#### Methane Source Finder: A web-based data portal for exploring methane data

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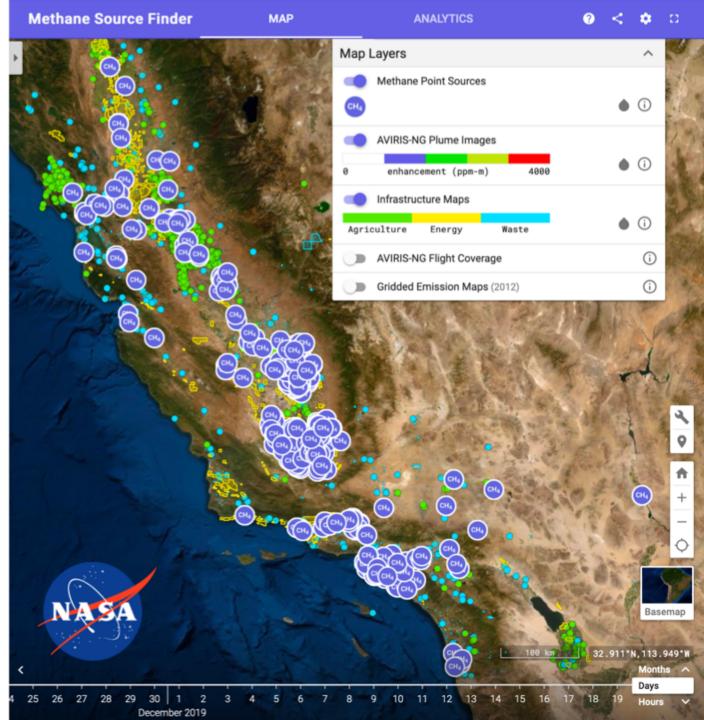
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<sup>2</sup>University of Arizona

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<sup>4</sup>University of California Riverside

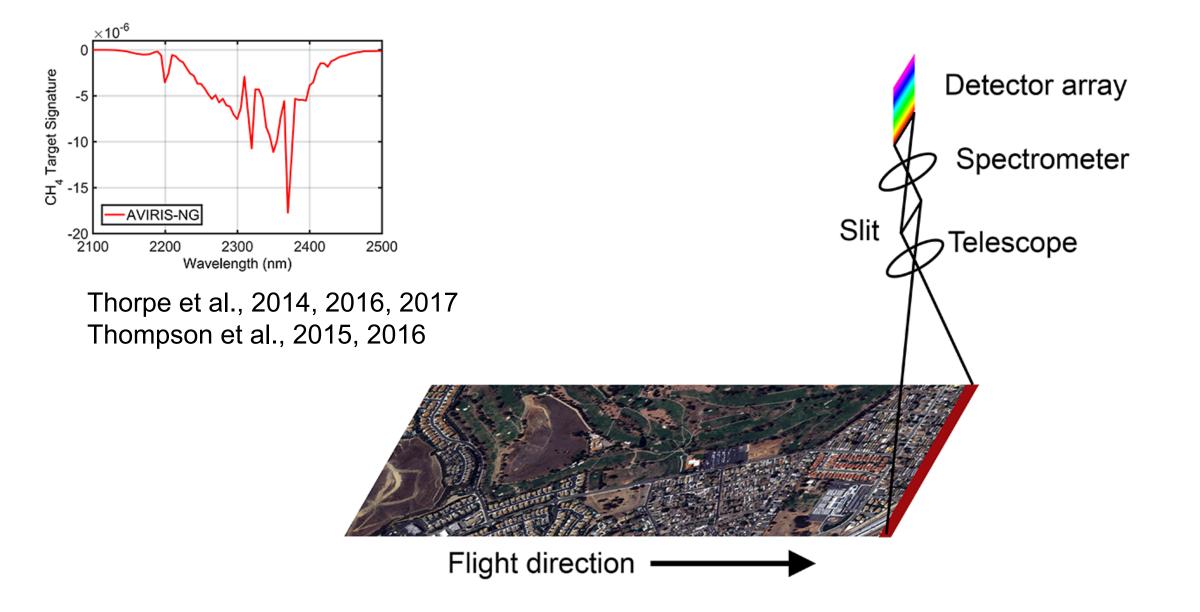
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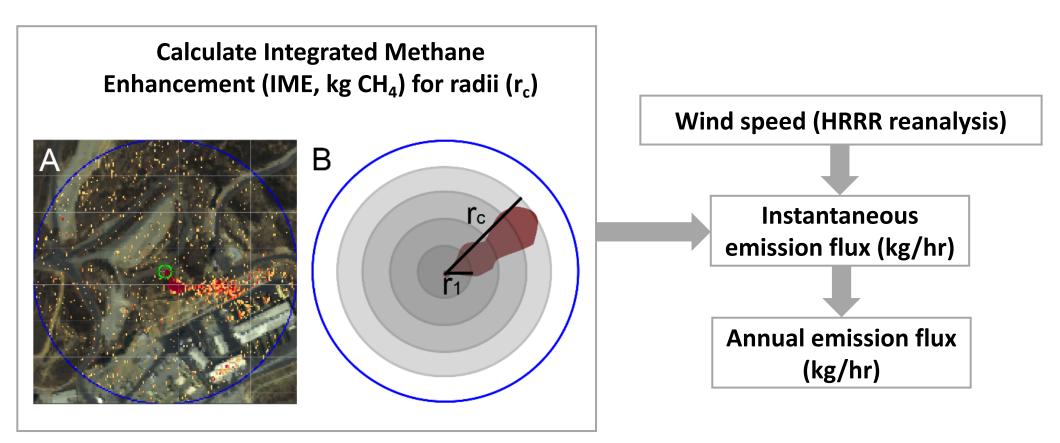
#### Methane Source Finder data portal

