 0.03 mb
p'p': ok, +/- 0.001 mb^2
w'p': ok, +/- 0.002 m/s mb
t: 6b&6t are outliers by 5degC during day, others +/- 1.5 degC
(may be orientation of sun shields?)
Pref: still steadily drifting low, though a bit of a diurnal cycle now.
(might be cooling of the reservoir)
now 14mb below ambient.

Profile: [,select.p]

T: ok
RH: 4m RH swapped, but left cap on! Now ok?
P: okay

diag: ok
samples.sonic: ok
spd: ok?, 8m generally lower than 7m (sensors are in correct position)
dir: ok
w: ok
tc: ok, 8m low by ~0.3 degC?
w'w': ok
u*: ok
sigma_w/u*: ok (1.3 at night)
w'tc': ok
h2o: ok?, 2 g/m^3 offset from dat("Q"), except in afternoon. (Does a light
leak help??)
w'h2o': ok, 0.03 m/s g/m^3 at midday
co2: ok, 15 mmol/m^3
w'co2': ok, -0.01 m/s mmo/m^3 at midday

Upwind (hts=3.3): [,select.u]
----

diag: ok
samples.sonic: ok
spd: ok, +/- 10 cm/s
dir: ok, mean offsets of up to 13deg -- need to enter new Vazimuths??
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 deg,
w'w': ok, +/- 0.005 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 3 cm/s, imaginary during light winds this afternoon
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.01 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Lower (hts=3.3): [,select.b]
----

diag: ok
samples.sonic: ok
spd: ok, +/- 30 cm/s
dir: ok, +/- 3 deg
w: ok, +/- 15 cm/s [need to check tilt angles]
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, some imaginary mid-day
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Upper (hts=4.3): [,select.t]
----

diag: ok
samples.sonic: ok
spd: ok, +/- 10 cm/s, 3t lower by 20cm/s
dir: ok, +/- 2 deg, 3t now outlier
w: ok, +/- 5 cm/s, 5t&6t outliers
tc: ok, +/- 0.2 degC, offsets up to 0.6 degC
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s, again imaginaries
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.005 m/s degC
tc'tc': ok, +/- 0.05 degC^2

- status

[profile sonics correctly set](#)
Steve Oncley posted on Jul 22, 2008
To check the 8m speeds being low, we checked the physical serial numbers on the tower. They are:

Height (m)	S/N
8	733
7	720
5.5	537
4	740
3	739
1.5	732

These are exactly as recorded in the file sonics/sonic.configs.

- sonic

[4m TRH changed on profile](#)

Steven Semmer posted on Jul 22, 2008
The 4m TRH, on profile, was replaced this morning. The RH of sensor 8 was ready a little low compared to the other TRHs. Sensor 8 was replaced with sensor 10.

UPDATE: It appears the protective cover was left on the sensor. The humidity is ready too high! It was removed at about 14:00. However, the RH from this position is still a bit low!

- trh

shortcuts
Steve Oncley posted on Jul 21, 2008
I've just added a few commands/aliases to make my life easier:

sshp, sshd1, sshd2, sshu, sshp1, sshp1 all ssh to the various adams

ds is data_stats (on aster)

rs is the shortcut rs that Gordon had on the adams, with a required second argument of the adam name

lsu does "df | grep usb" on all of the adams and lists aster's usb disk as well

My daily status is in $ISFF/projects/AHATS/logbook/template.

A list of S+ commands used to generate the daily status is in $ISFF/projects/AHATS/S/daily.qq.

- adam

Daily status, July 21
Steve Oncley posted on Jul 21, 2008
AHATS daily status 7/21/08

Staff: Semmer, Oncley, Knguyen, Tudor with ISS
Horst has just left for a well-deserved break...
Max temp: only 89F and min 59F yesterday! (with broken clouds)

- An extension of AHATS operations for 6 additional days has been approved.
- As of 16:00 yesterday afternoon, we are now in configuration #2.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: Winds turned perfect at 10pm last night, so we now
are in a 13-hour period of good data (obviously both stable and unstable).

Local data storage: (all now quite low)
----
root@upwind root# df | grep usb
/dev/sda1   57685532   2453532 55232000   4% /var/tmp/usbdisk
root@downwind1 root# df | grep usb
/dev/sda1   57685532   2745012 54940520   5% /var/tmp/usbdisk
root@downwind2 root# df | grep usb
/dev/sda1   57685532   3164908 54520624   5% /var/tmp/usbdisk
root@profile root# df | grep usb
/dev/sda1   57685532   2109752 55575780   4% /var/tmp/usbdisk
root@pressure1 root# df | grep usb
/dev/sda1   3940812   317660   3623152   8% /var/tmp/usbdisk
root@pressure2 root# df | grep usb
/dev/sda1   3940812   312264   3628548   8% /var/tmp/usbdisk
aster: df | grep isff2
/dev/sdb1   721075720 242010508 479065212 34% /media/isff2
isff: df | grep isff3
/dev/sdb1   961432072 367926356 593505716 39% /media/isff3

Pressure:

Has been running since late 19 Jul. when set into configuration #2
(+/- = ~1 std deviation among variables at the same height)

9t connector in box loosened -- fixed yesterday afternoon,
p: ok, +/- 0.03 mb
p'p': ok, +/- 0.001 mb^2
w'p': ok, +/- 0.002 m/s mb
t: 6b&6t are outliers by 5degC now, others +/- 1.5 degC
Pref: now steadily drifting low -- might be cooling of the reservoir
(which was reburied Sat morning -- 2 days ago), but looks strange.
now 11mb below ambient.

Profile: [,select.p]

Has been running since late 18 Jul. when set into configuration #2

diag: ok, recent spikes on 13b when Y-cable added to 3m profile
samples.sonic: ok
T: ok
RH: 4m is low by up to 2% RH -- we'll swap in a spare
P: okay

spd: ok?, 8m generally lower than 7m
dir: ok
w: ok
tc: ok, 8m low by ~0.3 degC?
w'w': ok
u*: ok
sigma_w/u*: ok (1.3 at night)
w'tc': ok
h2o: now okay after swapping Li7500s, offset of ~1.3 from dat("Q")
w'h2o': ok, 0.02 m/s g/m^3 at midday
co2: ok, 15 mmol/m^3
w'co2': ok, -0.01 m/s mmo/m^3 at midday

Upwind (hts=3.3): [,select.u]

Has been running since late 18 Jul. when set into configuration #2

Sonics were moved in height yesterday morning.
diag: ok, spikes during move
samples.sonic: ok, drops during move
spd: ok, +/- 10 cm/s, suggestion of systematic differences
dir: ok, mean offsets of up to 13deg -- need to enter new Vazimuths??
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 deg, 4u changed offset by ~0.3degC since move -- perhaps
it got bumped?
w'w': ok, +/- 0.005 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 3 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.01 m/s degC, again systematic??
tc'tc': ok, +/- 0.05 degC^2, again systematic??

Downwind Lower (hts=3.3): [,select.b]

Has been running since mid 20 Jul. when set into configuration #2

diag: ok
samples.sonic: ok
spd: ok, +/- 30 cm/s
dir: ok, +/- 3 deg, offsets now smaller than config #1??
w: ok, +/- 15 cm/s, now larger deviations and systematic negative bias,
consistent with being on horizontal array now, droop ~2 deg
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Upper (hts=4.3): [,select.t]

Has been running since mid 19 Jul. when set into configuration #2

diag: ok
samples.sonic: ok
spd: ok, +/- 10 cm/s
dir: ok, +/- 2 deg; more consistent now that on the horiz array, 6t at one
extreme
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.005 m/s degC
tc'tc': ok, +/- 0.05 degC^2

[Li7500 on profile replaced](#)
Steve Oncley posted on Jul 21, 2008
We just swapped Li7500s with our spare (1164) and data are now coming in. This unit is just sitting on the ground at the moment. We will move it up soon.

The old unit (1167) was burning ADAM front panel fuses.

P.S. Steve S. mounted it at about 11:30am.

P.P.S. In the trailer, 1167 works fine. Perhaps the whole problem is just the ADAM fuse -- it should be 3A since the Li7500 is supposed to go up to 30W during start-up. We'll check what is in there now.

P.P.P.S! The h2o values appeared high for the first couple of hours, but by about 13:00 they agreed within 0.5 g/m3 of dat("Q"). Assume that co2 is off for the first 2 hours as well.

- li7500

[Fixed 9t pressure at 1600 PDT, July 20](#)
Tom Horst posted on Jul 21, 2008
After the reconfiguration, pressure 9t was bad. Steve fixed the serial input cable for 9t in pressure 2 to make better contact with the RJ45 connector. This was completed around 16:00 PDT, July 20.

[Used a serial y cable for 3m profile, 13b sonics](#)
Tom Horst posted on Jul 21, 2008
The 3m profile sonic is doing double duty as a profile sonic and also sonic 13b in the horizontal array. Steve made a y cable to connect this sonic to both profile S2 and downwind2 S10.

11/23/09, TWH: It appears from the 5-minute covars that the connection of the 3m profile sonic to Serial channel 10 on the downwind2 adam was made around 09:30 on July 21.

- sonic

[Replaced sonic 2b (SN 1117) with 13b (SN 0741).](#)
Tom Horst posted on Jul 21, 2008
After the reconfiguration, sonic 2b (s/n 1117) would not start operating. We replaced it with the sonic previously used at 13b (s/n) 0741. For configurations 2 and 3 we are using a matching sonic from the profile tower for sonic 13b, i.e. the 3m and 7m sonics.

- sonic

[Configuration 2 Sonic configs](#)
Tom Horst posted on Jul 21, 2008
Upwind S1: (3u)
EEProm_sig=05088. Prom_sig=17263. \n>??D\r\nET= 60 ts=i XD=d GN=322a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=cdb d TNb=cbb JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0539 06nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=05088 &=1

Upwind S2: (4u)
ET= 60 ts=i XD=d GN=122a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=cbb d TNb=dbc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-
2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0536 06nov07
JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=40143 &=1 os=

Upwind S5: (5u)
EEProm_sig=06092. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=abc d TNb=dbb JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0677 30oct07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=06092 &=1

Upwind S6: (6u)
EEProm_sig=60317. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=223a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 009 ELb=009 009 010
TNo=8dd d TNb=7dc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 7 tlb=7 7 8 CA=1 TD= duty=092 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0674 09nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=60317 &=1

Upwind S7: (7u)
ET= 60 ts=i XD=d GN=332a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=98b d TNb=b9c JD= 007\r\nC0o=-2-2-2 C0b=-2-2-
2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=096 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1119 19nov07
JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=59940 &=1 os=

Upwind S8: (8u)
EEProm_sig=59504. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=334a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=009 010 010 ELb=009 010 009
TNo=ddb d TNb=dcc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=7 8 8 tlb=7 8 7 CA=1 TD= duty=092 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0673 13nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=59504 &=1

Upwind S9: (9u)
EEProm_sig=52525. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=8c7 d TNb=8c6 JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1121 26jun06 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=52525 &=1 o

Upwind S10 (10u)
EEProm_sig=59030. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=111a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=ccd d TNb=cdc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1123 06nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=59030 &=1

Upwind S11 (11u)
EEProm_sig=29356. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=232a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 011 010 ELb=010 011 010
TNo=b7b d TNb=baa JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 9 8 tlb=8 9 8 CA=1 TD= duty=096 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1122 19jun06 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=29356 &=1

Downwind1 S1 (1b)
ET= 60 ts=i XD=d GN=122a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=cbc d TNb=bbb JD= 007\r\nC0o=-2-2-2 C0b=-2-2-
2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0853 12jun08
JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=20347 &=1

Downwind1 S2 (2b)
ET= 60 ts=i XD=d GN=122a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=008 010 010 ELb=010 010 008 TNo=dca d TNb=dab JD= 007\r\nC0o=-2-2-2 C0b=-2-2-
2 RC=0 tlo=6 8 8 tlb=8 8 6 CA=1 TD= duty=091 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0741 31oct07
JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=04641 &=1

Downwind1 S5 (3b)
EEProm_sig=22282. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=211a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 011 ELb=010 010 008
TNo=cdd d TNb=ddc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 9 tlb=8 8 6 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0800 14sep06 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=22282 &=1

Downwind1 S6 (4b)
EEProm_sig=10244. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=212a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=008 010 010 ELb=010 010 010
TNo=deb d TNb=edc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=6 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0744 07nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=10244 &=1

Downwind1 S7 (5b)
EEProm_sig=46481. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=211a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=cce d TNb=ccd JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0745 05nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=46481 &=1

Downwind1 S8 (6b)
EEProm_sig=28394. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=433a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=acb d TNb=bcb JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=096   AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0376 09nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=28394 &=1

Downwind1 S9 (3t)
ET= 60 ts=i XD=d GN=333a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d sa=1\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=ced d TNb=dec JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8
tlb=8 8 8 DTR=01740 CA=1 TD= duty=087   AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 DTC=01160 RD=o ss=1 XP=2 RF=018 DS=007
SN0738 28mar03 HF=005 JC=3 CB=3 MD=5 DF=05000 RNA=1 rev 3.0a cs=18961 &=1

Downwind1 S10 (4t)
EEProm_sig=30038. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=320a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=9ba d TNb=9ab JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0856 14nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=30038 &=1

Downwind1 S11 (5t)
EEProm_sig=07083. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=422a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=7b9 d TNb=8aa JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0712 08nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=07083 &=1

Downwind1 S12 (6t)
EEProm_sig=62873. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=434a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=009 010 009 ELb=009 010 009
TNo=899 d TNb=999 JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=7 8 7 tlb=7 8 7 CA=1 TD= duty=091 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0672 14nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=62873 &=1

Downwind2 S1 (7b)
EEProm_sig=49554. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=232a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 009 010 ELb=010 009 010
TNo=ccb d TNb=bbc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 7 8 tlb=8 7 8 CA=1 TD= duty=092 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0671 31oct07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=49554 &=1

Downwind2 S2 (8b)
ET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d sa=1\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=cdc d TNb=cdb JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8
tlb=8 8 8 DTR=01740 CA=1 TD= duty=086   AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 DTC=01160 RD=o ss=1 XP=2 RF=018 DS=007
SN0364 27may04 HF=005 JC=3 CB=3 MD=5 DF=05000 RNA=1 rev 3.0a cs=14725 &=1

Downwind2 S5 (9b)
EEProm_sig=21246. Prom_sig=17263. \n>D\r\nET= 60 ts=i XD=d GN=512a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=007 010 010 ELb=010 010 010
TNo=5cd d TNb=5cc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=5 8 8 tlb=8 8 8 CA=1 TD= duty=091 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0743 07nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=21246 &=1

Downwind2 S6 (10b)
EEProm_sig=27043. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=add d TNb=cbd JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0538 02aug06 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=27043 &=1

Downwind2 S7 dead

Downwind2 S8 (11b)
EEProm_sig=47381. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=221a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 011 010 ELb=011 010 010
TNo=dac d TNb=dac JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 9 8 tlb=9 8 8 CA=1 TD= duty=096 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0855 01nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=47381 &=1

Downwind2 S9 (12b)
EProm_sig=60173. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=223a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=bbc d TNb=bbc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0377 12jan07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=60173 &=1

Downwind2 S10 (13b)
Should be Profile 3m

Downwind2 S11 (7t)
EEProm_sig=38472. Prom_sig=17263. \n>??D\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=acb d TNb=bab JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=\r1 XP=2 RF=018 DS=007 SN0540 14nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=38472 &=1

Downwind2 S12 (8t)
EEProm_sig=38141. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=232a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=ccd d TNb=dcb JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0378 01nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=38141

Downwind2 S13 (9t)
EEProm_sig=29072. Prom_sig=47942. \n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d sa=1\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=bbd d TNb=bad JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 DTR=01740 CA=1 TD= duty=086   AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 DTC=01160 RD=o ss=1 XP=2 RF=018 DS=007 SN0367 28may04 HF=005 JC=3 CB=3 MD=5 DF=05000 RNA=1 rev 3.0a cs=29072 &=1

Downwind2 S14 dead

Downwind2 S15 (10t)
EEProm_sig=27999. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=009 010 010 TNo=ded d TNb=eec JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=7 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0366 05nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=27999 &=1

Downwind2 S16 (11t)
EEProm_sig=51601. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=223a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=dbc d TNb=bbb JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0247 20oct06 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=51601 &=1

- sonic

pressure port orientation
Gordon Maclean posted on Jul 21, 2008
Tom said to note that, upon tear-down of configuration #1 (wide array), the pressure ports appeared to swivel a bit on the 1/4" bolt securing them to the booms. Thus, the separation vector between the ports and sonic arrays could be different. The bolts were tightened by inserting a washer in configuration #2.

