



GHGSAT

HIGH-RESOLUTION SATELLITE MONITORING FOR METHANE EMISSIONS

Adina R. Gillespie

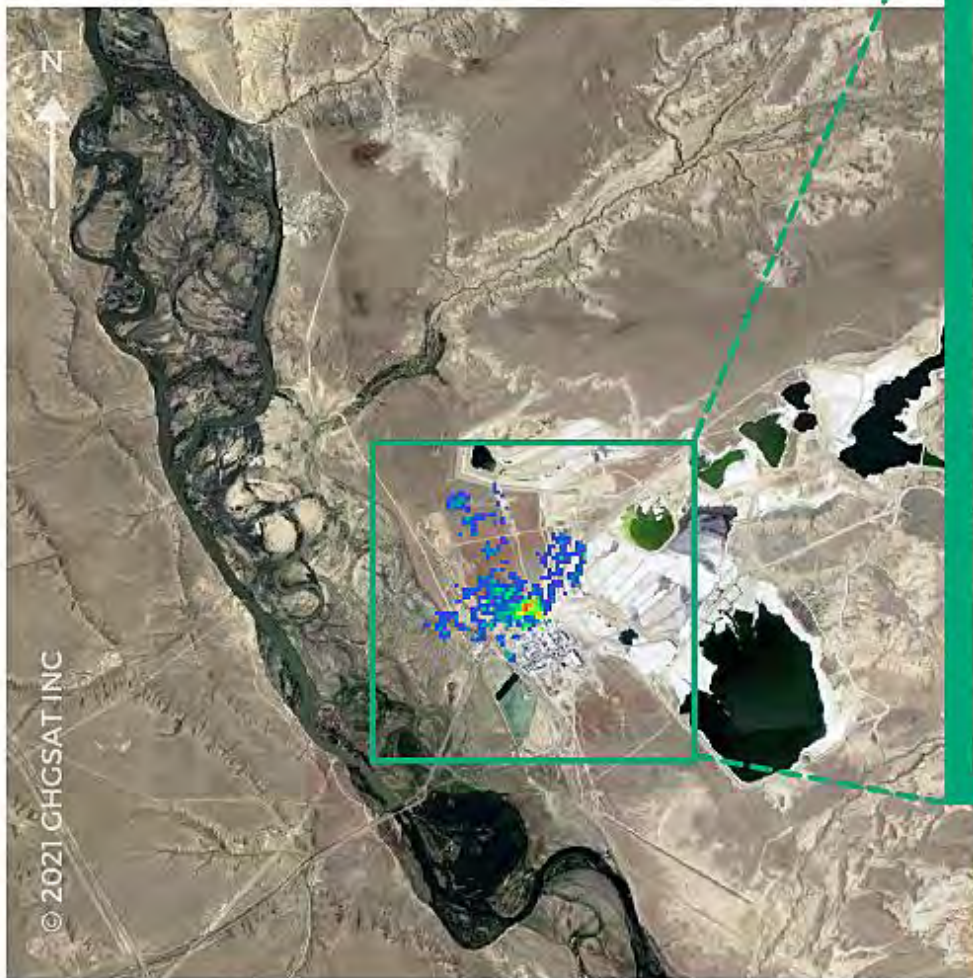
EO Week

06.09.2021



Satellite CH₄ Measurement

Underground Trona Mine - Wyoming, USA



BACKGROUND ©2021
GOOGLE MAP DATA
Date: 2021-06-13
Time: 18:11:16 UTC

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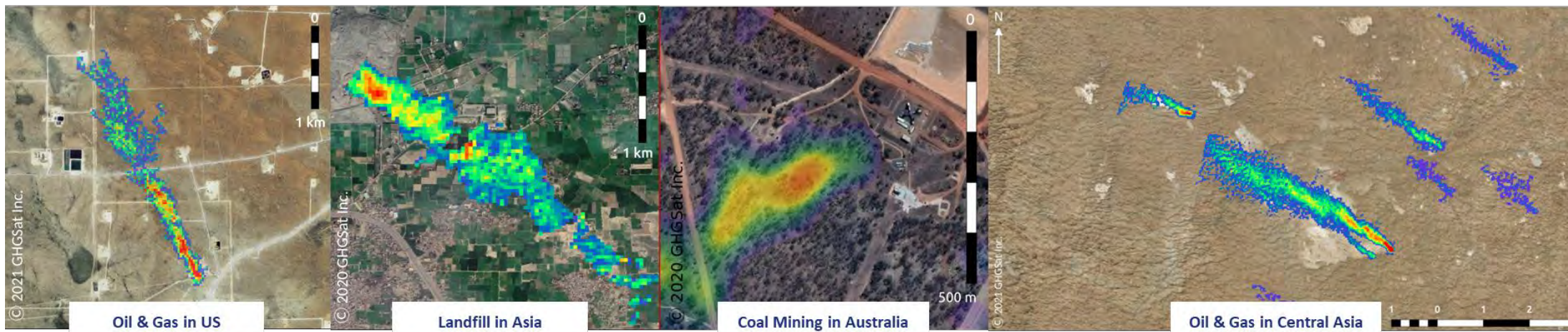


COMPANY CONTEXT

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

- Demo satellite (2016 launch) proved we could do it
- Commercial satellites (first launches 2020 & 2021) are providing actionable measurements for customers
- Constellation of 10 by end of 2022

