

METEC Facility: Satellite Flyover Detection of Aboveground Controlled Natural Gas Releases

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METEC

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Background

Overview

Oil and gas methane emissions are estimated using top-down (satellites, aerial, etc.) and bottom-up (emission factors and ground-based) measurement technologies. Research has shown variance in quantification estimates across technologies with high quantification error for many of them. Satellite technologies have limited testing capabilities, as they require higher release rates to create gas plumes within their performance ranges.

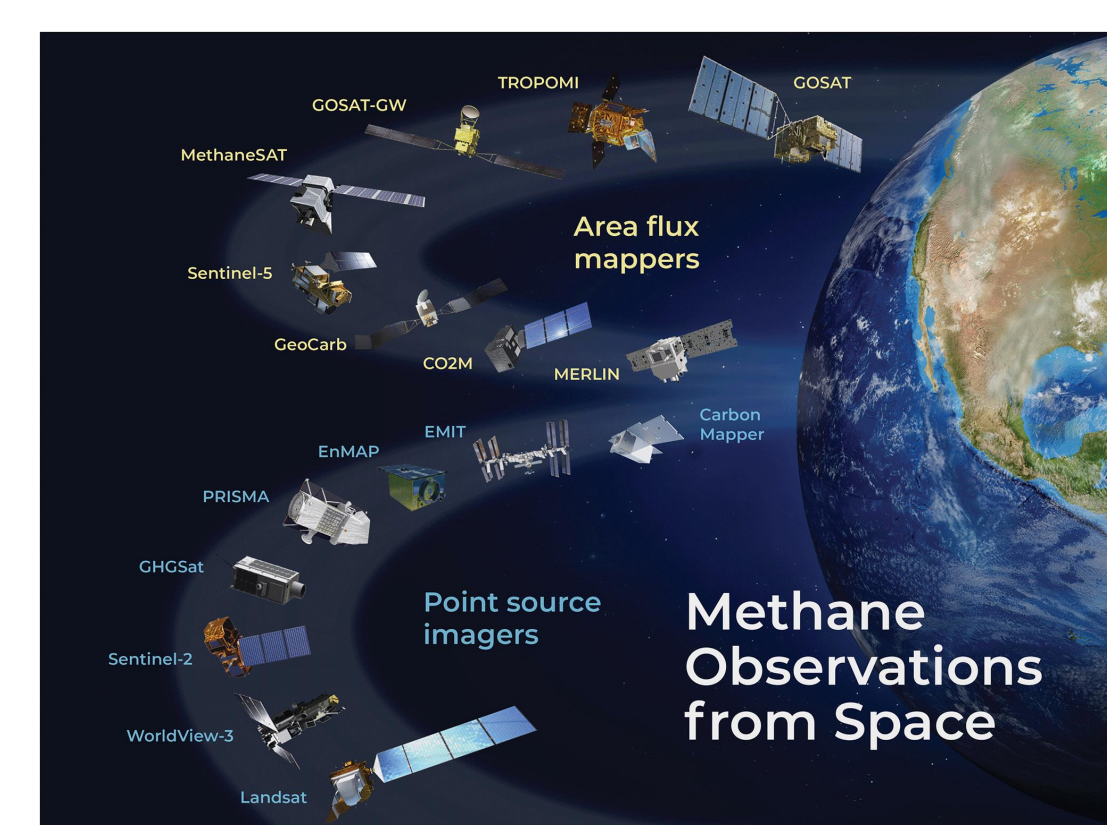


Figure 1: Top-down satellites (Jacob et al. 2022)



Figure 2: Location of satellite release rig in western Colorado

Objective

Develop a controlled release system to emit metered natural gas within satellites performance range to test the sensor's ability to detect and quantify methane plumes.

Methodology

The METEC team reached out to oil and gas operators to find a release location with the following requirements:

- Available gas source
- Distance from other methane leaks and residences
- Low cloud cover

Kinder Morgan provided a location at a meter station on the western slope of Colorado. A vertical wind profiling LiDAR device on site allows for column wind measurements.

