Weak Low-Level Westward Transport Responsible for Most Biomass-Burning Aerosol Located Within the Remote Southeast Atlantic Boundary Layer

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The puzzle: prior to the AMF1 on Ascension Island (8S, 14.5W; LASIC), westward aerosol transport was presumed to occur through the free troposphere, with smoke entering the boundary layer through (slow) subsidence far to the southeast

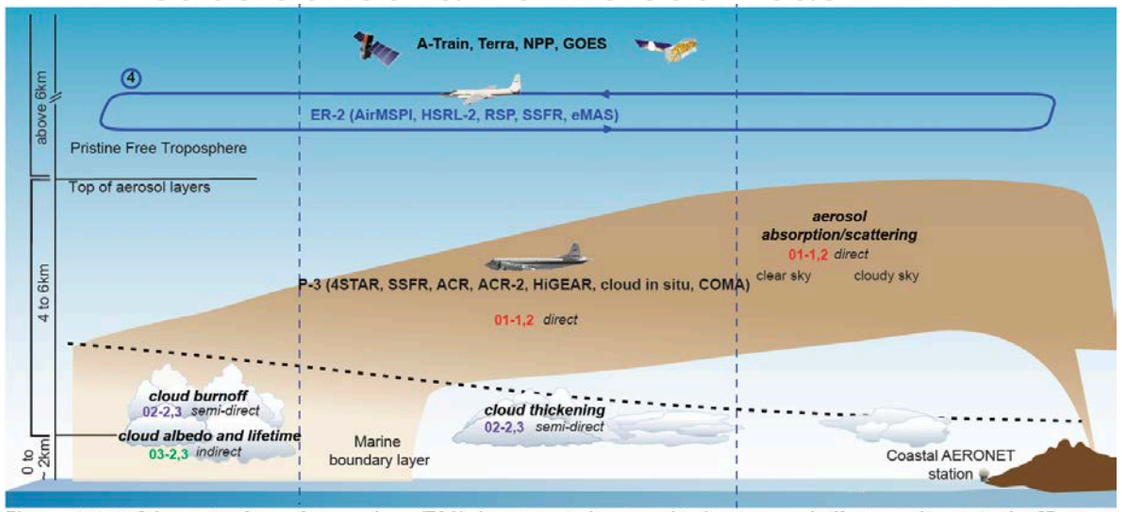


Figure 3.1-2. Schematic of top of atmosphere (TOA) direct, semi-direct, and indirect aerosol effects on climate in the SE Atlantic and their relationship to science objectives stated below.

e.g., Redemann et al., ORACLES proposal

However: LASIC measurements indicate smoke is often present in the remote boundary layer, mostly during the months when free-tropospheric westerlies are weak

