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Supporting Information for

# Aerosol mass and optical properties, smoke influence on $O_3$, and high $NO_3$ production rates in a western US city impacted by wildfires

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## Contents of this file



## Introduction

The supporting information contains:

- Supplemental Table 1, which includes critical ratios for each individual event specified in the study.
- Eleven figures: (S1—S5) High-resolution and hourly time series of species measured for each individual smoke event contributing to the analysis; (S6) Side by side comparison of "background" conditions and smoke impacted conditions. (S7) Plot of the BC/PM ratio; (S8) Plot of MSC at 401 nm; (S9) Plot of MAC at 401 nm; (S10) Plot of MSC at 870 nm; (S11): Plot of MAC at 870 nm.

**Supplemental Table S1.** Enhancement ratios (g/g) for each individual event.

| Source | BC/CO | $BC/PM_{2.5}$ | $PM_{2.5}/CO$ |
|---|---|---|---|
| Central ID | 0.0021 | 0.0183 | 0.1148 |
| Northwest MT | 0.0021 | 0.02 | 0.1050 |
| British Columbia | 0.0035 | 0.0225 | 0.1556 |
| Pacific Northwest | 0.0025 | 0.0242 | 0.1033 |
| Prescribed Fire | 0.0026 | 0.0157 | 0.1656 |

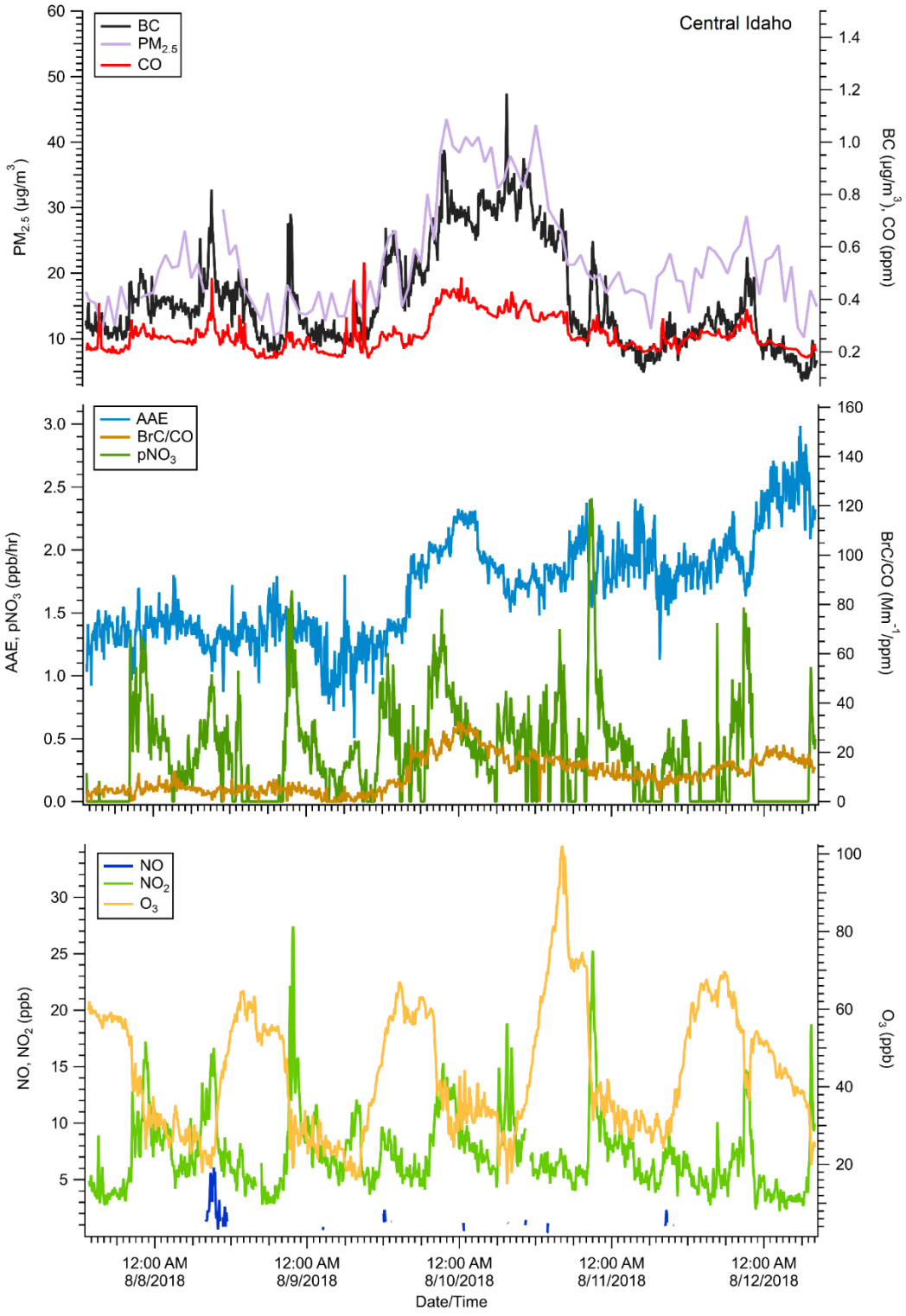


**Figure S1.** Time series of hourly $PM_{2.5}$, 5-minute BC, CO, $NO_x$, and $O_3$ measurements from Missoula. Hourly derived AAE and calculated $p(NO_3)$ using 5-minute measurements of $NO_2$ and $O_3$ are also shown. Graph label (Central Idaho) represents our best guess at smoke source location based on satellite observations and back trajectory calculations.

