GHGSAT™

2023

METHANE EMISSIONS REPORT

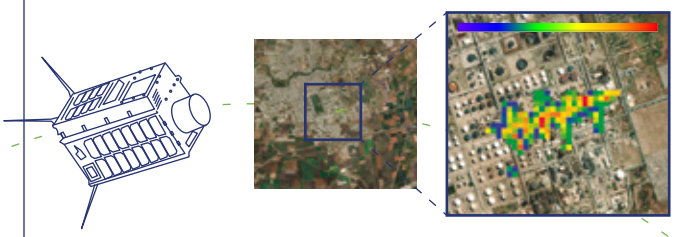
INDEX

From Methane Awareness to Methane Mitigation

2023 in Review

INDUSTRY DEVELOPMENTS

Calls for action to reduce methane emissions gathered pace in 2023, with several governments announcing new rules, regulations, and plans. Key commitments were made in the period leading up to and during COP28, including **China's Methane Plan**, the **European Union's provisional agreement on a new regulation on methane emissions**, **the US EPA's Final Rule**, and **Canada's federal regulation to reduce methane from O&G operations**. Meanwhile, news emerged that others, such as Brazil and Egypt, were considering similar measures. The event culminated with the launch of the Oil and Gas Decarbonization Charter (OGDC), which included commitments from over 50 companies to reduce methane emissions. COP28 also featured the announcement of additional signatories to the Global Methane Pledge, with Angola, Kazakhstan, Kenya, Romania, and Turkmenistan committing to take action. These pledges are particularly noteworthy for Angola, Kazakhstan, and Turkmenistan, given their role as major oil and gas producers.



The oil & gas sector has been increasingly in the spotlight due to its significant contribution to methane emissions and its access to mitigation solutions available today. However, other sectors, such as waste management, have been garnering attention as candidates for novel methane abatement approaches. For the first time at COP, stakeholders addressed the environmental impact of the waste management sector, underpinned by the high average emissions and persistence rate at landfills. These emissions have been detected, measured and validated, giving us volumes of accurate, precise, and timely data that operators can leverage for mitigation.

ANSWERING THE CALL TO ACTION

During 2023, we strengthened our track record of providing actionable data, working closely with stakeholders across government and industry. This capacity was bolstered through a dramatic rise in observations from the addition of six new satellites to our constellation in 2023. With four more satellites on order, we are poised to accelerate this impact and achieve strong results from our collaborative efforts, including our strategic partnerships with OGCI, Carbon Limits, SRON, The Global Methane Hub, and Yahsat to name a few.

HIGHLIGHTS OF OUR MAJOR ACHIEVEMENTS DURING 2023

Total methane emissions detected in 2023

378

$MTCO_2e$

2x

vs 2022 total

85 countries

We detected methane emissions from 85 countries during 2023

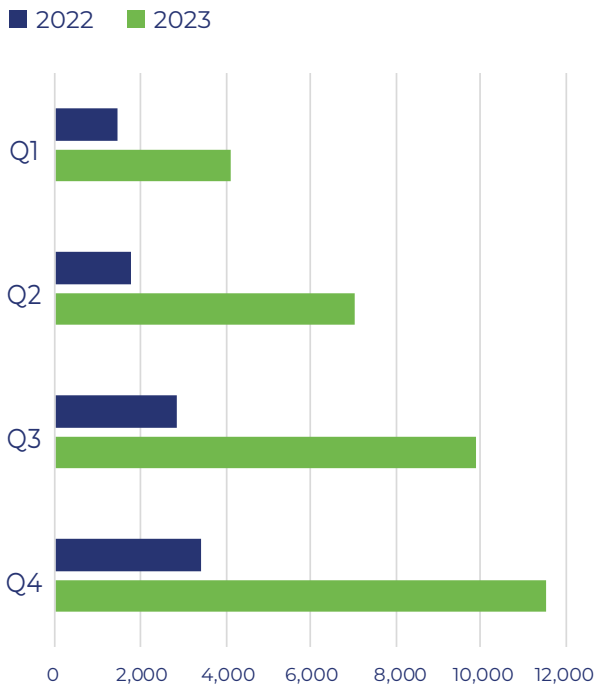
↑23%

vs 2022

>4M km^2

Unique area surveyed in 2023

Quarterly Observations - 2022 vs 2023



In 2023, through constructive engagement with numerous stakeholders, we mitigated:

6 $MTCO_2e$

Equivalent to removing 1.4m gasoline-powered passenger cars from the road for a year

With **our Series C1 funding round for an additional $44M completed** in September 2023, we **are poised to rapidly scale and commercialize our services**.