- Publicly available: <a href="https://methane.jpl.nasa.gov/">https://methane.jpl.nasa.gov/</a>
- Developed under NASA's ACCESS and CMS programs to explore  $\mbox{CH}_4$  data
- Data includes:
  - Remote sensing (AVIRIS-NG imaging spectrometer CH<sub>4</sub> plume results; Thorpe et al., 2017)
  - Surface monitoring (in situ towers for CH<sub>4</sub> flux inversions for the LA basin; Yadav et al., 2019)
  - Bottom up CH<sub>4</sub> emissions inventories (EPA)
  - Infrastructure database (potential CH<sub>4</sub> sources; Carranza et al., 2018)
- Goals:
  - Provide CH<sub>4</sub> dataset to a diverse range of stakeholders to improve understanding of regional CH<sub>4</sub> emissions
  - Provide opportunities for mitigation

# AVIRIS-NG for CH<sub>4</sub> plume mapping



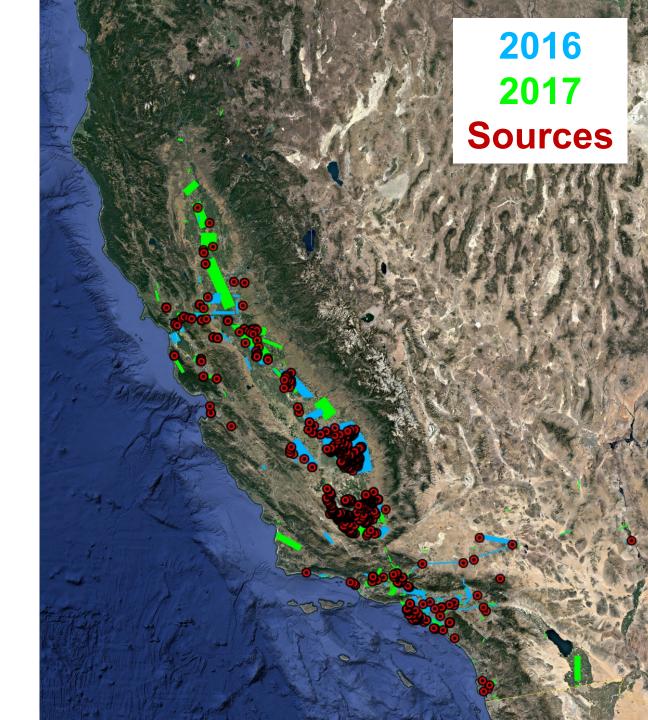
## AVIRIS-NG for CH<sub>4</sub> emission flux quantification



