

## Supplementary Material

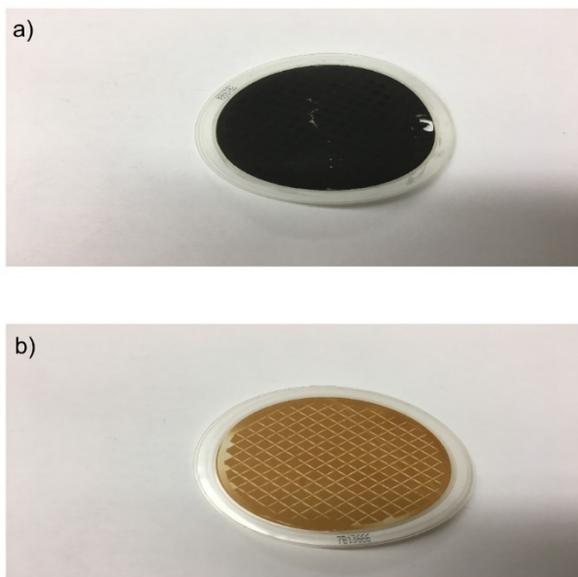


Figure S1: Visual appearance of aerosol collected on the filter during a) 800°C and b) 500°C burning.

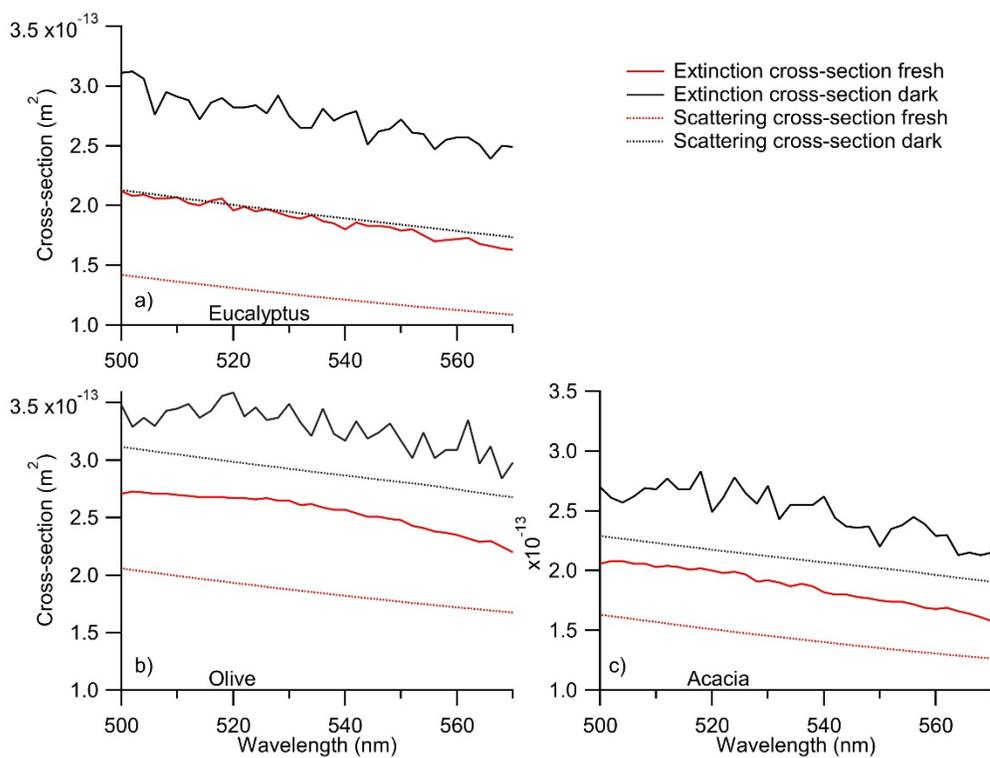


Figure S2: Impact of dark aging on extinction and scattering cross-section of 300 nm aerosol emitted during 500°C combustion cases for a) Eucalyptus, b) Olive, and c) Acacia.