We will keep this momentum growing until we reach **our objective: to measure emissions from every industrial site, every day.**

REGIONAL OVERVIEW

Regional Distribution of Detected Emissions Across All Emitting Sectors in 2023

One of the benefits of satellite technology is its global reach. Our geographic distribution reflects this advantage, with emissions detected on six continents.

19% North America

5% Europe

6% South America

5% Africa

33% Central Asia

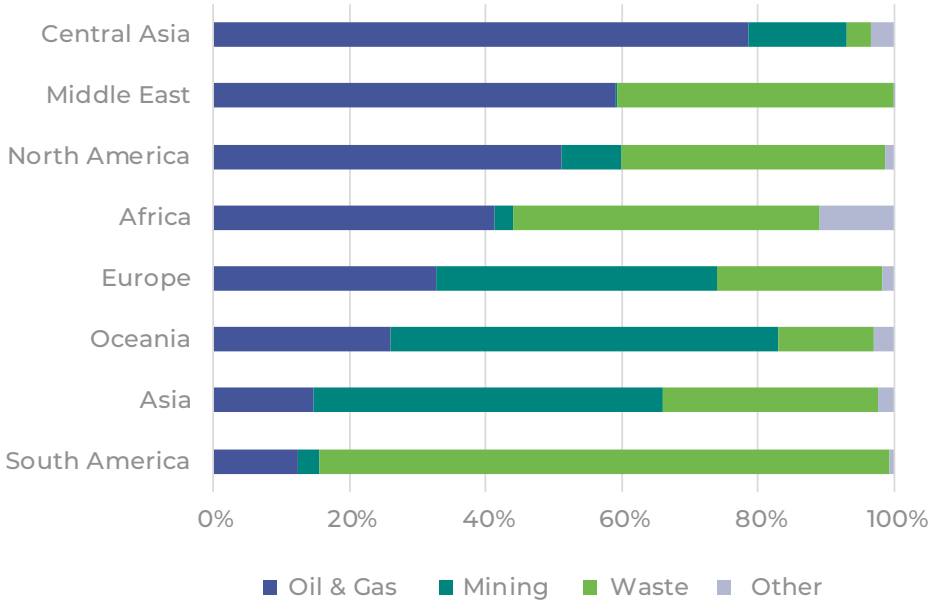
3% Oceania

8% Middle East

21% Asia

Emissions Detected by Region - 2023

