

GEO WEEK & MINISTERIAL SUMMIT 2023

Showcase

#TheEarthTalks



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



GEO WEEK
2023 MINISTERIAL
SUMMIT

GEO GROUP ON
EARTH OBSERVATIONS

#TheEarthTalks

GEO WEEK & Ministerial Summit 2023



GEO
WEEK
2023
MINISTERIAL
SUMMIT

Strength in numbers: The benefits of working with multiple platforms to monitor greenhouse gases and other air quality gases

07/11/2023 11:00am to 11:30am



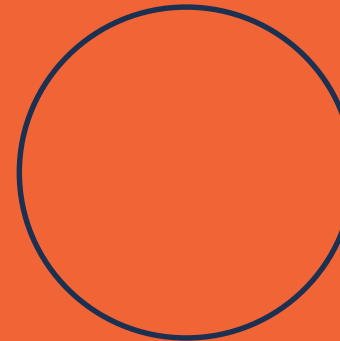
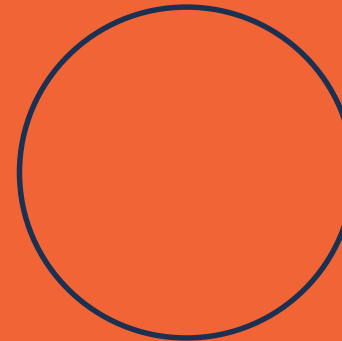
Barb Ryan
WGIC
Moderator



Osamu Ochiai
JAXA
Speaker



Jean-Francois
Gauthier
GHGSat
Speaker



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Public GHG observation cases

