

NASA and Solid Waste Management “Viewed from Space”

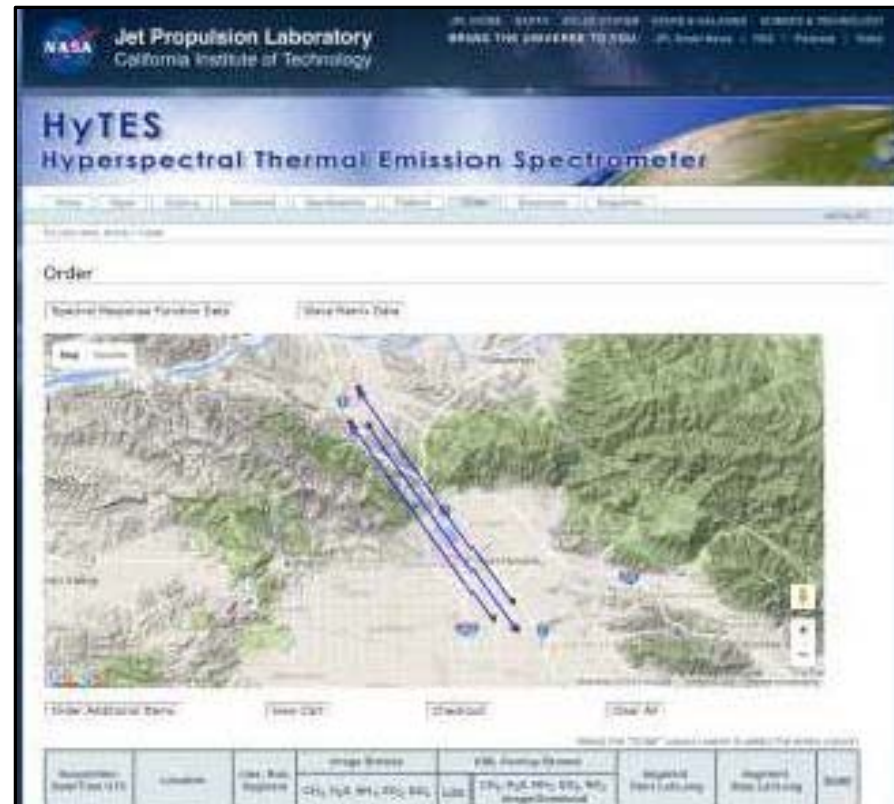
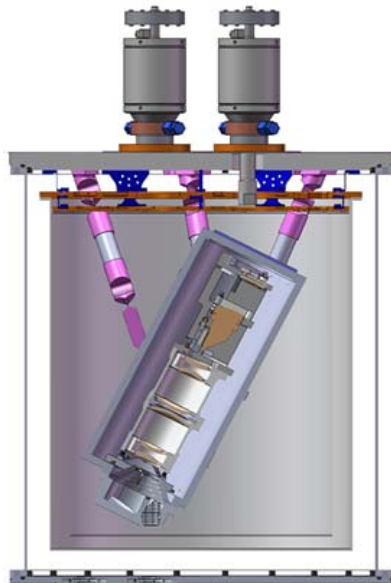
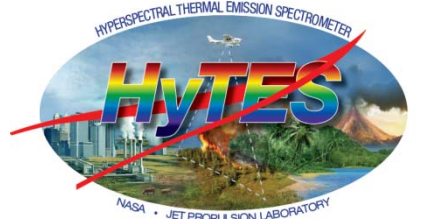
Eugene Tseng JD

Sunshine Canyon Landfill Local Enforcement Agency



SCL LEA Collaboration with NASA /JPL / CalTech

The Hyperspectral Thermal Emission Spectrometer (HyTES) is an airborne imaging spectrometer with 256 spectral channels between 7.5 and 12 micrometers in the thermal infrared part of the electromagnetic spectrum and 512 pixels cross-track.