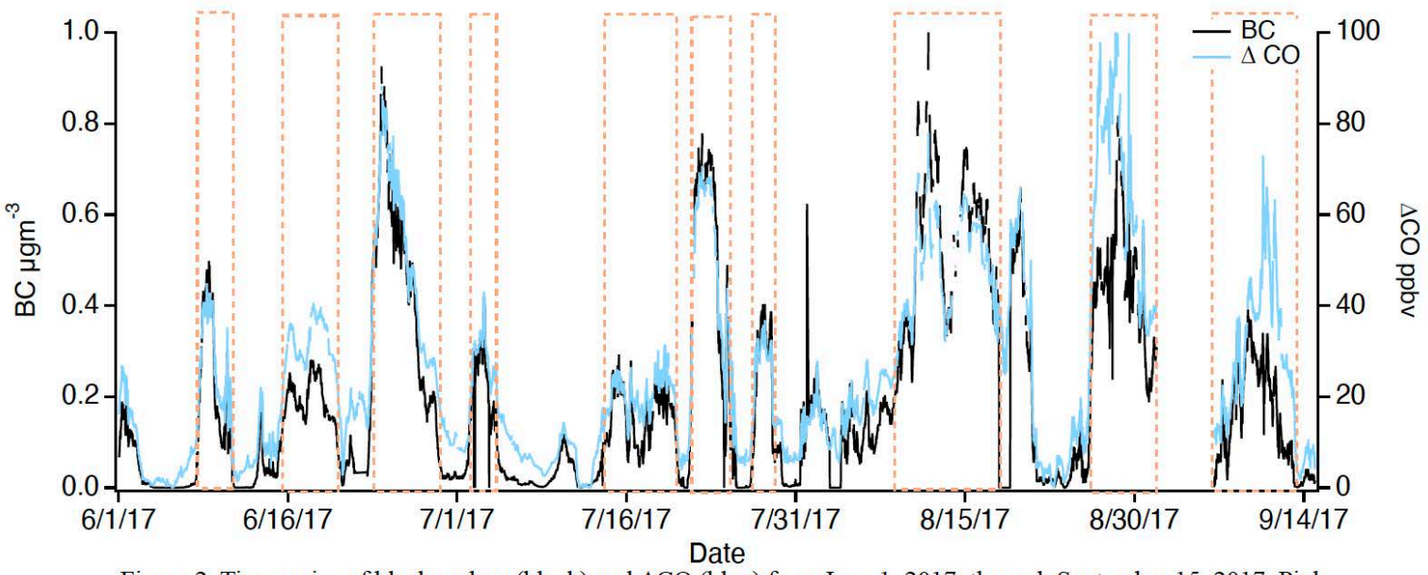
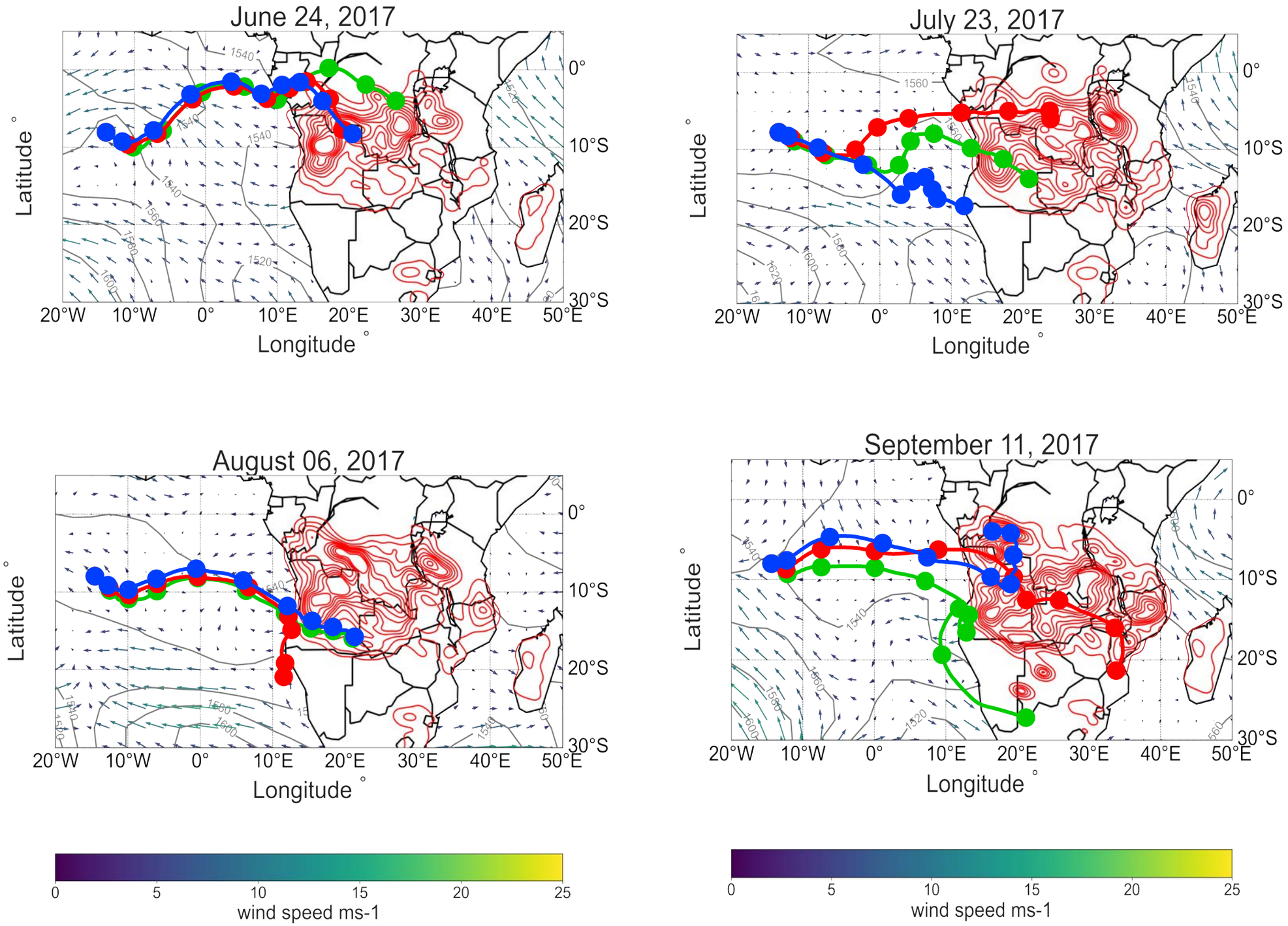


