

# ★ AUDIOVISUAL SERVICES ★

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METRONET

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UTILITY RESOURCES LLC

# ★ 2021 MIDWEST ★ DAMAGE PREVENTION ★ TRAINING CONFERENCE



***LAUNCHED! MONITORING SOLUTIONS FOR INFRASTRUCTURE  
OPERATORS FROM THE SPACE ECONOMY***

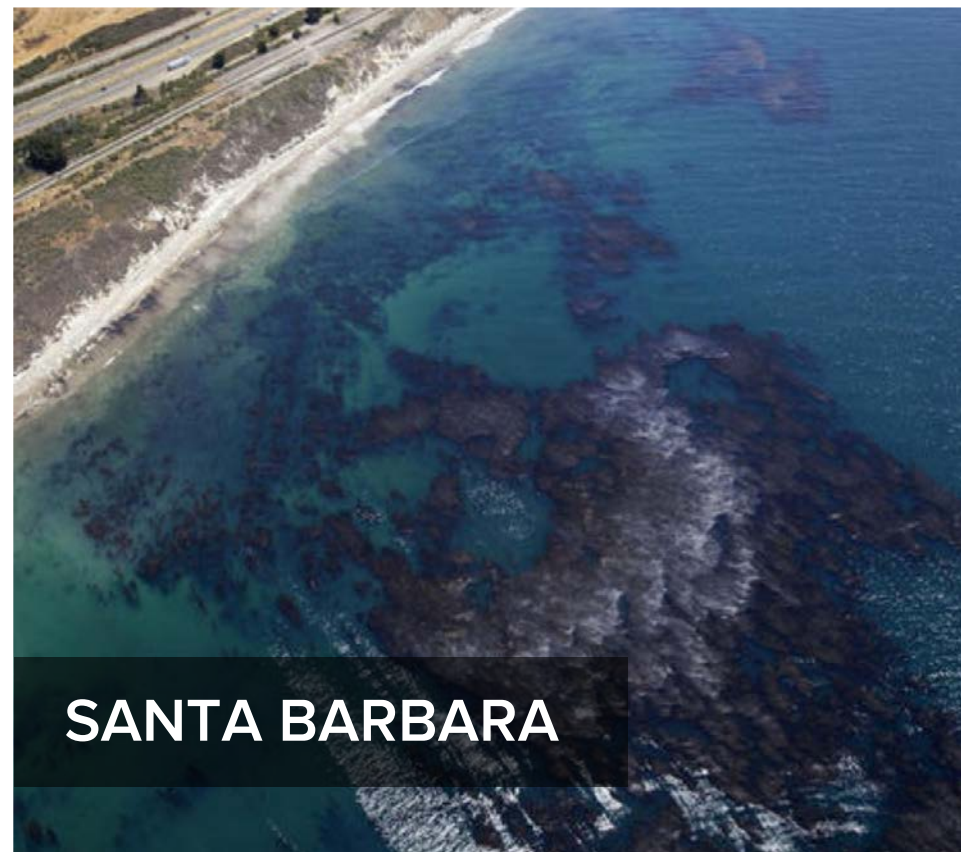
**Thursday November 11, 2021  
Session Block 1  
10:10 – 11:00 am  
French Lick, Indiana**



***R. Peter Weaver  
peter@orbitalsidekick.com  
(985) 237-3306***



# Pipelines Are Everywhere, and They're Aging





# Energy Infrastructure Monitoring has been Hovering in the Past



## SUBJECTIVE MONITORING

What the pilot might see:



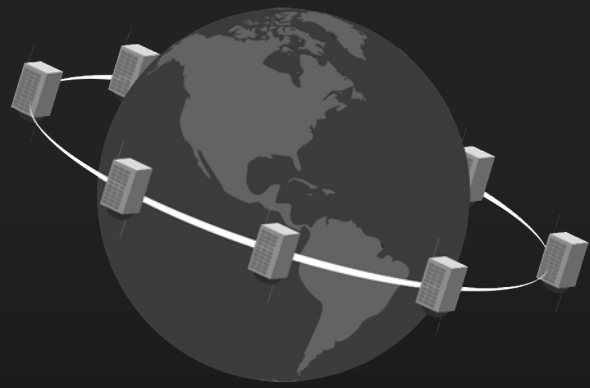
## COMPLIANCE REPORTING

What the operator might get:

Date	Observation Report	Method	Time	Reported To:
1/1/2019	No previously unreported activity.	Phone	12:08 PM	Name
1/8/2019	No previously unreported activity.	Phone	11:53 AM	Name
1/15/2019	No previously unreported activity.	Phone	10:30 AM	Name
1/22/2019	No previously unreported activity.	Phone	2:11 PM	Name
1/29/2019	No previously unreported activity.	Phone	1:17 PM	Name
2/5/2019	No previously unreported activity.	Phone	12:30 PM	Name
2/12/2019	No previously unreported activity.	Phone	11:31 AM	Name
2/19/2019	No previously unreported activity.	Phone	11:27 AM	Name
2/26/2019	No previously unreported activity.	Phone	2:17 PM	Name
3/5/2019	No previously unreported activity.	Phone	11:27 AM	Name



# Global Persistent Monitoring With Hyperspectral Satellites



## GHOST SYSTEM

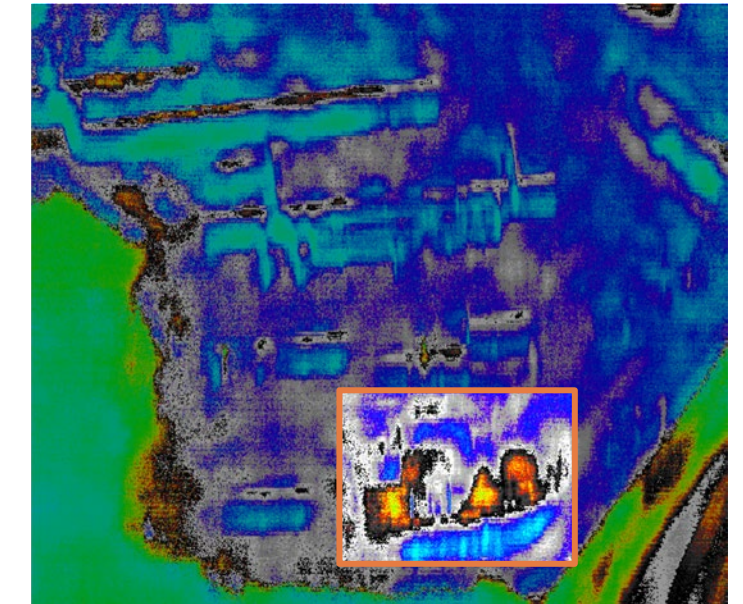
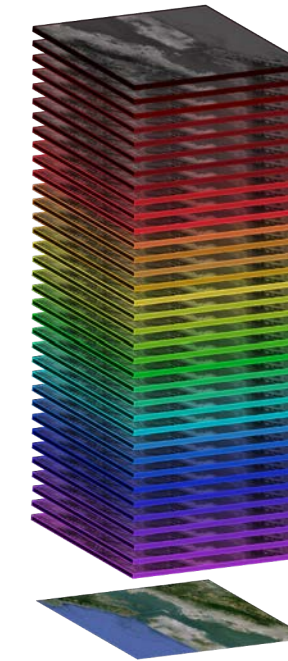
HSI Satellite Constellation  
Daily Monitoring

## SPECTRAL INTELLIGENCE™

Proprietary Chemical Fingerprinting



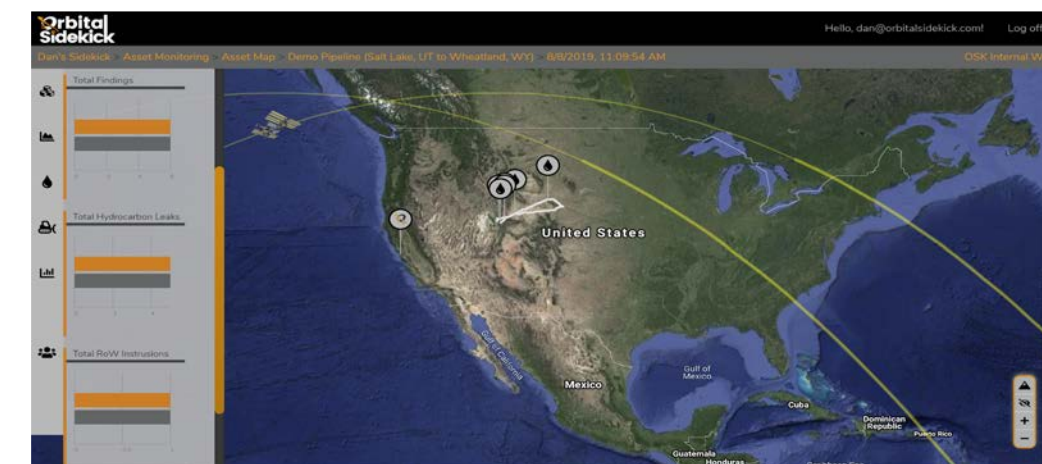
RGB Image  
No Hydrocarbon Detected



Hyperspectral Image  
Hydrocarbon Detected

## SIGMA™ USER PLATFORM

Global Monitoring Application



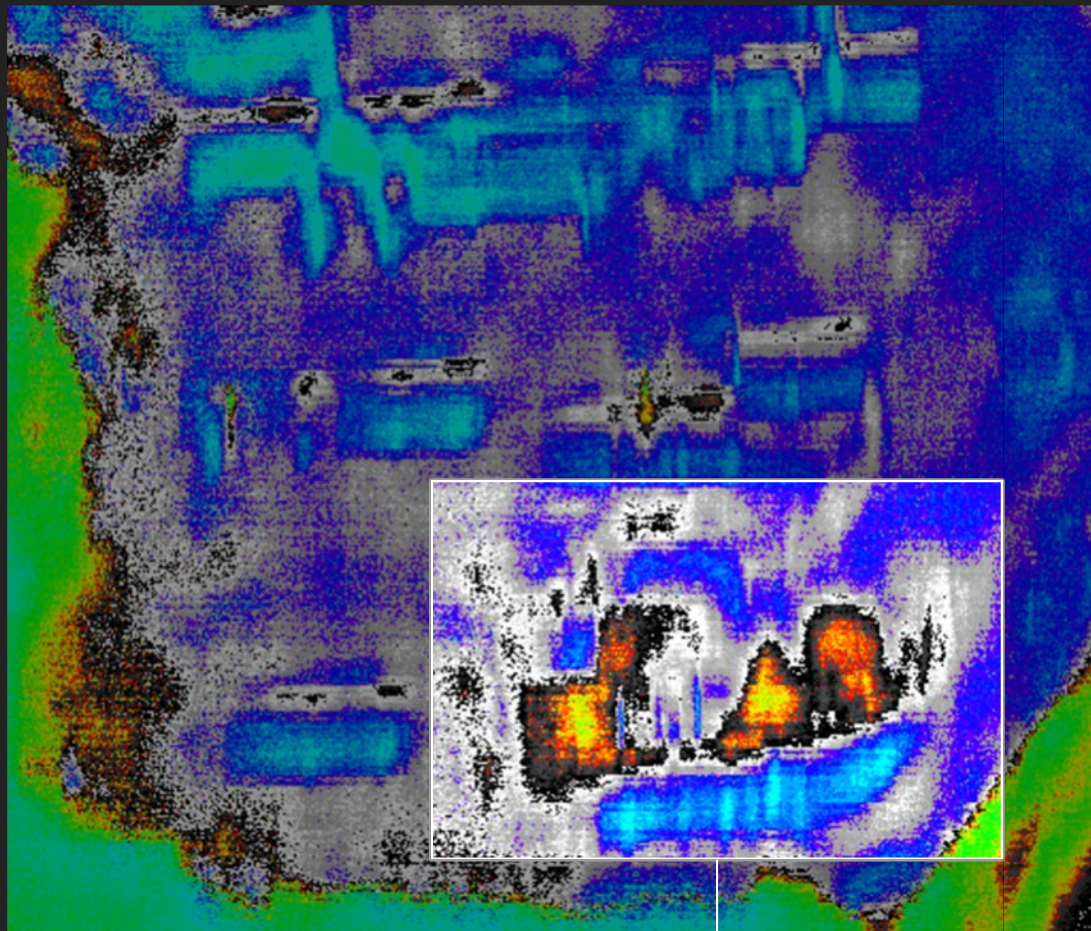
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# Underground Gas Leak

