Appendix F: Analysis of SF_6 Concentration Data for Test 6

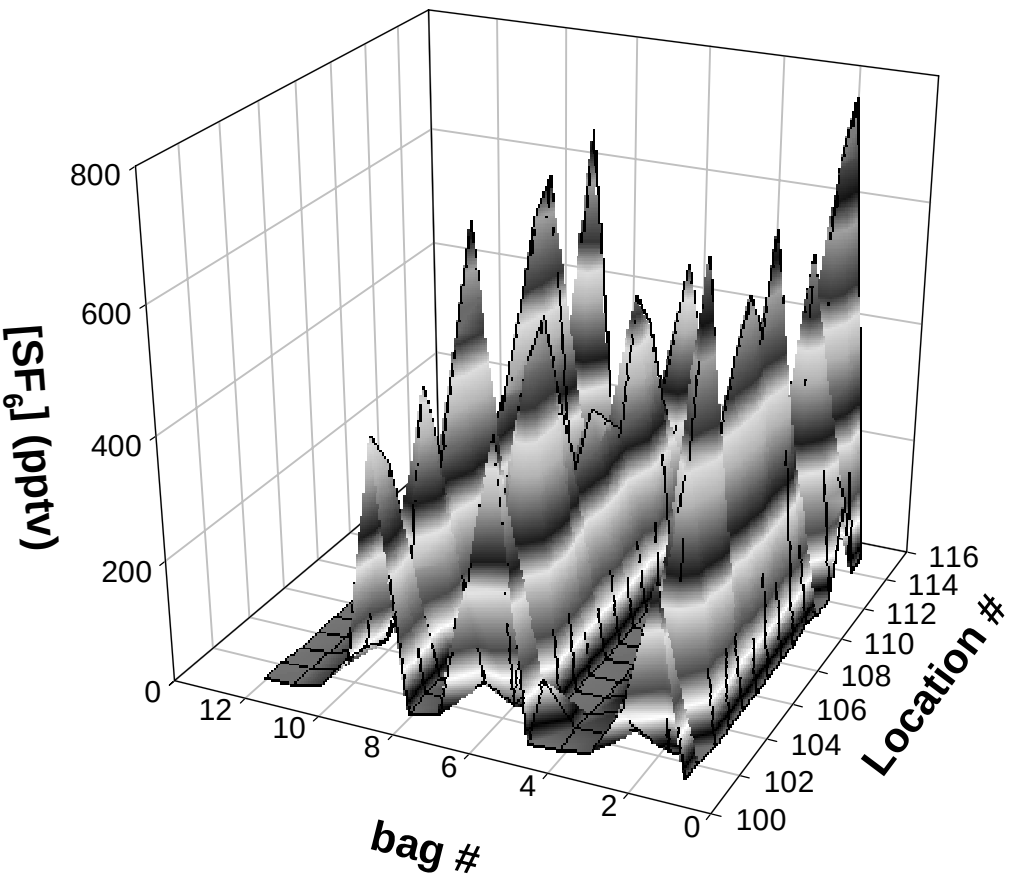

Figure F1. Whole air sampler data for Test 6, Line 1.

