

Advanced Air Pollution Monitoring

Environmental Law Institute

Peter Zalzal

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EDF Advanced Methane Monitoring

MethaneAir

- Deployed advanced sensing technology aboard a jet to track methane emissions from oil and gas operations and other sectors
- Remote sensing was flown at 40,000 ft and covered nearly 80% of U.S. onshore oil and gas producing regions over summer/fall 2023

MethaneSAT

- Satellite launched in March 2024 measuring methane emissions from millions of small sources around the world
- Point source detection threshold of 500 kg/hr will provide relatively high spatial resolution



Data Gathering

32 Flights

June-October 2023

12 Basins

Where ~70% of U.S.
oil and gas is produced

10,000 km²

Daily flight coverage
with 10m x 10m resolution

Data Findings

860 Tons per Hour

Extrapolated to ~7.5 tg/year

12 - 260 Tons per Hour

Range of total emissions across measured basins

1.6%

Average loss rate across measured basins

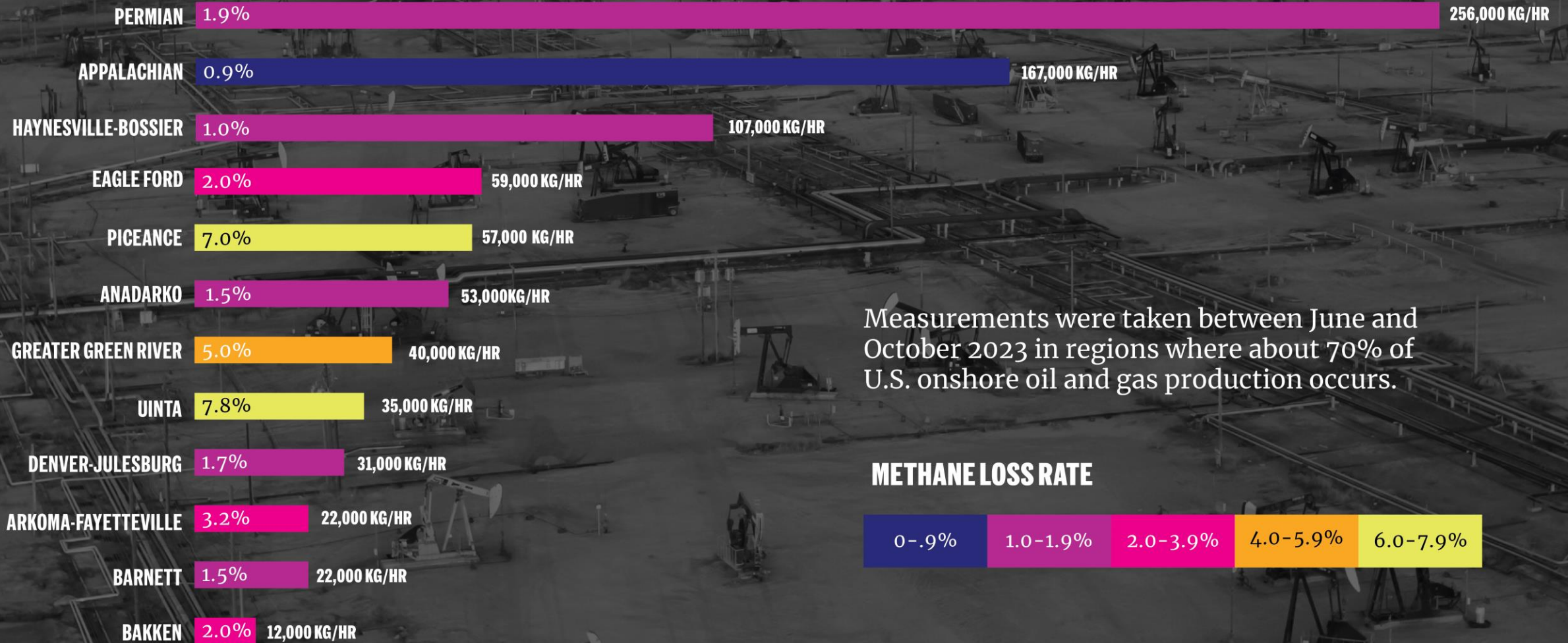
1 - 8%

Range of loss rate across measured basins

MethaneAIR

Comparing methane emissions across major U.S. oil and gas basins

MethaneSAT technology provides detailed snapshot of methane emissions



Measurements were taken between June and October 2023 in regions where about 70% of U.S. onshore oil and gas production occurs.