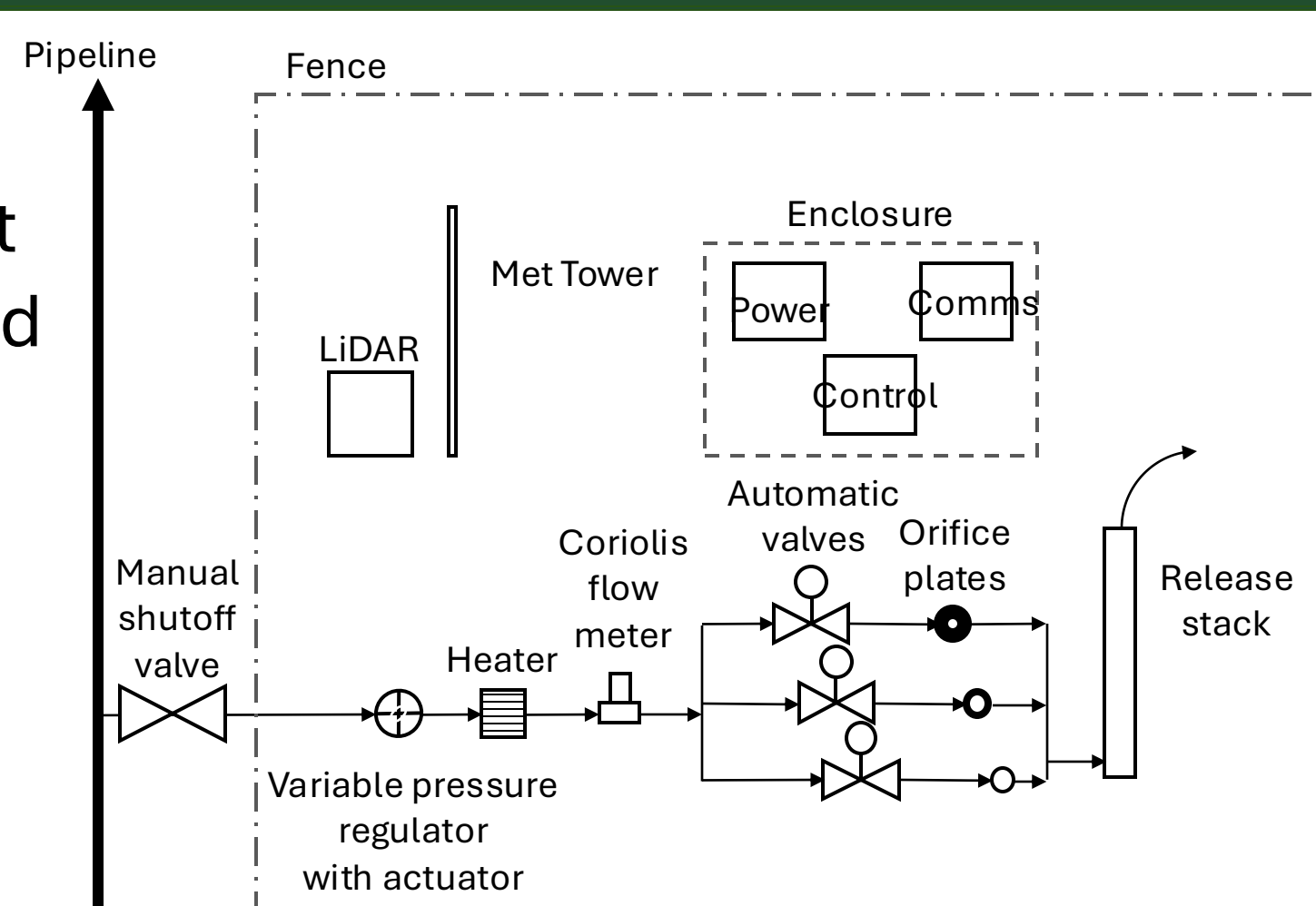
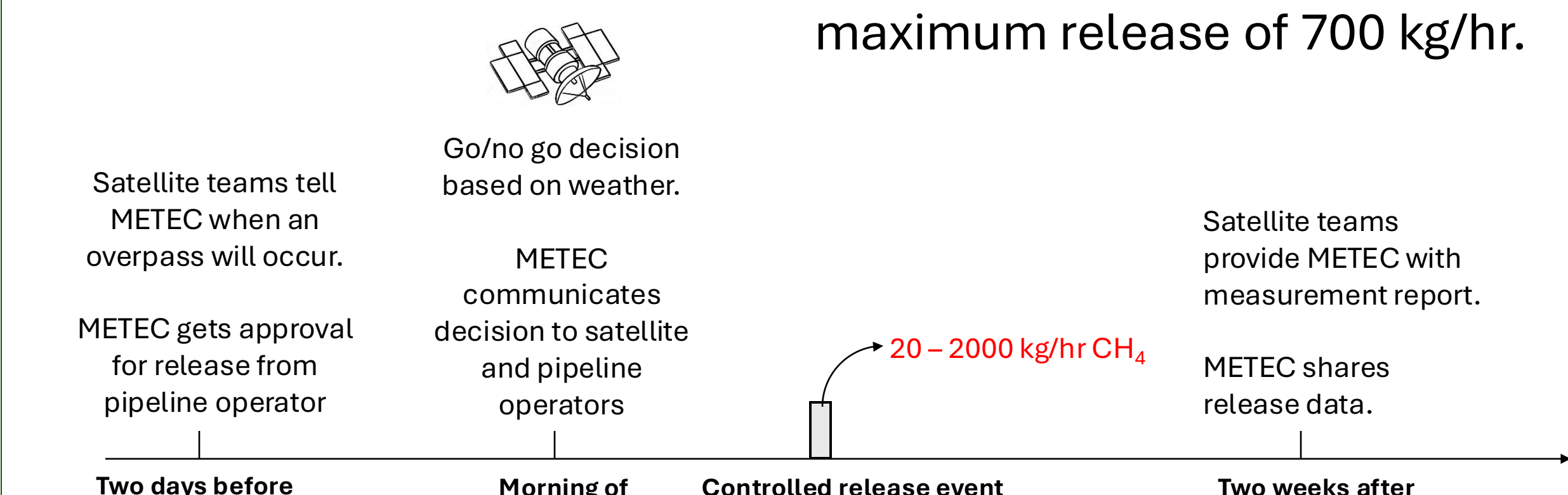


