Attribution of Source Specific 370nm UV Light Absorption from Dust, Brown Carbon, and Black Carbon at Two Locations in the San Joaquin Valley.

Michael R. Olson[1,2*], Alexandra Lai[2,3], Matthew Skiles[2,4], James J. Schauer[2]

[1] *California Air Resources Board, 8311 Galena Ave, Sacramento, CA, United States of America*

[2] *University of Wisconsin Madison, Water Science and Engineering Laboratory, 660 North Park Street, Madison, WI, United States of America*

[3] *Weizmann Institute of Science, Rehovot, Center District, Israel*

[4] *The University of Texas at Austin, Austin, TX, United States of America*

[*] Corresponding author. Tel: 1-279-208-7972

E-*mail address*: Michael.Olson@arb.ca.gov

Supplemental Materials:

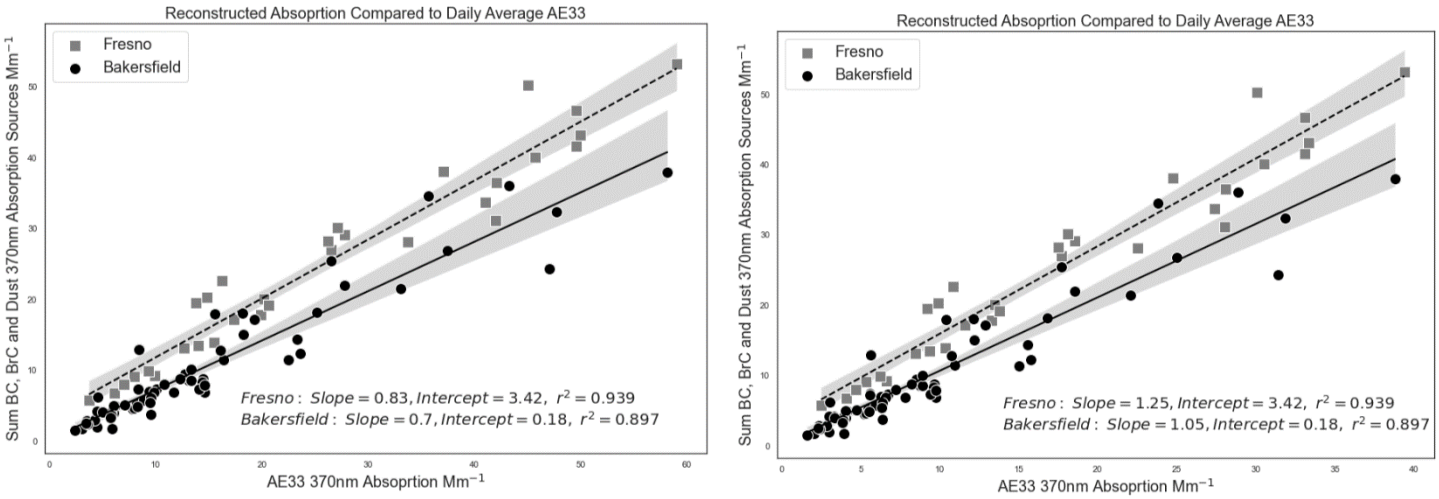

Fig. S1 (left panel) Reconstructed vs measured using (Drinovec, Sciare et al. 2020)value of 2.57 for C_{ref} and (right panel) Reconstructed vs measured using Olson (Olson, Yuqin et al. 2021) 3.85 $C_{ref.}$ The equation that show the relationship between the aethalometer absorption coefficient (b_{abs}) to attenuation coefficient (b_{atn}) and the scattering correction factor (C_{ref}) is shown in the left panel.

