Initial Results of a Natural Gas Methane Emissions Survey in California's Southern San Joaquin Valley

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Methane emissions from natural infrastructure and associated with petroleum production are estimated to account for a small but uncertain fraction (~ 10%) of California's total methane emissions. In an effort to provide quantitative emissions estimates that might guide future mitigation efforts, we report initial results of measurements that survey emissions from natural gas infrastructure as part of the CALifornia Greenhouse Gas Emissions Measurement (CALGEM) project. In November 2013, we conducted a field campaign to measure CH_4 emissions from the Southern San Joaquin Valley. Measurements included the combination of continuous CH_4, Volatile Organic Compound (VOC) flask sampling and inflight meteorology on a small aircraft, surface and boundary layer winds and mixing depth with a ground-based Doppler Lidar, continuous multi-height CH_4 and meteorology measurements and $^{13}CH_4$ stable isotope sampling, and periodic VOC flask sampling from a roadway vehicle. Airborne CH_4 enhancements were clearly measurable above background mixing ratios for the Bakersfield urban area and two oil-gas fields. While initial results suggest CH_4 , VOC, and isotopes measured on the south side of the Bakersfield urban area are dominated by nearby and interspersed livestock facilities, the north side of Bakersfield exhibited CH_4, light alkane, and isotope signals associated with oil and gas activities. Methane measurements from the roadway vehicles suggest that localized methane plumes were captured in several areas of urban Bakersfield. Ongoing analysis is expected to improve the specificity to petroleum and natural emission activities to provide quantitative emission estimates from natural activities.

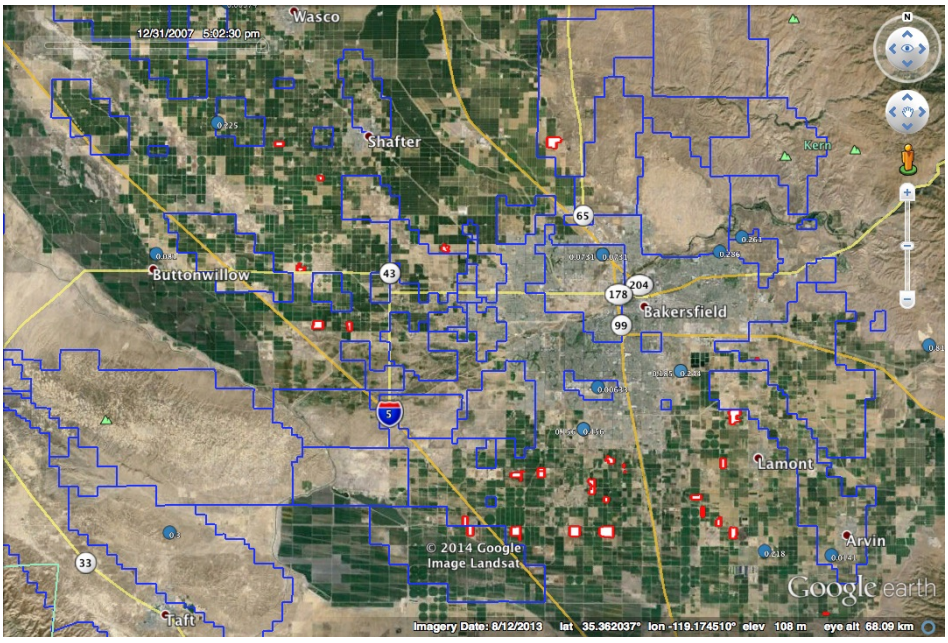

Figure 1. Image of Southern San Joaquin Valley showing locations of potential methane sources including urban Bakersfield, oil and gas field boundaries (blue lines), landfills and waste water treatment (blue dots), and dairies (red outlines).