Litter biomass as a driver of soil VOC fluxes in a Mediterranean forest

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Supplementary materials

Supplementary figures:

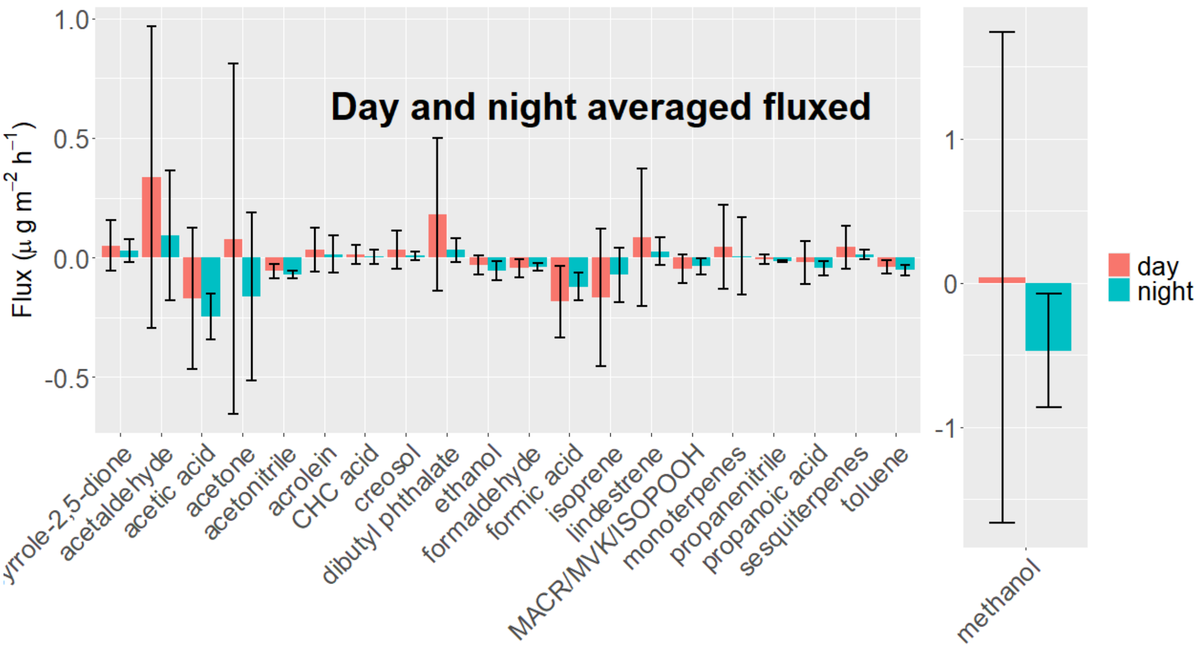

Figure S.1. Averaged fluxes including bare soil and all LM and their standard deviation (black lines) separated by day and night data.

Supplementary tables:

Soil and litter humidity during the field campaign									
Chamber	Sample	Date flux VOC (dd/mm)	Date weight (dd/mm/yyyy)	Day	Dry Mass (DM)(g) empty tube	Fresh Mass (FM) (g) tube+soil	FM (g) soil	DM (g) tube + soil	DM (g) soil
Chamber 1 (bare soil)	Soil	23-24/05	24/5/2023	J1	9.84	17.15	7.31	13.64	3.52
Chamber 2	Soil	23-24/05	24/5/2023	J1	9.87	19.94	10.06	16.29	3.64
Chamber 3	Soil	23-24/05	24/5/2023	J1	9.89	22.34	12.44	17.56	4.77
Chamber 4	Soil	23-24/05	24/5/2023	J1	9.89	25.03	15.14	20.21	4.82
Chamber 5	Soil	23-24/05	24/5/2023	J1	9.93	23.54	13.61	18.61	4.94
Chamber 1 (bare soil)	Soil	24-25/05	25/5/2023	J2	9.91	21.24	11.34	14.92	6.33