The following equations are utilized to calculate the BrC absorption contribution from corrected Aethalometer data; using an AAE = 1, $\sigma_{BC,880}$ is projected to calculate $\sigma_{BC,370}$. The $\sigma_{BC,370}$ is subtracted from the total $\sigma_{Tot,370}$ to estimate the non-BC (BrC and Dust) light absorption at 370 nm wavelength. Multiplying the source specific MAC to apportioned EC, OC, or dust concentrations (C_y)allows the calculation of light absorption associated with the source component.

$$AAE = -\frac{ln\left(\frac{\sigma_{cor,\lambda 1}}{\sigma_{cor,\lambda 2}}\right)}{ln\left(\frac{\lambda_1}{\lambda_2}\right)}$$

$$\sigma_{BrC,\lambda} = \sigma_{\lambda} - \sigma_{AAE=1\ projection,\lambda}$$

$$\sigma_{\lambda} = MAC_{y,\lambda} \times C_y$$

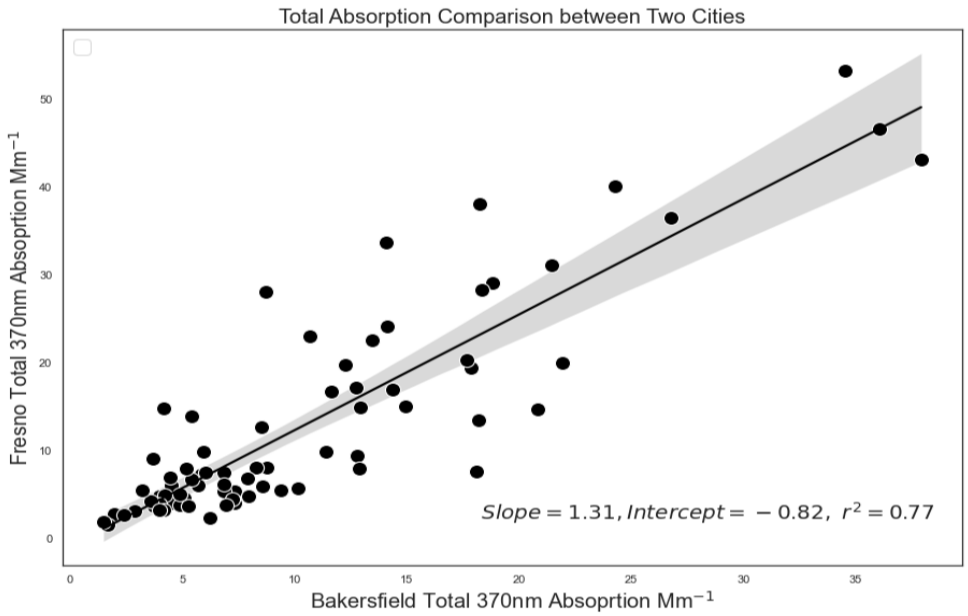

Fig. S2 Total near-UV absorption relationship between Bakersfield and Fresno in 2015. Indicating light absorption was greater in Fresno driven by the BrC contribution.