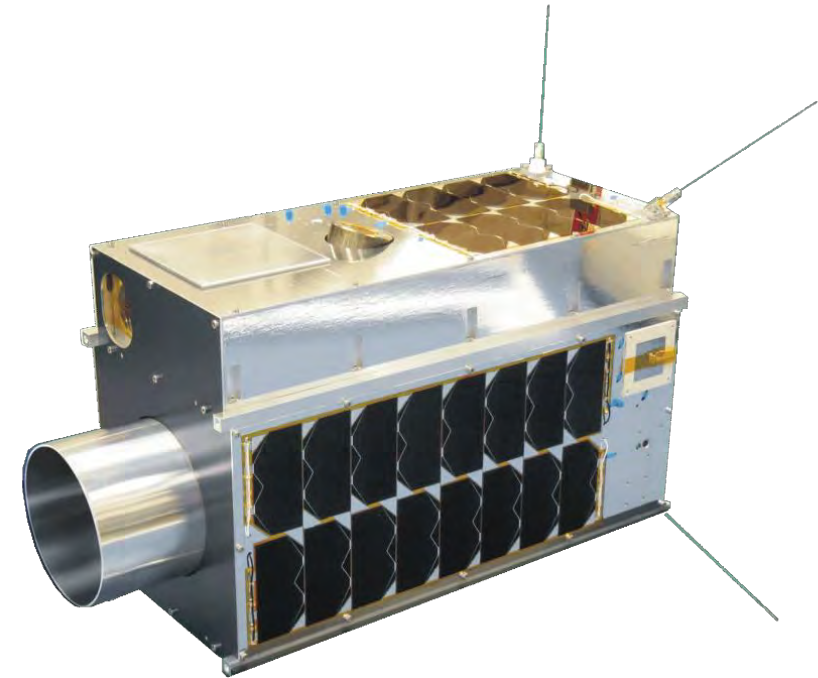
Miniaturised technology operating on nanosatellites, enabling rapid, low-cost deployment and tech iteration



GHGSAT-C1 & C2



- *Launch dates:* Sept 2nd, 2020 (C1), Jan 24th, 2021 (C2)
- 15 kg nanosatellites
- *Sun-synchronous orbit :* ~500 km
- 14 day revisit (3 satellites = 5-6 days)
- *Payload:*
 - Imaging Fabry-Perot spectrometer
 - Spectral region : 1.6 μm
 - **High spatial resolution (~30 m)**
 - 12km x 12km images
 - Always operate in **target mode**
 - Design improvements over GHGSat-D include:
 - Increased per-pixel signal and decreased straylight
 - Onboard calibration system
 - Optimized spectroscopy





