Appendix G: Analysis of SF_6 Concentration Data for Test 9

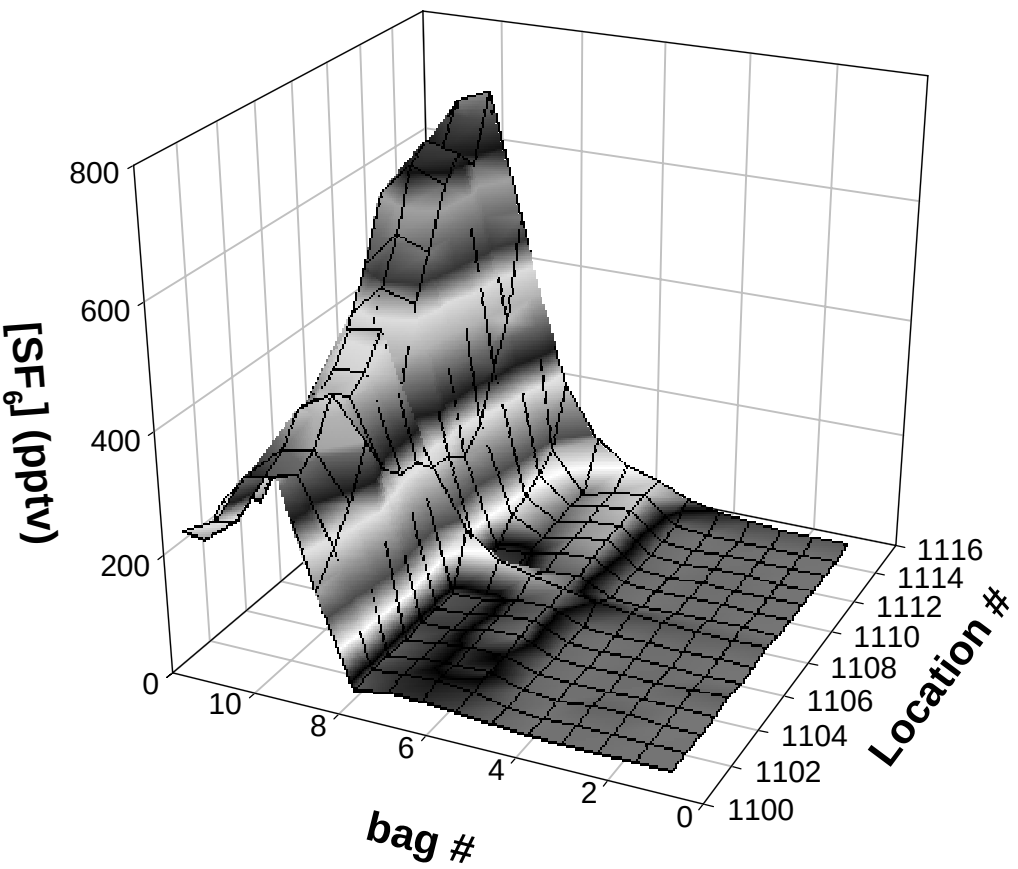

Figure G1. Whole air sampler data for Test 9, Line 1.

