array 4 boom angles

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	Boo
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								