SATELLITES DELIVERING FOR DIFFERENT PRIORITIES

	POLICY	ADVOCACY	DETECTION & REPAIR
Detection threshold Spatial resolution	~10,000 kg/hr Km-scale	~1,000 kg/hr 100m-scale	~100 kg/hr 10m-scale
Dedicated EO solutions	Sentinel-5P TROPOMI	MethaneSAT (2022 launch)	GHGSat
Multi-purpose missions with methane sensitivity	Sentinel-2 Gaofen-5 Landsat-8		

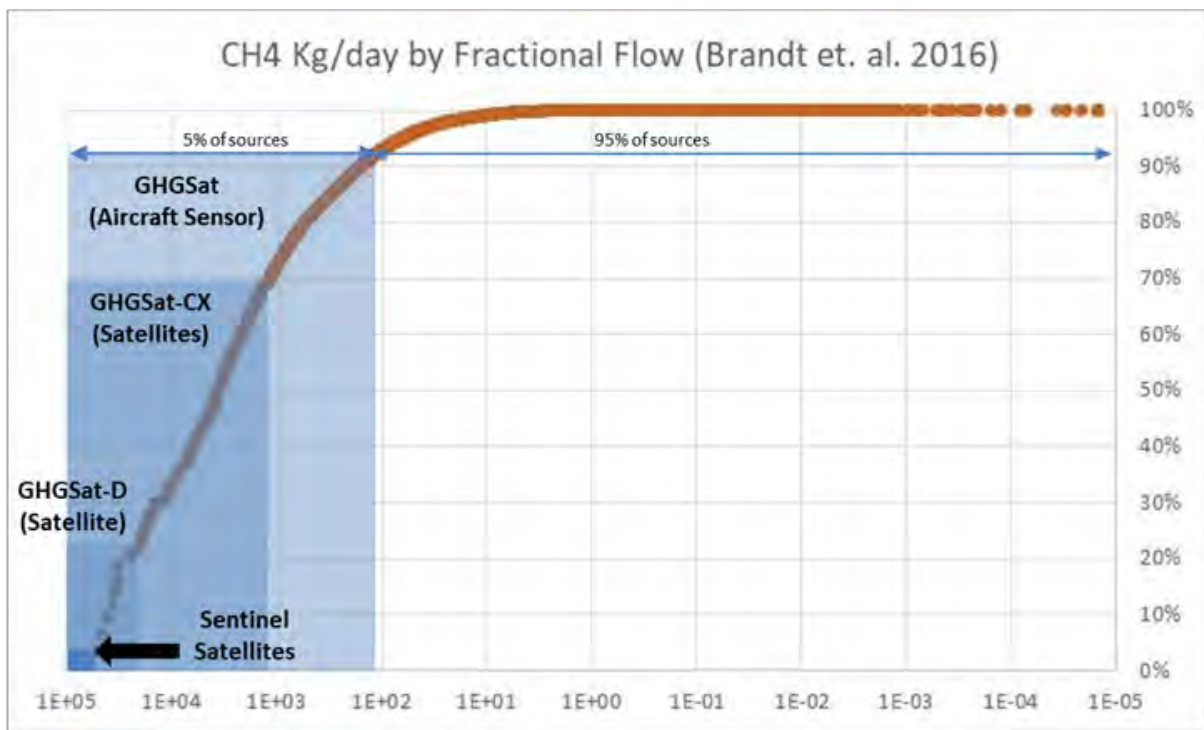
Reliable facility-level emissions attribution requires for **RESOLUTION** and **DETECTION THRESHOLD**