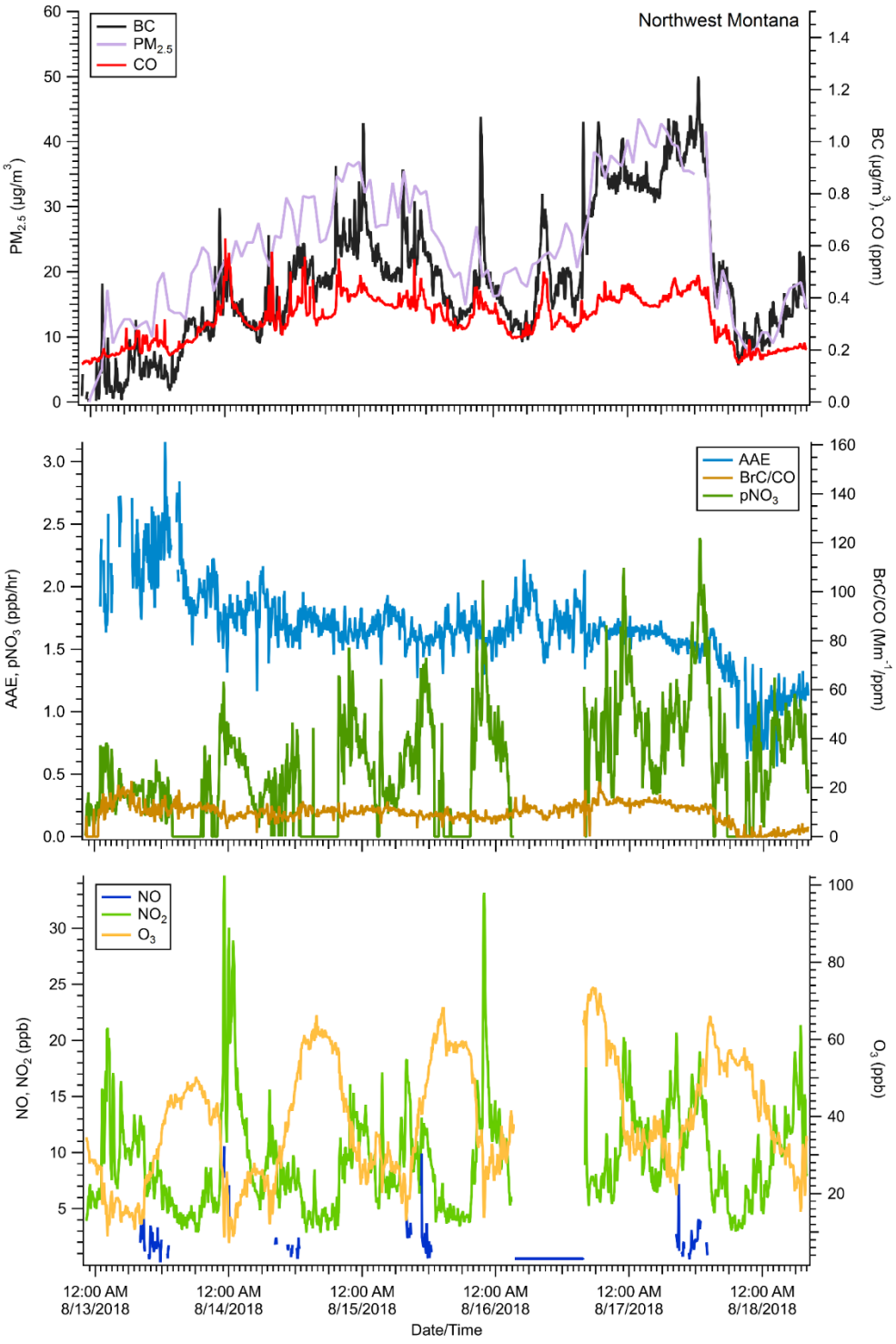


**Figure S2.** Time series of hourly $PM_{2.5}$, 5-minute BC, CO, $NO_x$, and $O_3$ measurements from Missoula. Hourly derived AAE and calculated p($NO_3$) using 5-minute measurements of $NO_2$ and $O_3$ are also shown. Graph label (Northwest Montana) represents our best guess at smoke source location based on satellite observations and back trajectory calculations.