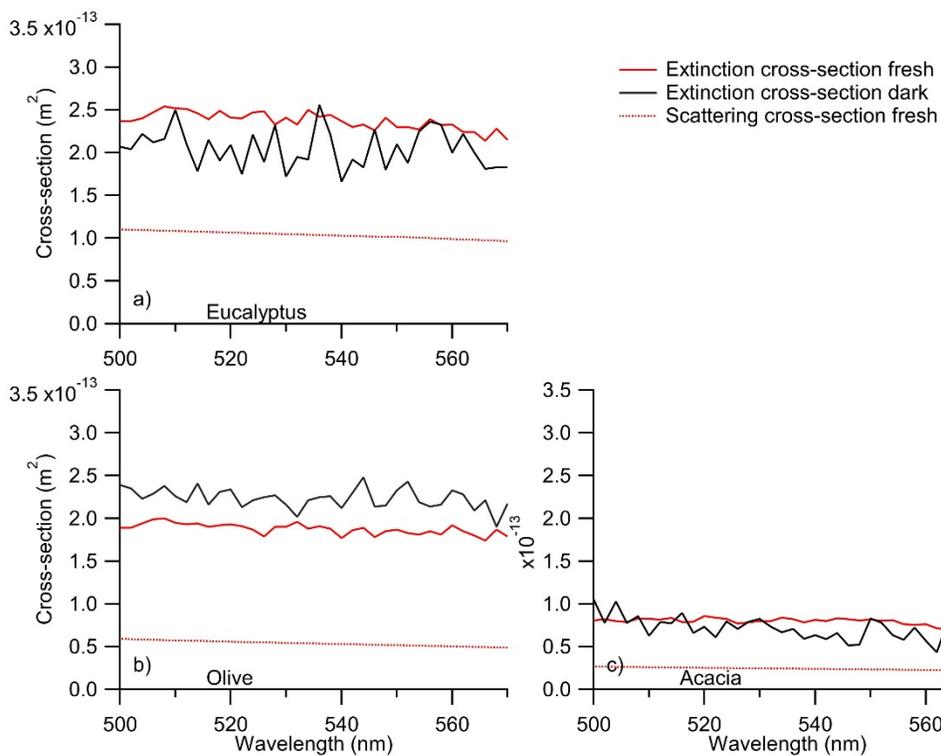


Figure S3: Impact of dark aging on extinction cross-section of 300 nm aerosol emitted during 800°C combustion cases for a) Eucalyptus, b) Olive, and c) Acacia.

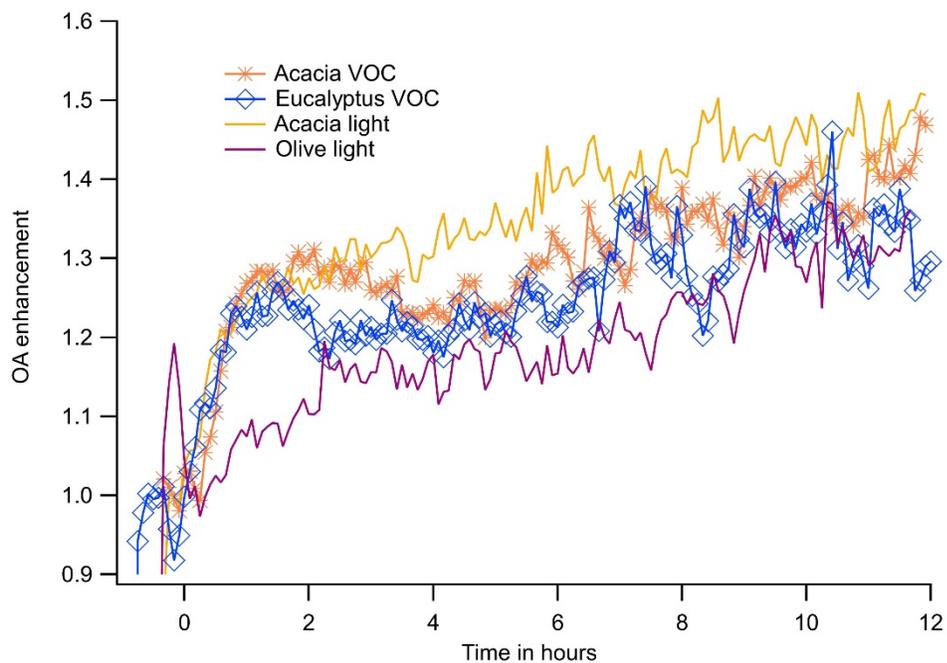


Figure S4: Variation of organic aerosol enhancement with photochemical aging time under light and light plus VOC aging for different fuels listed in the legend.