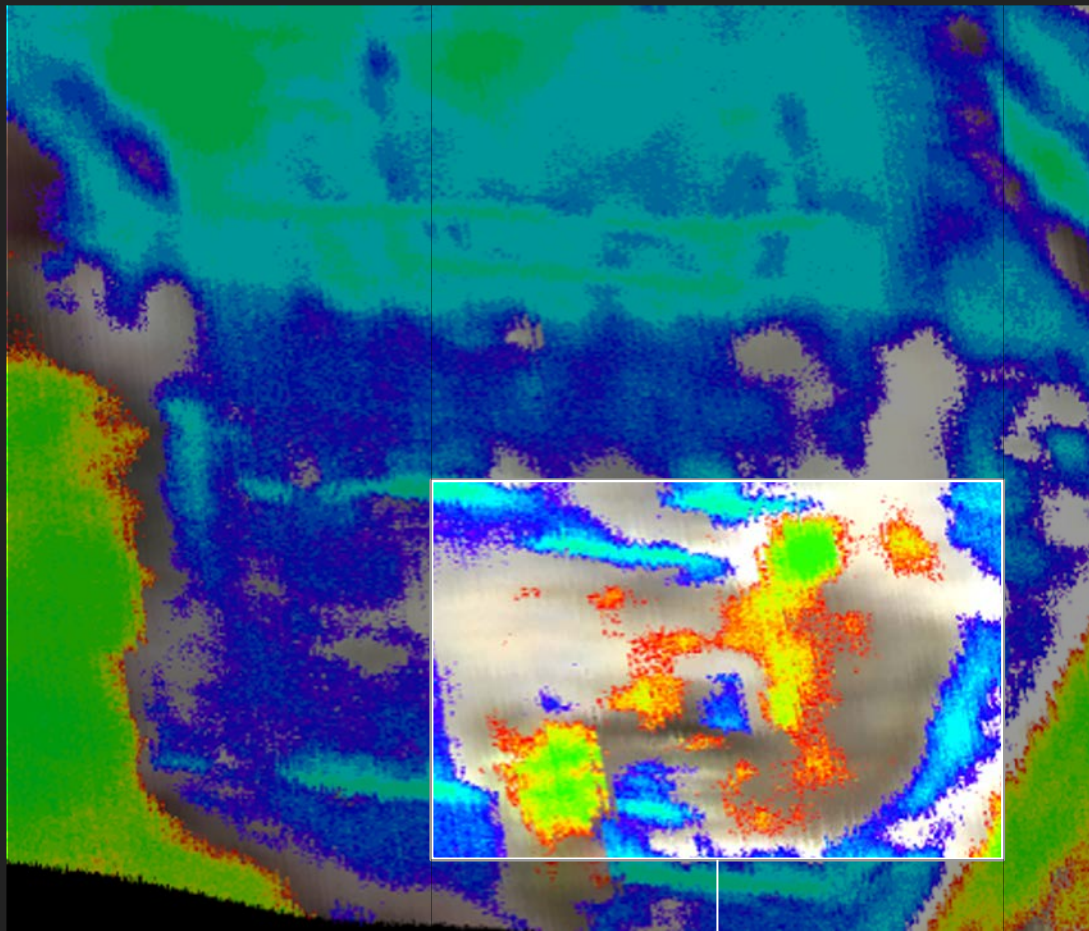
## CHANGE DETECTION AND SOIL DISTURBANCE



Issue detected



Issue is not visible  
in standard view



View after repair



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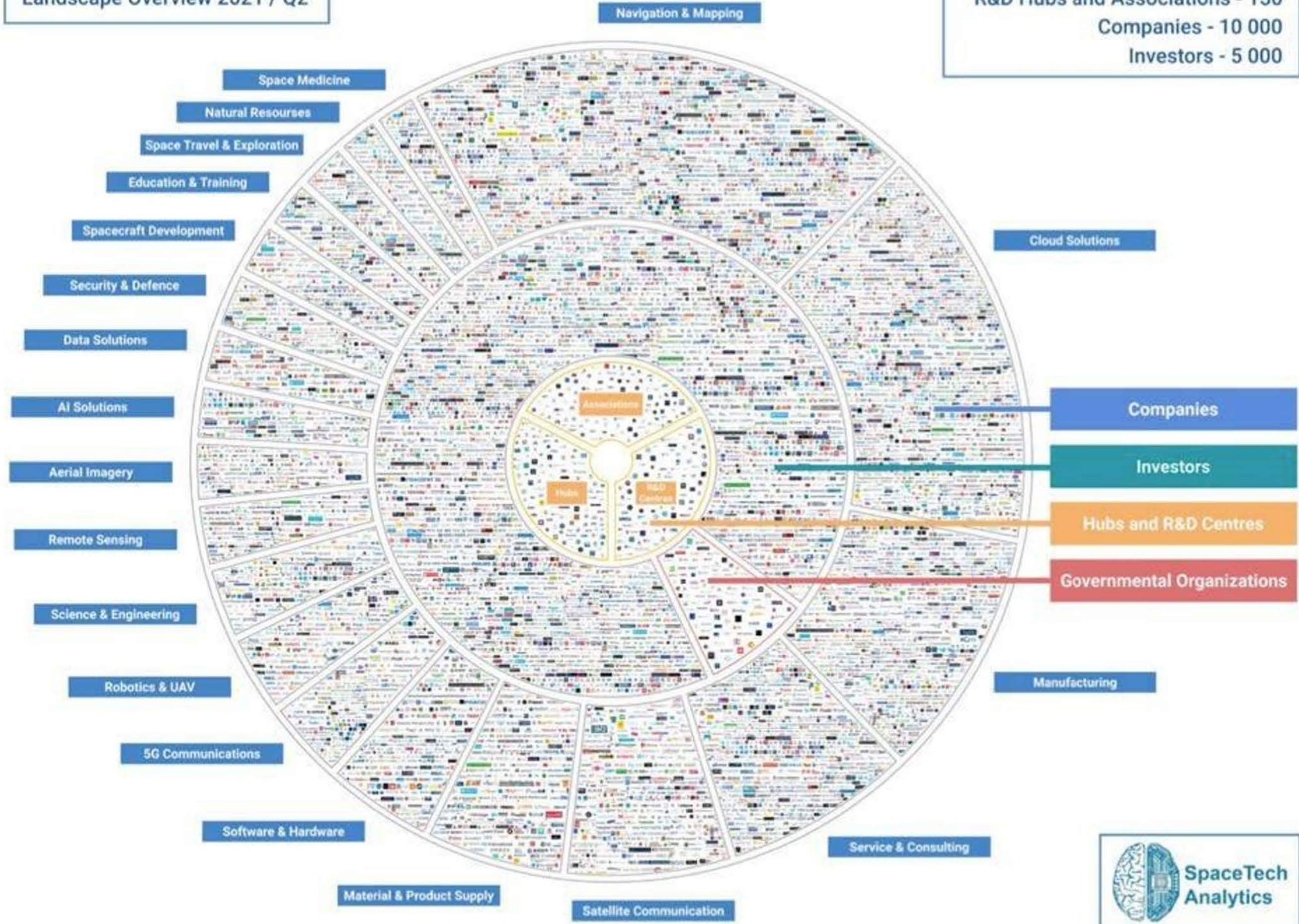