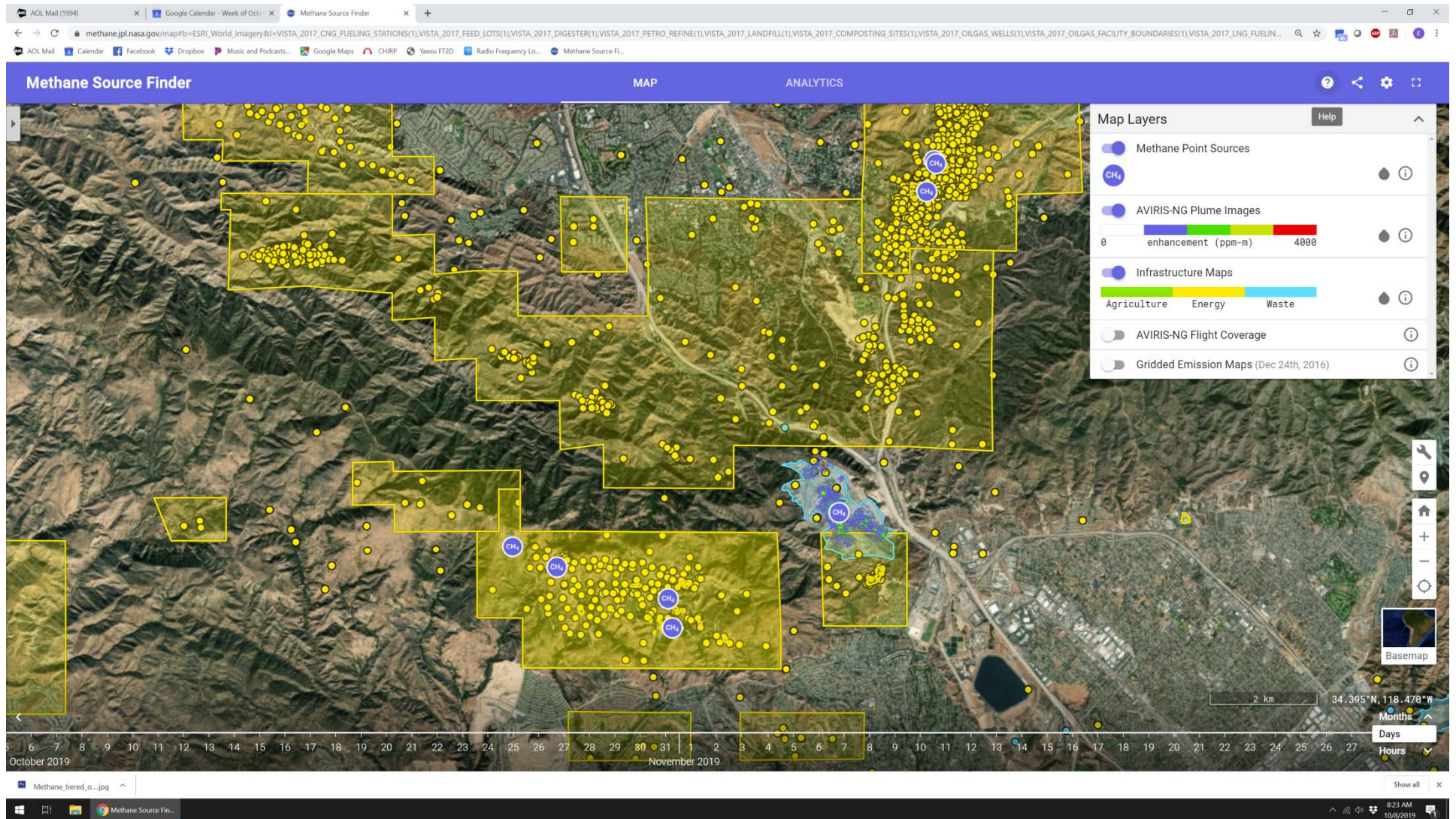


Tiered Observation System for Methane



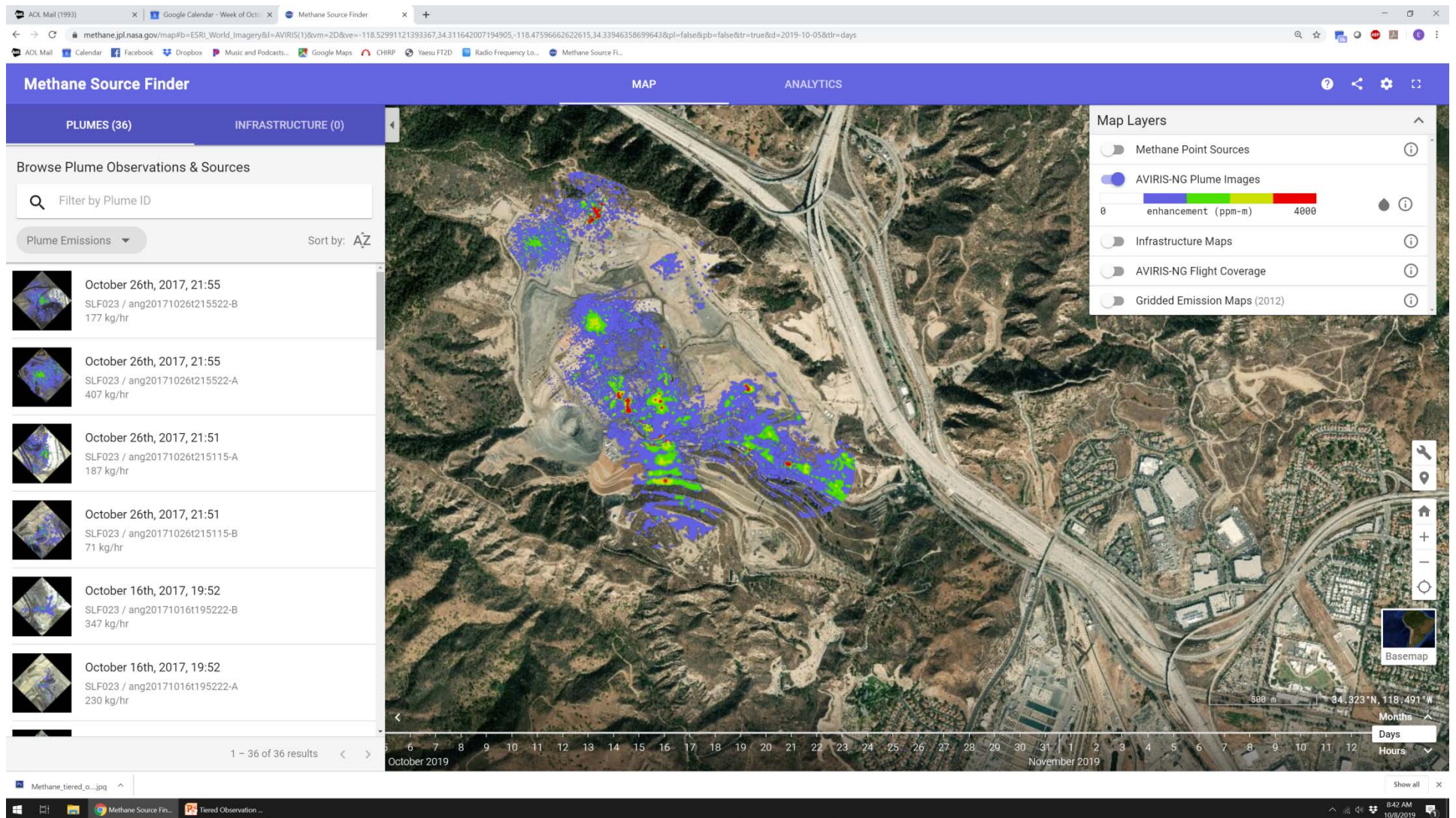
Methane Source Finder Interactive Map (2019)

