Supplementary Information for:

Emissions of organic carbon and methane from petroleum and dairy operations in California's San Joaquin Valley

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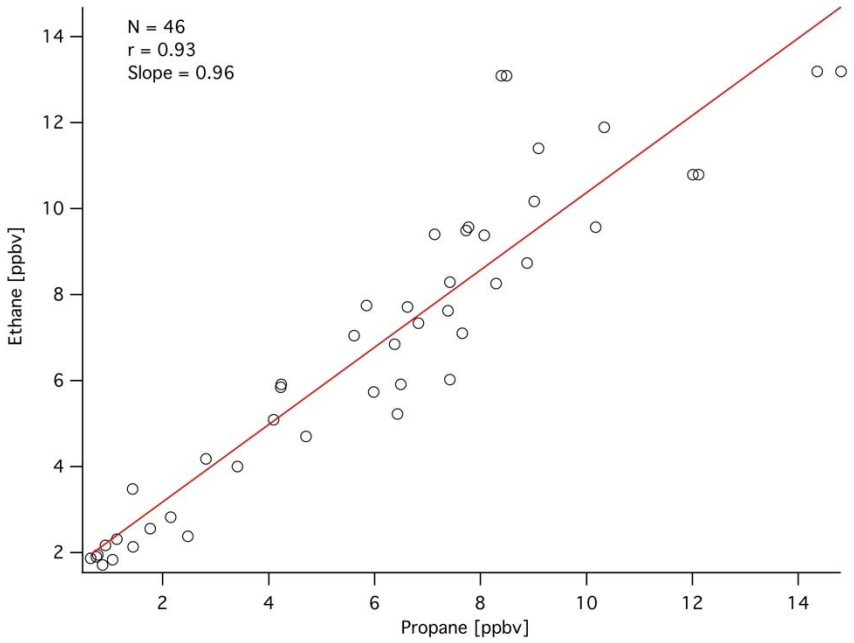

Figure S1: Observations of ethane vs. propane using canister measurements (5-8 PST) are well correlated with a ratio similar to that expected based on the petroleum gas source profile.

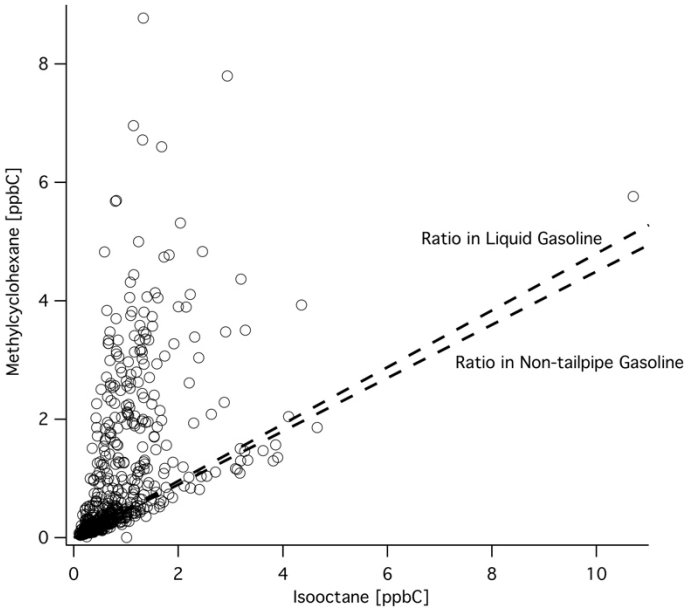

Figure S2: Comparison of methylcyclohexane and isooctane at the Bakersfield ground site. Isooctane is a prevalent tracer for gasoline emissions and its ratios to methylcyclohexane are roughly equivalent for exhaust and non-tailpipe emissions. Many points agree with these ratios, but numerous points have considerably more methylcyclohexane than expected. This result is similar for many other compounds whose observed values are episodically greater than predicted from gasoline and diesel sources.