Today's  
SpaceTech  
Ecosystem  
Represents  
>\$4 Trillion

Global SpaceTech Ecosystem  
Landscape Overview 2021 / Q2

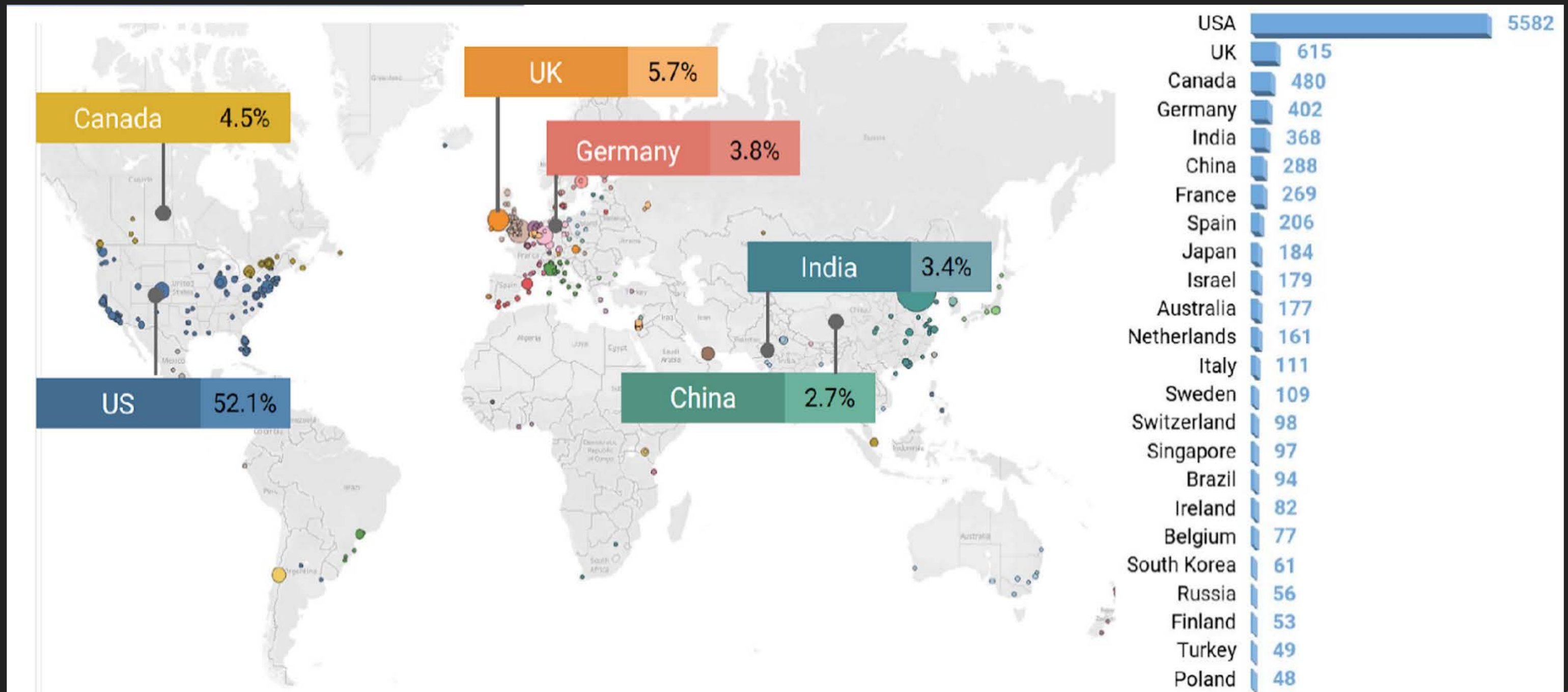


<https://www.spacetechnology.com/mindmap>



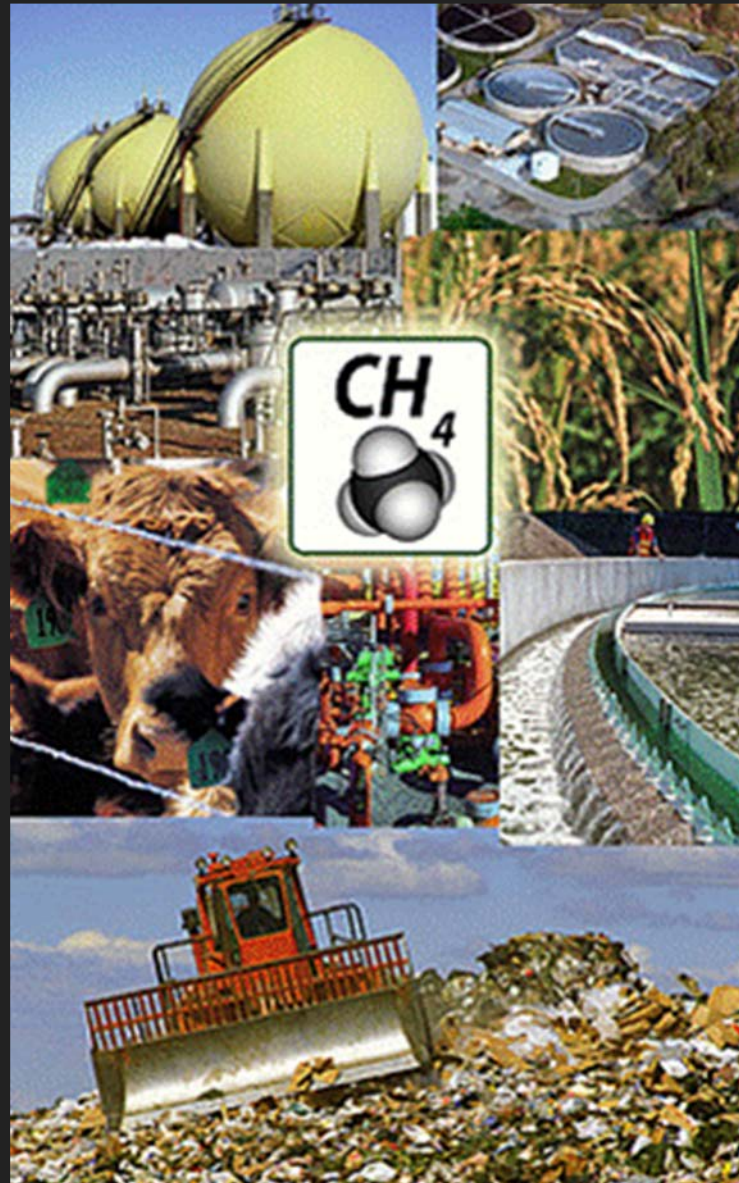


# Regional Distribution of Satellite Companies 2021 (by no. companies)





# What are the implications for managing how I do my job?

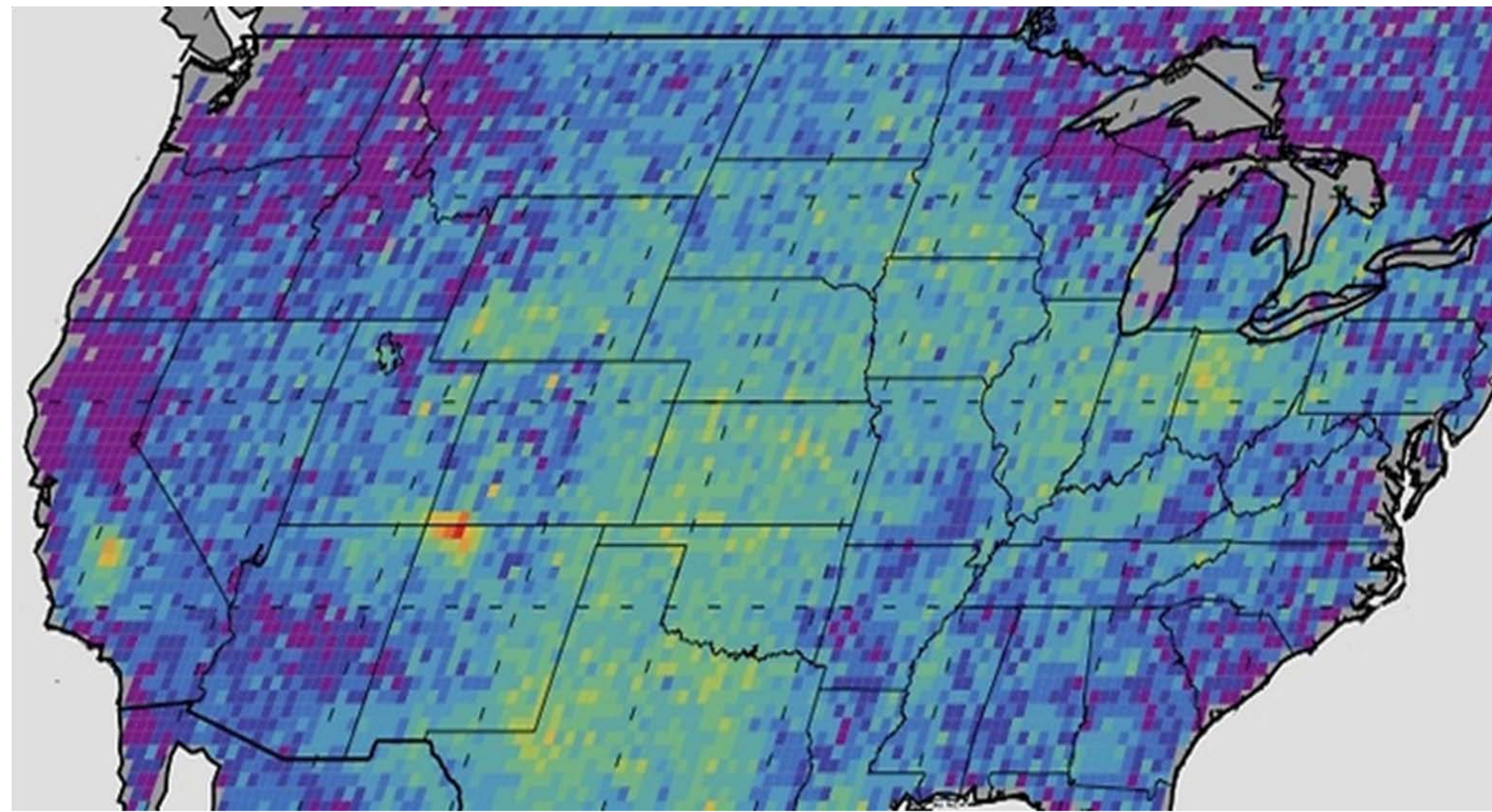




# Four Corners: (Reported 2012)

## *The First & Largest Methane Anomaly Detected from Space*

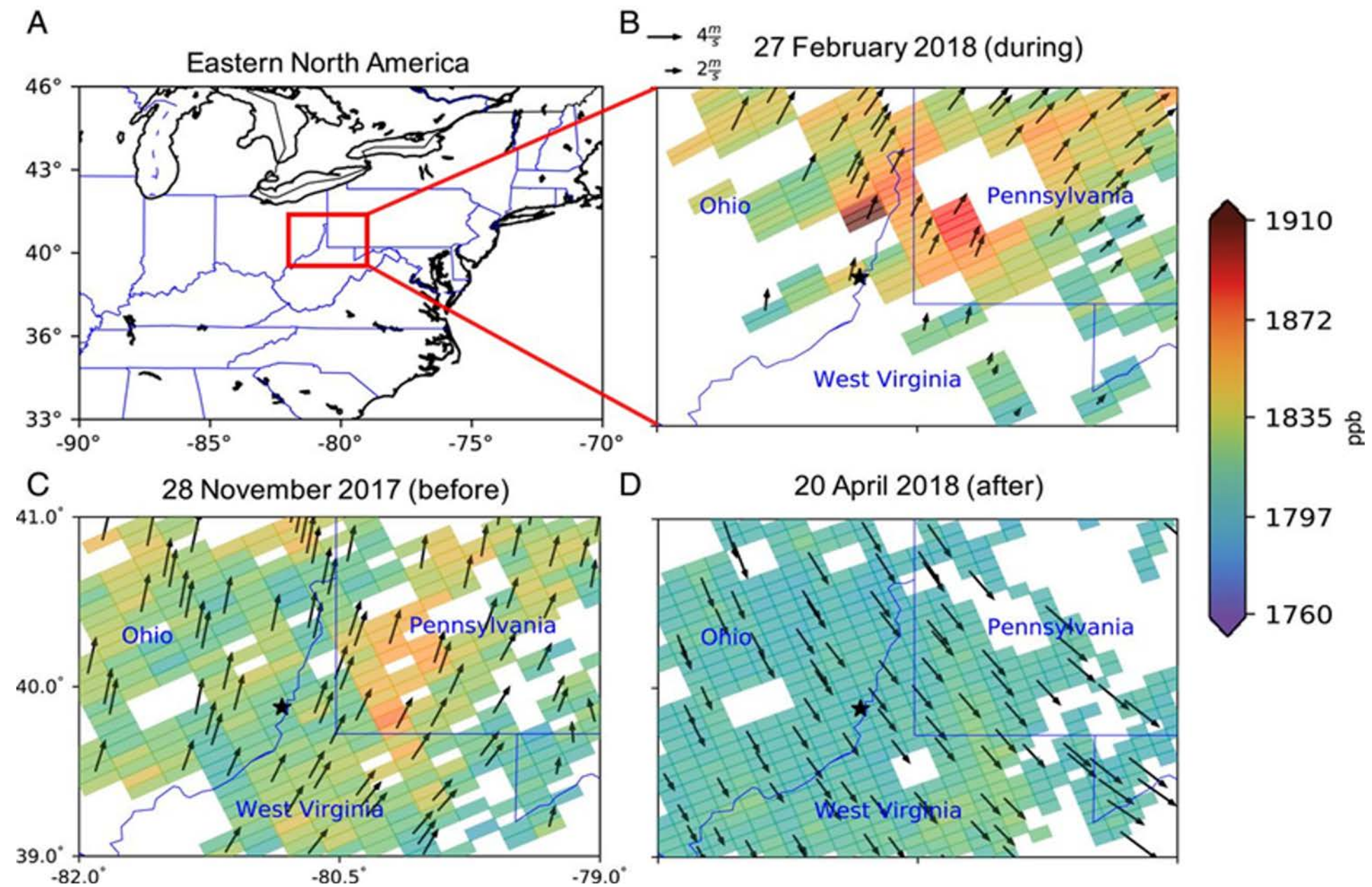
- ESA SCIAMACHY Sensor
- 2003 – 2009 Collection,  
results averaged
- 30 km x 60 km pixel





# Belmont County, OH (Feb. 2018)

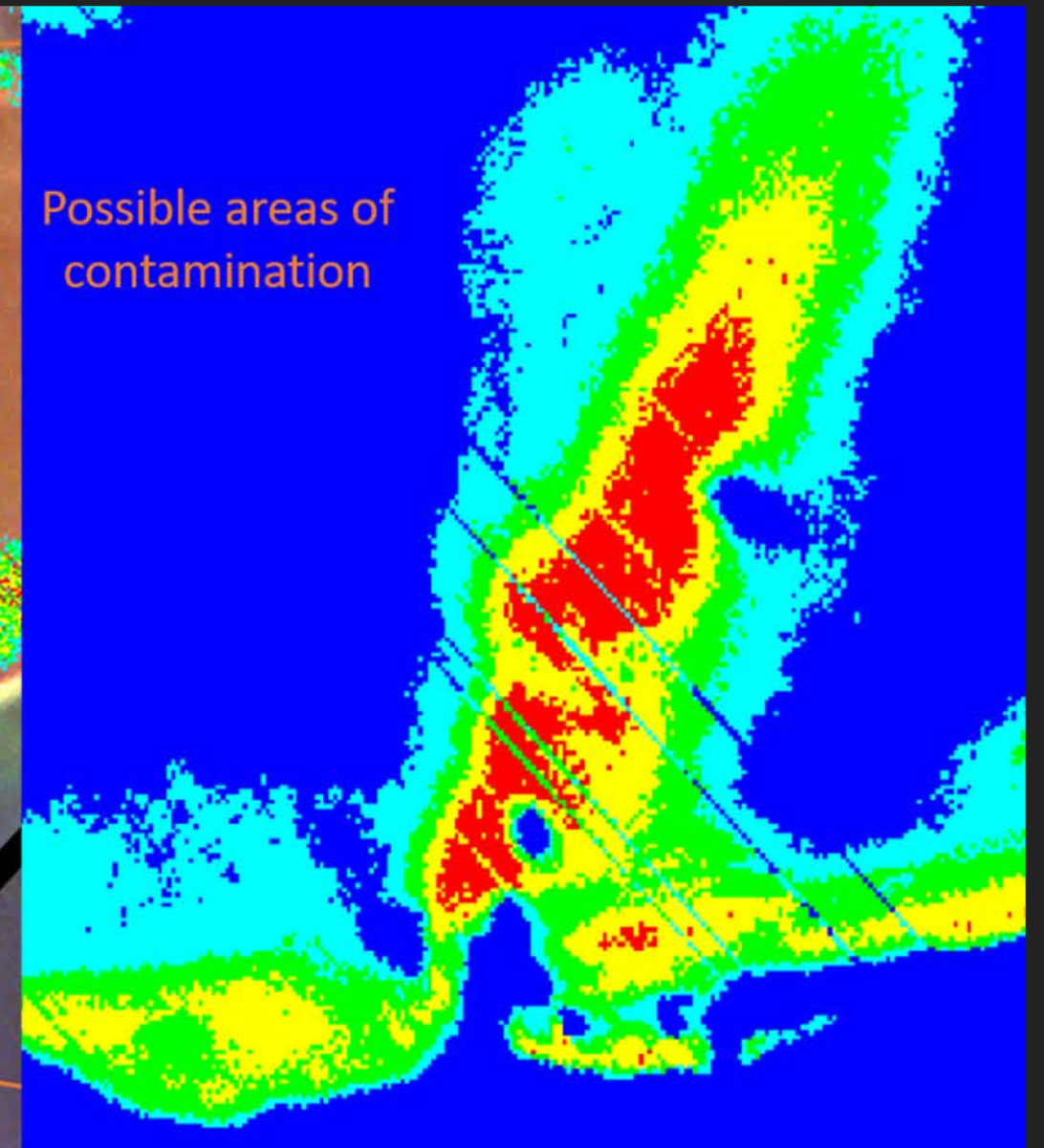
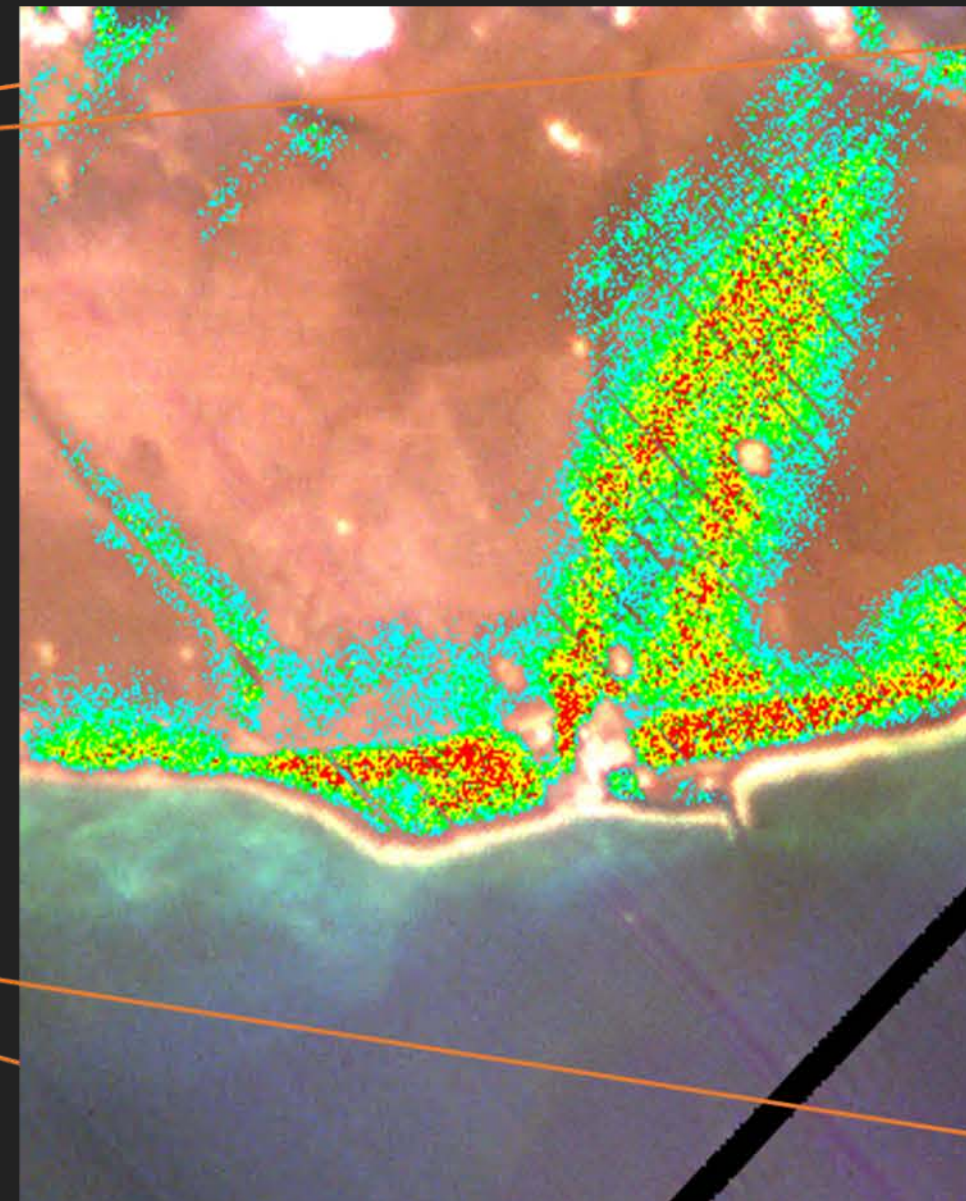
- ESA Sentinel-5P Sensor
- Wellhead blowout, 120 tph for 20 days
- Detection by a single observation
- 7 km pixel