Figure 3: Flow diagram of satellite release rig

The satellite testing rig was designed and constructed by the METEC team, then transported in June 2025 to Kinder Morgan's field-testing site. For this location, the pressure in provided gas allows a maximum release of 700 kg/hr.



Results

The METEC team initially tested the satellite release rig with varying release rates ranging up to 700 kg/hr. In June 2025, when it was transported from METEC to the site location. After the initial testing, all releases will continue to be controlled autonomously over a dashboard created by the METEC team.

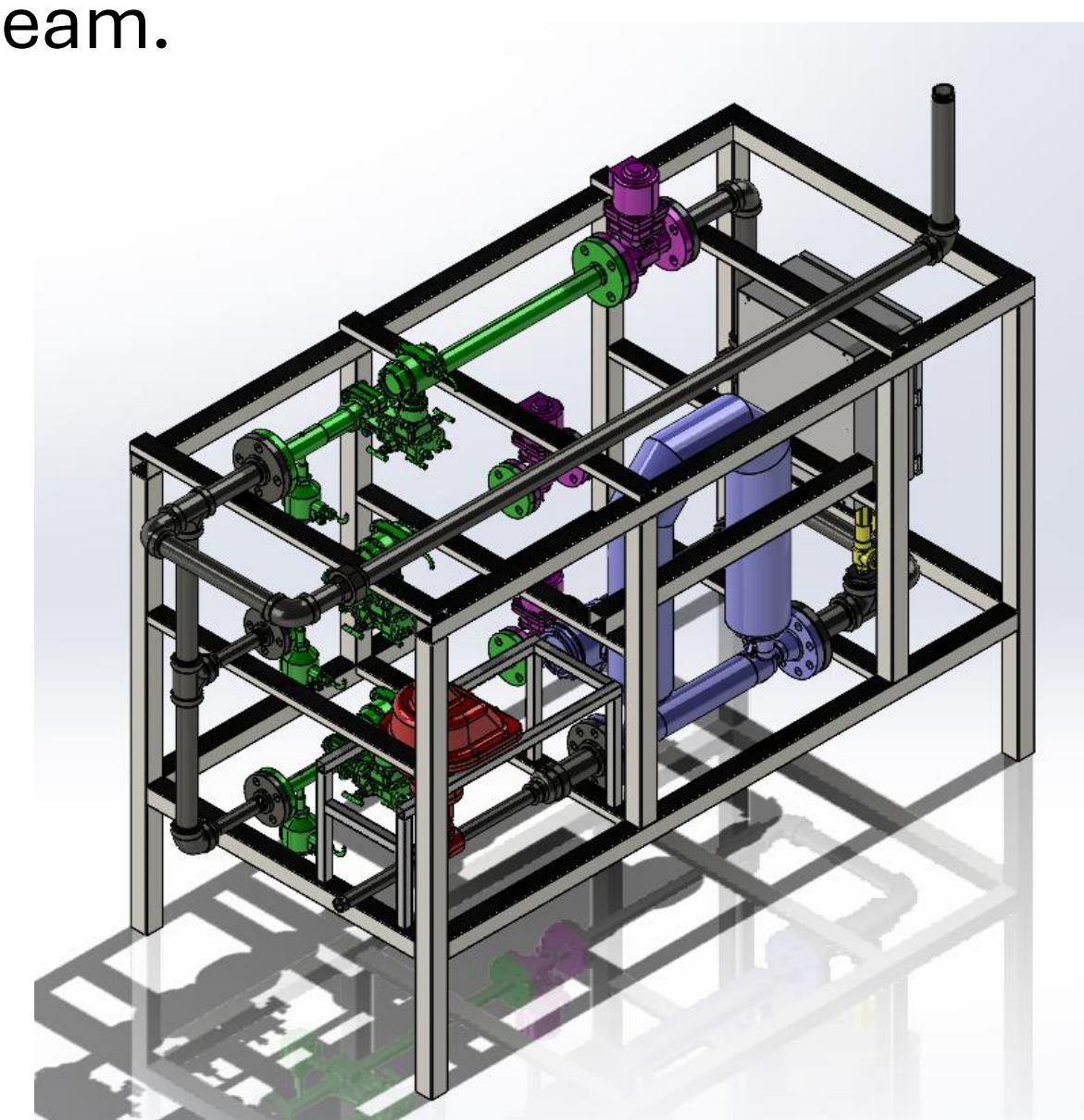


Figure 4: Model of satellite release rig

