



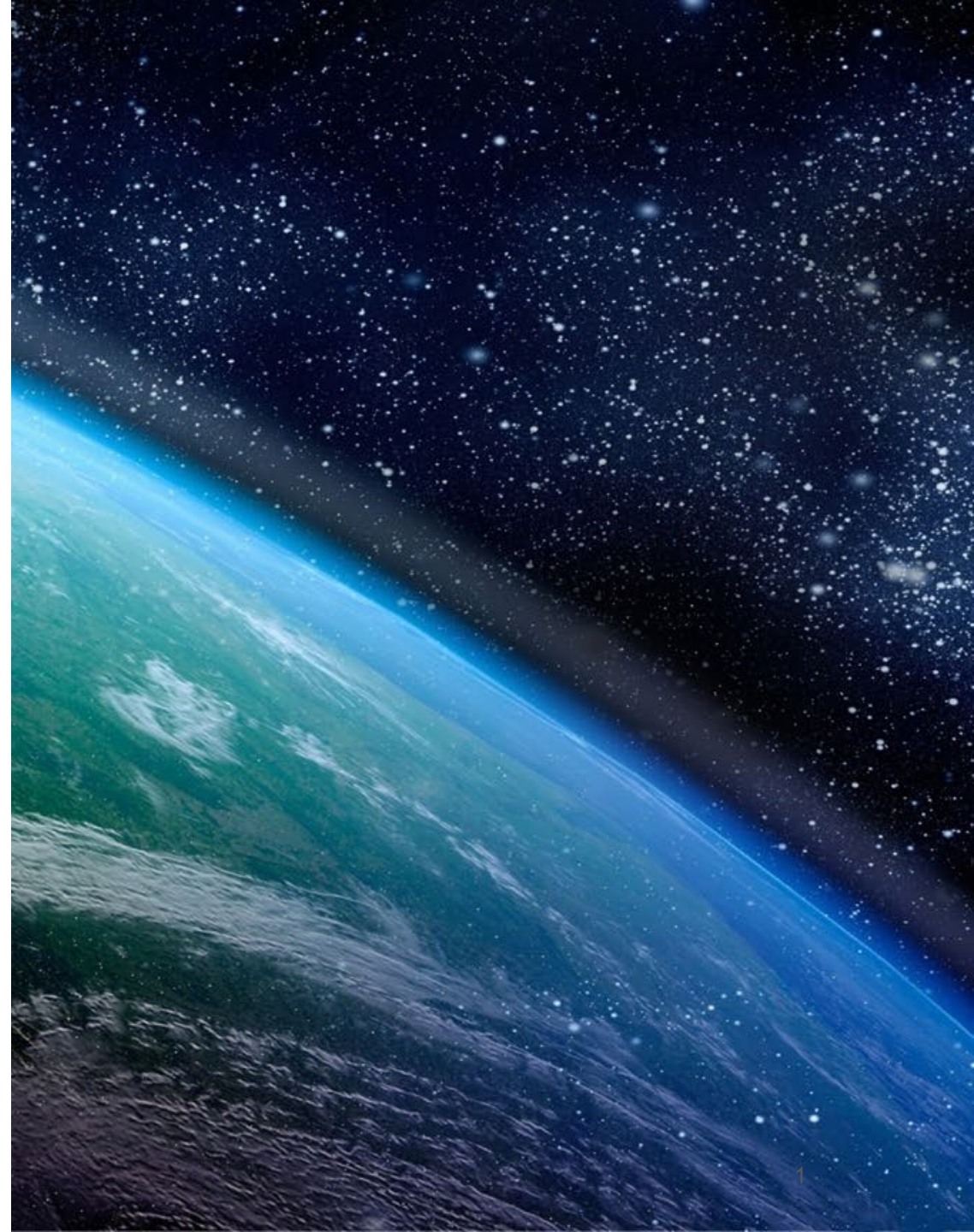
# Using remote sensing data to drive action in the waste sector

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**Tia Scarpelli**

Waste Sector Lead  
Carbon Mapper ([carbonmapper.org](https://carbonmapper.org))

*The Importance of Data Collection and Monitoring, Reporting, and Verification (MRV) to Finance Projects in the Biogas Sector, Global Methane Forum, March 2024*



# What is Carbon Mapper?

- Carbon Mapper is a nonprofit working to deliver actionable, localized CH<sub>4</sub> and CO<sub>2</sub> data
- Carbon Mapper leads a public-private partnership to develop and deploy emissions-detecting satellites
- Launch first satellite in 2024
- Long-term goal: Scale to a constellation to track 90% of high emitting CH<sub>4</sub> & CO<sub>2</sub> point sources globally on a daily basis
- All CH<sub>4</sub> & CO<sub>2</sub> data publicly available