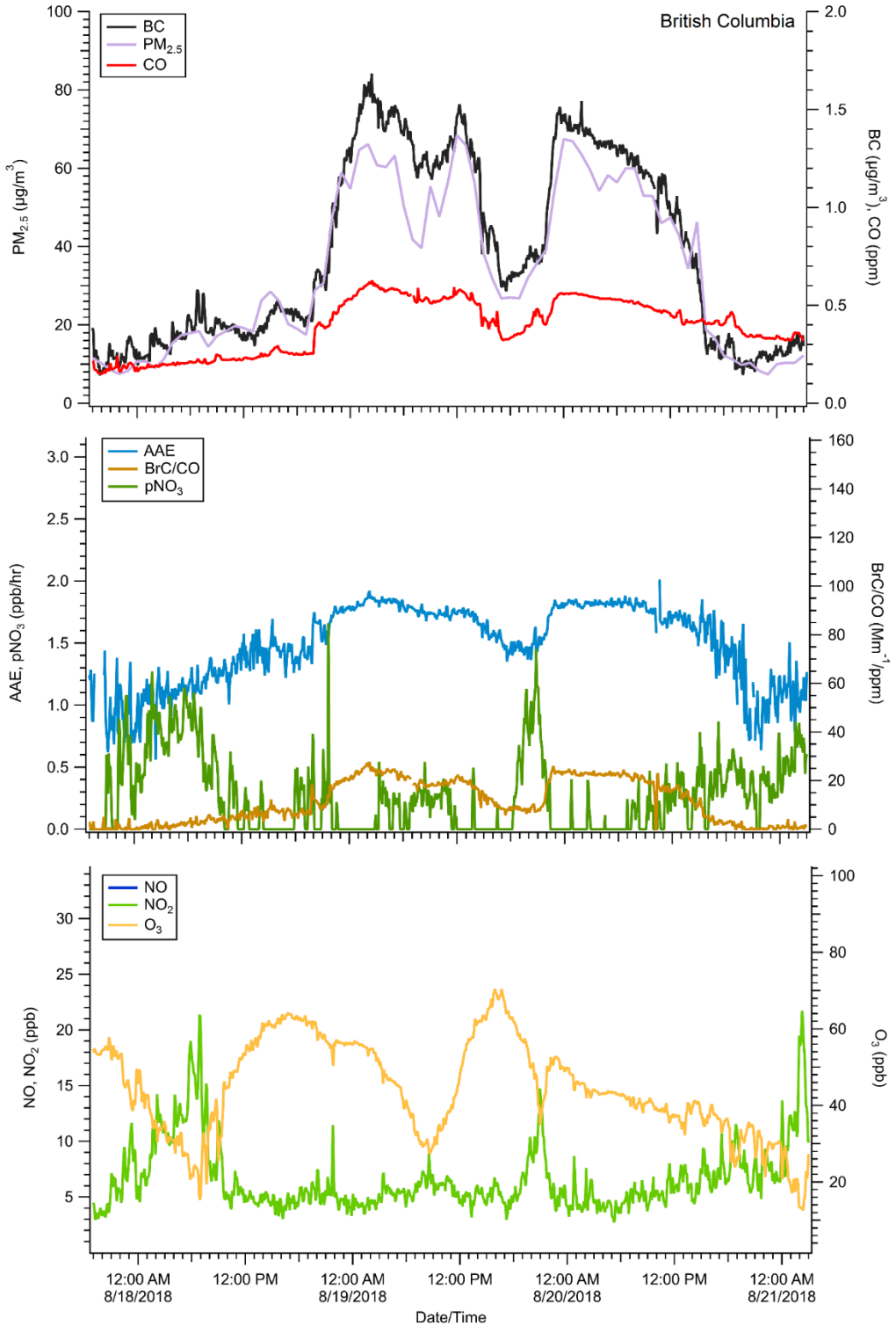


**Figure S3.** Time series of hourly $PM_{2.5}$, 5-minute BC, CO, $NO_x$, and $O_3$ measurements from Missoula. Hourly derived AAE and calculated $p(NO_3)$ using 5-minute measurements of $NO_2$ and $O_3$ are also shown. Graph label (British Columbia) represents our best guess at smoke source location based on satellite observations and back trajectory calculations.

