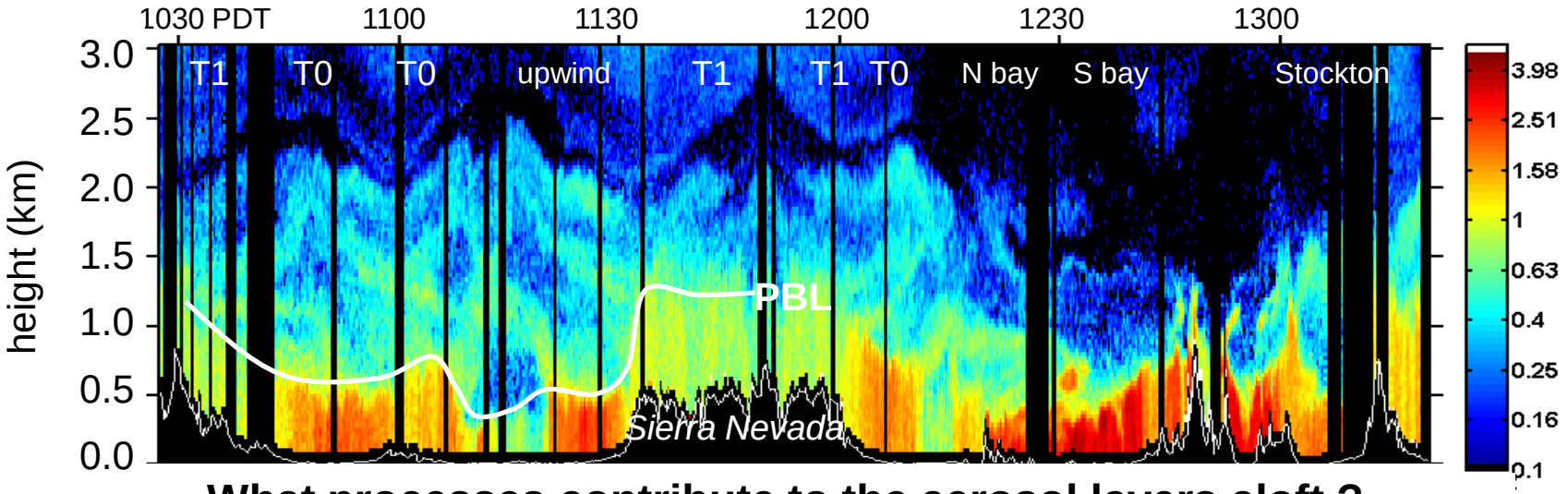
Meteorological Processes Contributing to Aerosols Above the Boundary Layer

Jerome Fast

Aerosol Backscatter from High Spectral Resolution Lidar, June 28 Flight 1

Rich Ferrare, Chris Hostetler



What processes contribute to the aerosol layers aloft ?
Are these the result of long-range transport or local sources ?