<https://methane.jpl.nasa.gov/>

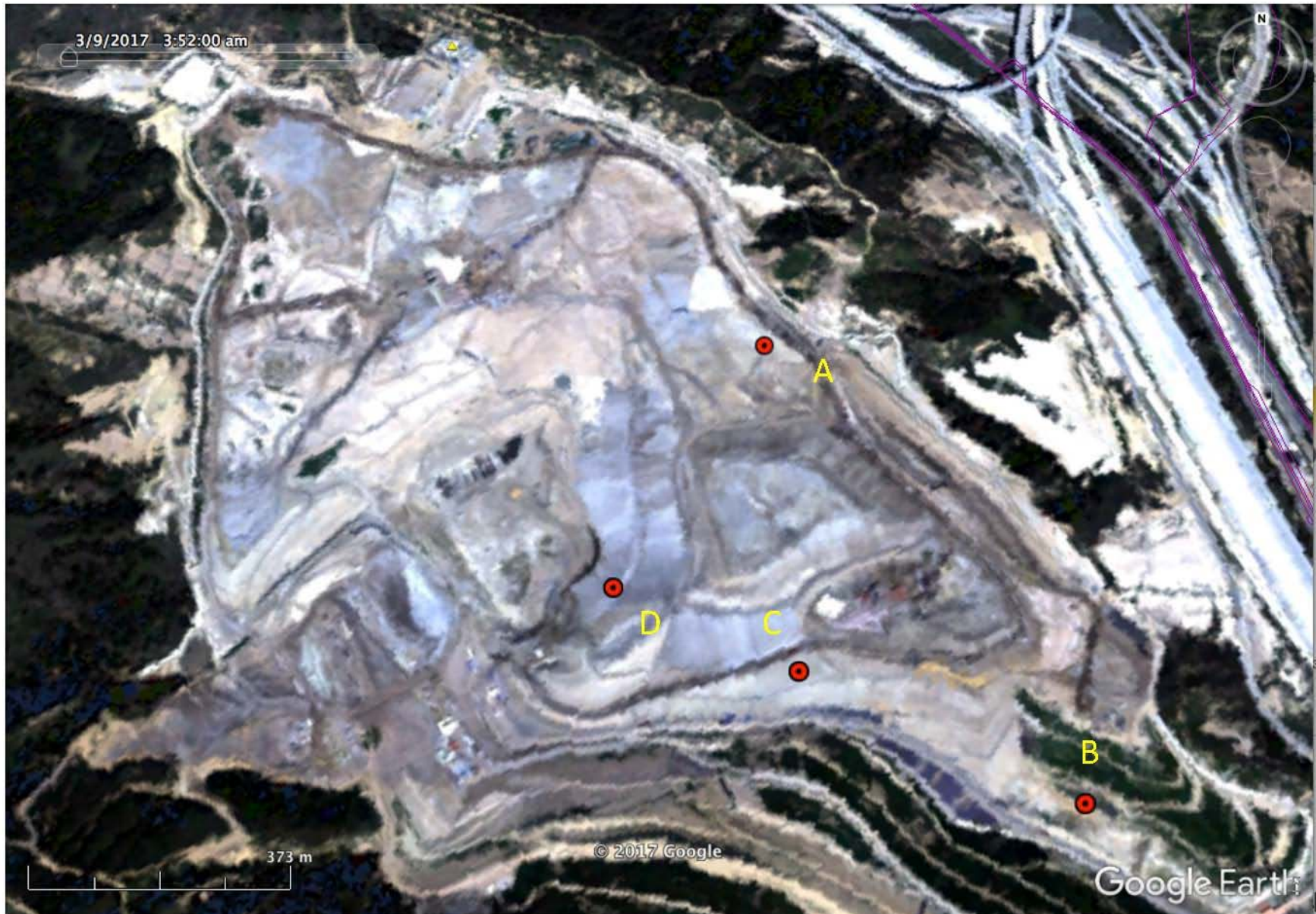


Methane Source Finder Interactive Map

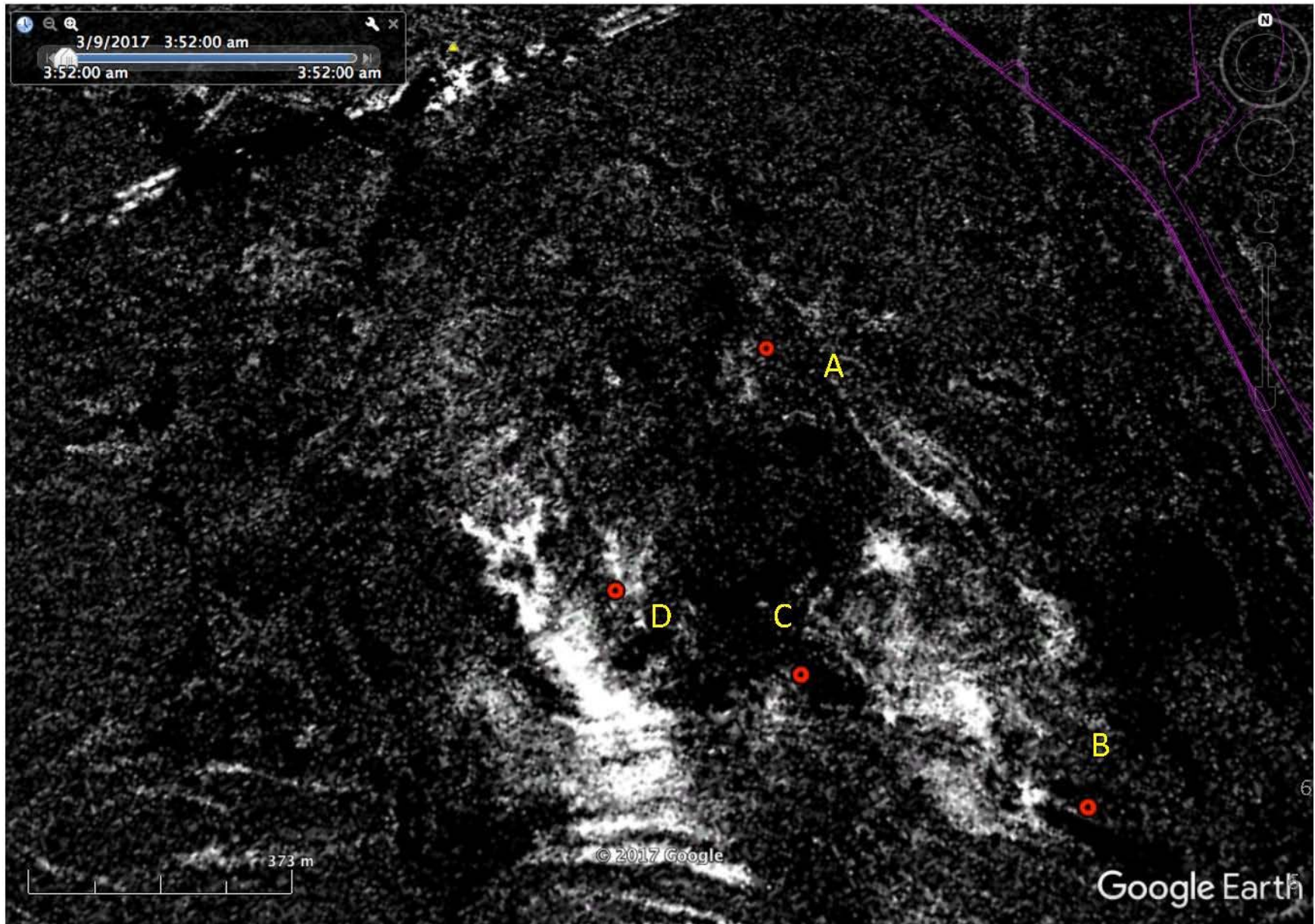
Focus on Individual Point Source