JAXA's GOSAT and GOBLEU cases



Osamu Ochiai

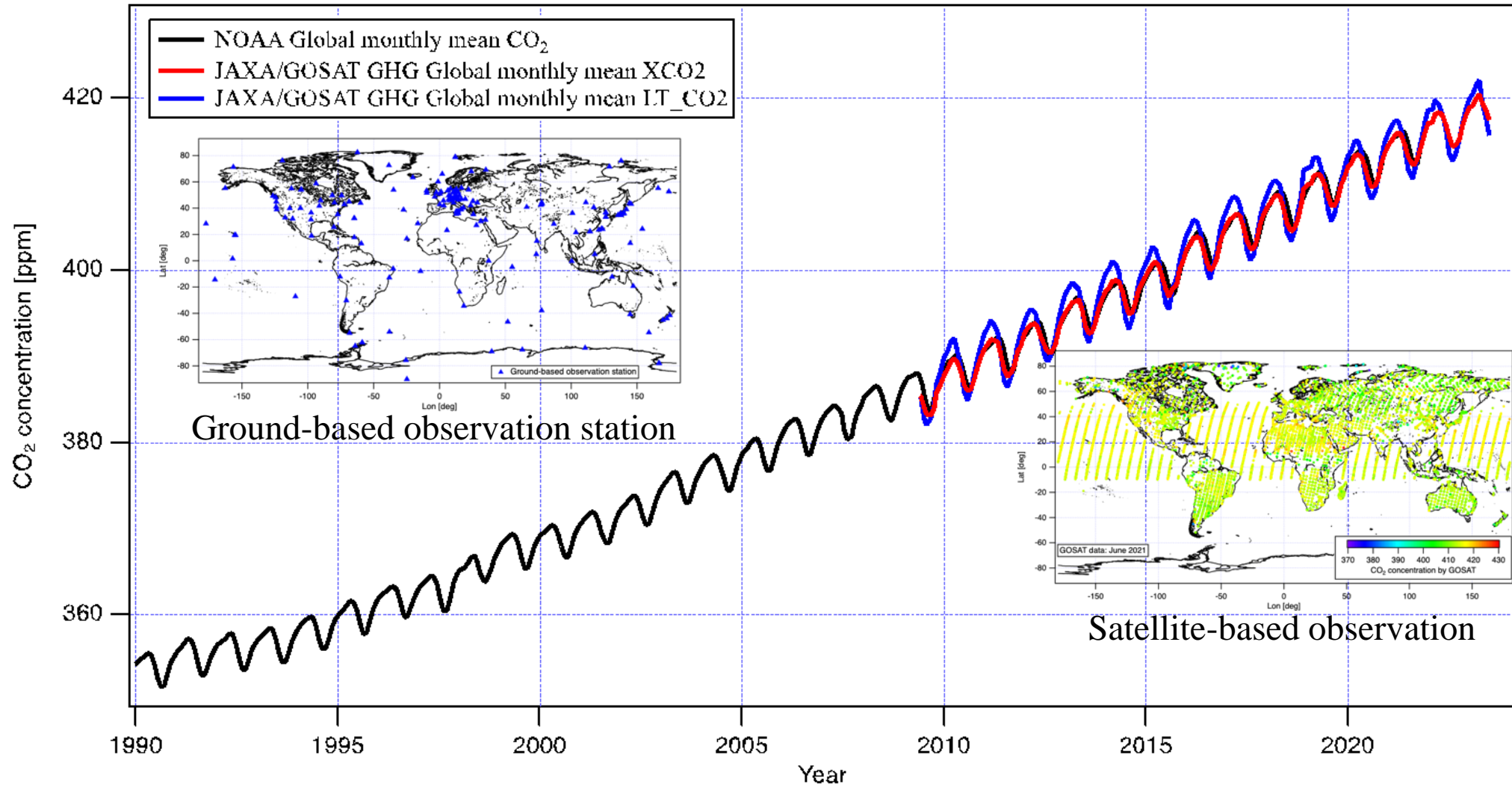


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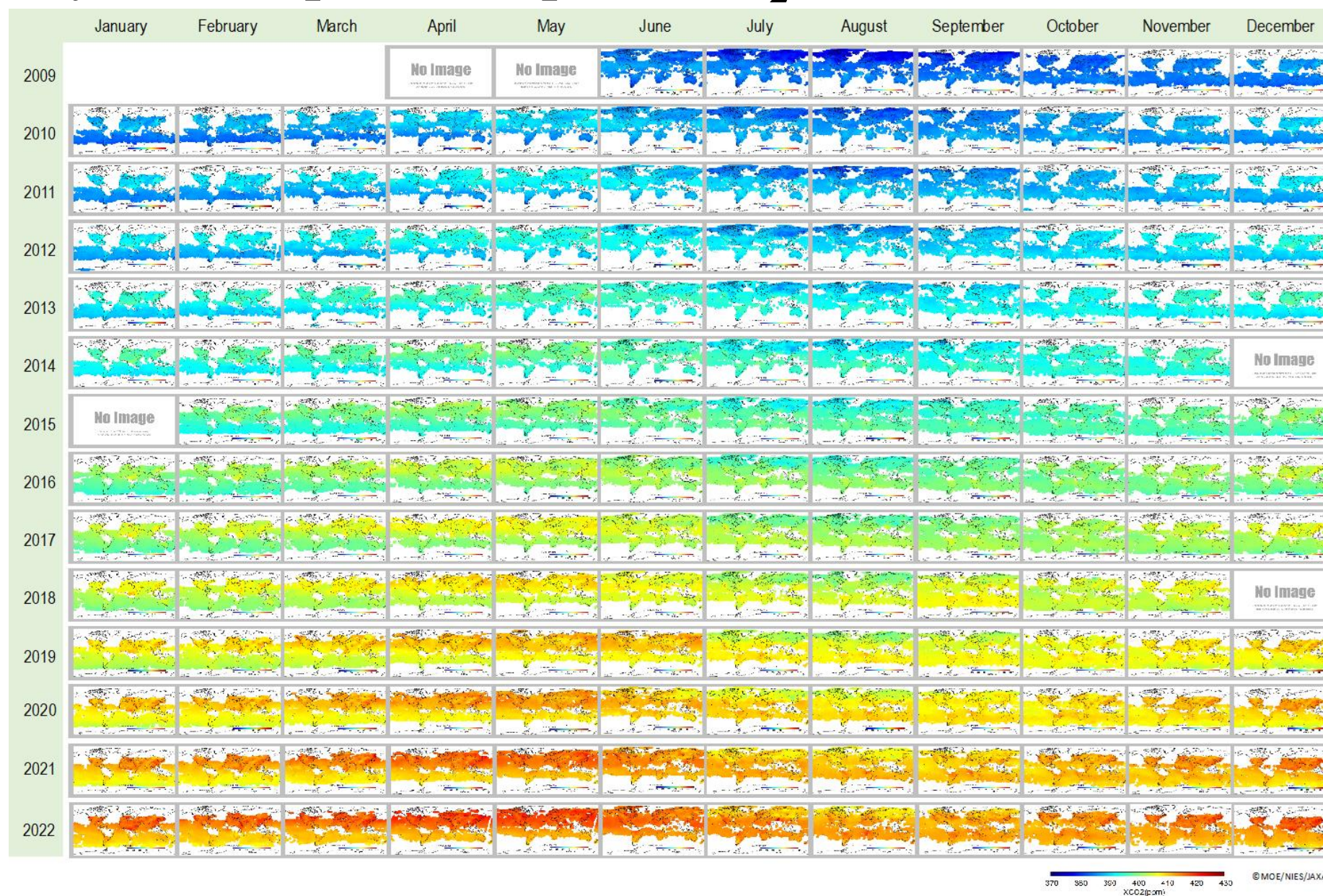


Contributing to the GHG observation history from space

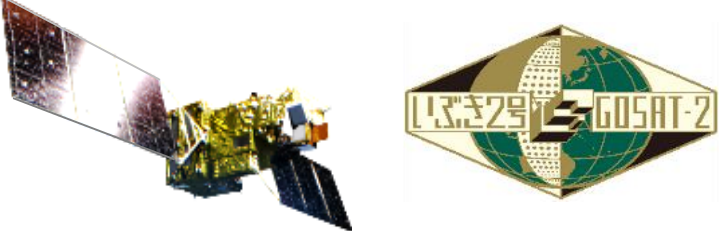
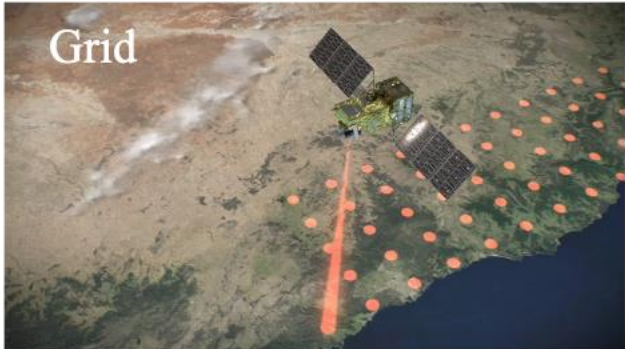


GOSAT data presents 14 years of global CO₂ concentration and its global changes since 2009.

14 years of spatio-temporal CO₂ distribution from GOSAT



Japan's GHG observatories from space

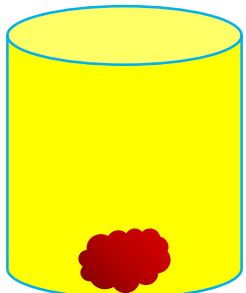
Project	GOSAT (Kuze et al, AO, 2009)	GOSAT-2 (Suto et al, AMT, 2021,2022)	GOSAT-GW (development)
Image			
Launch	2009/1/23 (14 years on-orbit)	2018/10/29 (4 years on-orbit)	JFY2024
Local observation time	13:00	13:00	13:30
Revisit time	3 days	6 days	3 days
Observation target	CO ₂ , CH ₄ , SIF(Solar-induced chlorophyll fluorescence)	CO ₂ , CH ₄ , CO SIF(Solar-induced chlorophyll fluorescence)	CO ₂ , CH ₄ , NO ₂ SIF(Solar-induced chlorophyll fluorescence)
Observation image			

JAXA partial column GHG product

- Use full observation advantage by GOSAT and GOSAT-2 such as **simultaneous ShortWave Infrared (SWIR) and Thermal Infrared (TIR) observation** as well as **2-orthogonal polarization information**.
 - **2 layers in troposphere and 3 layers in stratosphere** are applied for CO₂ and CH₄ vertical* concentration.
- * 6 pressure levels: 0.1 hPa & (0.05, 0.1, 0.2, 0.6, 1)*P_{surf}