Chamber 2	Soil	24-25/05	25/5/2023	J2	9.81	27.82	18.01	21.11	6.72
Chamber 3	Soil	24-25/05	25/5/2023	J2	9.89	25.92	16.03	18.98	6.94
Chamber 4	Soil	24-25/05	25/5/2023	J2	9.88	25.43	15.54	19.48	5.95
Chamber 5	Soil	24-25/05	25/5/2023	J2	9.94	25.62	15.67	19.39	6.22
Chamber 1 (bare soil)	Soil	25-26/05	26/5/2023	J3	9.87	22.75	12.87	16.48	6.26
Chamber 2	Soil	25-26/05	26/5/2023	J3	9.82	27.46	17.64	21.98	5.48
Chamber 3	Soil	25-26/05	26/5/2023	J3	9.83	26.12	16.29	18.95	7.17
Chamber 4	Soil	25-26/05	26/5/2023	J3	9.91	28.31	18.41	21.51	6.81
Chamber 5	Soil	25-26/05	26/5/2023	J3	9.73	24.64	14.91	19.04	5.59
Chamber	Sample	Date flux VOC (dd/mm)	Date weight (dd/mm/yyyy)	Day	FM (g) litter	FM(g) aliquot	DM (g) aliquot	Litter humidity (%)	DM (g)
Chamber 2 - LM1	Litter	23-24/05	24/5/2023	J1	8.88	7.99	6.684	16.43	7.42
Chamber 3 - LM2	Litter		24/5/2023	J1	16.69	7.99	6.66	16.79	13.88
Chamber 4 - LM3	Litter		24/5/2023	J1	30.1	8.01	6.91	13.79	25.95
Chamber 5 - LM4	Litter		24/5/2023	J1	43.3	8.02	5.57	30.55	30.07
Chamber 2 - LM1	Litter	24-25/05	25/5/2023	J2	7.10	7.09	4.24	40.22	4.25
Chamber 3 - LM2	Litter		25/5/2023	J2	14.60	7.98	4.68	41.24	8.58
Chamber 4 - LM3	Litter		25/5/2023	J2	31.70	8.08	6.66	17.57	26.13
Chamber 5 - LM4	Litter		25/5/2023	J2	50.60	8.09	5.92	26.94	36.97
Chamber 2 - LM1	Litter	25-26/05	26/5/2023	J3	8.00	3.60	3.08	14.41	6.85
Chamber 3 - LM2	Litter		26/5/2023	J3	16.00	6.90	5.32	22.86	12.34
Chamber 4 - LM3	Litter		26/5/2023	J3	32.00	8.00	6.33	20.94	25.30
Chamber 5 - LM4	Litter		26/5/2023	J3	48.00	8.00	3.88	51.44	23.31

Table S.1. Soil and litter fresh and dry masses (g), humidity inside the chambers during the field campaign experiment.

				Mean ± std (µg m^{-2} h^{-1})				
m/z	Chemical formula (with H^+)	Name	k (10^{-9} cm^3 s^{-1})	Bare Soil	LM 1	LM 2	LM 3	LM 4
m/z 31.01694	$C_1H_3O_1$	formaldehyde	3.169	-0.043 ± 0.046	-0.030 ± 0.035	-0.036 ± 0.039	-0.031 ± 0.038	-0.032 ± 0.035
m/z 33.03393	$C_1H_5O_1$	methanol	3.165	-0.566 ± 0.490	-0.292 ± 0.412	-0.220 ± 0.360	0.105 ± 1.790	-0.162 ± 0.379