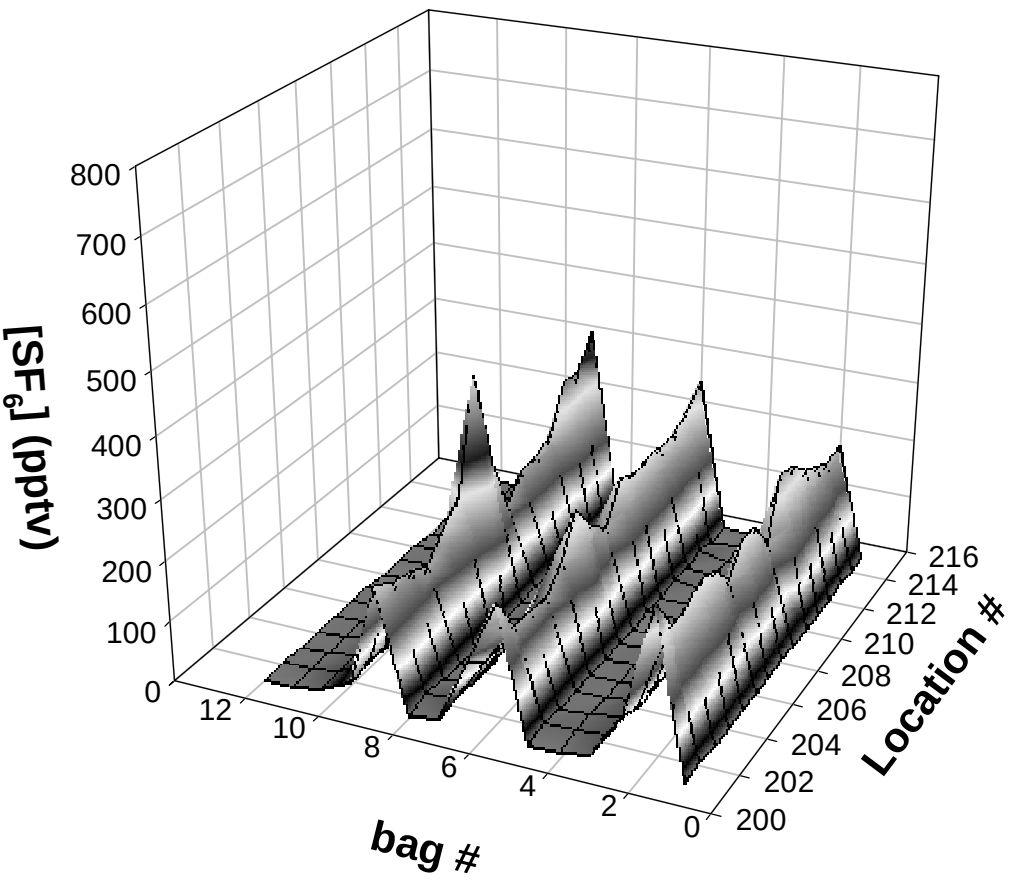

Figure F2. Whole air sampler data for Test 6, Line 2.

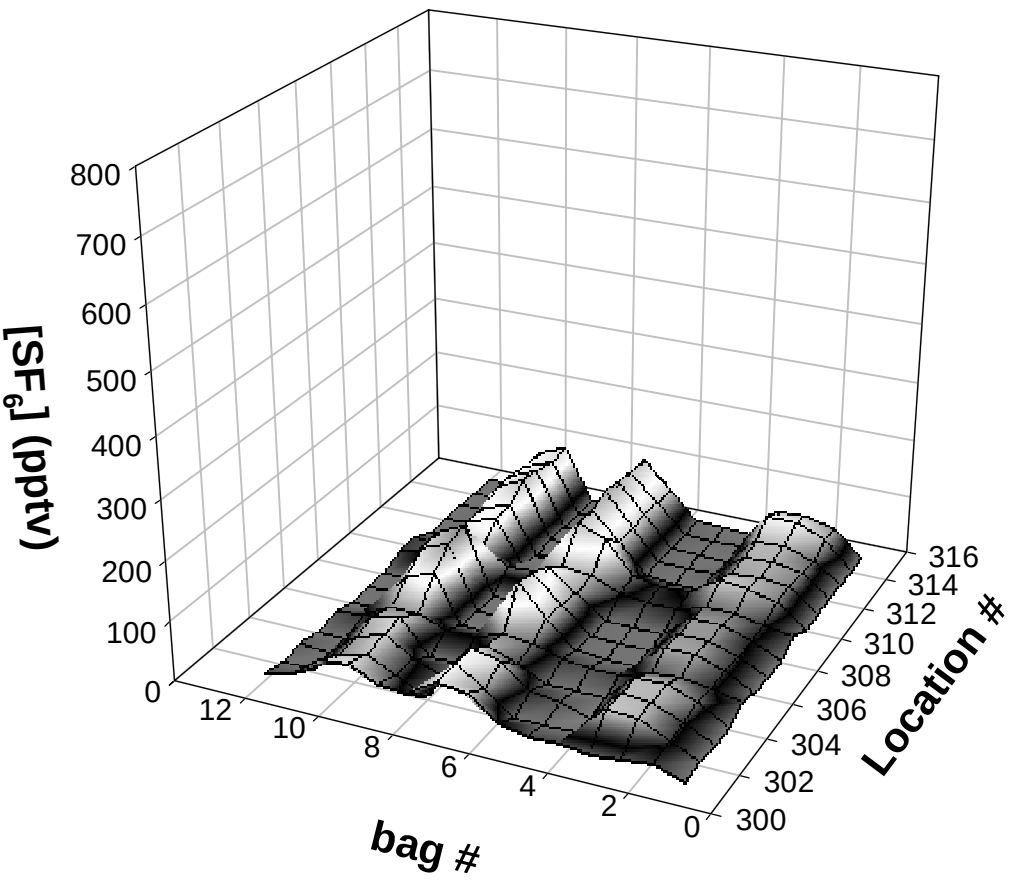

Figure F3. Whole air sampler data for Test 6, Line 3.