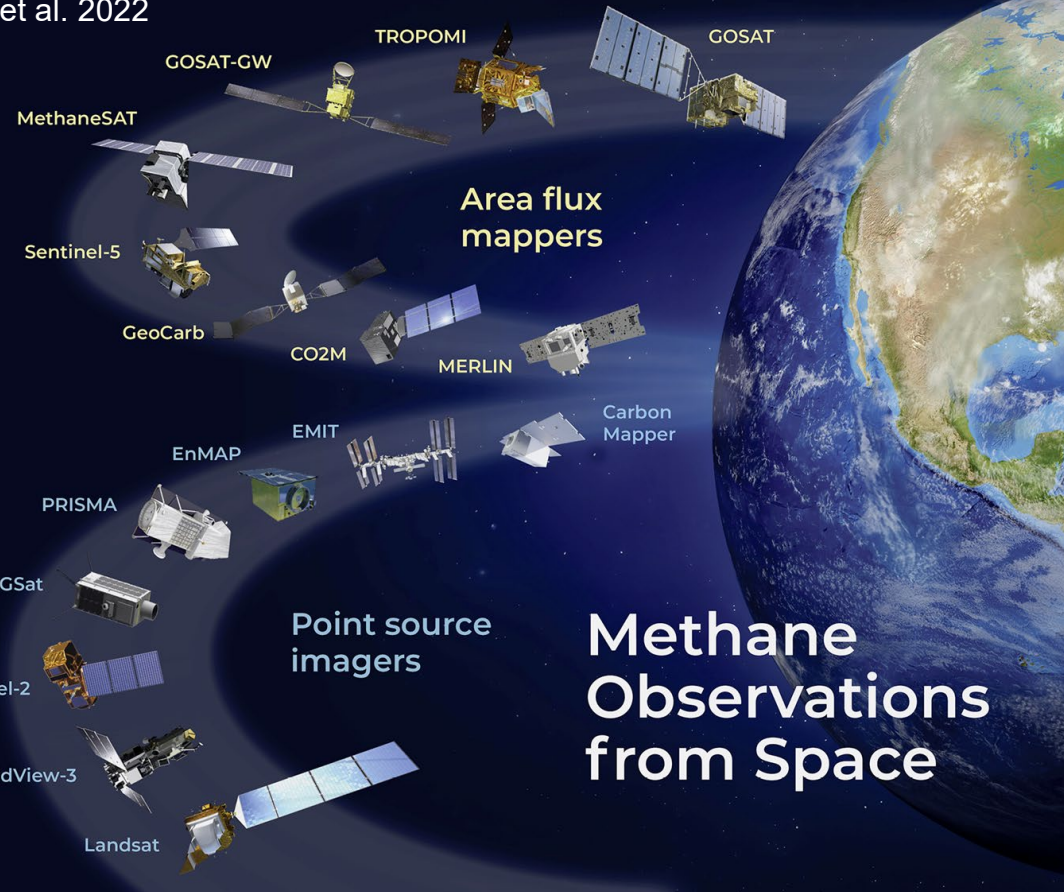


# Remote sensing instruments known as point source imagers observe large methane emission sources

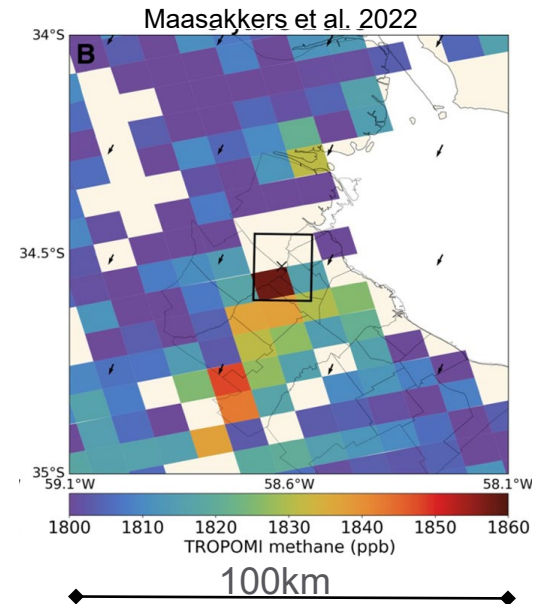
What is the technology?

What emission sources are observed?

Jacob et al. 2022

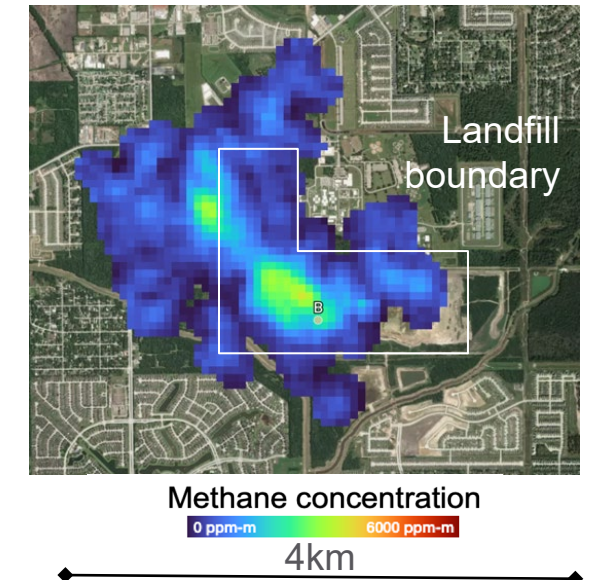


Area flux mappers



Methane concentration hotspot over Buenos Aires observed with TROPOMI

Point source imagers



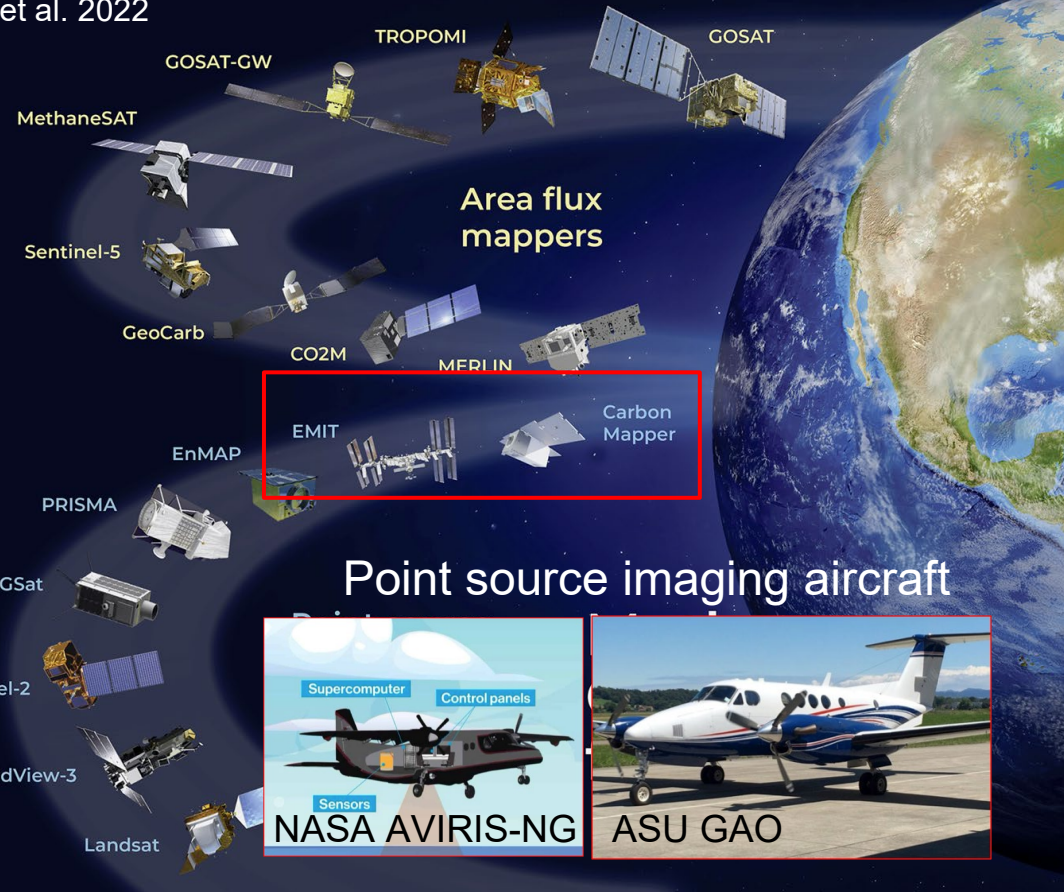
Methane plume that can be attributed to a point source (a large emission sources that originates from a localized area)