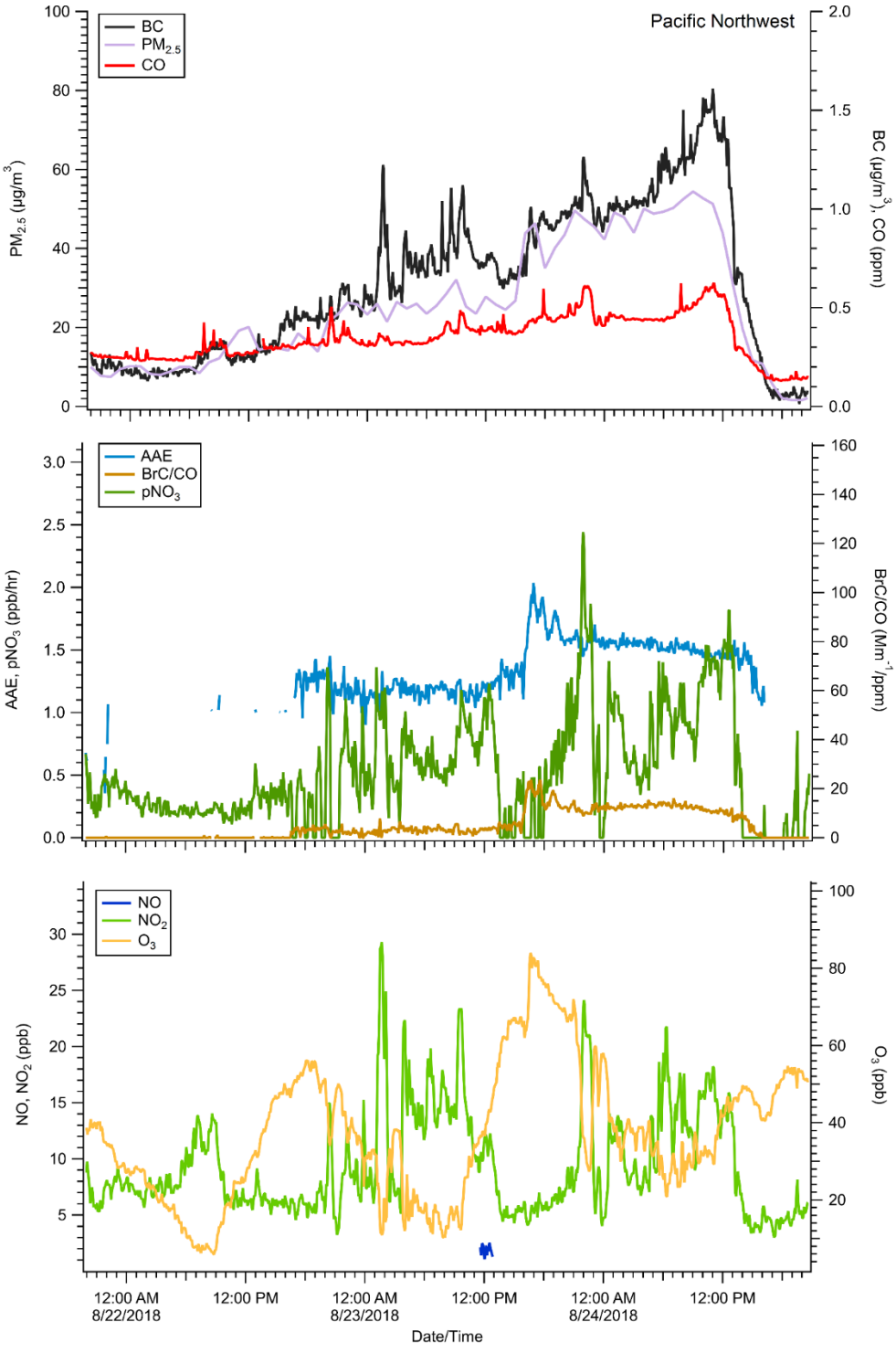


**Figure S4.** Time series of hourly $PM_{2.5}$, 5-minute BC, CO, $NO_x$, and $O_3$ measurements from Missoula. Hourly derived AAE and calculated p($NO_3$) using 5-minute measurements of $NO_2$ and $O_3$ are also shown. Graph label (Pacific Northwest) represents our best guess at smoke source location based on satellite observations and back trajectory calculations.