(comment entered by Steve Oncley, but page was logged in as Gordon -- now I know better...)

- pressure

Configuration 2 Dimensions
Tom Horst posted on Jul 20, 2008
Reference height for Configuration 2 is 1.76m above ground level, measured at NE tower of horizontal array.

Top of sonic boom = 1.91m above reference; note sonic is 5.3 cm above top of boom, so actual sonic height is 1.76+1.91+0.053 = 3.72m (and 4.72m).

 Sonic 12b is 1.92m above reference.

Moved 5.5m sonic and SHT up to make way for raising 3m and 4m sonics. The heights are now 3.99m above reference for the sonic (= 5.80m actual) and 4.43 m for the SHT (=1.76+4.43-0.37 = 5.82m actual).

 Moved 3m and 4m profile sensors up to match the horizontal array. The '3m' heights are 1.96m above reference for the sonic and 2.36m for the SHT. Actual heights are 3.77 for the sonic and 3.75 for the SHT. The '4m' heights are now 2.90m for the sonic and 3.33m above reference for the SHT. Actual heights are 4.71m for the sonic and 4.72m for the SHT.

nominal height	sonic*	+1.76+0.053	SHT*	+1.76-0.37
3m	1.96m	3.77m	2.36m	3.75m
4m	2.90m	4.71m	3.33m	4.72m
5.5m	3.99m	5.80m	4.43m	5.82m

UPDATE: Distance to top of berm at bearing of 131deg from center of 7u mast is 26.70m.

TODO: Also need spacings between sonics on Roan towers and sonics on horizontal array. Tom placed the yokes on the horizontal array at intervals of 1.29m.

Spacings of upwind masts are:

	position (m)	difference (m)
3u	0.10	-

4u	1.42	1.32
5u	2.71	1.29
6u	3.98	1.27
7u	5.30	1.32
8u	6.60	1.30
9u	7.87	1.27
10u	9.19	1.32
11u	10.43	1.24

(I'll double-check this last spacing later.)

- sonic
- sht

Daily status, July 19

Tom Horst posted on Jul 19, 2008
AHATS daily status 7/19/08

Staff: Semmer, Horst, McIntyre, Khoung

For more details, see the ahats logbook at
https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: From July 11, 12:00, through July 18, 05:55, we have
had 75.92 hours or 51% good wind directions with continuous periods
of at least 25 minutes. This includes 53.92 hours stable data and
22 hours unstable

- status

Stopped adams for reconfiguration

Tom Horst posted on Jul 18, 2008
Stopped adams this morning around 5:55 am PDT, July 18, in order to change array to the second configuration.

- data-system

GPIO boards in pressure systems

Gordon Maclean posted on Jul 17, 2008
These are the serial numbers of the Diamond GPIO-MM-12 cards used in each pressure system, along with the clock rates that were determined for each card. Following the tables is a discussion of the clock rate calibration procedure. Plots of the clock calibrations are viewable as attachments, under the **Tools** menu.

Pressure1

board	SN	corrected clock rate (Hz)
0	302859	20,000,292.73
1	302828	20,000,450.67
2	302832	20,000,284.66
3	302871	20,000,072.66
4	302835	20,000,242.86

Pressure2

board	SN	corrected clock rate (Hz)
0	302821	20,000,314.13
1	302829	20,000,364.39
2	302826	20,000,354.37
3	302874	20,000,342.21
4	302842	20,000,346.47

GPIO-MM Clock Calibrations

Prior to AHATS, a calibration of the 20 MHz clocks on each of the diamond GPIO-MM-12 cards was performed using the rubidium referenced signal generator in the NCAR EOL sounding lab.

The reference frequency was stepped in 10 KHz increments from 110 to 300 KHz approximately every 10 seconds. The GPIO cards were configured to count the number of tics from the onboard 20 MHz clock while counting 10,000 cycles of the reference input, which is the same manner that the frequencies of the ParoScientific temperature transducers are sampled. These counts are repeated every 0.1 seconds. The resulting frequency measurements were then compared against the reference frequencies.

See the attachments to this blog for plots of the calibrations.

The upper left plot shows the linear relation between the mean error in the frequency measurement and the reference frequency.

The slope of the least squares linear fit to the data is a correction for the 20 MHz clock on the GPIO-MM:

corrected clock frequency = 20 MHz / (1 + slope)

The upper right plot is the measurement error after applying the corrected 20MHz clock rate to the data.

Lower left is a plot of various measurement errors. The top black points are the frequency discretizaion due to a difference of one 20 MHz clock tic. As you can see, below a 200 KHz input frequency the resolution is better than 1 part in 10^6, which is the target accuracy for sampling the ParoScientific 202BGs. The temperature signal from a 202BG is around 170 KHz and the pressure signal is around 40 KHz, so a 20 MHz clock is able to provide this accuracy.

*max(abs(fcor-fref))*is the maximum absolute difference of the measured, clock corrected frequency from the reference frequency for the 100-300 samples at each reference frequency. This maximum error seen in the test stayed below the $1{:}10^6$line except for some points at frequencies over 200 KHz. Board 3 in pressure2 was the exception and did have some points over the line. We should repeat the calibration after the project.

The maximum error also generally stayed below the frequency discretization level, suggesting that after the clock is corrected, almost all of the remaining error is due to the discretization. Boards 1,2 and 3 however do show some errors above the discretization level.

mean(fcor-fref) are the mean measurement error points at each frequency.

The lower right plot shows the number of samples at each frequency. The tests were sometimes performed more than once, or with more than one input pulse counter, hence we usually have more than the 100 samples expected over 10 seconds.

The effect of temperature on the on-board 20 MHz clock is not known.

- pressure
- data-system

[Daily status, July 16](#)
Tom Horst posted on Jul 16, 2008
AHATS daily status 7/16/08

Staff: Semmer, Horst, McIntyre, Khoung

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: From July 11, 12:00, through July 16, 12:00, we have
had 61.08 hours or 51% good wind directions with continuous periods
of at least 25 minutes. This includes 43.33 hours stable data and
16.92 hours unstable. Note that more than half of the stable data
is weakly stable, 0 < z/L < 0.1. With the exception of this near-neutral
data, the balance between stable and unstable is more closely balanced
than the numbers suggest.

Local data storage:

```
root@upwind root# df | grep usb
/dev/sda1       57685532  2377044  55308488   4% /var/tmp/usbdisk
root@downwind1 root# df | grep usb
/dev/sda1       57685532  2878296  54807236   5% /var/tmp/usbdisk
root@downwind2 root# df | grep usb
/dev/sda1       57685532  3114884  54570648   5% /var/tmp/usbdisk
root@profile root# df | grep usb
/dev/sda1       57685532  1951096  55734436   3% /var/tmp/usbdisk
root@pressure1 root# df | grep usb
/dev/sda1        3897204   630656   3266548  16% /var/tmp/usbdisk
root@pressure2 root# df | grep usb
/dev/sda1        3940812   630240   3310572  16% /var/tmp/usbdisk
```

Pressure:

(+/- = ~1 std deviation among variables at the same height)

p: ok, +/- 0.02 mb
p'p': ok, +/- 0.002 mb^2
w'p': ok, +/- 0.002 m/s mb
t: ok, +/- 0.3 degC
Pref: ok, range = +/- 2 mb, with a period of ~24 hours

Profile:
----

h2o: ok, 13 gm/kg
w'h2o': ok, 0.02 m/s g/m^3 at midday
co2: ok, 15 mmol/m^3
w'co2': ok, -0.01 m/s mmo/m^3 at midday

- status

[ASTER rebooted](#)
Tom Horst posted on Jul 16, 2008
ASTER and ISFF were stopped and rebooted around 12:30 PDT, July 16, to move power to two new UPS's.

- data-system

[Daily status, July 15](#)
Tom Horst posted on Jul 15, 2008
AHATS daily status 7/15/08

Staff: Semmer, Horst, McIntyre, Khoung

For more details, see the ahats logbook at
https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: From July 11, 12:00, until July 15, 12:00, we have had 43.7 hours or 46% good wind directions with continuous periods of at least 25 minutes. This includes 32.67 hours stable data and 10.08 hours unstable.
Local data storage:

Swapped all local data storage media yesterday.

Pressure:

(+/- = ~1 std deviation among variables at the same height)

p: ok, +/- 0.02 mb
p'p': ok, +/- 0.002 mb^2
w'p': ok, +/- 0.004 m/s mb
t: ok, +/- 0.3 degC
Pref: ok, range = +/- 2 mb

Profile:
----

diag: ok
samples.sonic: ok
spd: ok
dir: ok
w: ok
tc: ok
w'w': ok
u*: ok
sigma_w/u*: ok (1.3 at night)
w'tc': ok
T: ok
RH: 4m may be low by on the order of 1% RH
P: okay

Upwind (hts=3.3):
----

diag: ok
samples.sonic: ok
spd: ok, +/- 14 cm/s (6u has +15 cm/s offset in u)
dir: ok, +/- 3 deg
w: ok, +/- 7 cm/s
tc: ok, +/- 0.17 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Downwind Lower (hts=3.3):
----

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s
dir: ok, +/- 6 deg
w: ok, +/- 6 cm/s
tc: ok, +/- 0.25 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 3 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.08 degC^2

Downwind Upper (hts=4.3):
----

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg; 6t is about 6.5 degrees off from profile sonic
w: ok, +/- 6 cm/s
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 3 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.07 degC^2

- status

Daily status, July 14
Tom Horst posted on Jul 14, 2008
AHATS daily status 7/14/08

Staff: Semmer, Horst, McIntyre, Khoung

Summary: Max temperature yesterday at z=1.5m, 97 degF.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: From July 11, 12:00, until July 14, 12:00, we have
had 33.5 hours or 47% good wind directions with continuous periods
of at least 25 minutes. This includes 24.75 hours stable data and
8.17 hours unstable.

Local data storage:

Swapped all local data storage media today.

Pressure:

(+/- = ~1 std deviation among variables at the same height)

p: ok, +/- 0.02 mb
p'p': ok, +/- 0.002 mb^2
w'p': ok, +/- 0.004 m/s mb
t: ok, +/- 0.3 degC
Pref: ok, range = +/- 2 mb

- status

[USBdisk swap](#)
Steven Semmer posted on Jul 14, 2008
The usbdisks at profile, downwind1, pressure1, and pressure2 were swapped at ~12:00 local. Will do downwind2 and upwind after lunch.

Downwidn1 and upwind swap at ~ 16:15.

[ASTER rebooted](#)
Tom Horst posted on Jul 14, 2008
Steve bumped the switch on the power strip used for the computers and hard disks around 7:26 am, July 14, causing the isff2 and isff3 to stop archiving data. We rebooted aster around 9:57 am.

- data-system

[Ambient pressure change](#)
Steven Semmer posted on Jul 13, 2008
The output message from the ambient pressure was changed to 3 decimal places like the pressure reference. This occurred at 15:20 local time.

- pressure

[Daily status, July 13](#)
Tom Horst posted on Jul 13, 2008
AHATS daily status 7/13/08

Staff: Semmer, Horst, McIntyre

Summary: Max temperature yesterday at z=1.5m, 98 degF; seems even cooler today.

<w'p'> is max around 14:00 PDT at about -0.015 m/s mb; much smaller at night.
<u'p'> and <v'p'> (in sonic coordinates) have comparable magnitudes.
d<w'p'>/dz max is about -0.005 mb/s

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: From July 11, 12:00, until July 13, 12:00, we have
had 25.17 hours or 52% good wind directions with continuous periods
of at least 25 minutes. This includes 18.75 hours stable data and
6.08 hours unstable. The past 24 hours has had a good run of proper
wind directions.

Local data storage:

Swapped all local data storage media yesterday.

Pressure:

Note that dat("p") + dat("Pref") - dat("P") ~ 0.1 mb.

This is on the order of the absolute accuracy of the Vaisala barometers.
I would have expected this difference to be negative and correlated with
wind speed^2 to reflect the residual dynamic pressure errors of the
PAM pressure port. However the difference is the wrong sign and is not
correlated with wind speed. Apparently this is the combined offset
errors in the two Vaisala barometers.

(+/- = ~1 std deviation relative to others)
p: ok, +/- 0.02 mb
p'p': ok, +/- 0.002 mb^2
w'p': ok, +/- 0.003 m/s mb
t: ok, +/- 0.3 degC
Pref: ok, range = +/- 2 mb

- status

Repositioned downwind1 gps antenna
Tom Horst posted on Jul 13, 2008
I repositioned the downwind1 gps antenna around 11:30 am, July 13. I moved it from the top of the adam, where it was under one of the horizontal braces
of the PAM tripod, to the top of the brace near the gps antenna for pressure1.

- gps

Antenna Change
Steven Semmer posted on Jul 13, 2008
Wireless communication has not been good since the switch to the AP24. So we have changed back to the 180 antenna and will see if things improve.
There has been an improvement in the SNR since the antenna cable length was reduced.

Pressure reference change
Steven Semmer posted on Jul 13, 2008
The output format of the pressure sensor attached to the pressure reference tank was changed to 1/1000. Also the running average was changed to 30
seconds to provide better resolution. The output rate was left at 1 second.

UPDATE: The averaging was set back to 1 second since we can average the data in post processing.

- pressure

AP24 power reduction
Steven Semmer posted on Jul 13, 2008
Tom noticed we had noisy data throughout the night, so I reduced the tx-power of the AP24 from 25 to 20. Based on data_stats the noise has gone away.
This dropped the SNR from high 40s to 40. Will monitor.

- network

USBdisk swap
Steven Semmer posted on Jul 12, 2008
Due to the on/off wireless today we decide to download the local storage after the AP24 system was back up. All ADAMS had their disks swapped.

- data-system

Etherant status
Steven Semmer posted on Jul 12, 2008
Due to the wireless outages we decided to move the .14 network to the AP24 internal antenna. This took place over the course of today. Since the mast
had to lowered , wires run, changes to the Ap24 firmware, etc. As a result the SNR from downdwind2 and profile has almost doubled. The tx-power ion the
internal was set to 25, gain to 0.

A backup configuration for the previous configuration and the new one were created. They can be found in the AP24 directory file.

Alico-11072008-2300.backup (old)

Alico-12072008-2252.backup (new)

network address for AP24:

internal: 192.168.14..251

external 192.168.12.251

- network

Daily status, July 12
Tom Horst posted on Jul 12, 2008
AHATS daily status 7/12/08

Staff: Semmer, Horst, McIntyre

Summary: Max temperature yesterday at z=1.5m, 100 degF.

Fast pressure has been working since 12:00 7/11...start of good operations.

I have inventoried the HATS data to estimate how many hours of good wind
direction are required to obtain a comparable amount of good data for AHATS.
HATS had 4.2 - 7.4 hours of analyzable data per configuration for a total
of 22 hours. HATS has 175 hours of periods at least 25 minutes long with
wind directions within +/- 30 deg of normal to the array. Thus we would
like to have 40-45 hours of good wind directions prior to changing from
one configuration to the other. If we get good wind directions 30% of
the time, this will require 6 days per configuration. Starting July 11
at 12:00, we have 29.75 days prior to tear-down on the morning of
August 10, minus 3.5 days for reconfigurations or 26.25 days of data
collection.