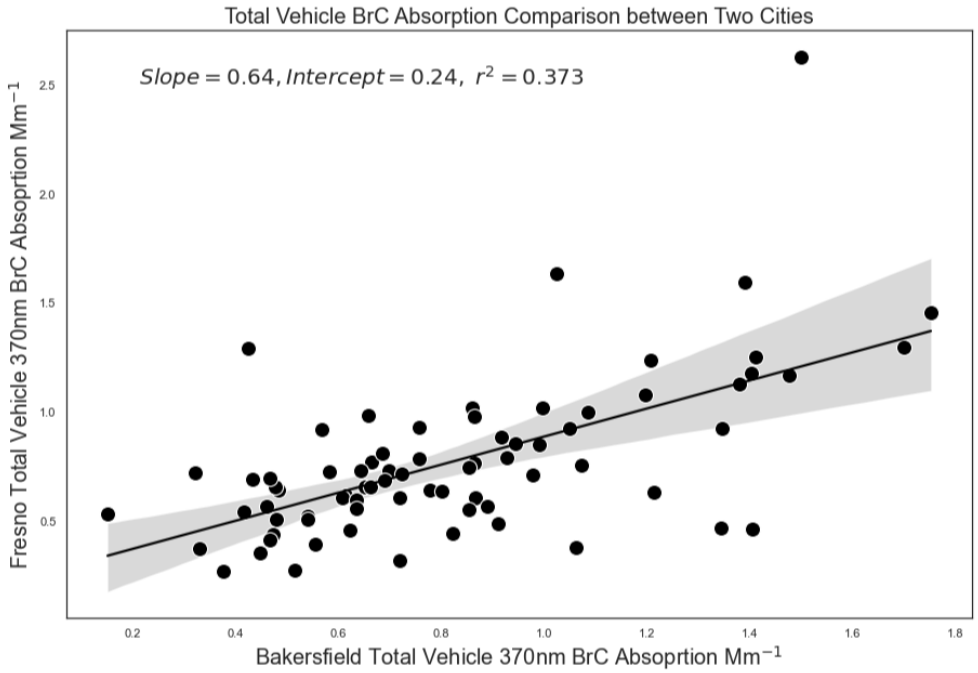

Fig. S3 Total Vehicle BrC relationship between Bakersfield and Fresno. Show's Bakersfield had greater influence from vehicle BrC.

