Polyols and glucose particulate species as tracers of primary biogenic organic aerosols at 28 french sites

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Table S1: Characteristics of sampling sites (including altitude, site typology) and number of analyzed samples

Sampling site	Altitude (m)	PM fraction	AASQA* in charge of sampling sites	Number of Samples	Sugar compounds analyzed by	PMF analysis	Typology
OPE-ANDRA	293	PM_{10}	OPE-ANDRA	266	IGE		Rural
OPE-ANDRA	293	$PM_{2.5}$	OPE-ANDRA	310	IGE		Rural
Peyrusse Vieille	175	PM_{10}	ATMO Occitanie	59	IGE		Rural
Revin	395	PM_{10}	ATMO Grand-Est	168	LSCE	+	Rural
Revin	395	$PM_{2.5}$	ATMO Grand-Est	162	IGE		Rural
Dieulefit	550	$PM_{2.5}$	ATMO AuRA	56	IGE		Rural
Verneuil	180	$PM_{2.5}$	LIG'AIR	60	IGE		Rural
Chamonix	1035	PM_{10}	ATMO AuRA	120	IGE	+	Urban
Marnaz	504	PM_{10}	ATMO AuRA	203	IGE	+	Urban
Passy	588	PM_{10}	ATMO AuRA	344	IGE	+	Urban
Lanslebourg	1400	PM_{10}	ATMO AuRA	82	IGE		Urban
Grenoble_LF	214	PM_{10}	ATMO AuRA	714	IGE	+	Urban
Grenoble_CB	212	PM_{10}	ATMO AuRA	72	IGE		Urban
Grenoble_VIF	310	PM_{10}	ATMO AuRA	72	IGE		Urban
Gap	743	PM_{10}	AIR PACA	125	IGE		Urban
Lyon	160	PM_{10}	ATMO AuRA	172	IGE	+	Urban
Marseille	64	PM_{10}	AIR PACA	255	IGE	+	Urban
Gardanne	212	PM_{10}	AIR PACA	88	IGE		Urban
Meyreuil	235	PM_{10}	AIR PACA	91	IGE		Urban
Mallet	200	PM_{10}	AIR PACA	96	IGE		Urban
Port-de-Bouc	1	PM_{10}	AIR PACA	242	IGE	+	Urban
Aix-en-Provence	188	PM_{10}	AIR PACA	177	IGE	+	Urban
Nice	9	PM_{10}	AIR PACA	228	IGE	+	Urban
Talence	20	PM_{10}	ATMO Nouvelle-Aquitaine	159	IGE	+	Urban
Poitiers	0	PM_{10}	ATMO Nouvelle-Aquitaine	134	IGE	+	Urban
Lens	47	PM_{10}	ATMO Hauts-de-France	118	IGE	+	Urban
				169	LSCE	+	Urban
Nogent	47	PM_{10}	ATMO Hauts-de-France	155	LSCE	+	Urban
Rouen	6	PM_{10}	ATMO Normandie	168	LSCE	+	Urban
Roubaix	10	PM_{10}	ATMO Hauts-de-France	159	LSCE	+	Traffic
Strasbourg	139	PM_{10}	ATMO Grand-Est	120	IGE	+	Traffic

**AASQA: Officially-approved French Air Quality Monitoring networks which instrument and maintain the sampling sites, and handle the filters. Symbol (+) indicates cases where PMF analysis was performed.*

**Except PM_{10} collected at OPE-ANDRA (sampled on weekly basis with low volume sampler operating at a flow rate of 1 $m^3.h^{-1}$), all others PM samples were collected on daily basis, using high volume samplers operating at a flow rate of 30 $m^3.h^{-1}$.*