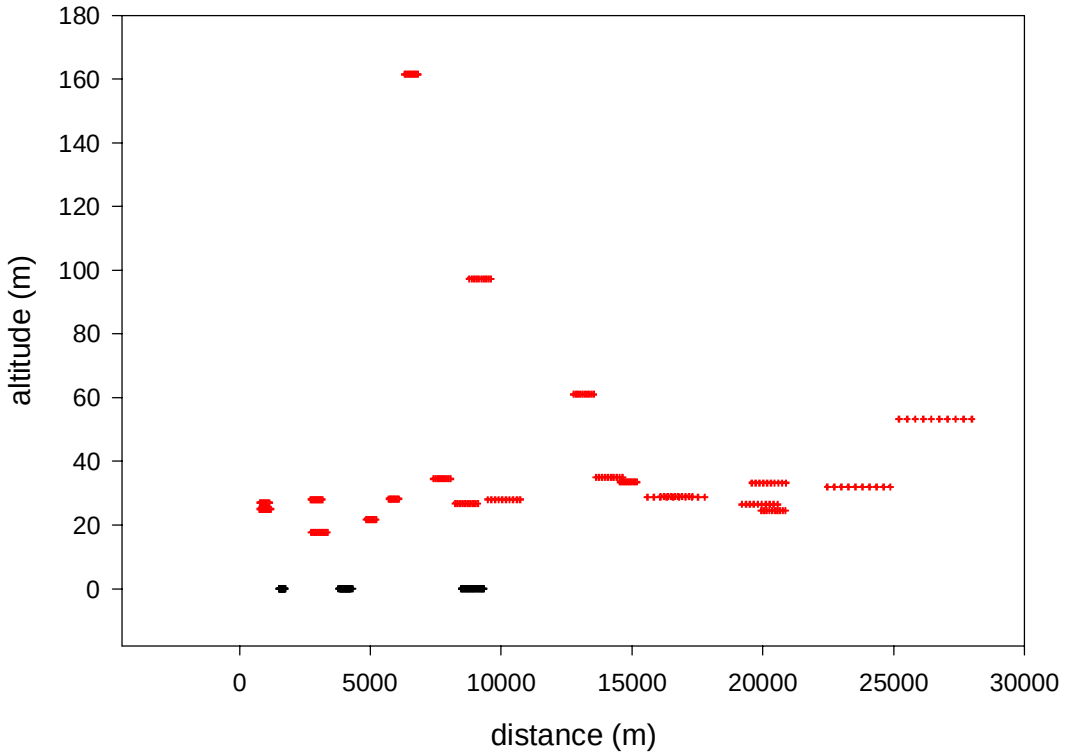

Figure F4. Test 6 continuous analyzer data. Altitude versus downwind distance. The red crosses are aircraft measurements. The black crosses are ground measurements at sampling Lines 1, 2, and 3. The width is ± 1σ from the position of peak concentration.