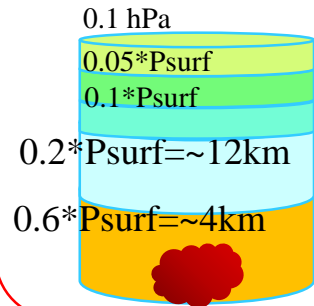
Conventional Method

Use only solar reflected light

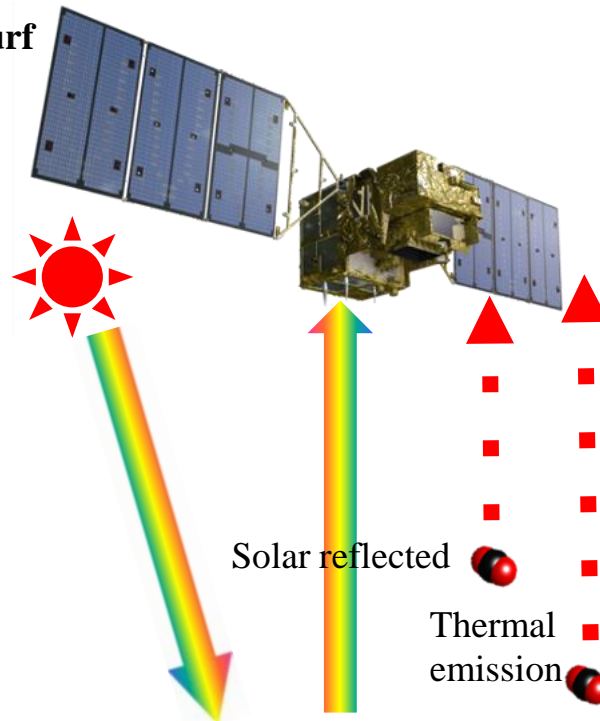


JAXA/EORC new Method

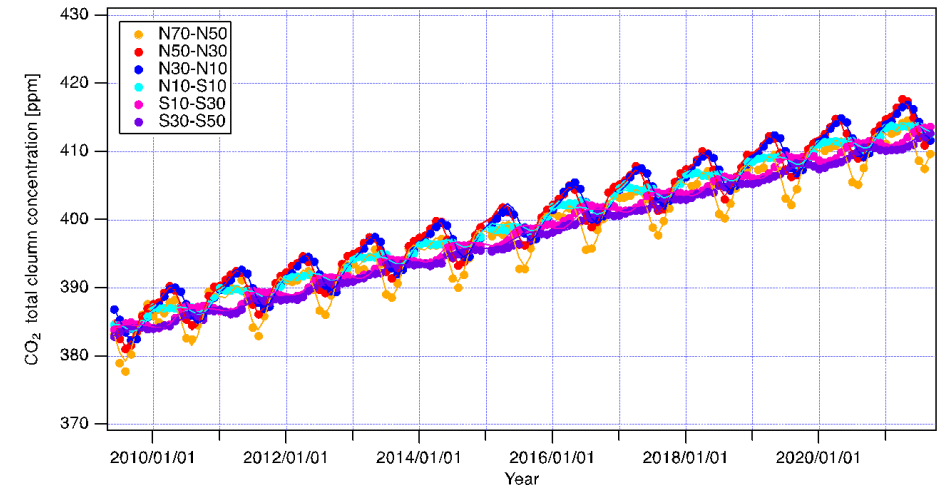
Use both solar reflected light & thermal



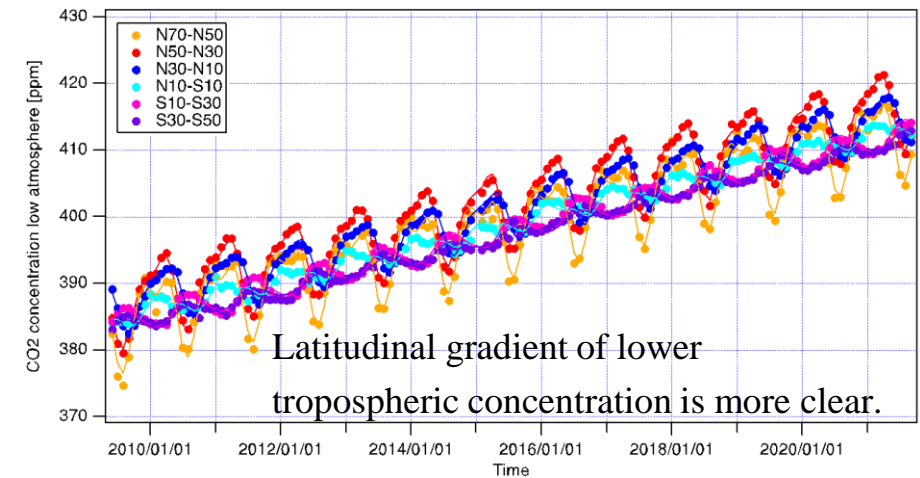
CO₂ & CH₄ emission and enhanced density of the lower troposphere