m/z 42.03758	C_2H_4N	acetonitrile	3.789	-0.038 ± 0.040	-0.038 ± 0.040	-0.038 ± 0.039	-0.038 ± 0.040	-0.040 ± 0.042
m/z 45.03087	C_2H_5O	acetaldehyde	3.125	0.173 ± 0.206	0.002 ± 0.124	0.336 ± 0.181	-0.059 ± 0.181	-0.066 ± 0.084
m/z 47.01352	CH_3O_2	formic acid	2.353	-0.090 ± 0.104	-0.072 ± 0.091	-0.088 ± 0.101	-0.074 ± 0.094	-0.088 ± 0.103
m/z 47.04655	C_2H_7O	ethanol	3.131	-0.023 ± 0.031	-0.022 ± 0.030	-0.022 ± 0.030	-0.019 ± 0.027	-0.023 ± 0.030
m/z 53.03925	C_4H_5	cyclobutadiene or butenyne	1.658	-0.005 ± 0.005	-0.004 ± 0.005	-0.005 ± 0.005	-0.004 ± 0.005	-0.004 ± 0.004
m/z 56.04845	C_3H_6N	propanenitrile	3.791	-0.006 ± 0.006	-0.005 ± 0.006	-0.005 ± 0.006	-0.005 ± 0.006	-0.005 ± 0.006
m/z 57.03024	C_3H_5O	acrolein	3.117	0.005 ± 0.029	0.014 ± 0.037	0.006 ± 0.031	0.009 ± 0.038	0.012 ± 0.030
m/z 59.0493	C_3H_7O	acetone	3.122	-0.213 ± 0.215	-0.156 ± 0.73	-0.048 ± 0.084	0.082 ± 0.271	0.194 ± 0.251
m/z 60.05095	C_3H_8O	acetamide (Sarkar et al., 2016)	3.124	-0.008 ± 0.008	-0.006 ± 0.007	-0.003 ± 0.004	0.001 ± 0.010	0.006 ± 0.008
m/z 61.02929	$C_2H_5O_2$	acetic acid	2.349	-0.098 ± 0.118	-0.066 ± 0.126	-0.112 ± 0.120	-0.111 ± 0.121	-0.061 ± 0.091
m/z 62.02913	CH_4NO_2	nitromethane (Inomata et al., 2014)	3.755	-0.002 ± 0.002	-0.001 ± 0.002	-0.002 ± 0.002	-0.002 ± 0.002	-0.001 ± 0.001
m/z 69.06937	C_5H_9	isoprene	1.838	-0.075 ± 0.116	-0.034 ± 0.096	-0.056 ± 0.094	-0.054 ± 0.118	-0.025 ± 0.086
m/z 70.07176	C_4H_8N	-	3.834	-0.002 ± 0.003	-0.001 ± 0.003	-0.002 ± 0.003	-0.002 ± 0.003	-0.001 ± 0.002
m/z 71.04503	C_4H_7O	MACR/MVK/ISOPOOH	3.119	-0.019 ± 0.025	-0.012 ± 0.019	-0.016 ± 0.026	-0.015 ± 0.026	-0.015 ± 0.022
m/z 75.04034	$C_3H_7O_2$	propanoic acid	2.395	-0.002 ± 0.027	-0.014 ± 0.015	-0.020 ± 0.022	-0.006 ± 0.022	-0.017 ± 0.018
m/z 79.06013	C_6H_7	benzene	1.924	-0.004 ± 0.004	-0.004 ± 0.004	-0.004 ± 0.004	-0.004 ± 0.004	-0.005 ± 0.005

m/z 85.01845	C_4H_5S	thiophene	2.016	-0.003 ± 0.004	-0.003 ± 0.004	-0.003 ± 0.005	-0.003 ± 0.005	-0.004 ± 0.005
m/z 85.06795	C_5H_9O	cyclopentanone (Mancuso et al., 2015)	3.122	0.001 ± 0.004	-0.002 ± 0.003	-0.001 ± 0.006	0.001 ± 0.003	-4.375 10^{-4} ± 0.005
m/z 86.02312	$C_3H_4NO_2$	cyano acetic acid	3.813	-1.732 10^{-4} ± 2.774 10^{-4}	-1.734 10^{-4} ± 2.683 10^{-4}	5.366E-03± 0.008	2.036 10^{-4} ± 2.905 10^{-4}	-2.169 10^{-4} ± 3.028 10^{-4}
m/z 87.04397	$C_4H_7O_2$	2,3-butadione (Sarkar et al., 2016)	2.446	-0.005 ± 0.013	-0.013 ± 0.014	-0.011 ± 0.018	-0.008 ± 0.011	-0.013 ± 0.015
m/z 87.08134	$C_5H_{11}O$	MBO	3.124	0.001 ± 0.002	2.40 10^{-4} ± 0.001	0.002 ± 0.005	0.003 ± 0.005	0.001 ± 0.002
m/z 93.07393	C_7H_9	toluene	2.057	-0.014 ± 0.014	-0.012 ± 0.013	-0.011 ± 0.012	-0.013 ± 0.014	-0.013 ± 0.014
m/z 95.02947	$C_2H_7O_4$	dioxybismethanol (Meischner et al., 2022)	3.122	0.007 ± 0.016	-0.002 ± 0.003	-0.001 ± 0.004	0.005 ± 0.011	-0.002 ± 0.003
m/z 97.03481	$C_4H_5N_2O$	-	3.025	-0.002 ± 0.003	-0.003 ± 0.003	-0.003 ± 0.003	-0.003 ± 0.003	-0.003± 0.004
m/z 98.02441	$C_4H_4NO_2$	1H-pyrrole-2,5-dione	3.842	-4.702 10^{-4} ±0.001	-4.878 10^{-4} ±0.001	0.028 ± 0.004	0.017 ± 0.004	-4.840 10^{-4} ± 0.001
m/z 99.05189	$C_5H_7O_2$	-	2.507	-0.003 ± 0.005	-0.005 ± 0.007	-0.004 ± 0.006	-0.004 ± 0.007	-0.005 ± 0.007
m/z 100.0365	$C_4H_6NO_2$	-	3.851	-0.001 ± 0.001	-0.001 ± 0.001	0.003 ± 0.004	0.002± 0.003	-0.001± 0.001