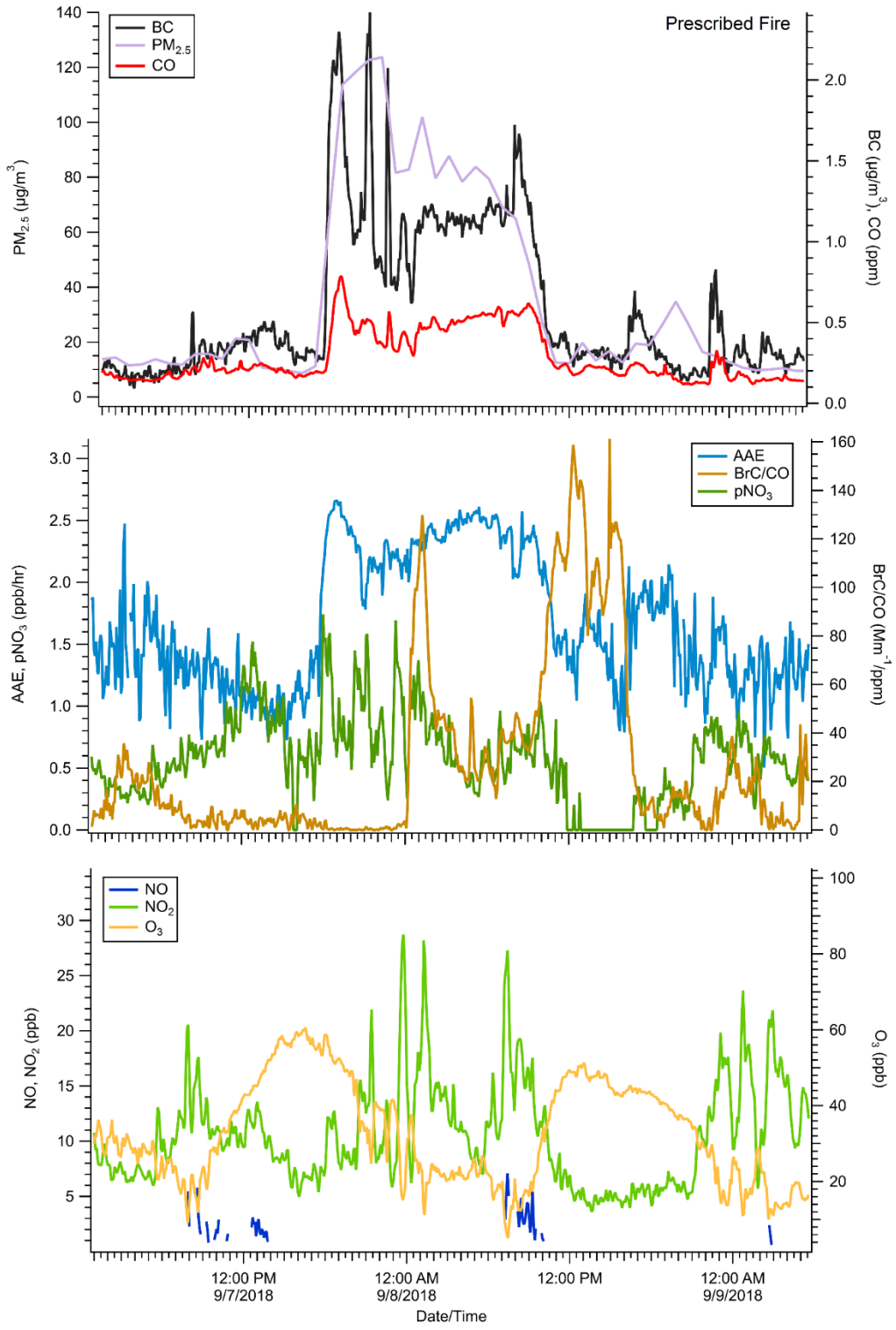


**Figure S5.** Time series of hourly $PM_{2.5}$, 5-minute BC, CO, $NO_x$, and $O_3$ measurements from Missoula for the one prescribed fire measured. Hourly derived AAE and calculated p($NO_3$) using 5-minute measurements of $NO_2$ and $O_3$ are also shown.


**Figure S6.** Comparison of "cut-off" conditions (top photo), to typical "smoke impacted conditions" shown in the bottom photo.