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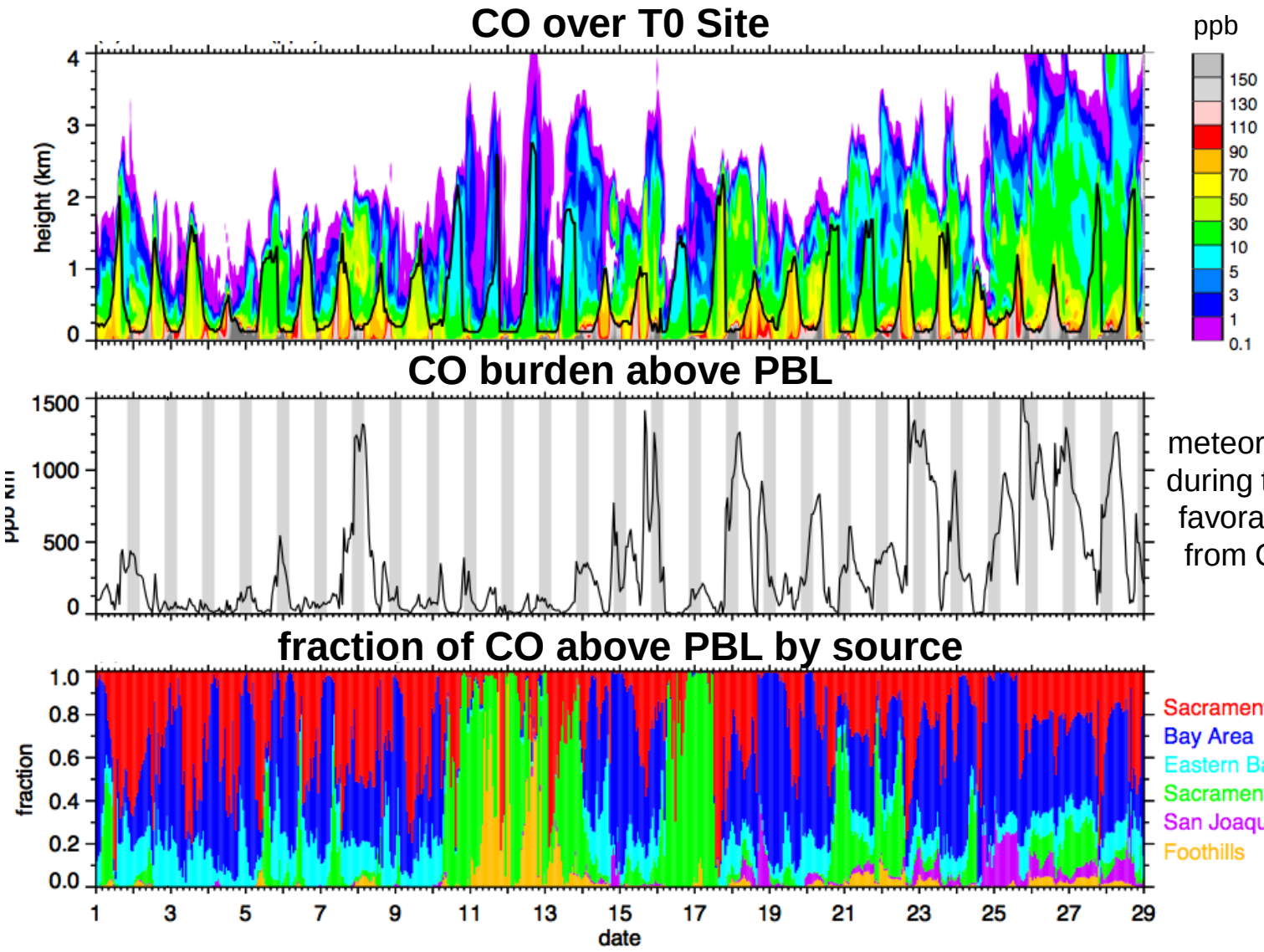
Operational WRF Forecasts



meteorological processes during the last week more favorable for layers aloft from California sources