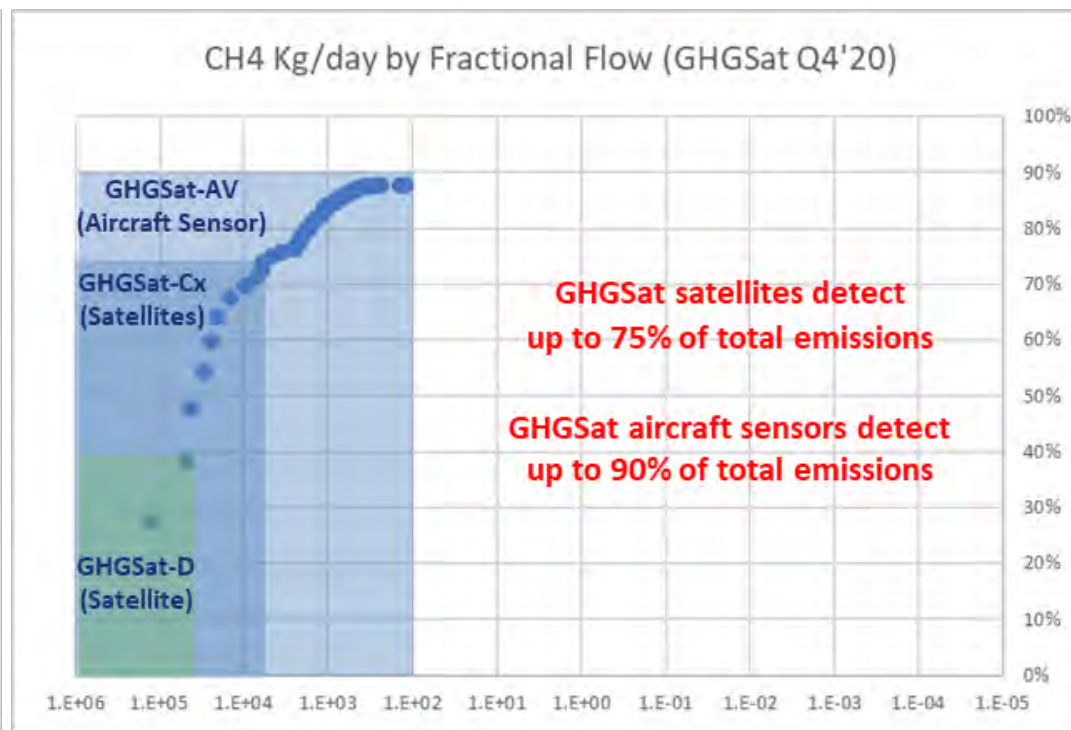
PERFORMANCE

Predicted (Using Third-Party Data)



Data Source: Brandt, A. et al. "Methane Leaks from Natural Gas Systems Follow Extreme Distributions" <https://doi.org/10.1021/acs.est.6b04303>
 Sample size: 11,848 sources from 18 different studies; each orange dot is a different source

Actual (GHGSat Data)