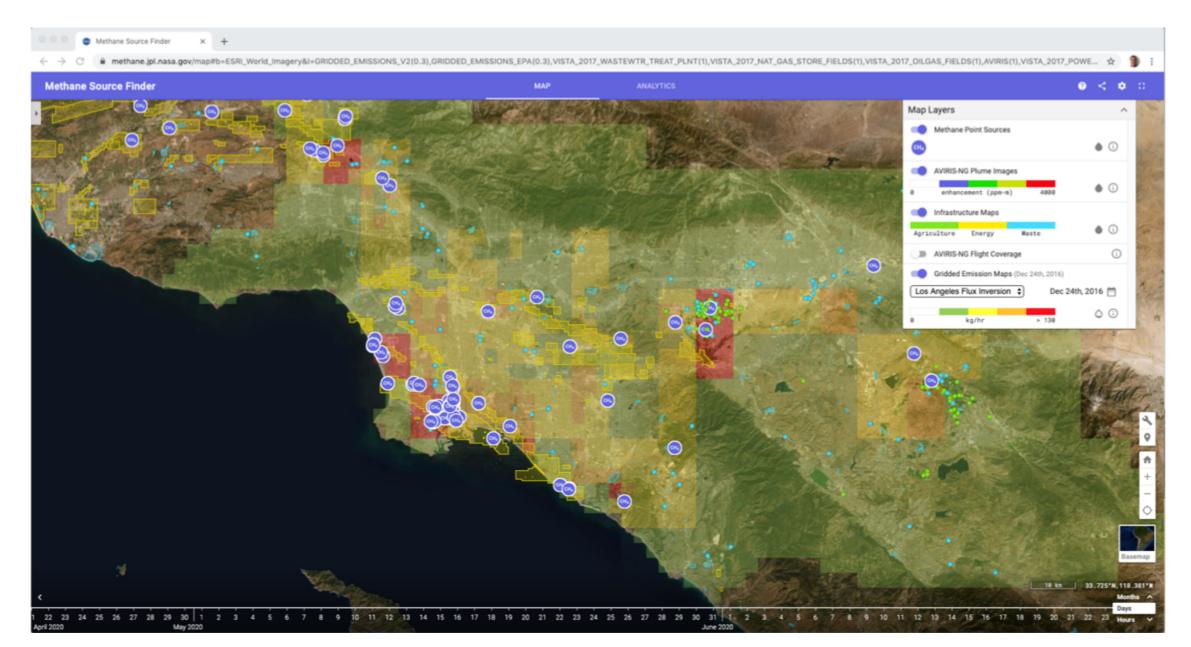
Duren et al., 2019

# California Methane Survey

- AVIRIS-NG flights funded by the California Air Resources Board (CARB) and California Energy Commission (CEC)
- Targeting CH<sub>4</sub> hotspots from the energy, agriculture, and waste management sectors



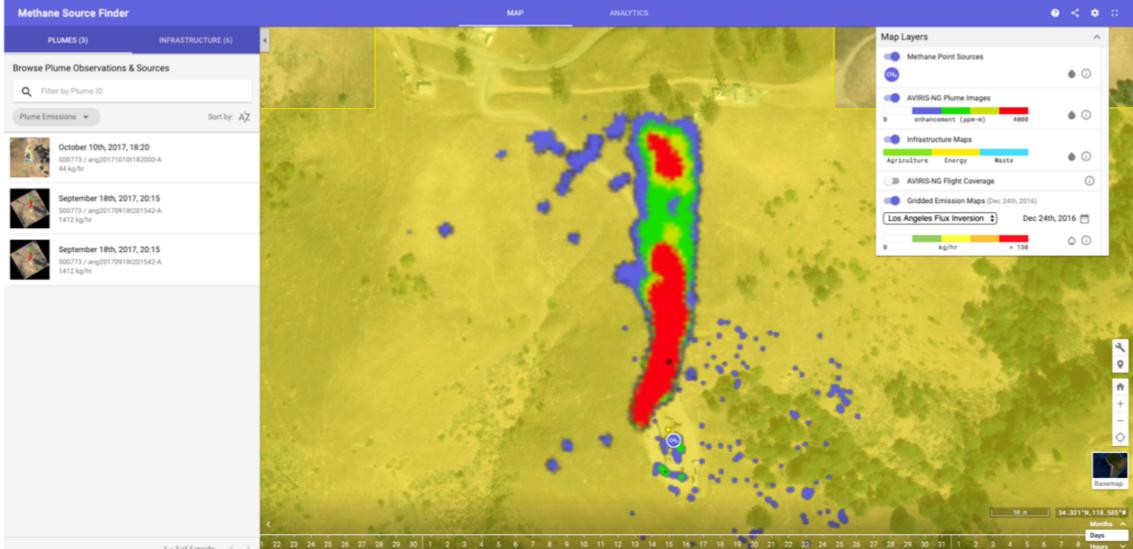
#### Methane Source Finder: LA Basin CH<sub>4</sub> hotspots