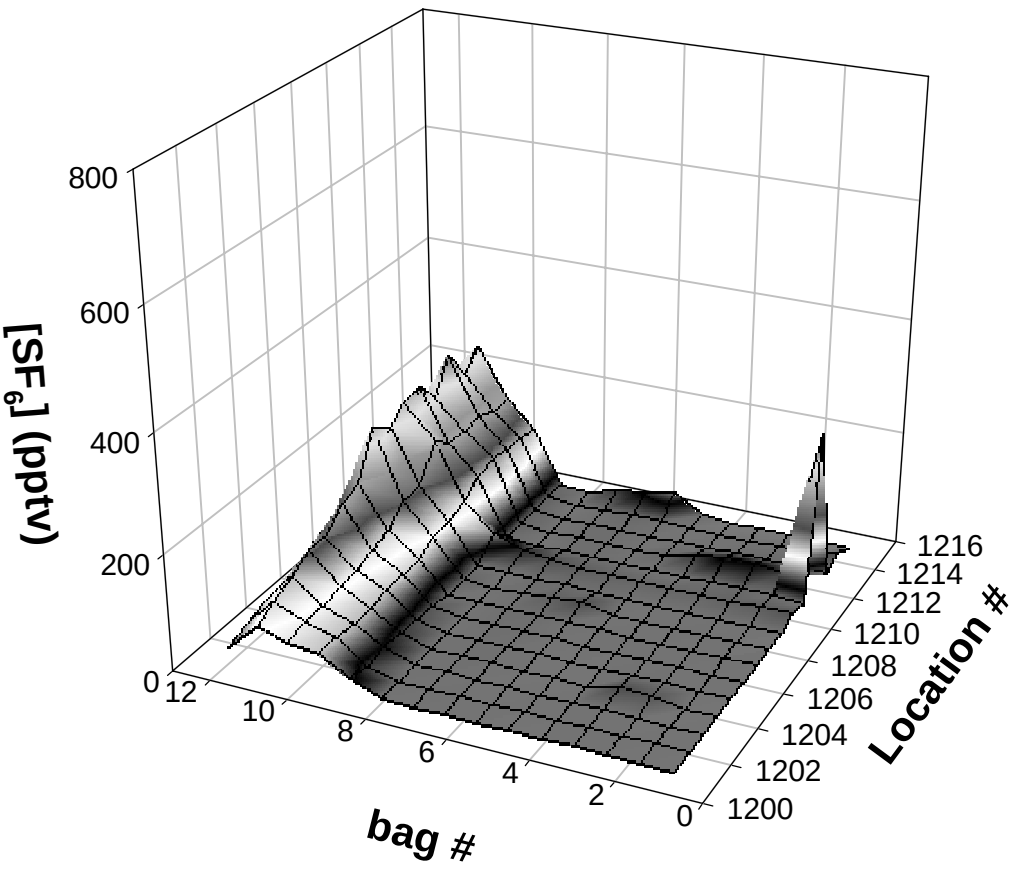

Figure G2. Whole air sampler data for Test 9, Line 2.

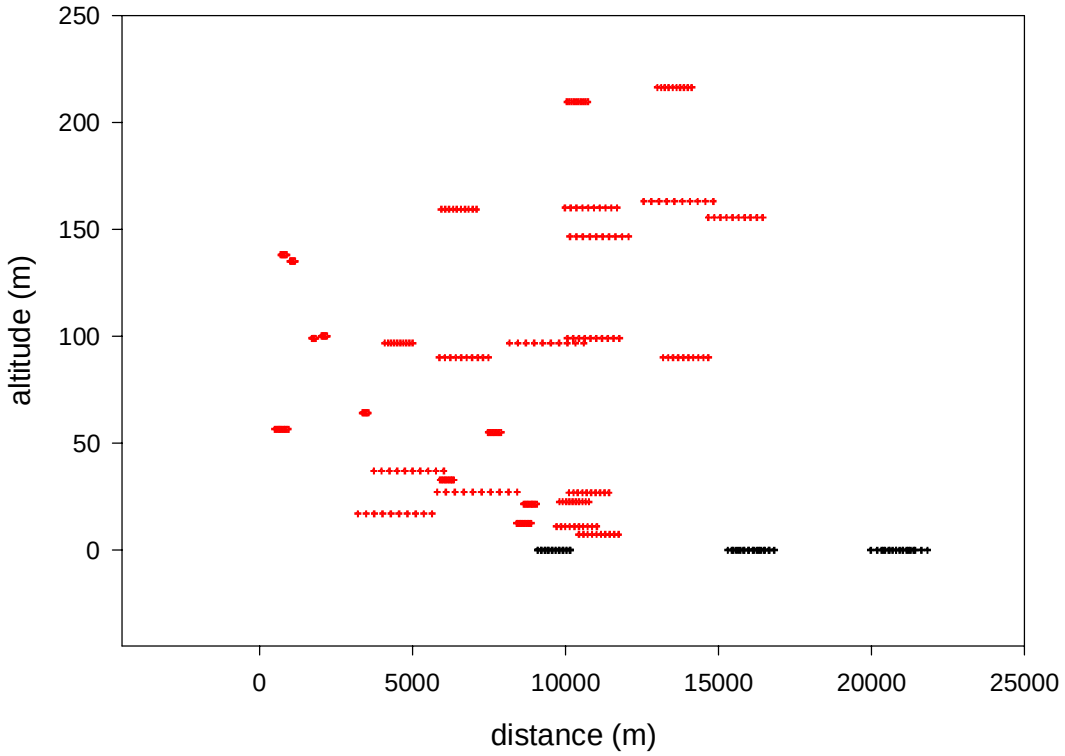

Figure G3. Test 9 continuous analyzer data. Altitude versus downwind distance. The red crosses are aircraft measurements. The black crosses are ground measurements at sampling Lines 1, 2, and 3. The width is ± 1σ from the position of peak concentration.

