Supplemental Information for

Diel Cycle Impacts on the Chemical and Light Absorption Properties of Organic Carbon Aerosol from Wildfires in the Western United States

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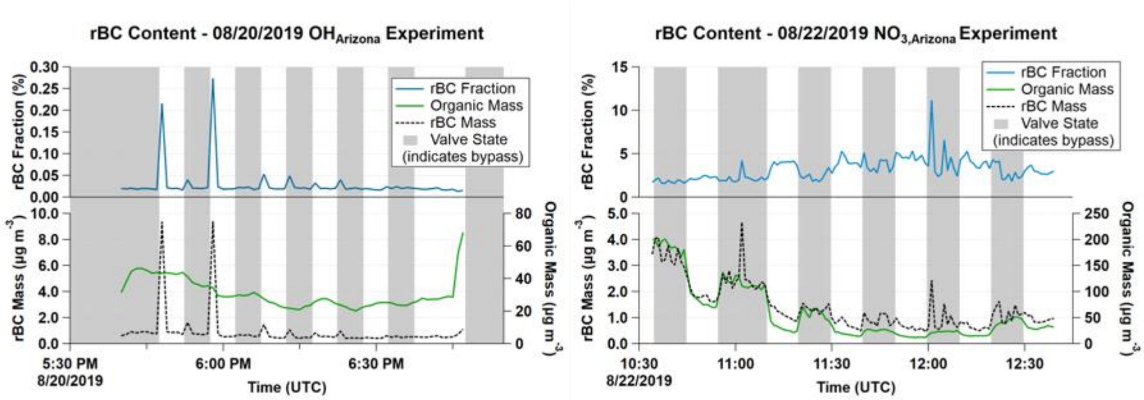


Figure S1: rBC fraction (top, blue), rBC (bottom, dashed black, left axis) and organic mass concentrations (bottom, green, right axis) for both Arizona experiments.

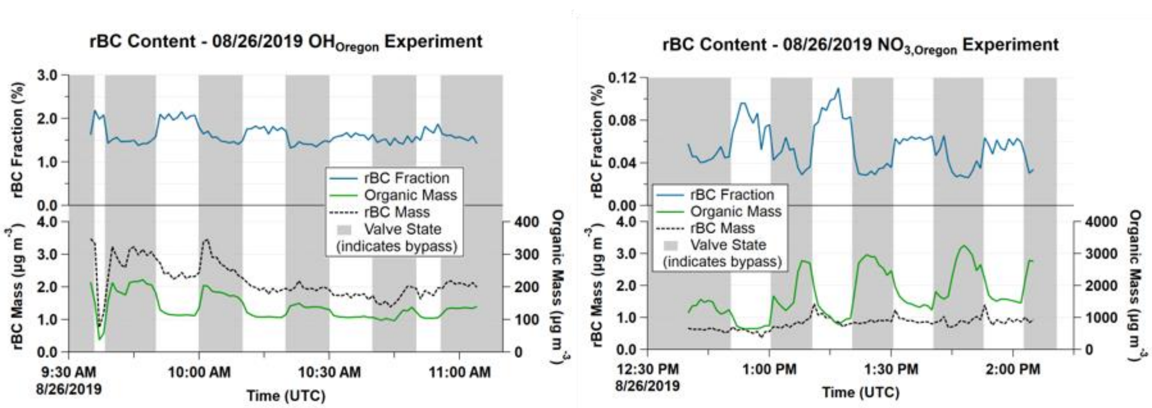


Figure S2: rBC fraction (top, blue), rBC (bottom, dashed black, left axis) and organic mass concentrations (bottom, green, right axis) for both Oregon experiments.