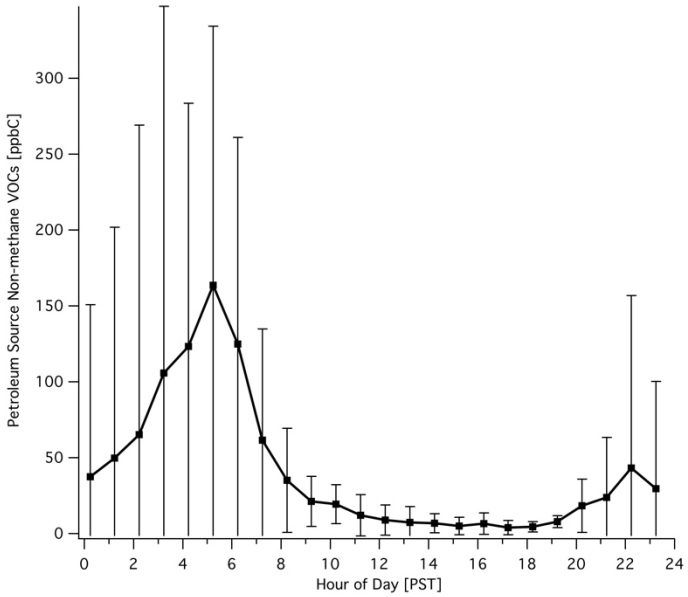

Figure S3: Average diurnal pattern of the petroleum operation source contribution (before "unexplained" mass is added).

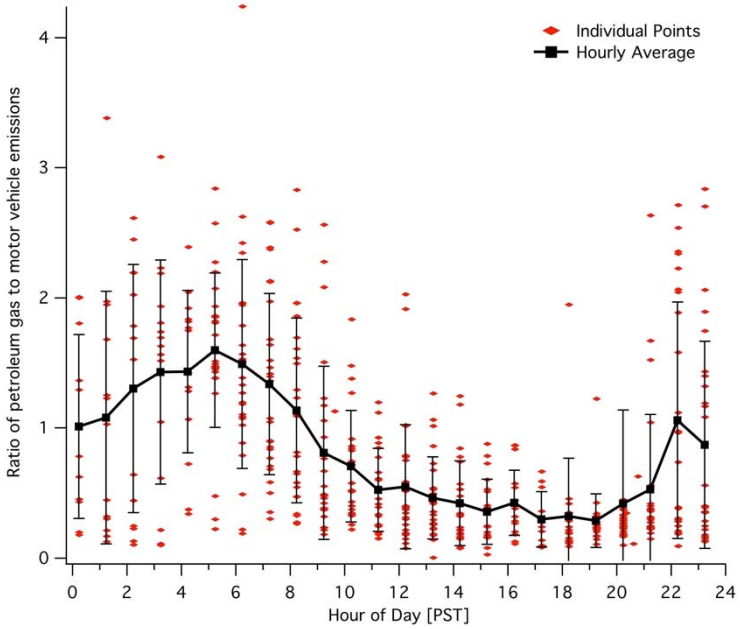

Figure S4: The diurnal average of the ratio of petroleum gas (including "unexplained" mass) to the sum of motor vehicle emissions.

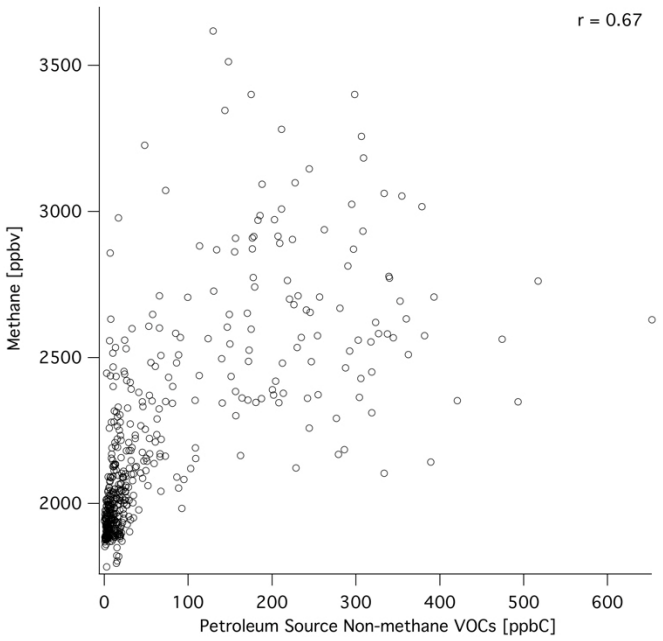

Figure S5: Observations of methane are not well correlated with the petroleum gas source and much of the observed correlation can be attributed to simultaneous dilution or concentration due to boundary layer effects.