# Grand Bahama Island, Hurricane Dorian (Sep. 2019)

ISS-HEIST



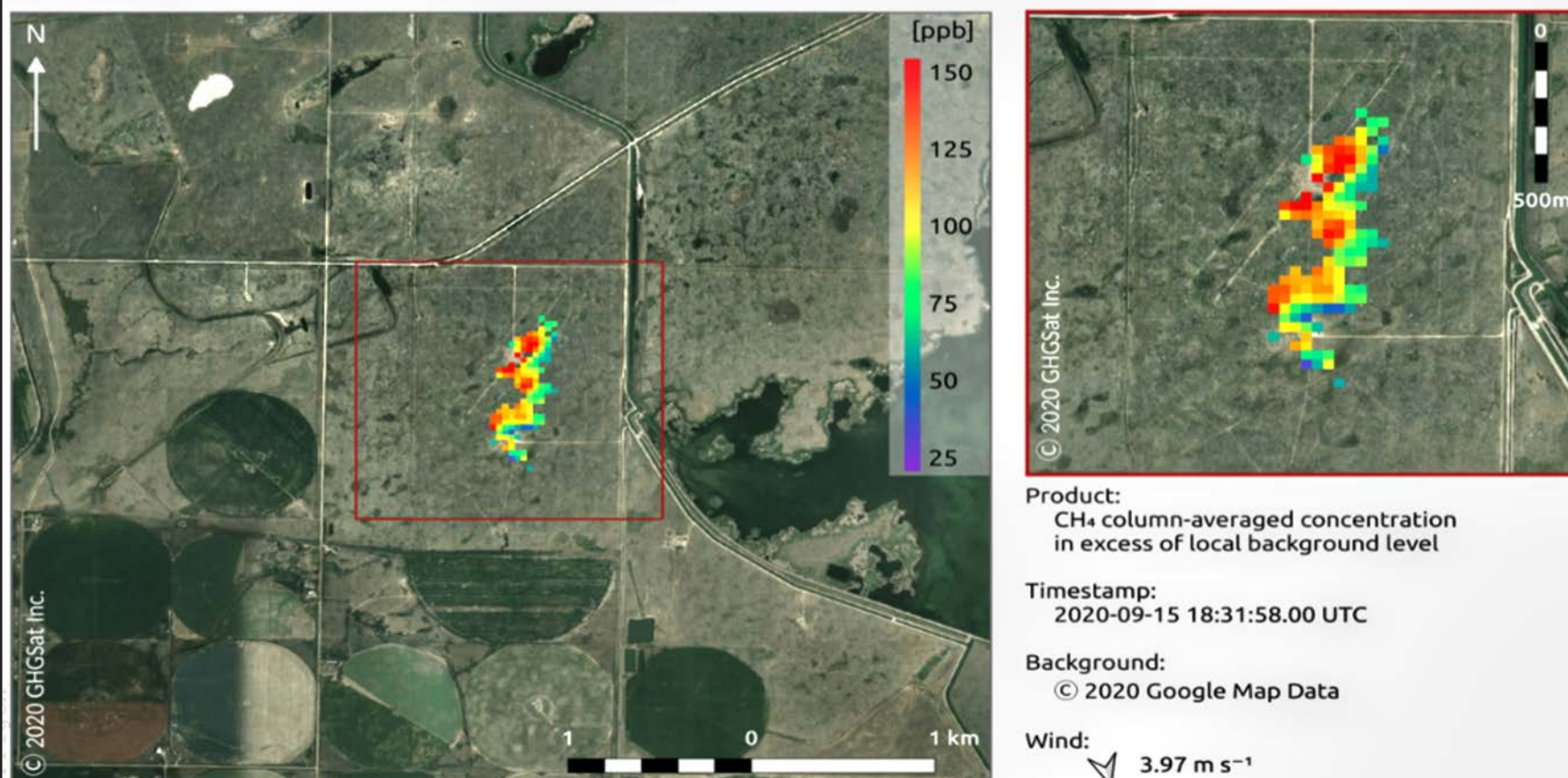
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## Controlled Release, Alberta - Canada GHGSat-C1 - CH<sub>4</sub> Measurement



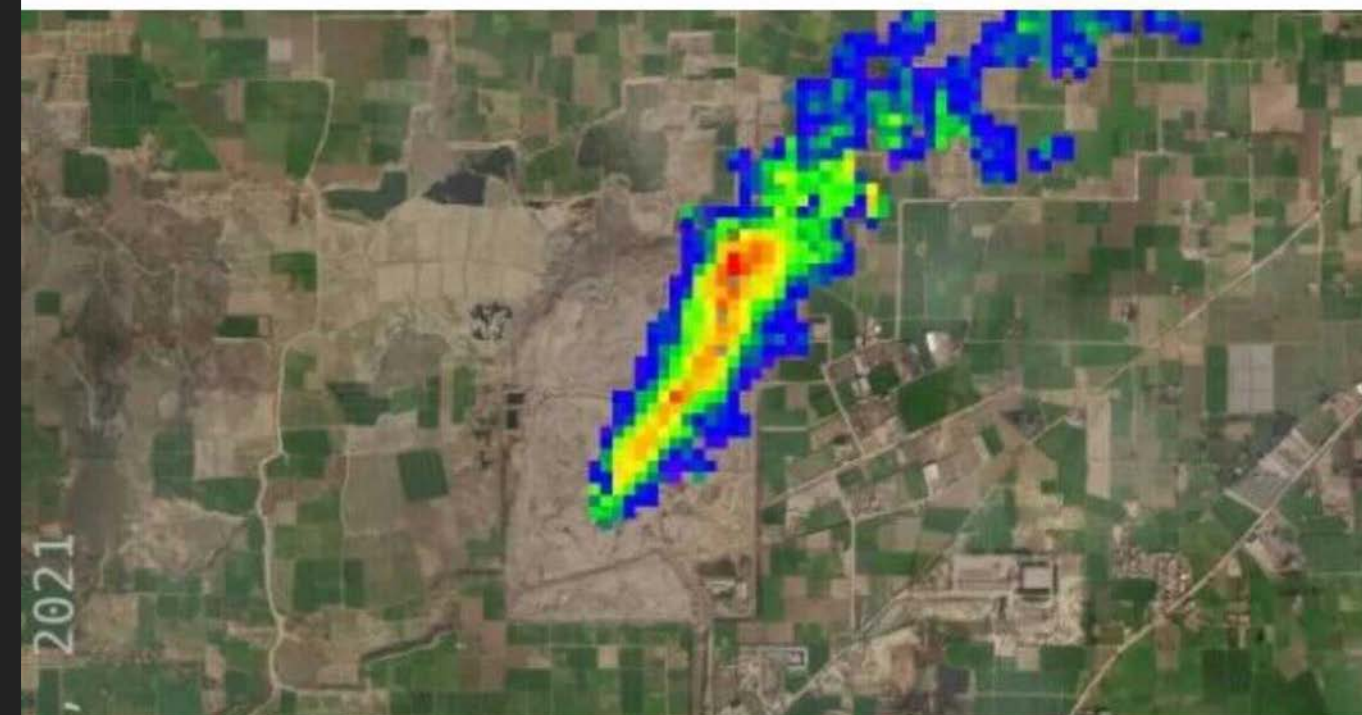
**GHGSAT**

14,901 followers

5d • Edited • 🌐

[+ Follow](#)

"Following Maasakkers' work, geoanalytics firm GHGSat, which offers higher resolution detection, captured a large methane plume on July 1 from Lakhodair landfill. 🛰️ The rate of release was about 4 tons per hour, which GHGSat captured using its own commercial satellites."