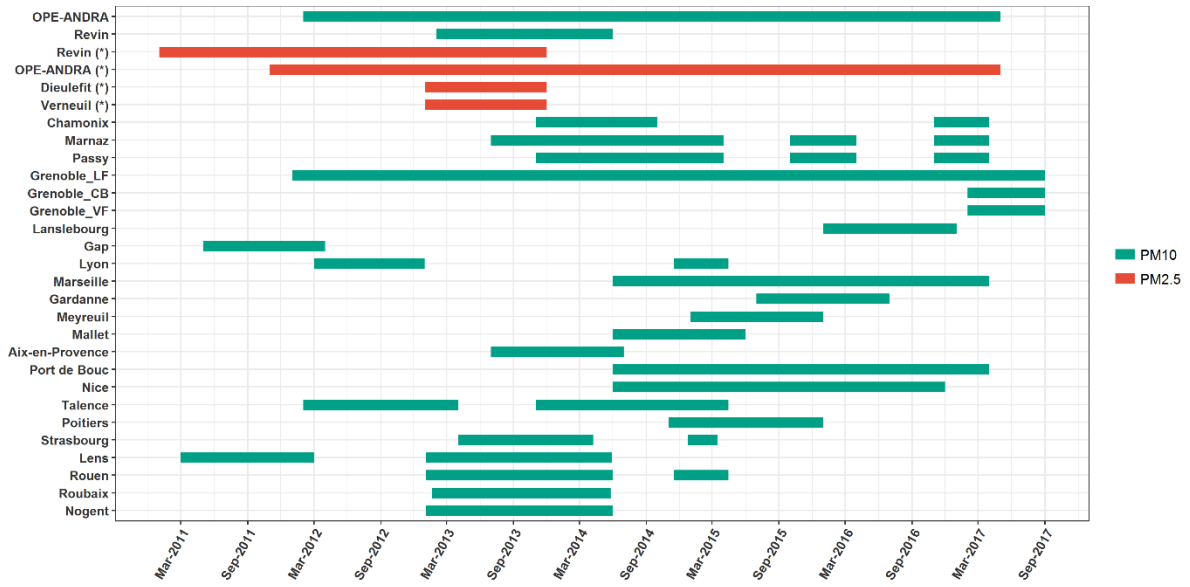

Figure S1: Timeline of Particulate matter (PM) sampling campaign periods for each studied site.