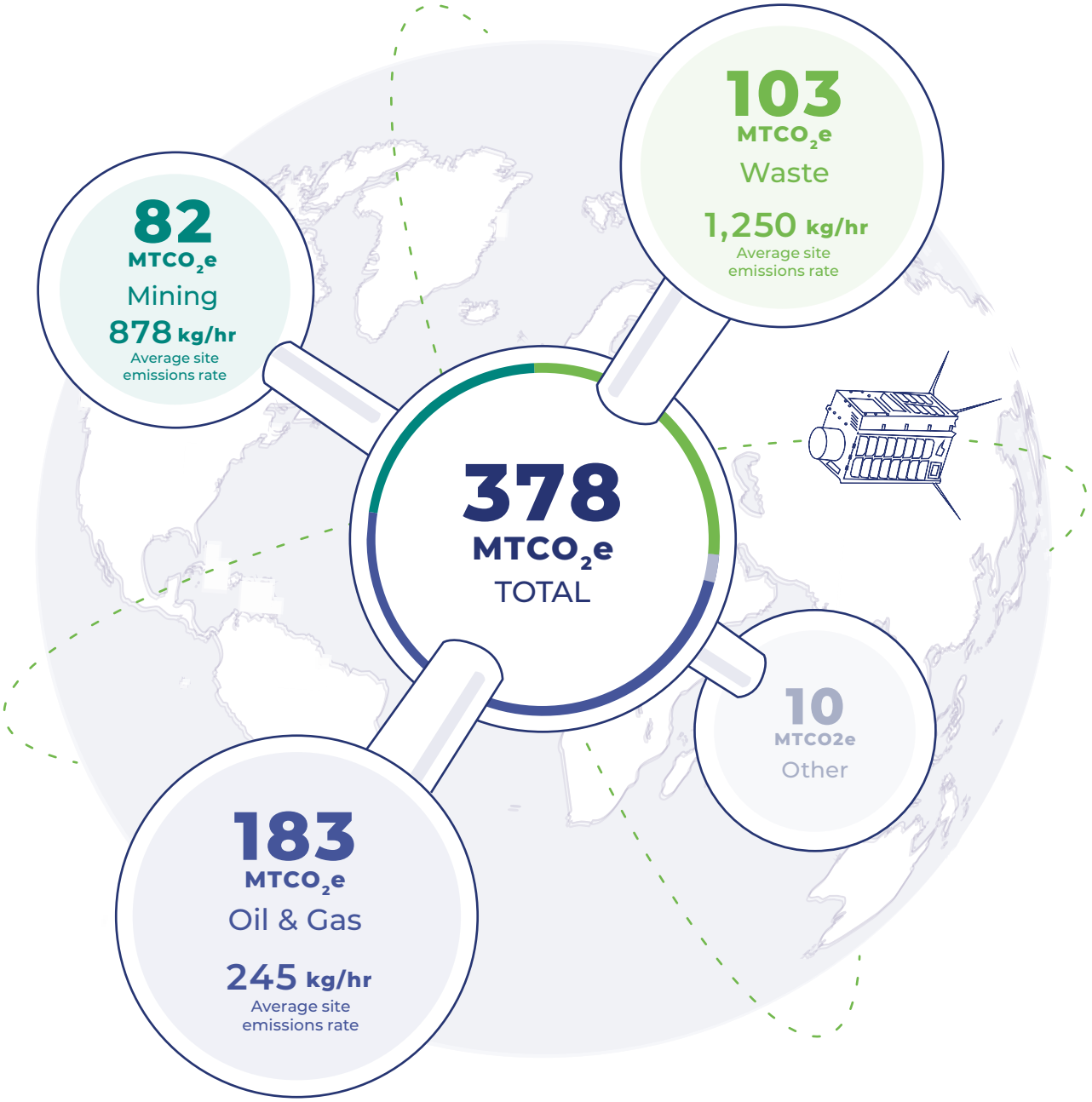
While O&G accounted for the largest source of our detected emissions globally, on a regional level, there was **significant variation across regions**; for example, nearly **85%** of South America's detected emissions during 2023 came from the waste sector.



SECTOR OVERVIEW

Global Detected Emissions in 2023 by Sector

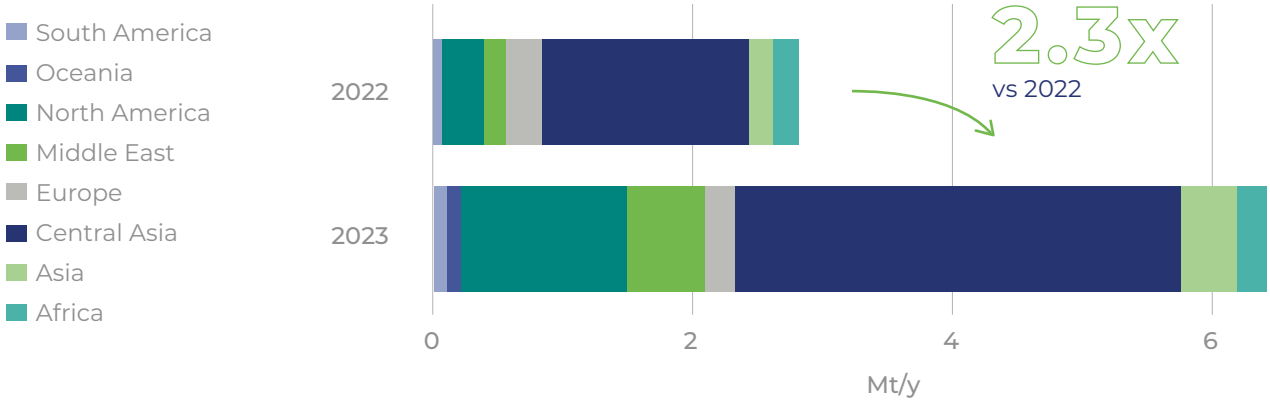
O&G accounted for nearly half of all emissions detected during 2023, while the strong average site emissions from the Waste sector contributed to this sector accounting for a 27% share.