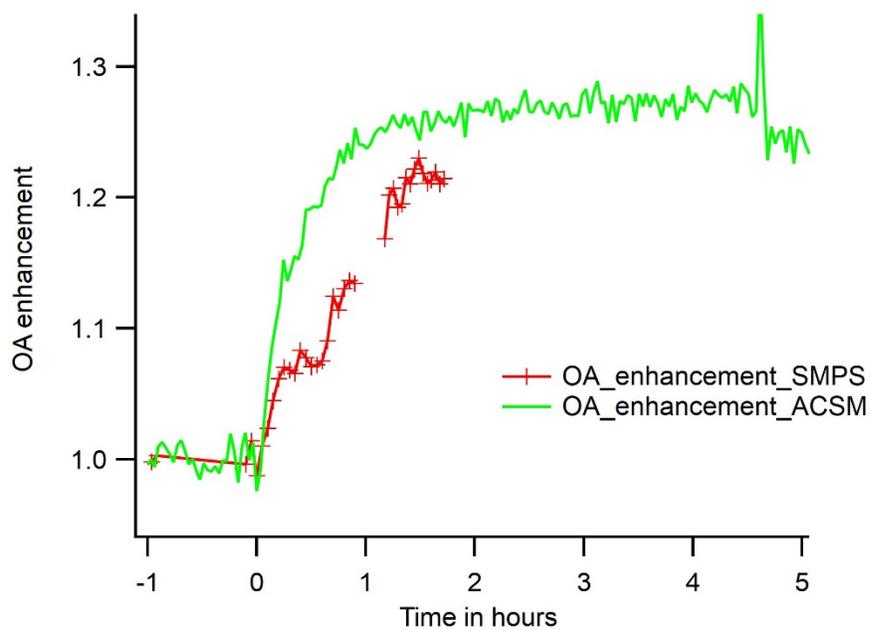


Figure S5: Comparison of OA enhancement calculation based on the SMPS and ACSM.

Table S1: Size selected SSA of different fuels measured at 500°C and 800°C burn conditions with different aging conditions.

Fuel type	Size nm	Measurement conditions	Average SSA 500°C burn case	Average SSA 800°C burn case
Eucalyptus	200	Fresh	0.645 ± 0.017	0.468 ± 0.012
		Aged (dark)	0.716 ± 0.025	-
		Aged (light)	0.876 ± 0.021	-
		Aged (VOC)	0.953 ± 0.024	-
	300	Fresh	0.660 ± 0.018	0.439 ± 0.010
		Aged (dark)	0.707 ± 0.020	-
		Aged (light)	0.931 ± 0.027	-
		Aged (VOC)	0.978 ± 0.023	-
	400	Fresh	0.668 ± 0.018	0.427 ± 0.009
		Aged (dark)	0.715 ± 0.020	-
		Aged (light)	0.959 ± 0.029	-
		Aged (VOC)	0.995 ± 0.024	-
Acacia	200	Fresh	0.727 ± 0.024	0.325 ± 0.028
		Aged (dark)	0.817 ± 0.025	-
		Aged (light)	0.902 ± 0.019	-
		Aged (VOC)	0.844 ± 0.025	-
	300	Fresh	0.769 ± 0.027	0.309 ± 0.012
		Aged (dark)	0.847 ± 0.026	-
		Aged (light)	0.935 ± 0.020	-
		Aged (VOC)	0.913 ± 0.025	-
	400	Fresh	0.857 ± 0.030	0.308 ± 0.026
		Aged (dark)	0.908 ± 0.025	-
		Aged (light)	0.967 ± 0.021	-
		Aged (VOC)	0.912 ± 0.026	-
Olive	200	Fresh	0.675 ± 0.038	0.283 ± 0.007
		Aged (dark)	0.826 ± 0.031	-
		Aged (light)	0.961 ± 0.020	-

	Aged (VOC)	-	-
300	Fresh	$0.728 \pm 0.052$	$0.287 \pm 0.006$
	Aged (dark)	$0.886 \pm 0.029$	-
	Aged (light)	$0.991 \pm 0.021$	-
	Aged (VOC)	-	-
400	Fresh	$0.816 \pm 0.054$	$0.290 \pm 0.006$
	Aged (dark)	$1.002 \pm 0.037$	-
	Aged (light)	$1.015 \pm 0.021$	-
	Aged (VOC)	-	-