GTI ENERGY

SAGE

STATISTICS, ANALYTICS, AND GIS IN ENERGY CONFERENCE

August 13-14, 2025 | Des Plaines, Illinois

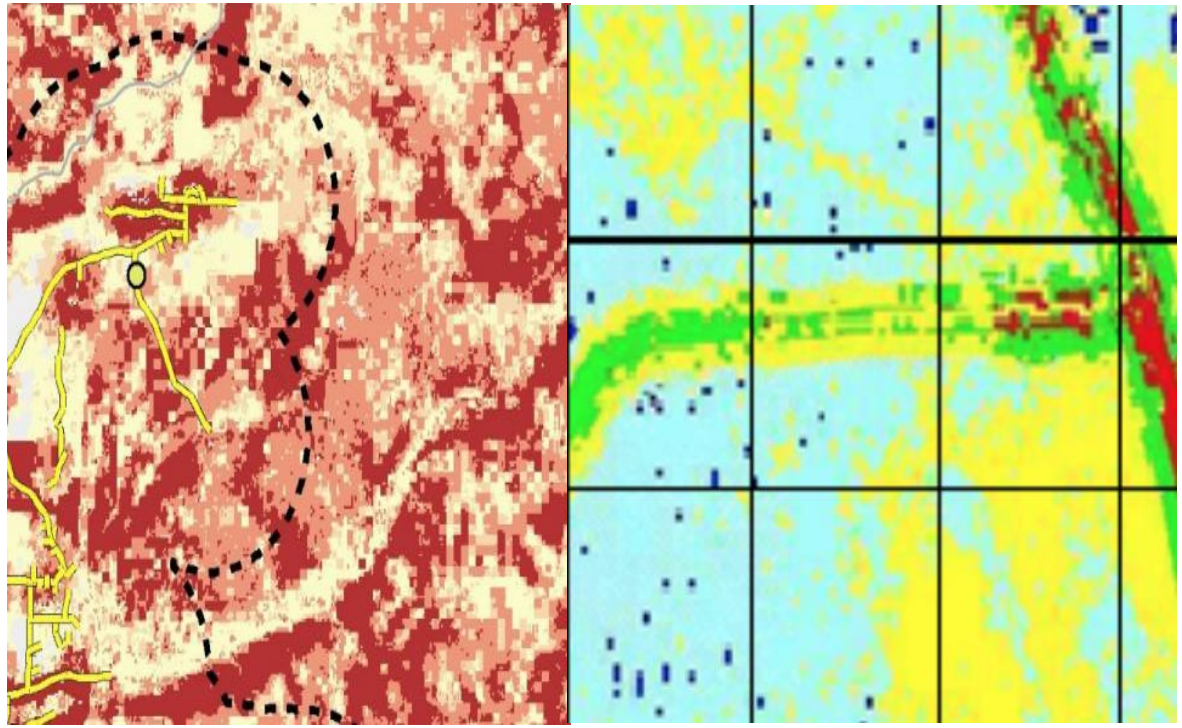
Remote Sensing for Environmental Monitoring