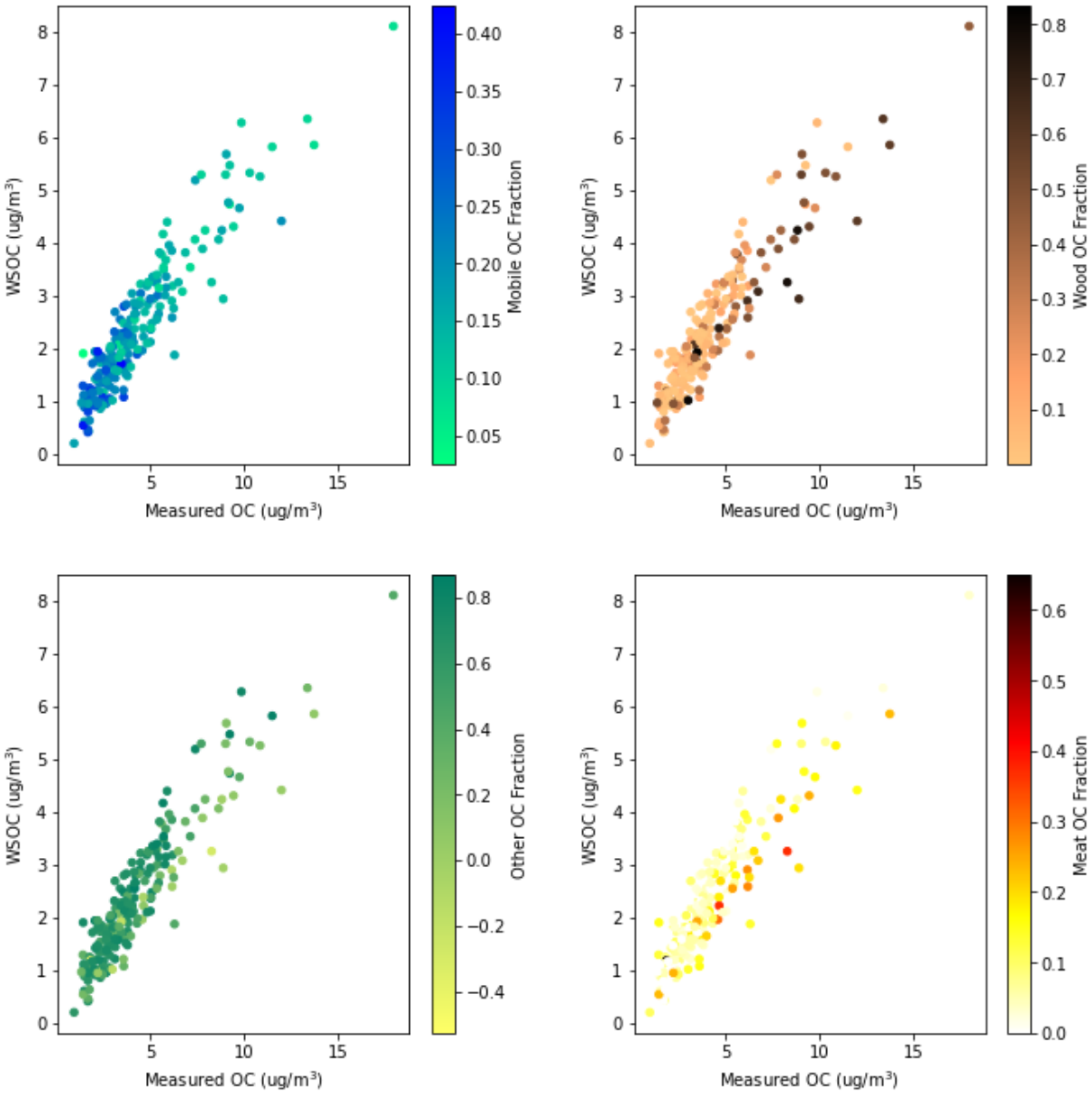

Fig. S4 WSOC vs OC for both Bakerfield and Fresno. Color scale shows the fraction of OC apportioned to major BrC contributors. Color indicates fraction of OC apportioned to major BrC sources. Mobile (a), Wood (b), Other - SOA (c), and Meat cooking (d).