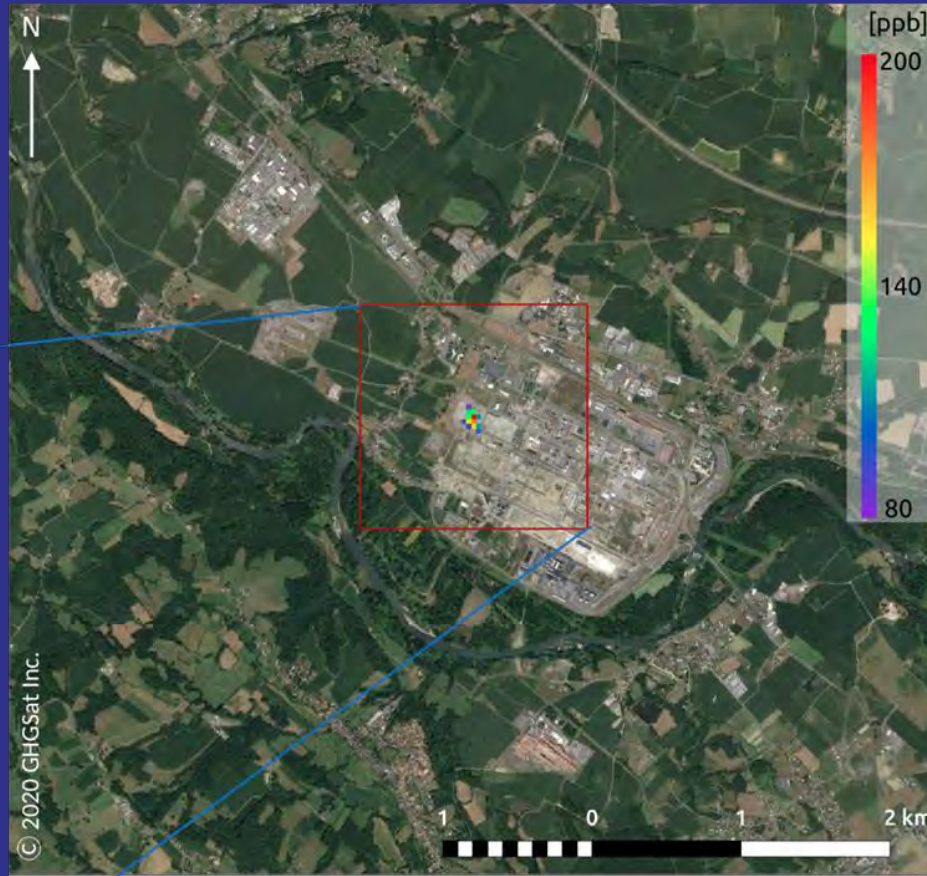
Data Source: GHGSat measurements taken in Q4 2020 in Permian Basin, Texas.
 For illustrative purposes, GHGSat assumes 10% of total emissions would only be detectable by ground measurement (per Brandt results)

PERFORMANCE



TOTAL

“In developing the technical solutions of tomorrow to monitor methane emissions, Total uses its TADI facility to validate emerging technologies on the market, notably those selected by OGCI Climate Investments.”



GHGSat had no knowledge of release rate or position

Our retrieval: 250 ± 140 kg/hr

Ground truth: 234 kg/hr

Wind 1.6 m/s

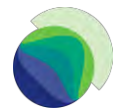
Product:
CH₄ column-averaged concentration in excess of local background level

