



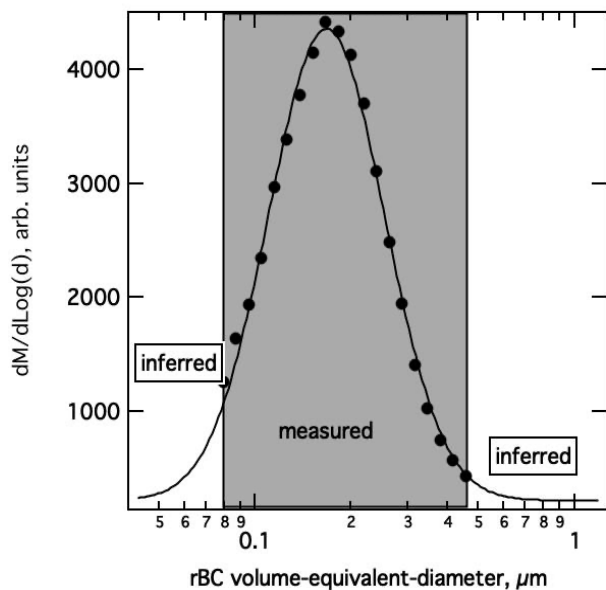
Supplement of

Characteristics and evolution of brown carbon in western United States wildfires

Linghan Zeng et al.

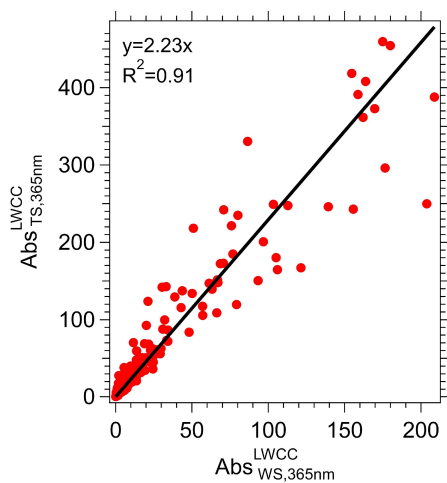
Correspondence to: Rodney J. Weber (rweber@eas.gatech.edu)

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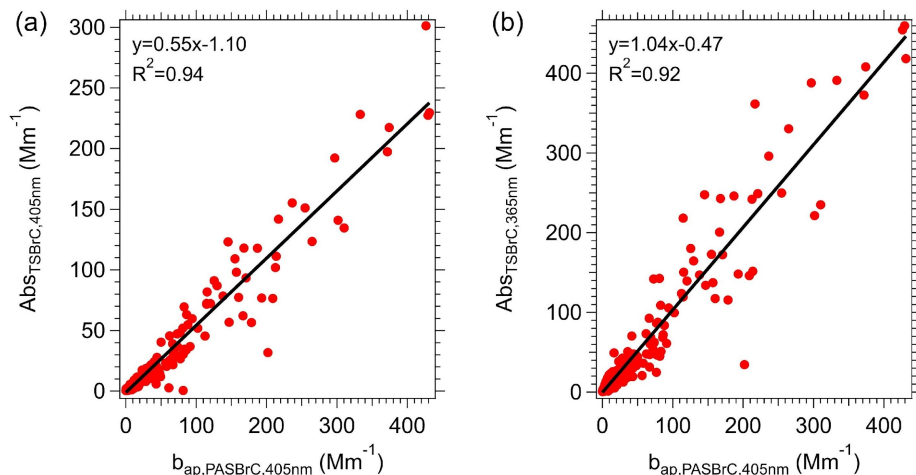
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 29 Figure S1. Mass size distribution of rBC measured for a flight. A log normal fit over the valid range of detection is
 30 used to infer the rBC mass undetected in the population.