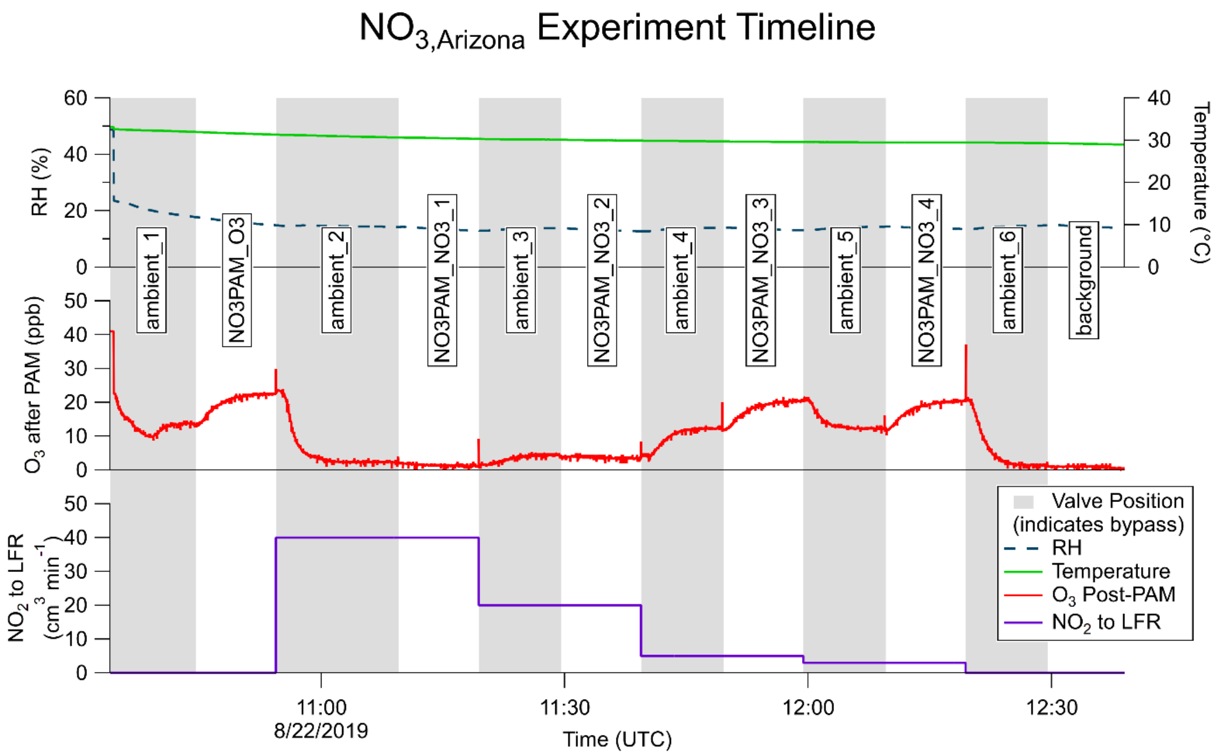
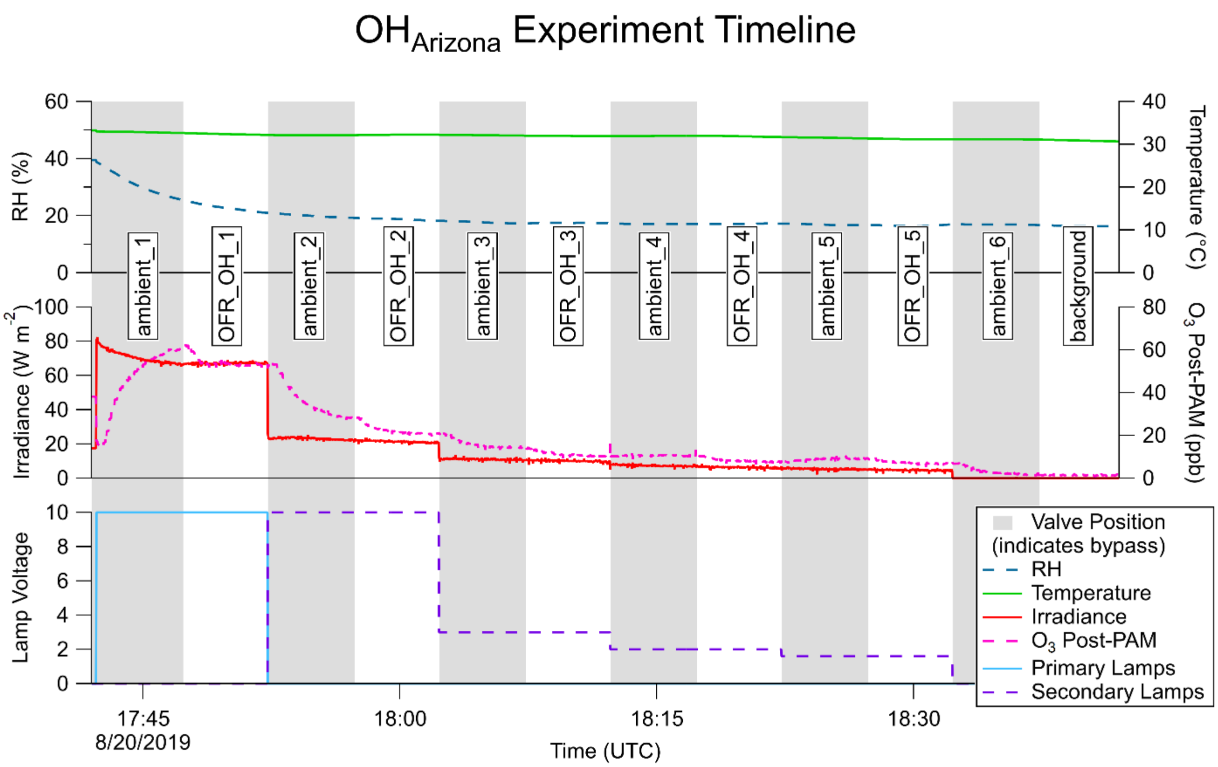