## LA Basin CH<sub>4</sub> from energy sector

Methane Source Finder × +

🔒 methane.jpl.nasa.gov/map#b=ESRI\_World\_Imagery&l=VISTA\_2017\_CNG\_FUELING\_STATIONS(1),VISTA\_2017\_FEED\_LOTS(1),VISTA\_2017\_DIGESTER(1),VISTA\_2017\_PETRO\_REFINE(1),VISTA\_2017\_LANDFILL(1),VISTA\_2017\_COMPOSTING\_SITES(1),VISTA\_2017\_DIGESTER(1),VISTA\_2017\_PETRO\_REFINE(1),VISTA\_2017\_LANDFILL(1),VISTA\_2017\_COMPOSTING\_SITES(1),VISTA\_2017\_DIGESTER(1),VISTA\_2017\_PETRO\_REFINE(1),VISTA\_2017\_LANDFILL(1),VISTA\_2017\_COMPOSTING\_SITES(1),VISTA\_2017\_DIGESTER(1),VISTA\_2017\_DIG



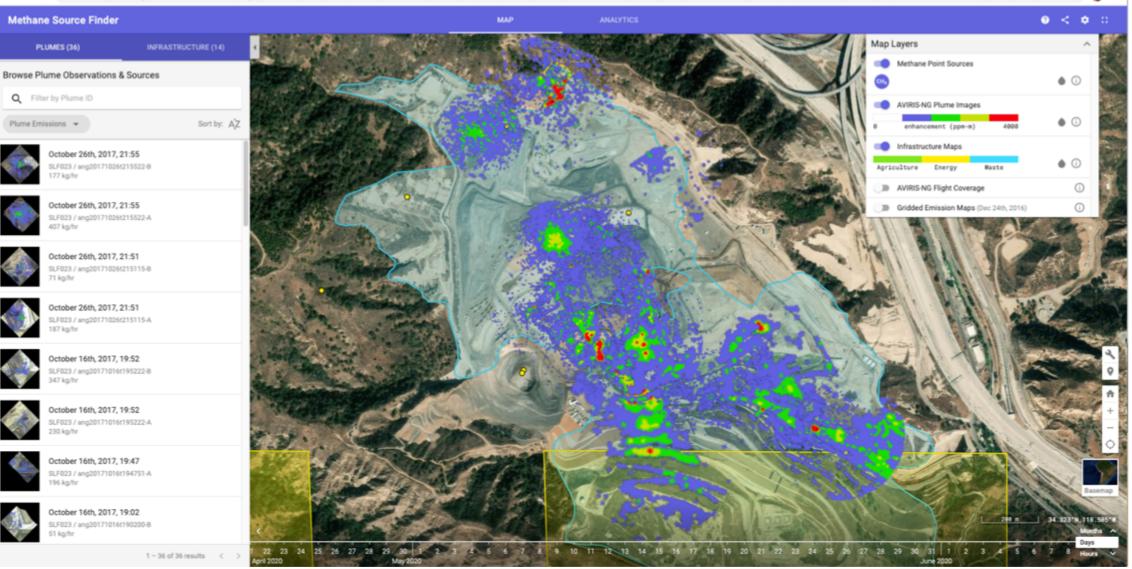
#### LA Basin CH<sub>4</sub> from energy sector

Methane Source Finder × + 🔒 methane.jpl.nasa.gov/map#b=ESRI\_World\_Imagery&l=VISTA\_2017\_CNG\_FUELING\_STATIONS(1),VISTA\_2017\_FEED\_LOTS(1),VISTA\_2017\_DIGESTER(1),VISTA\_2017\_PETRO\_REFINE(1),VISTA\_2017\_LANDFILL(1),VISTA\_2017\_COMPOSTING\_SITES(1),VISTA\_2017\_OILG... С Methane Source Finder 0 < • 0 PLUMES (3) Browse Plume Observations & Sources Q Filter by Plume ID September 18th, 2017, 20:15 **Download Plume Data** Plume Emissions 👻 Sort by: AZ **Observation Data** October 10th, 2017, 18:20 S00773 / ang20171010t182000-A 44 kg/hr Candidate ID ang20170918t201542-A Emissions (kg/hr) 1412 ± 294 kg/hr S00773 Source ID Location 34.321349\*N, -118.582249\*W September 18th, 2017, 20:15 00773 / ang20170918t201542-A VIEW IN GOOGLE MAPS 412 kg/hr September 18th, 2017, 20:15 **Observation Methane Plume Imagery Observation RGB Imagery** 00773 / ang20170918t201542-A 412 kg/hr

#### LA Basin CH<sub>4</sub> from landfill

Methane Source Finder x +

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#### San Joaquin Valley CH<sub>4</sub> emissions

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00150 / ang20171113t210409-C

7 kg/h

Days

2 3 4 5 6 7 8 Hours

#### San Joaquin Valley CH<sub>4</sub> from energy sector

Methane Source Finder × +

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#### San Joaquin Valley CH<sub>4</sub> from dairy digester