model suggests sources in California can account for layers aloft, but …

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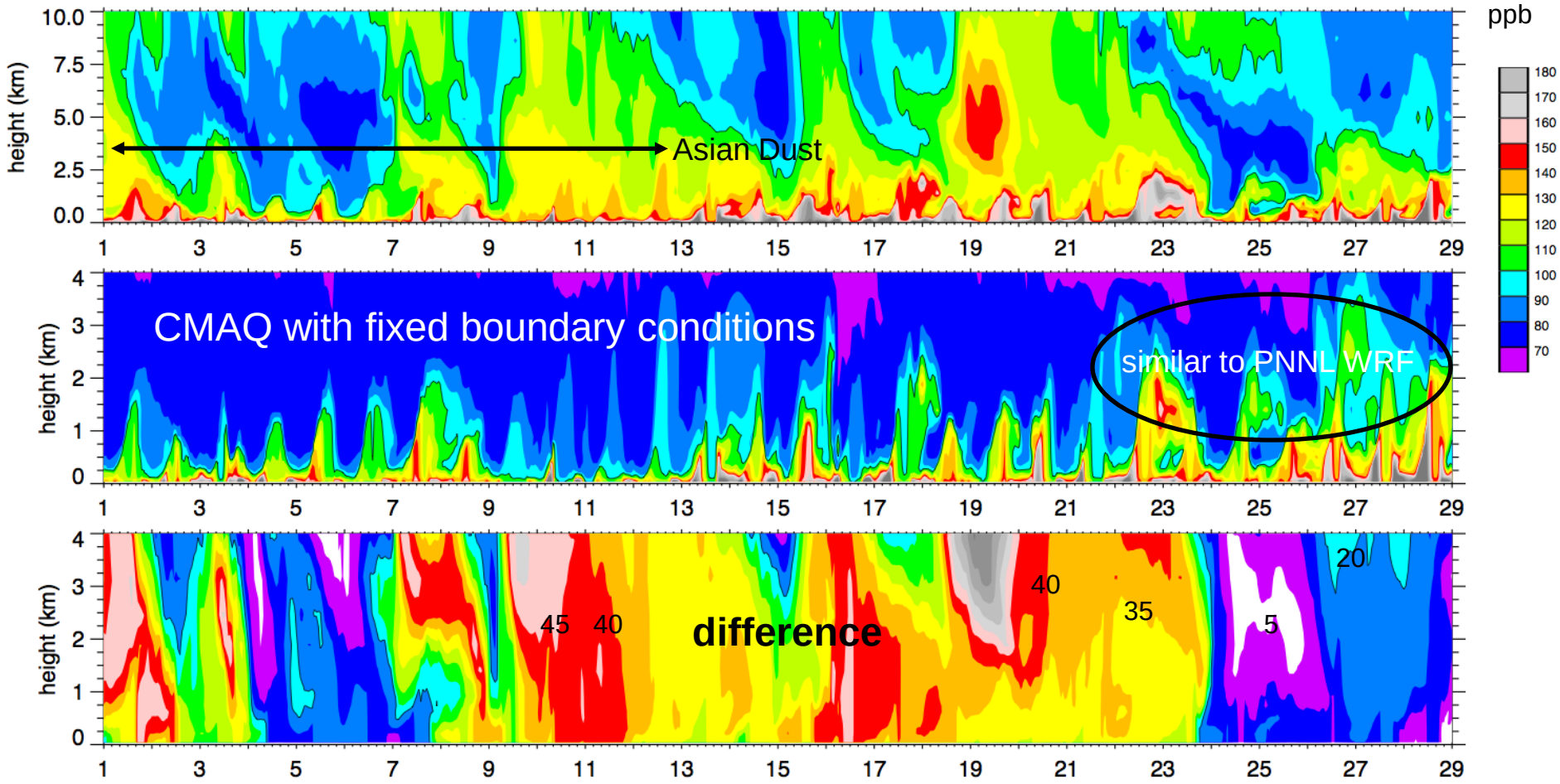
CMAQ (regional) + RAQMS (global) Forecasts