Release testing schedules are being planned between METEC, Kinder Morgan, Momentick, and the other interested flyover companies. The companies can plan for a single release with the METEC team, or reoccurring releases over an extended time period. The companies can also get a release analysis report from the METEC team.

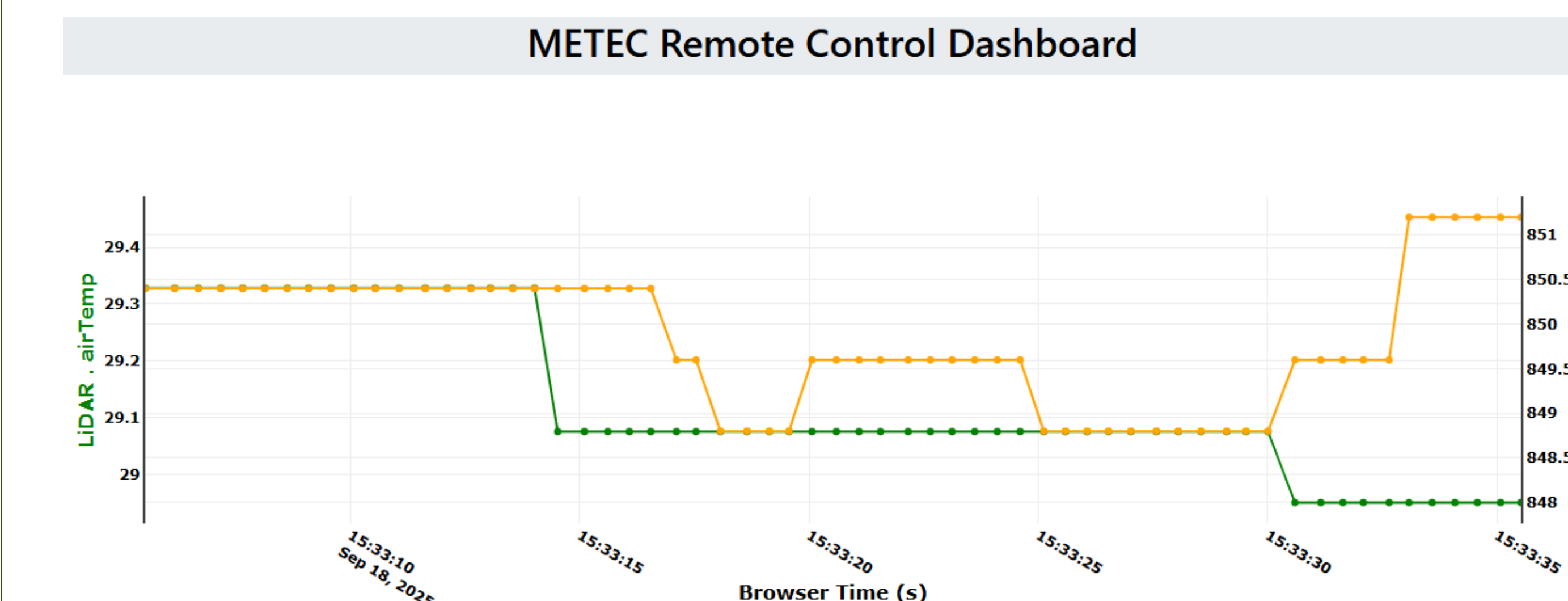


Figure 5: METEC control dashboard for autonomously controlling gas releases

The results will continue to accrue, as testing is currently underway. In July 2025 five releases were performed as preliminary testing with Momentick and Sentinel and Landsat satellites. Of the five releases, there was too much cloud cover during two of them for the satellites to get readings. Their results are shown in Table 1 and Figure 6 below.