For more details, see the ahats logbook at
https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: From July 11, 12:00, until July 12, 12:00, we have
had 9.75 hours or 40.6% good wind directions with continuous periods
of at least 25 minutes. This includes 6.75 hours stable data and
2.92 hours unstable.

Local data storage:

Swapped all local data storage media yesterday.

Pressure:

Note that dat("p") = dat("P") - dat("Pref"), but that was probably also
true before we sealed the reference side.

(+/- = ~1 std deviation)
p: ok, +/- 0.03 mb
t: ok, +/- 0.4 degC
Pref: ok, range = +/- 1 mb

Profile:

Brief data losses around 23:00, July 10, and 07:00, July 12
(Why weren't all the RF losses on July 10 recovered from local data storage?)

diag: ok
samples.sonic: ok, see above
spd: ok
  ** neutral profiles have an increased gradient above 4m that is possibly
  ** an internal boundary layer caused by the upwind check dam
dir: ok
w: ok
tc: ok
w'w': ok
u*: ok
sigma_w/u*: ok (1.3 at night)
w'tc': ok
T: ok
RH: 4m may be low by less than 1% RH
P: okay

Upwind (hts=3.5):

See Profile for data loses

diag: ok
samples.sonic: ok, see above for data losses
spd: ok, +/- 14 cm/s (6u has +15 cm/s offset in u)
dir: ok, +/- 3 deg
w: ok, +/- 5 cm/s
tc: ok, +/- 0.16 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Lower (hts=3):

See Profile for data loses

diag: ok
samples.sonic: ok, see above for data losses
spd: ok, +/- 20 cm/s
dir: ok, +/- 6 deg
w: ok, +/- 5 cm/s
tc: ok, +/- 0.25 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 3 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.08 degC^2

Upper (hts=4):

See Profile for data loses

diag: ok
samples.sonic: ok, see above for data losses
spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg; 6t is about 6.5 degrees off from profile sonic
w: ok, +/- 6 cm/s
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 3 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.07 degC ^2

- status

[Daily status, July 11](#)
Tom Horst posted on Jul 11, 2008
AHATS daily status 7/11/08

Staff: Semmer, Horst, McIntyre

Summary:

Max temperature yesterday at z=1.5m, 113 degF!

Steve finished putting cable ties on all the pressure line junctions
this morning at 10:30 am. The system passed an over-pressure leakdown
test. Woo Hoo! At 12:00 (noon) he connected the pressure system
to the reference volume.

The wireless connection between the array and the base was down from
23:10, July 10, until 07:15, July 11.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: Because of the extended wireless outages, we need
to merge the local data storage and rerun covars before I can make a
good assessment

Local data storage:

Swapped all local data storage media today.

- status

USBdisk swap
Steven Semmer posted on Jul 11, 2008
Local data storage from each ADAM was downloaded this morning.

Good data from SGS HATS
Tom Horst posted on Jul 11, 2008
I inventoried (Splus function 'inventory()' in SGS/S directory) the good data statistics from SGS/HATS for the four configurations, running good.dir (min. period=25*60).

Config	Days	good.dir (hrs)	good.wx (hrs)	percent
1	7.6	55.2	7.4	13.4
2	6.1	36.2	4.2	11.5
3	8.8	46.8	5.1	10.9
4	5.6	36.4	5.3	14.6
Total	28	175	22	12.6

good.dir are periods with continuous wind direction within 30 deg of normal to array

good.wx are periods selected for analysis on the basis of stationarity

percent is good.wx/good.dir*100

- data

Sealed pressure lines
Tom Horst posted on Jul 11, 2008
Steve completed sealing the fast pressure lines July 11 at 10:30 am PDT. He used teeny cable ties on all the junctions.   The system passed an over-pressure leakdown test by maintaining a constant pressure.

A separate test was done on the reference tank. It also had a leak at the junction to the tank. This was fixed at 12:00 noon.

- pressure

etherants down again
Gordon Maclean posted on Jul 11, 2008
eantG and H have died the past two evenings. Here are the log entries from ap24eth. The later ones without a date are for Jul 11. Times in UTC.

On the night of Jul 10 is the first time I've noticed that a radio reconnects after being disconnected due to extensive data loss. There is one instance, Jul 10 02:40:36, where the sodar antenna, eantI is disconnected, but then reconnects. In general the sodar antenna has stayed up. It is up now.

My guess is that we are being hit with interference, and that eantG and H are hardest hit because they are transmitting constantly. Using a narrower beam patch antenna rather than the 180-degreen antenna is probably a good idea. We could use the ap24 internal patch antenna.

```
:24:7F is eantG (profile)
:24:85 is eantH (downwind2)
:24:56 is eantI (sodar)

jul/10 02:37:11 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: connected
jul/10 02:40:24 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: disconnected, extensive data loss
jul/10 02:40:36 wireless,info 00:20:F6:05:24:56@wlan2-Ext-Ant: disconnected, extensive data loss
jul/10 02:40:52 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, extensive data loss
jul/10 02:41:08 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: connected
jul/10 02:41:20 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: connected

jul/10 03:05:03 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: connected
jul/10 03:06:39 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: disconnected, extensive data loss
jul/10 03:06:47 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, extensive data loss
jul/10 04:07:35 wireless,info 00:20:F6:05:24:56@wlan2-Ext-Ant: disconnected, reassociating
jul/10 04:07:35 wireless,info 00:20:F6:05:24:56@wlan2-Ext-Ant: connected

00:00:02 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: connected
00:01:38 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, extensive data loss
00:01:40 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: connected
00:01:41 wireless,info 00:20:F6:05:24:56@wlan2-Ext-Ant: disconnected, reassociating
00:01:41 wireless,info 00:20:F6:05:24:56@wlan2-Ext-Ant: connected
00:05:56 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: disconnected, extensive data loss
00:05:57 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: connected
00:06:16 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, reassociating

06:07:03 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: disconnected, extensive data loss
06:15:56 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, extensive dat loss
06:15:57 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: connected
06:17:32 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, extensive data loss
```

- network

More leaks

Steven Semmer posted on Jul 10, 2008

A pressure check was done after modifying 4 sensors. There was improvement but the leak still existed. Decided to go back to square one by checking the Vaisala line. It was ok. Leakage started as soon as we added the first "T" junction. Further tests showed that the leak could be stopped by adding panduit ties at each junction (3 ties per T). This requires very small ties so an order to Digikey was placed. Should have the ties by tomorrow noon.

- pressure

Pressure1 down

Steven Semmer posted on Jul 10, 2008

After getting the wireless link from downwind2 and profile going this morning we did not realize that pressure1 was also down. It was restarted late this afternoon.

Note by Gordon: this system was still configured to use dhcp - and it lost its lease when the etherants were down. Fixed.

- pressure

USBdisk Swap

Steven Semmer posted on Jul 10, 2008

The pocketec from downwind1 and downwind2 were swapped again today due to the wireless link going down last night. Tom needed data from last night.

- data

Sonic 2b restarted

Tom Horst posted on Jul 10, 2008

Sonic 2b stopped around 15:30 PDT, July 10, and restarted around 4:43, July 10.

- sonic

serial port assignments
Gordon Maclean posted on Jul 10, 2008

Upwind

device	sensor	id
ttyS1	3u	1,1030
ttyS2	4u	1,1040
ttyS3	GPS	1,30
ttyS5	5u	1,1050
ttyS6	6u	1,1060
ttyS7	7u	1,1070
ttyS8	8u	1,1080
ttyS9	9u	1,1090
ttyS10	10u	1,1100
ttyS11	11u	1,1110

Downwind1 Note that 5b,6b and 4b were out of order in the wide array (first configuration), and put back in order in the medium,low array (second config).

device	sensor (wide)	sensor (others)	id
ttyS1	1b	1b	2,2010
ttyS2	2b	2b	2,2020
ttyS3	GPS	GPS	2,30
ttyS5	3b	3b	2,2030
ttyS6	5b	4b	2,2040
ttyS7	6b	5b	2,2050
ttyS8	4b	6b	2,2060
ttyS9	3t	3t	2,3030
ttyS10	4t	4t	2,3040
ttyS11	5t	5t	2,3050
ttyS12	6t	6t	2,3060

Downwind2 (two dead ports, ttyS7, ttyS14)

device	sensor	id
ttyS1	7b	3,2070
ttyS2	8b	3,2080
ttyS3	GPS	3,30

ttyS5	9b	3,209 0
ttyS6	10b	3,210 0
ttyS7	dead	
ttyS8	11b	3,211 0
ttyS9	12b	3,212 0
ttyS10	13b	3,213 0
ttyS11	7t	3.307 0
ttyS12	8t	3,308 0
ttyS13	9t	3,309 0
ttyS14	dead	
ttyS15	10t	3,310 0
ttyS16	11t	3,311 0
ttyS17	baro,Pref	3,50

Profile

device	sensor	id
ttyS1	1.5m	4,15 0
ttyS2	3m	4.30 0
ttyS3	GPS	4,30
ttyS5	4m	4,40 0
ttyS6	5.5m	4,55 0
ttyS7	7m	4,70 0
ttyS8	8m	4.80 0
ttyS9	Licor, 3m	4,30 2
ttyS10	TRH,1.5m	4.15 4
ttyS11	TRH,3m	4.30 4
ttyS12	TRH,4m	4.40 4
ttyS13	TRH,5.5m	4,55 4
ttyS14	TRH,7m	4,70 4
ttyS15	TRH,8m	4,80 4
ttyS16	baro	4,50

- [ahats](#)
- [data-system](#)

[started data merge](#)
Gordon Maclean posted on Jul 10, 2008
The script $ISFF/projects/AHATS/ISFF/scripts/merge.sh merges the network and local data storage files.

I've started it running for the period Jun 25 - Jul 8 00:00 on the isff system.

It reads input files from /net/media/isff2/projects/AHATS/raw_data and writes output files to /media/isff3/projects/AHATS/merge.

 Once it finishes we can run statsproc on the merged files.

- ahats

[Daily status, July 9](#)
Tom Horst posted on Jul 09, 2008
AHATS daily status 7/09/08

Staff: Semmer, Horst, Khoung, McIntyre; Maclean left this morning

Summary:

We moved the Vaisala barometer from the PAM pressure port to the fast
pressure reference cylinder last night. It appears that the reference
cylinder pressure follows the diurnal cycle of ambient pressure (although
we no longer have an independent measure of ambient pressure).
Today we are testing for leaks by blowing into the reference line
to overpressure it and watching for a decay in pressure indicating a
leak. Steve found one obvious leak where a tee was used instead of a
straight through junction.

Steve has repaired the bad 'filter' boards so that we now have 14 good
pressure/temperature signals, albeit apparently poor pressure data due
to leaks on the reference side.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: For the period 7/7 12:30 through 7/9 12:30, we have
only 5.25 hours (11%) of good data. We no longer are getting good wind
directions either day or night.

Local data storage: (7/9/08)

Filesystem   1k-blocks   Used Available Use% Mounted on
root@upwind root# df | grep usbdisk
/dev/sda1   57685532   1198288 56487244   2% /var/tmp/usbdisk
root@downwind1 root# df
/dev/sda1   57685532   347476 57338056   1% /var/tmp/usbdisk
root@downwind2 root# df
/dev/sda1   57685532   425008 57260524   1% /var/tmp/usbdisk
root@profile root# df | grep usbdisk
/dev/sda1   57685532   1133292 56552240   2% /var/tmp/usbdisk
root@pressure1 root# df | grep usbdisk
/dev/sda1   3940812   396592   3544220 10% /var/tmp/usbdisk
root@pressure2 root# df | grep usbdisk
/dev/sda1   3940812   395692   3545120 10% /var/tmp/usbdisk

Pressure:

Diurnal variation of fast pressure is an order of magnitude less
than ambient pressure.

p: all channels ok as of 10 am PDT this morning
t: all channels ok as of 10 am PDT this morning

- status

[Leak found in Pressure line](#)
Steven Semmer posted on Jul 09, 2008
A variety of pressure tests were conducted on the pressure lines. Th first was a check of the reference cell. There appeared to be a very slow leak. The
main line was tested a major leak was found. It was at the end of the line where a tee was instead of a straight coupler. This was fixed around 2:30 pm.;
We will see what happens over the next few hours.

- pressure

[Pressure 11B back on line](#)
[Steven Semmer](#) posted on Jul 09, 2008

The interface board being used for 11B had a bad RJ45 connector. This was fixed and the board was installed at Pressure2. PARO 11B was attached and data looks good. This occurred around 10:00am local.

- pressure

[Paro 11B back up](#)
[Steven Semmer](#) posted on Jul 09, 2008

A modified interface board for 11B, Pressure2, was added this morning. Based on Gordon's data_dump function the pressure and temperature data looked good with little noise.

- pressure

[USBdisk swap](#)
[Steven Semmer](#) posted on Jul 09, 2008

The pocketecs, #2 and #11, at downwind1 and downwind2 were removed this morning and new ones put in. Data being copied to base disk.

- usbdisk

[Downwind2 link down](#)
[Steven Semmer](#) posted on Jul 09, 2008

The wireless link from Downwind2 was down this morning. It went down around 1 am. Power was recycled on the EtherAnt and the link came back to life.

- data-system

[eanth down](#)
[Gordon Maclean](#) posted on Jul 09, 2008

eanth is down, which means downwind2, pressure2 and upwind are not reporting.

Again the log on the ap24 shows "extensive data loss" at 08:48 UTC:

```
 ssh admin@ap24eth
log
print
...
 08:48:42 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, extensive data loss
/quit
```

- ahats
- network

[barometer connected to reference ta](#)
[Gordon Maclean](#) posted on Jul 09, 2008

In order to investigate whether the reference pressure system is working correctly, the Vaisala barometer was removed from the profile tower and installed next to the reference pressure tank. It is connected to the reference tube via a 1/16 inch T connector near where the line goes underground to the tank. The barometer data cable is connnected to ttyS17 on downwind2. The pressure variable is called Pref. The data appears at 18:22 PDT, Jul 8. So, at this point we have no ambient air pressure. A second Vaisala PTB is being shipped from Boulder.

The barometer was removed around 18:00, July 8. The replacement barometer was installed around 10:30 am, July 10.

- ahats
- pressure

[profile and upwind pocketecs](#)
Gordon Maclean posted on Jul 08, 2008

ptec#1 was removed from profile on Jul 8. It showed errors when downloading with copy_usbdisk.sh, so I did a bb_fsck.sh on it. As of 8:20 pm it was still running.

ptec#5 was removed from upwind later on Jul 8. It still needs to be downloaded.

- [data-system](#)

[downloading pocketecs and usb drives](#)
Gordon Maclean posted on Jul 08, 2008

To download data from a pocketec or usb pen drive, do the following:

1. Plug the drive into the 1 spare port on the isff system (latitude D830)
2. On isff, do

```
copy_usbdisk.sh AHATS
```

3. When it finishes, power down the pocketec and remove.

It copy_usbdisk.sh reports errors, then you should do a complete bad block check of the drive. Insert the drive in isff, and do:

```
bb_fsck.sh
```

The bb_fsck.sh command takes about 5 hours to complete on a 60 Gbyte pocketec.

- [ahats](#)
- [data-system](#)

[How to dump raw data from ParoScientific 202BGs](#)
Gordon Maclean posted on Jul 08, 2008

Here are the sensor ids of the ParoScientific sensors and the frequency counter board numbers and the input pin numbers.