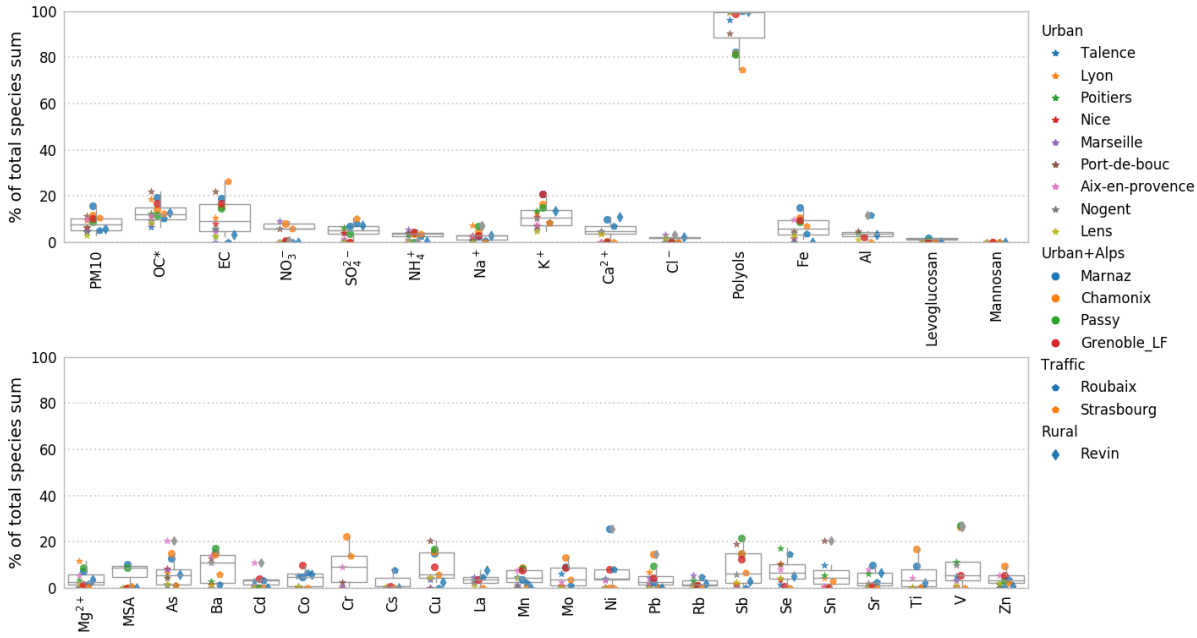

Figure S2: Percentage of each species apportioned by the PBOA profile from PMF studies. Values lower than a few pg µg^{-1} are not displayed on purpose. For each boxplot, the top, middle and bottom lines of the box represent the 75th, median and 25th percentile, respectively. The whiskers at the top and bottom of the box extend from the maximum to the minimum.

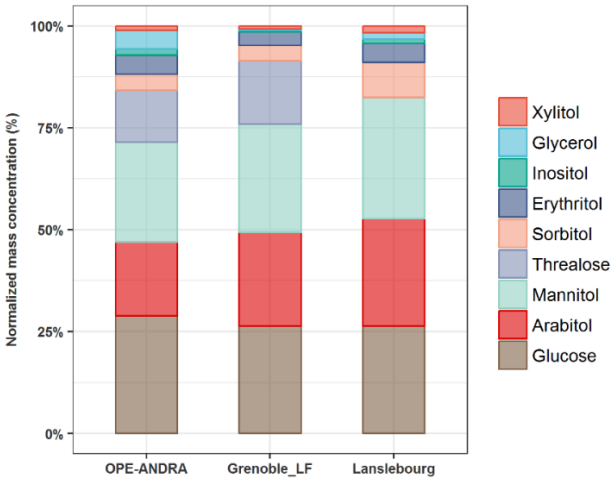

Figure S3: Overview of the average relative mass distributions of individual primary sugar alcohols and saccharide compounds quantified in some aerosol samples at three sites over summer and autumn periods (June to November) corresponding to maximal atmospheric concentrations of sugar alcohols/saccharide compounds. For Lanslebourg, threalose is not visible since its concentration was below the limit of quantification.

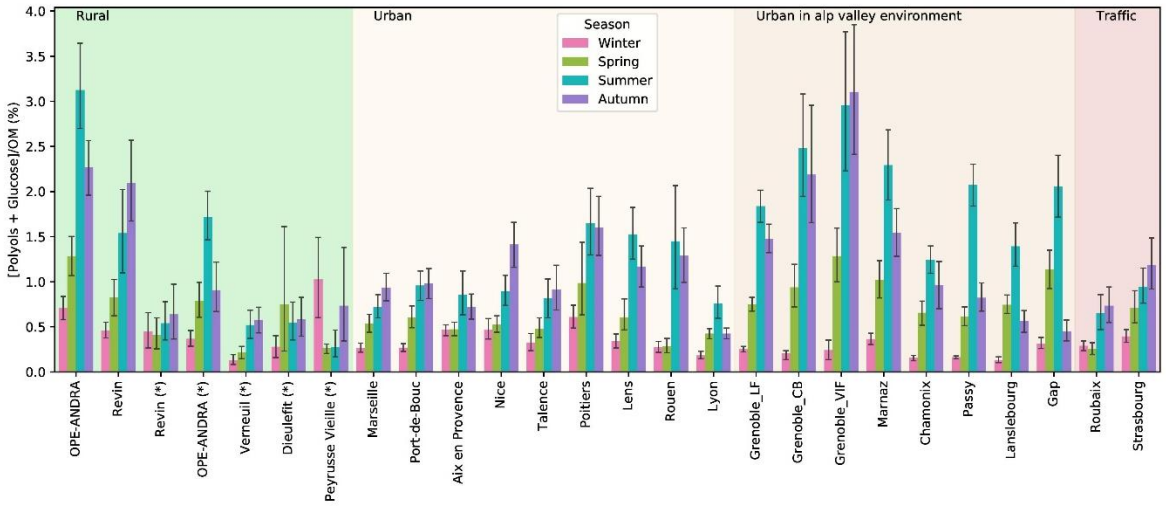

Figure S4: Spatial and seasonal average contributions of dominant polyols (arabitol + mannitol) and glucose to total organic (OM) aerosols at various sites in France. Symbol (*) indicates $PM_{2.5}$ aerosol samples