Sunshine Cyn visible 2017-03-09



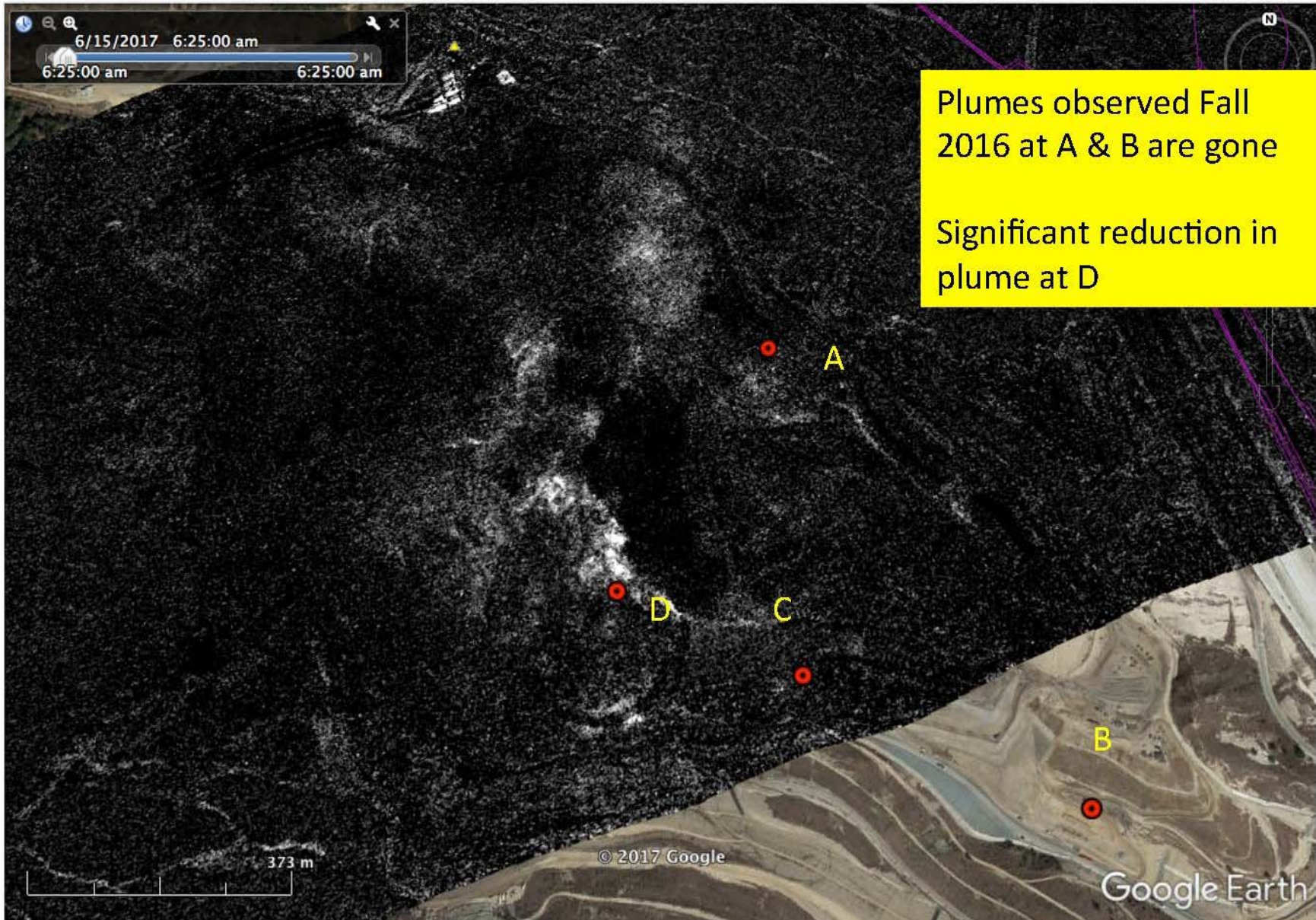
Sunshine Cyn methane 2017-03-09



Sunshine Cyn visible 2017-06-15

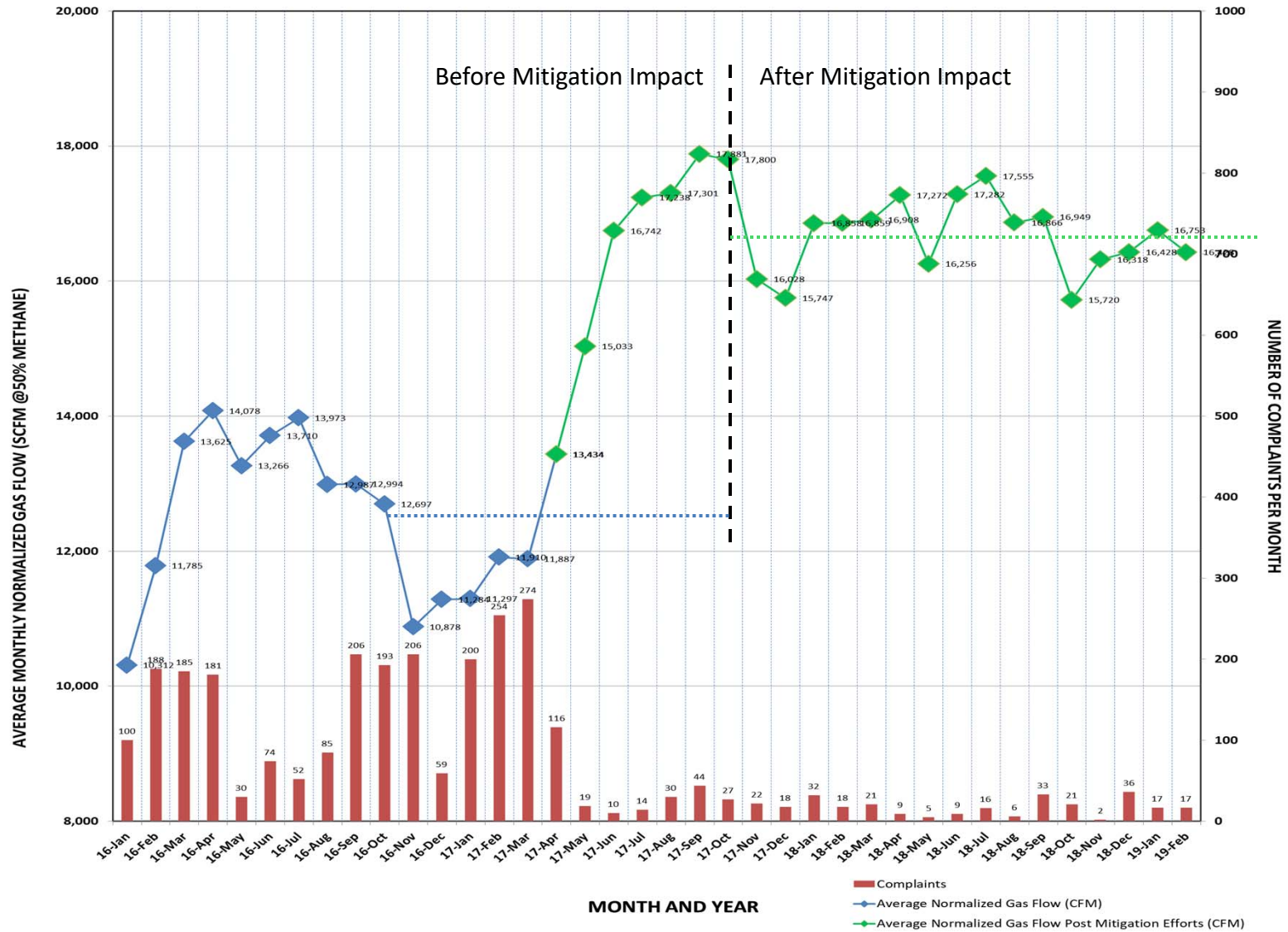