©MOE/JAXA/NIES



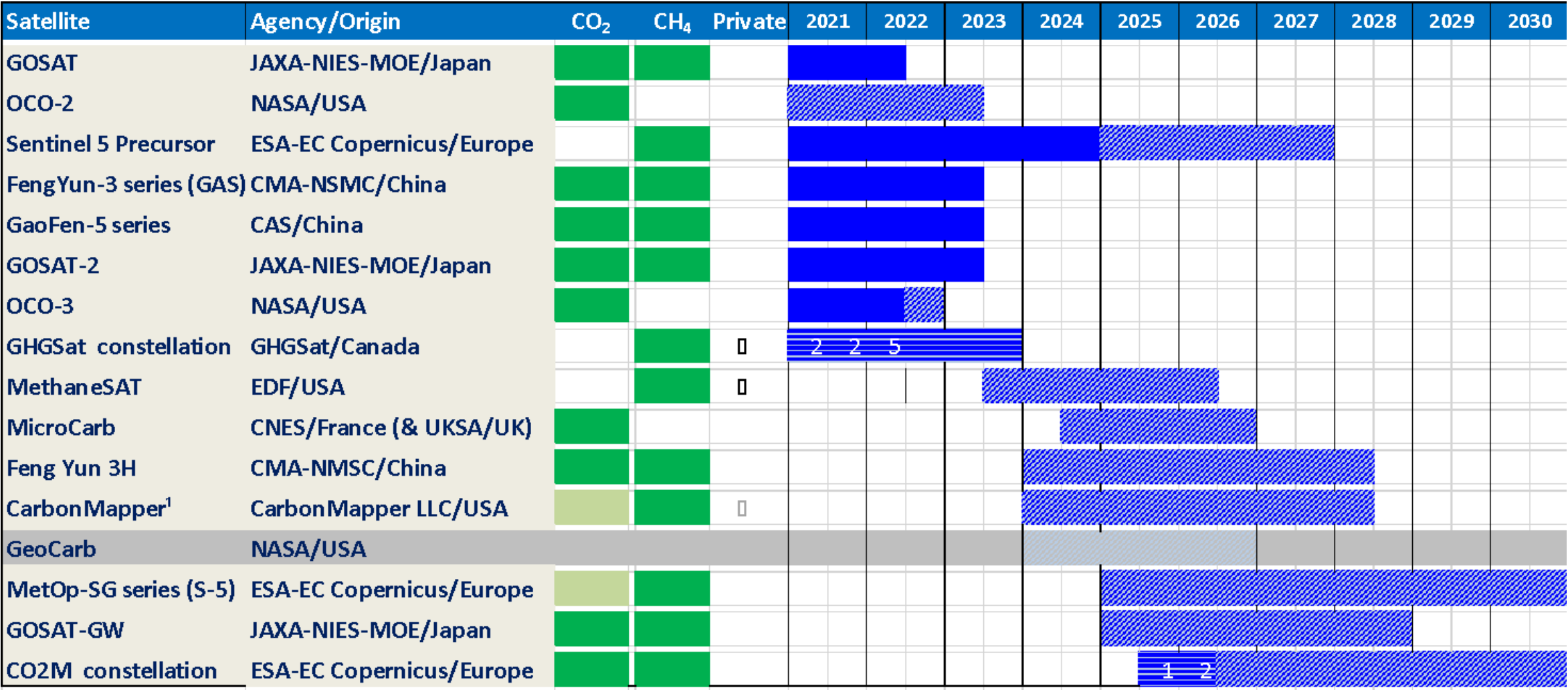
Total column concentration



Lower tropospheric concentration

Latitudinal gradient of lower tropospheric concentration is more clear.

Overview of GHG Satellite Missions – GENERIC



1. Carbon Mapper is a public/private partnership between California and Carbon Mapper LLC.

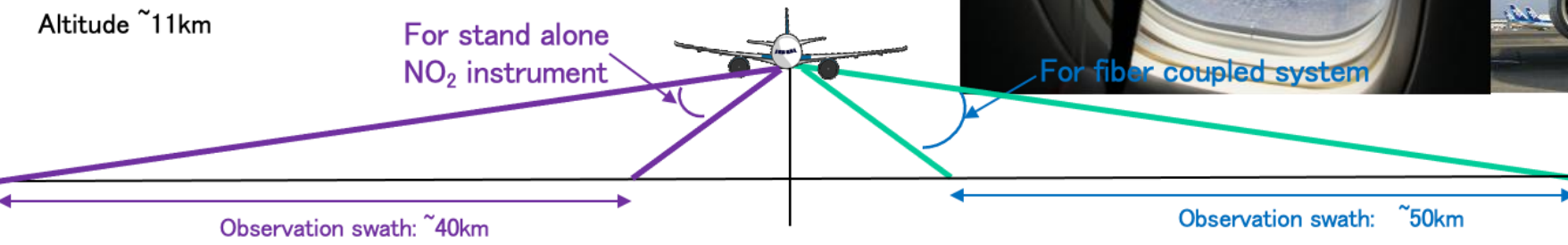


GHG remote sensing from a passenger aircraft

Our concepts:

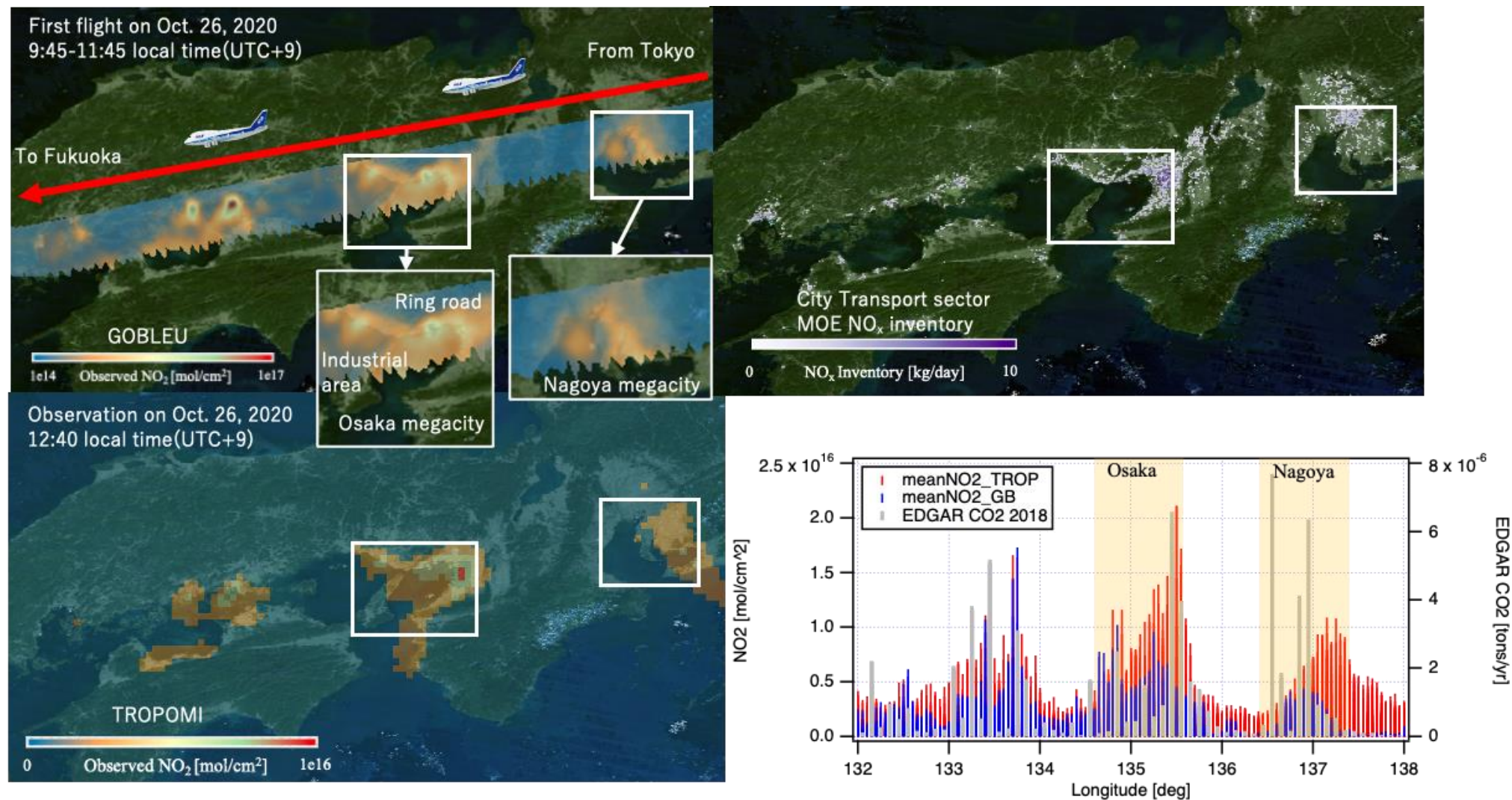
- NO hardware modification to aircraft*
- Compact instruments on cabin seats
- Observing through cabin window
- Small power consumption with mobile battery operation
- 3 modules: 450nm, 740nm and 1.6 μ m bands for NO₂, SIF and CO₂ with fiber coupling.