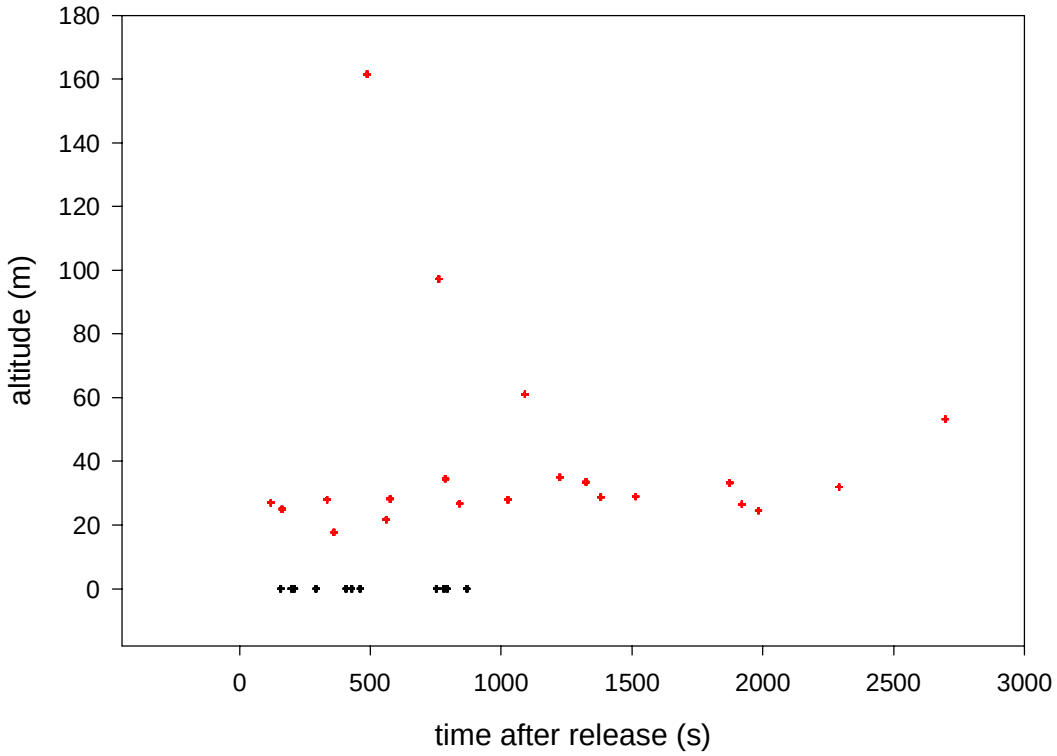

Figure F5. Test 6 continuous analyzer data. Altitude versus time after release. The red crosses are aircraft measurements. The black crosses are ground measurements at sampling Lines 1, 2, and 3.

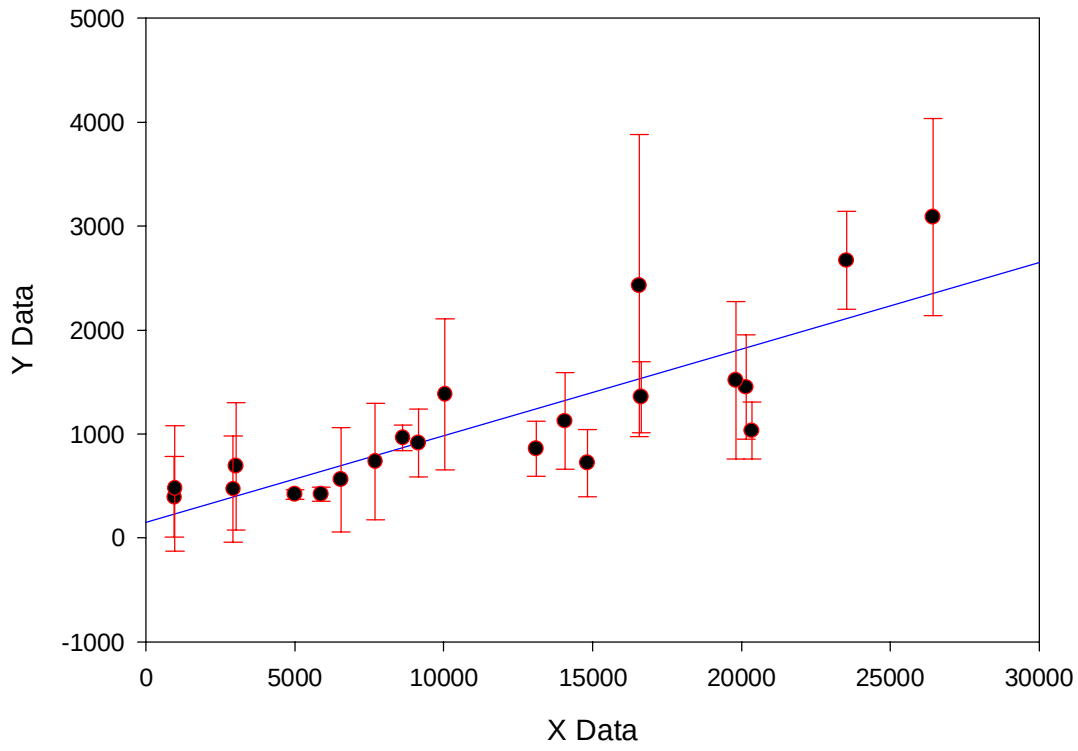

Figure F6. Test 6 σ_x versus downwind distance from aircraft continuous analyzer measurements. The blue line is a linear fit to the data with the equation $\sigma_x = (0.08 \pm 0.01)\, x + (150 \pm 20)$, $r^2 = 0.7$.