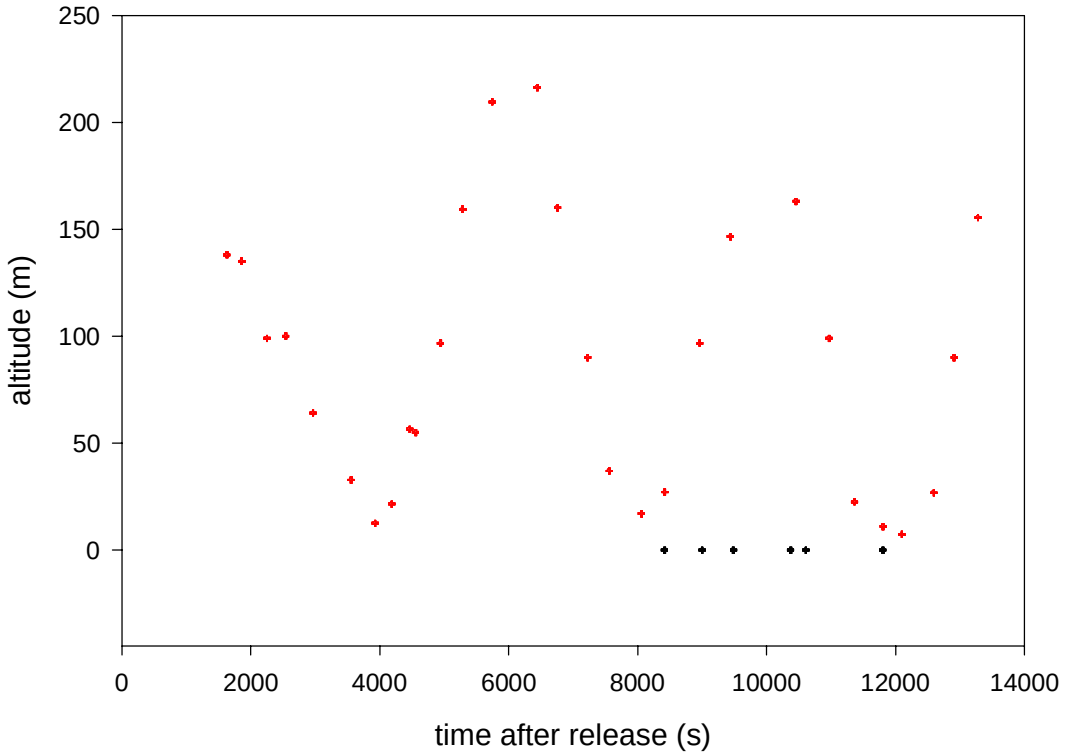

Figure G4. Test 9 continuous analyzer data. Altitude versus time after release. The red crosses are aircraft measurements. The black crosses are ground measurements at sampling Lines 1, 2 and 3.

Table G1. Test 9 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	1.5	1.0	150	41	0.4	0.2	12
Line 200	1.5	1.0	150	42	0.8	0.8	12
Line 300	1.5	1.0	150	42	0.3	0.3	12
All					0.5	0.5	36
0 - 100 pptv					0.5	0.6	30
100 - 500 pptv					0.4	0.7	6
> 500 pptv							

Table G2. Test 9 sampling line SF_6 concentration variability by line for each sampling bag.

Line 1100				Line 1200				Line 1300			
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	5	2	0.4	1	24	73	3.0	1	4	0	0.1
2	5	4	0.8	2	5	3	0.6	2	4	0	0.1
3	5	2	0.4	3	7	9	1.2	3	4	0	0.1
4	4	1	0.1	4	5	4	0.8	4	5	3	0.6
5	8	1	0.1	5	4	1	0.2	5	4	1	0.2
6	36	17	0.5	6	5	4	0.7	6	4	0	0.1
7	17	4	0.2	7	4	0	0.1	7	4	1	0.3
8	35	33	0.9	8	4	0	0.1	8	6	4	0.8
9	266	95	0.4	9	12	8	0.6	9	10	6	0.6
10	546	157	0.3	10	90	33	0.4	10	36	20	0.6
11	407	153	0.4	11	190	66	0.3	11	47	16	0.4
12	210	54	0.3	12	101	47	0.5	12	19	4	0.2

Table G3. Test 9 SF_6 transport parameters from ground-based continuous analyzers.

	Location					
	1101	1115	1201	1215	1301	1315
WS (m s^{-1})	1.5		1.5		1.5	
σ_{ws} (m s^{-1})	1.0		1.0		1.0	
θ (deg)	150		150		150	
σ_θ (deg)	41		42		42	
V_{SF6} (m s^{-1})	0.93	1.1	1.8	1.7	1.98	1.8
Error Limit V_{SF6} (m s^{-1})	0.04	0.02	0.04	0.02	0.03	0.02
σ_x (m)	1177	1178	1348	1688	1166	2063
Error Limit σ_x (m)	208	133	386	1000	152	147
SF_6 Transport Time (s)	10375	8419	9000	9484	10607	11804
Error Limit SF_6 Transport Time (s)	503	117	196	117	164	105
SF_6 Peak (pptv)	493	985	118	168	102	117
Error Limit SF_6 Peak (pptv)	77	100	28	84	13	9

Table G4. Test 9 SF_6 transport parameters from aircraft continuous analyzer.