Sunshine Cyn methane 2017-06-15



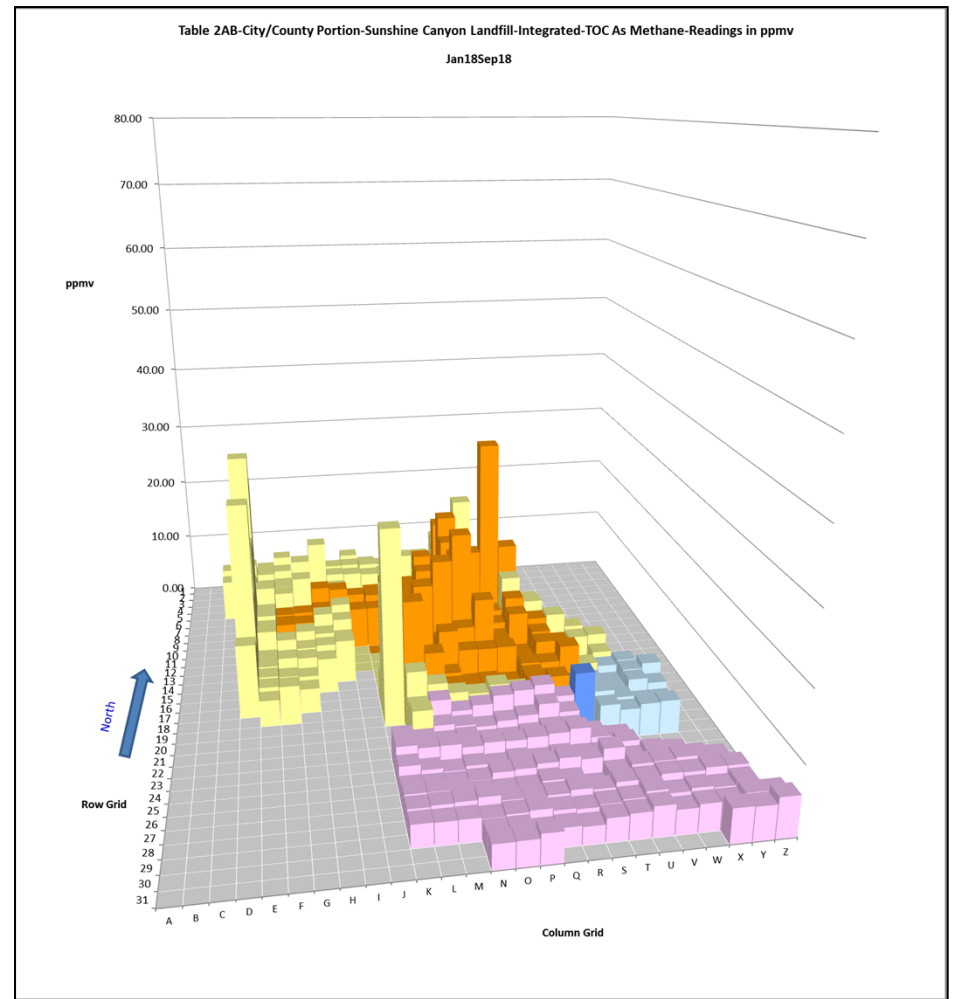
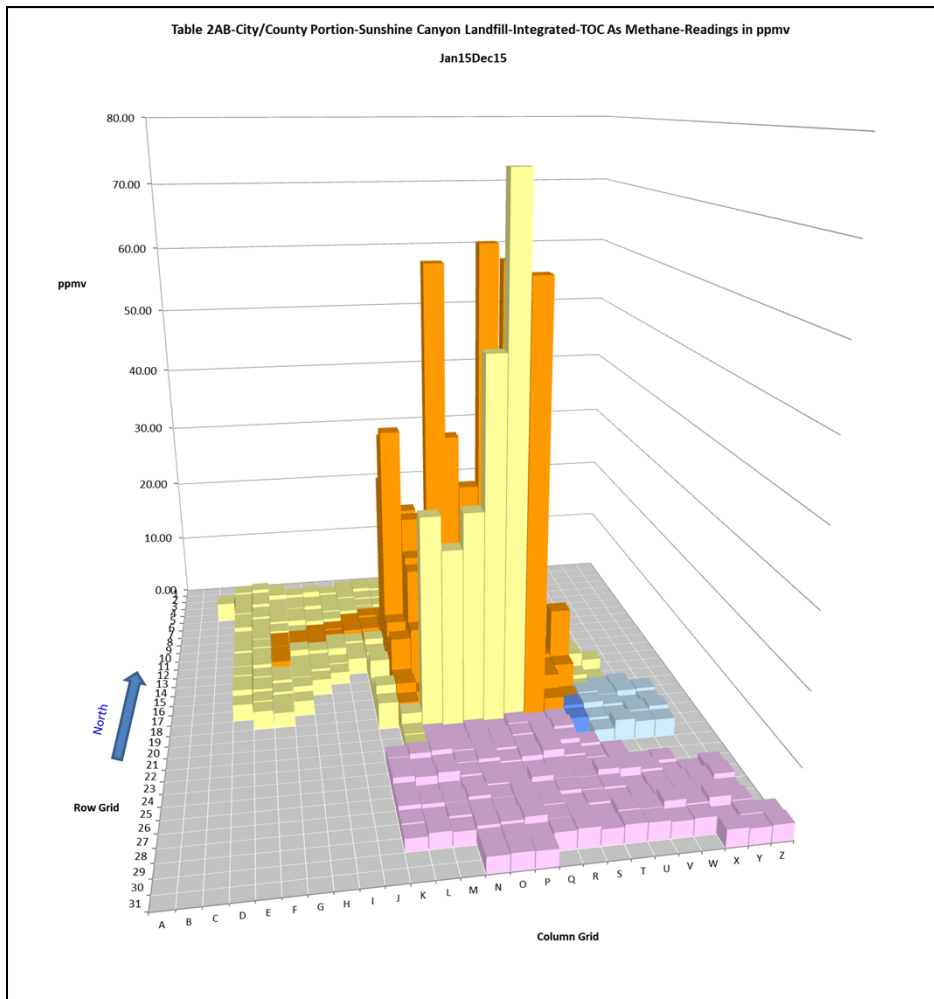
ANALYSIS OF LANDFILL GAS COLLECTION VOLUME / RATE