Table F1. Test 6 sampling line SF_6 concentration variability.

ID	WS ($m\ s^{-1}$)	σ_{ws} ($m\ s^{-1}$)	θ (deg)	σ_θ (deg)	mrsd	σ_{mrsd}	N
Line 100	5.7	0.9	133	6	0.3	0.2	12
Line 200	5.8	1.0	133	6	0.3	0.2	12
Line 300	5.7	1.0	134	6	0.3	0.2	12
All					0.3	0.2	36
0 - 100 pptv					0.3	0.2	29
100 - 500 pptv					0.3	0.1	7
> 500 pptv							

Table F2. Test 6 sampling line SF_6 concentration variability by line for each sampling bag.

Line 100				Line 200				Line 300			
Bag	Mean SF_6 (pptv)	σ_{SF6} (pptv)	rsd	Bag	Mean SF_6 (pptv)	σ_{SF6} (pptv)	rsd	Bag	Mean SF_6 (pptv)	σ_{SF6} (pptv)	rsd
1	4	1	0.2	1	4	1	0.3	1	4	1	0.2
2	520	264	0.5	2	227	31	0.1	2	34	8	0.2
3	4	1	0.1	3	4	1	0.3	3	59	20	0.3
4	5	3	0.5	4	4	2	0.4	4	4	2	0.4
5	4	1	0.2	5	4	3	0.7	5	4	1	0.1
6	430	173	0.4	6	231	40	0.2	6	3	2	0.5
7	5	1	0.1	7	5	1	0.3	7	99	23	0.2
8	5	1	0.3	8	5	2	0.4	8	5	3	0.7
9	428	182	0.4	9	226	69	0.3	9	4	1	0.2
10	5	2	0.3	10	5	2	0.3	10	106	32	0.3
11	4	2	0.5	11	4	1	0.2	11	4	2	0.4
12	5	1	0.2	12	4	2	0.5	12	4	1	0.1

Table F3. Test 6 SF_6 transport parameters from ground-based continuous analyzers for plume #1.

	Location					
	101	115	201	215	301	315
WS (m s^{-1})	5.7		5.8		5.7	
σ_{ws} (m s^{-1})	0.9		1.0		1.0	
θ (deg)	133		133		134	
σ_θ (deg)	6		6		7	
V_{SF6} (m s^{-1})	10	7.8	13.8	8.8	11.8	11.2
Error Limit V_{SF6} (m s^{-1})	1	0.2	0.3	0.1	0.7	0.7
σ_x (m)	239	213	609	379	914	933
Error Limit σ_x (m)	33	13	43	10	73	68
SF_6 Transport Time (s)	158	207	293	461	752	793
Error Limit SF_6 Transport Time (s)	16	3	7	7	48	48
SF_6 Peak (pptv)	4565	10230	1445	2506	415	407
Error Limit SF_6 Peak (pptv)	463	620	99	53	21	16

Table F4. Test 6 SF_6 transport parameters from ground-based continuous analyzers for plume #2.

	Location					
	101	115	201	215	301	315
WS (m s^{-1})	6.1		5.7		6.4	
σ_{ws} (m s^{-1})	1		1		1	
θ (deg)	147		133		147	
σ_θ (deg)	5.1		6		5	
V_{SF6} (m s^{-1})	8.2	7.7	10	9.5	11.5	10.3
Error Limit V_{SF6} (m s^{-1})	0.2	0.2	0.1	0.1	0.1	0.2
σ_x (m)	247	215	491	422	960	846
Error Limit σ_x (m)	109	23	234	50	540	316
SF_6 Transport Time (s)	198	211	408	429	781	869
Error Limit SF_6 Transport Time (s)	2	3	3	3	7	16
SF_6 Peak (pptv)	6836	10813	2440	2180	421	493
Error Limit SF_6 Peak (pptv)	2100	1141	823	240	161	136

Table F5. Test 6 SF_6 transport parameters from ground-based continuous analyzers for plume #3.