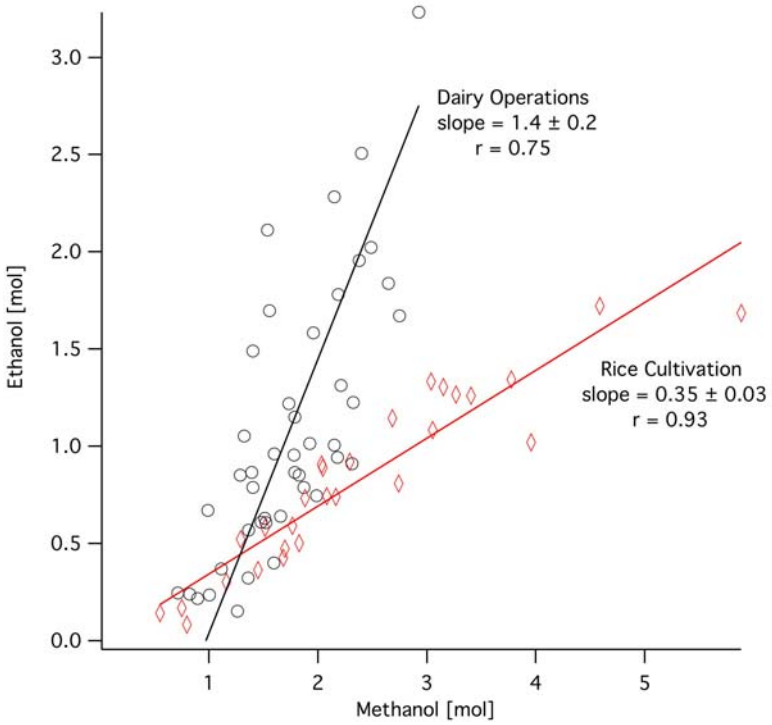

Figure S6: Canister measurements of ethanol and methanol taken via aircraft (flight dates: 5/7, 6/14, 6/16, 2010) show distinct ratios. Note: absolute ratios should be used with caution as canister measurements were subject to losses of both alcohols.

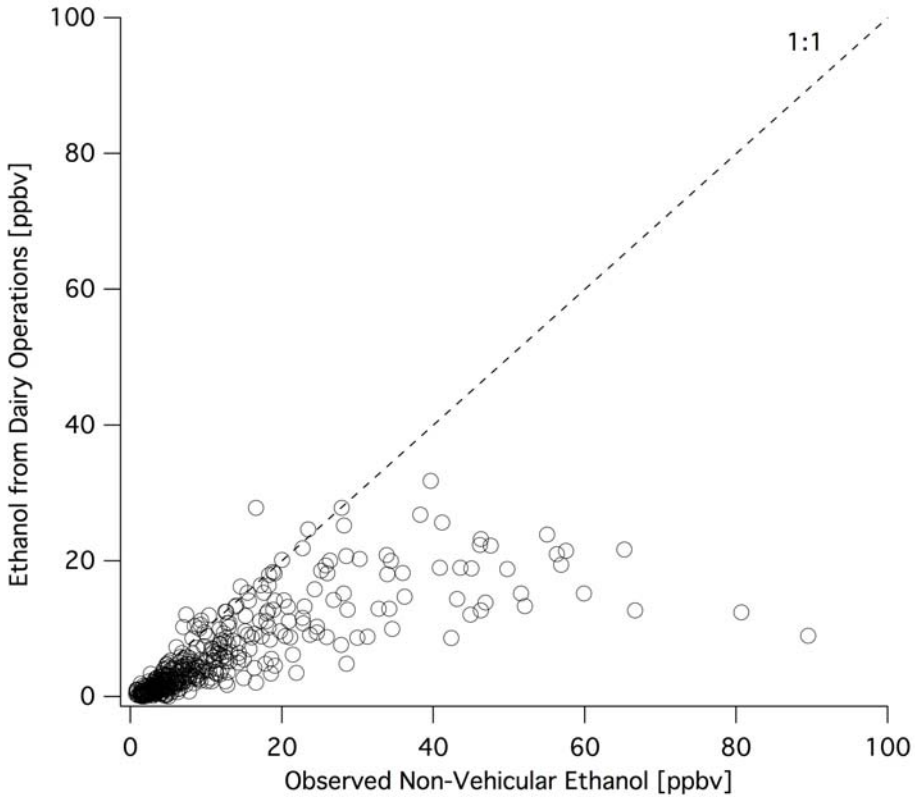

Figure S7: Similar to Figure 7, a comparison of ethanol from dairy operations against total observed non-vehicular ethanol.