Provided by Brad Pierce (NOAA) as part of CalNex

CO over Sacramento



long-range transport from Asia could also be important

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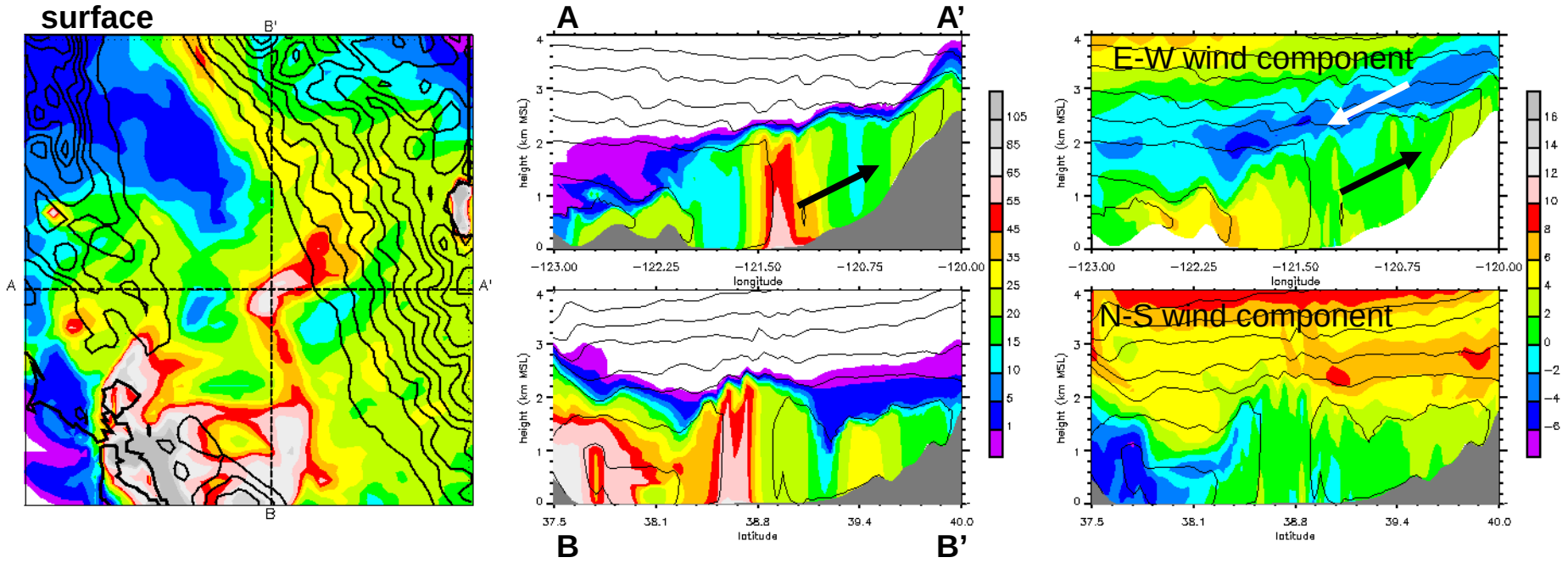
Vertical Cross Sections (1)

Ensemble CO from WRF, 17 PDT June 22



up-slope flow transports CO in the boundary layer into foothills, but vertical wind shear predicted at top of boundary layer

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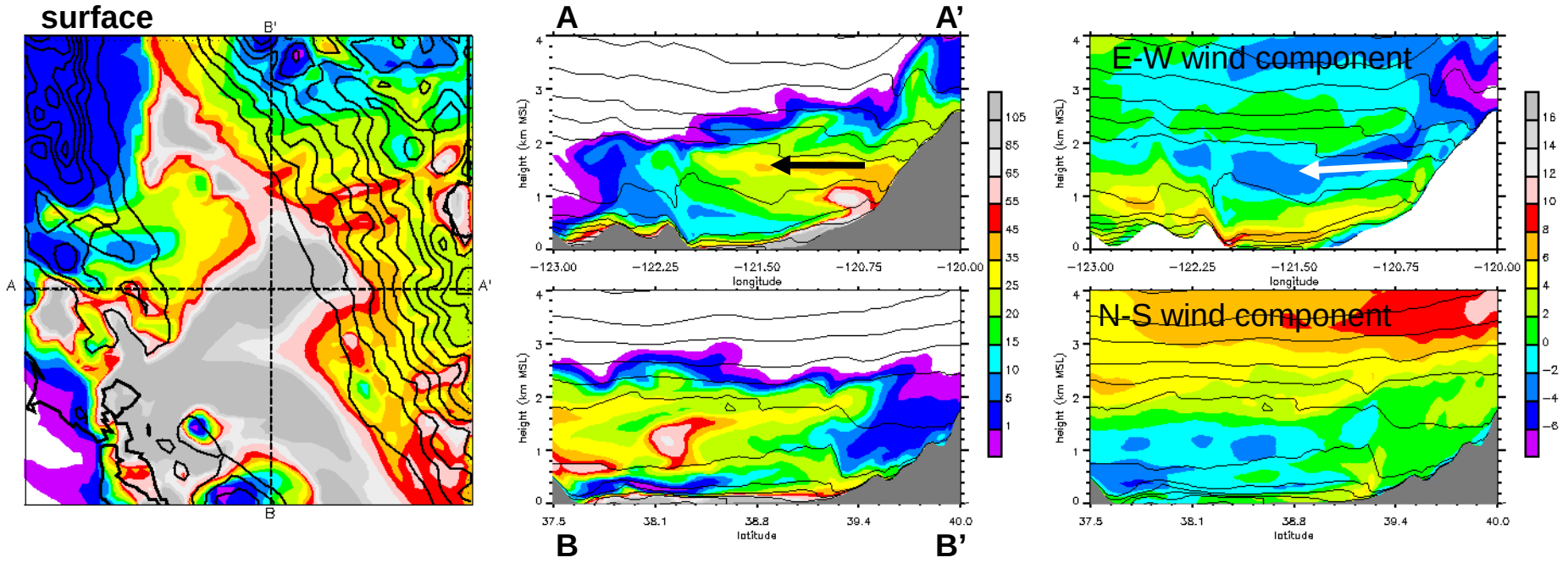
Vertical Cross Sections (2)