METHANE LOSS RATE



MethaneAIR

MethaneSAT

Goal | To quantify methane emission rates, from multiple sectors, including at least 80% of global oil and gas production regions

Access | All data freely available online through methanesat.org

Purpose | Provide radical transparency through freely accessible methane data on a global scale

Launch | March 2024; planned lifetime of 5 years



Partners



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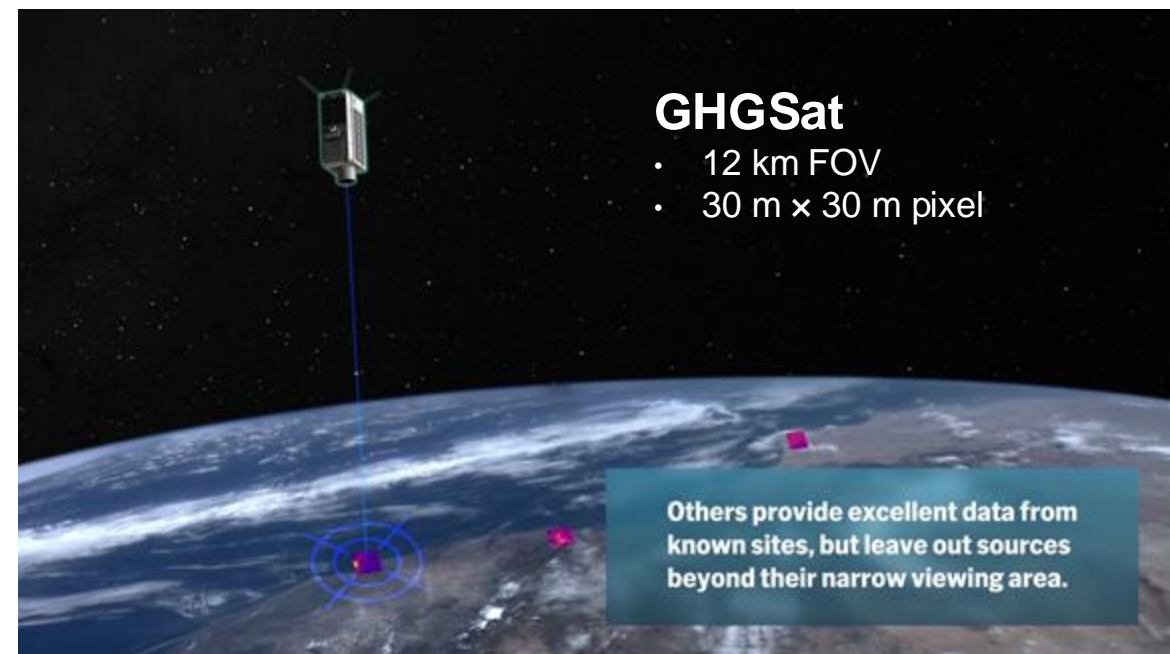
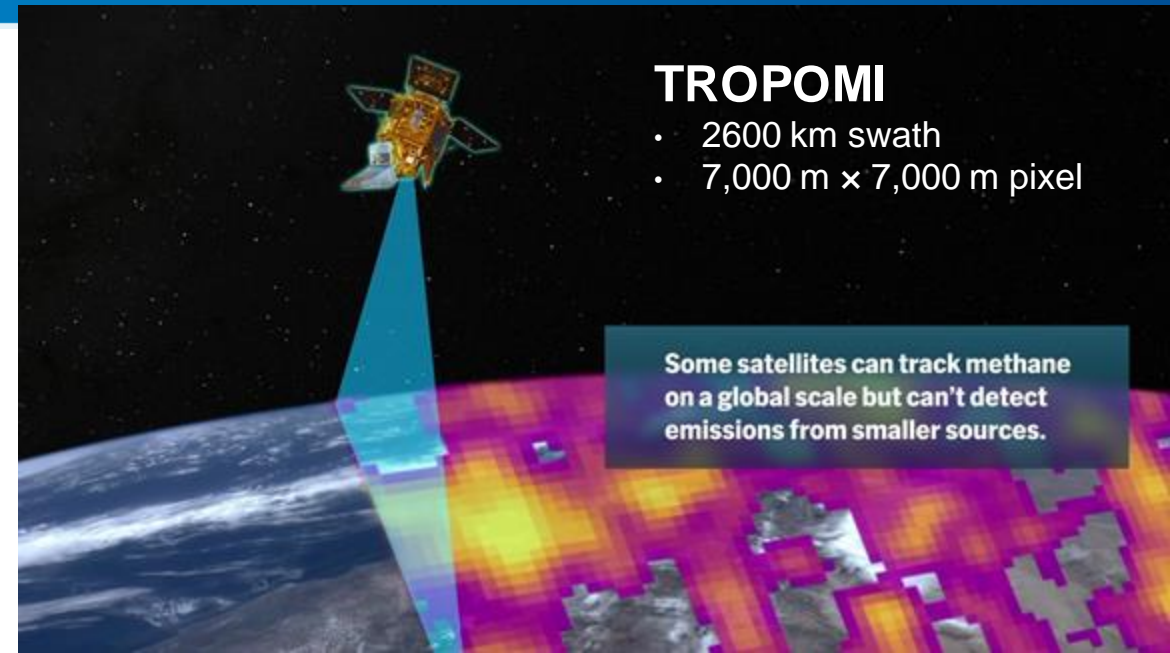
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MethaneSAT & other satellites