Bhareth Kachroo

CTO, streambatch.io

Daily Monitoring: Fire Risk

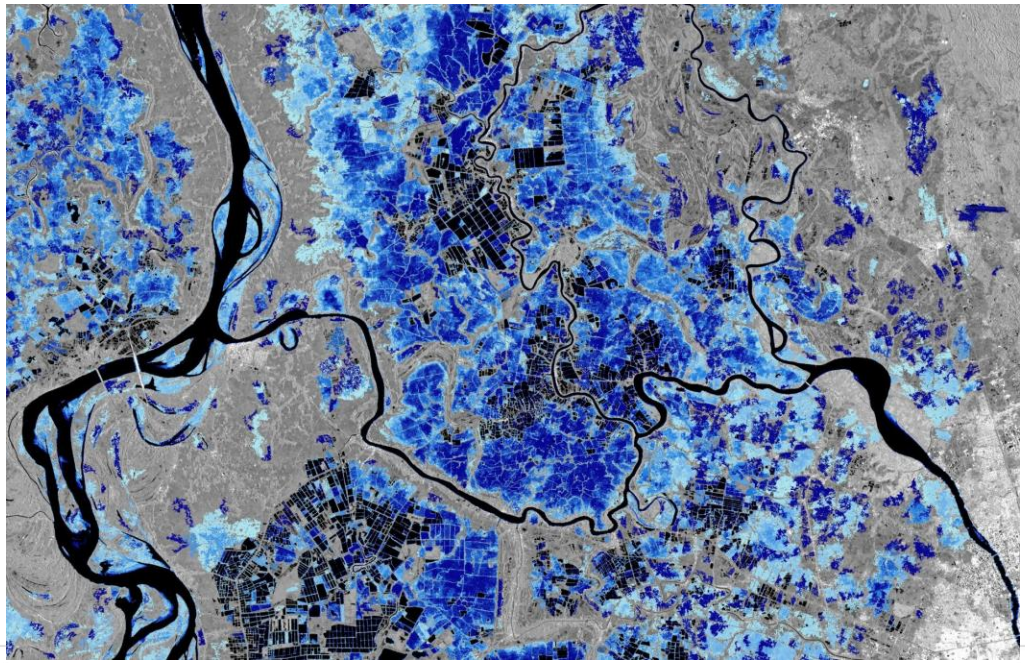
- Monitoring utility lines with daily 30m satellite updates on vegetation growth, dryness, fire risk
- Dovetails with less frequent drone/aerial mapping
- Supplies dashboards, more efficient inspections

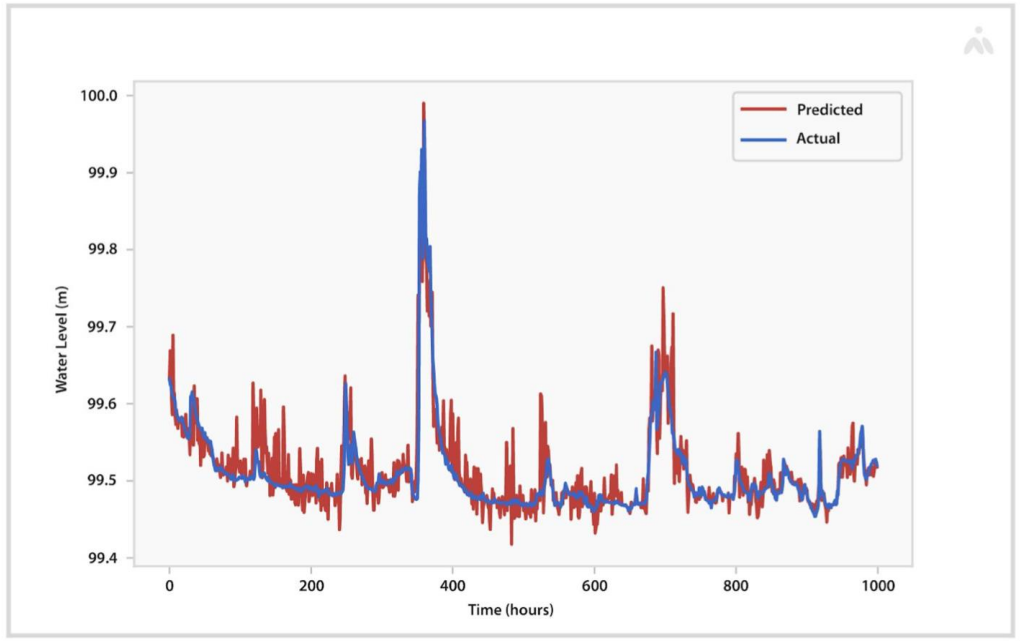


*Figures are just examples of fire risk maps, not part of the project.

