

Sonic Offset Corrections

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 1 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 18 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