Timestamp:
2020-10-29 11:00:47 UTC

Background:
© 2020 Google Map Data

Blind controlled release in partnership with Total, Oct, 2020 – France



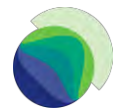


DELIVERING RESULTS – OIL & GAS

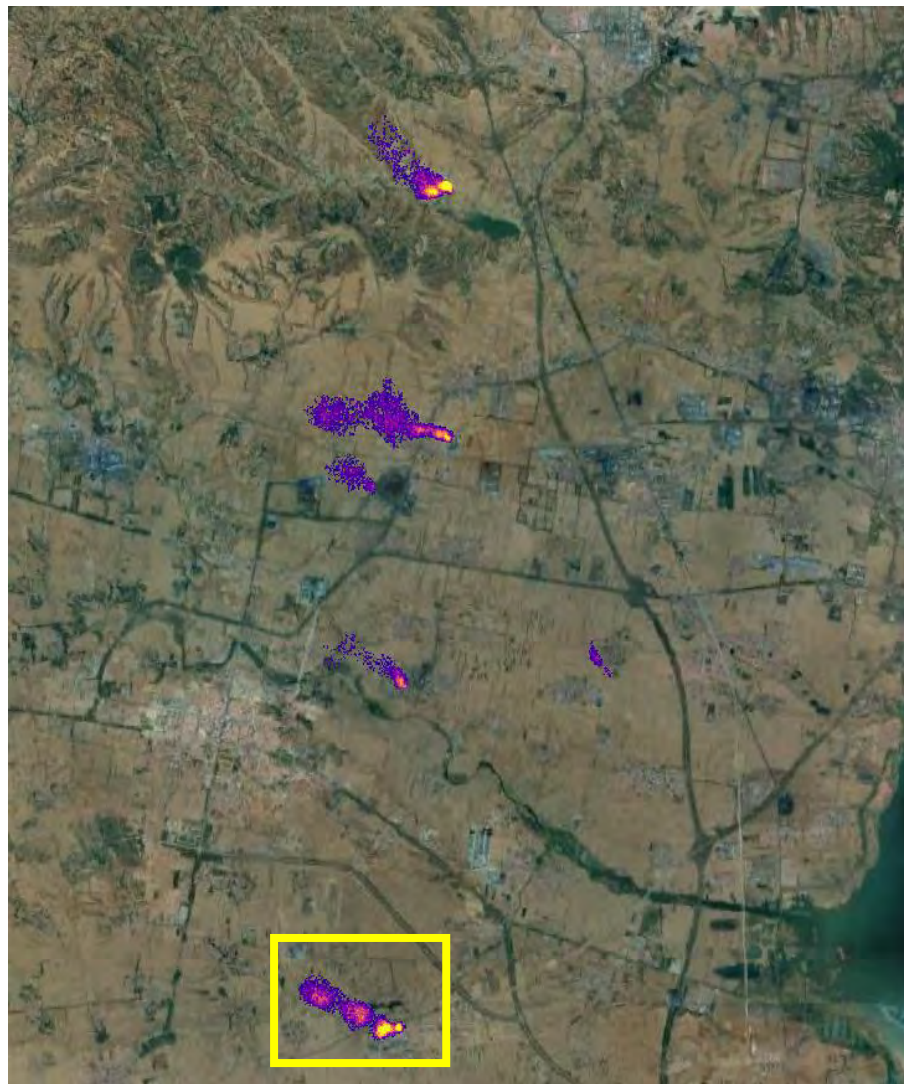


**September 2020
Permian Basin, NM,
USA**



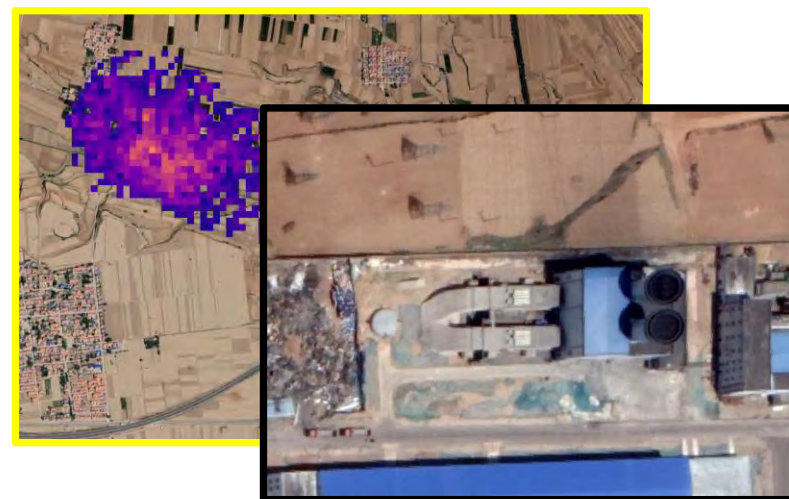


DELIVERING RESULTS – UNDERGROUND COAL MINING



May 2021, Shanxi, China

6 plumes detected in one observation



