



Supplement of

Estimating contributions from biomass burning, fossil fuel combustion, and biogenic carbon to carbonaceous aerosols in the Valley of Chamonix: a dual approach based on radiocarbon and levoglucosan

Lise Bonvalot et al.

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DETAILED DATA

Contamination determination

BLANK						
Sample index	Measured Carbon mass [μg]	Measured F^{14}C	Error 2 sig	Corrected F^{14}C	CI 95%	Data used in
AIX-19001.2.9	3	0.3372	0.0370	-0.0303	0.1811	Figure 1
AIX-19001.2.1	5	0.1914	0.0149	-0.0286	0.0755	
AIX-19001.2.8	5	0.2792	0.0215	0.0951	0.0722	
AIX-19001.2.10	5	0.1384	0.0156	-0.1032	0.0801	
AIX-19001.2.11	8	0.1378	0.0108	0.0067	0.0404	
AIX-19001.2.13	9	0.1170	0.0060	-0.0008	0.0341	
AIX-19001.2.2	10	0.0906	0.0073	-0.0178	0.0310	
AIX-19001.2.14	13	0.0897	0.0063	0.0094	0.0228	
AIX-19001.2.3	16	0.0536	0.0057	-0.0138	0.0186	
AIX-19001.2.4	20	0.0713	0.0057	0.0198	0.0147	
AIX-19001.2.15	22	0.0436	0.0038	-0.0048	0.0130	
AIX-19001.2.5	34	0.0353	0.0049	0.0044	0.0093	
AIX-19001.2.16	34	0.0323	0.0036	0.0012	0.0086	
AIX-19001.2.6	72	0.0166	0.0047	0.0019	0.0060	

STANDARD						
Sample index	Measured Carbon mass [μg]	Measured F^{14}C	Error 2 sig	Corrected F^{14}C	CI 95%	Data used in
AIX-19002.3.15	3	1.1255	0.0643	1.4955	0.2083	Figure 1
AIX-19002.3.23	5	1.1393	0.0547	1.3064	0.0992	
AIX-19002.3.16	6	1.1992	0.0347	1.3488	0.0681	
AIX-19002.3.25	8	1.2361	0.0367	1.3482	0.0569	
AIX-19002.3.17	9	1.2416	0.0315	1.3399	0.0482	
AIX-19002.3.18	10	1.2884	0.0294	1.3831	0.0441	
AIX-19002.3.26	25	1.2869	0.0152	1.3212	0.0187	
AIX-19002.3.29	39	1.3262	0.0176	1.3493	0.0193	
AIX-19002.3.19	41	1.3118	0.0140	1.3332	0.0156	
AIX-19002.3.19	47	1.2940	0.0154	1.3120	0.0167	
AIX-19002.3.21	53	1.3141	0.0159	1.3306	0.0169	
AIX-19002.3.30	63	1.2949	0.0162	1.3082	0.0169	
AIX-19002.3.7	84	1.3185	0.0157	1.3288	0.0162	
AIX-19002.3.28	105	1.3277	0.0166	1.3360	0.0169	

Test samples: solid measurements

Sample	Sample index	Measured F ¹⁴ C after graphitization	error 2 sigma	Data used in
X modern carbon = 0	AIX-20000.1.1	0.0016	0.0003	Figure 2 and Table 1
X modern carbon = 0	AIX-20000.1.2	0.0013	0.0003	
X modern carbon = 0	AIX-20000.1.3	0.0010	0.0003	
X modern carbon = 0	AIX-20000.1.4	0.0013	0.0003	
X modern carbon = 0	AIX-20000.1.5	0.0015	0.0004	
X modern carbon = 0.2	AIX-20009.1.1	0.2296	0.0019	Figure 2 and Table 1
X modern carbon = 0.2	AIX-20009.1.2	0.2298	0.0019	
X modern carbon = 0.2	AIX-20009.1.3	0.2295	0.0019	
X modern carbon = 0.51	AIX-20002.1.1	0.5894	0.0041	Figure 2 and Table 1
X modern carbon = 0.51	AIX-20002.1.2	0.5889	0.0042	
X modern carbon = 0.51	AIX-20002.1.3	0.5898	0.0042	
X modern carbon = 0.51	AIX-20002.1.4	0.5903	0.0043	
X modern carbon = 0.51	AIX-20002.1.5	0.5895	0.0037	
X modern carbon = 0.8	AIX-20003.3.1	0.9407	0.0055	Figure 2 and Table 1
X modern carbon = 0.8	AIX-20003.3.2	0.9424	0.0056	
X modern carbon = 0.8	AIX-20003.3.3	0.9401	0.0056	
X modern carbon = 1	AIX-20001.1.1	1.1865	0.0077	Figure 2 and Table 1
X modern carbon = 1	AIX-20001.1.2	1.1841	0.0077	
X modern carbon = 1	AIX-20001.1.3	1.1854	0.0076	
X modern carbon = 1	AIX-20001.1.4	1.1855	0.0077	
X modern carbon = 1	AIX-20001.1.6	1.1886	0.0068	
Urban Dust SRM 1649b	AIX-20005.1.1	0.5288	0.0023	Table 2
Urban Dust SRM 1649b	AIX-20005.1.2	0.5314	0.0023	
Urban Dust SRM 1649b	AIX-20005.1.3	0.5340	0.0023	
Urban Dust SRM 1649b	AIX-20005.1.4	0.5370	0.0035	