OIL & GAS

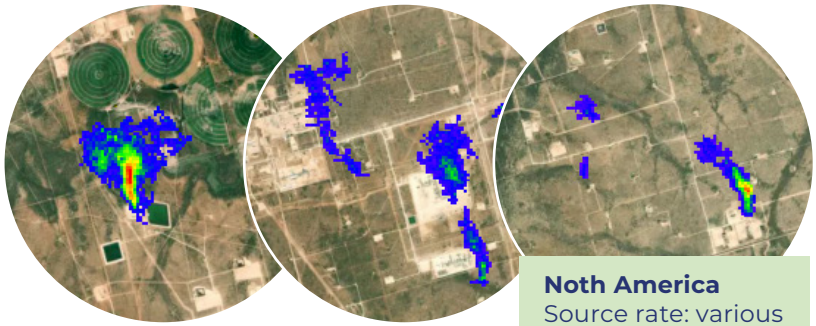
GHGSat detected the greatest increase in emissions from O&G operations in 2023, with Central Asia and North America contributing most. **Detected emissions from North American O&G nearly quadrupled** from 2022 to 2023, reaching over 6.5 $MTCO_2e$, as monitoring capacity grew alongside production.

Detected Emissions from O&G - 2022 vs 2023



Of the 11 emissions detected in this field of view, only one measured above 1,000 kg/hr (1,105 kg/hr), rendering the rest undetectable by other satellites currently in operation.

Our ability to clearly identify emissions at the facility level is a powerful enabler for proper attribution, particularly in the O&G sector, where multiple operators can be situated in close proximity to one another.



Noth America
Source rate: various
August 2023

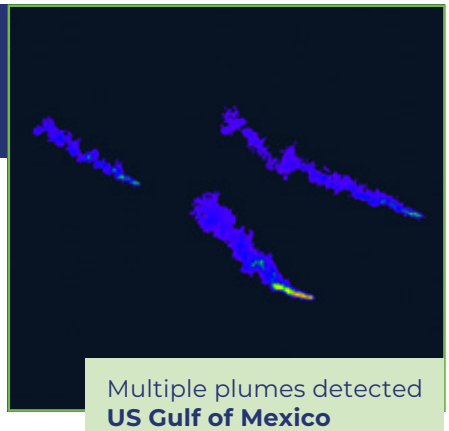
GLINT: Unique capabilities to detect offshore O&G methane emissions

20 $MTCO_2e$ **emissions**

Detected from the US O&G industry offshore in 2023

182 kg/hr

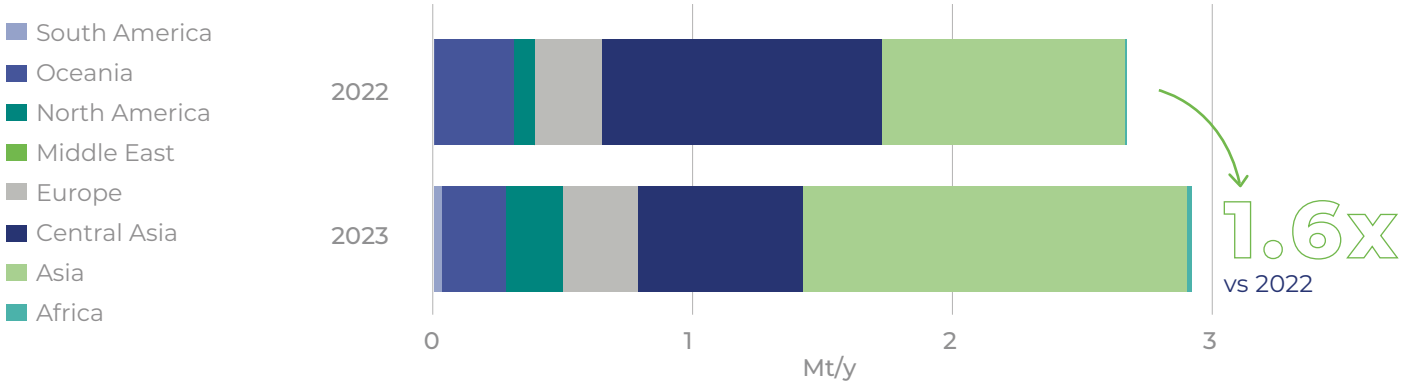
Lowest detected source rate from offshore O&G in 2023