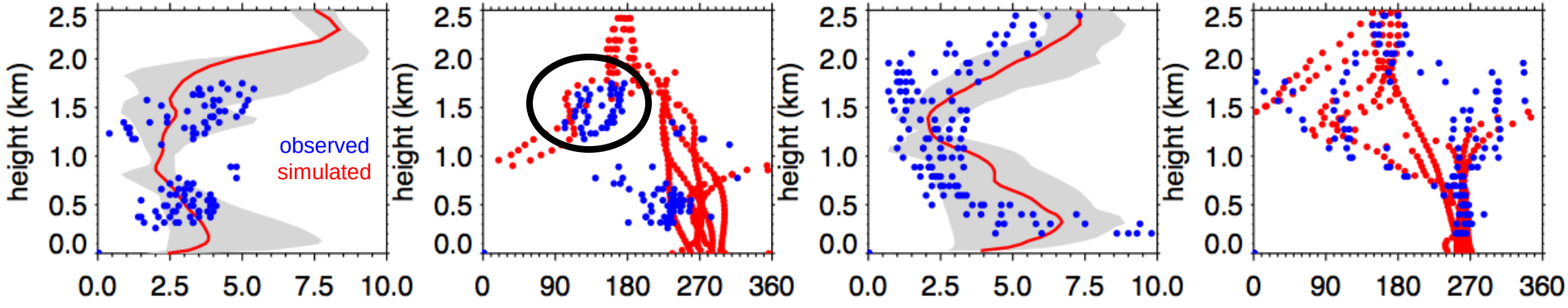
Ensemble CO from WRF, 23 PDT June 22



SE winds aloft transport some of CO previously transported over foothills back over the valley