DELIVERING RESULTS – LANDFILL



April 2021, Buenos Aires

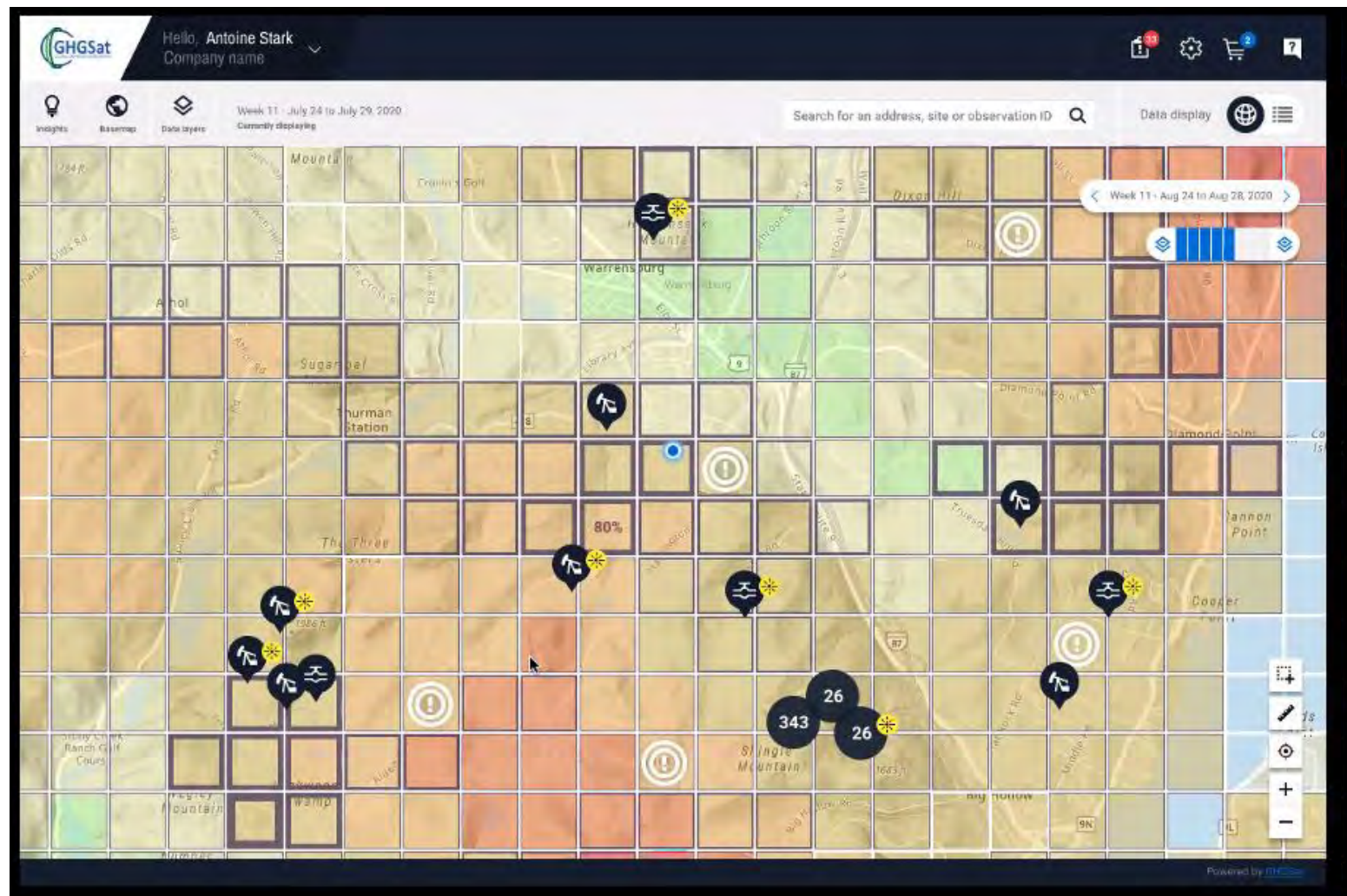
Multiple points of origin in active area

Detectable plume reaches edge of retrieval domain





DELIVERING RESULTS - ANALYTICS



GHGSat analytics layers for regions or countries of interest:

- Methane concentration map at 2km x 2km
- Hotspot detection
- Flaring detection
- Prediction of where leaks are most likely to occur
- Recommendation on action