Multiple plumes detected
US Gulf of Mexico

MINING

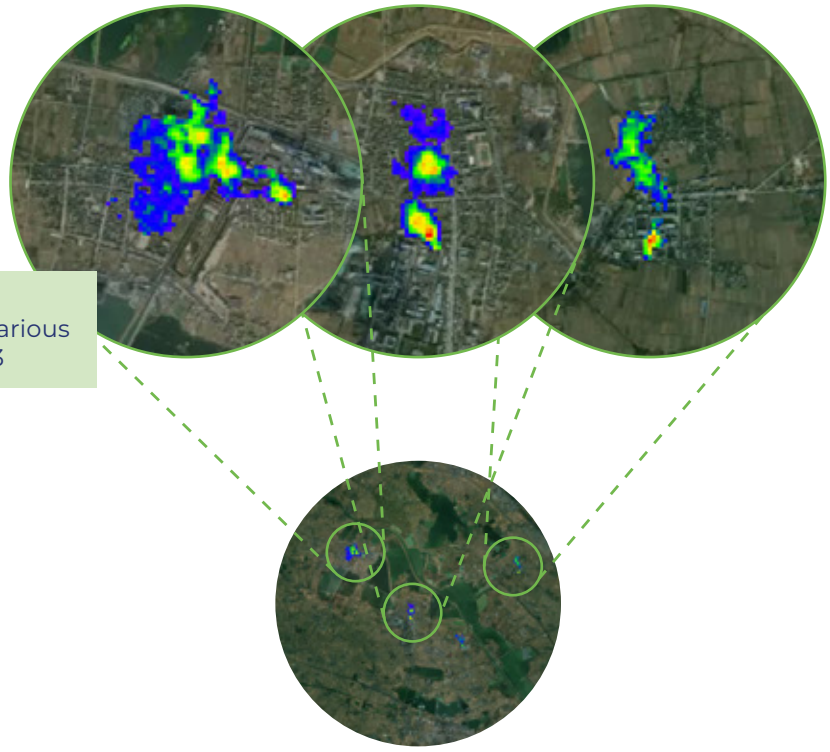
Detected Emissions from Mining - 2022 vs 2023



Overall detected emissions from the mining segment rose slightly in 2023; however, there was more dynamism at the regional level, with a strong increase in Asia that mirrored the broader patterns of higher coal production and consumption, aided in part by **China's addition of 47.4GW in capacity** during the year.

Higher detected emissions in North America in 2023 aligned with the thread of **higher regional production, likely driven by demand for thermal coal from international markets**, while consumption within this region fell in 2023.

Satellites are a powerful tool for gaining a better understanding of emissions from underground mining, and therefore activity at the mines, thanks to the larger field of observation.



Asia
Source rate: various
February 2023

LANDFILLS

Landfills tend to be more persistent emitters than facilities in other sectors.

In 2023, our detected emissions rose globally, thanks largely to both an increase in measurements, supported by more satellites in orbit, and optimized tasking.

At the regional level, detected emissions from **North America and Asia each reached nearly 1 MTCO$_2$e**; together these two regions accounted for over 50% of sector emissions measured during the year.

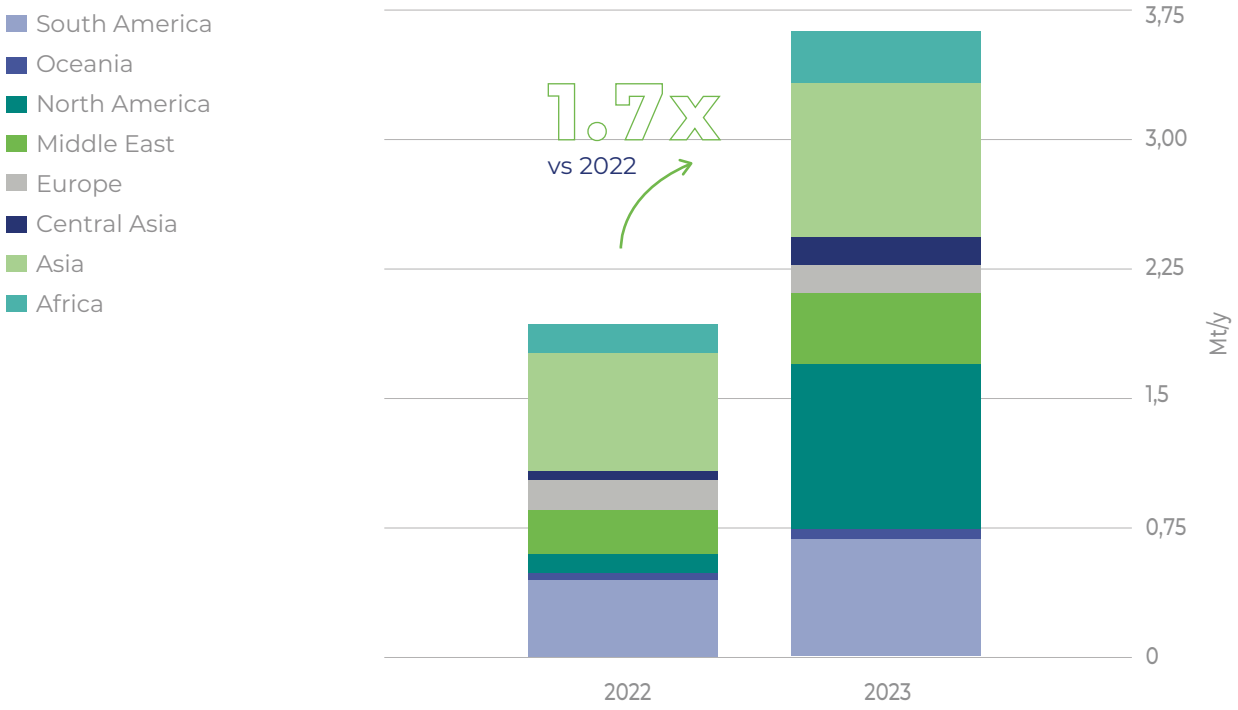
Through our collaboration with partners, such as SRON and the Global Methane Hub, we have been continuing to fine-tune our detection **methods** for more effective monitoring.