# Remote sensing instruments known as point source imagers observe large methane emission sources

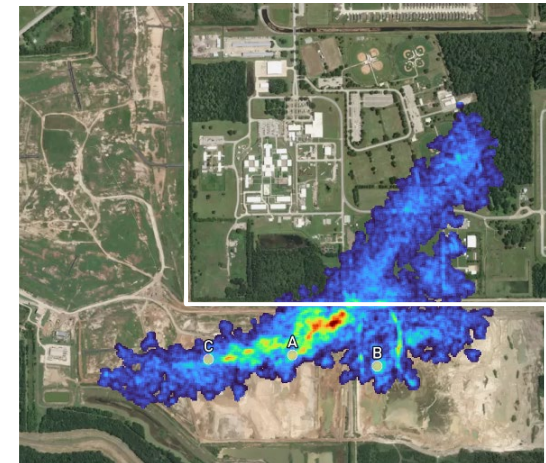
## What is the technology?

Jacob et al. 2022

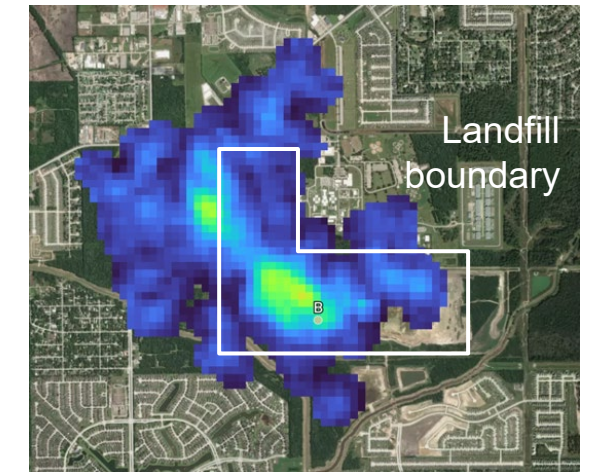


## What emission sources are observed?

### Aircraft



### Satellite



Methane concentration  
0 ppm-m to 6000 ppm-m



# We can use point source emissions data to drive mitigation action

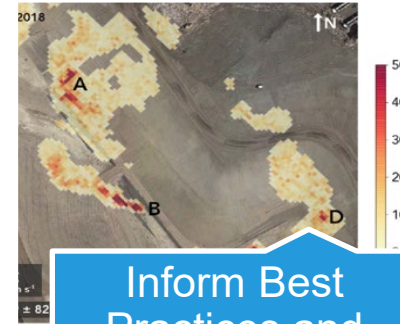
## Why are point sources important?

- They can account for a large fraction of regional emissions
- They are found across sectors, especially oil and gas and waste
- At a handful of landfills in the US, we've found that point sources dominate total emissions

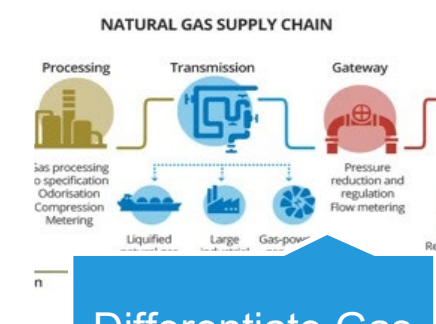
Accessible and actionable methane and CO<sub>2</sub> data can support various actions for emissions reduction



Help Operators  
Screen for Leaks



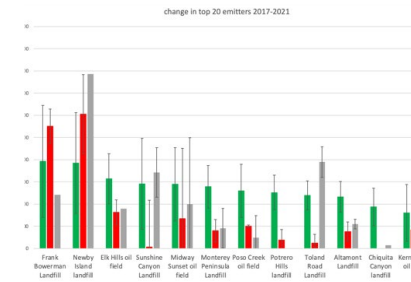
Inform Best  
Practices and  
Investment  
Priorities