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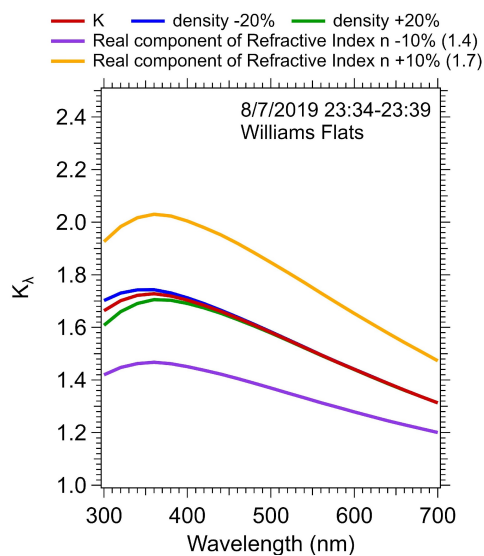
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 34 Figure S2. Comparison of TS BrC ($Abs_{TS,365nm}^{LWCC}$) and WS BrC ($Abs_{WS,365nm}^{LWCC}$) at 365 nm (total soluble=water soluble
 35 + methanol soluble) for all FIREX-AQ identified smoke plumes. The line represents the orthogonal distance regression
 36 of the data forced through zero.

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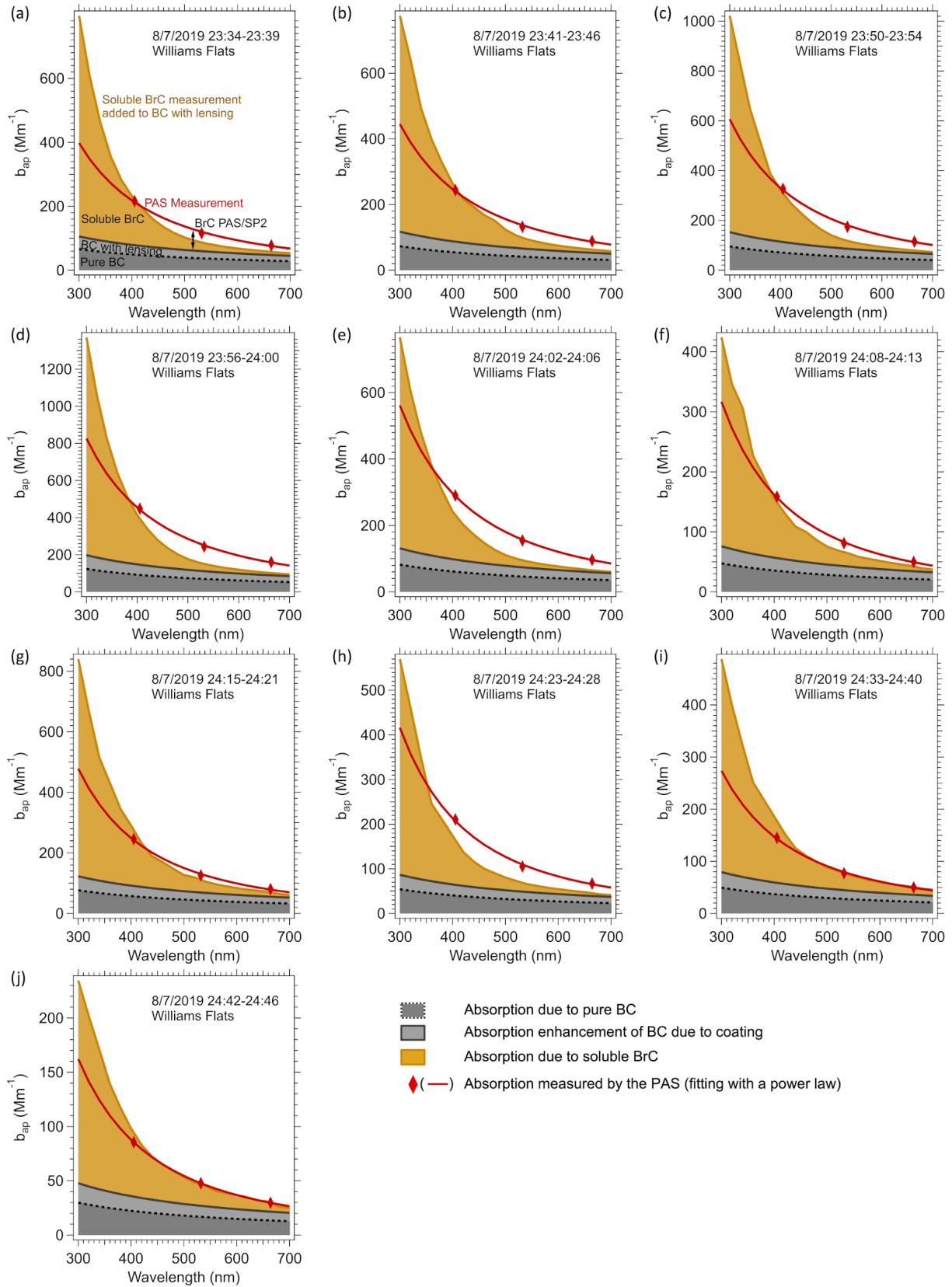
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 40 Figure S3. Comparison of BrC absorption in liquid (without applying the conversion factor K) at (a) 405 nm and at
 41 (b) 365 nm with BrC absorption inferred from the PAS at 405 nm.