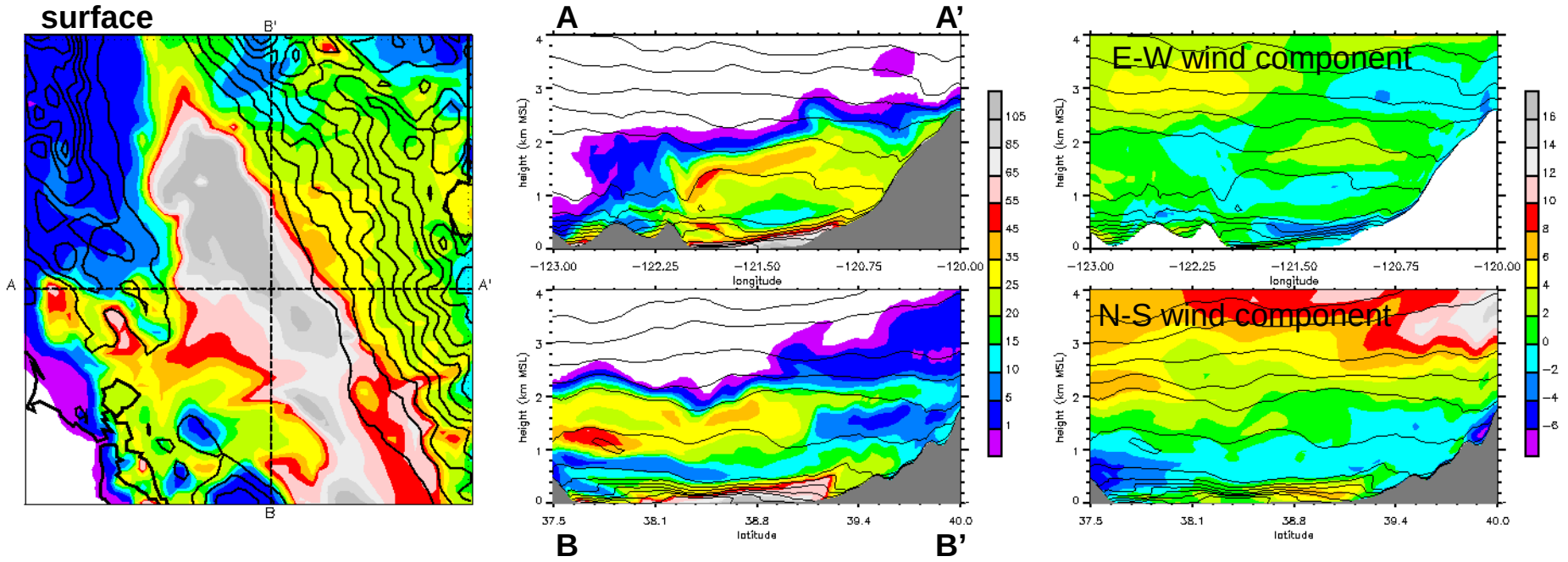
T1 Profiler 17 – 23 PDT

T0 Profiler 17 – 23 PDT



Vertical Cross Sections (3)

Ensemble CO from WRF, 05 PDT June 23



easterly winds aloft diminish by sunrise, but CO remains over central valley because winds aloft are light

biogenic species emitted the previous afternoon over the slope of the Sierra could also be mixed with anthropogenic sources and transported over the valley along

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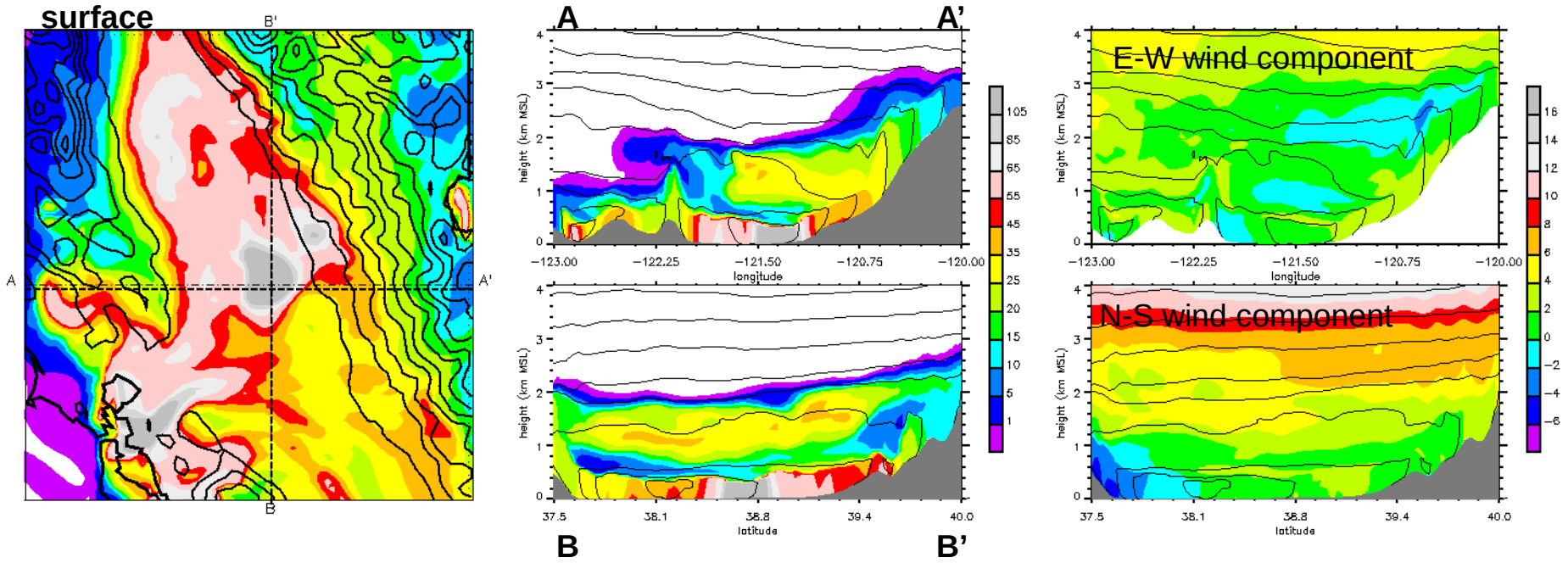
Vertical Cross Sections (4)