## Methane Plumes in Pakistan Put Landfills in the Spotlight - BNN Bloomberg

[bnnbloomberg.ca](https://bnnbloomberg.ca) ⚡ • 3 min read





# The Future of Earth Observation Satellites



World View 3

Commercial Custom Satellite  
Weight: 2800 kg  
Cost: \$680M  
Launched: 2014  
Planned Mission Life: 7.25years



Generic BCT Bus

Commoditized Satellite  
Weight: upto 250 kg  
Cost: <\$5M  
Launched: 2019  
Planned Mission Life:  
2-5 years

Can swap with any number of payloads  
(Systems of Systems approach)

- High resolution panchromatic
- Multispectral
- SAR
- Hyperspectral
- Thermal





# SPACEX

## Transporter-2 Deployments

- |                           |                             |
|---------------------------|-----------------------------|
| 1. PACE-1                 | 17. Third ICEYE Satellite   |
| 2. NewSat-19              | 18. LINCS-1                 |
| 3. First ICEYE Satellite  | 19. Mandrake-2 Able         |
| 4. TROPICS Pathfinder     | 20. Fourth ICEYE Satellite  |
| 5. GNOMES-2               | 21. First SpaceBEE Cluster  |
| 6. Tyvak-0173             | 22. Second SpaceBEE Cluster |
| 7. Second ICEYE Satellite | 23. D2/AltaCom-1            |
| 8. Tyvak-0211             | 24. LEMUR Number 1          |
| 9. YAM-3                  | 25. NewSat-22               |
| 10. TUBIN                 | 26. YAM-2                   |
| 11. UmbraSAR              | 27. LEMUR Number 2          |
| 12. ION Satellite Carrier | 28. Mandrake-2 Baker        |
| 13. LINCS-2               | 29. Sherpa-FX2              |
| 14. NewSat-20             | 30. Sherpa-LTE1             |
| 15. NewSat-21             | 31. Starlink                |
| 16. Capella SAR Satellite |                             |

T+ 00:56:45  
TRANSPORTER 2

SPEED  
27620  
KM/H

ALTITUDE  
537  
KM

STAGE 2 TELEMETRY

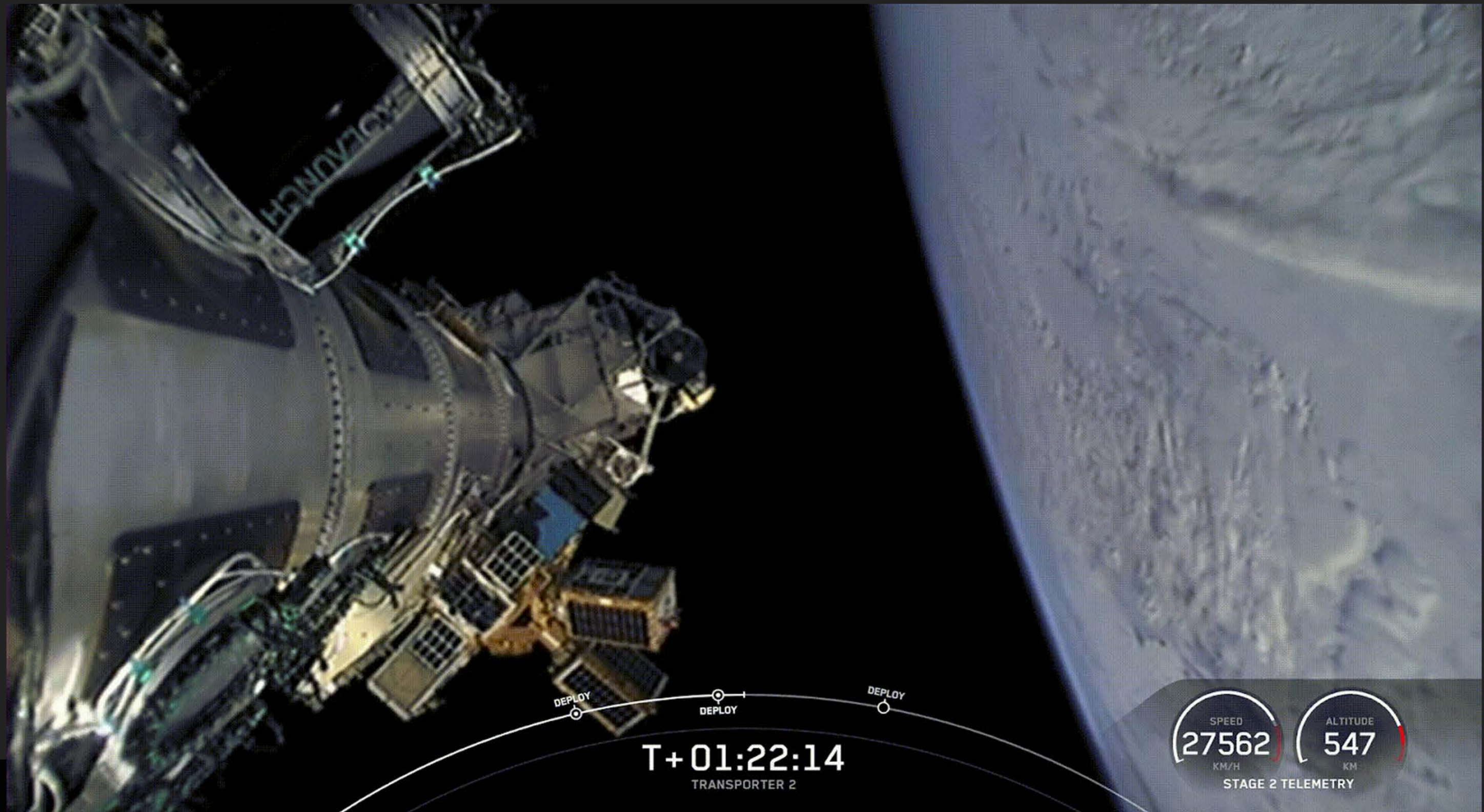
▶ ⏮ 🔊 • LIVE

⏭ CC 4K



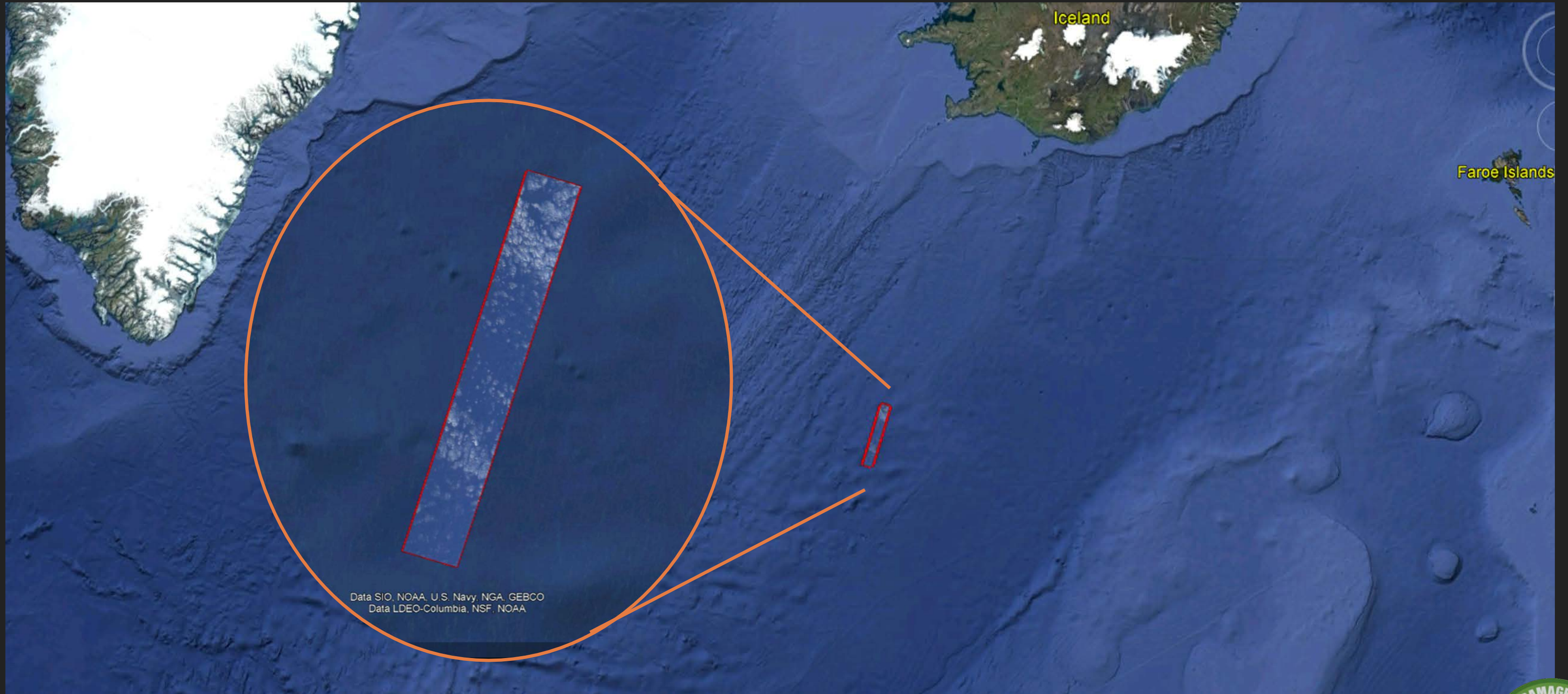


# Sherpa LTE-1 (aka. OSK "Aurora"), 30 June 2021





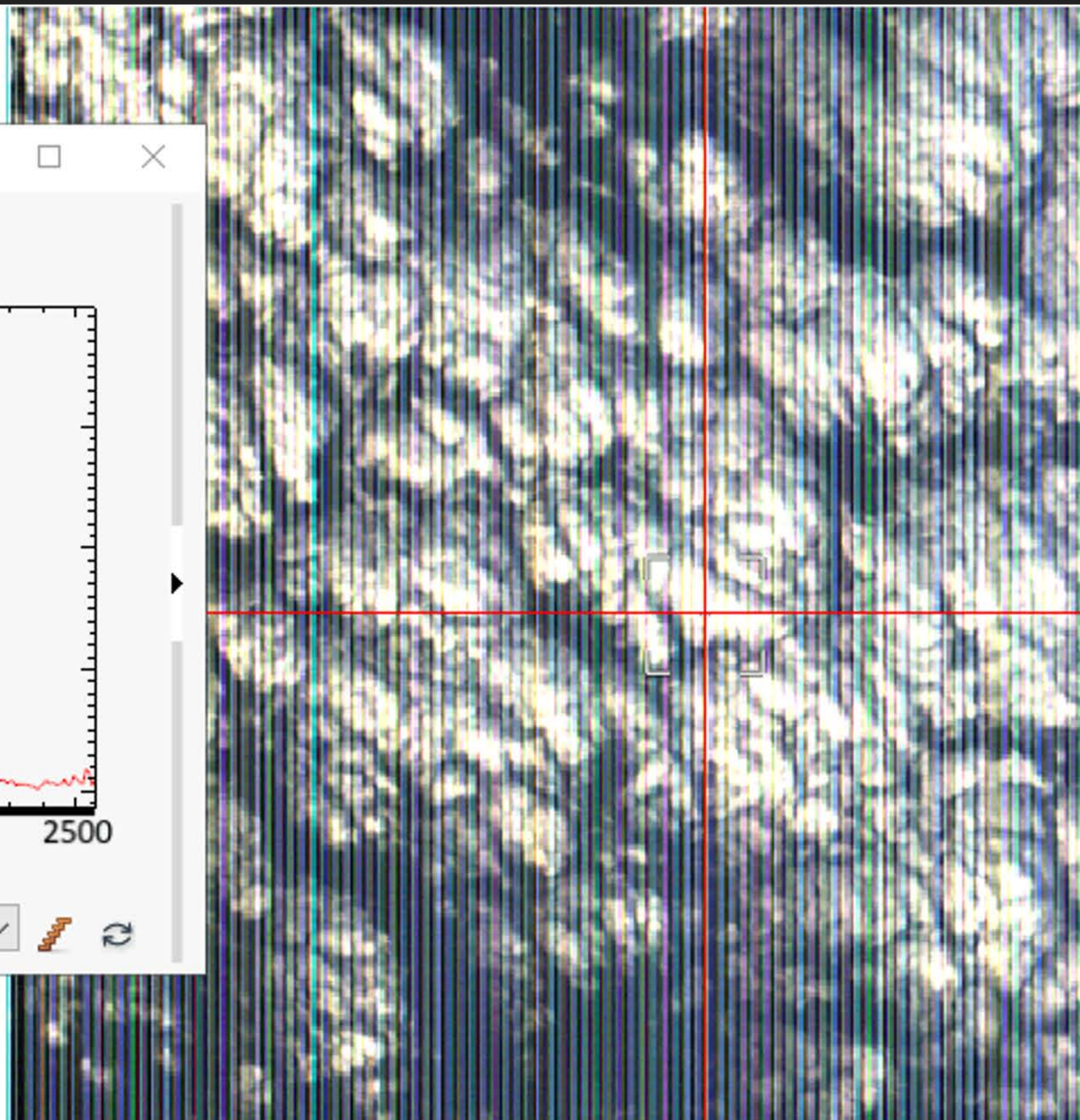
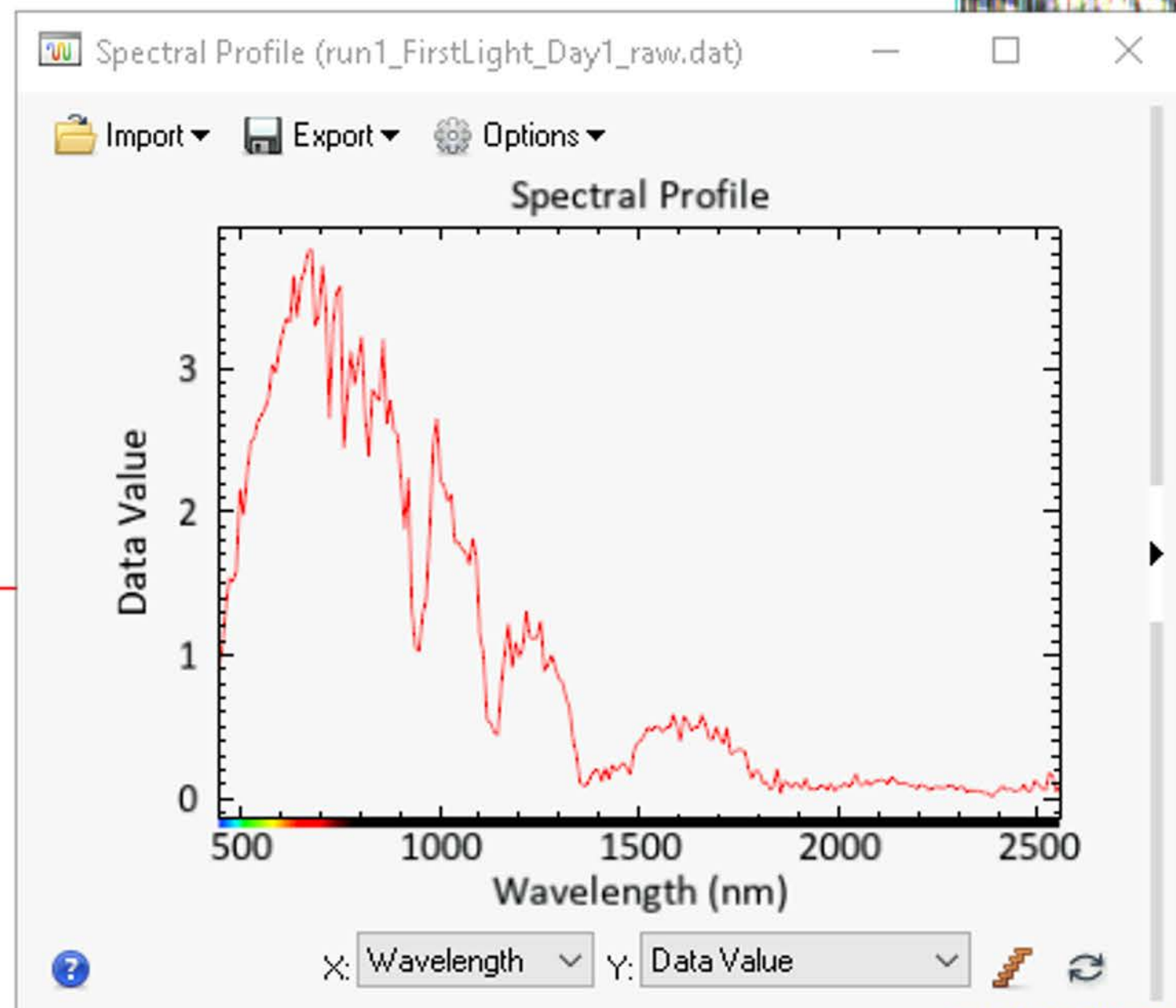
# OSK Aurora "First Light" – 17 October 2021