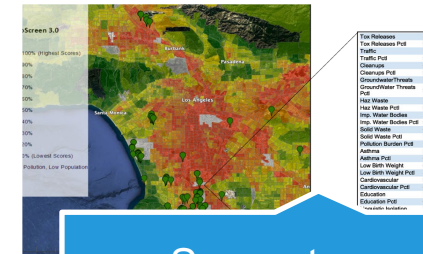
Differentiate Gas  
Supply Chains



Guide Policy



Inform Trends and  
Assess Progress



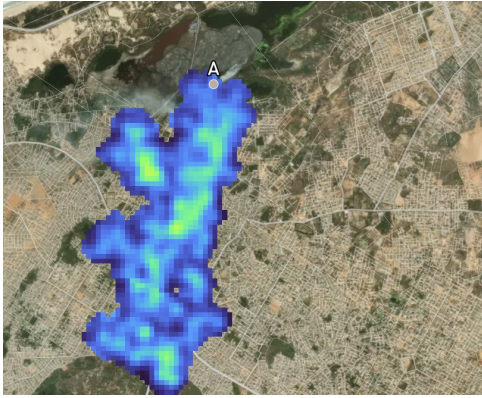
Support  
Community  
Health/Safety



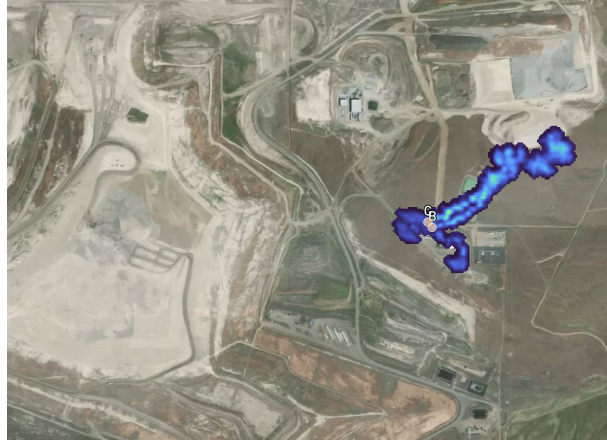
# What types of emission sources do we see in the waste sector?