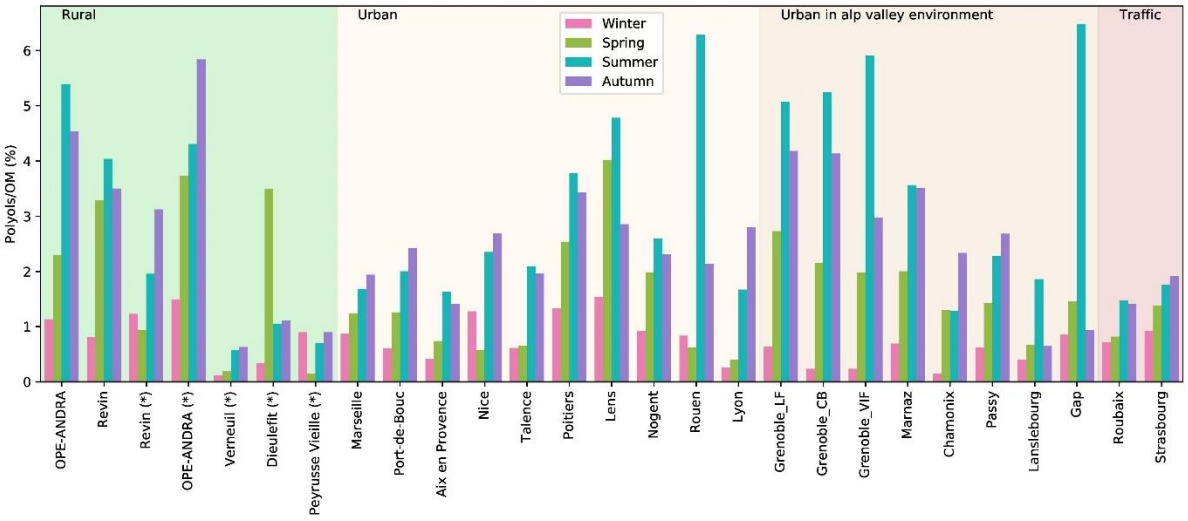

Figure S5 : Maximum seasonal contributions of dominant polyols to total organic aerosols (OM) at various sites in France. Symbol (*) indicates $PM_{2.5}$ aerosol samples.

Table S2: PBOA average factor profile (in fraction of PM mass) identified in the DECOMBIO and SOURCES programs.

Chemical species	Mean (ng μg^{-1})	Standard deviation (ng μg^{-1})
OC*	394	51
EC	81	68
Cl^-	3.9	6.8
NO_3^-	22	49
SO_4^{2-}	55	61
Na^+	4.6	5.2
$NH4^+$	13	14
K^+	9.5	3.2
Mg^{2+}	0.75	0.86
Ca^{2+}	5.6	6.3
MSA	0.12	0.32
Polyols	25	10
Levoglucosan	0.5	1.5
Mannosan	0	0
Fe	9.0	6.2
Al	3.1	2.5
	(pg μg^{-1})	(pg μg^{-1})
As	21	19
Ba	209	153
Cd	1.8	3.2
Co	3.2	4.7
Cr	107	182
Cs	0.6	1.5
Cu	351	298
La	5.4	4.8
Mn	115	130
Mo	11	11
Ni	31	57
Pb	75	80
Rb	7	10
Sb	29	26
Se	45	54
Sn	43	45
Sr	31	36
Ti	64	111
V	32	33
Zn	333	484

OC corresponds to the bulk organic carbon fraction minus individual molecular weight of characterized organic species.*