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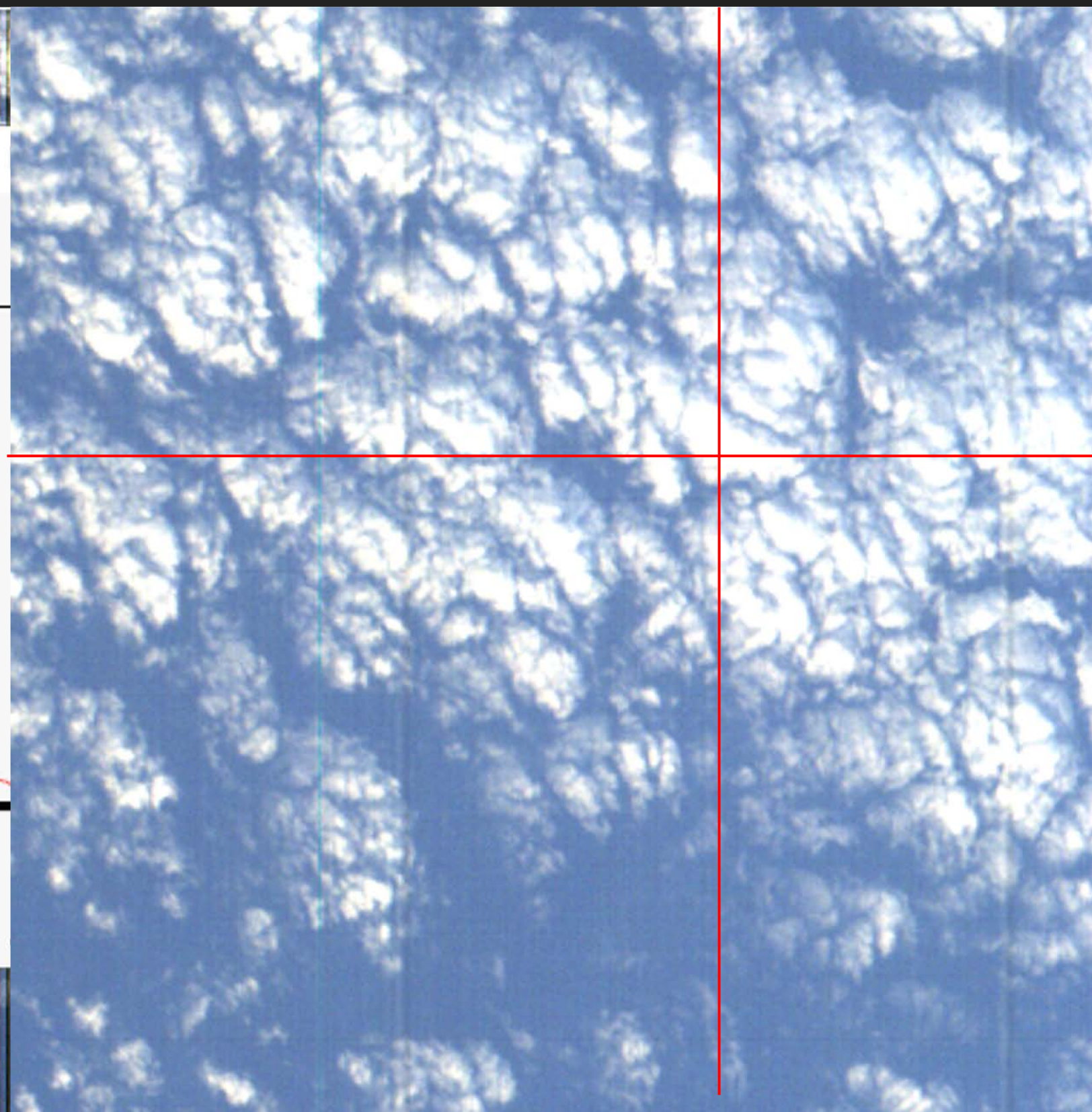
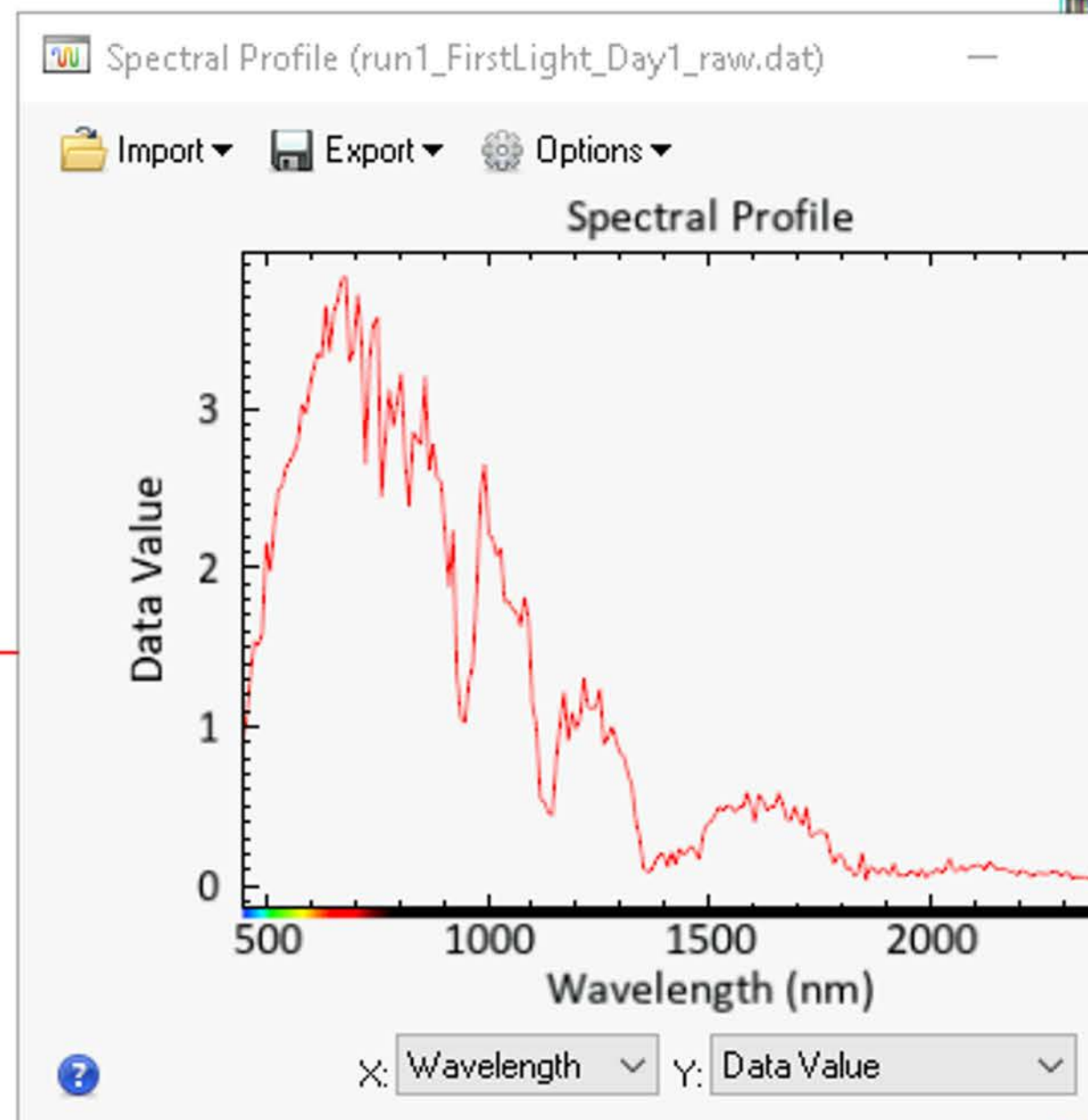