## Across the value chain

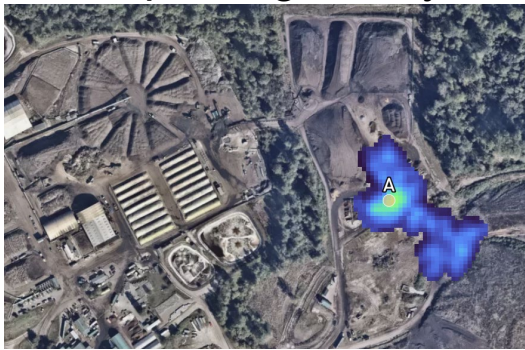
Dumpsite



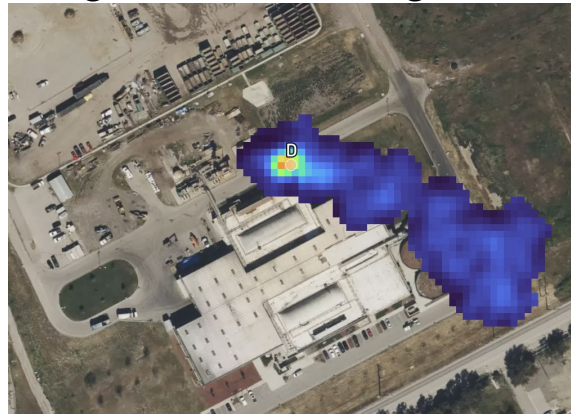
Renewable natural gas facility



Composting facility

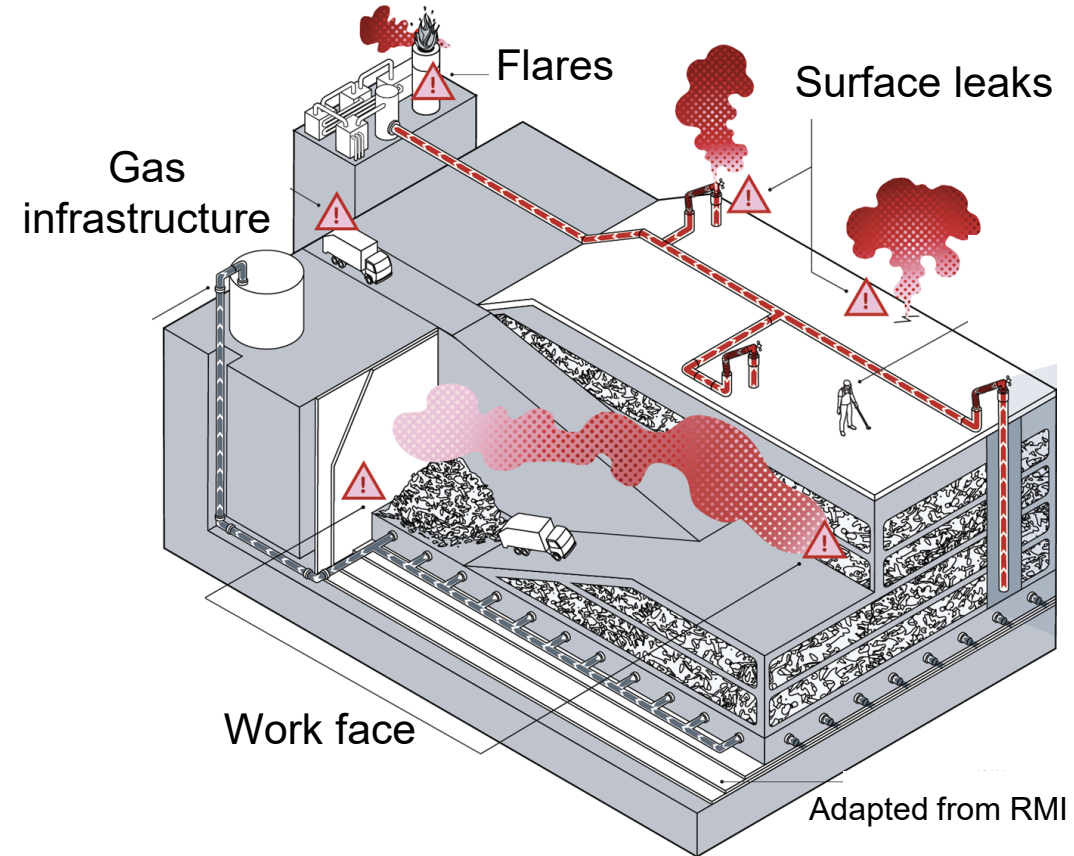


Organic Waste Digester



## At the facility

Point sources observed at landfills

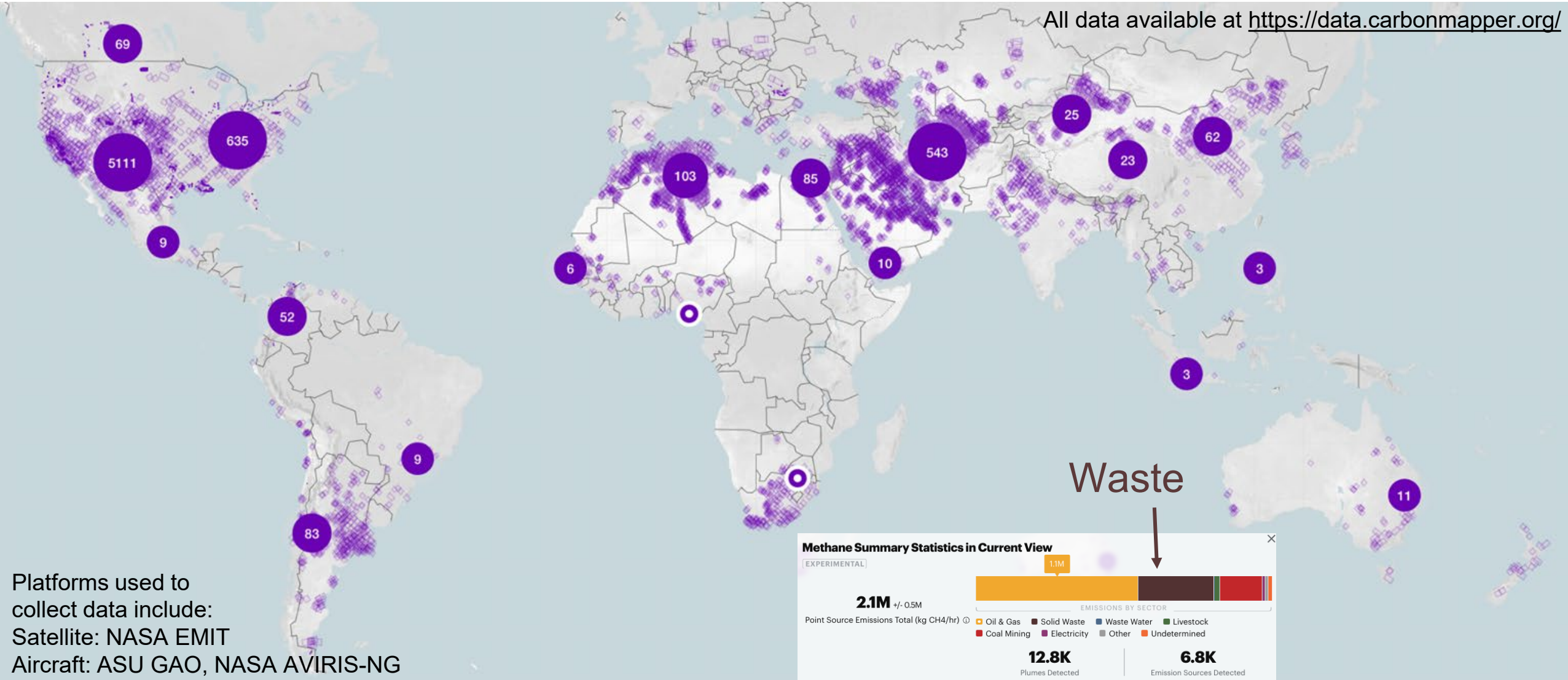


Adapted from RMI 2023

# Where have we observed methane emissions in the waste sector?

Regions of the world where Carbon Mapper has detected methane point sources