By the end of the year, we were monitoring over 350 sites worldwide, with more sites being added on a continuous basis.

Landfills have been increasingly in the spotlight, and while emissions mitigations from this sector are more challenging than others, given their relatively diffuse nature; our records of multiple measurements at the same site underscore the opportunity for new mitigation solutions to be implemented.

This observance of persistent emissions is not restricted to less developed markets; rather, it is a common challenge across all geographies.

Detected Emissions from Waste - 2022 vs 2023



OTHER

During 2023, we successfully detected emissions from several agricultural sources, such as sugar mills in Argentina and hog farms in Brazil.

We were also the first entity in the world to detect emissions from a cattle feedlot by satellite.

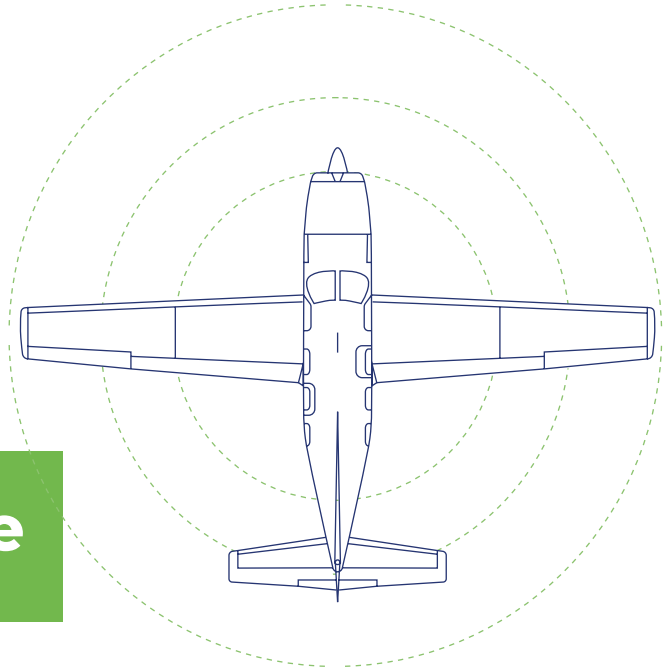
North America
Source rate: 966 kg/hr
July 2023

DATA.AIR

In 2023, we nearly **doubled** the unique area surveyed year on year through our aircraft campaigns

24,000
Facility measurements in 2023

275,000 CO_2e
Emissions mitigated in 2023



[Supporting MiQ Certification and LDAR Programs >]

[Monitor long pipelines in shorter time with Aerial Emissions Monitoring Campaign >]

DID YOU KNOW?

NEWS

GHGSat to deliver 300 observations of IMEO selected emitting locations

GHGSat to Measure Greenhouse Emissions at Every Industrial Site, Worldwide, Every Day

Space Data to Cut Landfill Emissions

Stephane Germain, Named to the Inaugural TIME100 Climate List of the 100 Most Influential Leaders Driving Business Climate Action

World-first 'Zero Debris Charter' Launches

NASA Selects GHGSAT as a Commercial Smallsat Data Acquisition Program Contractor

Methane Leak Detected from Space in the UK Successfully Mitigated

Awards/accolades received in 2023

Global Cleantech 100

Fast Company's World Changing Ideas Award for Climate

Fast Company's World's Most Innovative Companies

Deloitte's Technology Fast 50™ Canada

Time100 Climate List

GHGSat offices

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