1. Left: https://edocs.puc.state.or.us/efdocs/HAQ/ro14haq171953.pdf
2. Right: https://www.researchgate.net/figure/Fire-Hazard-Rating-Map-of-the-study-area_fig3_237007131

GTI ENERGY
SAGE
STATISTICS, ANALYTICS, AND GIS IN ENERGY CONFERENCE





Predictive Modelling: Flood Forecasting

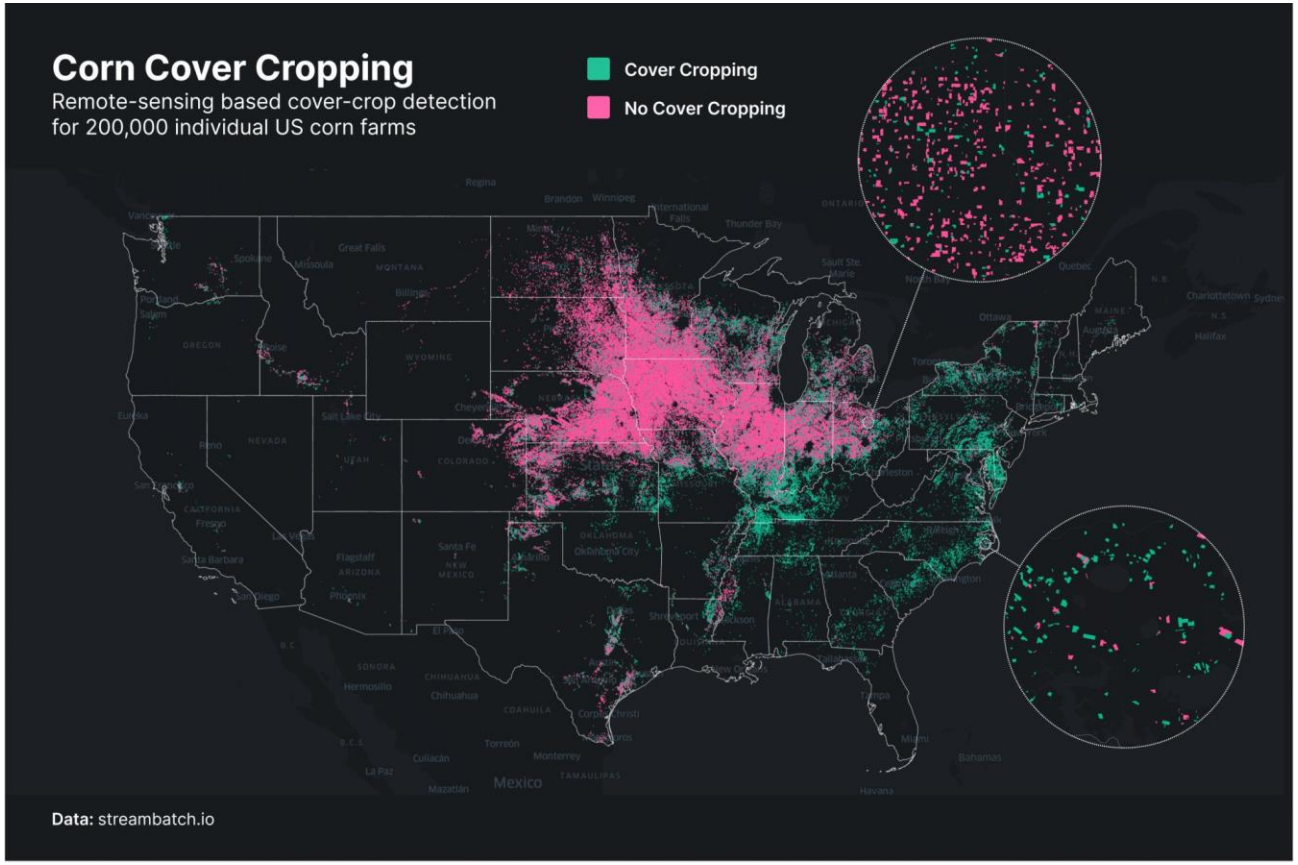
- 10 years of past satellite images make automatically updated flood maps
- Data fusion: trained predictive model with IoT sensors, weather forecasts, satellite imagery
- 24hr ahead flood prediction with 93% accuracy–better than a guy looking at the radar