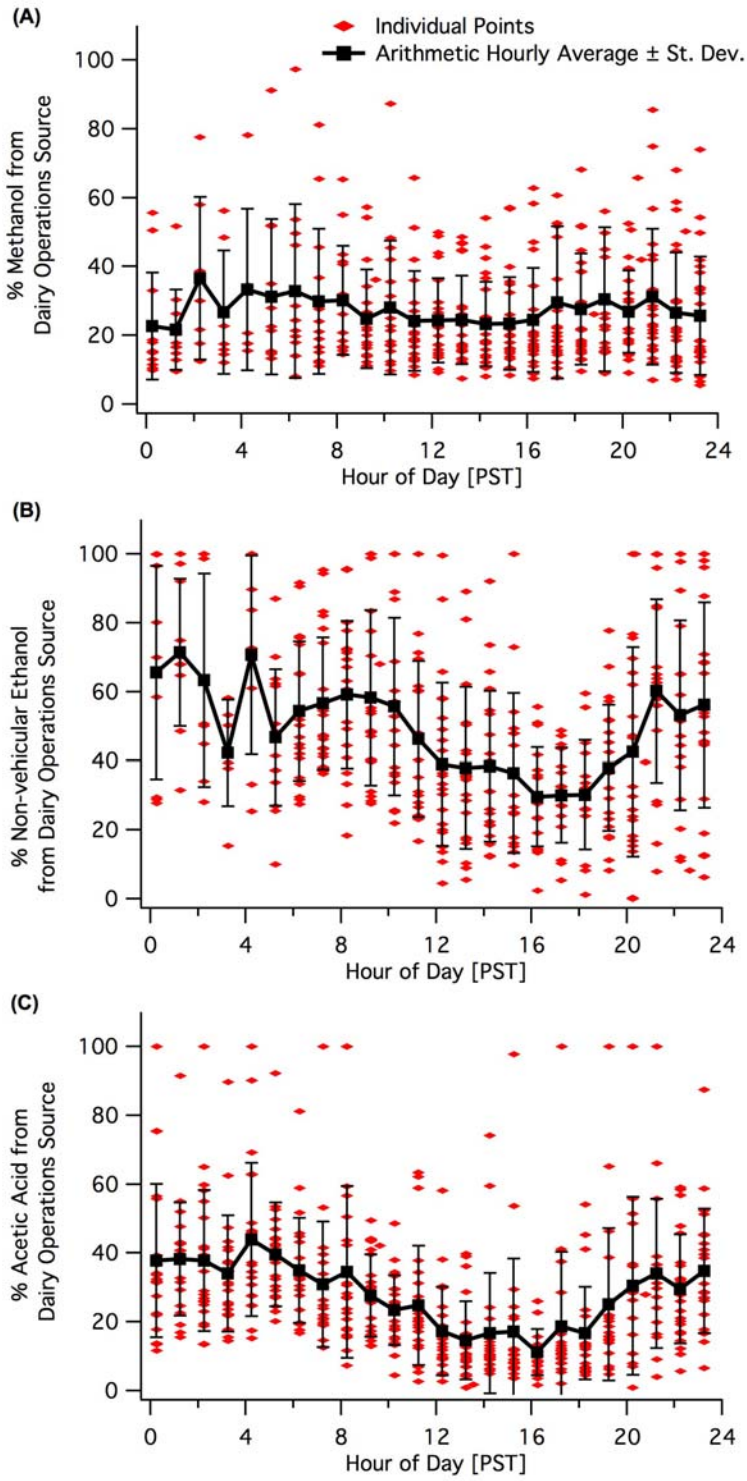

Figure S8: Diurnal patterns for percentages of total observed (A) methanol, (B) non-vehicular ethanol, and (C) acetic acid from dairy operations. Emissions from other sources of methanol overwhelm the diurnal pattern of methanol emissions from dairy operations. Contributions of ethanol and acetic acid from dairy operations comprise the smallest fraction of sources during the day when biogenic and photochemical sources are most active.