GLOBAL MAPPING	AREA MAPPING	LOCAL MAPPING
Global & large-scale regions Large point sources	Area sources Point sources Sector-wide quantification	Point sources Facility level attribution
TROPOMI SCIAMACHY GOSAT GOSAT-GW CO2M	MethaneSAT	GHGSat PRISMA EnMAP Carbon Mapper ZY1

MethaneSAT was designed to fill a gap in understanding the magnitude of methane emissions at a regional scale



EDF Advanced Air Pollution Monitoring

EDF and Google Earth Outreach collaboration to examine methane leaks and vehicle pollution using sensors attached to Google Street View cars

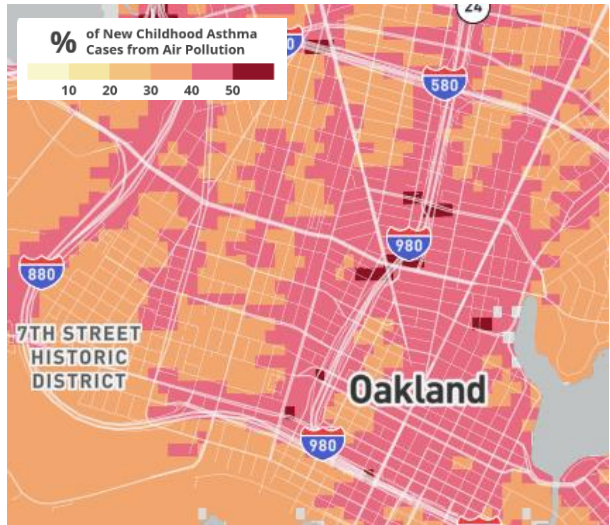
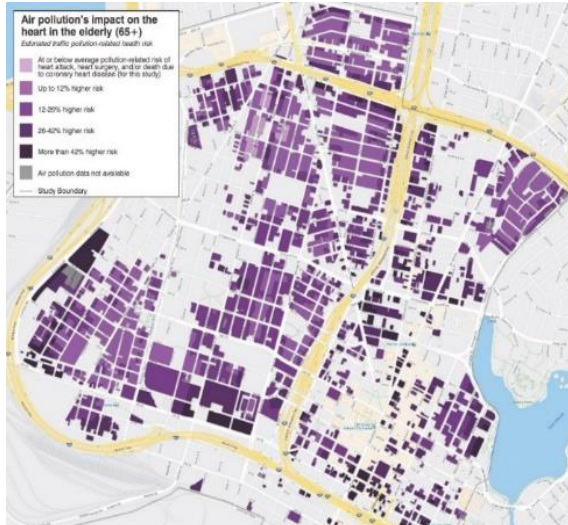
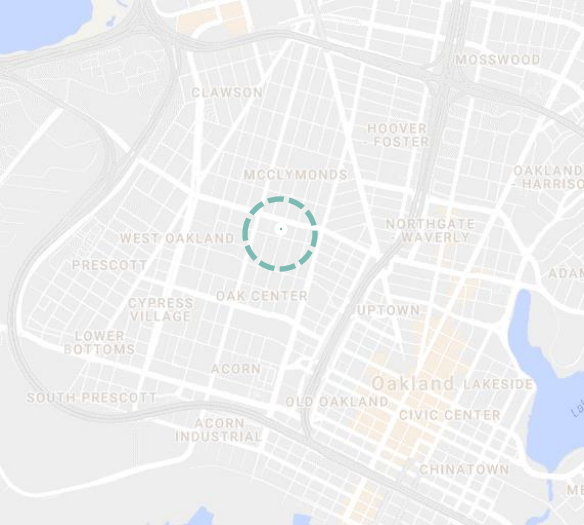
- Methane: created detailed maps of places where natural gas was leaking from utility pipes under city streets
- Vehicles: collected data at street level and showed how pollution varied over very short distances. Projects in Oakland, London, Houston and SLC

Mapping hyperlocal air pollution & health risks in West Oakland

Research: Air pollution measurements (BC, NO, NO₂) using fast response sensors on Google Street View cars.

Research: Epidemiological studies linking air pollution at residential address with electronic medical records.

Research: Health impact assessment using modeled and measured air pollution data at 100 m grid scale



Key Finding: Within West Oakland, some areas had **5-8 times** higher median pollution levels than others. Many parts of the neighborhood had higher air pollution than levels measured at the central regulatory monitor.

Key Finding: Elderly residents (age 65+) living in areas of West Oakland with the highest concentrations of NO₂ would have **>40% greater risk** of a cardiovascular disease event than those in less polluted areas of the neighborhood.

Key Finding: More than **2,500 deaths** and **5,200 child asthma cases** annually due to NO₂ exposure in the Bay Area; neighborhoods with higher percentages of residents of color had double the rate of asthma from air pollution compared with predominantly white neighborhoods.

Apte et al. 2017

Alexeeff et al. 2018

Southerland et al. 2021

EPA monitoring grants under IRA further improve data

Nov. 2022 - EPA announced selection of 132 air monitoring projects in 37 states to receive **\$53.4 million in funding** to enhance air quality monitoring in communities with health disparities.

Feb. 2024 - EPA announced availability of another **\$81 million in non-competitive, direct award funding** to establish new ambient air monitoring sites, and maintain, operate, or upgrade existing networks across the U.S.

Rigorous data can help support compliance, enforcement and protective policy design

- EPA Oil and Gas Methane Standards
- EPA Greenhouse Gas Reporting Requirements, RFI
- Additional Opportunities (Landfills, NAAQS, others)

Thank you!