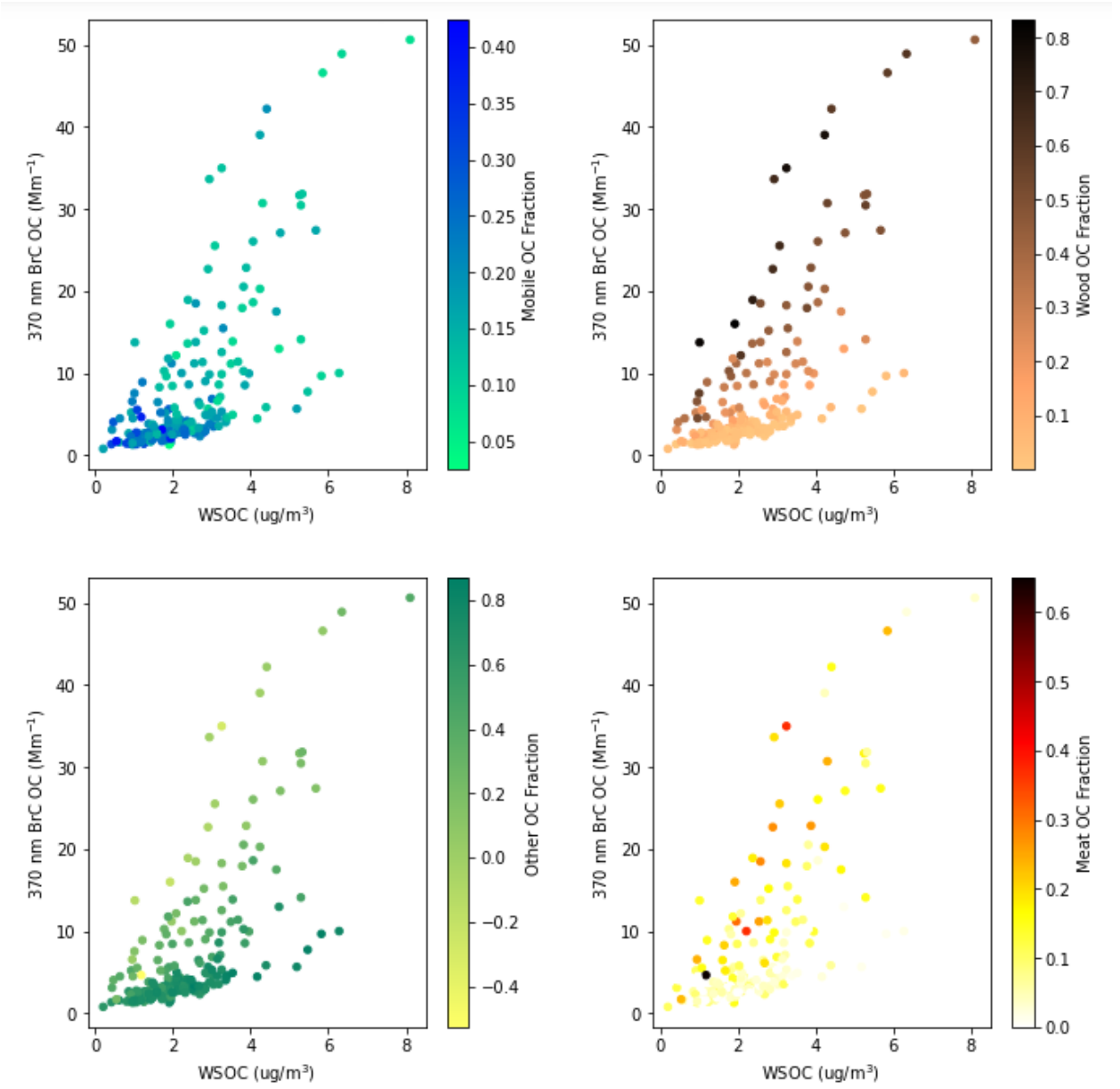

Fig. S5 Total OC BrC 370nm light absorption vs WSOC for both Bakerfield and Fresno. Color scale shows the fraction of OC apportioned to major BrC contributors. Color indicates fraction of OC apportioned to major BrC sources. Mobile (a), Wood (b), Other -SOA (c), and Meat cooking (d).