Commercial airliners can make repeatable and frequent observations over mega-cities with lower cost than research flights!



*Limitation of size and wight, the capacity of battery, electronical magnetic conducton from instruments have to be passed the

The first high resolution NO₂ observations from GOBLEU



- High NO₂ were observed over emission hot spots (cities, point sources, and traffic)
- In megacity Nagoya, spatial pattern of NO₂ is different from GOBLEU(GB) and emission inventory.



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High-Resolution GHG Data

The GHGSat Constellation



Jean-Francois
Gauthier



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ROUTINE MONITORING OF METHANE EMISSIONS AT INDUSTRIAL SITES – FROM SPACE

GHGSat is the only entity in the world (private or public) with satellites designed to monitor emissions from individual industrial facilities anywhere in the world.



GHGSAT

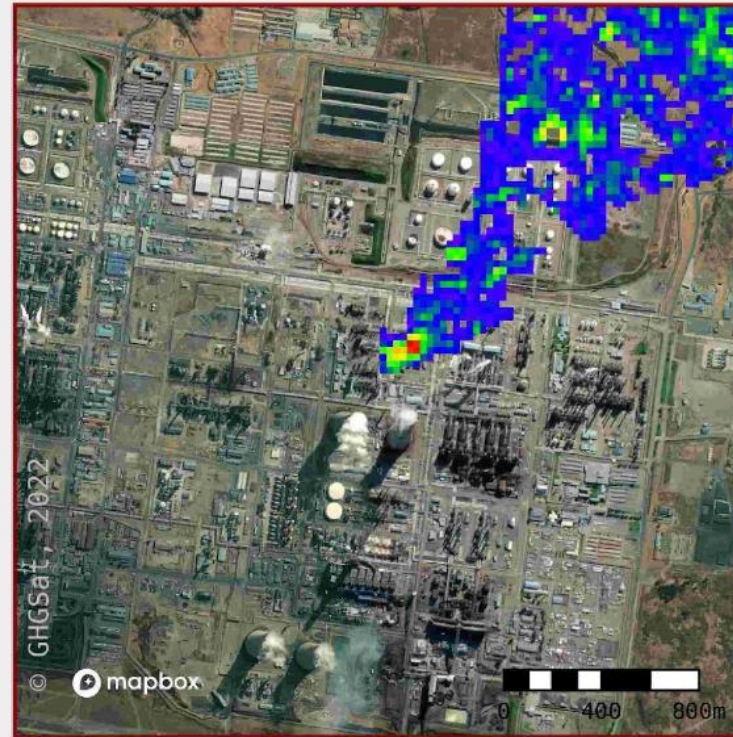
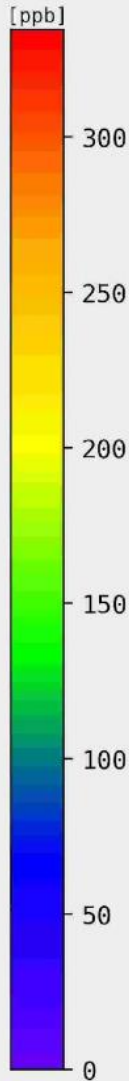
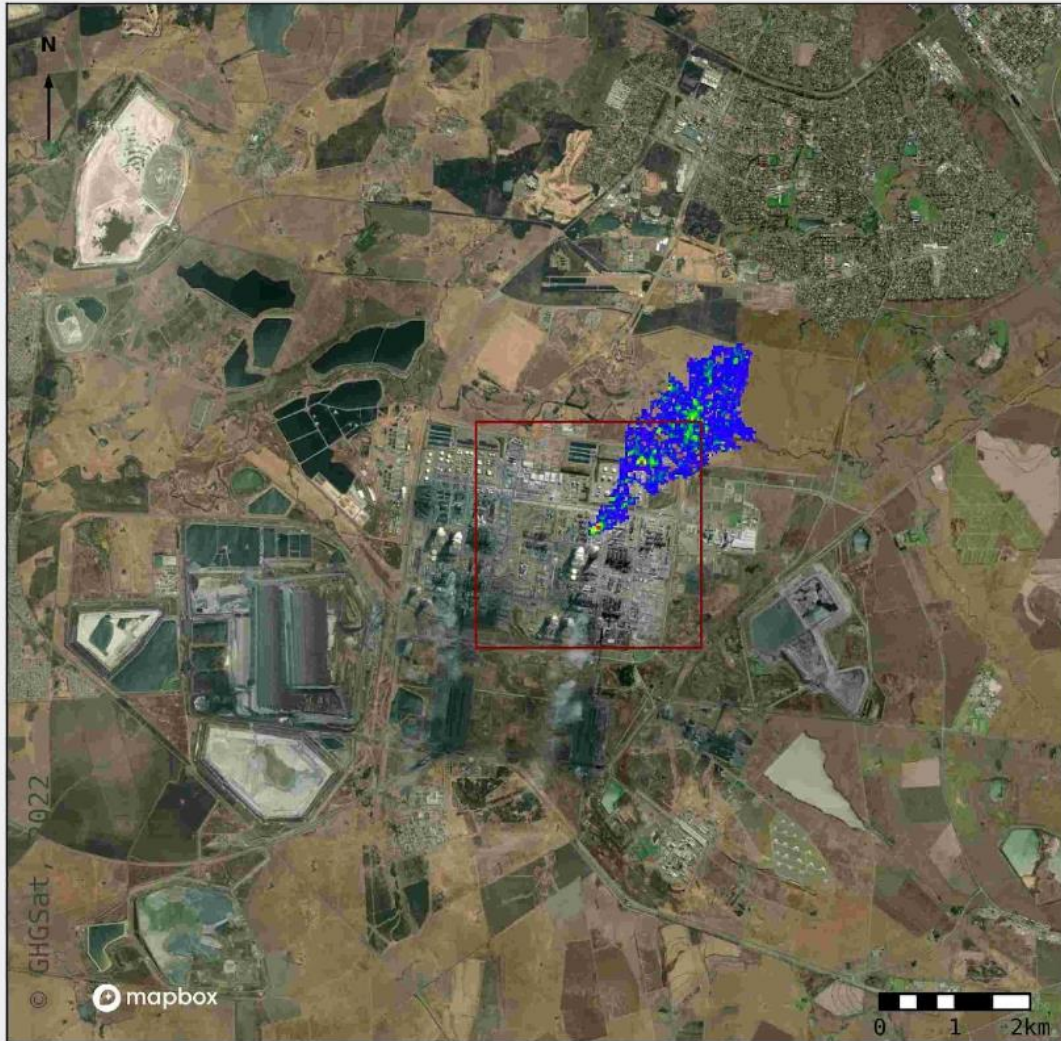
-  Satellite Data
-  Aircraft Data
-  Analytics
-  Data Repository



GHGSAT CONSTELLATION - CAPACITY

	<u>Now</u>	<u>Q4 2023</u>	<u>2027</u>
Satellites in orbit	9	12	100
Facility Measurements per Year	2M+	3M+	20M+

Every industrial emitter in the world, measured daily, in near real-time



Product:
Column averaged CH₄ concentration in excess of local background.