Note that 7t is on pressure1 and 7b is on pressure2. Also notice that ids in the 3000's are not at the top height.

pressure1

Location	adam	temperature id	board, pin	pressure id	board, pin
3b	5	2034	0,1	2036	0,8
4b	5	2044	0,18	2046	1,1
5b	5	2054	1,8	2056	1,18
5t	5	2064	2,1	2066	2,8
6b	5	2074	2,18	2076	3,1
6t	5	3054	3,8	3056	3,18
7t	5	3064	4,1	3066	4,8

pressure2

Location	adam	temperature id	board, pin	pressure id	board, pin
7b	6	2084	0,1	2086	0,8
8b	6	2094	0,18	2096	1,1
8t	6	2104	1,8	2106	1,18
9b	6	2114	2,1	2116	2,8
9t	6	3074	2,18	3076	3,1
10b	6	3084	3,8	3086	3,18

11b	6	3094	4,1	3096	4,8

To display data for a given id, do (this example is for temperature from 3b)

```
data_dump -i 5,2034 -L sock:aster
```

If you are running on an adam, the data_dump is an older version, do:

```
data_dump -d 5 -s 2034 -L sock:localhost
```

[Daily status, July 8](#)

Tom Horst posted on Jul 08, 2008
AHATS daily status 7/08/08

Staff: Maclean, Horst, Khoung, McIntyre; Semmer arrived today

Summary:

We will count July 7 12:30 PDT as the new start of (good) operations.

A revised configuration schedule, accounting for the start and stop
times of reconfiguration days:

```
Config  z (m)  S (m)   Dates   Length
1       3-4    4       7/7-15  8.7 days
2       3-4    1.3     7/18-23 6.6 days
3       7-8    1.3     7/25-30 6.6 days
4       7-8    0.43    8/2-9   8.6 days
```

Gordon replaced the serial board in the downwind-2 adam, which should
eliminate the outages we have been experiencing there.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: For the period 7/7 12:30 through 7/8 12:30, we have
only 3.33 hours (14%) of good data. We no longer are getting good wind
directions either day or night.

Pressure:

11b not connected. Pressure, but not temperature, bad at 9t.
Diurnal variation of fast pressure is an order of magnitude less
than ambient pressure.

Profiles:

Missing data 17:30 - 18:50, July 7 (power outage at trailer)

diag: spikes around 14:30, July 7.
samples.sonic: same spikes
spd: ok
dir: ok
w: ok
tc: ok
sigma_w/u*: ok (1.3 at night)
w'w': ok
u*: ok
w'tc': ok
T: ok
RH: 4m may be low by less than 1% RH
P: okay

Upwind (hts=3.5):

(+/- = ~1 std deviation)
Missing data 17:30 - 18:50, July 7 (power outage at trailer)
Missing sonic 7u 13:00 July 7 - 10:25 July 8 (bad port on new serial card)

diag: ok
samples.sonic: ok
spd: ok, +/- 15 cm/s (6u has +15 cm/s offset in u)
dir: ok, +/- 5 deg
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 2 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.05 degC^2

Lower (hts=3):

Missing data 17:30 - 18:50, July 7 (power outage at trailer)
Missing sonics 7b-13b 10:15 - 10:40 July 8 (swapping serial board)

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s
dir: ok, +/- 6 deg
w: ok, +/- 5 cm/s
tc: ok, +/- 0.27 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 3 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.1 degC^2

Upper (hts=4):

Missing data 17:30 - 18:50, July 7 (power outage at trailer)
Missing sonics 7t-11t 10:15 - 10:40 July 8 (swapping serial board)

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg; 6t is about 6.5 degrees off from profile sonic
w: ok, +/- 6 cm/s
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 4 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.1 degC ^2

- status

power glitches in base trailer
Gordon Maclean posted on Jul 07, 2008
When the air conditioner in the trailer kicks on it often triggers the UPS's to kick on. We had all the computer systems and disk drives on the smaller unit, the APC SmartUPS 1000. Perhaps on hot afternoons, when the ISS trailer air conditioner is also running, the power surges are larger.

In any case the SmartUPS 1000 was shutting down on every AC turn on, since it eventually drained its battery after so many hits. This causes disk problems, which is **NOT** good. We now have the USP's cabled in serial, with the SmartUPS 1000 plugged into line power, the big SmartUPS 22XXX (whose battery is toast) is plugged into the 1000, and the computer systems are running on the 22XXX. It seems to work better than with the 22XXX first in line.

We've asked Kurt to order a new battery for the 1000.

- ahats
- base

changed serial cards at upwind, downwind2
Gordon Maclean posted on Jul 07, 2008
The serial card problem is a bit mystifying. It didn't happen in CHATS, and we had about the same or more load on the data system.

Systems with the Emerald 8P cards seem to be the ones that are failing. I don't believe we had those at CHATS. So I'm removing them from our systems.

upwind: had 1 8P card and 1 8M. It was only using 7 ports on the 8P and none on the 8M, so I removed the 8P and cabled the 8M as the first and only card. There is still an available port for the 15th pressure system.

downwind2: removed 8P W274177, installed 8M W240036, which is a spare card. This board has a dead port #1 (numbered from 0) which is /dev/ttyS6 when it is installed as the first card. To minimize the cabling changes. I installed W240036 as the second card, and so W249924 is now the first card. This means that port /dev/ttyS14 is now dead, and the last sonic was switched to /dev/ttyS15.

Currently the profile tower has the only remaining 8P card (and it has been working quite well since we improved the voltage level).

Later noticed that port ttyS7 on upwind was not working. Seems that W240025 also has a bad port. Since we want all ports to work on upwind in order to have one available for the 15 pressure system, I did another swap on Jul 8. At 10:20am removed the first emerald card, W249924, from downwind2, installed it on upwind. Took W240025 from upwind and installed it as the first serial board on downwind2.

The data system configuration is now:

name	viper #	box	tower	net link	serial #0	serial #1
profile	3	6	profile	eantg	8P W274095	8M 240017
downwind 1	6	14	d4	hub in profile	8M W249918	8M 250043
downwind 2	1	13	d10	eanth	8M W240025	8M W240036
upwind	2	1	u7	hub in downwind2	8M W249924	
pressure1	10	small	d4	hub in profile		
pressure2	11	large	d10	hub in downwind2		

These serial cards have bad ports

SN	bad ports
W240025	2(ttyS7)
W240036	1(ttyS6)

W240025 and W240036 are on downwind2. The configuration on downwind2 skips ports ttyS7 and ttyS14.

- ahats
- data-system
- sonic

Revised configuration schedule
Tom Horst posted on Jul 07, 2008
Revised Schedule, accounting for estimated start and stop times of reconfiguration days:

Config	z (m)	S (m)	start	end	Length (days)
1	3-4	4	July 7 12:30	July 16 06:00	8.7
2	3-4	1.2	July 17 16:00	July 24 06:00	6.6
3	7-8	1.29	July 24 16:00	July 31 06:00	6.6
4	7-8	0.43	Aug 1 16:00	Aug 10 06:00	8.6

- schedule

Daily status, July 7
Tom Horst posted on Jul 07, 2008
AHATS daily status 7/07/08

Staff: Maclean, Horst, Khoung, McIntyre

Summary: Yesterday we deployed pressure-1 after lunch and pressure-2
around 20:30 PDT. Pressure-1 serves 3b-6b and 5t-7t, but pressure-2
had only 5 new filter boards, serving 7b-9b and 8t-9t. Unfortunately
the temperature channel on 9b is noisy. Gordon finished the final
two filter boards this morning and installed them in pressure-2.
The bad filter board was removed, leaving 11b currently not connected.

We will count July 7 12:30 PDT as the new start of (good) operations.

A tentative revised configuration schedule would be:

Config	z (m)	S (m)	Dates	Length
1	3-4	4	7/7-15	8 days
2	3-4	1.3	7/18-25	7 days
3	7-8	1.3	7/25-31	7 days
4	7-8	0.43	8/3-9	7 days

Gordon replaced the serial board in the upwind adam, which should
eliminate the outages we have been experiencing there.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: For the period 6/25 17:00 through 7/7 13:00, we have
121.17 hours of data periods of length 20 minutes or longer with
wind directions from 295-355 degrees. This includes 92.67 hours of periods
longer than one hour and equates to good wind direction periods 43%
of the time. Sorted by stability, there are 61.08 hours of stable
stratification ($<w'tc'> < 0$) and 58.67 hours of unstable stratification.

Profiles:
----

diag: ok
samples.sonic: ok
spd: ok
dir: ok
w: ok
tc: ok
sigma_w/u*: ok (1.3 at night)
u*: ok
w'tc': ok
T: ok
RH: 4m may be low by less than 1% RH
P: okay

Upwind (hts=3.5):

(+/- = ~1 std deviation)
missing sonics 5u-11u 1:10 - 09:00, July 6
missing sonics 5u-11u 20:10 July 6 - 07:40 July 7

diag: ok
samples.sonic: ok
spd: ok, +/- 17 cm/s (6u has +15 cm/s offset in u)
dir: ok, +/- 5 deg
w: ok, +/- 6 cm/s
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 5 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.06 degC^2

Lower (hts=3):
----
upwind2 stopped 9:10-11:30, July 6; missing sonics 9b-13b

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s
dir: ok, +/- 6 deg
w: ok, +/- 5 cm/s
tc: ok, +/- 0.27 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 4 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.1 degC^2

Upper (hts=4):
----
upwind2 stopped 9:10-11:30, July 6; missing sonics 7t-11t

diag: ok
samples.sonic: ok
spd: ok, +/- 17 cm/s
dir: ok, +/- 5 deg; 6t is about 6.5 degrees off from profile sonic
w: ok, +/- 6 cm/s
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 4 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.05 degC ^2

- status

installed altered pressure interface cards
Gordon Maclean posted on Jul 07, 2008
Yesterday, July 6, in the afternoon we installed the pressure1 system, with the altered interface cards, and mounted the Paroscientific units on the masts. Data from pressure1 appears at 15:30 PDT. All frequency counts look good. The units serviced by pressure1 are 3b,4b,5b,5t,6b,6t and 7t.

- ahats
- pressure

Daily status, July 6
Tom Horst posted on Jul 07, 2008
AHATS daily status 7/06/08

Staff: Maclean, Horst, Khoung, McIntyre

Summary: Gordon has demonstrated that the passive filter circuit produces
solid period measurements of both the temperature and pressure signals
from the Paroscientific barometers. We are in the process of replicating
the new circuit for all 14 barometers. We have deployed adam pressure-1
serving locations 3b-6b and 5t-7t and plan to deploy adam pressure-2,
serving locations 7b-9b and 8t-9t before we leave for the day.
This will give us two sets of five pressure sensors (5-9) at two heights.
We will complete pressure-2 with locations 10b and 11b tomorrow
after we purchase additional resistors.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: For the period 7/1 13:00 through 7/6 13:00, we have
71.67 hours of data periods of length 20 minutes or longer with
wind directions from 295-355 degrees. This includes 59.17 hours of periods
longer than one hour and equates to good wind direction periods 60%
of the time. Sorted by stability, there are 33.75 hours of stable
stratification (<w'tc'> < 0) and 37.58 hours of unstable stratification.

Note that the normal to the array is 325 degrees. If the array orientation
were 315 degrees (NW: 285-345 degrees) as for HATS/SGS, then the division
is 36.58 hours stable and only 24.67 hours unstable.

Since 6/25, we have had 46% good wind directions, with a symmetric stability
distribution in the range -1 < z/L < 1 and some periods with -2 < z/L < -1
or 1 < z/L < 5.

- status

Configuration 1 sonic azimuths
Tom Horst posted on Jul 06, 2008
Started to measure the sonic azimuths with the datascope. Set declination = 0.

Array orientations

Sighting along the PAM masts, the orientation of the upwind array is 221 deg and the downwind array is 40 deg. Adding 90 and 270 degrees and the declination (13.7 deg) gives 324.7 degrees true for the upwind array and 323.7 deg true for the downwind array, which are close to the design value of 325 deg.

Note that the tripods for the second upwind array are already set up roughly N of the profile tower. The data scope gives an angle of 156 deg magnetic from the leg of the SW tripod to the profile sonics, so the **profile winds** from directions greater than 156+180 + 13.7 = 349.7 deg true should be used with **caution.**

The tables list three or more independent measurements of sonic azimuth. I measured each row at different times, requiring independent estimates of proper alignment of the datascope relative to the sonic, which is the biggest source of uncertainty. I found that the sun angle is much better for visibility of the sonics at 7 am than at 10 am, so I remeasured the azimuths done prior to 7/11/08.

The **cal_file** entries are the value used for the sonic azimuth in the cal_files in order to give winds in a coordinate system with the sonic u component normal to the array (positive for winds blowing into the array sonics) and v parallel to the array: use + 13.7 - (325-180) = use - 131.7

Upwind Array Sonics

date	3u	4u	5u	6u	7u	8u	9u	10u	11u
7/6	133.6	136.5	133.3	134.3	135.3	NA	133.9	134.9	133.1
7/6	133.4	135.8	132.3	134.4	134.8	132.4	133.2	134.0	133.7
7/6	133.0	135.4	132.1	134.4	134.7	134.0	131.8	132.8	132.3
7/14	133.2	133.6	132.0	132.2	134.0	133.3	132.6	132.3	132.6
7/14	132.8	135.0	131.6	132.5	133.2	131.5	132.9	132.6	132.4
7/14	132.6	135.0	132.1	132.3	133.5	132.0	132.8	132.2	131.3
use	132.9	135.0	132.1	132.3	133.6	132.3	132.8	132.4	132.1
cal_file	1.2	3.3	0.4	0.6	1.9	0.6	1.1	0.7	0.4

Profile tower Sonics

date	1.5 m	3m	4m	5.5 m	7m	8m
7/8	132.4	135.8	133.6	135.9	128.8	131.2
7/8	132.9	136.7	133.4	134.0	130.7	133.0
7/8	132.2	136.3	133.8	133.1	130.3	132.0
7/13	132.5	136.0	133.9	133.5	133.9	129.2
7/13	132.1	134.5	133.1	135.6	134.0	134.6
7/13	132.0	136.0	133.7	135.1	134.1	135.7
use	132.3	136.0	133.6	134.6	134.0	132.6
cal_file	0.6	4.3	1.9	2.9	2.3	0.9

Downwind Array, top sonics

date	3t	4t	5t	6t	7t	8t	9t	10t	11t
7/11	136.1	136.1	138.9	134.5	134.7	135.1	135.7	135.7	140.9
7/11	135.9	135.3	139.1	134.1	134.6	134.9	135.3	135.9	140.7
7/11	135.8	135.9	138.8	134.0	135.1	134.9	135.6	135.5	140.6
use	135.9	135.8	138.9	134.2	134.8	135.0	135.5	135.7	140.7
cal_file	4.2	4.1	7.2	2.5	3.1	3.3	3.8	4.0	9.0

Downwind Array, bottom sonics

date	1b	2b	3b	4b	5b	6b	7b	8b	9b	10b	11b	12B	13B
7/12	136.3	131.8	134.3	133.8	136.3	130.9	134.5	135.8	134.4	134.5	138.5	136.8	137.0
7/12	136.3	130.8	134.4	134.1	136.0	131.8	134.0	136.3	135.2	135.1	138.6	136.6	136.7
7/13	136.1	131.5	135.1	134.2	136.4	131.6	134.1	136.1	134.8	135.3	138.7	136.5	136.9
use	136.2	131.4	134.6	134.0	136.2	131.4	134.2	136.1	134.8	135.0	138.6	136.6	136.9
cal_file	4.5	-0.3	2.9	2.3	4.5	-0.3	2.5	4.4	3.1	3.3	6.9	4.9	5.2

- sonic

Downwind-2 serial board stopped

Tom Horst posted on Jul 06, 2008

Serial board stopped on downwind2 adam around 9:10 PDT.   Lost data on sonics 9b-13b, 7t-11t. Restarted around 11:32 PDT.

- data-system

Upwind serial board stopped

Tom Horst posted on Jul 06, 2008

Upwind adam serial board stopped around 01:10 PDT. No data from sonics 5u-11u. Restarted around 09:02.

- ahats
- sonic

Downwind-2 serial board stopped

Tom Horst posted on Jul 05, 2008

The serial board on downwind-2 adam stopped around 17:10, July 5. Restarted around 17:40.