GAS FLOW (SCFM @ 50% METHANE) AND MONTH/YEAR GRAPH AND ODOR COMPLAINTS



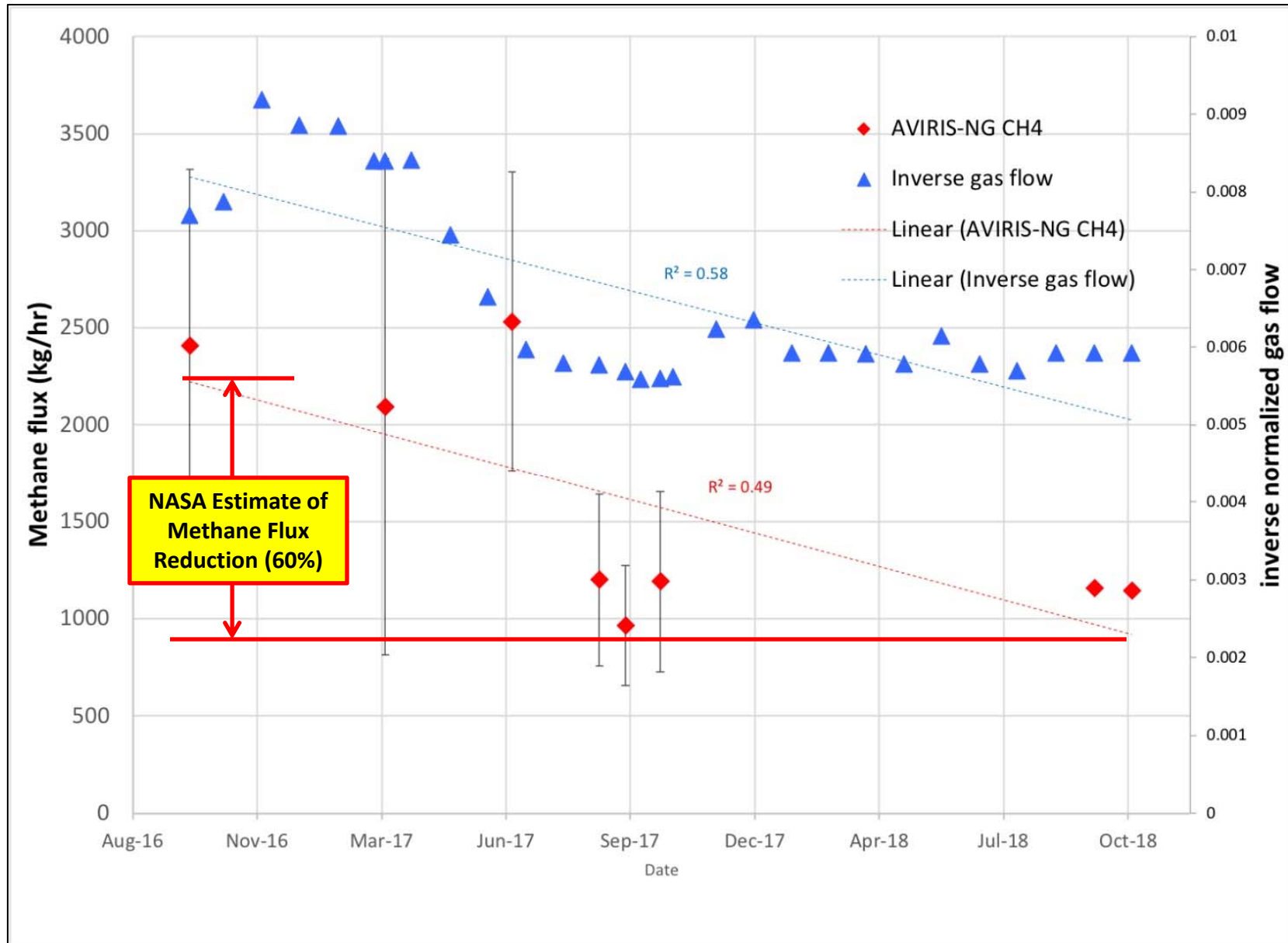
SCAQMD Rule 1150.1 Surface Emissions Monitoring (Year 2015 vs 2018)

Compare Emission Levels of Grids of Different Year



Note: Methane level is only a proxy for odor.

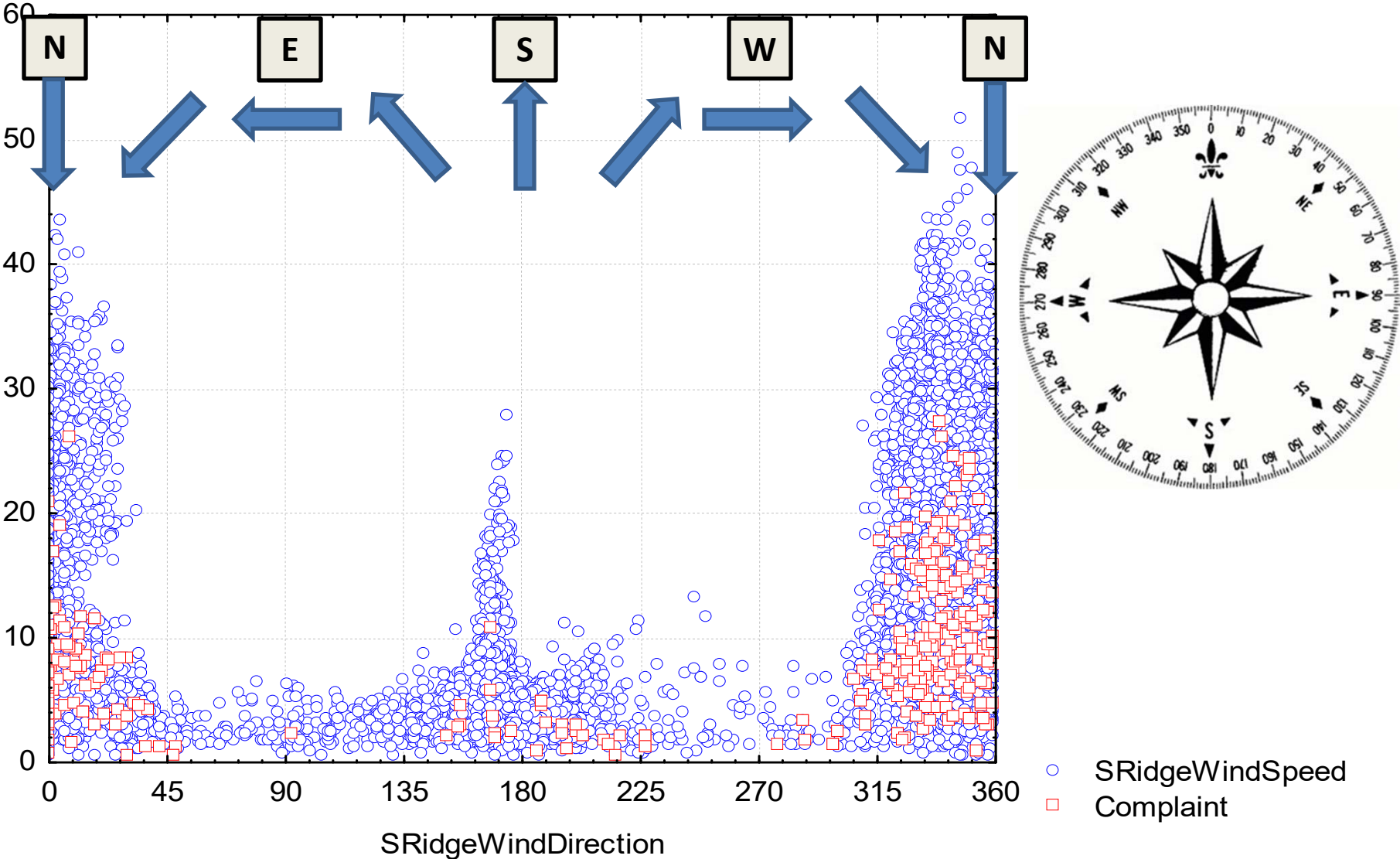
Methane Flux (NASA)