	Location					
	101	115	201	215	301	315
WS (m s^{-1})	6.7		6.8		6.8	
σ_{ws} (m s^{-1})	1.0		1.0		1.0	
θ (deg)	149		149		149	
σ_θ (deg)	5		5		5	
V_{SF6} (m s^{-1})	8.5	8.3	8.9	11.2	10.9	9.9
Error Limit V_{SF6} (m s^{-1})	0.3	0.2	0.1	0.1	0.1	0.1
σ_x (m)	182	165	476	454	750	583
Error Limit σ_x (m)	20	7	280	30	489	62
SF_6 Transport Time (s)	193	200	460	365	830	908
Error Limit SF_6 Transport Time (s)	5	2	4	4	9	12
SF_6 Peak (pptv)	7036	13862	1601	2574	354	667
Error Limit SF_6 Peak (pptv)	730	600	1061	160	161	64

Table F6. Test 6 SF_6 transport parameters (release 1) from aircraft continuous analyzer.

	Pass							
	1	2	3	4	5	6	7	8
SF_6 Speed ($m\ s^{-1}$)	13.4	11.9	12.0	11.9	10.7	10.2	9.8	
Error SF_6 Speed ($m\ s^{-1}$)	0.80	0.05	0.00	0.60	0.30	0.06	0.40	
σ_x (m)	560	910	860	2430	1450	2670	3090	
Error σ_x (m)	500	330	260	1450	500	470	950	
Peak Detection Time (s)	490	760	1090	1380	1870	2290	2700	
Error Peak Detection Time (s)	8	2	2	12	12	3	19	
Peak Concentration (pptv)	100	250	190	140	110	110	110	
Error Peak Concentration (pptv)	90	90	50	90	40	10	30	
Altitude (m)	160	100	60	30	30	30	50	
Downwind Distance (m)	6500	9100	13100	16600	20200	23500	26400	
Error Downwind Distance (m)	400	40	40	900	600	100	1100	

Table F7. Test 6 SF_6 transport parameters (release 2) from aircraft continuous analyzer.

	Pass							
	1	2	3	4	5	6	7	8
SF_6 Speed ($m\ s^{-1}$)	7.8	8.3	10.2	10.2	11.4	10.9	10.3	
Error SF_6 Speed ($m\ s^{-1}$)	0.00	0.10	0.04	0.04	0.00	0.07	0.20	
σ_x (m)	400	700	420	960	1130	1360	1520	
Error σ_x (m)	390	610	70	120	460	340	760	
Peak Detection Time (s)	120	360	580	840	1220	1510	1920	
Error Peak Detection Time (s)	2	2	2	2	2	3	9	
Peak Concentration (pptv)	5400	3180	1240	470	230	170	170	
Error Peak Concentration (pptv)	3700	1530	150	40	70	40	60	
Altitude (m)	30	20	30	30	40	30	30	
Downwind Distance (m)	900	300	2900	8600	14100	16600	19800	
Error Downwind Distance (m)	0.0	0.03	0.02	0.03	0.0	0.1	0.5	

Table F8. Test 6 SF_6 transport parameters (release 3) from aircraft continuous analyzer.

	Pass							
	1	2	3	4	5	6	7	8
SF_6 Speed ($m\ s^{-1}$)	5.9	8.7	8.9	9.7	9.7	11.1	10.2	
Error SF_6 Speed ($m\ s^{-1}$)	0.20	0.30	0.06	0.08	0.03	0.10	0.10	
σ_x (m)	480	470	420	740	1380	720	1030	
Error σ_x (m)	600	510	50	560	730	320	270	
Peak Detection Time (s)	160	340	560	790	1030	1320	1980	
Error Peak Detection Time (s)	2	3	2	3	2	4	4	
Peak Concentration (pptv)	5740	1860	2380	1000	580	220	270	
Error Peak Concentration (pptv)	3460	1000	110	450	200	80	60	
Altitude (m)	30	30	20	30	30	30	20	
Downwind Distance (m)	1000	2900	5000	7700	10000	14800	20400	
Error Downwind Distance (m)	40	130	40	70	40	170	200	