All data available at <https://data.carbonmapper.org/>

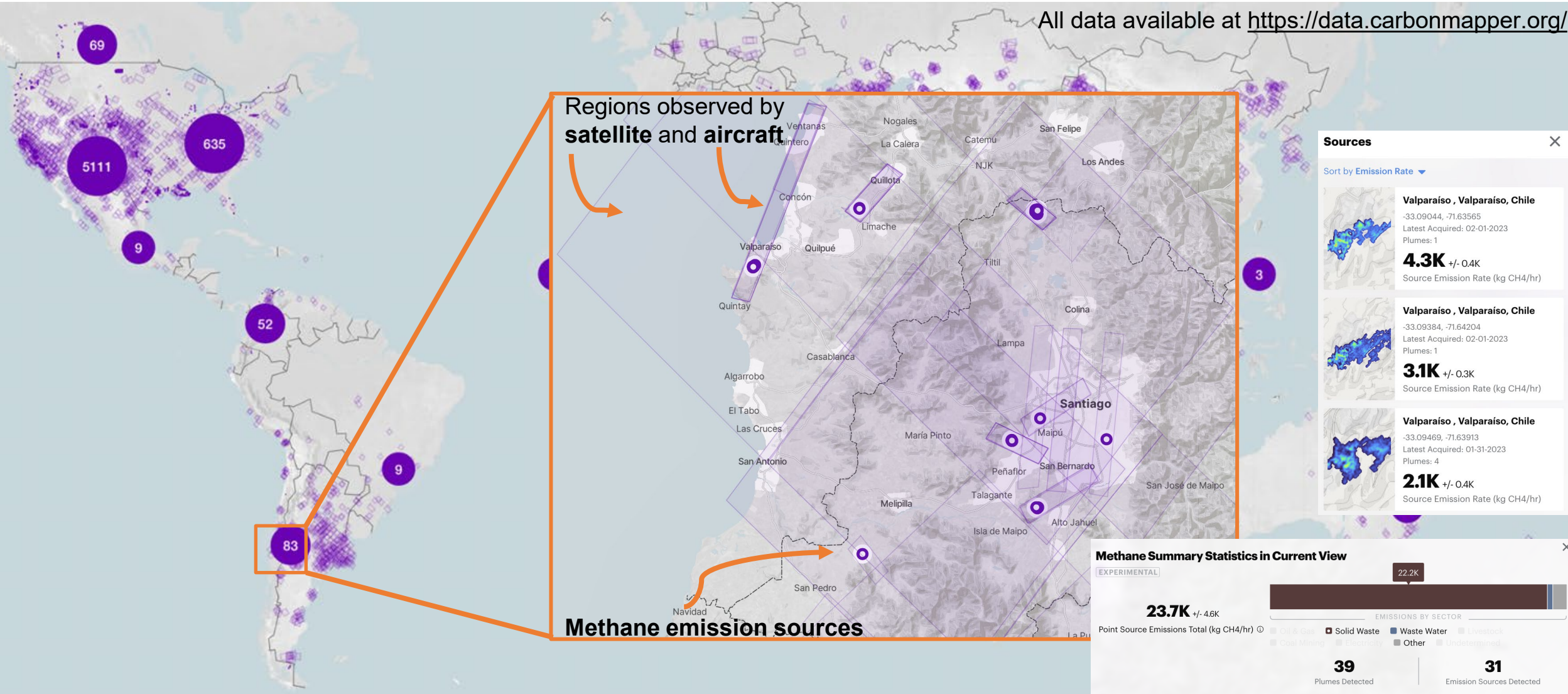


Platforms used to collect data include:  
Satellite: NASA EMIT  
Aircraft: ASU GAO, NASA AVIRIS-NG

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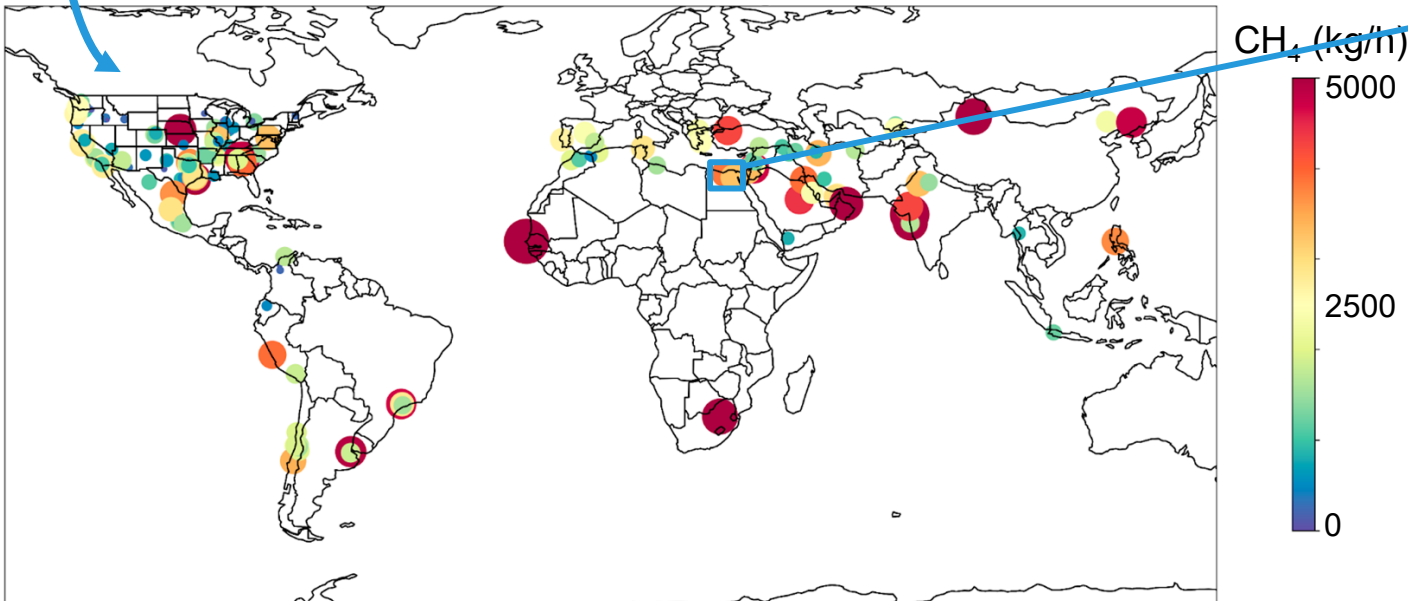




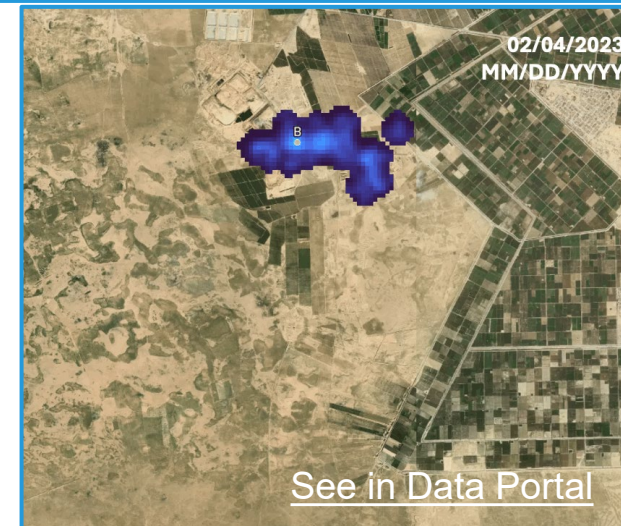
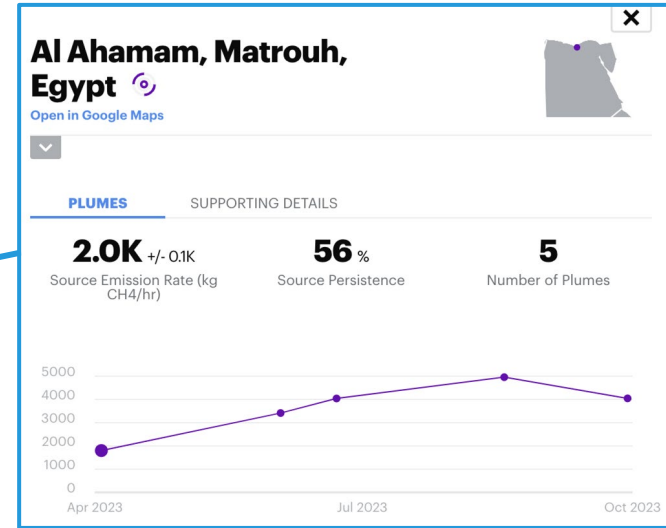
# What have we learned about the waste sector?