Figure S3: The timeline of the $NO_{3,Arizona}$ experiment showing relative humidity, temperature, ozone post-PAM, and NO_2 concentration flowing to the LFR. The gray bars indicate when the bypass valve was engaged and ambient aerosol was being analyzed. Each step is labeled for reference.



30 **Figure S4: The timeline of the OH$_{Arizona}$ experiment showing relative humidity, temperature, 185 nm irradiance, ozone post-PAM, and voltages applied to the ballasts of both sets of lamps. The gray bars indicate when the bypass valve was engaged and ambient aerosol was being analyzed. Each step is labeled for reference.**

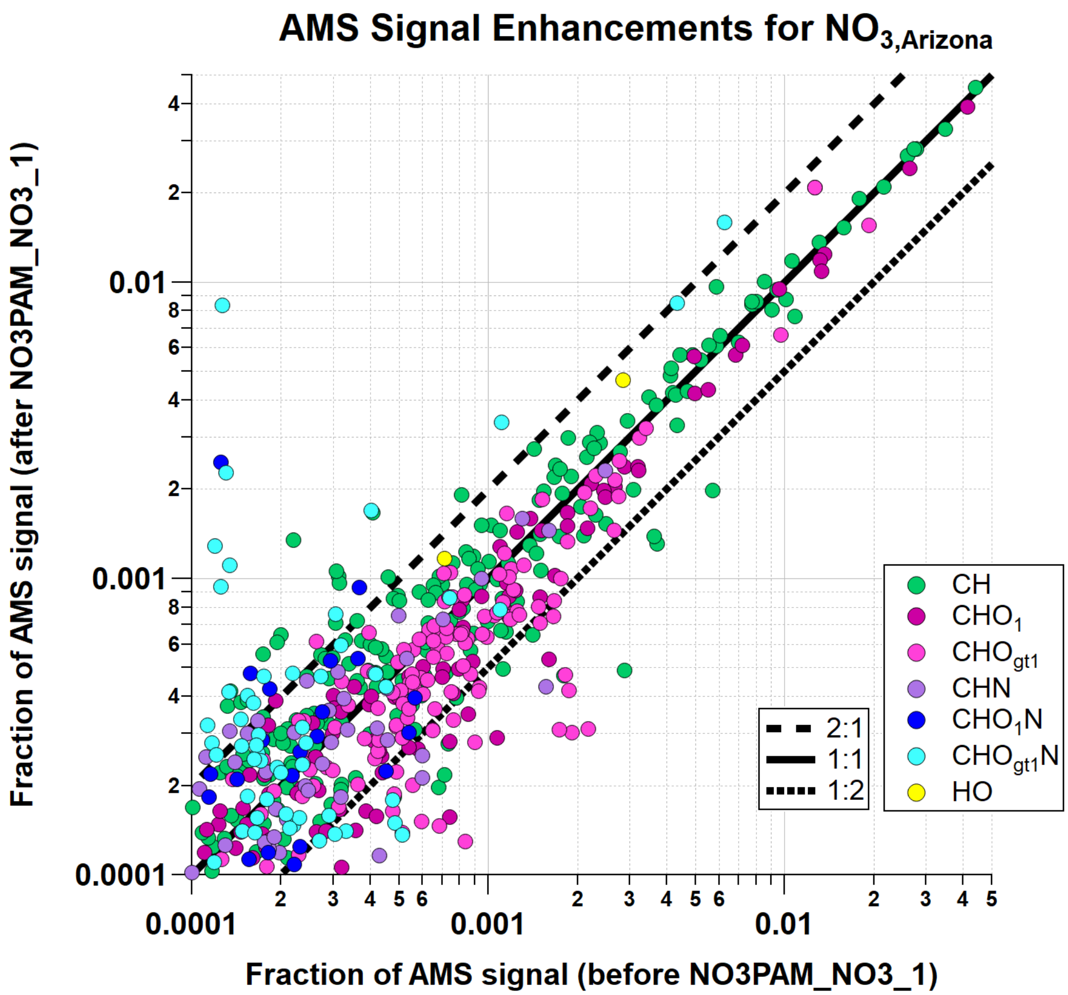
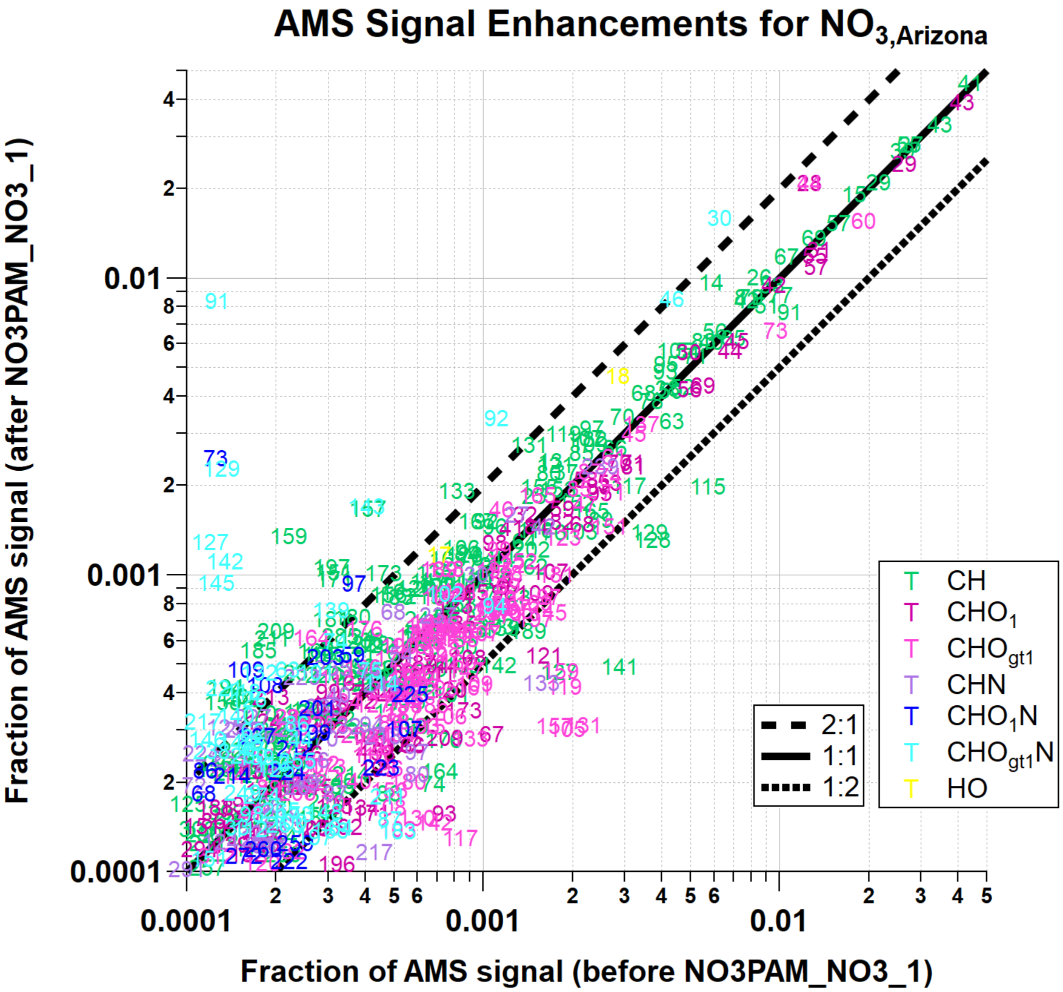


Figure S5: Scatterplot of enhancement and depletion of ions measured by the AMS before and after NO3PAM_NO_3_1. The ion families with the highest enhancement are the nitrogenated hydrocarbons (CHO_1N and $CHO_{gt1}N$, dark and light blue, respectively), while the most depleted species are the non-nitrogenated hydrocarbons (CHO_1 and CHO_{gt1} purple and pink, respectively). The solid black line is the 1:1 line, above which indicates enhancement. The 2:1 and 1:2 lines are also given for convenience.



