Figure S-1. Maps of Central Mexico showing circles centered around T0 for six different radii: (a) 60 km, 120 km, 250 km, (b) 250 km, 500 km, 1000 km. Daily MODIS fire counts from March to April of 2006 for each radius: (c) 60 km, 120 km, 250 km, (d) 500 km, 750 km, 1000 km; (e) Yucatan Peninsula. The area for which fire counts are integrated around the Yucatan Peninsula is also indicated in (b).
Figure S-2. Scatter plots of BBOA concentrations at T0 vs. MODIS fire counts (average from day plus the previous day) for five different regions: (a-d): circles of radii 250, 500, 750, and 1000 km centered at T0; (e) Yucatan peninsula. Symbols are the day of the month during March 2006.

- $f_{250 \text{ km}}(x) = 0.18x - 0.73 \ (R^2 = 0.38)$
- $f_{500 \text{ km}}(x) = 0.094x - 1.84 \ (R^2 = 0.45)$
- $f_{750 \text{ km}}(x) = 0.073x - 2.32 \ (R^2 = 0.45)$
- $f_{1000 \text{ km}}(x) = 0.052x - 2.75 \ (R^2 = 0.45)$
- $f_Y(x) = -0.0102x + 2.93 \ (R^2 = 0.004)$
Figure S-3. Scatter plots of daily AMS-PMF OA component mass concentrations versus MODIS fire counts (average from day plus the previous day) for circles of radii 60 and 120 km centered on T0 plotted by day of the month in March 2006: (a) HOA, (b) OOA, (c) background OOA (8pm-4am), (d) OA, (e) LOA.

(a) HOA Mass (µg am\(^{-3}\))

\[
f_{60\ km}(x) = -0.246x + 5.66 \quad (R = -0.19) \\
f_{120\ km}(x) = -0.119x + 5.84 \quad (R = -0.27)
\]

(b) OOA Mass (µg am\(^{-3}\))

\[
f_{60\ km}(x) = -0.350x + 8.60 \quad (R = -0.49) \\
f_{120\ km}(x) = -0.137x + 8.56 \quad (R = -0.41)
\]

(c) OOA background Mass (µg am\(^{-3}\))

\[
f_{60\ km}(x) = -0.029x + 4.95 \quad (R = -0.05) \\
f_{120\ km}(x) = -0.0001x + 4.85 \quad (R = 0.00)
\]

(d) OA Mass (µg am\(^{-3}\))

\[
f_{60\ km}(x) = -0.022x + 16.27 \quad (R = -0.018) \\
f_{120\ km}(x) = 0.011x + 16.09 \quad (R = 0.009)
\]

(e) LOA Mass (µg am\(^{-3}\))

\[
f_{60\ km}(x) = 0.00418x + 1.38 \quad (R = 0.026) \\
f_{120\ km}(x) = 0.00228x + 1.37 \quad (R = 0.026)
\]
Figure S-4. Scatter plots of daily-average FIF$_{14-24}$ vs PMF-AMS factors: (a) BBOA, (b) HOA, (c) LOA, (d) OOA, (e) total OA.
Figure S-5. Diurnal cycles of PM$_1$ K for the three fire impact periods.
Figure S-6. Scatter plots of total K in approx. PM$_1$ from PIXE vs AMS factors: (a) BBOA, (b) HOA, (c) LOA, (d) OOA, (e) total OA.
Figure S-7. Fire impact period analysis graphs, comparing the average values of different parameters for the high fire (F1, F2) and low fire (F3) periods for (a) Daily MODIS fire counts at 500 km, 750 km, 1000 km, (b) ΔCH$_3$CN/ΔCO and aerosol optical properties, and (c-e) gas-phase species at T0.
Figure S-8. Fire impact period graphs, comparing the average values of different parameters for the high fire (F1, F2) and low fire (F3) period for crustal material in PM$_{10}$ (μg am$^{-3}$) and trace metals (ng am$^{-3}$), from the data of Querol et al. (2008).
Figure S-9. Time series of mass concentrations of AMS BBOA and coarse mass (between PM$_{2.5}$ and PM$_{10}$) as measured by the OPC.
Figure S-10.
Comparison of OC measurements: (a) OC calculated from AMS OA vs CMB OC, (b) OC from $^{14}$C filters from this study (PM$_{10}$) vs CMB OC (PM$_{2.5}$). ($L =$ low fire period, $H =$ high fire period)

(a) $f(x) = (1.07 \pm 0.061)x$
$R^2 = 0.50$

(b) $\text{PSI OC}$ vs $\text{CMB OC}$