Distinct Biomass-Burning Aerosol Regimes at Ascension Island

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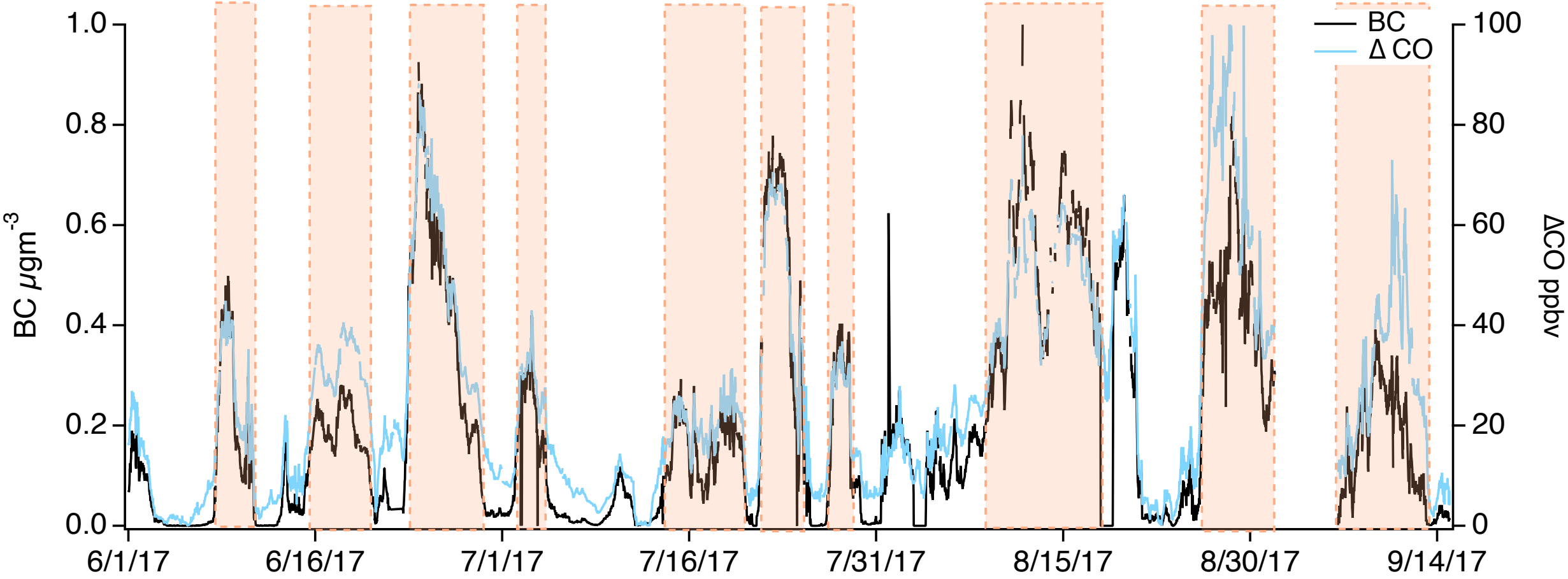
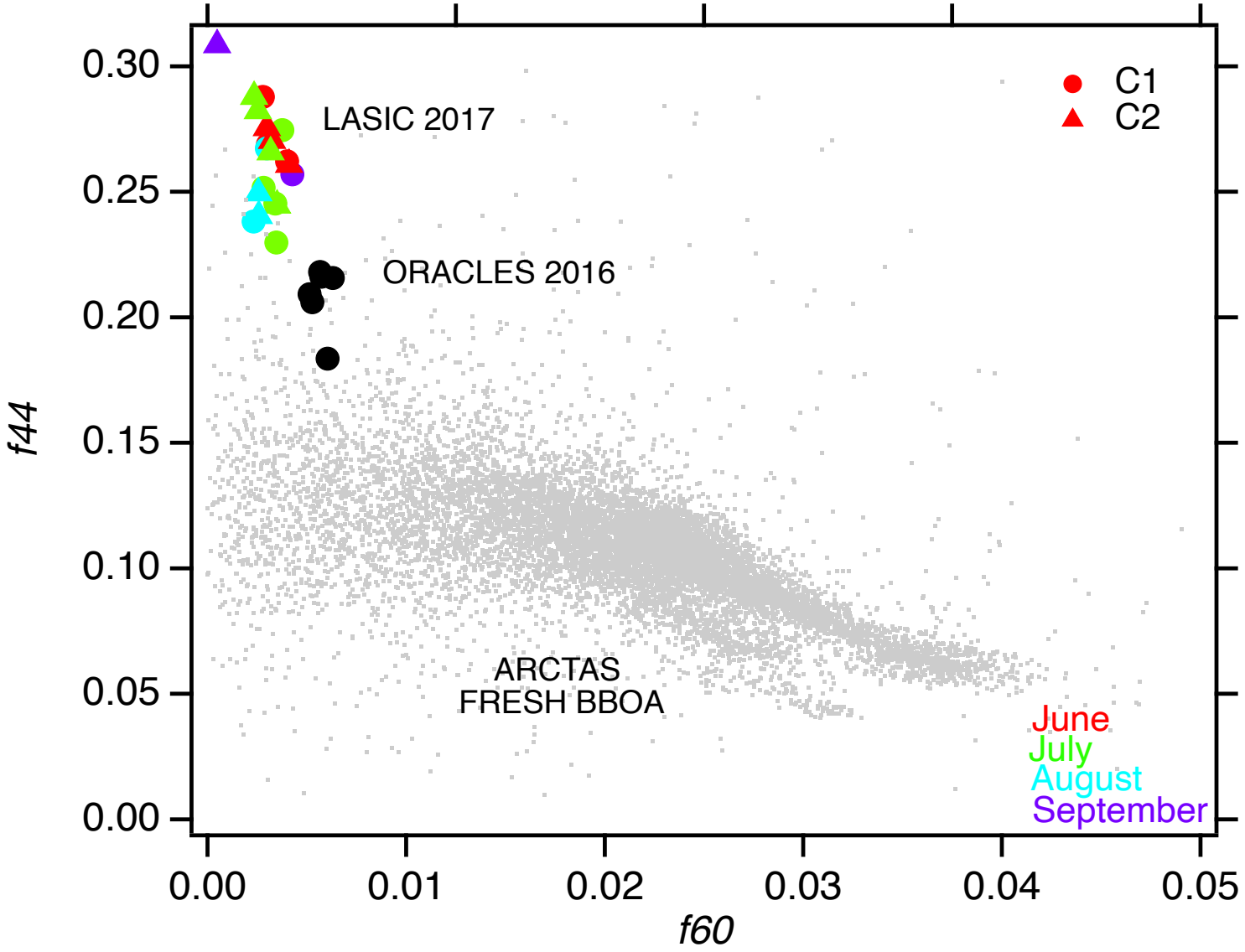
LASIC 2017 campaign