40 **Figure S6: As with Figure S5, showing individual *m/z*.**

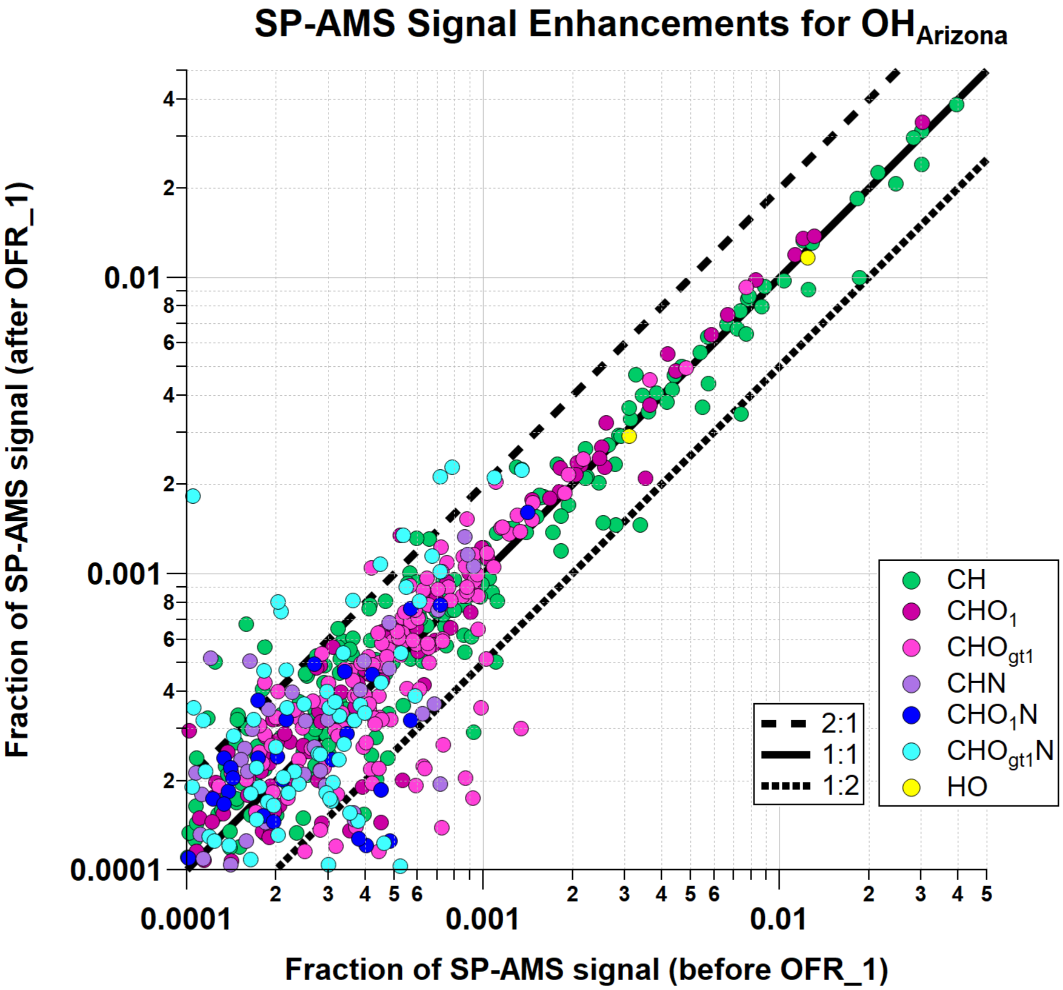


Figure S7: Scatterplot of enhancement and depletion of ions measured by the SP-AMS before and after OFR_1. The ion family with the highest enhancement is still the nitrogenated hydrocarbons with more than one oxygen atom ($CHO_{gt1}N$, light blue), though the most depleted species are the nitrogenated hydrocarbons with a single oxygen atom (CHO_1N, blue). The solid black line is the 1:1 line, above which indicates enhancement. The 2:1 and 1:2 lines are also given for convenience.