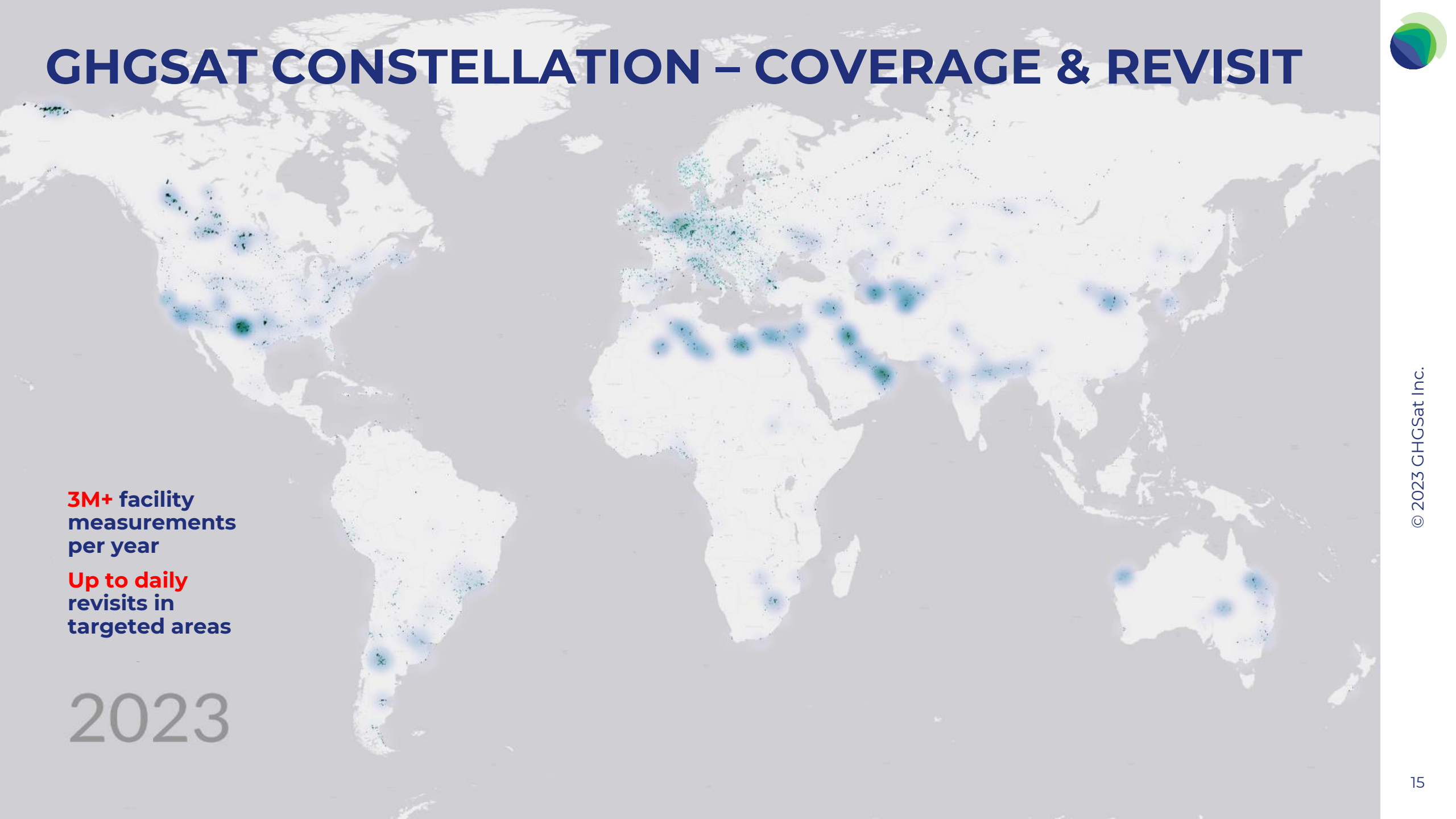
Background Image:
© Mapbox: <https://www.mapbox.com/about/maps>
© OpenStreetMap: <http://www.openstreetmap.org/copyright>
© Maxar: <https://www.maxar.com>

Timestamp:
2022-02-20 07:11:15 UTC

Observation ID:
AY1703i

Satellite:
GHGSat-C2

GHGSAT CONSTELLATION – COVERAGE & REVISIT



3M+ facility
measurements
per year

Up to daily
revisits in
targeted areas

2023

GHGSAT'S MODEL: COLLABORATION

- GHGSat believes that collaboration is the ultimate force-multiplier when it comes to addressing the emissions challenge head on
- Academic/Scientific Partnerships
 - Harvard
 - SRON
 - Stanford
- Institutional Partnerships
 - European Space Agency (ESA)
 - Canadian Space Agency (CSA)
 - NASA
 - UNEP IMEO
- Industrial Partnerships
 - Glint mode development/demonstration
- Others
 - S&P Global
 - IEA Methane Tracker Report

GHGSAT JOINS ESA'S THIRD PARTY MISSION PROGRAMME

Edinburgh, 25 May 2022. - High-resolution greenhouse gas monitoring company GHGSat, has joined ESA's prestigious Third Party Mission Programme, ESA said. The company will share data from its fleet of commercial satellites with Earth science and climate change researchers free of charge.



From left to right: Eric Laliberté, Director General Space Utilization at the Canadian Space Agency, Adina Gillespie, Director of Business Development, Europe at GHGSat Inc and Simonetta Cheli, Director of Earth Observation Programmes. Credit: ESA / Jürgen Mai

The 45-year-old programme enables the global scientific community to access high-quality data from Earth observation satellite missions. ESA's Third Party Missions Programme comprises over 60 instruments on more than 50 space missions.