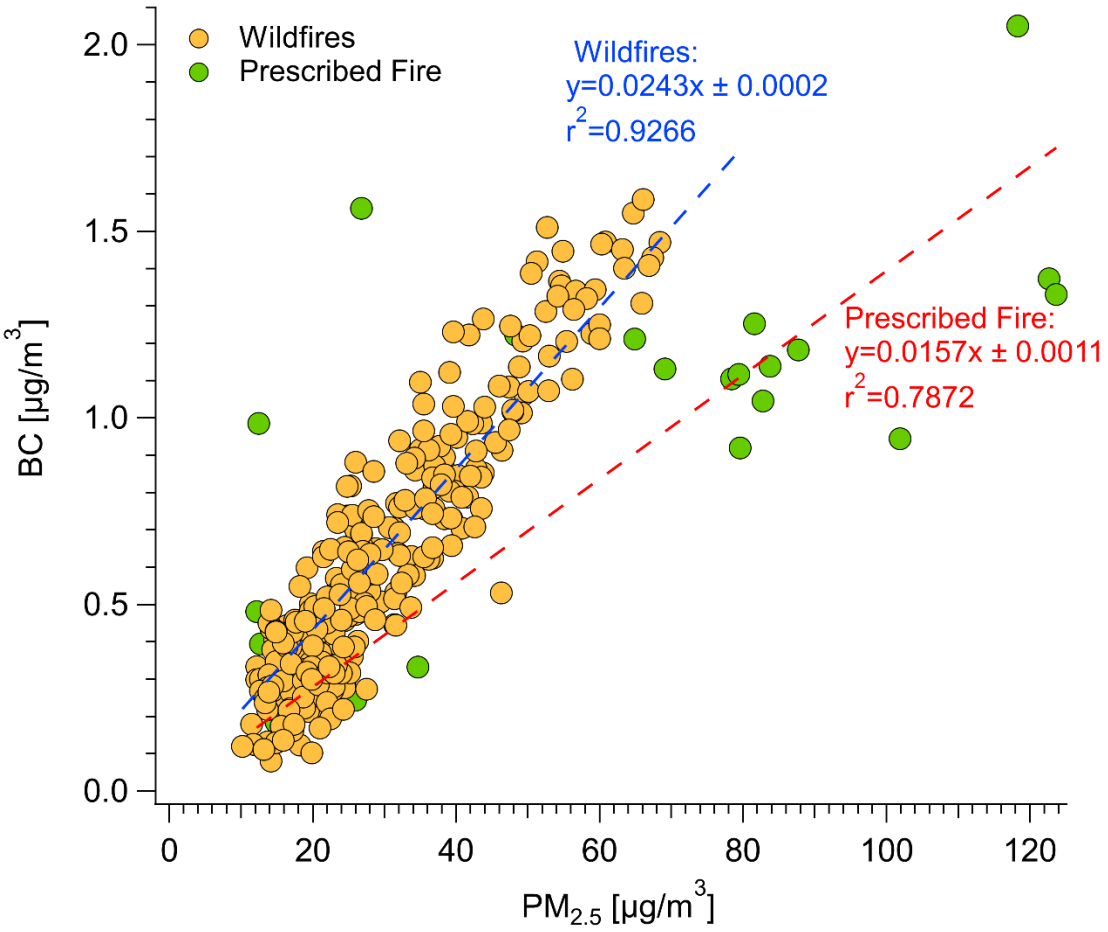


**Figure S7.** Hourly BC versus hourly $PM_{2.5}$. Slopes represent the corresponding BC/PM ratio.

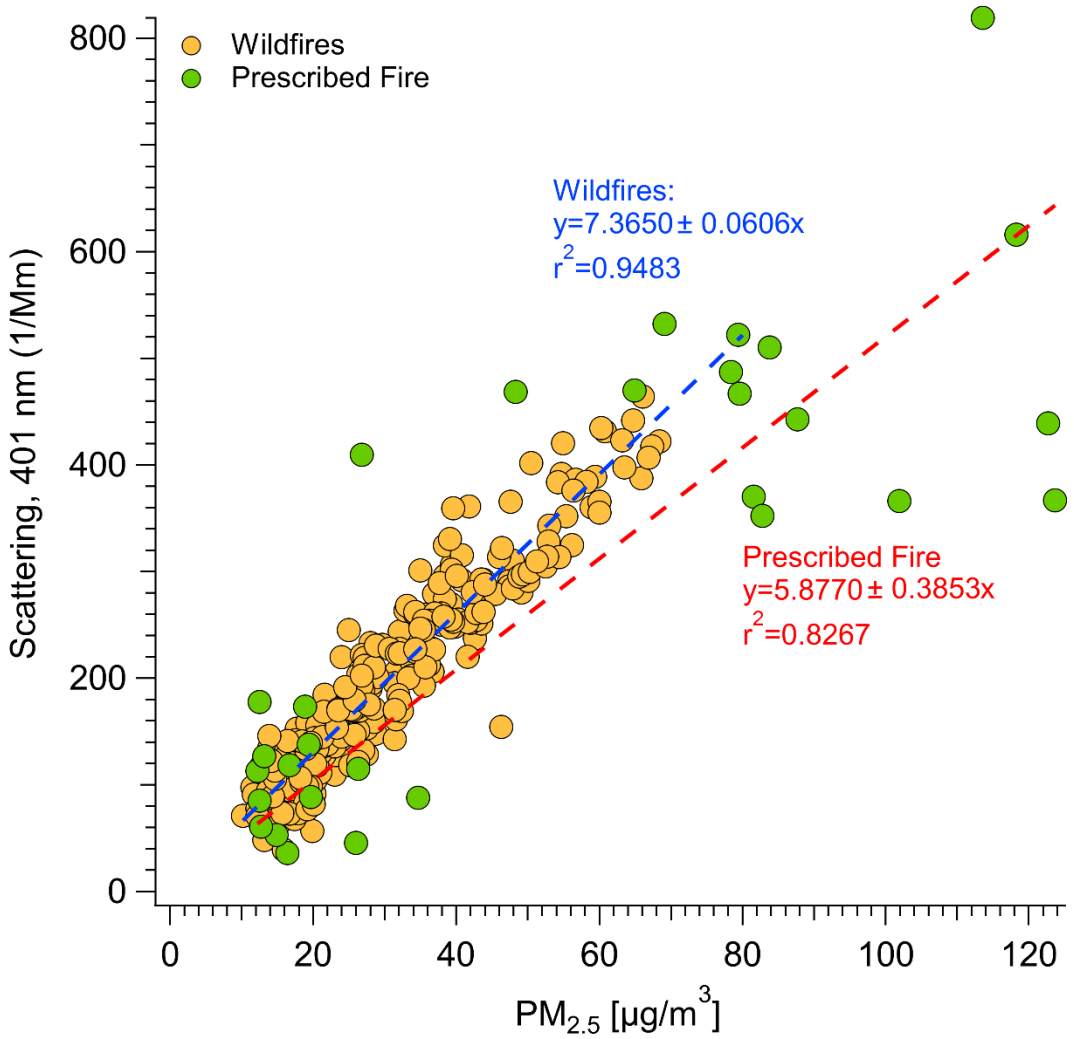


**Figure S8.** Hourly scattering measured by the PAX-401 versus hourly PM2.5. Slope values represent the corresponding mass scattering coefficients.