- data-system
- ahats

sonic 6u offset

Tom Horst posted on Jul 05, 2008

Sonic 6u appears to have an offset in the u component (from the mean of all 9 upwind sonics) of about +15 cm/s. However the range of u and v offsets (from the mean) for all 9 sonics is about +/- 20 cm/s. 6u stands out because there is no other sonic with a positive offset this large, while there are a couple of sonics with a u component offset near -20 cm/s.

- ahats
- sonic

Daily status, July 5

Tom Horst posted on Jul 05, 2008

AHATS daily status 7/05/08

Staff: Maclean, Horst, Khoung, McIntyre

Summary: Gordon is experimenting with replacing Semmer's active low-pass filter circuit with a passive filter circuit suggested by Paroscientific.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: For the period 7/1 13:00 through 7/5 13:00, we have
63 hours of data periods of length 20 minutes or longer with
wind directions from 295-355 degrees. This includes 52.5 hours of periods
longer than one hour and equates to good wind direction periods 66%
of the time. Sorted by stability, there are 31 hours of stable
stratification ($<w'tc'> < 0$) and 31.92 hours of unstable stratification.

Note that the normal to the array is 325 degrees. If the array orientation
were 315 degrees (NW: 285-345 degrees) as for HATS/SGS, then the division
is 33.83 hours stable and only 21.33 hours unstable.

Profiles:
----

diag: ok
samples.sonic: ok
spd: ok
dir: ok
w: ok
tc: ok
sigma_w/u*: ok (1.3 at night)
u*: ok
w'tc': ok
T: ok
RH: 4m may be low by less than 1% RH
P: okay

Upwind (hts=3.5):

(+/- = ~1 std deviation)
missing sonics 5u-11u 3:10 - 07:40, July 4
missing all sonics 9:15 - 11:50, July 4

diag: ok
samples.sonic: ok
spd: ok, +/- 15 cm/s (6u has +15 cm/s offset in u)
dir: ok, +/- 3 deg
w: ok, +/- 6 cm/s
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 0.04 m/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.015 m/s degC
tc'tc': ok, +/- 0.06 degC^2

Lower (hts=3):
----

diag: ok
samples.sonic: ok
spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg
w: ok, +/- 5 cm/s
tc: ok, +/- 0.25 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 3 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.1 degC^2

Upper (hts=4):
----

diag: ok
samples.sonic: ok
spd: ok, +/- 17 cm/s
dir: ok, +/- 4 deg; 6t is about 6.5 degrees off from profile sonic
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 3 cm/s
sigma_w/u*: ok (1.3 at night)
w'tc': ok, +/- 0.02 m/s degC
tc'tc': ok, +/- 0.05 degC ^2

- status
- ahats

Daily status, July 4

Tom Horst posted on Jul 04, 2008
AHATS daily status 7/04/08

Staff: Maclean, Horst, Khoung, Brown, McIntyre

Summary: Gordon found that the noisy pressure signals are caused by
RF crosstalk between unshielded wire segments. He and Khoung are wrapping
the signal wires with ground wires.

Some data outages yesterday afternoon (downwind-2) and this morning (upwind).
For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

I have begun preparing the horizontal ASTER tower array for the upcoming
configurations by mounting yokes and vertical braces.

Good wind direction: For the period 7/1 13:00 through 7/4 13:00, we have
45.17 hours of data periods of length 20 minutes or longer with
wind directions from 195-355 degrees. This includes 11 periods of length
greater than one hour and equates to good periods 63% of the time.
Sorted by stability, there are 23.75 hours of stable stratification
(<w'tc'> < 0) and 21.33 hours of unstable stratification.

Since June 26, we have had good wind directions 46% of the time;
stable data 26% of the time and unstable data 19% of the time.

- status

Rebooted upwind serial board

Tom Horst posted on Jul 04, 2008

The serial board on the upwind adam stopped around 03:10, July 4. Gordon rebooted the adam around 07:40. Lost data from sonics 5u-11u.

- data-system
- sonic

Lost power and data at upwind adam

Tom Horst posted on Jul 04, 2008

The transformer at the array blew a fuse in its surge protector around midnight, July 3. The batteries for the upwind adam apparently went below a critical voltage at 09:15, July 4, and the adam shut down. Power was restored around 11:50. Changed the load on the two legs of the transformed by moving the sodar data power to the same leg as the ISFS data systems, leaving the sodar air conditioner on the other leg.

- ahats
- power
- sonic

Downwind-2 serial board stopped

Tom Horst posted on Jul 03, 2008

Rebooted downwind-2 at 18:08, July 3. Serial board stopped around 14:10.

Missing data from sonics 9b-13b.

- data
- sonic

Daily status, July 3

Tom Horst posted on Jul 03, 2008

AHATS daily status 7/03/08

Staff: Maclean, Horst, Khoung, Brown

Summary: Gordon is working on the software to obtain calibrated fast pressure data. An initial look at the frequency data suggests that the data from the pressure sensor is too noisy. We are working on cleaning up the signal.

For more details, see the ahats logbook at
https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: For the period 7/1 13:00 through 7/3 13:00, we have 28.33 hours of data periods of length 20 minutes or longer with wind directions from 195-355 degrees. This includes 8 periods of length greater than one hour and equates to good periods 59% of the time.
Sorted by stability, there are 14.5 hours of stable stratification
($<w'tc'>$ < 0) nad 13.75 hours of unstable stratification.

Profiles:
----

spd: ok
dir: ok
w: ok
tc: ok
sigma_w/u*: ok (1.3 at night)
u*: ok
w'tc': ok
diag: ok
samples.sonic: ok
T: ok
RH: 4m may be low by less than 1% RH
P: okay

(+/- = ~1 std deviation)
Upwind (hts=3.5):
----

spd: ok, +/- 15 cm/s
dir: ok, +/- 5 deg
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 0.04 m/s
sigma_w/u*: ok (1.3 at night)
tc'tc': ok, +/- 0.06 degC^2
w'tc': ok, +/- 0.015 m/s degC
diag: ok
samples.sonic: ok

Lower (hts=3):
----

spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg
w: ok, +/- 6 cm/s
tc: ok, +/- 0.25 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 0.04 m/s
sigma_w/u*: ok (1.3 at night)
tc'tc': ok, +/- 0.1 degC ^2
w'tc': ok, +/- 0.02 m/s degC
diag: ok
samples.sonic: ok

Upper (hts=4):
----

spd: ok, +/- 16 cm/s
dir: ok, +/- 5 deg; 6t is about 6.5 degrees off from profile sonic
w: ok, +/- 5 cm/s
tc: ok, +/- 0.25 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 0.04 m/s
sigma_w/u*: ok (1.3 at night)
tc'tc': ok, +/- 0.1 degC ^2
u*: ok, +/- 0.04 m/s
w'tc': ok, +/- 0.02 m/s degC
diag: ok
samples.sonic: ok

- ahats
- status

Daily status, July 2
Tom Horst posted on Jul 02, 2008
Staff: Maclean, Horst, Khoung, Brown; Chenning left this morning

Summary: Gordon found low voltages in the adams, so has been improving the
battery charging over the past few days. These changes have improved the
power in the adams and have reduced the number of outages we have been
having.

We have been measuring the array dimensions and still need to measure
the sonic azimuths.

We are essentially starting ops at 13:00 on July 1, because of
the change in sonic heights in the upwind array and the late completion
of the pressure array. Chenning and I have agreed on the following
tentative schedule for configuration changes.

Configuration 1 (height = 3m, spacing = 4m): July 1-10 (10 days)
Configuration 2 (height = 3m, spacing = 1.29m): July 13-20 (8 days)
Configuration 3 (height = 7m, spacing = 1.29 m): July 22-29 (8 days)
Configuration 4 (height = 7m, spacing = 0.43 m): August 1-9 (9 days)

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

Good wind direction: For the period 7/1 13:00 through 7/2 13:00, we have
13.67 hours of data periods of length 20 minutes or longer with
wind directions from 195-355 degrees. This includes 3 periods of length
greater than one hour and equates to good periods 57% of the time.

Profiles:
----

spd: ok
dir: ok
w: ok
tc: ok
sigma_w/u*: ok (1.3 at night)
u*: ok
w'tc': ok
diag: ok
samples.sonic: undersampled sonic data 16:00-17:00, July 1
T: ok
RH: 4m may be low by less than 1% RH
P: okay

(+/- = ~1 std deviation)
Upwind (hts=3.5):
----

spd: ok, +/- 15 cm/s
dir: ok, +/- 5 deg
w: ok, +/- 5 cm/s
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 0.04 m/s
sigma_w/u*: ok (1.3 at night)
tc'tc': ok, +/- 0.1 degC^2
u*: ok, +/- 0.04 m/s
w'tc': ok, +/- 0.015 m/s degC
diag: ok
samples.sonic: undersampled sonic data 16:00-17:00, July 1

Lower (hts=3):
----

spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg
w: ok, +/- 6 cm/s
tc: ok, +/- 0.25 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 0.04 m/s
sigma_w/u*: ok (1.3 at night)
tc'tc': ok, +/- 0.1 degC ^2
w'tc': ok, +/- 0.02 m/s degC
diag: ok
samples.sonic: undersampled sonic data 16:00-17:00, July 1

Upper (hts=4):
----

spd: ok, +/- 15 cm/s
dir: ok, +/- 5 deg; 6t is about 6.5 degrees off from profile sonic
w: ok, +/- 6 cm/s
tc: ok, +/- 0.25 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
u*: ok, +/- 0.04 m/s
sigma_w/u*: ok (1.3 at night)
tc'tc': ok, +/- 0.1 degC ^2
u*: ok, +/- 0.05 m/s
w'tc': ok, +/- 0.02 m/s degC
diag: ok
samples.sonic: undersampled sonic data 16:00-17:00, July 1

- status
- ahats

Daily status, July 1
Tom Horst posted on Jul 01, 2008
AHATS daily status 7/01/08

Staff: Maclean, Horst, Tong, Khoung, Brown

Summary: Chenning and Khoung completed the pressure sensor deployment this
morning by connecting the upper 5 sensors to the reference cylinder.

We decided to lower the sonics in the upwind array by 0.5 m to match
the height of the lower sonics in the downwind array. This will allow
a more accurate combination of the cross-array gradients and the
between-array gradients to calculate the streamwise and crosswind gradients.

Good wind direction: For the period 6/25 17:00 through 7/1 16:35, we have
54.25 hours of data periods of length 20 minutes or longer with
wind directions from 195-355 degrees. This includes 13 periods of length
one hour or greater and equates to good periods 38%(!) of the time.

Note that the daytime periods may be compromised by work on the array,
e.g. installing the pressure sensors.

For more details, see the ahats logbook at https://wiki.ucar.edu/display/ahatslogbook