- Characterize the chemical, physical, and optical properties of biomass-burning aerosol in the boundary layer.
- Understand where the aerosol came from and how the aerosol is transported to Ascension Island in the boundary layer.
- Build upon the simple relationship of OA:BC and SSA from the ORACLES campaign.



LASIC 2017 campaign – Distinct Biomass-Burning aerosol regimes at Ascension Island



PMF analysis shows only 2 factors for the 10 major plume events

LASIC aerosol is more oxidized than ORACLES aerosol. f44 still increases after 1 week of transport.

The youngest aerosol was sampled at the end of July.

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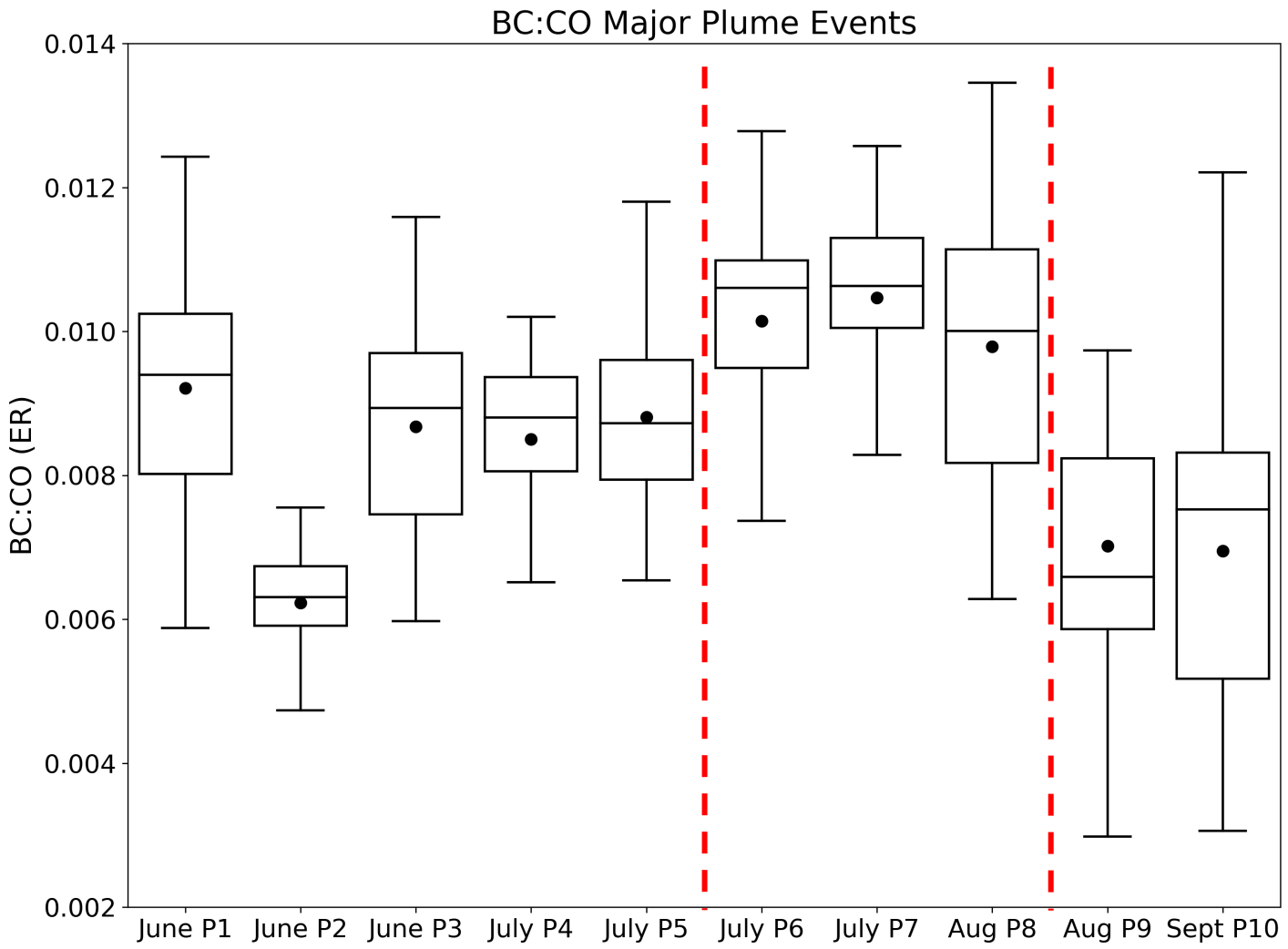

3 Regimes

1. Early June through mid-July
   - Fires closest to the coast
   - Moderate boundary layer zonal winds
   - African monsoon turns on mid-June
2. Late July through early August
   - Strongest boundary layer winds
   - Number of fires drastically increase
   - Strongest signature of biomass-burning aerosol (highest BC)
3. Late August through early September
   - Fires shift east toward Zambia and Mozambique (potentially different fuel types)
   - Winds are strongest aloft. ”Cold” transportation could impact aerosol properties

(Vakkari et al., 2018; Che et al., 2022)

Dobracki et al., 2022 show simple SSA estimate with OA:BC ratio - SSA530nm=0.801+0.0055*(OA:BC)

The fraction of black carbon (FrBC) strongly correlates with SSA in the boundary layer at ASI

SSA and OA:BC relationship from ORACLES can be extended and generalized with the LASIC OA:BC ratio