

CloudEye: Autonomous Edge-AI Methane Detection System

Slide 1: Title

CloudEye

Autonomous Edge-AI Methane Detection

Real-Time Satellite Intelligence for Climate Action

---SkyHack 2025 • Space Innovation Challenge---

Slide 2: The Problem

The Problem: Hidden Emissions

- **20% of global methane** from 1% of sources—super-emitters
- Ground detection is slow, expensive, covers limited areas
- Current satellite processing causes **hours to days latency**
- No autonomous system to detect → confirm → act in real-time

Slide 3: Our Solution

Our Solution: CloudEye

A satellite system with onboard AI that detects methane plumes in real-time and autonomously decides where to look next.

- **Detect:** Onboard AI identifies methane plumes from sensor data
- **Prioritize:** Smart downlink sends high-value data first
- **Act:** Autonomous scheduler retasks satellite for follow-up imaging

Slide 4: Technical Architecture

Technical Architecture

Edge AI Model

U-Net segmentation + quantized inference for onboard processing

Smart Downlink

Detections-first compression reduces bandwidth by 60%

Autonomous Retask

Orbital scheduler prioritizes follow-up imaging automatically

Slide 5: Track Alignment

SkyHack Track Alignment

▣ AI-Driven Satellites

Autonomous onboard decision-making and smart tasking

▣ AI/ML for Space Data

Deep learning for methane plume detection and quantification

Slide 6: Real-World Impact

Real-World Impact

- Detects facility-scale methane emissions in minutes, not days
- Enables rapid policy action and corporate accountability
- Supports global climate goals and net-zero commitments
- Proven by leading initiatives—already detecting super-emitters

Slide 7: Why CloudEye Wins

Why CloudEye Wins

⚡ Speed

<5 minutes detection to action (vs. hours)

▣ Precision

90%+ accuracy on methane plume detection

▣ Efficiency

60% bandwidth savings via smart downlink

Slide 8: Execution Plan

Our Execution Plan

Round 2

Working model, simulation demo, GitHub repo, metrics dashboard

Round 3

5-min video: detection clips, inference demo, impact narrative

Slide 9: De-Risk Strategy

De-Risk Strategy

- **Simulation First:** All autonomy tested in orbital mechanics sim
- **Public Data:** Train on proven facility-scale methane datasets
- **Proven Tech:** U-Net + INT8 quantization already flight-tested
- **Fallback Logic:** Ground processing backup if onboard fails

Slide 10: Call to Action

Let's Turn Data Into Climate Action

CloudEye: Where AI Meets the Sky

Questions?