Test samples: gaseous measurements

Sample	Sample Index	Carbon mass [μg]	Error (4%) [μg]	Corrected F ¹⁴ C	error (CI 95%)	Data used in
X modern carbon = 0	AIX-20000.3.1	6	0.24	0.0694	0.0575	Figure 2
X modern carbon = 0	AIX-20000.3.2	6	0.26	0.0145	0.0542	
X modern carbon = 0	AIX-20000.3.2	12	0.50	0.1118	0.0234	
X modern carbon = 0	AIX-20000.4.1	10	0.40	0.0364	0.0310	
X modern carbon = 0	AIX-20000.4.2	11	0.45	0.0520	0.0270	
X modern carbon = 0.2	AIX-20009.3.1	39	1.56	0.2277	0.0215	Figure 2
X modern carbon = 0.2	AIX-20009.3.2	40	1.60	0.2059	0.0170	
X modern carbon = 0.2	AIX-20009.3.3	88	3.52	0.2265	0.0180	
X modern carbon = 0.2	AIX-20009.3.4	86	3.44	0.2230	0.0178	
X modern carbon = 0.2	AIX-20009.3.5	156	6.24	0.2146	0.0291	
X modern carbon = 0.2	AIX-20009.3.6	133	5.32	0.2139	0.0367	
X modern carbon = 0.2	AIX-20009.3.7	9	0.36	0.2139	0.0128	
X modern carbon = 0.2	AIX-20009.3.8	7	0.28	0.1866	0.0142	
X modern carbon = 0.2	AIX-20009.3.9	25	1.00	0.2346	0.0145	
X modern carbon = 0.2	AIX-20009.3.10	22	0.88	0.3381	0.0108	
X modern carbon = 0.51	AIX-20002.3.1	26	1.06	0.5873	0.0109	Figure 2
X modern carbon = 0.51	AIX-20002.3.2	23	0.91	0.5565	0.0290	
X modern carbon = 0.51	AIX-20002.3.3	22	0.90	0.5863	0.0382	
X modern carbon = 0.51	AIX-20002.3.4	44	1.78	0.5743	0.0157	
X modern carbon = 0.51	AIX-20002.3.4	47	1.87	0.5834	0.0137	
X modern carbon = 0.8	AIX-20003.1.1	11	0.46	0.8784	0.0151	Figure 2
X modern carbon = 0.8	AIX-20003.1.1	10	0.40	0.8716	0.0090	
X modern carbon = 0.8	AIX-20003.1.3	48	1.93	0.9040	0.0090	
X modern carbon = 0.8	AIX-20003.1.4	48	1.93	0.9020	0.0081	
X modern carbon = 0.8	AIX-20003.1.5	46	1.82	0.8926	0.0080	
X modern carbon = 1	AIX-20001.5.7	19	0.77	1.1861	0.0063	Figure 2
X modern carbon = 1	AIX-20001.5.8	43	1.73	1.1772	0.0066	
X modern carbon = 1	AIX-20001.5.9	43	1.72	1.1790	0.0322	
X modern carbon = 1	AIX-20001.5.10	41	1.64	1.1620	0.0437	
X modern carbon = 1	AIX-20001.5.11	13	0.52	1.1671	0.0115	
X modern carbon = 1	AIX-20001.5.12	10	0.40	1.1799	0.0129	
Urban Dust SRM 1649b	AIX-20005.4.1	87	3.48	0.5057	0.0133	Table 2
Urban Dust SRM 1649b	AIX-20005.4.2	93	3.72	0.5237	0.0127	
Urban Dust SRM 1649b	AIX-20005.4.5	7	0.28	0.4424	0.0393	
Urban Dust SRM 1649b	AIX-20005.4.6	19	0.76	0.4753	0.0153	
Urban Dust SRM 1649b	AIX-20005.4.7	11	0.44	0.4901	0.0246	
Urban Dust SRM 1649b	AIX-20005.4.8	32	1.28	0.5028	0.0120	
Urban Dust SRM 1649b	AIX-20005.4.9	37	1.48	0.5151	0.0120	
Urban Dust RM 8785	AIX-20005.3.1	20	0.80	0.3893	0.0146	Figure 3
Urban Dust RM 8785	AIX-20005.3.2	23	0.92	0.3783	0.0127	
Urban Dust RM 8785	AIX-20005.3.3	23	0.92	0.3783	0.0133	