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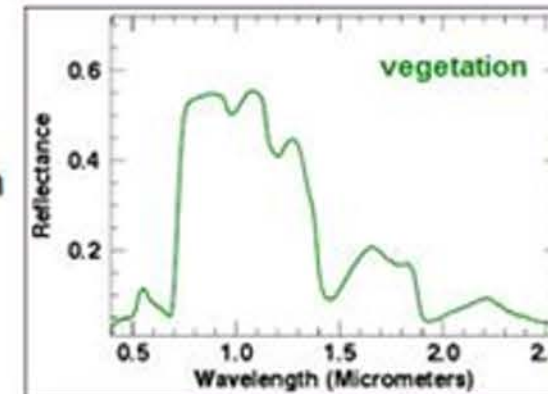
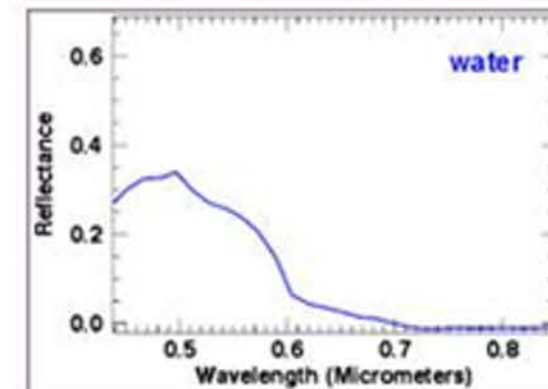
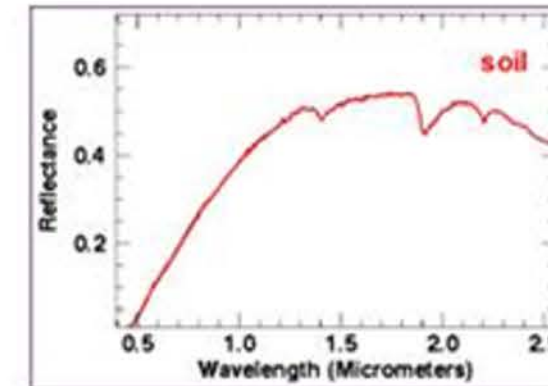
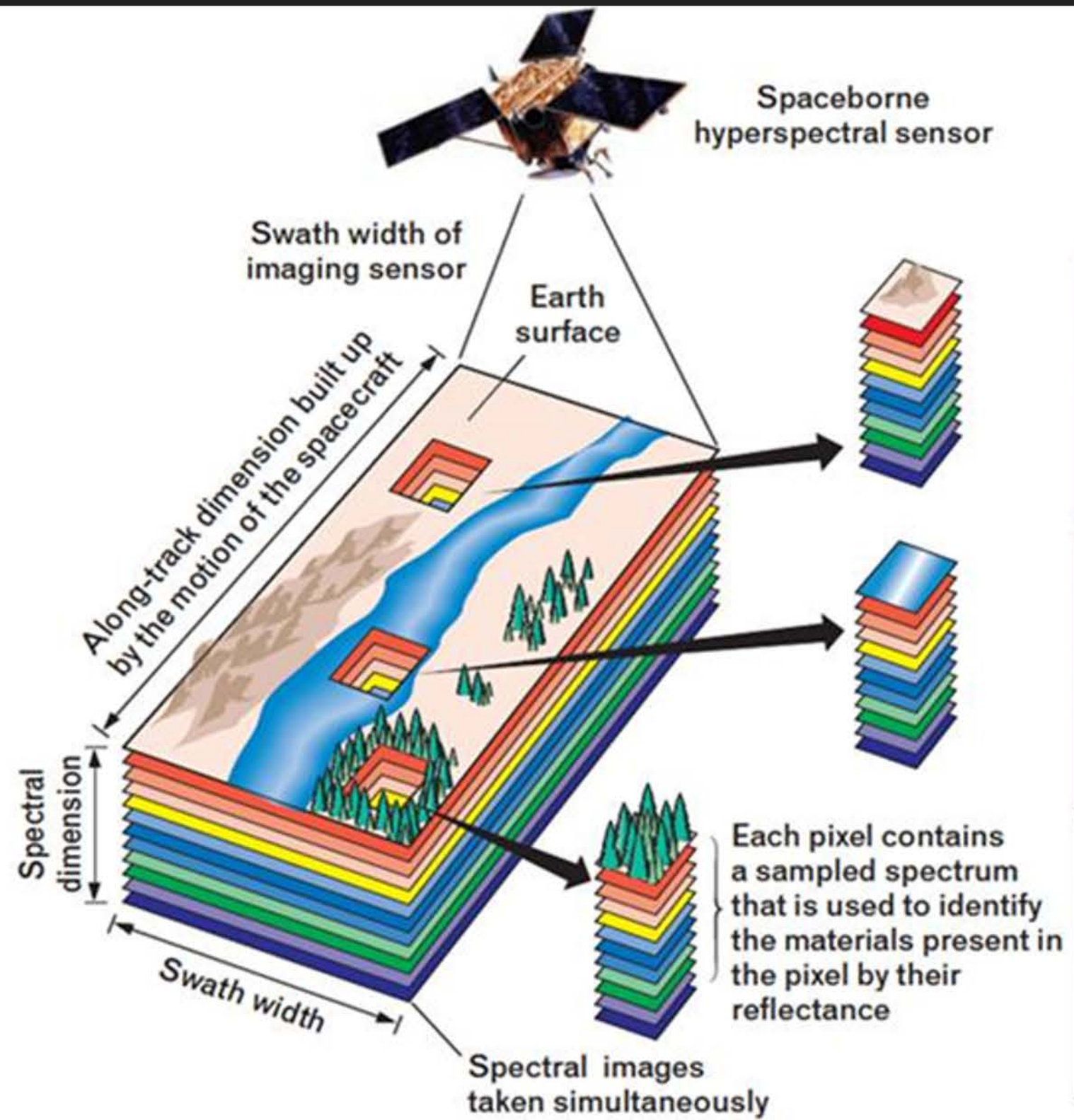




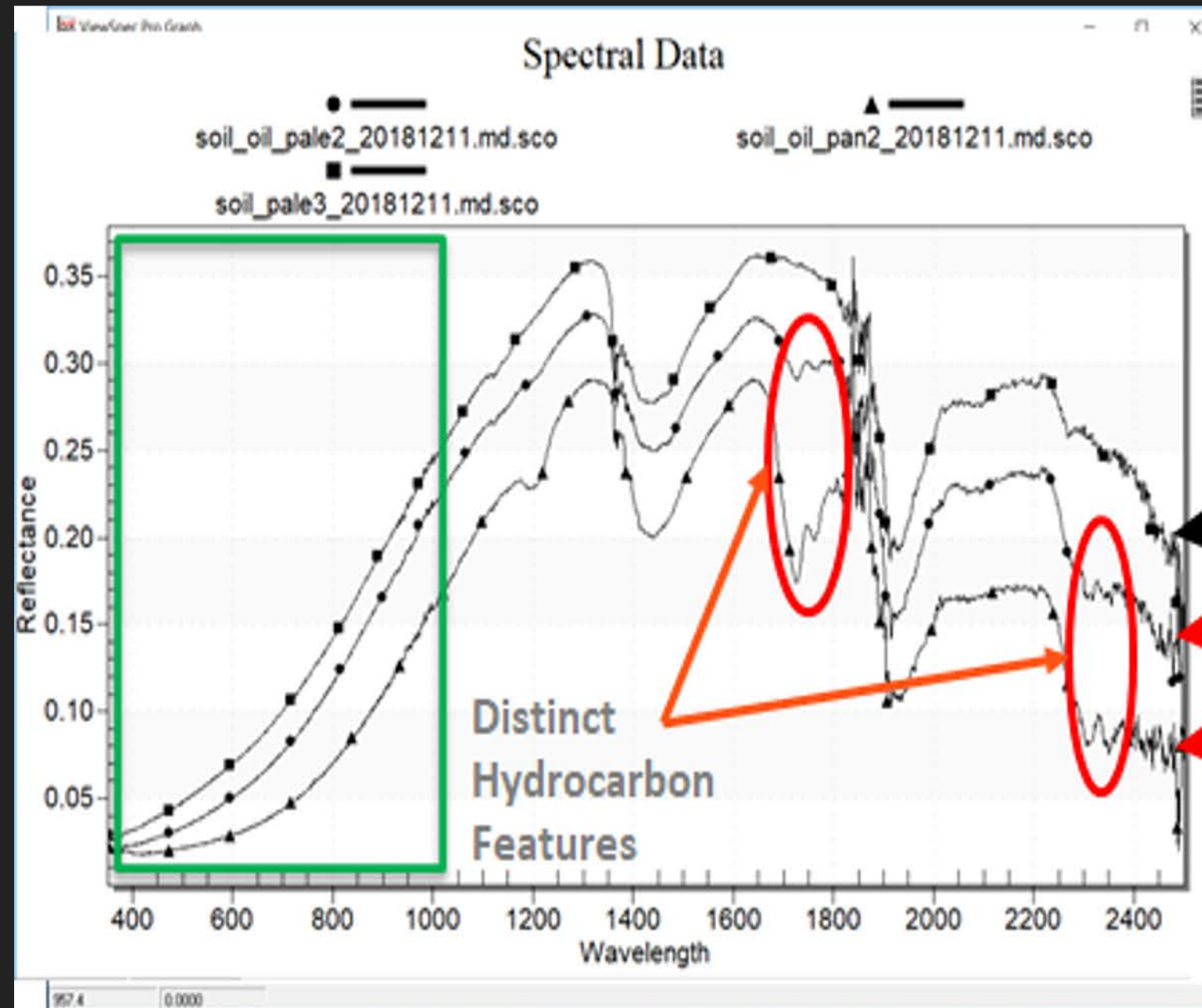
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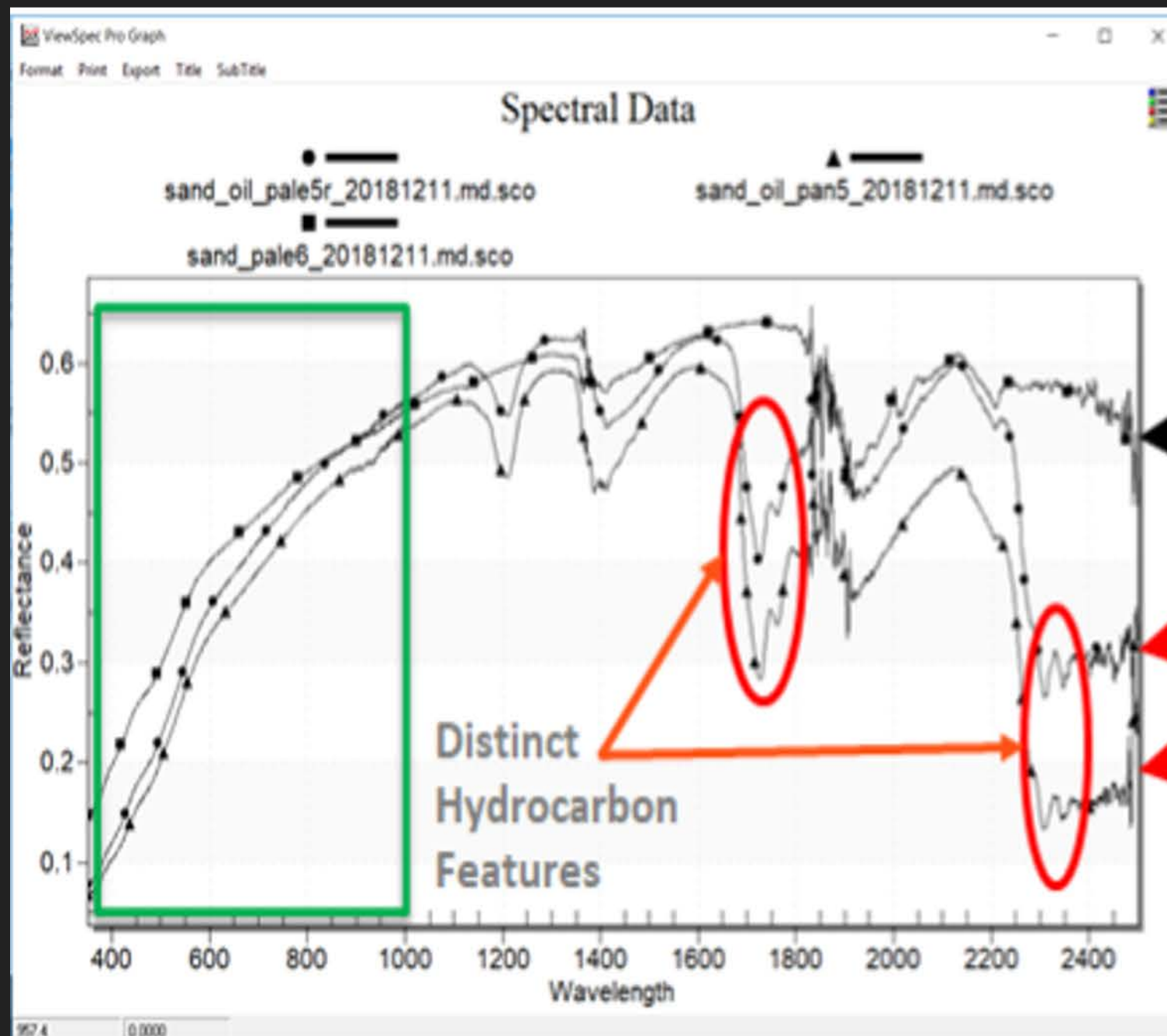




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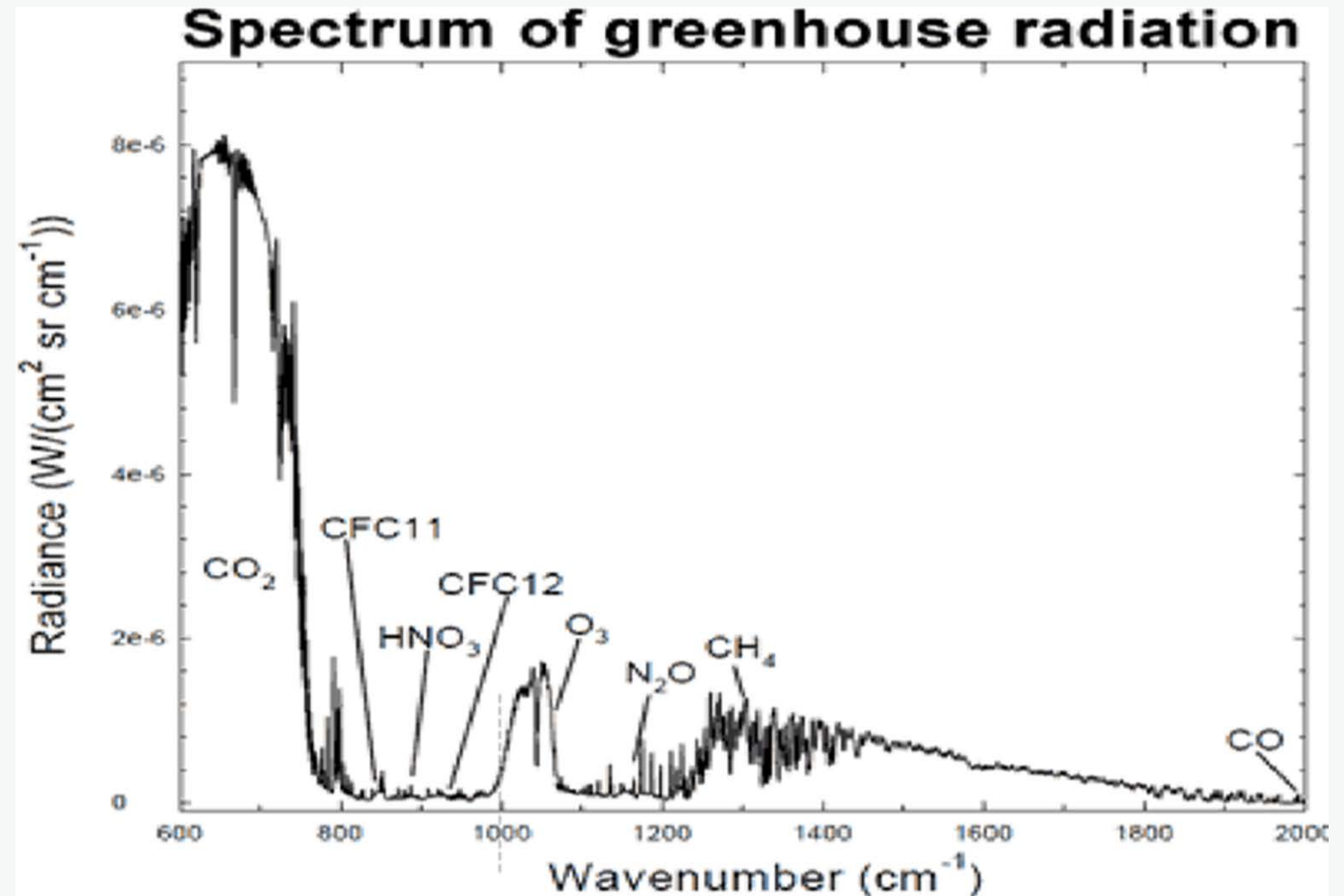