1. https://www.esa.int/ESA_Multimedia/Images/2021/11/Copernicus_Sentinel-1_flood_monitoring

GTI ENERGY
SAGE
STATISTICS, ANALYTICS, AND GIS IN ENERGY CONFERENCE

Scaling Spatially: Land Use

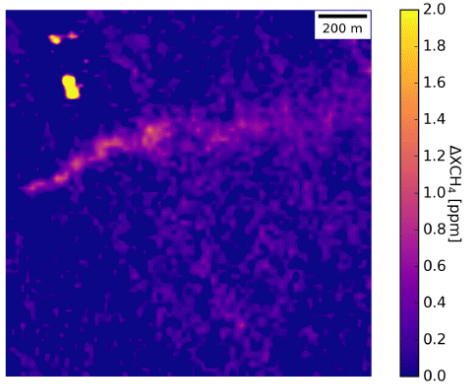
- Lower-resolution methods like satellite can scale up very cheaply
- Limiting factor is usually local calibration data
- This is 200k parcels across US analysed for 5 yrs for <$10K



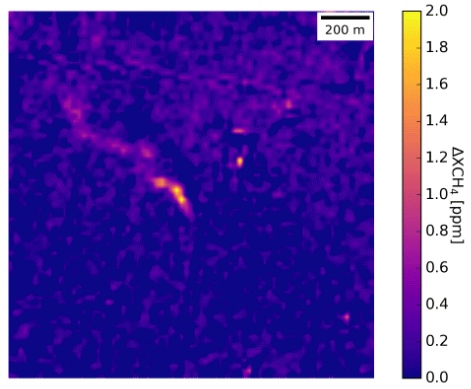
GTI ENERGY
SAGE
STATISTICS, ANALYTICS, AND GIS IN ENERGY CONFERENCE

Targeting: Emissions Monitoring

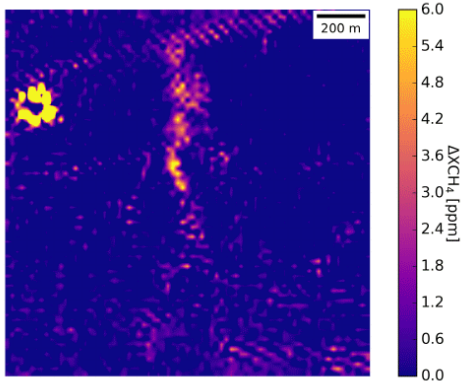
- Public satellite data (SWIR), 2-3 day revisit
- Works for >1t/h
- Tradeoff: Distance vs. Sensor reuse



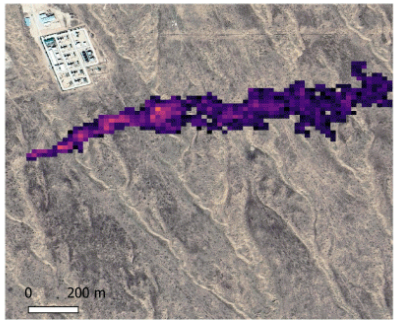
(a) ΔXCH_4 (Korpeje)



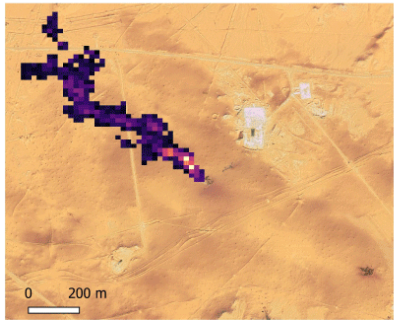
(b) ΔXCH_4 (Hassi Messaoud)