[aster@aster S]$ data_stats

sensor	dsm	sampid	nsamps	|------start----||---end----|		rate	minMaxDT(sec)		minMaxLen	
upwind:/var/tmp/gps_pty0	1	30	20	2008 07 01 23:47:24.385	07 01 23:47:33.643	2.05	0.155	1.043	70	73
upwind:/dev/ttyS1	1	1030	579	2008 07 01 23:47:24.045	07 01 23:47:33.669	60.05	0.013	0.026	12	12
upwind:/dev/ttyS2	1	1040	579	2008 07 01 23:47:24.049	07 01 23:47:33.685	59.98	0.013	0.027	12	12
upwind:/dev/ttyS5	1	1050	579	2008 07 01 23:47:24.041	07 01 23:47:33.671	60.02	0.008	0.021	12	12
upwind:/dev/ttyS6	1	1060	579	2008 07 01 23:47:24.042	07 01 23:47:33.681	59.96	0.009	0.021	12	12
upwind:/dev/ttyS7	1	1070	579	2008 07 01 23:47:24.042	07 01 23:47:33.682	59.96	0.009	0.021	12	12
upwind:/dev/ttyS8	1	1080	579	2008 07 01 23:47:24.042	07 01 23:47:33.682	59.96	0.009	0.021	12	12
upwind:/dev/ttyS9	1	1090	579	2008 07 01 23:47:24.042	07 01 23:47:33.672	60.03	0.007	0.022	12	12
upwind:/dev/ttyS10	1	1100	579	2008 07 01 23:47:24.043	07 01 23:47:33.672	60.03	0.007	0.022	12	12
upwind:/dev/ttyS11	1	1110	579	2008 07 01 23:47:24.051	07 01 23:47:33.682	60.01	0.008	0.022	12	12
downwind1:/var/tmp/gps_pty0	2	30	20	2008 07 01 23:47:24.502	07 01 23:47:33.669	2.07	0.155	0.944	70	73
downwind1:/dev/ttyS1	2	2010	579	2008 07 01 23:47:24.052	07 01 23:47:33.675	60.07	0.012	0.026	12	12
downwind1:/dev/ttyS2	2	2020	579	2008 07 01 23:47:24.047	07 01 23:47:33.683	59.98	0.007	0.019	14	14
downwind1:/dev/ttyS5	2	2030	579	2008 07 01 23:47:24.047	07 01 23:47:33.687	59.95	0.008	0.021	12	12
downwind1:/dev/ttyS6	2	2040	579	2008 07 01 23:47:24.047	07 01 23:47:33.677	60.02	0.008	0.021	12	12
downwind1:/dev/ttyS7	2	2050	579	2008 07 01 23:47:24.048	07 01 23:47:33.678	60.02	0.008	0.021	12	12
downwind1:/dev/ttyS8	2	2060	578	2008 07 01 23:47:24.048	07 01 23:47:33.668	59.98	0.009	0.021	12	12
downwind1:/dev/ttyS9	2	3030	579	2008 07 01 23:47:24.049	07 01 23:47:33.678	60.02	0.008	0.022	12	12
downwind1:/dev/ttyS10	2	3040	578	2008 07 01 23:47:24.049	07 01 23:47:33.668	59.98	0.009	0.021	12	12
downwind1:/dev/ttyS11	2	3050	578	2008 07 01 23:47:24.059	07 01 23:47:33.678	59.98	0.008	0.022	12	12
downwind1:/dev/ttyS12	2	3060	579	2008 07 01 23:47:24.049	07 01 23:47:33.679	60.02	0.008	0.021	12	12
downwind2:/var/tmp/gps_pty0	3	30	20	2008 07 01 23:47:24.388	07 01 23:47:33.655	2.05	0.156	1.043	70	73
downwind2:/dev/ttyS1	3	2070	579	2008 07 01 23:47:24.043	07 01 23:47:33.671	60.03	0.013	0.026	12	12
downwind2:/dev/ttyS2	3	2080	579	2008 07 01 23:47:24.041	07 01 23:47:33.681	59.96	0.013	0.027	12	12
downwind2:/dev/ttyS5	3	2090	579	2008 07 01 23:47:24.044	07 01 23:47:33.683	59.96	0.009	0.021	12	12
downwind2:/dev/ttyS6	3	2100	579	2008 07 01 23:47:24.053	07 01 23:47:33.684	60.02	0.009	0.022	12	12
downwind2:/dev/ttyS7	3	2110	579	2008 07 01 23:47:24.054	07 01 23:47:33.684	60.02	0.007	0.022	12	12
downwind2:/dev/ttyS8	3	2120	579	2008 07 01 23:47:24.054	07 01 23:47:33.685	60.02	0.007	0.023	12	12
downwind2:/dev/ttyS9	3	2130	579	2008 07 01 23:47:24.054	07 01 23:47:33.685	60.02	0.010	0.023	12	12
downwind2:/dev/ttyS10	3	3070	579	2008 07 01 23:47:24.055	07 01 23:47:33.685	60.02	0.010	0.023	12	12
downwind2:/dev/ttyS11	3	3080	579	2008 07 01 23:47:24.044	07 01 23:47:33.674	60.02	0.008	0.022	12	12
downwind2:/dev/ttyS12	3	3090	579	2008 07 01 23:47:24.044	07 01 23:47:33.674	60.02	0.008	0.022	12	12
downwind2:/dev/ttyS13	3	3100	579	2008 07 01 23:47:24.055	07 01 23:47:33.686	60.02	0.008	0.023	12	12
downwind2:/dev/ttyS14	3	3110	579	2008 07 01 23:47:24.056	07 01 23:47:33.686	60.02	0.009	0.023	12	12
profile:/var/tmp/gps_pty0	4	30	21	2008 07 01 23:47:24.340	07 01 23:47:33.508	2.18	0.107	0.944	49	73
profile:/dev/ttyS16	4	50	10	2008 07 01 23:47:24.150	07 01 23:47:33.130	1.00	0.930	1.060	19	19
profile:/dev/ttyS1	4	150	579	2008 07 01 23:47:24.042	07 01 23:47:33.666	60.06	0.012	0.026	12	12
profile:/dev/ttyS10	4	154	9	2008 07 01 23:47:24.893	07 01 23:47:33.573	0.92	1.079	1.091	30	30
profile:/dev/ttyS2	4	300	579	2008 07 01 23:47:24.047	07 01 23:47:33.680	60.00	0.011	0.027	12	12
profile:/dev/ttyS9	4	302	96	2008 07 01 23:47:24.092	07 01 23:47:33.592	10.00	0.099	0.101	47	47
profile:/dev/ttyS11	4	304	9	2008 07 01 23:47:24.653	07 01 23:47:33.234	0.93	1.069	1.081	30	30
profile:/dev/ttyS5	4	400	579	2008 07 01 23:47:24.056	07 01 23:47:33.686	60.02	0.008	0.021	12	12
profile:/dev/ttyS12	4	404	9	2008 07 01 23:47:24.423	07 01 23:47:33.214	0.91	1.090	1.100	30	30
profile:/dev/ttyS6	4	550	579	2008 07 01 23:47:24.047	07 01 23:47:33.687	59.96	0.009	0.021	12	12
profile:/dev/ttyS13	4	554	9	2008 07 01 23:47:24.353	07 01 23:47:33.243	0.90	1.109	1.121	30	30
profile:/dev/ttyS7	4	700	579	2008 07 01 23:47:24.047	07 01 23:47:33.687	59.96	0.009	0.021	12	12
profile:/dev/ttyS14	4	704	9	2008 07 01 23:47:24.313	07 01 23:47:33.103	0.91	1.090	1.100	30	30
profile:/dev/ttyS8	4	800	579	2008 07 01 23:47:24.056	07 01 23:47:33.687	60.01	0.009	0.021	12	12
profile:/dev/ttyS15	4	804	9	2008 07 01 23:47:24.223	07 01 23:47:32.973	0.91	1.089	1.100	30	30
pressure1:/var/tmp/gps_pty0	5	30	20	2008 07 01 23:47:24.407	07 01 23:47:33.584	2.07	0.156	0.944	70	73
pressure1:/dev/gpiomm_fcntr0	5	2034	96	2008 07 01 23:47:24.108	07 01 23:47:33.607	10.00	0.100	0.100	8	8
pressure1:/dev/gpiomm_fcntr1	5	2036	96	2008 07 01 23:47:24.108	07 01 23:47:33.607	10.00	0.100	0.100	8	8
pressure1:/dev/gpiomm_fcntr2	5	2044	96	2008 07 01 23:47:24.108	07 01 23:47:33.607	10.00	0.100	0.100	8	8
pressure1:/dev/gpiomm_fcntr3	5	2046	96	2008 07 01 23:47:24.108	07 01 23:47:33.608	10.00	0.100	0.100	8	8
pressure1:/dev/gpiomm_fcntr4	5	2054	96	2008 07 01 23:47:24.108	07 01 23:47:33.607	10.00	0.100	0.100	8	8
pressure1:/dev/gpiomm_fcntr5	5	2056	96	2008 07 01 23:47:24.107	07 01 23:47:33.607	10.00	0.100	0.100	8	8
pressure1:/dev/gpiomm_fcntr6	5	2064	96	2008 07 01 23:47:24.107	07 01 23:47:33.607	10.00	0.100	0.100	8	8
pressure1:/dev/gpiomm_fcntr7	5	2066	96	2008 07 01 23:47:24.107	07 01 23:47:33.607	10.00	0.100	0.100	8	8
pressure1:/dev/gpiomm_fcntr8	5	2074	96	2008 07 01 23:47:24.107	07 01 23:47:33.607	10.00	0.100	0.100	8	8
pressure1:/dev/gpiomm_fcntr9	5	2076	96	2008 07 01 23:47:24.107	07 01 23:47:33.607	10.00	0.100	0.100	8	8
pressure1:/dev/gpiomm_fcntr10	5	3054	96	2008 07 01 23:47:24.107	07 01 23:47:33.607	10.00	0.100	0.100	8	8

```
pressure1:/dev/gpiomm_fcntr11   5  3056      96 2008 07 01 23:47:24.107  07 01 23:47:33.607   10.00 0.100 0.100   8   8
pressure1:/dev/gpiomm_fcntr12   5  3064      96 2008 07 01 23:47:24.107  07 01 23:47:33.607   10.00 0.100 0.100   8   8
pressure1:/dev/gpiomm_fcntr13   5  3066      96 2008 07 01 23:47:24.107  07 01 23:47:33.607   10.00 0.100 0.100   8   8
pressure2:/var/tmp/gps_pty0     6   30    20 2008 07 01 23:47:24.321  07 01 23:47:33.487    2.07 0.156 0.944  70  73
pressure2:/dev/gpiomm_fcntr0    6  2084      97 2008 07 01 23:47:24.088  07 01 23:47:33.688   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr1    6  2086      96 2008 07 01 23:47:24.088  07 01 23:47:33.588   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr2    6  2094      96 2008 07 01 23:47:24.088  07 01 23:47:33.588   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr3    6  2096      96 2008 07 01 23:47:24.088  07 01 23:47:33.588   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr4    6  2104      96 2008 07 01 23:47:24.088  07 01 23:47:33.588   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr5    6  2106      96 2008 07 01 23:47:24.088  07 01 23:47:33.588   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr6    6  2114      97 2008 07 01 23:47:24.088  07 01 23:47:33.688   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr7    6  2116      96 2008 07 01 23:47:24.088  07 01 23:47:33.588   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr8    6  3074      97 2008 07 01 23:47:24.088  07 01 23:47:33.688   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr9    6  3076      97 2008 07 01 23:47:24.088  07 01 23:47:33.688   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr10   6  3084      97 2008 07 01 23:47:24.088  07 01 23:47:33.688   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr11   6  3086      97 2008 07 01 23:47:24.088  07 01 23:47:33.688   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr12   6  3094      97 2008 07 01 23:47:24.088  07 01 23:47:33.687   10.00 0.100 0.100   8   8
pressure2:/dev/gpiomm_fcntr13   6  3096      97 2008 07 01 23:47:24.088  07 01 23:47:33.687   10.00 0.100 0.100   8   8
```

- status

Tentative configuration schedule

Tom Horst posted on Jul 01, 2008

We are essentially starting ops at 13:00 on July 1, because of the change in sonic heights in the upwind array and the late completion of the pressure array. Chenning and I have agreed on the following tentative schedule for configuration changes.

Configuration 1 (height = 3m, spacing = 4m): July 1-10 (10 days)

Configuration 2 (height = 3m, spacing = 1.29m): July 13-20 (8 days)

Configuration 3 (height = 7m, spacing = 1.29 m): July 22-29 (8 days)

Configuration 4 (height = 7m, spacing = 0.43 m): August 1-9 (9 days)

Lowered the upwind array sonics to 3.2 m

Tom Horst posted on Jul 01, 2008

From 12:17 until 12:55, July 1, Gordon and Tom lowered the upwind sonics by 0.5 m to match the height of the lower downwind array.

Array 1 dimensions

Tom Horst posted on Jul 01, 2008

Chenning and Tom finished measuring the array dimensions this morning, July 1, from around 9:30 until 10:20 am.

Downwind sonic heights

Position*	1	2	3	4	5	6	7	8	9	10	11	12	13
reference mark height (m agl)	1.50	1.495	1.51	1.58	1.55	1.55	1.57	1.51	1.51	1.53	1.525	1.54	1.52
top of lower sonic boom (m above ref)	1.67	1.67	1.665	1.655	1.655	1.66	1.67	1.66	1.67	1.66	1.66	1.66	1.67
top of upper sonic boom (m above ref)			2.675	2.67	2.665	2.66	2.66	2.66	2.67	2.66	2.66		

*Note positions are numbered from NE to SW

mean downwind reference height = 1.53 m, mean lower sonic height above reference = 1.663+0.053 m (total mean height = 3.25 m)

mean upper sonic height = 2.664+0.053 m (total mean height = 4.25 m)

3/17/09, TWH: Why did I use 5.5 cm rather than 5 cm as the height of the sonic above its boom?

12/14/09, TWH answer: To account for thickness of saddle on sonic boom; perhaps 5.3 cm would be better

Upwind sonic heights

Position	3	4	5	6	7	8	9	10	11
reference mark height (m agl)	1.48	1.55	1.53	1.52	1.55	1.54	1.575	1.57	1.49
top of sonic boom (m above ref)	2.17	2.17	2.165	2.17	2.17	2.17	2.17	2.17	2.17

mean upwind reference height = 1.534 m; mean sonic height above ref= 2.169+0.053 m (total mean height = 3.76 m)

From 12:17 until 12:55, July 1, Gordon and Tom *lowered the upwind sonics* by 0.5 m to match the height of the lower downwind array.

Sonic spacing

Position	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13
Downwind (m)	4.04	3.97	4.00	3.99	3.99	4.00	3.98	4.01	3.97	4.02	4.01	3.98
Upwind (m)			3.98	4.00	4.02	3.99	3.96	4.01	4.01	3.99		

Mean downwind sonic spacing = 3.997 m

Mean upwind sonic spacing = 3.995 m

Array spacing

Position	3	7	11
Separation (m)	16.07	16.07	16.09

Upwind check dam

The sonic 7u (upwind array) is 40m downwind of the check dam along azimuth 131 deg magnetic.

The check dam is parallel to azimuth 258.1 deg magnetic.

The sonics on the profile tower are 35m downwind of the check dam.

Profile tower

Reference height agl = 1.52 m

Sonics are 5.3 cm above top of boom; SHT inlets are 37 cm below top of boom

Note that often we could not place sonic and SHT boom mounts at the ideal heights

nominal height	1.5	3	4	5.5	7	8
top of sonic boom above ref (m)	-0.02	1.725	2.665	3.955	5.505	6.475
sonic height agl (+ 1.573 m)	1.55	3.30	4.24	5.53	7.08	8.05
top of SHT boom above ref (m)	0.355	2.105	3.08	4.315	5.855	6.855
TRH height agl (+1.15 m)	1.505	3.255	4.23	5.465	7.005	8.005

- ahats
- dimensions
- sht
- sonic

Data dropout at pressure2

Gordon Maclean posted on Jul 01, 2008
No data was being sent from pressure2, and local storage was not being written to. System was up, could log in over the network, and the dsm process was running.

data quit at 12:26 UTC, Jul 1. Restarted it with adn/aup at 13:26 UTC.

- ahats
- pressure

Added power supply to profile tower

Gordon Maclean posted on Jul 01, 2008
6/30 7:00 pm PDT

Due to the low voltage at the profile tower, we cobbled together a power system for it.

Prior to adding the supply, the voltage at the inside of the power interface panel on profile was 9.9V.

Charging system consists of a 12VDC power supply (white rectangular cube), PAM charge controller (didn't note which kind) and a battery, all in a white cooler. A second separate battery is also connected. Strung a new AC extension cord to this system. Left the cooler lid propped open. Will have to watch that this doesn't overheat.

Voltage a the profile power interface panel after adding the charger was 12.1 V.

The hope is that this will also increase the voltage levels at downwind1.

Checked voltages at downwind1 charge controller:

J3 (DC in): 12.8V

J2 (to battery): 12.2V

J1 (load): 12.1V

At unused output from charger: 13.5 V.

Inside downwind1 interface panel: 11.1 V (still seems low)

- ahats
- power

Daily status June 30
Tom Horst posted on Jun 30, 2008
AHATS daily status 6/30/08

Staff: Maclean, Horst, Tong, Khoung, Brown

Summary: Chenning and Khung working on completion of pressure sensor
deployment. They may not finish until Tuesday since they are waiting
for delivery of tubing connectors, but the lower 9 sonics are now connected.
Chenning is burying the reference cylinder this morning.

We continue to have intermittent problems with the wireless data transmission
from the array to the base.

Good wind direction: For the period 6/25 17:00 through 6/30 10:00, we have
41.75 hours of data periods of length 20 minutes or longer with
wind directions from 195-355 degrees. This includes 12 periods of length
greater than one hour and equates to good periods 37%(!) of the time.

Note that the daytime periods may be compromised by work on the array,
e.g. installing the pressure sensors.

Profiles:
----
missing all but 1.5 and 3 m sonic data after 15:00 june 30

spd: ok
dir: ok
u*: ok
w'tc': ok
diag: ok up until 12:00, June 30
T: ok
RH: 4m may be low by less than 1% RH
P: okay

(+/- = ~1 std deviation)
Upwind (hts=3.5):
----
some missing data June 29, 06:00 - 16:00

spd: ok, +/- 15 cm/s
dir: ok, +/- 5 deg
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.01 m^2/s^2 (30 min avg for second moments)
sigma_w/u*: ok (1.3 at night)
tc'tc': ok, +/- 0.1 degC^2
u*: ok, +/- 0.04 m/s
w'tc': ok, +/- 0.02 m/s degC
diag: ok, mostly << 1 but some spikes prior to 6/29 16:00 that are likely
caused by samples lost during rf transmission; local data storage
should be okay.

Lower (hts=3):
----
missing sonic 2b after 6/29 18:50 6/29; restarted 6/30 16:50
missing data from 7b-13b (downwind-2) 6/29 05:45 - 15:10

spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg
tc: ok, +/- 0.25 deg
w'w': ok, +/- 0.015 m^2/s^2 (30 min avg for second moments)
sigma_w/u*: ok (1.3 at night)
tc'tc': ok, +/- 0.1 degC ^2
u*: ok, +/- 0.04 m/s
w'tc': ok, +/- 0.02 m/s degC
diag: ok, mostly << 1 but spikes after 12:00 6/30 on downwind-1.

Upper (hts=4):
----
missing sonics from downwind-2 adam 05:45 - 15:10, 6/29: 7t--11t

spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg; 6t is about 6.5 degrees off from profile sonic
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.02 m^2/s^2 (30 min avg for second moments)
sigma_w/u*: ok (1.3 at night)
tc'tc': ok, +/- 0.1 degC ^2
u*: ok, +/- 0.05 m/s
w'tc': ok, +/- 0.025 m/s degC
diag: ok, mostly << 1 but spikes after 12:00 6/30 on downwind-1.

- status
- ahats

Restarted sonic 2b
Tom Horst posted on Jun 30, 2008
Sonic 2b stopped around 18:50 on 6/29; restarted around 16:50 6/30.

- sonic

pressure1 down again
Gordon Maclean posted on Jun 30, 2008
pressure1 died again. pc104 stack dead.

Rearranged the power wiring at downwind1, so that power to all 3 adams are Y'd from the fused load at the charging system battery box. pressure1's power is now direct from the charging sytem instead of from the aux2 power port of downwind1.

Voltage at the battery of the profile tower was 11.2V (it is at the end of a 30 ft cable from the charger at downwind1). Moved that battery over to downwind1. Voltage of the 3 batteries at downwind1 is 12.0, 11.8 and 11.6 V starting at the one nearest the charger.

See a typical value of 10.2 V at the inside interface panels of these adams. Seems low, but things boot. Will watch pressure1.

- ahats
- power

pressure1 down, got usbdisk running on upwind
Gordon Maclean posted on Jun 29, 2008
pressure1 died. No lights on the PC104 stack. It appeared that the fuse was blown on the aux2 power port of downwind1. Replaced it with a 1.5 A. Next day determined that the fuse was OK. This system seems to have a power problem.