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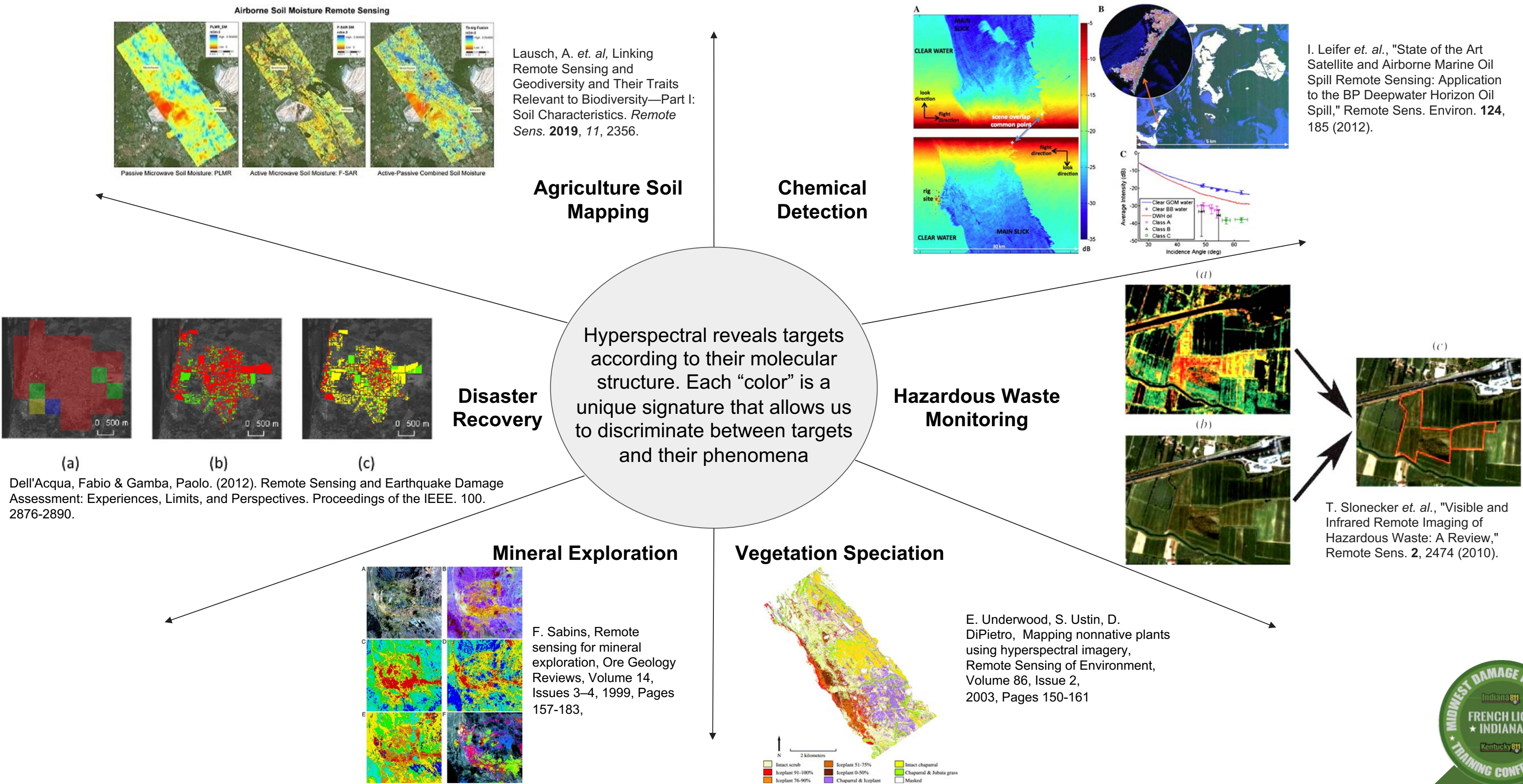


# Emission Absorption Features in the V-SWIR Region





# HYPERSPECTRAL APPLICATIONS

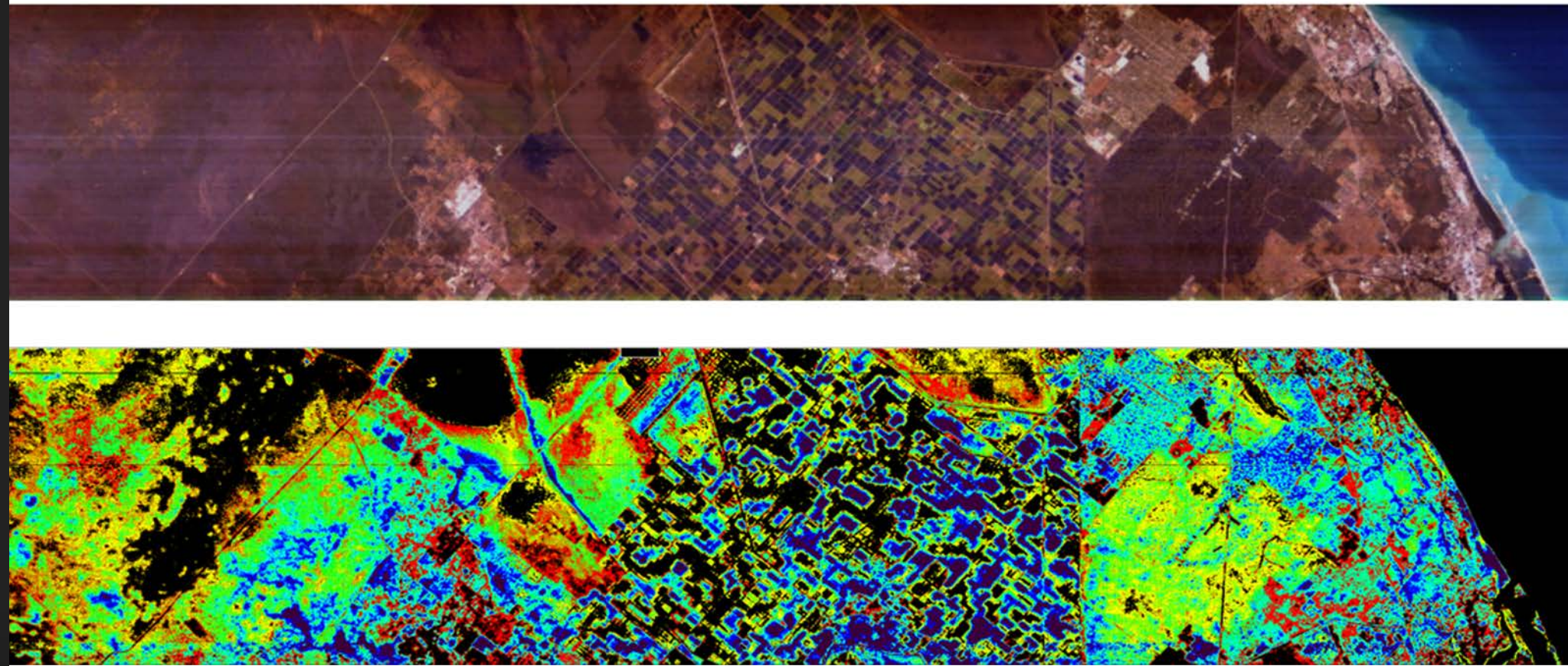




# OSK Hyperspectral Fire Risk Tool

## FIGHTING WILDFIRES

Fire risk assessment tool developed for utilities and emergency services



Uses various vegetation indices to calculate **Fire Risk**; including live fuel moisture content, greenness, canopy water content, and dry or senescent carbon content.

- **Blue** values indicate least fuel
- **Red** values indicate most fuel







# Orbital Sidekick

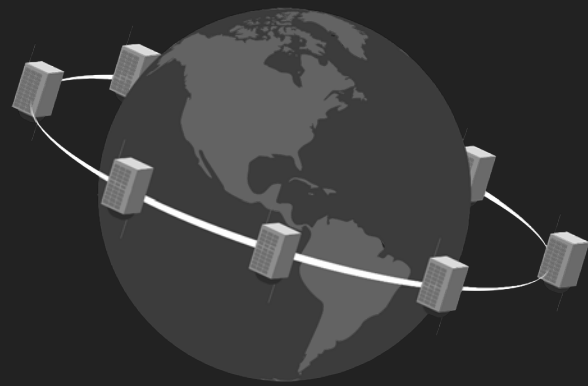


Insert Know What's Above Video

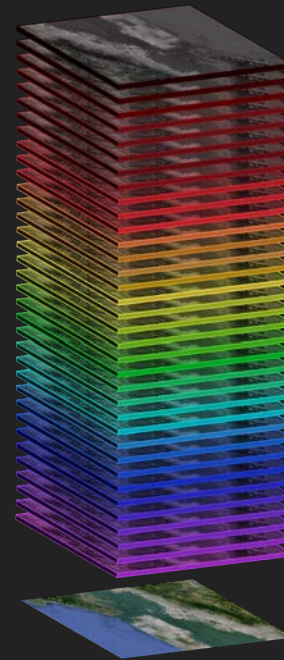




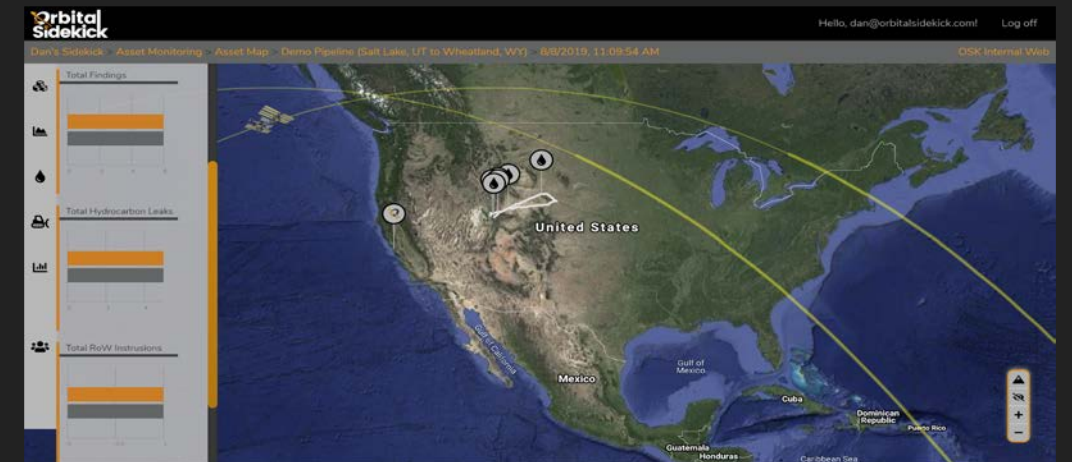
# The OSK Model: Global Monitoring with Hyperspectral Satellites



Global HSI Satellite  
constellation (GHOSSt™)  
Daily Monitoring



Hyperspectral Analysis  
Proprietary Chemical  
Fingerprinting



Accessible User Platform  
Spectral Intelligence Global  
Monitoring Application (SIGMA™)





# Orbital Sidekick

Enabling sustainable operations with the most robust remote sensing  
and analytics capability in existence

R. Peter Weaver  
[peter@orbitalsidekick.com](mailto:peter@orbitalsidekick.com)  
(985) 237-3306