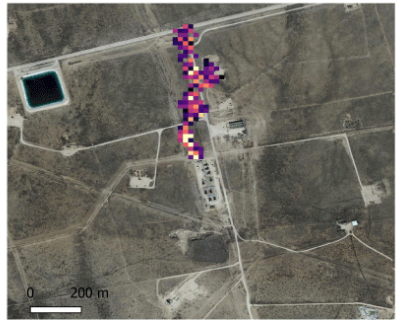
(c) ΔXCH_4 (Permian)



(d) ΔXCH_4 mask (Korpeje)



(e) ΔXCH_4 mask (Hassi Messaoud)



(f) ΔXCH_4 mask (Permian)

- Public data→Scheduled/Tasked Satellite→Aerial→Drone→Sensor
- Cool new tech: laser sensors on drones, aerial interferometry

GTI ENERGY
SAGE
STATISTICS, ANALYTICS, AND GIS IN ENERGY CONFERENCE

1. https://amt.copernicus.org/articles/16/89/2023/

GTI ENERGY

SAGE

STATISTICS, ANALYTICS, AND GIS IN ENERGY CONFERENCE

August 13-14, 2025 | Des Plaines, Illinois

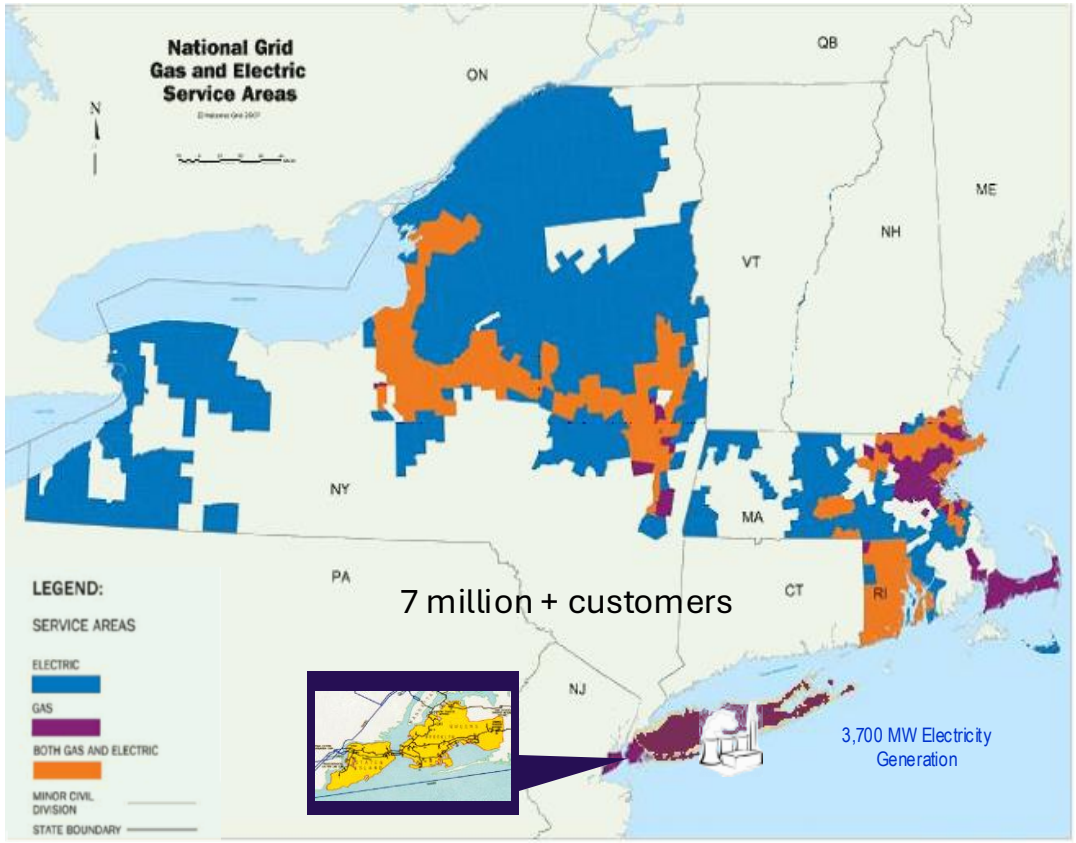
Remote Sensing for Environmental Monitoring

Brian Barkwill P.E.

