



Details on calculated total column values

The Tables below gives details on the calculated total column values for both CO₂ and CH₄ for each sampling case for each day AirCore vertical profiles were available.

Table S1. Estimated total column (XCO₂) values (ppm) derived from AirCore, model-only (PCTM + CarbonTracker (CT)) and synthetic vertical profiles calculated using our approach based on partial column measurements.

	AirCore	<8500 m	<7500 m	<6500 m	<5500 m	<3000 m	PCTM+CT
01/14/2012	392.49	392.51	395.56	392.58	392.48	393.00	394.40
08/15/2012	391.70	391.86	391.60	391.78	392.21	392.17	394.40
10/11/2012	391.46	391.35	391.57	391.40	391.49	391.71	394.28
10/23/2012	391.67	391.74	391.77	391.76	391.83	392.13	394.50
10/24/2012	391.44	391.52	391.61	391.68	391.80	392.24	394.59
01/15/2012	392.19	392.40	392.50	392.36	392.38	392.63	394.07
02/27/2014	398.77	398.84	398.98	398.96	399.08	398.52	402.2
09/16/2014	395.82	396.48	396.60	396.86	397.12	397.42	399.61
09/17/2014	395.34	396.08	396.06	396.00	396.39	396.83	399.88
01/14/2012 (II)	392.36	392.28	392.34	392.47	392.32	392.58	394.40
02/27/2014 (II)	398.55	398.80	398.86	398.80	398.97	398.58	402.20
09/16/2014 (II)	395.57	395.96	396.05	396.28	396.60	397.07	399.61
09/17/2014 (II)	395.98	396.58	396.60	396.54	396.63	397.17	399.88
01/15/2012 (II)	392.33	393.33	393.42	393.32	393.34	393.69	394.07

Table S2. Estimated total column (XCO₂) values (ppm) derived from AirCore vertical profiles, different number of simulated flask samples taken at 0–6500 m amsl altitude range, and model-only (PCTM + CarbonTracker (CT)).

	AirCore	Number of flasks				PCTM+CT
		1	2	6	12	
01/14/2012	392.50	392.8	392.48	392.44	392.41	394.40
08/15/2012	391.70	392.2	392.00	392.19	392.05	394.40
10/11/2012	391.46	391.05	391.78	391.65	391.66	394.28
10/23/2012	391.67	391.87	391.31	391.87	392.00	394.50
10/24/2012	391.44	392.86	392.20	391.83	391.76	394.59
01/15/2012	392.19	392.76	392.27	392.43	392.36	394.07
02/27/2014	398.77	399.38	399.07	398.91	399.27	402.2
09/16/2014	395.82	396.13	396.49	397.41	397.37	399.61
09/17/2014	395.34	396.60	396.58	396.33	396.20	399.88
01/14/2012 (II)	392.36	392.67	392.19	392.24	392.94	394.40
02/27/2014 (II)	398.55	399.30	398.88	398.56	398.70	402.20
09/16/2014 (II)	395.57	396.04	396.32	397.02	396.81	399.61

09/17/2014 (II)	395.98	396.80	396.56	396.68	396.58	399.88
01/15/2012 (II)	392.34	392.74	392.58	392.64	392.52	394.07

Table S3. Estimated total column (XCH_4) values (ppm) derived from AirCore vertical profiles, model-only (GEOS-Chem) and synthetic vertical profiles, calculated using our approach based on partial column measurements.

	AirCore	<8500 m	<7500 m	<6500 m	<5500 m	<3000 m	GEOS-Chem
01/14/2012	1.8066	1.8002	1.7996	1.7984	1.7972	1.8064	1.7935
08/15/2012	1.8019	1.7949	1.8021	1.8056	1.8073	1.7981	1.7940
10/11/2012	1.8111	1.7971	1.7976	1.8021	1.8009	1.7871	1.7800
10/23/2012	1.8436	1.8314	1.8320	1.8324	1.8324	1.8354	1.7967
10/24/2012	1.8247	1.8088	1.8696	1.8095	1.8089	1.8072	1.7986
01/15/2012	1.8017	1.7984	1.7991	1.7985	1.7976	1.7956	1.7913
02/27/2014	1.8191	1.8231	1.8222	1.8182	1.8172	1.8190	1.8117
09/16/2014	1.8365	1.8561	1.8567	1.8561	1.8521	1.8509	1.8162
09/17/2014	1.8321	1.8462	1.8437	1.8392	1.8335	1.8270	1.8186
01/14/2012 (II)	1.8027	1.7961	1.7956	1.7946	1.7921	1.7985	1.7935
02/27/2014 (II)	1.8195	1.8210	1.8195	1.8151	1.8149	1.8162	1.8117
09/16/2014 (II)	1.8325	1.8461	1.8473	1.8476	1.8423	1.8456	1.8162
09/17/2014 (II)	1.8312	1.8456	1.8457	1.8412	1.8347	1.8254	1.8186
01/15/2012 (II)	1.8025	1.8078	1.8087	1.8073	1.8064	1.8048	1.7913

Table S4. Estimated total column (XCH_4) values (ppm) derived from AirCore vertical profiles, different number of simulated flask samples taken at 0–6500 m amsl altitude range, and model-only (GEOS-Chem).

	AirCore	Number of flasks				GEOS-Chem
		1	2	6	12	
01/14/2012	1.8066	1.8023	1.8016	1.7983	1.7968	1.7935
08/15/2012	1.8019	1.7965	1.7990	1.8054	1.8136	1.7940
10/11/2012	1.8111	1.7808	1.7879	1.8026	1.8063	1.7800
10/23/2012	1.8436	1.8129	1.8076	1.8157	1.8152	1.7967
10/24/2012	1.8247	1.8146	1.8089	1.8118	1.8100	1.7986
01/15/2012	1.8017	1.7977	1.7931	1.7963	1.7971	1.7913
02/27/2014	1.8191	1.8123	1.8112	1.8219	1.8220	1.8117
09/16/2014	1.8365	1.8350	1.8310	1.8369	1.8415	1.8162
09/17/2014	1.8321	1.8250	1.8249	1.8338	1.8356	1.8186
01/14/2012 (II)	1.8027	1.7992	1.7961	1.7917	1.7938	1.7935
02/27/2014 (II)	1.8195	1.8131	1.8112	1.8178	1.8184	1.8117
09/16/2014 (II)	1.8325	1.8354	1.8239	1.8468	1.8399	1.8162
09/17/2014 (II)	1.8312	1.8255	1.8245	1.8350	1.8378	1.8186

01/15/2012 (II)	1.8025	1.7974	1.7976	1.8001	1.7999	1.7913
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