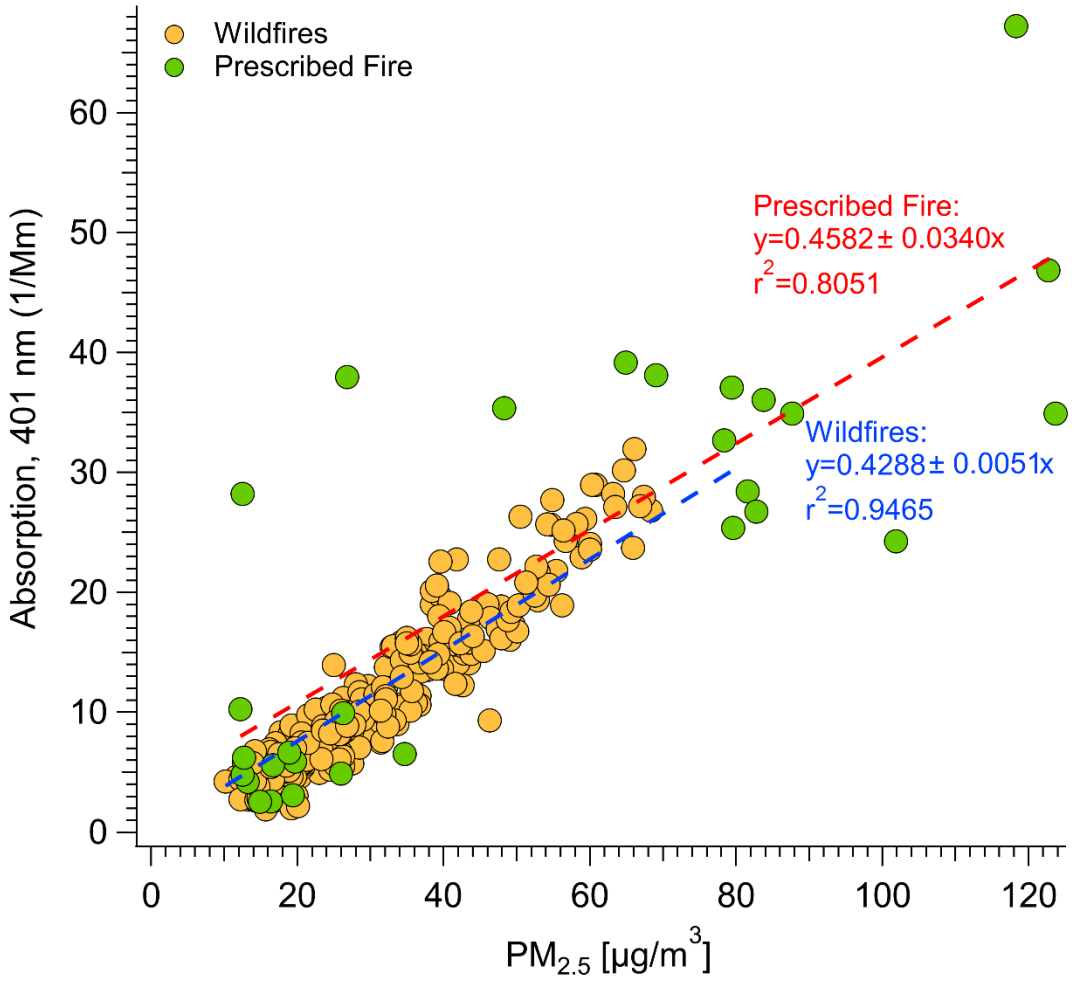


**Figure S9.** Hourly absorption measured by the PAX-401 versus hourly PM2.5. Slope values represent the corresponding mass absorption coefficients.