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## Methane Source Finder facilitates stakeholder engagement

#### CA Methane Survey



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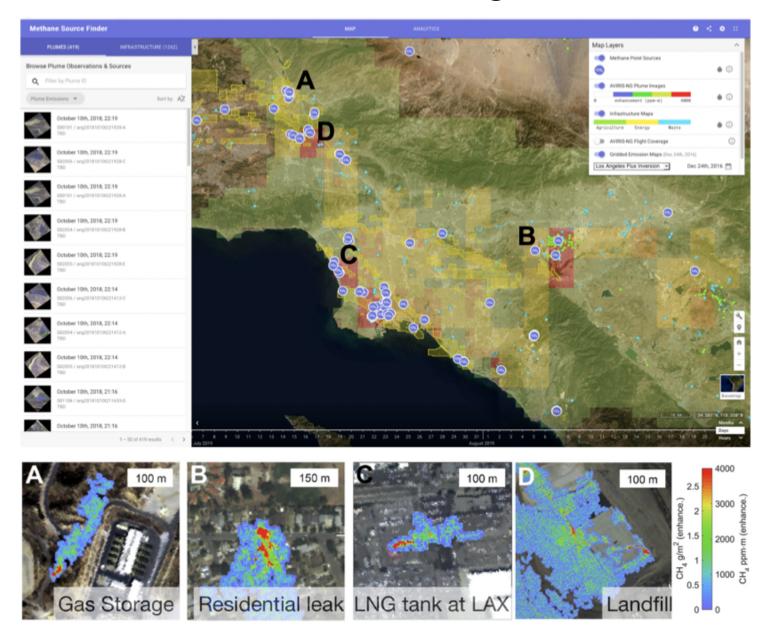
**Energy sector** 



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SERVICES

#### Methane Source Finder facilitates mitigation



# California Methane Survey scientific findings

- 1) Multiple revisits of facilities permitted assessment of persistence:
  - Oil & gas, dairy: 20-35% (mean) persistence
  - Landfills: 100% persistence
- 2) Emissions were calculated for 564 methane point sources
- 3) Estimated emissions from methane point sources in California:
  - 0.618 TgCH<sub>4</sub> yr<sup>-1</sup> (95% confidence 0.523-0.725)
  - Equivalent to 34-46% of 2016 methane inventory
- 4) Super-emitter activity occurs in every surveyed sector (10% of point sources contributed ~60% of point source emissions)

nature > articles > article

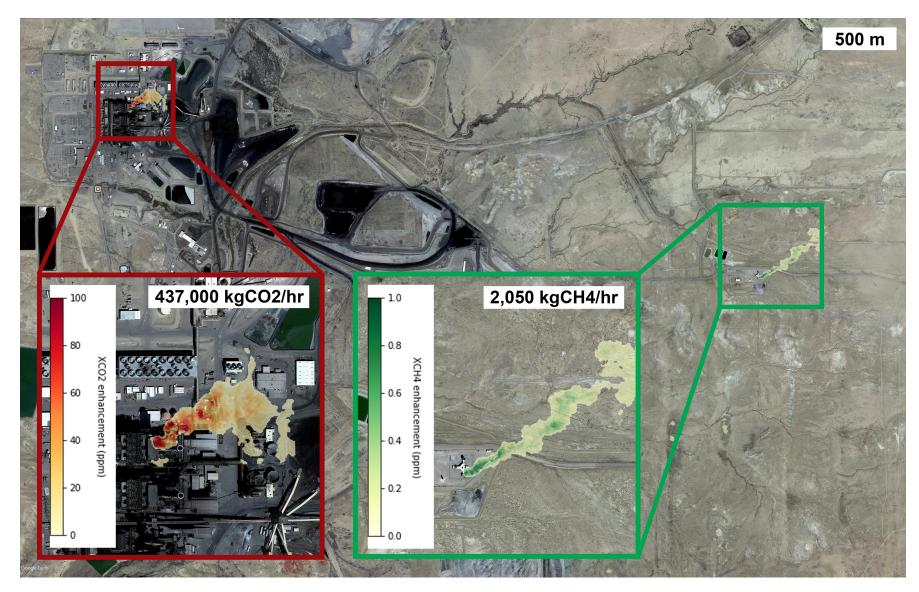
#### nature

Article Published: 06 November 2019

# California's methane superemitters

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#### Future work: AVIRIS-NG CO<sub>2</sub> and CH<sub>4</sub> (complete carbon footprint)



#### Cusworth et al., in prep