We have observed over 200 US landfills with point sources and find that emissions are often persistent across days and even years. So far, we have seen similarly large, persistent emissions at many global landfills and dumpsites.

Waste sector methane emission sources



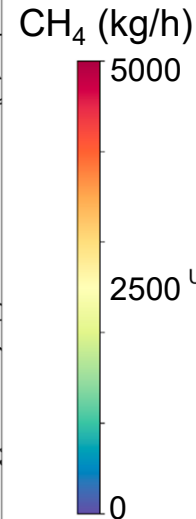
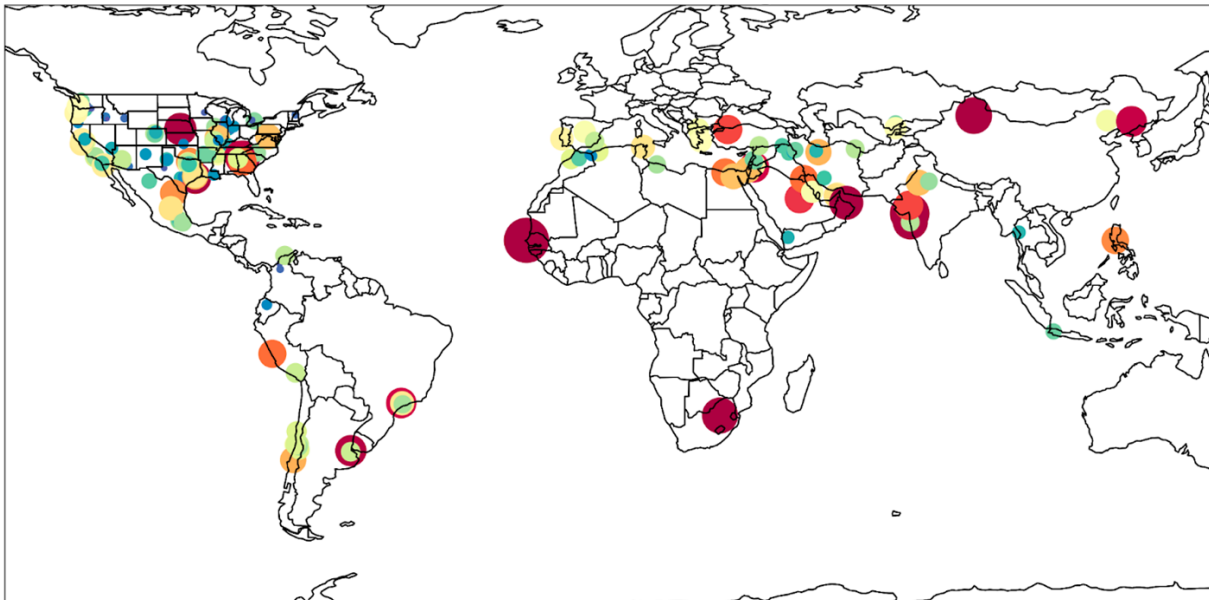
Example persistent methane plume at landfill outside of Alexandria, Egypt



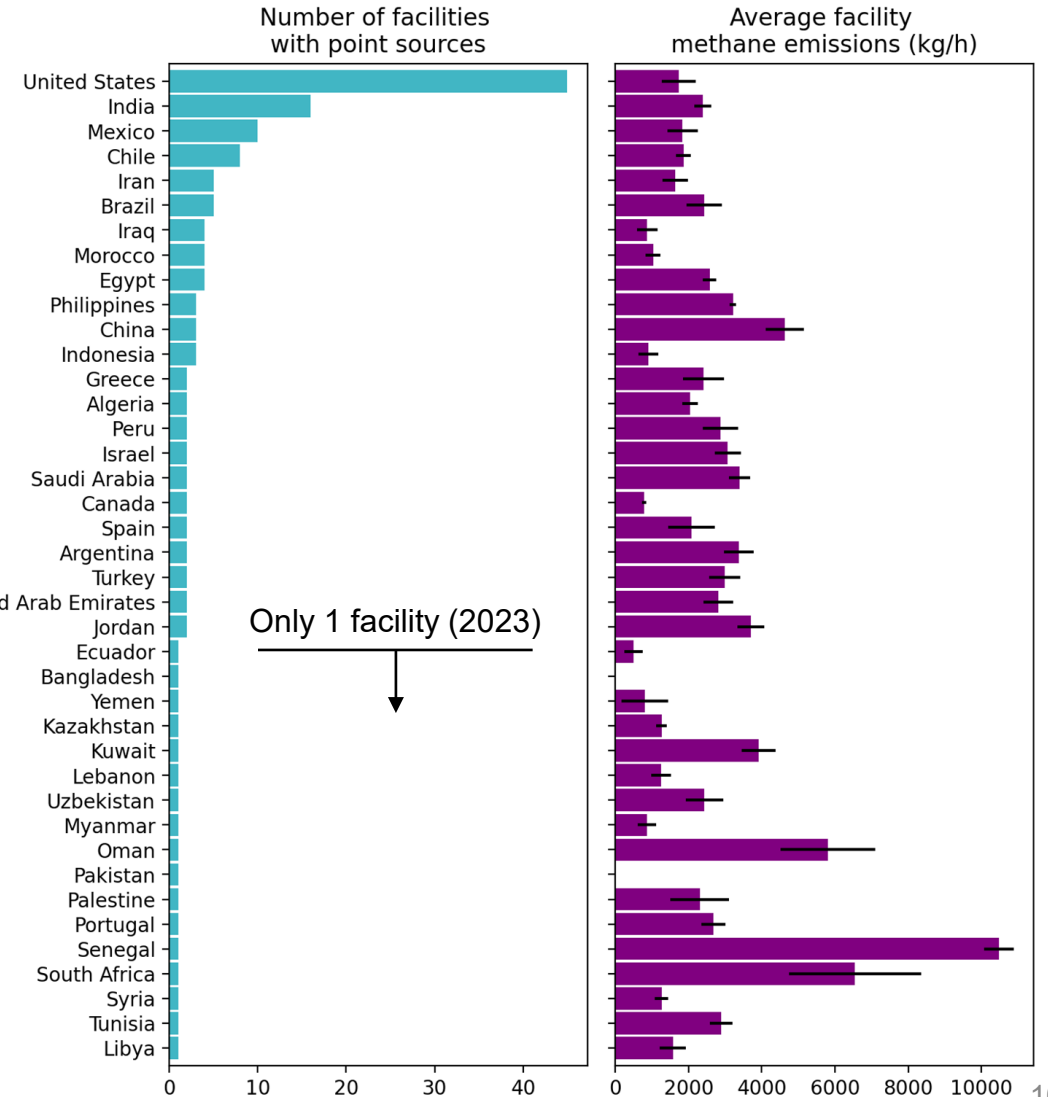
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Waste sector methane emission sources