	Pass							
	1	2	3	4	5	6	7	8
SF_6 Speed ($m\ s^{-1}$)	0.4	0.5	0.7	0.8	1.1	1.7	2.1	2.1
Error SF_6 Speed ($m\ s^{-1}$)	0.00	0.00	0.01	0.00	0.00	0.00	0.08	0.02
σ_x (m)	210	190	130	200	220	490	530	470
Error σ_x (m)	80	80	40	20	40	200	510	140
Peak Detection Time (s)	1630	1860	2250	2540	2970	3560	3960	4190
Error Peak Detection Time (s)	1	2	2	1	1	2	4	2
Peak Concentration (pptv)	800	1150	1950	930	350	200	90	130
Error Peak Concentration (pptv)	300	350	570	20	50	70	60	30
Altitude (m)	140	140	100	100	60	30	10	20
Downwind Distance (m)	800	1100	1800	2100	3400	6100	8600	8800
Error Downwind Distance (m)	0.0	0.0	40	0.0	0.0	70	300	100

Table G4. Test 9 SF_6 transport parameters from aircraft continuous analyzer (continued).

	Pass							
	9	10	11	12	13	14	15	16
SF_6 Speed ($m\ s^{-1}$)	0.1	1.6	0.9	1.2	1.8	2.0	1.5	0.9
Error SF_6 Speed ($m\ s^{-1}$)	0.04	0.03	0.03	0.04	0.04	0.01	0.00	0.03
σ_x (m)	480	470	1010	1280	760	1250	1890	1780
Error σ_x (m)	470	250	570	830	480	160	260	970
Peak Detection Time (s)	4460	4560	4940	5290	5750	6440	6760	7230
Error Peak Detection Time (s)	3	3	3	4	4	2	1	4
Peak Concentration (pptv)	70	230	1620	800	350	320	310	1100
Error Peak Concentration (pptv)	40	80	1230	390	150	30	30	560
Altitude (m)	60	60	100	160	210	220	160	90
Downwind Distance (m)	700	7700	4500	6500	10400	13500	10700	6600
Error Downwind Distance (m)	200	200	200	300	300	90	40	230

Table G4. Test 9 SF_6 transport parameters from aircraft continuous analyzer (continued).

	Pass							
	17	18	19	20	21	22	23	24
SF_6 Speed ($m\ s^{-1}$)	0.6	0.5	0.8	1.0	1.1	1.2	0.9	0.9
Error SF_6 Speed ($m\ s^{-1}$)	0.04	0.10	0.06	0.08	0.00	0.10	0.02	0.00
σ_x (m)	2540	2690	2900	2700	2130	2520	1890	1070
Error σ_x (m)	520	890	400	560	490	560	270	120
Peak Detection Time (s)	7560	8060	8420	8960	9440	10460	10970	11370
Error Peak Detection Time (s)	4	24	7	12	1	17	4	2
Peak Concentration (pptv)	1000	930	740	310	130	190	230	140
Error Peak Concentration (pptv)	160	240	80	60	20	40	30	10
Altitude (m)	40	20	30	100	150	160	100	20
Downwind Distance (m)	4800	4300	7000	9300	11000	13600	10800	10200
Error Downwind Distance (m)	310	1610	500	800	40	1270	230	70

Table G4. Test 9 SF_6 transport parameters from aircraft continuous analyzer (continued).

	Pass							
	25	26	27	28	29	30	31	32
SF_6 Speed ($m\ s^{-1}$)	0.8	0.9	0.8	1.0	1.1			
Error SF_6 Speed ($m\ s^{-1}$)	0.03	0.01	0.09	0.00	0.00			
σ_x (m)	1460	1440	1450	1640	1970			
Error σ_x (m)	620	170	310	200	290			
Peak Detection Time (s)	11810	12100	12600	12910	13280			
Error Peak Detection Time (s)	6	2	17	2	1			
Peak Concentration (pptv)	120	130	120	100	10700			
Error Peak Concentration (pptv)	30	10	20	10	90			
Altitude (m)	10	10	30	90	160			
Downwind Distance (m)	10300	11000	10700	13900	15500			
Error Downwind Distance (m)	400	150	170	70	30			