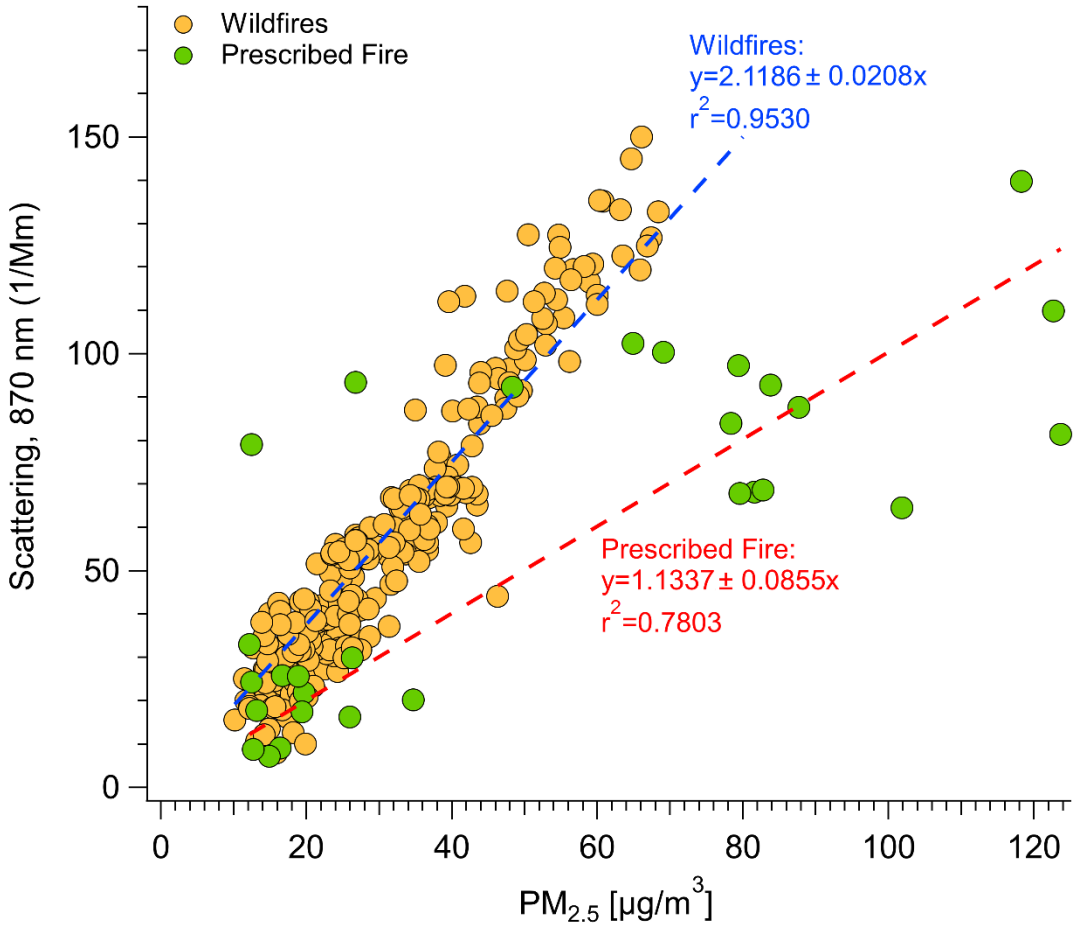


**Figure S10.** Hourly scattering measured by the PAX-870 versus hourly PM2.5. Slope values represent the corresponding mass scattering coefficients.

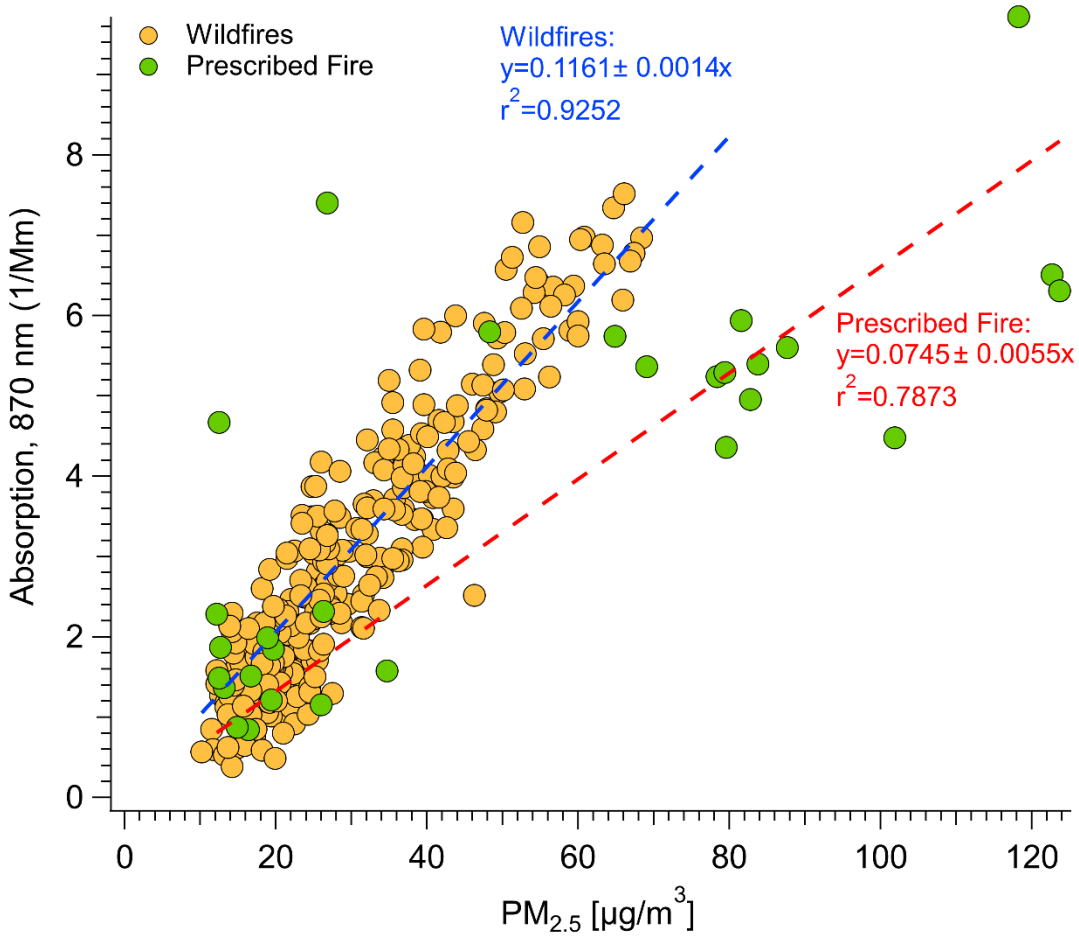


**Figure S11.** Hourly absorption measured by the PAX-870 versus hourly PM2.5. Slope values represent the corresponding mass absorption coefficients.