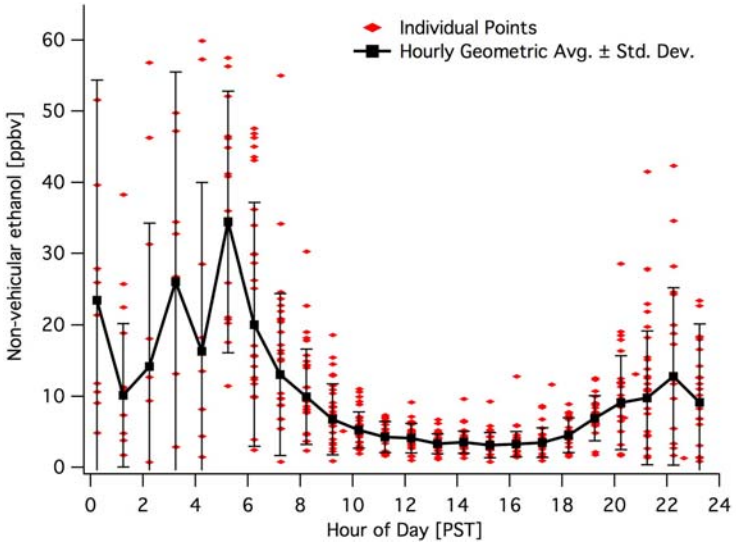

Figure S9: Diurnal pattern of non-vehicular ethanol at CalNex-Bakersfield

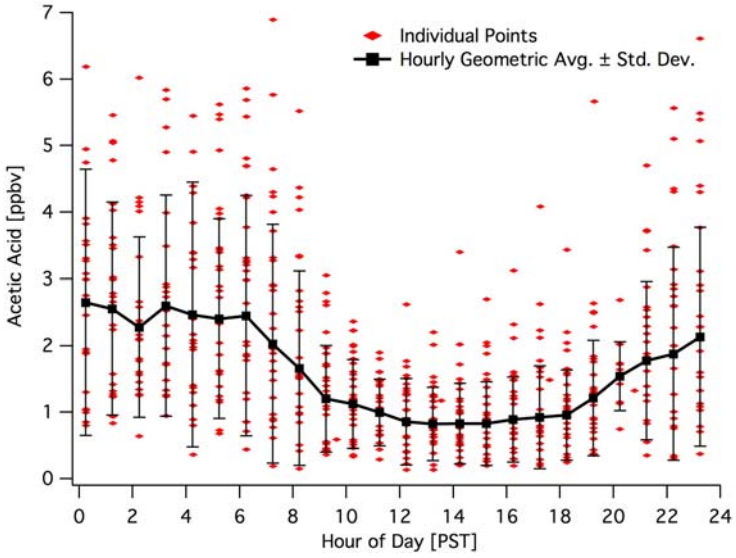

Figure S10: Diurnal pattern of acetic acid at CalNex-Bakersfield

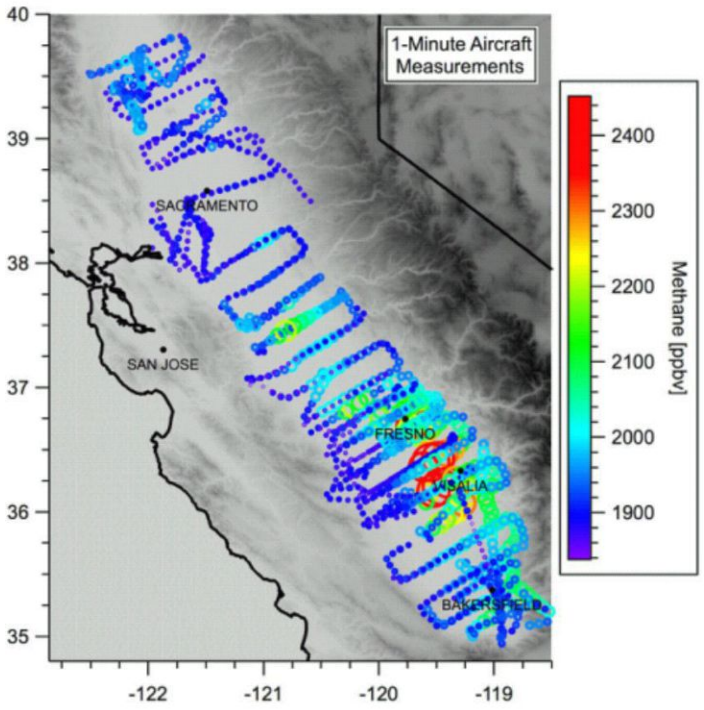

Figure S11: Methane aircraft measurements; similar to Figure 14, but including the Sacramento Valley