Gas Innovation National Grid

National Grid: Gas Innovation

- National Grid has over 7 million customers across its gas and electric business.
- Funding comes primarily through surcharges on gas usage, which supports traditional R&D as well as research consortium efforts such as OTD and NYSEARCH.



OTD Operations Technology Development

NYSEARCH Natural Gas RD&D

GTI ENERGY SAGE
STATISTICS, ANALYTICS, AND GIS IN ENERGY CONFERENCE

Gas Innovation Focus Areas

1. Customer & Personnel Safety
   - RMDs and gas dispersion studies
   - Remote gas sensing for first responders
   - Work Zone Intrusion
2. Environmental Matters & Carbon Emission Reduction
   - Advanced leak detection
   - Alternatives to venting
3. Operational Excellence
   - Smart tools, training
   - Advanced locating technologies, cross bore avoidance
4. Asset Integrity & Network Reliability
   - Advance remote sensing
   - Material verification, tracking, NDT of plastic
5. Future of Heat & Decarbonization
   - Hydrogen, RNG

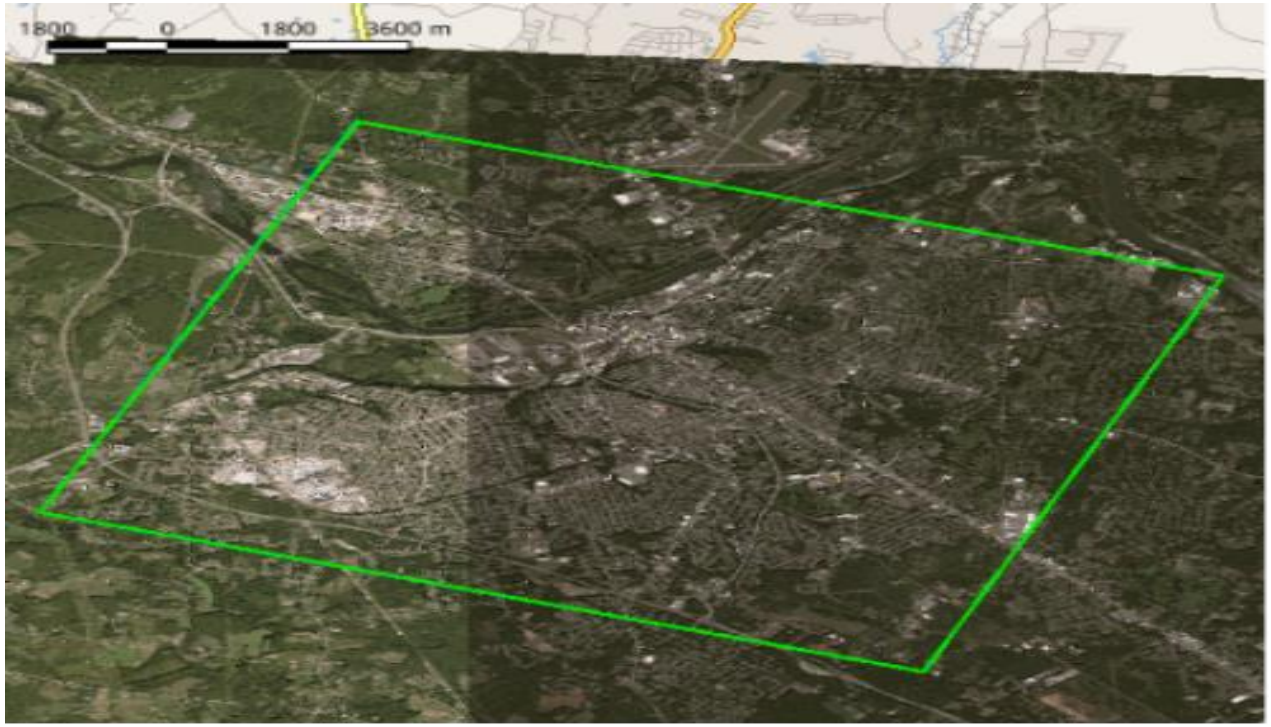
Methane Sensing R&D

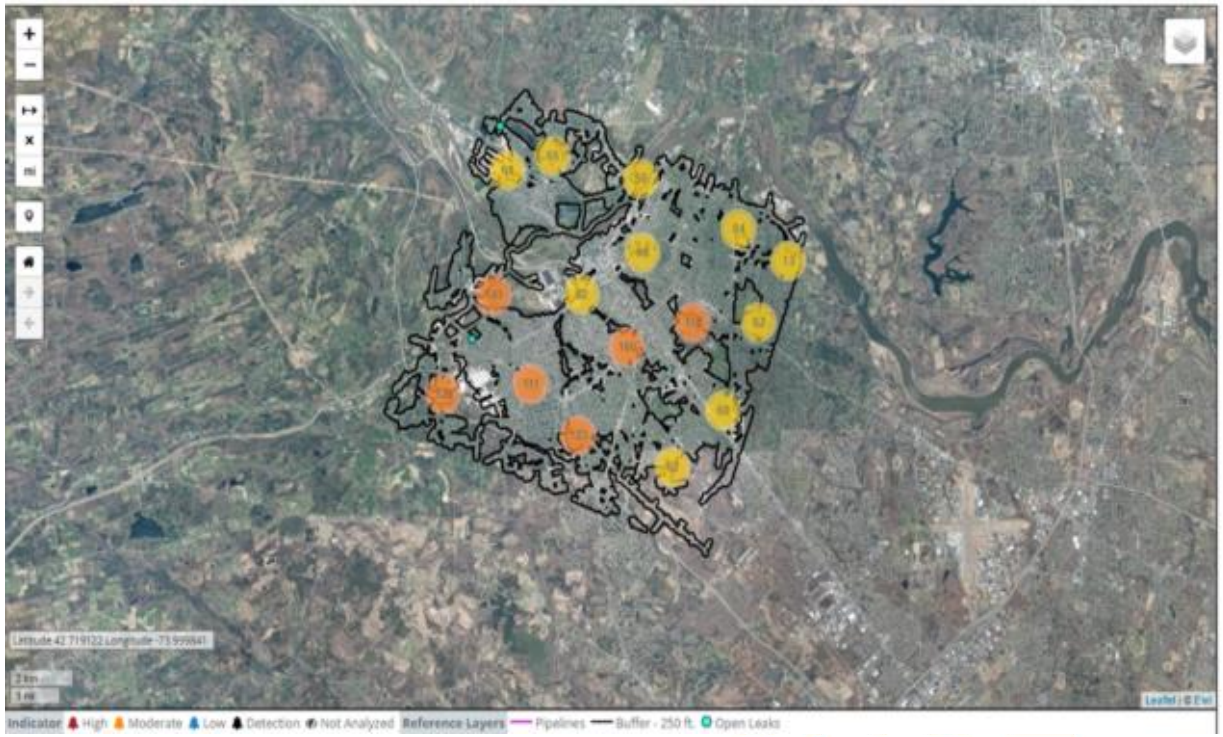
- Advanced Mobile Leak Detection
  - Roll out of Advanced Leak Detection Project in downstate NY to target high emitting leaks
  - 7.22.J – Evaluation of Advanced Mobile Leak Detection Systems
- Self calibrating Combustible Gas Indicators (CGI)