OUR APPROACH TO GLOBAL TRANSPARENCY

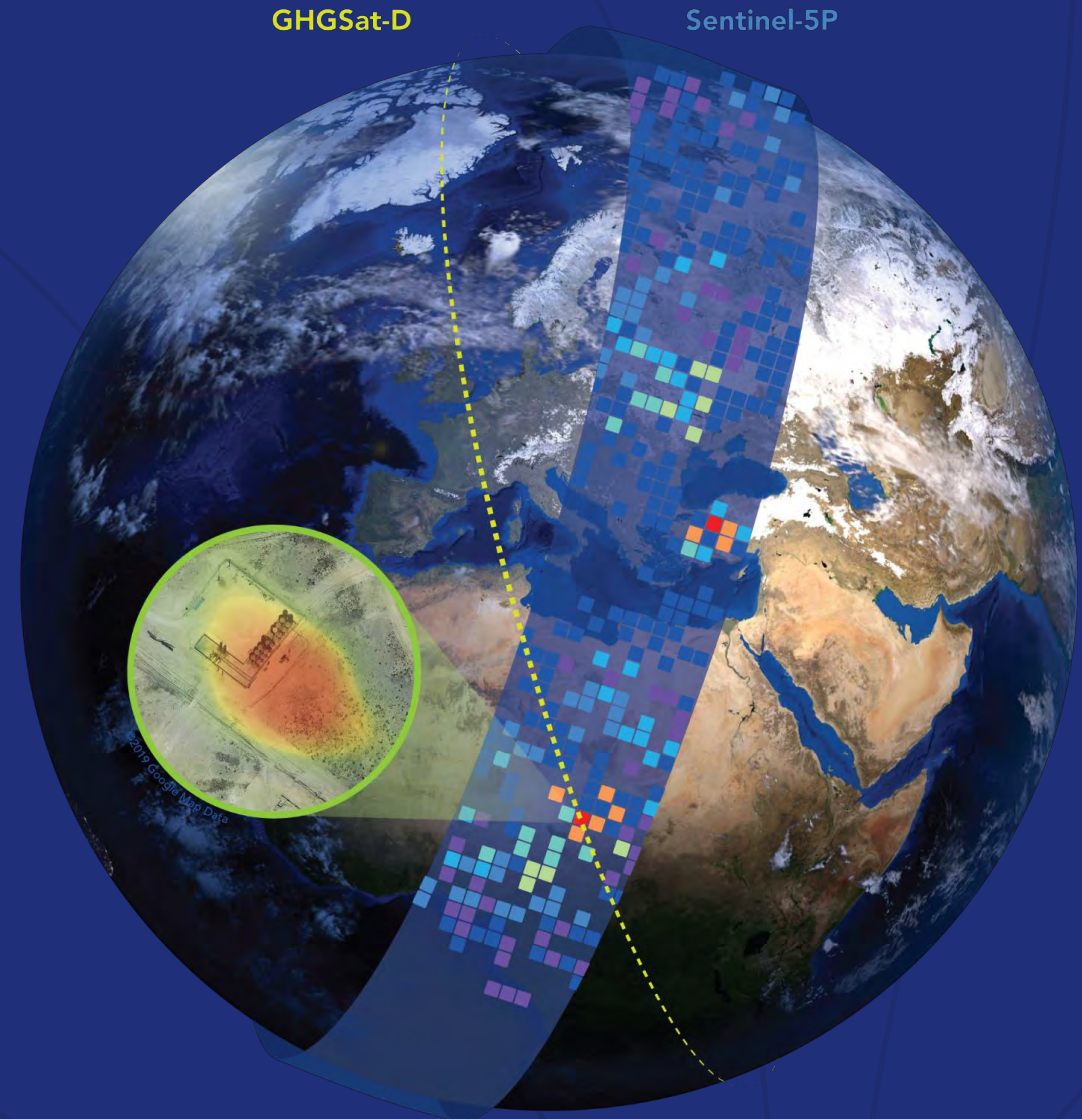
GHGSat data is available for commercial sale

We deliver industry-specific applications to provide actionable insight on methane emissions

Data is available for developing new science & applications

GHGSat invites collaboration from space agencies, academics and research organisations

Pulse delivers a free high-resolution, global methane visualization that incorporates public & private data



PLANS FOR THE UK

Today

- 5 employees
- Office at the Silicon Roundabout
- Scoping office locations elsewhere in the UK

Year ahead

- Recruitment will continue
- Deliver domestic and export services for ESG data