Wind Direction and Complaints (Scatter Plot)

Sunshine Canyon Landfill - Complaint and Weather Data -2013-2016

Month=December



○ SRidgeWindSpeed
□ Complaint

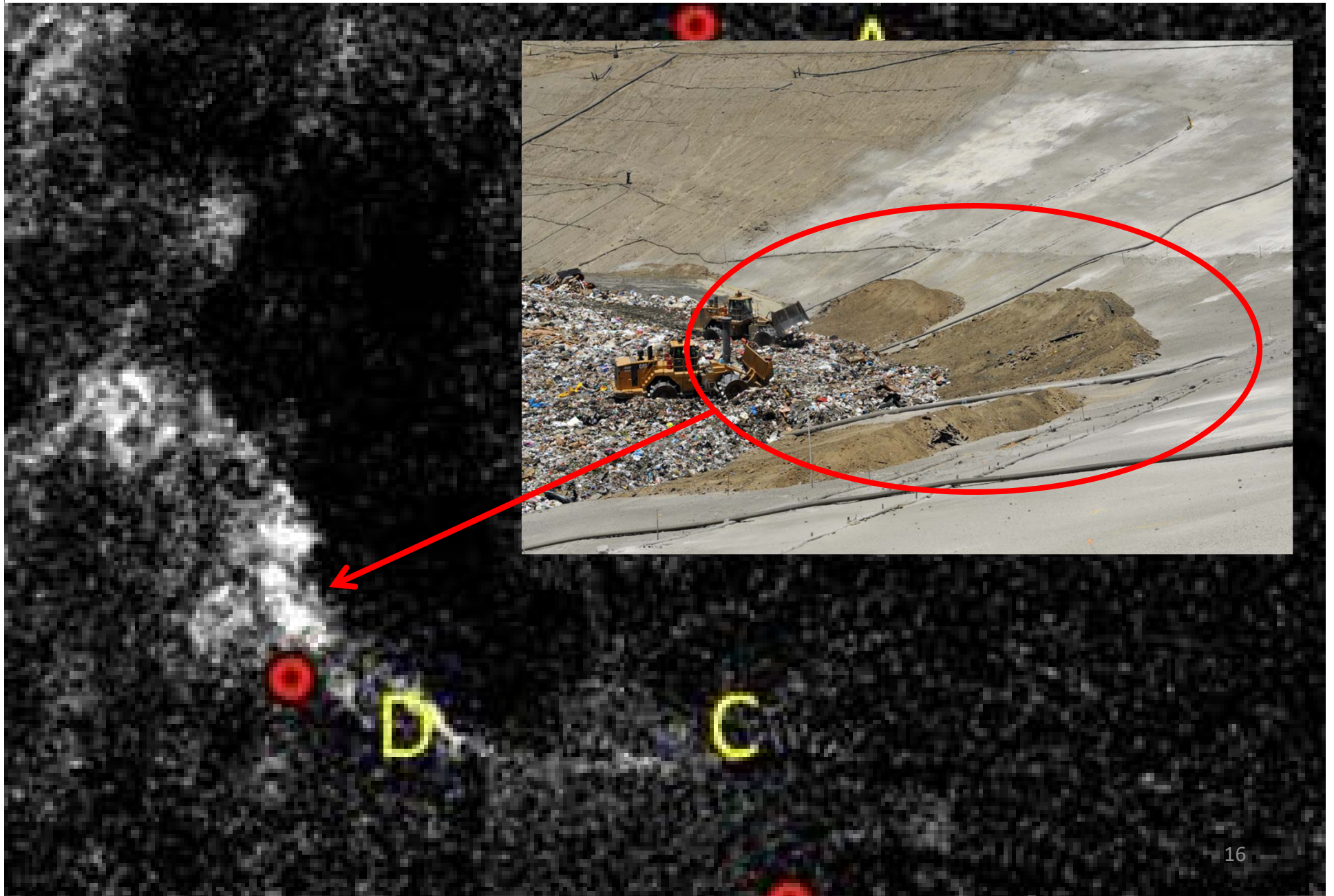
Freeze Frame at 2:52:00 PM



Freeze Frame at 2:52:30 PM

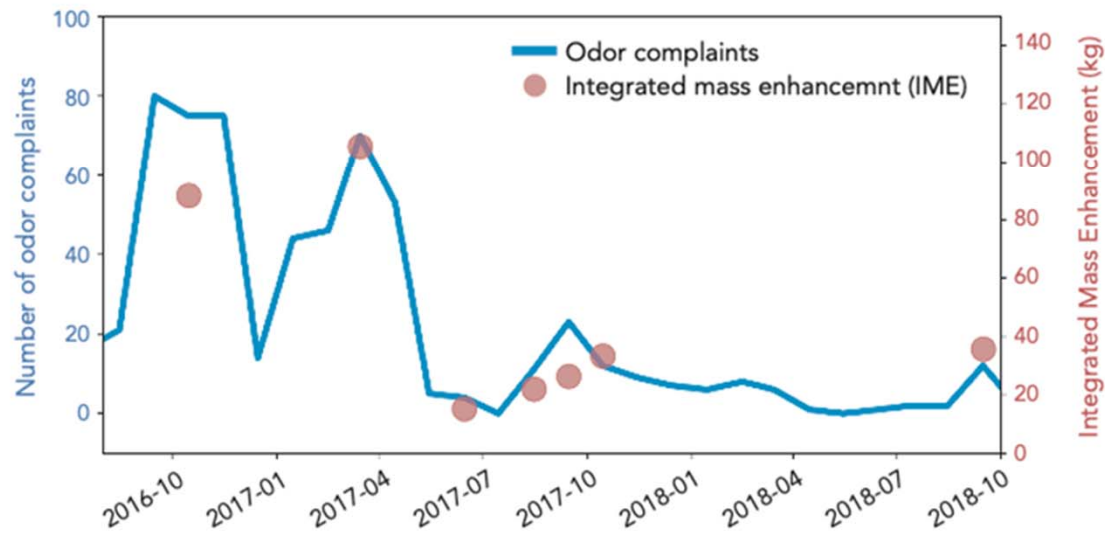


PEELING BACK INTERMEDIATE COVER



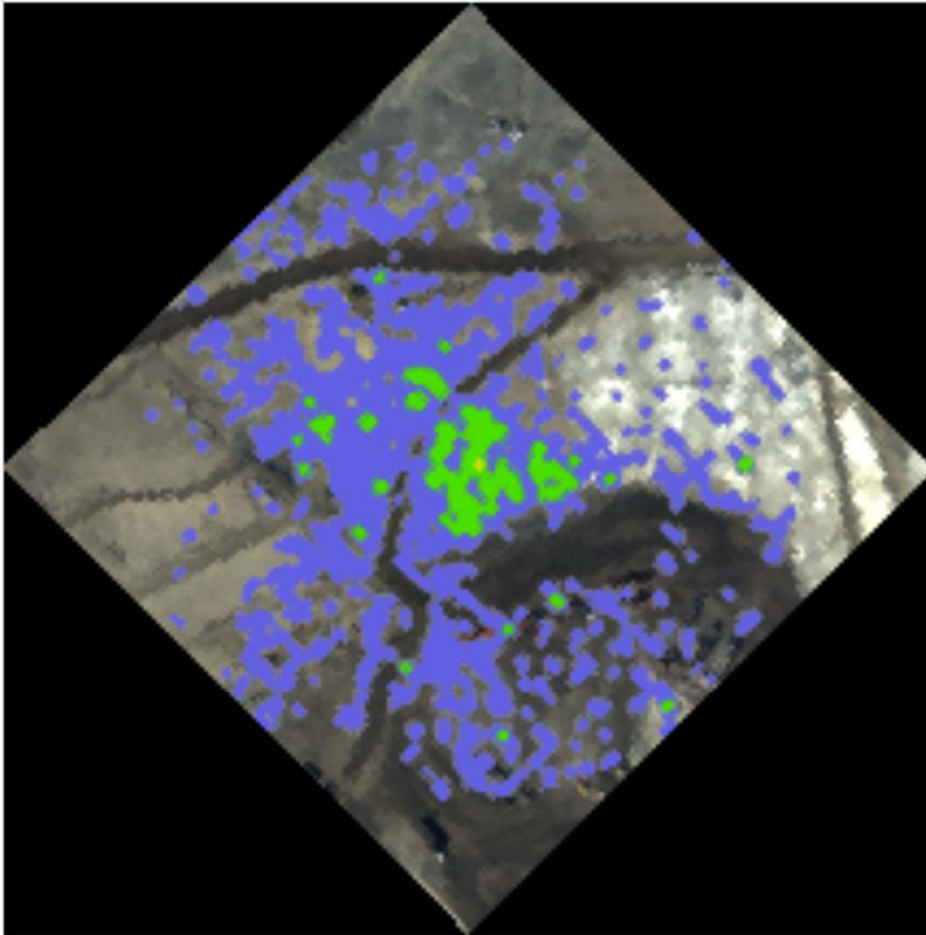
NASA (Cusworth 2019)

Reduction in methane emissions from intermediate cover verified by airborne monitoring

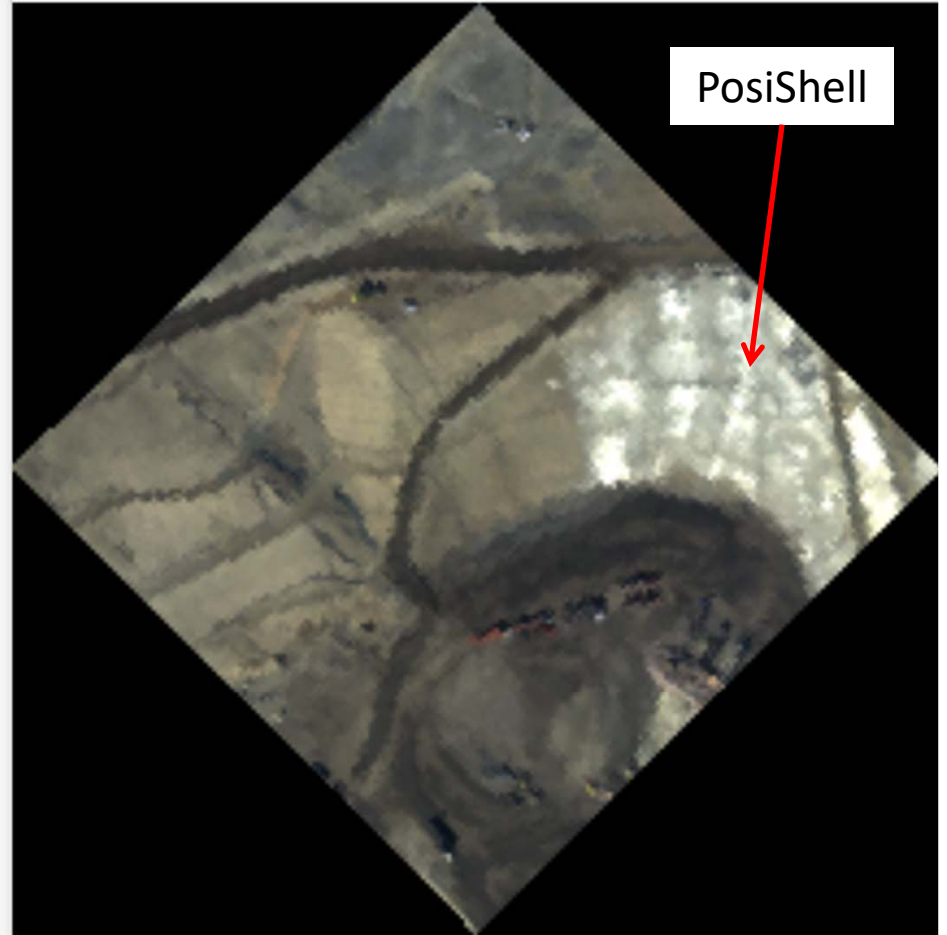


Methane Source Finder Interactive Map

Observation Methane Plume Imagery



Observation RGB Imagery



Flyovers of Connected Plume Source: **SLF023**

Uncertainty Warning: *Plume sources are currently identified through a manual process.*

October 29, 2017 Flyover

NASA (Cusworth) Example:

JPL/Sunshine Canyon communication lead to placing fibrous and plastic caps over problematic slopes to reduce methane blowouts.