Via Satellite

Search

Imagery and Sensing

October 18, 2023

Lockheed Martin Invests \$10M in HawkEye 360

Mobility

October 18, 2023

Viasat Expands IFC Deal

Government/Military Imagery and Sensing

NASA Selects 7 Providers for Commercial Smallsat Data Program

By Rachel Jewett | October 3, 2023

upstream
ENERGY EXPLORED

Latest News Exclusive Regions Field Development LNG Energy Transition e-paper

Brent spot \$71.91 +0.33%	Brent futures (1 mo) \$71.89 +0.38%	WTI spot \$68.75 +0.38%	WTI futures (1 mo) \$68.69 +0.28%	UK Nat Gas (1 mo) 127.71p
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ENVIRONMENT

See all articles

Alert me about Environment

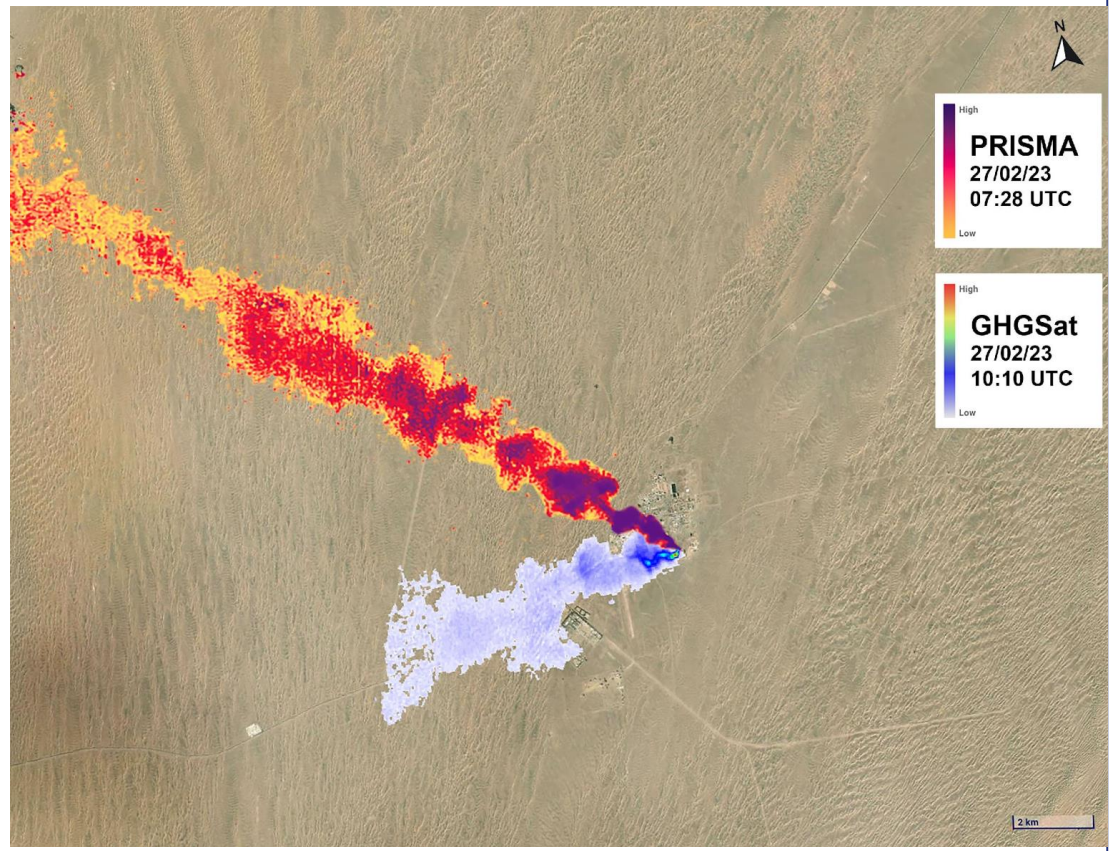
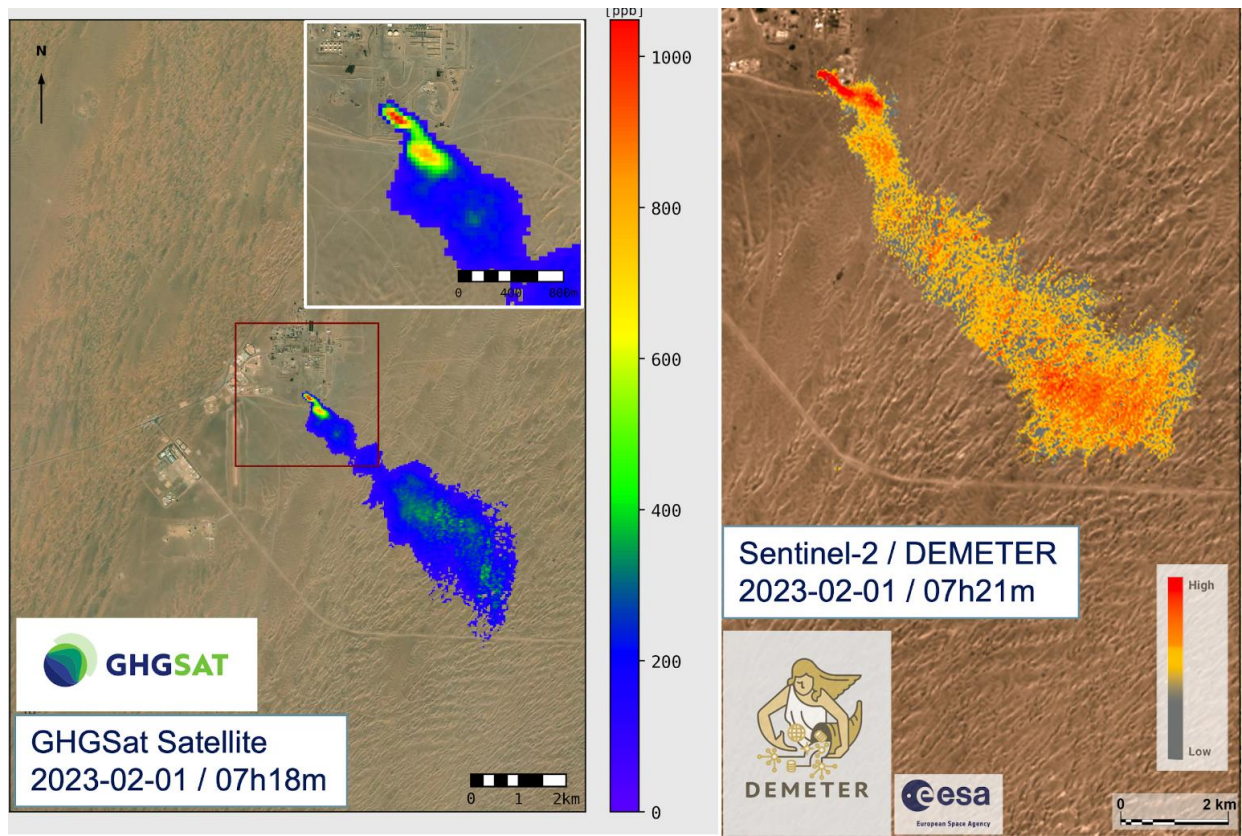