Blank measurements: Arve River valley samples

Location	Date dd/mm/yy	Sample Index	Carbon mass [µg]
Passy	10/02/2014	AIX-20007.1.57	4
Passy	10/02/2014	AIX-20007.1.58	4
Passy	17/02/2014	AIX-20007.1.88	0
Passy	17/02/2014	AIX-20007.1.89	1
Passy	21/02/2014	AIX-20007.1.29	1
Passy	21/02/2014	AIX-20007.1.30	2
Passy	21/07/2014	AIX-20007.1.61	1
Passy	21/07/2014	AIX-20007.1.62	1
Passy	04/08/2014	AIX-20007.1.74	2
Passy	04/08/2014	AIX-20007.1.75	1
Passy	11/08/2014	AIX-20007.1.13	2
Passy	11/08/2014	AIX-20007.1.14	2
Chamonix	23/12/2013	AIX-20008.1.13	0
Chamonix	23/12/2013	AIX-20008.1.14	3
Chamonix	06/01/2014	AIX-20008.1.25	1
Chamonix	06/01/2014	AIX-20008.1.26	3

Passy measurements

Date dd/mm/yy	Sample index	PASSY			
		Carbon mass [$\mu\text{gC m}^{-3}$]	\pm Carbon mass [$\mu\text{gC m}^{-3}$]	F ¹⁴ C	\pm F ¹⁴ C
24/11/2013	AIX-20007.1.1	16.30	0.67	0.9786	0.0147
24/11/2013	AIX-20007.1.2	15.63	0.64	0.9934	0.0147
03/12/2013	AIX-20007.1.3	48.29	1.97	1.0077	0.0147
03/12/2013	AIX-20007.1.4	48.29	1.97	0.9964	0.0149
05/12/2013	AIX-20007.1.33	24.56	1.03	0.9697	0.0154
05/12/2013	AIX-20007.1.34	24.56	1.03	0.9851	0.0153
06/12/2013	AIX-20007.1.5	37.99	1.56	1.0117	0.0150
06/12/2013	AIX-20007.1.6	37.40	1.54	1.0183	0.0147
08/12/2013	AIX-20007.1.35	37.73	1.55	1.0469	0.0150
08/12/2013	AIX-20007.1.36	39.51	1.62	1.0465	0.0159
09/12/2013	AIX-20007.1.21	47.78	1.95	0.9733	0.0147
09/12/2013	AIX-20007.1.22	44.22	1.81	0.9653	0.0143
12/12/2013	AIX-20007.1.7	54.11	2.20	0.9850	0.0141
12/12/2013	AIX-20007.1.8	53.51	2.18	0.9888	0.0143
13/12/2013	AIX-20007.1.9	59.38	2.41	0.9942	0.0142
13/12/2013	AIX-20007.1.10	55.20	2.25	0.9759	0.0142
15/12/2013	AIX-20007.1.11	34.76	1.43	1.0741	0.0154
15/12/2013	AIX-20007.1.12	34.17	1.41	1.0608	0.0149
16/12/2013	AIX-20007.1.15	41.19	1.69	0.9671	0.0149
16/12/2013	AIX-20007.1.16	42.97	1.76	0.9612	0.0142
18/12/2013	AIX-20007.1.17	27.95	1.16	0.9279	0.0145
18/12/2013	AIX-20007.1.18	29.71	1.23	0.9249	0.0141
20/12/2013	AIX-20007.1.19	24.91	1.04	0.9985	0.0149
20/12/2013	AIX-20007.1.20	25.50	1.06	1.0067	0.0150
01/01/2014	AIX-20007.1.23	7.93	0.34	0.9764	0.0149
01/01/2014	AIX-20007.1.24	7.71	0.33	0.9802	0.0148
22/01/2014	AIX-20007.1.41	18.34	0.75	0.9575	0.0145
22/01/2014	AIX-20007.1.42	16.54	0.68	0.9559	0.0155
12/02/2014	AIX-20007.1.25	7.69	0.33	0.9194	0.0141
12/02/2014	AIX-20007.1.26	7.92	0.33	0.9284	0.0144
13/02/2014	AIX-20007.1.43	6.35	0.27	0.9857	0.0162
13/02/2014	AIX-20007.1.44	6.57	0.28	0.9736	0.0163
15/02/2014	AIX-20007.1.37	3.88	0.18	0.8730	0.0174
15/02/2014	AIX-20007.1.38	3.66	0.17	0.8779	0.0185
16/02/2014	AIX-20007.1.39	16.48	0.67	1.0224	0.0160
16/02/2014	AIX-20007.1.40	16.48	0.67	1.0297	0.0143
19/02/2014	AIX-20007.1.45	17.06	0.70	0.9819	0.0156
19/02/2014	AIX-20007.1.46	17.06	0.70	0.9690	0.0159
19/02/2014	AIX-20007.1.47	17.50	0.71	0.9164	0.0153
19/02/2014	AIX-20007.1.48	17.28	0.71	0.9319	0.0157
21/02/2014	AIX-20007.1.27	12.18	0.50	1.0426	0.0151