Ensemble CO from WRF, 11 PDT June 23



winds aloft remain light and portion of previous days emissions linger over the valley into the day

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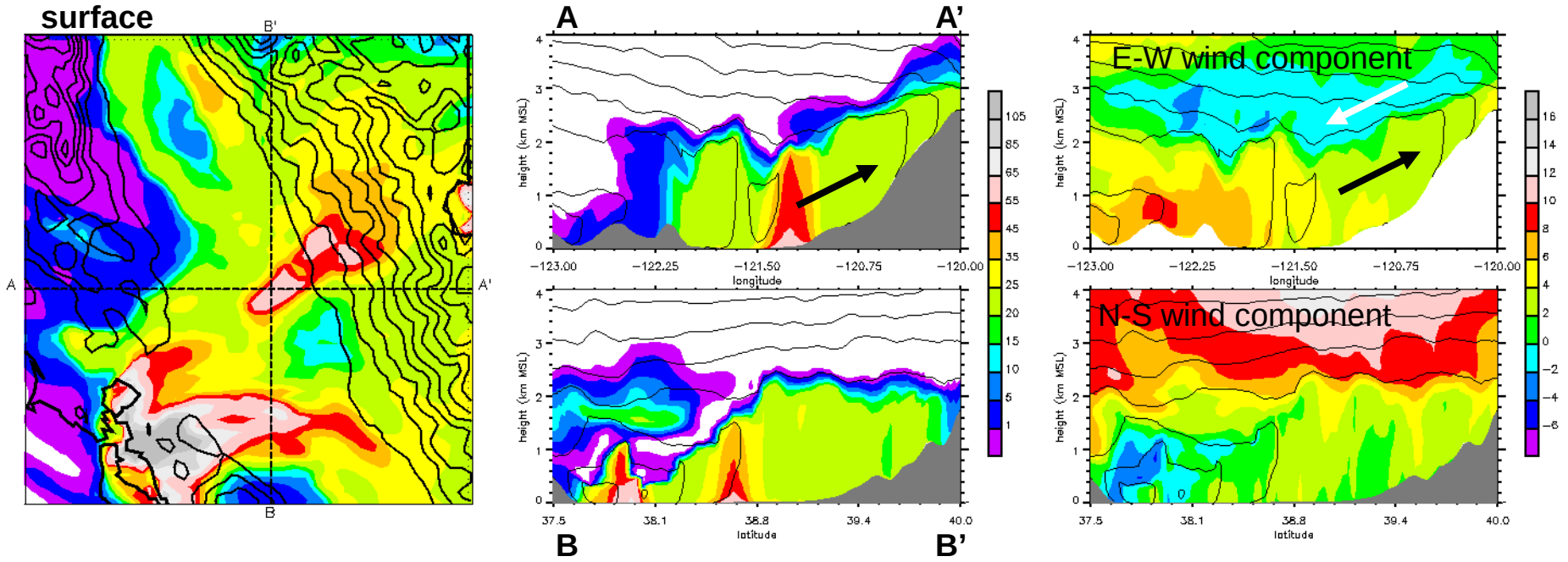
Vertical Cross Sections (5)

Ensemble CO from WRF, 17 PDT June 23



growing convective boundary layer mixes aged air aloft with fresh emissions, return circulation over the foothills re-establishes itself