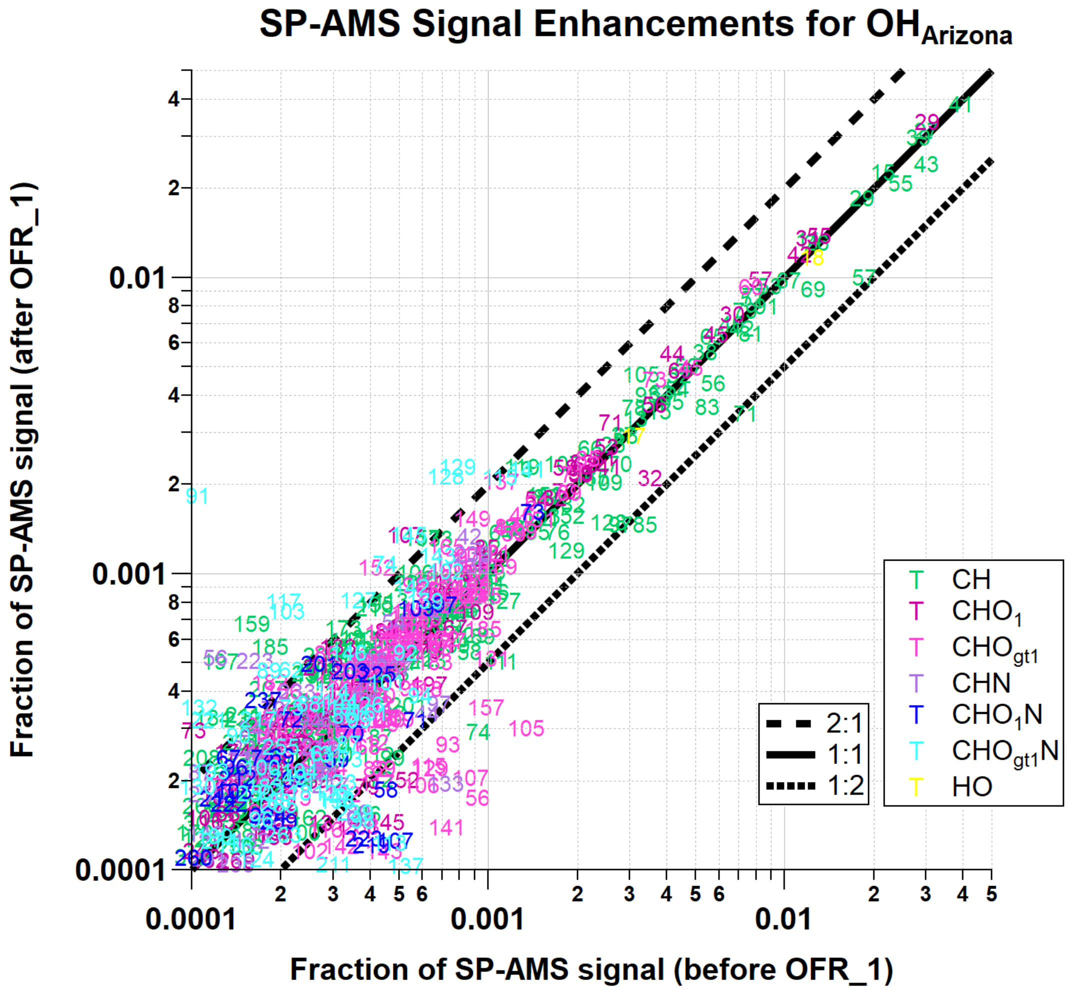


Figure S8: As with Figure S7, showing individual *m/z*.

Table S1: Fit coefficients used in Eq. 1 (reproduced from Lambe et al. 2020).

Coefficient	Subspace 1 values	Subspace 2 values	Subspace 3 values
a	61.0694	−59.3835	246.416
b	−20.1400	27.3434	−122.229
c	0.795209	0.803508	0.581443
d	−0.375825	1.18285	51.2355
e	0.031103	0.008157	−0.66569
f	0.888193	−0.0731138	−0.0210958
g	−0.379009	0.13199	−0.346062
h	1.73605	−0.422009	−81.9221
i	0.14737	0.035132	−22.4373
j	0.261402	0.311104	13.204
k	−1.22009	−0.323329	−0.118988
l	0.007336	−0.004277	0.676436
m	−0.957064	−0.436977	−0.3983

Table S2: Fit coefficients used in Eq. 2.

Coefficient	*a*	*b*	*c*	*d*	*e*	*f*
Value	10.098	0.15062	-0.4424	0.18041	0.031146	0.1672