Table 1: Momentick release rate estimates for preliminary unblinded releases

Release Date	Release Rate (kg/hr)	Momentick Estimated Release Rate (kg/hr)
7/2/2025	700	660
7/14/2025	670	678
7/14/2025	670	697

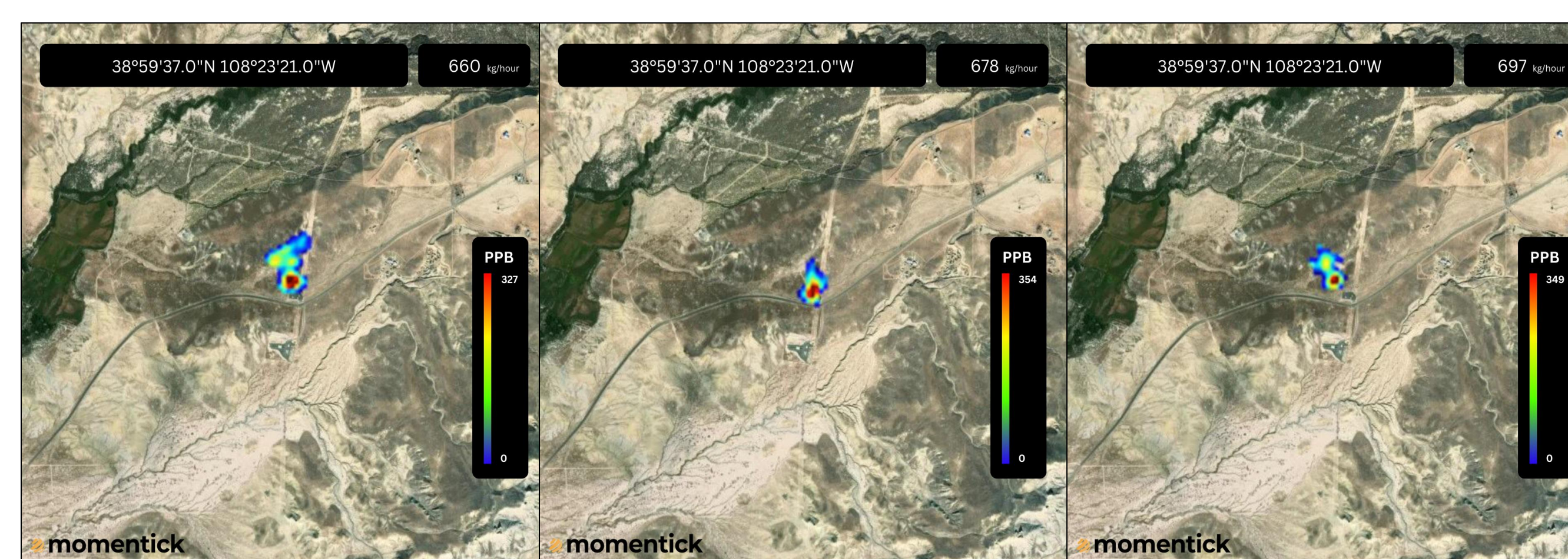


Figure 6: Preliminary unblinded testing results from Momentick during flyovers from Sentinel2, Landsat8, and Sentinel2, respectively

Conclusions and Next Steps

Testing is currently underway at Kinder Morgan's field-testing location, predominately conducting releases for satellite flyovers. Releases will also be conducted for airplane aerial flyovers that would like to test at higher release rates than the ones METEC can provide.

At this point in the project there are several companies that have signed up for releases at this location, with more showing interest.



Figure 7: Satellite release rig set up at Kinder Morgan's testing location

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Thank you to Kinder Morgan for providing a great location that allows this testing to occur using higher gas release volumes. Special thanks to Andy Klements, Mike McIntosh, and Dawn Meyers for their time and expertise



Figure 8: Installation of the release rig at the Kinder Morgan testing location

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