m/z 101.0686	$C_5H_9O_2$	2,3-Pentanedione or acetyl acetone or 2-butenoic acid methyl ester	2.523	0.011 ± 0.021	0.001 ± 0.009	0.024 ± 0.041	0.012 ± 0.020	0.009 ± 0.020
m/z 103.0410	$C_4H_7O_3$	propylene Carbonate	3.111	-0.003 ± 0.003	-0.003 ± 0.003	-0.002 ± 0.003	-0.003 ± 0.003	-0.003 ± 0.003
m/z 107.0938	C_8H_{11}	xylenes	2.182	-0.002 ± 0.003	-0.003 ± 0.004	-0.003 ± 0.004	-0.003 ± 0.003	-0.004 ± 0.004
m/z 111.0457	$C_6H_7O_2$	-	2.572	-0.002 ± 0.003	-0.004 ± 0.004	-0.004 ± 0.004	-0.002 ± 0.004	-0.003 ± 0.004
m/z 113.0216	$C_5H_5O_3$	-	3.121	-0.002 ± 0.004	-0.004 ± 0.004	-0.004 ± 0.005	-0.003 ± 0.004	-0.004 ± 0.004
m/z 115.0781	$C_6H_{11}O_2$	-	2.605	7.974×10^{-4} ± 0.003	-8.437 10^{-4} ± 0.002	3.853 10^{-4} ± 0.002	0.003 ± 0.004	-2.147 10^{-4} ± 0.003
m/z 116.0409	$C_4H_6NO_3$	3-Methyl-2,5-oxazolidine-dione	3.101	-1.218 10^{-4} ± 3.445 10^{-4}	-2.168 10^{-4} ± 3.162 10^{-4}	0.008 ± 0.012	0.004 ± 0.005	-2.448 10^{-4} ± 3.125 10^{-4}
m/z 129.098	$C_7H_{13}O_2$	cycloheaxanecarboxylic acid - CHC acid	2.685	-4.928 10^{-4} ± 0.002	-6.588 10^{-4} ±0.002	0.008 ± 0.015	0.003 ± 0.005	-0.002 ± 0.003
m/z 129.1315	$C_8H_{16}O$	octanal or octanone or 1-octen-3-ol, ...	2.175	0.003 ± 0.004	0.002 ± 0.003	6.275 10^{-4} ± 0.002	0.005 ± 0.008	0.002 ± 0.005
m/z 137.1397	$C_{10}H_{17}$	monoterpenes	2.433	-0.007 ± 0.016	-0.007 ± 0.015	-0.007 ± 0.016	-0.006 ± 0.015	0.026 ± 0.043
m/z 139.0844	$C_8H_{11}O_2$	p-creosol	2.741	0.007 ± 0.013	-7.802 10^{-4} ± 0.002	7.082 10^{-4} ± 0.002	0.003 ± 0.007	0.004 ± 0.014
m/z 139.129	$C_{10}H_{19}$	-	2.453	-0.002 ±0.002	-5.206 10^{-4} ± 0.002	3.961 10^{-4} ± 0.002	0.002 ± 0.003	-0.003 ± 0.003

m/z 153.1204	$C_{10}H_{17}O$	oxygenated monoterpenes	3.247	-4.447 10^{-4} ± 0.002	-5.383 10^{-4} ± 0.002	0.002 ± 0.002	0.003 ± 0.003	-0.002 ± 0.002
m/z 157.1471	$C_{10}H_{20}O$	-	3.946	0.003 ± 0.005	2.378 10^{-4} ± 0.003	-4.986 10^{-4} ± 0.004	0.001 ± 0.004	-0.002 ± 0.004
m/z 205.1848	$C_{15}H_{25}$	sesquiterpenes	2.909	4.282 10^{-5} ± 0.002	0.002 ± 0.002	0.006 ± 0.016	0.007 ± 0.008	6.952 10^{-4} ± 0.002
m/z 215.1319	$C_{15}H_{19}O$	lindestrene	3.493	0.002 ± 0.003	0.003 ± 0.007	0.025 ± 0.054	0.002 ± 0.004	-5.369 10^{-4} ± 8.963 10^{-4}
m/z 279.1614	$C_{16}H_{23}O_4$	dibutyl phthalate	3.805	-0.003 ± 0.005	0.007 ± 0.021	0.008 ± 0.017	0.013 ± 0.022	0.008 ± 0.021

Table S.2. VOCs targeted in our study and mean fluxes ± std in each chamber with bare soil, LM 1, 2, 3, 4.