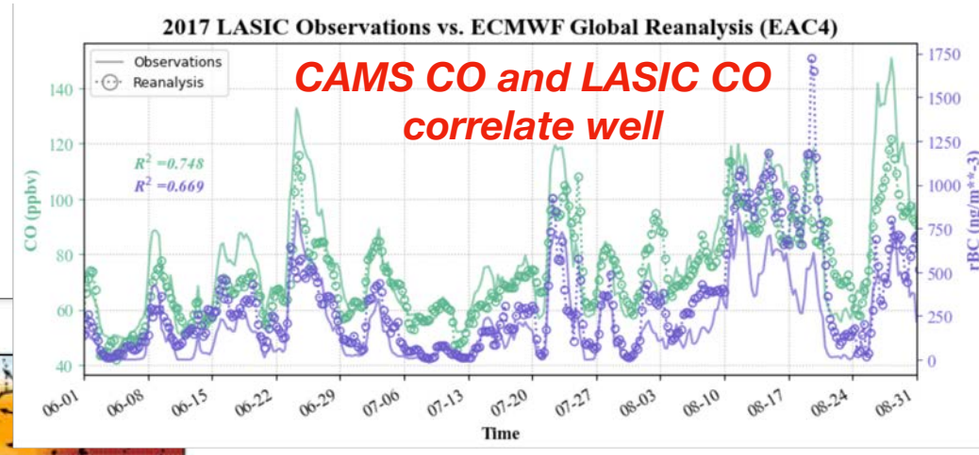
Figure 2. Time series of black carbon (black) and ΔCO (blue) from June 1, 2017, through September 15, 2017. Pink boxes indicate periods selected as major plume events. ΔCO was calculated for each month by removing