21/02/2014	AIX-20007.1.28	11.96	0.49	1.0494	0.0151
22/02/2014	AIX-20007.1.49	7.08	0.30	1.0131	0.0164
22/02/2014	AIX-20007.1.50	7.08	0.30	1.0085	0.0161
24/02/2014	AIX-20007.1.53	20.84	0.85	0.7729	0.0137
24/02/2014	AIX-20007.1.54	15.94	0.65	0.8977	0.0138
24/02/2014	AIX-20007.1.69	14.16	0.58	0.9649	0.0139
25/02/2014	AIX-20007.1.51	9.93	0.41	0.9251	0.0156
25/02/2014	AIX-20007.1.52	9.70	0.41	0.9176	0.0155
27/02/2014	AIX-20007.1.55	12.60	0.52	0.9539	0.0175
27/02/2014	AIX-20007.1.56	12.15	0.50	0.9578	0.0147
28/02/2014	AIX-20007.1.31	8.81	0.37	1.0086	0.0153
28/02/2014	AIX-20007.1.32	8.81	0.37	0.9988	0.0149
02/03/2014	AIX-20007.1.59	7.25	0.31	1.0487	0.0166
02/03/2014	AIX-20007.1.60	7.25	0.31	1.0197	0.0157
28/07/2014	AIX-20007.1.63	3.56	0.16	0.7159	0.0170
28/07/2014	AIX-20007.1.64	3.35	0.16	0.7113	0.0182
30/07/2014	AIX-20007.1.65	2.71	0.13	0.6275	0.0212
30/07/2014	AIX-20007.1.66	2.93	0.14	0.6221	0.0199
31/07/2014	AIX-20007.1.67	3.33	0.16	0.7099	0.0180
31/07/2014	AIX-20007.1.68	3.33	0.16	0.6621	0.0177
02/08/2014	AIX-20007.1.70	3.13	0.15	0.8198	0.0191
02/08/2014	AIX-20007.1.71	3.13	0.15	0.8097	0.0205
03/08/2014	AIX-20007.1.72	2.92	0.14	0.8798	0.0228
03/08/2014	AIX-20007.1.73	2.71	0.13	0.8790	0.0227
05/08/2014	AIX-20007.1.76	3.77	0.17	0.8073	0.0172
05/08/2014	AIX-20007.1.77	3.56	0.16	0.8241	0.0186
06/08/2014	AIX-20007.1.78	4.64	0.21	0.7728	0.0151
06/08/2014	AIX-20007.1.79	4.85	0.21	0.7684	0.0149
08/08/2014	AIX-20007.1.82	3.55	0.16	0.7251	0.0173
08/08/2014	AIX-20007.1.96	2.90	0.14	0.7051	0.0202
09/08/2014	AIX-20007.1.80	3.12	0.15	0.8406	0.0200
09/08/2014	AIX-20007.1.81	3.12	0.15	0.8048	0.0199
11/08/2014	AIX-20007.1.84	2.50	0.13	0.7763	0.0254
11/08/2014	AIX-20007.1.85	2.50	0.13	0.7657	0.0230
12/08/2014	AIX-20007.1.86	2.73	0.13	0.8519	0.0243
12/08/2014	AIX-20007.1.87	2.73	0.13	0.8099	0.0221
14/08/2014	AIX-20007.1.90	1.87	0.10	0.8019	0.0314
14/08/2014	AIX-20007.1.91	2.09	0.11	0.7877	0.0272
15/08/2014	AIX-20007.1.92	2.33	0.12	0.8813	0.0280
15/08/2014	AIX-20007.1.93	2.33	0.12	0.8984	0.0285
17/08/2014	AIX-20007.1.94	2.51	0.13	0.8256	0.0246
17/08/2014	AIX-20007.1.95	2.29	0.12	0.8215	0.0265