We track the extent of landfill improvements over time

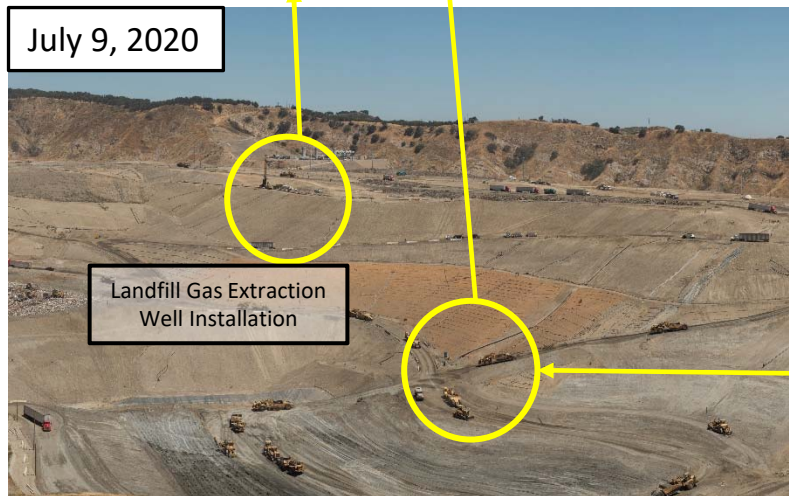


ONGOING NASA / SCL LEA AND SUNSHINE CANYON LANDFILL COLLABORATION

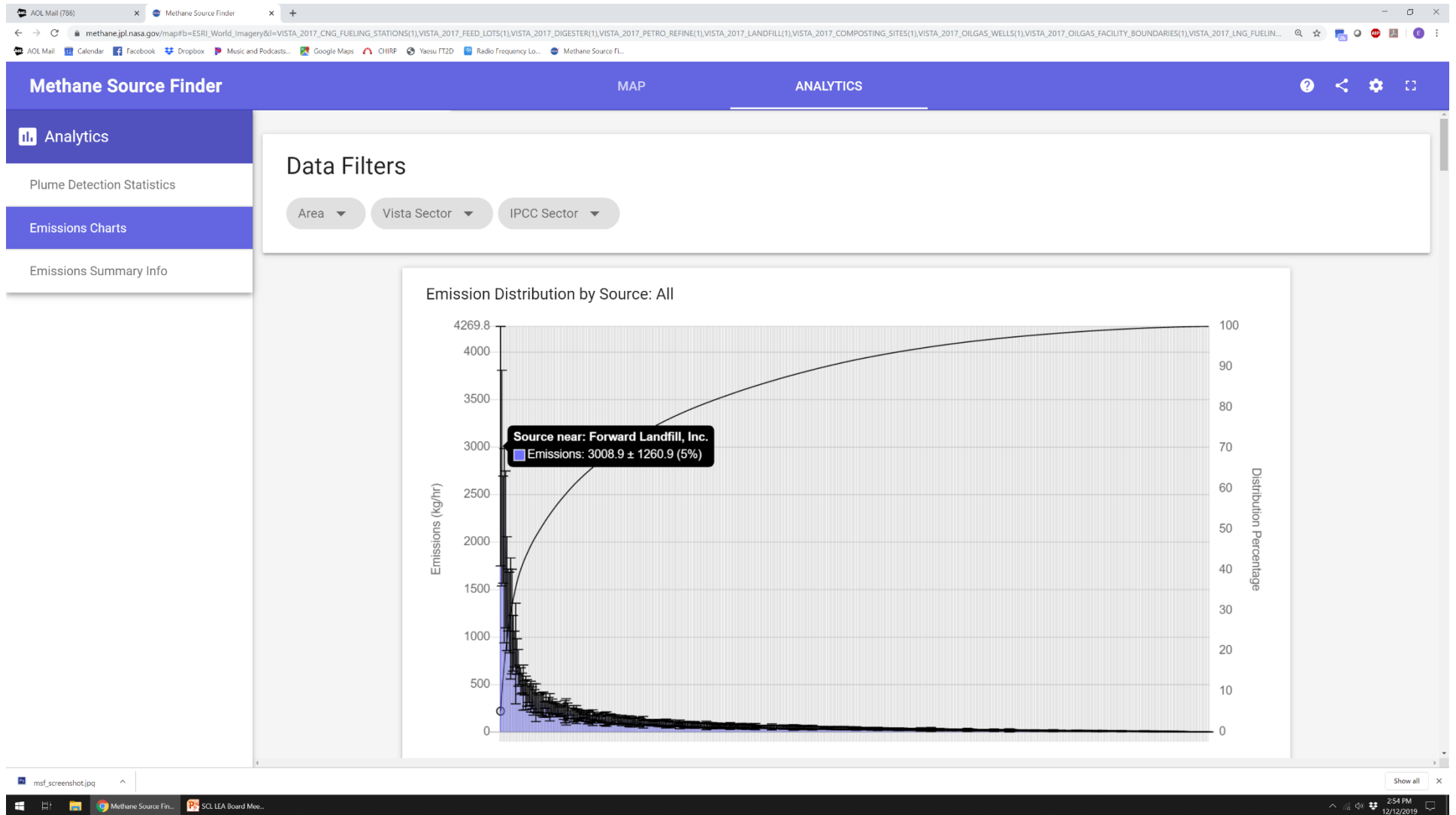
NASA Slide #10 (7/24/2020)



**Construction
Activities in July
2020 and
August 2020**

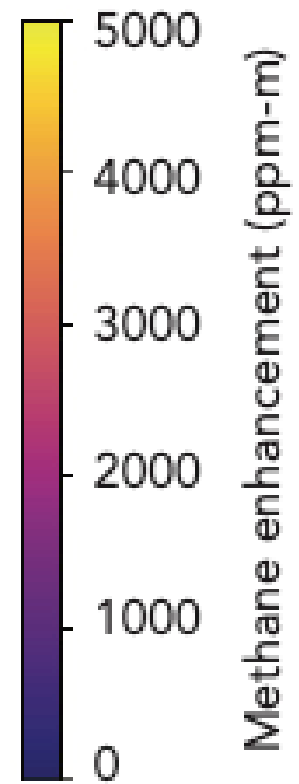
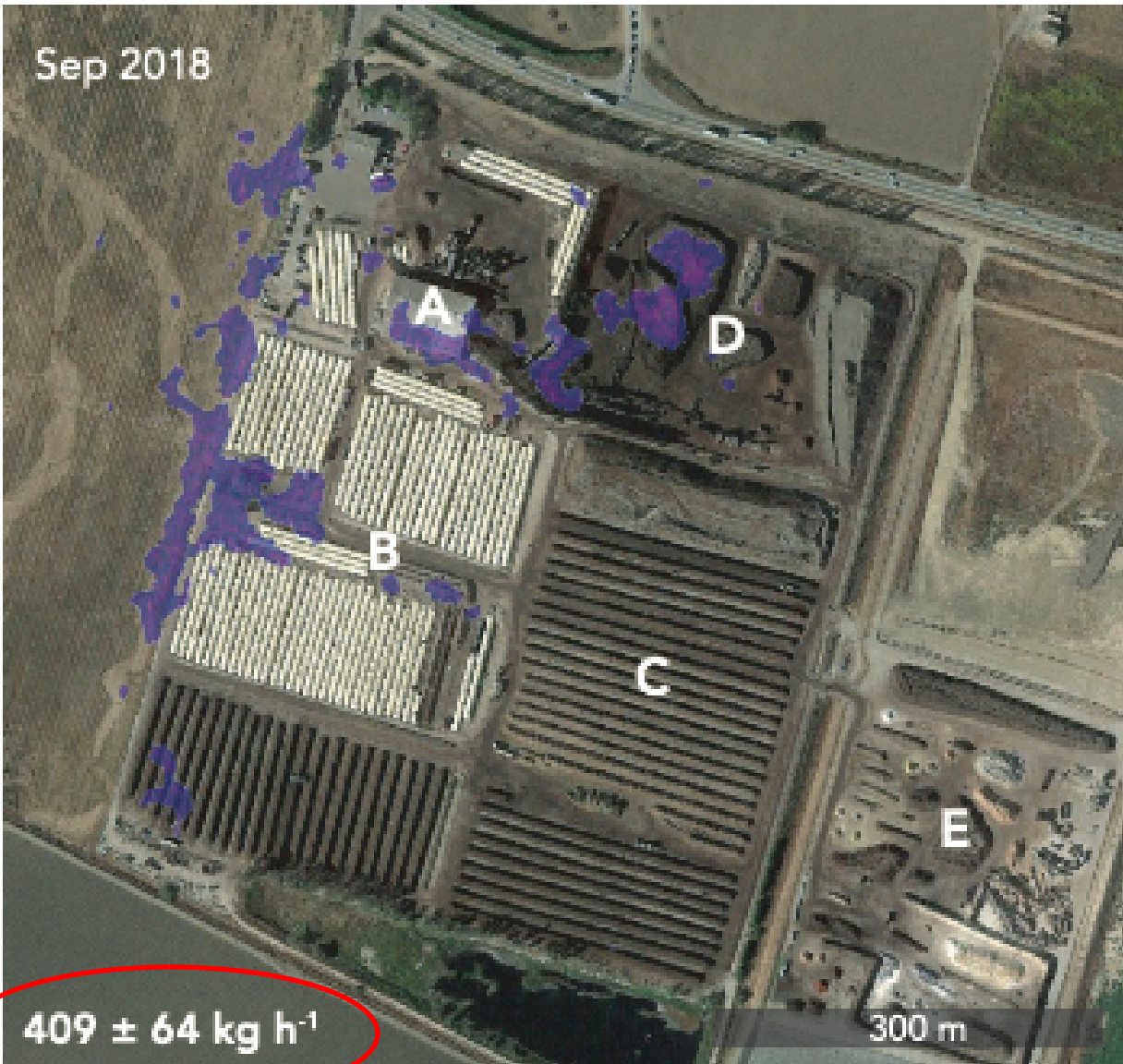


NASA Methane Survey (All California Sources)



Aerated windrow composting

Sep 2018



NASA Methane Survey Findings

- The California Methane Survey quantified a point source methane budget in California (solid waste management, manure/enteric fermentation, oil/gas, energy, wastewater treatment);
- Less than 0.2% of infrastructure elements in the state (based on a survey of 272,000 facilities and components) are responsible for 34–46% of total methane emissions in California;
- Waste management is the largest methane point source emission sector in California (41% of our study total), driven by a small fraction of landfills;
- Largest emitters in California are about 35 landfills – typically with average fluxes in the few thousand kgCH₄/hr range.
 - Higher than larger emitters in other sectors which tend to be in the few hundred kg/hr range.

Thank You

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