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 47 Figure S4. Sensitivity analysis of the conversion factor from absorption in liquid to aerosol based on Mie theory. The
 48 red curve, which is the same as the one in Figure 4, with assumptions that $n=1.55$, and density is 1.4 g cm^{-3} . Tuning
 49 the particle density by up (green) or down (blue) by 20% only results in less than 5% change. Altering the real
 50 component of the refractive index (n) up (yellow) or down (purple) by 10% can lead to $\sim 20\%$ of variation.

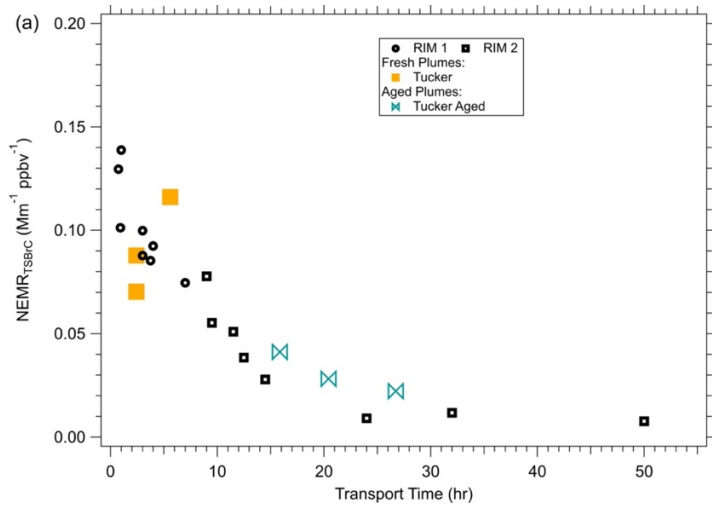
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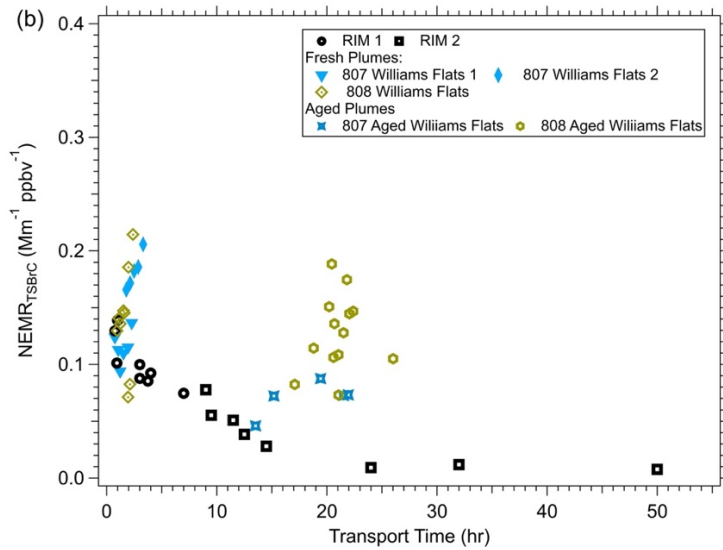
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54 Figure S5. Closure analysis of aerosol absorption measurements for the Williams Flats fire airborne measurements
55 starting on 7 Aug. 2019. Each plot is the average of a plume transect starting from near to further from the fire. This
56 fire had high BC concentrations relative to BrC.

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Figure S6. NEMR_{TSBRC} at 365 nm measured in liquid extracts (conversion factor K is not applied) versus smoke transport time for (a) just the Tucker fire and (b) the Williams Flats fires measured on 7 and 8 of Aug. Results from the RIM fire measured during the SEAC⁴RS campaign reported by Forrister et al. (2015) are also shown.