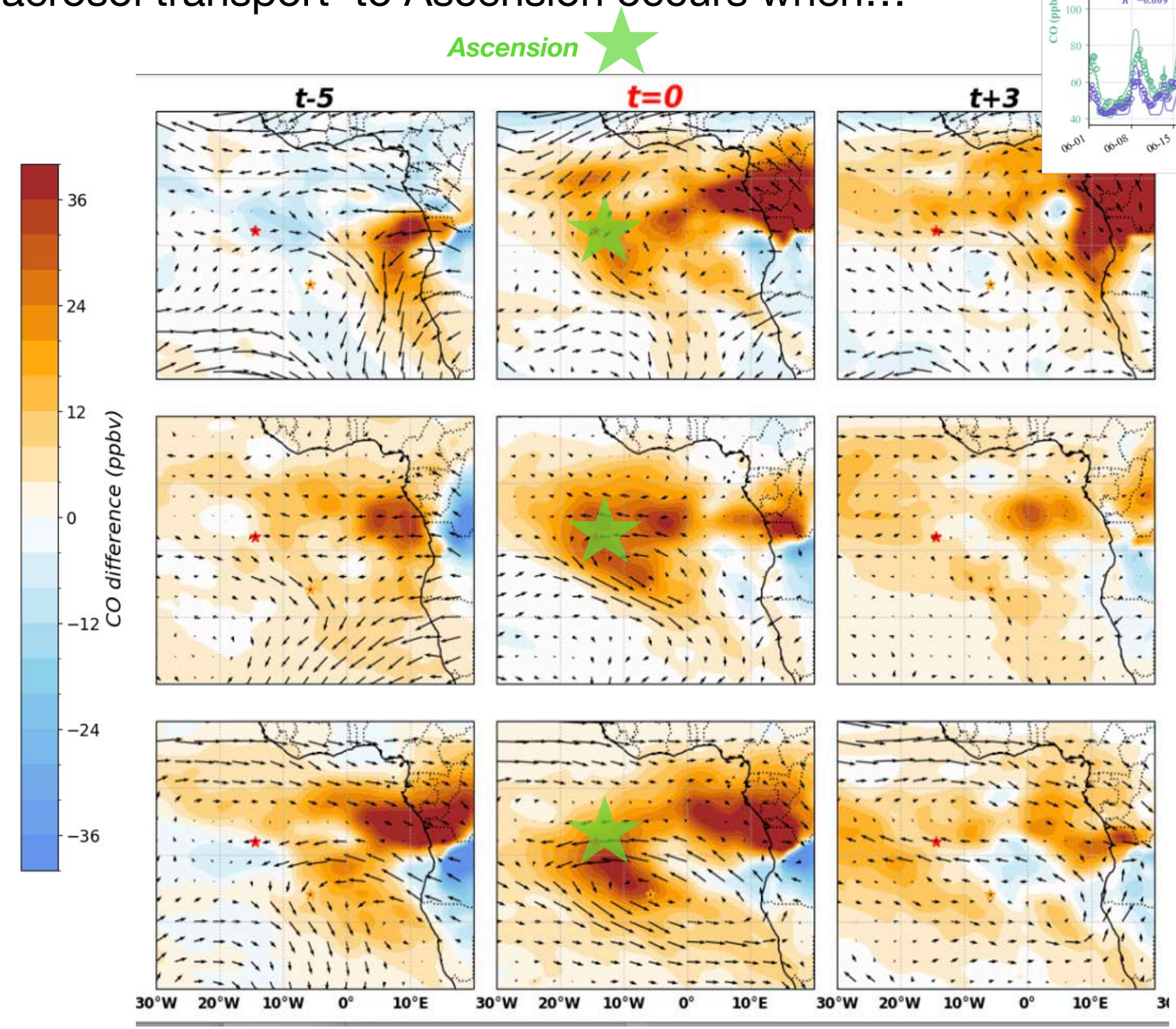
	% of rBC mass	% of detected continental fires
June	37	7
July	20	26
August	37	33
September	6	34

Backtrajectories indicate highest aerosol loading events during LASIC-2017 at Ascension come through direct, low-level, westward transport



CAMS CO lead-lag composites show aerosol transport to Ascension occurs when…





June: south Atlantic SLP high not present, some transport from NE

July: more direct westward transport

August: anticyclonic circulation ~ 10 deg SE of Ascension aids transport + subsidence into the boundary layer

CAMS CO (80th %ile @Ascension) lead-lag composites with 800hPa winds, 2003-2018