Chamonix measurements

CHAMONIX					
Date dd/mm/yy	Sample Index	Carbon mass [$\mu\text{gC m}^{-3}$]	\pm Carbon mass [$\mu\text{gC m}^{-3}$]	F ¹⁴ C	\pm F ¹⁴ C
05/12/2013	AIX-20008.1.1	19.87	0.81	0.8998	0.0150
05/12/2013	AIX-20008.1.2	19.65	0.80	0.8999	0.0163
08/12/2013	AIX-20008.1.3	24.25	1.01	0.9998	0.0165
08/12/2013	AIX-20008.1.4	25.39	1.06	1.0356	0.0168
11/12/2013	AIX-20008.1.5	28.97	1.20	0.8695	0.0143
11/12/2013	AIX-20008.1.6	30.12	1.25	0.8749	0.0154
14/12/2013	AIX-20008.1.7	21.43	0.87	0.9727	0.0159
14/12/2013	AIX-20008.1.8	20.55	0.84	0.9638	0.0160
17/12/2013	AIX-20008.1.9	29.42	1.22	0.8708	0.0151
17/12/2013	AIX-20008.1.10	30.56	1.26	0.8595	0.0152
20/12/2013	AIX-20008.1.11	7.08	0.30	0.8438	0.0154
20/12/2013	AIX-20008.1.12	7.08	0.30	0.8365	0.0171
23/12/2013	AIX-20008.1.15	19.56	0.83	0.9036	0.0166
23/12/2013	AIX-20008.1.16	20.69	0.87	0.9238	0.0156
26/12/2013	AIX-20008.1.17	5.73	0.25	0.9218	0.0164
26/12/2013	AIX-20008.1.18	5.73	0.25	0.9141	0.0162
29/12/2013	AIX-20008.1.19	8.36	0.35	0.9424	0.0217
29/12/2013	AIX-20008.1.20	8.36	0.35	0.9431	0.0159
01/01/2014	AIX-20008.1.21	26.88	1.12	1.0249	0.0170
01/01/2014	AIX-20008.1.22	25.75	1.07	1.0117	0.0170
04/01/2014	AIX-20008.1.23	8.59	0.36	0.9396	0.0158
04/01/2014	AIX-20008.1.24	8.37	0.35	0.9438	0.0159
07/01/2014	AIX-20008.1.27	19.73	0.80	0.9007	0.0151
07/01/2014	AIX-20008.1.28	19.94	0.81	0.8926	0.0157

Temperature measurements

Date dd/mm/yy	T [°C]	± T [°C]	Data used in
28/07/2014	19.0	4.4	Figure 10
30/07/2014	17.1	0.9	
31/07/2014	23.6	1.9	
02/08/2014	21.4	2.2	
03/08/2014	20.6	2.1	
05/08/2014	24.0	1.9	
06/08/2014	22.5	1.1	
08/08/2014	25.1	3.3	
09/08/2014	25.8	3.5	
11/08/2014	17.4	1.5	
12/08/2014	19.5	2.8	
14/08/2014	17.0	2.2	
15/08/2014	13.5	1.8	
17/08/2014	22.1	2.5	