Also replaced the aux1 fuse on the downwind1 box. Had to break it to remove it - it was frozen in its bed. aux1 port still doesn't work.

upwind's usbdisk was not mounting. Replaced it. Last data on pocketec was Jan 29 16:41 UTC. Restarted at Jun 30 01:42 UTC

Daily status, June 29
Tom Horst posted on Jun 29, 2008
AHATS daily status 6/29/08

Staff: Maclean, Horst, Tong, Khoung

Summary: Chenning and Khoung working on completion of pressure sensor
deployment. They may not finish until Tuesday since they are waiting
for delivery of tubing connectors. Currently no data from downwind-2
and upwind adams; radio down but should have local data storage.

Good wind direction: For the period 6/25 17:00 through 6/29 08:42, we have
30 hours 10 minutes of data periods of length 20 minutes or longer
with wind directions from 195-355 degrees. This includes 10 periods of
length greater than one hour and equates to good periods 34% ⚠ of the
time. Note that the daytime periods may be compromised by work on the array,
e.g. installing the pressure sensors.

Profiles:
----

spd: ok
dir: ok
u*: ok
w'tc': ok
T: ok
RH: 4m may be low by less than 1% RH
P: okay

Upwind (hts=3.5):

(+/- = ~1 std deviation)

missing sonics from upwind adam after 05:43 6/29

spd: ok, +/- 15 cm/s
dir: ok, +/- 5 deg
tc: ok, +/- 0.25 deg
w'w': ok, +/- 0.015 m^2/s^2 (30 min avg for second moments)
tc'tc': ok, +/- 0.1 degC^2
u*: ok, +/- 0.03 m/s
w'tc': ok, +/- 0.02 m/s degC
diag: ok, mostly << 1 but some spikes that are likely caused by samples
lost during rf transmission; local data storage should be okay.

Lower (hts=3):
----

missing sonics from downwind-2 adam after 05:43 6/29: 7b--13b

spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg
tc: ok, +/- 0.25 deg
w'w': ok, +/- 0.015 m^2/s^2 (30 min avg for second moments)
tc'tc': ok, +/- 0.1 degC ^2
u*: ok, +/- 0.04 m/s
w'tc': ok, +/- 0.02 m/s degC
diag: ok, mostly << 1 but some spikes that are likely caused by samples
lost during rf transmission; local data storage should be okay.

Upper (hts=4):
----

missing sonics from downwind-2 adam after 05:43 6/29: 7t--11t

spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg
tc: ok, +/- 0.2 deg
w'w': ok, +/- 0.015 m^2/s^2 (30 min avg for second moments)
tc'tc': ok, +/- 0.1 degC ^2
u*: ok, +/- 0.04 m/s
w'tc': ok, +/- 0.02 m/s degC
diag: ok, mostly << 1 but some spikes that are likely caused by samples
lost during rf transmission; local data storage should be okay.

- ahats
- status

Time periods working on the pressure measurement system near sonics
Chenning Tong posted on Jun 29, 2008
Chenning and Khuong working on the pressure measurement system at these times:

June 27, 2008:

Morning. Hung the horizontal pressure reference line.
4:45-5:15 PM. Working on the 1/4 in tubing, connecting them to the pressure transducers.

June 28, 2008

9:00-11:00am. Put 1/16 in couplers to the transducers on the lower array. The tubing on the transducer is hard and the coupler cannot be inserted directly, a heat gun was used to melt the tubing in order to insert the coupler.

1:30-3:00 pm. Connected 1/4 tubing to the pressure ports

June 29, 2008

8:30-9:15 am. Connected 1/4 tubing to the pressure ports
8:30-9:30 am. Dug a hole for the reference cylinder

4:00-5:00 pm. Finished connecting the reference lines for the pressure transducers on the lower array. Sealed the reference cylinder. Ready to test the pressure measurement system.

June 30, 2008

9:00-10:10 AM. Buried the reference cylinder. Covered it with a thermal blanket. Ready to test and take data.

July 1

12:00 - 1:00 PM. The straight and T couplers came in. Finished the reference sides of the transducers on the upper array.

- pressure
- sonic

 EantH down, changed all to static addresses
Gordon Maclean posted on Jun 29, 2008
EantH, serving upwind,downwind2 and pressure2, died 12:43 UTC, 5:43 PDT, June 29.

```
12:43:50 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, extensive data loss
```

I rebooted it, and changed it (and all others) to a static IP address. It just died again:

```
16:49:42 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, extensive data loss
```

- ahats
- network

 Status, June 28
Tom Horst posted on Jun 28, 2008
AHATS daily status 6/28/08

Staff: Maclean, Horst, Tong, Khoung

Summary: Replaced 3m profile sonic yesterday. Chenning and Khung working on completion of pressure sensor deployment. Currently no data from downwind 1 and profile adams; radio down but should have local data storage.

Gordon recycled power on the transmitter, but we later discovered that the downwind-1 and pressure-1 adams are not transmitting. Gordon found that the adams were not getting their internet addresses due to outages of the wireless network.

Good wind direction: For the period 6/25 17:00 through 6/28 11:45, we have 24 hours 35 minutes of data periods of length 20 minutes or longer with wind directions from 195-355 degrees. This includes 8 periods of length greater than one hour. Note that the daytime periods may be compromised by work on the array, e.g. installing the pressure sensors.

Profiles:
----

spd: ok
dir:
u*: ok
w'tc': ok
T: ok
RH: 4m may be low by less than 1% RH
P: okay

Upwind (hts=3.5):
------

spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg
tc: ok, +/- 0.5 deg
w'w': ok, +/- 0.02 m^2/s^2 (30 min avg for second moments)
tc'tc': ok, +/- 0.2 degC ^2
u*: ok, +/- 0.1 m/s
w'tc': ok, +/- 0.05 m/s degC
diag: ok, mostly << 1 but some spikes after 0400 this morning

Lower (hts=3):
------

missing sonics from downwind-1 adam after 22:20 6/27: 1b,2b,3b,4b,5b,6b

spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg
tc: ok, +/- 0.5 deg
w'w': ok, +/- 0.02 m^2/s^2 (30 min avg for second moments)tc'tc': ok, +/- 0.2 degC ^2
u*: ok, +/- 0.1 m/s
w'tc': ok, +/- 0.03 m/s degC
diag: ok, mostly << 1 but some spikes after 0500 this morning

Upper (hts=4):
------

missing sonics from downwind-1 adam after 22:20 6/27: 3t,4t,5t,6t

spd: ok, +/- 20 cm/s
dir: ok, +/- 5 deg
tc: ok, +/- 0.5 deg
w'w': ok, +/- 0.02 m^2/s^2 (30 min avg for second moments)
tc'tc': ok, +/- 0.2 degC ^2
u*: ok, +/- 0.1 m/s
w'tc': ok, +/- 0.04 m/s degC
diag: ok, mostly << 1 but some spikes after 0500 this morning

- status
- ahats

[EantG down, changed parameters, fetched data](#)
Gordon Maclean posted on Jun 28, 2008
EantG went down at 05:21:59 UTC. Log file on the ap24eth again mentions "extensive data loss". EantH and EantI (sodar) stayed up.

We power cycled the antenna which brought it back. We also fetched the pocketecs and usb stick from profile, downwind1 and pressure1.

I'm not sure that changing the frequency, as was done earlier, changes anything. After changing the frequency, the Etherants still indicated that they are using channel #1.

Will now try setting the disconnect-timeout parameter to 15 seconds (the maximum allowed value). The default is 3 seconds. Will also increase the on-fail-retry-time to 1/2 second

```
interface wireless set 1 disconnect-timeouot=15s
interface wireless set 1 on-fail-retry-time=500ms
```

Here are the current wireless interface settings:

```
1  R name="wlan2-Ext-Ant" mtu=1500 mac-address=00:15:6D:10:3C:BC arp=enabled
     disable-running-check=no interface-type=Atheros AR5213 radio-name="AP24-ExtAnt"
     mode=ap-bridge ssid="ISFF14" area="" frequency-mode=manual-txpower country=united states
     antenna-gain=0 frequency=2462 band=2.4ghz-b/g scan-list=default rate-set=default
     supported-rates-b=1Mbps,2Mbps,5.5Mbps,11Mbps
     supported-rates-a/g=6Mbps,9Mbps,12Mbps,18Mbps,24Mbps,36Mbps,48Mbps,54Mbps
     basic-rates-b=1Mbps basic-rates-a/g=6Mbps max-station-count=50 ack-timeout=dynamic
     tx-power=25 tx-power-mode=all-rates-fixed noise-floor-threshold=default
     periodic-calibration=default periodic-calibration-interval=60 burst-time=disabled
     dfs-mode=radar-detect antenna-mode=ant-a wds-mode=disabled wds-default-bridge=none
     wds-default-cost=100 wds-cost-range=50-150 wds-ignore-ssid=no
     update-stats-interval=disabled default-authentication=no default-forwarding=yes
     default-ap-tx-limit=0 default-client-tx-limit=0 proprietary-extensions=post-2.9.25
     hide-ssid=yes security-profile=isffwep disconnect-timeout=15s on-fail-retry-time=500ms
     preamble-mode=both compression=no allow-sharedkey=no
```

- ahats
- network

magnetic declination
Tom Horst posted on Jun 27, 2008
I find that the declination for the ahats site (36 deg 1' 15" N, 119 deg 53' 45" W from hats logbook) is 13 deg 40' E. The datascope is set at 13.4 deg E.

- site

Changed 3m profile sonic
Tom Horst posted on Jun 27, 2008
When we raised the 3m sonic, we pinched the cable from the head at the connector (bent it back on itself). This appears to have damaged the cable (high diag and questionable wind direction data), so this morning (June 27) we replaced sonic S/N 0739 with S/N 1124 around 11:30 am.

10/27/08: It appears that S/N 1124 was recalibrated on 7/31/08, so it is possible that these serial numbers are reversed, i.e. we replaced 1124 with 0739.

- sonic
- ahats

Changed profile heights
Tom Horst posted on Jun 27, 2008
Yesterday afternoon, June 26, Kurt and Laura raised 3m and 4m sonics and TRH about a foot to match as-built heights of horizontal array sensors. Will measure actual heights soon.

- ahats
- sonic
- trh

Sonic Locations at Setup for Wide Array
John Militzer posted on Jun 26, 2008
Specific Sonic Locations; Wide Array:

Note: Sensors shown in table organized from Southwest end of array to the Northeast end of the array.

UpWind Array of PAM tripods (spacing nominally 4m, array line parallel to and 16m NW from 'downwind').

	SW								NE
horiz index	11	10	9	8	7	6	5	4	3
3.2m sonic s/n	1122	1123	1121	673	1119	674	677	536	539
upwind serial port	11	10	9	8	7	6	5	2	1

DownWind Array of PAM tripods (spacing nominally 4m). *Height is roughly what we used....confirm this*

Note that sonics 744 (b4), 745 (b 5) and 376 (b6) are plugged into the wrong sequence of ports: downwind-1 ports 8, 6, 7

	SW											NE
horiz index	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
3.2m sonic s/n	741	377	855	538	743	364	671	376	745	744	800	1117	853
downwind (1 or 2) serial port	2-9	2-8	2-7	2-6	2-5	2-2	2-1	1-7	1-6	1-8	1-5	1-2	1-1
Pressure 3.2m			110367	110373	110378	110383	110381	110382	110232	110368	110366		
4.2m sonic s/n			247	366	367	378	540	672	712	856	738		
downwind (1 or 2) serial port			2-14	2-13	2-12	2-11	2-10	1-12	1-11	1-10	1-9		
Pressure 4.2m					110377	110384	110365	110374	110369			

Profile Tower

height (m)	**1.5**	**3**	**4**	**5.5**	**7**	**8**
sonic s/n	0732	0739	0740	0537	0720	0733
profile serial port	1	2	5	6	7	8

I downloaded the sonic configs as follows:

Sequence to download sonic configurations:

```
rserial /dev/ttyS# {downwind1,downwind2,upwind,profile}
```

where # = serial port
T (end data output and enter sonic terminal mode)
??<return> (output configuration)
D (exit terminal mode and restart data output)
<control> D (to get out of rserial)

downwind1
S1: (b1)
ET= 60 ts=i XD=d GN=121a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=ccc d TNb=ccb JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0853 12jun08 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=20347 &=1 os=

S2: (b2)
ET= 60 ts=i XD=d GN=201a TK=1 P=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=adb d TNb=bca JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 X=0 MX=0 DT=02320 ss=1 XP=2 RF=018 DS=007 SN1117 11jun08 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=45458 &=0 os=

S5: (b3)
ET= 60 ts=i XD=d GN=111a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 011 ELb=010 010 008 TNo=eee d TNb=ded JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 9 tlb=8 8 6 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0800 14sep06 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=22282 &=1 os=

S6: (b5) Note scramble of S6 - S8 w.r.t. sonic location
ET= 60 ts=i XD=d GN=100a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=dcf d TNb=ede JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0745 05nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=46481 &=1 os=

S7: (b6) Note scramble of S6 - S8 w.r.t. sonic location
EEProm_sig=28394. Prom_sig=17263. \n>T\n>\r\n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=dde d TNb=dee JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0376 09nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=28394 &=1 os=

S8: (b4) Note scramble of S6 - S8 w.r.t. sonic location
ET= 60 ts=i XD=d GN=112a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=008 010 010 ELb=010 010 010 TNo=eeb d TNb=eec JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=6 8 8 tlb=8 8 8 CA=1 TD= duty=092 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0744 07nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=10244 &=1 os=

S9: (t3)
EEProm_sig=18961. Prom_sig=47942. \n>??\r\nET= 60 ts=i XD=d GN=332a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d sa=1\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=dee d TNb=ded JD=
007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 DTR=01740 CA=1 TD= duty=086   AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320
DTC=01160 RD=o ss=1 XP=2 RF=018 DS=007 SN0738 28mar03 HF=005 JC=3 CB=3 MD=5 DF=05000 RNA=1 rev 3.0a cs=18961 &=1 os=

S10: (t4)
Reset. EEProm_sig=30038. Prom_sig=17263. \n>??D\r\nET= 60 ts=i XD=d GN=210a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0
AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010
ELb=010 010 010 TNo=bcb d TNb=acd JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1
UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0856 14nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=30038 &=1 os=

S11: (t5)
Reset. EEProm_sig=07083. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=311a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0
AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010
ELb=010 010 010 TNo=9cc d TNb=adc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1
UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0712 08nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=07083 &=1 os=

S12: (t6)
EEProm_sig=62873. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=009 010 009 ELb=009 010 009
TNo=bcd d TNb=dcc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=7 8 7 tlb=7 8 7 CA=1 TD= duty=091 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0672 14nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=62873 &=1 os=

downwind2:

S1: (b7)
EEProm_sig=49554. Prom_sig=17263. \n>??D\r\nET= 60 ts=i XD=d GN=131a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0
RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 009 010 ELb=010 009 010
TNo=ecc d TNb=cdd JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 7 8 tlb=8 7 8 CA=1 TD= duty=092 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0671 31oct07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=49554 &=1 os=

S2: (b8)
ET= 60 ts=i XD=d GN=121a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d sa=1\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=eed d TNb=ded JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8
tlb=8 8 8 DTR=01740 CA=1 TD= duty=084   AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 DTC=01160 RD=o ss=1 XP=2 RF=018 DS=007
SN0364 27may04 HF=005 JC=3 CB=3 MD=5 DF=05000 RNA=1 rev 3.0a cs=14725 &=1 os=

S5: (b9)
EEProm_sig=21246. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=201a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=007 010 010 ELb=010 010 010
TNo=8cd d TNb=adc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=5 8 8 tlb=8 8 8 CA=1 TD= duty=091 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0743 07nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=21246 &=1 os=

S6: (b10)
EEProm_sig=27043. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=221a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=dde d TNb=cce JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0538 02aug06 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=27043 &=1 os=