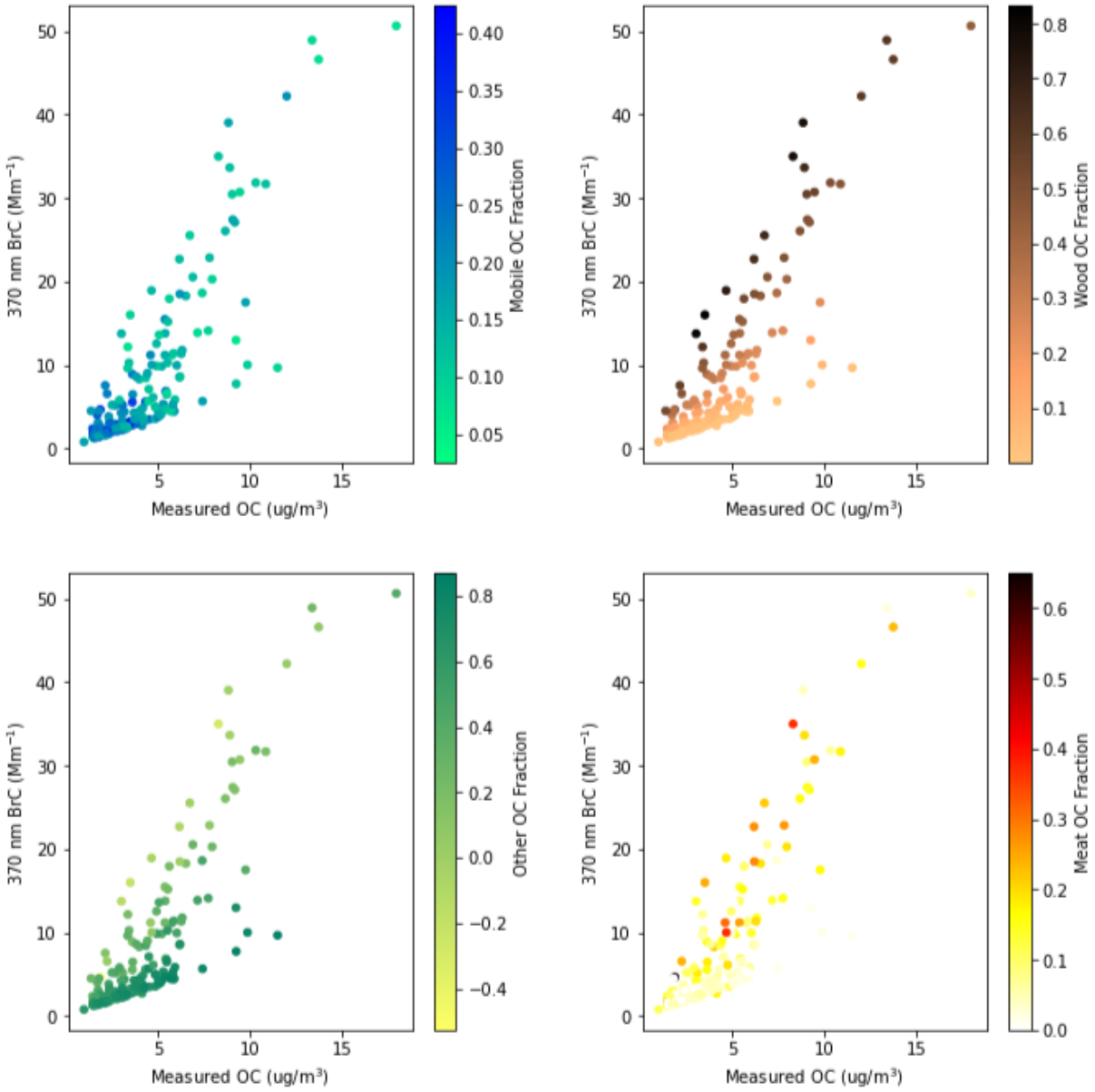

Fig. S6 Total OC BrC 370nm light absorption vs OC for both Bakerfield and Fresno. Color scale shows the fraction of OC apportioned to major BrC contributors. Color indicates fraction of OC apportioned to major BrC sources. Mobile (a), Wood (b), Other -SOA (c), and Meat cooking (d).

Table S1 Seasonal average 370 nm absorption coefficient and standard error for all valid samples collected in 2015 and 2016 at Fresno and Bakersfield, SJV, California.

Fresno	Abs Coef (Mm^{-1})	Std Error	Bakersfield	Abs Coef (Mm^{-1})	Std Error
Winter			***Winter***		
BC 370 ABS	5.333	0.538	BC 370 ABS	4.993	0.497
Dust Abs	0.086	0.010	Dust Abs	0.120	0.012
BrC Veg Det 370 ABS	0.047	0.005	BrC Veg Det 370 ABS	0.036	0.003
BrC Wood 370 ABS	14.929	1.639	BrC Wood 370 ABS	7.814	1.004
BrC Meat 370 ABS	0.026	0.004	BrC Meat 370 ABS	0.020	0.003
BrC Total Mobile 370 ABS	0.766	0.056	BrC Total Mobile 370 ABS	0.852	0.061
BrC CMB Other 370 ABS	0.795	0.146	BrC CMB Other 370 ABS	0.855	0.163
Spring			***Spring***		
BC 370 ABS	1.732	0.210	BC 370 ABS	2.067	0.311
Dust Abs	0.132	0.014	Dust Abs	0.244	0.028
BrC Veg Det 370 ABS	0.031	0.002	BrC Veg Det 370 ABS	0.028	0.002
BrC Wood 370 ABS	1.948	0.545	BrC Wood 370 ABS	0.959	0.344
BrC Meat 370 ABS	0.005	0.001	BrC Meat 370 ABS	0.005	0.001
BrC Total Mobile 370 ABS	0.609	0.034	BrC Total Mobile 370 ABS	0.596	0.062
BrC CMB Other 370 ABS	1.152	0.113	BrC CMB Other 370 ABS	1.179	0.132
Summer			***Summer***		
BC 370 ABS	2.138	0.181	BC 370 ABS	2.979	0.470
Dust Abs	0.218	0.018	Dust Abs	0.420	0.089
BrC Veg Det 370 ABS	0.022	0.002	BrC Veg Det 370 ABS	0.027	0.007
BrC Wood 370 ABS	0.366	0.066	BrC Wood 370 ABS	0.565	0.377
BrC Meat 370 ABS	0.002	0.000	BrC Meat 370 ABS	0.003	0.001
BrC Total Mobile 370 ABS	0.820	0.054	BrC Total Mobile 370 ABS	0.834	0.059
BrC CMB Other 370 ABS	1.887	0.187	BrC CMB Other 370 ABS	1.741	0.192
Fall			***Fall***		
BC 370 ABS	5.673	0.705	BC 370 ABS	5.679	0.822
Dust Abs	0.261	0.048	Dust Abs	0.270	0.048
BrC Veg Det 370 ABS	0.031	0.005	BrC Veg Det 370 ABS	0.020	0.003
BrC Wood 370 ABS	7.915	2.312	BrC Wood 370 ABS	4.677	1.436
BrC Meat 370 ABS	0.015	0.004	BrC Meat 370 ABS	0.017	0.005
BrC Total Mobile 370 ABS	0.895	0.096	BrC Total Mobile 370 ABS	0.898	0.097
BrC CMB Other 370 ABS	1.687	0.252	BrC CMB Other 370 ABS	1.625	0.195