GTI ENERGY
SAGE
STATISTICS, ANALYTICS, AND GIS IN ENERGY CONFERENCE

Advanced Remote Sensing – Satellite

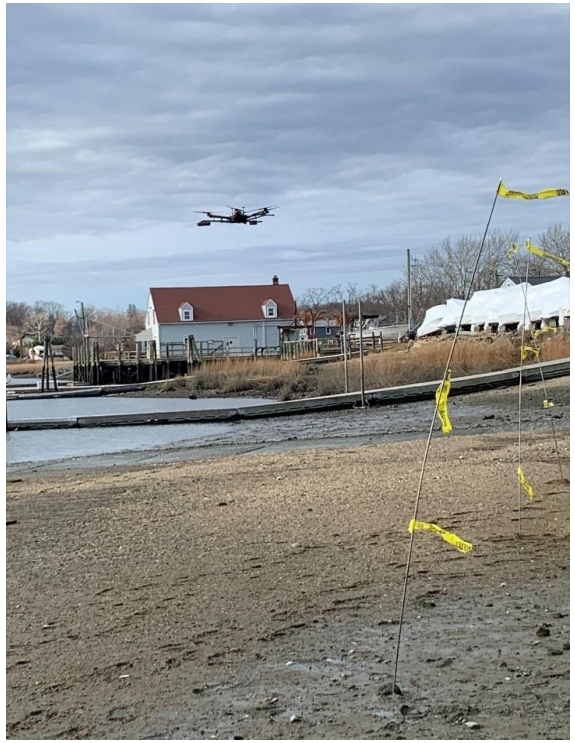
- National Grid conducted a pilot of methane detection via satellite images between May 2023 through September 2024.
- Six captures with several controlled releases were conducted.

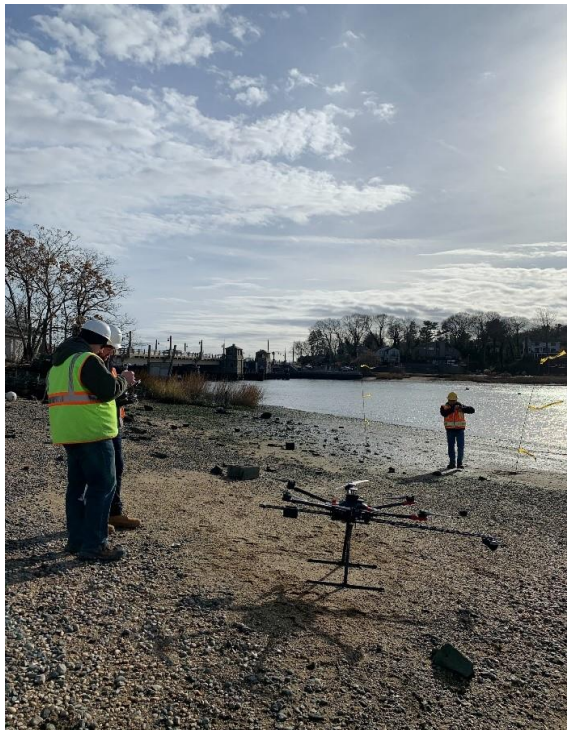




Advanced Remote Sensing – Aerial

- National Grid has been apart of several consortia research projects deploying Aerial Sensing Technologies.
- A traditional pilot project with Bridger Photonics that will be held in the same location as our satellite project is slated to begin this fall.





SAGE
STATISTICS, ANALYTICS, AND GIS IN ENERGY CONFERENCE

Digital Leak Survey

- Intent is to digitalize leak survey process instead of traditional printing out maps for technician routing and uploading completed paperwork to send to PSC
- GPS technician tracking, digital record keeping, and breadcrumbing are among key features
- Save time and material on creating mapping route for technicians, streamline and standardize reporting process (instead of countless different handwritings)