S7: (b11)
EEProm_sig=47381. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=221a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 011 010 ELb=011 010 010
TNo=ebe d TNb=ebd JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 9 8 tlb=9 8 8 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0855 01nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=47381 &=1 os=

S8: (b12)
EEProm_sig=60173. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=112a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=ede d TNb=ede JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0377 12jan07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=60173 &=1 os=

S9: (b13)
EEProm_sig=04641. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=111a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=008 010 010 ELb=010 010 008
TNo=ecc d TNb=dbc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=6 8 8 tlb=8 8 6 CA=1 TD= duty=089 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0741 31oct07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=04641 &=1 os=

S10: (t7)
EEProm_sig=38472. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=111a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=edc d TNb=ddd JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0540 14nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=38472 &=1 os=

S11: (t8)
EEProm_sig=38141. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=221a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=ede d TNb=edd JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0378 01nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=38141 &=1 os=

s12: (t9)
EEProm_sig=29072. Prom_sig=47942. \n>??\r\nET= 60 ts=i XD=d GN=212a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d sa=1\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=cce d TNb=cad JD=
007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 DTR=01740 CA=1 TD= duty=086   AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320
DTC=01160 RD=o ss=1 XP=2 RF=018 DS=007 SN0367 2D8may04 HF=005 JC=3 CB=3 MD=5 DF=05000 RNA=1 rev 3.0a cs=29072 &=1 os=

S13: (t10)
EEProm_sig=27999. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=009 010 010
TNo=efd d TNb=ffe JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=7 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0366 05nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=27999 &=1 os=

S14: (t11)
EEProm_sig=51601. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=dbc d TNb=cbc JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0247 20oct06 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=51601 &=1 os=

upwind:

S1: (u3)
EEProm_sig=05088. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=211a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=dfd d TNb=dee JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0539 06nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=05088 &=1 os=

S2: (u4)
ET= 60 ts=i XD=d GN=101a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=ecf d TNb=eee JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2
RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0536 06nov07 JC=3
CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=40143 &=1 os=

S5: (u5)
EEProm_sig=06092. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=221a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=cce d TNb=dce JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=095 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0677 30oct07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=06092 &=1 os=

S6: (u6)
EProm_sig=60317. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 009 ELb=009 009 010
TNo=9de d TNb=7ed JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 7 tlb=7 7 8 CA=1 TD= duty=091 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0674 09nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=60317 &=1 os=

S7: (u7)
ET= 60 ts=i XD=d GN=111a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2
SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=dbc d TNb=dcd JD= 007\r\nC0o=-2-2-2 C0b=-2-2-
2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1119 19nov07
JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=59940 &=1 os=

s8: (u8)
EProm_sig=59504. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=223a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=009 010 010 ELb=009 010 009
TNo=fdc d TNb=ddd JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=7 8 8 tlb=7 8 7 CA=1 TD= duty=092 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0673 13nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=59504 &=1 os=

S9: (u9)
EEProm_sig=52525. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=111a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=ada d TNb=ad8 JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1121 26jun06 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=52525 &=1 os=

S10: (u10)
EEProm_sig=59030. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=011a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010
TNo=dde d TNb=eed JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1123 06nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=59030 &=1 os=

S11: (u11)
EEProm_sig=29356. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=121a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1
BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 011 010 ELb=010 011 010
TNo=ccd d TNb=ccd JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 9 8 tlb=8 9 8 CA=1 TD= duty=096 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0
DTU=02320 ss=1 XP=2 RF=018 DS=007 SN1122 19jun06 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=29356 &=1 os=

profile

S1: (1.5m)
EEProm_sig=39009. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=000a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=ecf d TNb=ddf JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0732 16nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=39009 &=1 os=

S2: (3m)
ET= 60 ts=i XD=d GN=110a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=009 009 010 ELb=009 009 010 TNo=eee d TNb=eee JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=7 7 8 tlb=7 7 8 CA=1 TD= duty=089 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0739 05jun08 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=43113 &=1 os=

S5: (4m)
EEProm_sig=26065. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=201a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 010 TNo=bed d TNb=bed JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 8 8 CA=1 TD= duty=094 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0740 15nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=26065 &=1 os=

S6: (5.5m)
EEProm_sig=33258. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=121a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 009 010 ELb=010 010 010 TNo=eee d TNb=ede JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 7 8 tlb=8 8 8 CA=1 TD= duty=093 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0537 01sep06 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=33258 &=1 os=

S7: (7m)
EEProm_sig=08513. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=222a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 010 ELb=010 010 008 010 TNo=deb d TNb=beb JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 8 tlb=8 6 8 CA=1 TD= duty=092 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0720 05nov07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=08513 &=1 os=

S8: (8m)
EEProm_sig=43188. Prom_sig=17263. \n>??\r\nET= 60 ts=i XD=d GN=010a TK=1 UP=5 FK=0 RN=1 IT=1 DR=102 rx=2 fx=038 BX=0 AH=1 AT=0 RS=1 BR=0 RI=1 GO=00000 HA=0 6X=3 3X=2 PD=2 SD=0 ?d tf=02600 02600 02600\r\nWM=o ar=0 ZZ=0 DC=1 ELo=010 010 008 ELb=010 010 008 TNo=ede d TNb=edd JD= 007\r\nC0o=-2-2-2 C0b=-2-2-2 RC=0 tlo=8 8 6 tlb=8 8 6 CA=1 TD= duty=088 AQ= 60 AC=1 CD=0 SR=1 UX=0 MX=0 DTU=02320 ss=1 XP=2 RF=018 DS=007 SN0733 25oct07 JC=3 CB=3 MD=5 DF=05000 RNA=1 sa=1 rev 3.0f cs=43188 &=1 os=

- ahats
- sonic
- pressure

wifi down (changed freq to 2462 MHz)
Gordon Maclean posted on Jun 25, 2008
The wifi network went down at 01:19 UTC, Jun 26. Here are the log entries from the AP24:

```
jun/25 17:01:32 dhcp,info,debug wlan2-dhcp1 assigned 192.168.14.39 to 00:20:F6:05:24:7F
jun/25 17:17:51 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: disconnected, reassociating
jun/25 17:17:51 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: connected
jun/25 17:25:08 dhcp,info,debug wlan2-dhcp1 deassigned 192.168.14.245 from 00:12:3F:F6:73:20
jun/25 23:52:39 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, reassociating
jun/25 23:52:39 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: connected
01:19:47 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: disconnected, reassociating
01:19:47 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: connected
01:25:49 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, reassociating
01:25:49 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: connected
01:35:13 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: disconnected, extensive data loss
01:35:15 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: connected
01:40:47 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, reassociating
01:40:47 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: connected
01:45:38 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: disconnected, reassociating
01:45:38 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: connected
01:58:15 wireless,info 00:20:F6:05:24:85@wlan2-Ext-Ant: disconnected, extensive data loss
02:01:23 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: disconnected, reassociating
02:01:23 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: connected
02:04:14 wireless,info 00:20:F6:05:24:7F@wlan2-Ext-Ant: disconnected, extensive data loss
02:26:13 system,info,account user admin logged in from 192.168.13.1 via ssh
```

The mac address ending in 24:7F is EantG and 24:85 is EantH. Both show "extensive data loss".

EantG also died last night - perhaps in a similar manner.

A frequency scan on the AP24 doesn't show any current interference. The external antenna on the AP24 is using frequency 2437 MHz.

```
interface wireless frequency-monitor 1
FREQ          USE
2412MHz       0%
2417MHz       0.4%
2422MHz       0%
2427MHz       0.2%
2432MHz       0.4%
2437MHz       1.8%
2442MHz       0%
2447MHz       0.6%
2452MHz       0.2%
2457MHz       0.5%
2462MHz       0.4%
```

Will change it to 2462 MHz (as a hack), power cycle the Eants and go home...

```
 interface wireless set 1 frequency 2462
```

- ahats
- network

[ntp timekeeping](#)
Gordon Maclean posted on Jun 25, 2008
Use the **ntpq -p** command on the aster system to check on the status of NTP on the various data systems. It is also a good check of the general health of the network:

```
ntpq -p
     remote           refid      st t when poll reach   delay   offset  jitter
==============================================================================
+profile.isff.uc GPS_NMEA(0)      3 u  271  512  377    2.572   -0.413   2.746
+downwind1.isff. GPS_NMEA(0)      3 u  209  512  377    2.544   -0.496   0.983
-downwind2.isff. GPS_NMEA(0)      3 u  283  512  377    2.571   -0.373   0.033
*upwind.isff.uca GPS_NMEA(0)      3 u  175  512  377    2.548   -0.446   0.726
+pressure1.isff. GPS_NMEA(0)      3 u  445  512  377    2.529   -0.503   0.126
+pressure2.isff. GPS_NMEA(0)      3 u  219  512  377    2.603   -0.413   0.659
-gatexfer-4.ucar 143.25.232.51    3 u  247  512  377  748.012   -4.281 108.822
 LOCAL(0)        .LOCL.          10 l   15   64  377    0.000    0.000   0.001
```

The offset column shows the millisecond difference between the aster system clock and the clocks on the various data systems. The above shows good agreement between all systems. I'm hoping that the offset values will stay within a millisecond of each other.

A value of 377 in the reach column indicates that the last 8 attempts to reach the system were successful (octal 377 is 11111111 binary). If this is other than 377, then either the network or the remote system is sick.

 The poll column lists the number of seconds between NTP polls. NTP will adjust this value depending on the stability of the various clocks. "when" is the current counter. When it reaches the value for "poll", a system will be polled, and new values for the clock parameters will be displayed.

gatexfer-4.ucar is a NTP system at UCAR. Since it is reached via the satellite link, it will have a large and varying delay, and is just a crude reference.

LOCAL is the local system clock, which is being synchronized to the remote systems. A host with a "*" in the first column is the current synchronization host. Systems with a "+" are considered good candidates for synchronization. Systems with a "-" are considered less trustworthy.

- ahats
- network
- ntp

[Wifi To Array](#)
Gordon Maclean posted on Jun 24, 2008

We're using two etherants:

1. etherant G on the profile tower
   a. connected to hub in profile data system
   b. serves profile, downwind1 and pressure1 data systems
2. etherant G on the downwind tower # 10
   a. connected to hub in downwind2
   b. serves downwind2, upwind and pressure2

Currently seeing about 25 dB of signal from both antennas. signal -65 dBm, noise -90 dBm.

These etherants are served from wlan2-Ext-Ant on the AP24.

```
[admin@Alico] ip> ..
[admin@Alico] > interface wireless
[admin@Alico] interface wireless> print
Flags: X - disabled, R - running
 0 X  name="wlan1-Int-Ant" mtu=1500 mac-address=00:15:6D:10:29:B2 arp=enabled disable-running-check=no
interface-type=Atheros AR5213 radio-name="AP24-IntAnt" mode=ap-bridge
     ssid="ISFF12" area="" frequency-mode=manual-txpower country=united states antenna-gain=25 frequency=2412
band=2.4ghz-b/g scan-list=default rate-set=default
     supported-rates-b=1Mbps,2Mbps,5.5Mbps,11Mbps supported-rates-a/g=6Mbps,9Mbps,12Mbps,18Mbps,24Mbps,36Mbps,
48Mbps,54Mbps basic-rates-b=1Mbps basic-rates-a/g=6Mbps
     max-station-count=50 ack-timeout=dynamic tx-power=13 tx-power-mode=all-rates-fixed noise-floor-
threshold=default periodic-calibration=default
     periodic-calibration-interval=60 burst-time=disabled dfs-mode=radar-detect antenna-mode=ant-b wds-
mode=disabled wds-default-bridge=none wds-default-cost=100
     wds-cost-range=50-150 wds-ignore-ssid=no update-stats-interval=disabled default-authentication=no default-
forwarding=no default-ap-tx-limit=0
     default-client-tx-limit=0 proprietary-extensions=post-2.9.25 hide-ssid=yes security-profile=isffwep
disconnect-timeout=3s on-fail-retry-time=100ms preamble-mode=both
     compression=no allow-sharedkey=no

 1  R name="wlan2-Ext-Ant" mtu=1500 mac-address=00:15:6D:10:3C:BC arp=enabled disable-running-check=no
interface-type=Atheros AR5213 radio-name="AP24-ExtAnt" mode=ap-bridge
     ssid="ISFF14" area="" frequency-mode=manual-txpower country=united states antenna-gain=0 frequency=2437
band=2.4ghz-b/g scan-list=default rate-set=default
     supported-rates-b=1Mbps,2Mbps,5.5Mbps,11Mbps supported-rates-a/g=6Mbps,9Mbps,12Mbps,18Mbps,24Mbps,36Mbps,
48Mbps,54Mbps basic-rates-b=1Mbps basic-rates-a/g=6Mbps
     max-station-count=50 ack-timeout=dynamic tx-power=25 tx-power-mode=all-rates-fixed noise-floor-
threshold=default periodic-calibration=default
     periodic-calibration-interval=60 burst-time=disabled dfs-mode=radar-detect antenna-mode=ant-a wds-
mode=disabled wds-default-bridge=none wds-default-cost=100
     wds-cost-range=50-150 wds-ignore-ssid=no update-stats-interval=disabled default-authentication=no default-
forwarding=no default-ap-tx-limit=0
     default-client-tx-limit=0 proprietary-extensions=post-2.9.25 hide-ssid=yes security-profile=isffwep
disconnect-timeout=3s on-fail-retry-time=100ms preamble-mode=both
     compression=no allow-sharedkey=no
```

- ahats
- network

Data Systems
Gordon Maclean posted on Jun 24, 2008
Initial AHATS data system configuration. Note: this was changed later, see changed serial cards at upwind, downwind2

name	viper #	box	IP	tower	net link	serial #0	serial #1
profile	3	6	192.168.14.103	profile	eantg	8P W274095	8M 240017
downwind1	6	14	192.168.14.106	d4	hub in profile	8M W249918	8M 250043
downwind2	1	13	192.168.14.101	d10	eanth	8P W274177	8M W249924
upwind	2	1	192.168.14.102	u7	hub in downwind2	8P W274198	8M W240025
pressure1	10	small	192.168.14.110	d4	hub in profile		
pressure2	11	large	192.168.14.111	d10	hub in downwind2		

To prevent the AP24 from serving addresses to the vipers, I entered these commands:

```
ip dhcp-server lease
add mac-address 00:80:66:10:43:96 block-access=yes
add mac-address 00:80:66:10:43:8C block-access=yes
add mac-address 00:80:66:10:43:92 block-access=yes
add mac-address 00:80:66:10:43:8D block-access=yes
add mac-address 00:80:66:10:43:C5 block-access=yes
add mac-address 00:80:66:10:42:A6 block-access=yes
add mac-address 00:80:66:10:43:96 block-access=yes
```

- data-system
- network

Local Data storage
Gordon Maclean posted on Jun 05, 2008
We have 6 pocketecs for local storage. (Originally we had 8, one died, and one is at Marshall I believe)

 Let's use the pocketecs for the 4 sonic adams.

 The pressure adams will generate about 290 Mbyte/day (24 bytes/sample, 10 samples/sec, 14 channels). So for the pressure systems, let's use 4 Gbyte usb pen drives.

- data-system

ADAM Power Consumption
John Militzer posted on Jun 04, 2008
6/4/08 Adams up and running for checkout.

One of the power supplies running 3 adams died.   It suffered from thermal shutdown and dropped its output to 4vdc killing the adams.   It's rating is 12Ain and was operating in the wind tunnel: not encouraging given prospects in central valley.   After letting it cool, we restarted and measured the following currents and measured the profile adam running on a second supply:

Adam	Amps	A-total	VDC	Comments
downwind 1	2.3	2.3	13.6	10 sonics
upwind	2.8	5.1	13.6	1x sonics, & etherant worth ~. 3
downwind 2	2.9	8	13.6	12 sonics
profile	2.5		12.6	3-trh, licor

We put a 3rd supply to split the larger load.

- power