TotalEnergies, Chevron and Shell onboard for offshore leak detection study



COLLABORATIONS

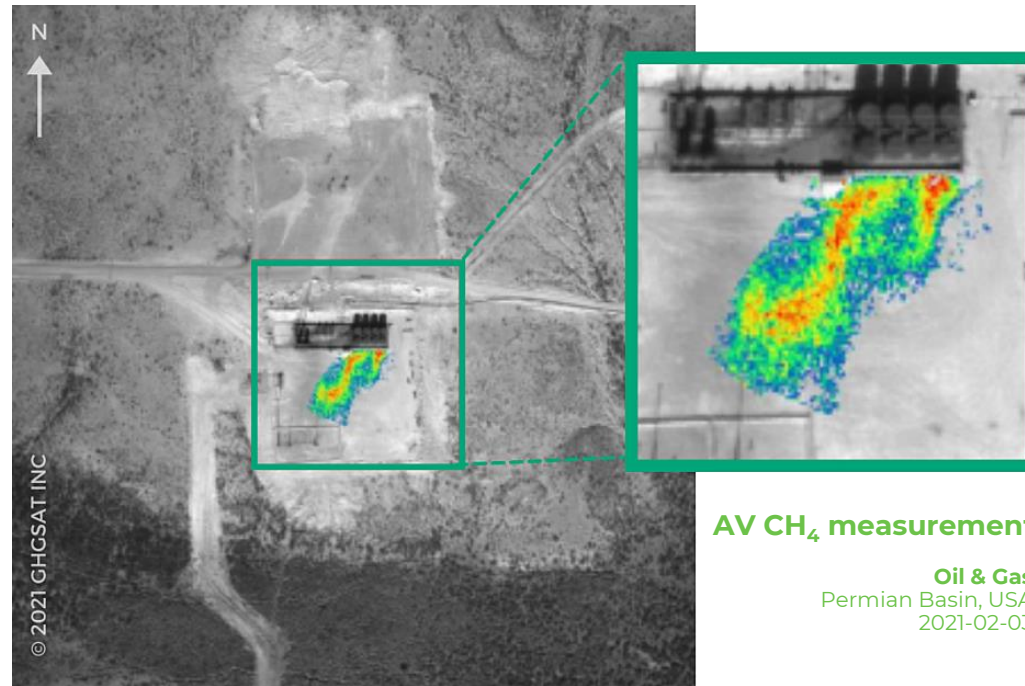
Validation / Combining Public and Private Data



02

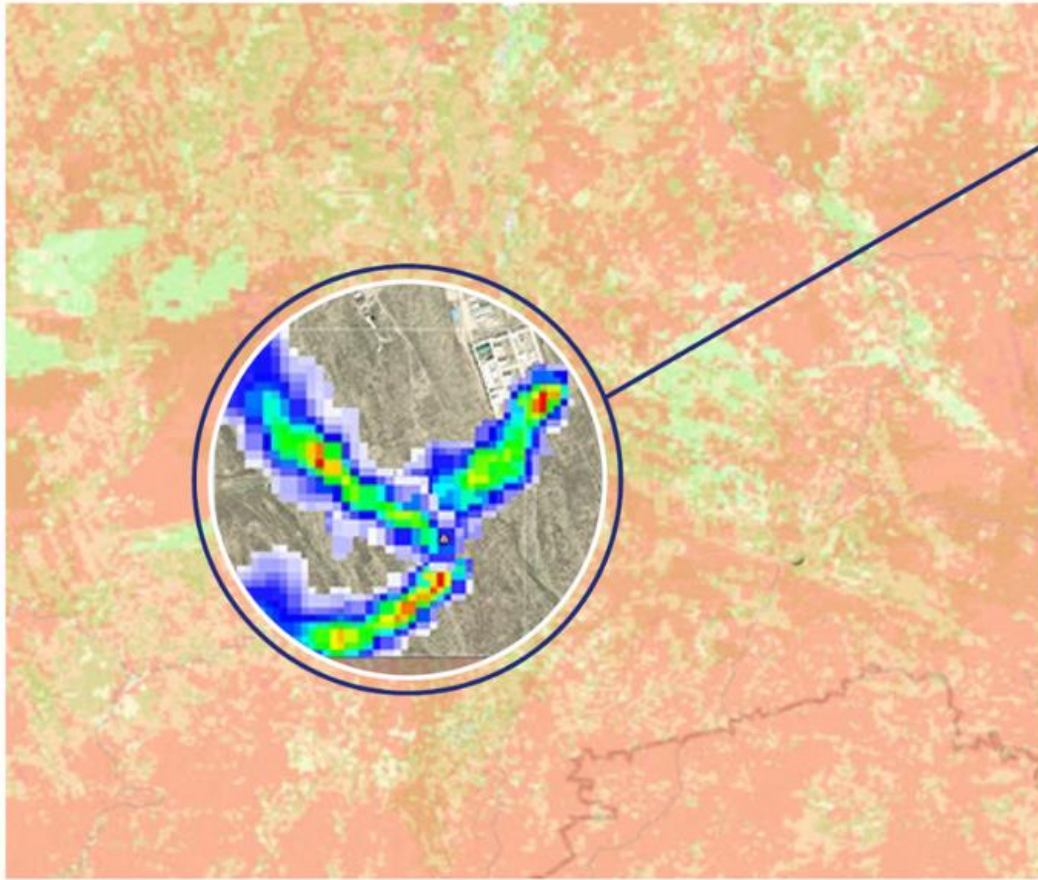
Aircraft monitoring with DATA.AIR

GHGSat airborne sensors are deployed in every major basin in North America, as well as internationally



- Minimum detection threshold of ~10 kg/hr
- Flight altitude: 10,000 ft above ground level (AGL)
- Spatial resolution (GSD) <1 m (<3 ft), altitude dependent





SPECTRA

GHGSAT

New free subscription on emissions intelligence platform

Everyone can explore higher temporal resolution of methane concentrations globally with a high-resolution observation gallery of featured emissions around the world.

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6-10 NOVEMBER

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