Satellite observed facilities and emissions by country

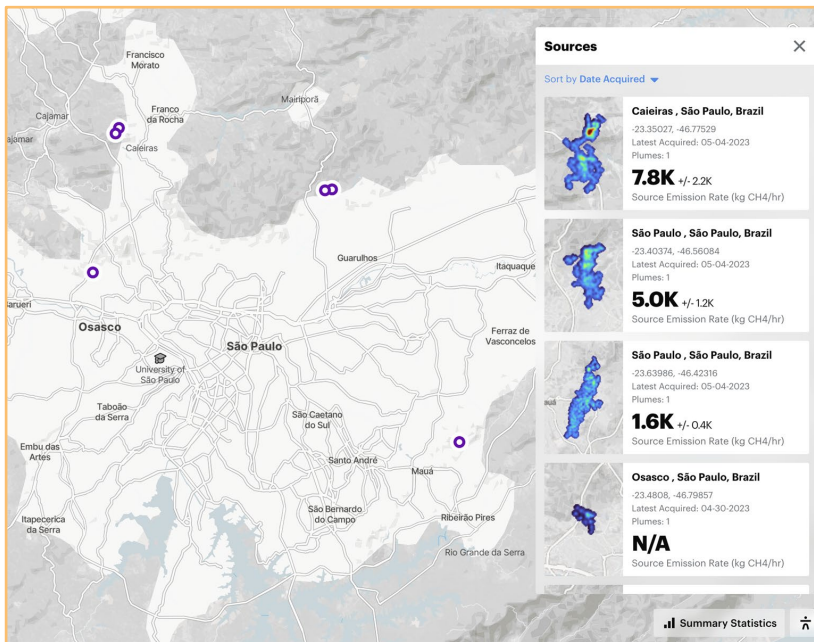


# Supporting mitigation in the waste sector

## Planning

Identifying opportunities to mitigate large emission sources

Waste facilities with large methane sources in São Paulo, Brazil



## Monitoring

Tracking methane emissions and emissions reductions at large facilities

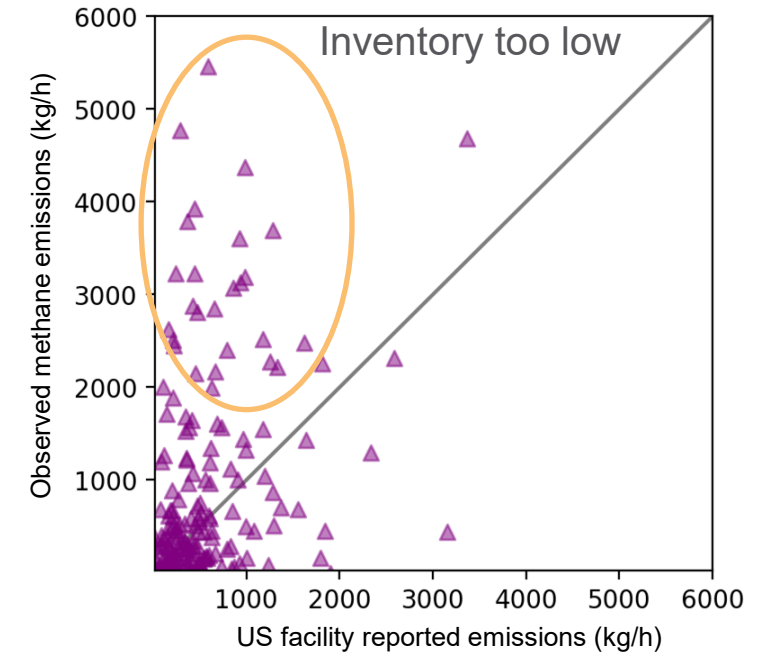
Informing and verifying emissions reductions at Sunshine Canyon landfill



## Support

Providing guidance for improving emissions reporting and policy

Identifying the sources of emissions at landfills with underestimated emissions in inventories



Gusworth et al. 2020

# Supporting mitigation in the waste sector

## Planning

Identifying opportunities to mitigate large emission sources

## Monitoring

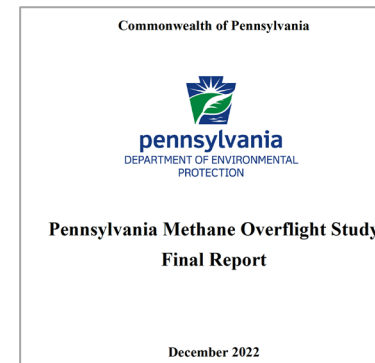
Tracking methane emissions and emissions reductions at large facilities

## Support

Providing guidance for improving emissions reporting and policy

### Government entities

US



### Facilities

#### Environmental Research Letters



### Global initiatives and partners

Global



We bridge the gap between science and action by working with various partners





Thank You

**Tia Scarpelli**

Waste Sector Lead  
Carbon Mapper ([carbonmapper.org](https://carbonmapper.org))  
Global Methane Forum March 2024

All data available at  
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