

Sonic boom sag

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