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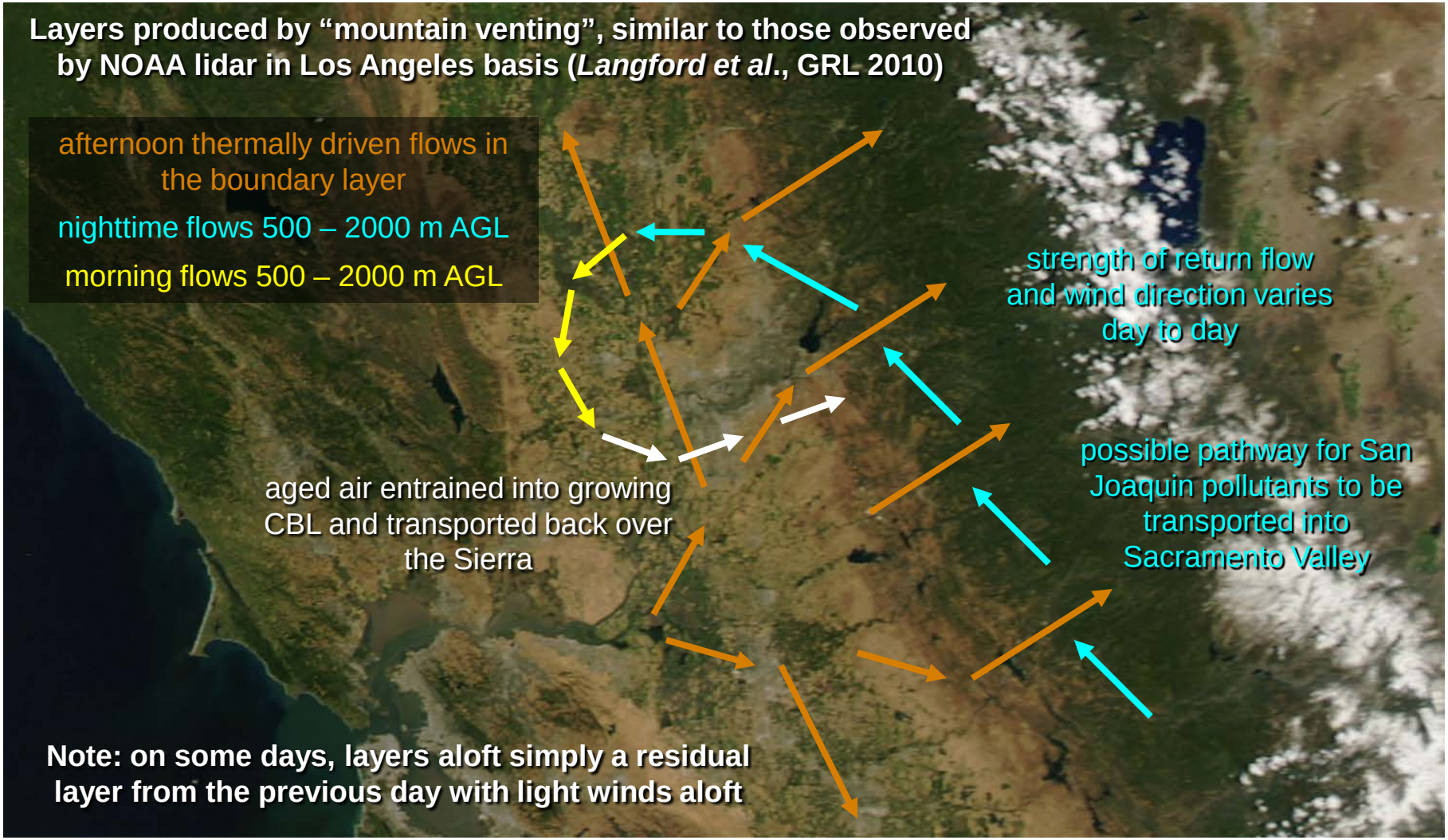
Summary



upper-level ambient winds too strong (especially during the passage of 3 troughs with NW winds) for this flow pattern to occur frequently until the last week of the campaign

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