



# Reconstructing and quantifying methane emissions from the full duration of a 38-day natural gas well blowout using space-based observations

**SRON**

Netherlands Institute for Space Research

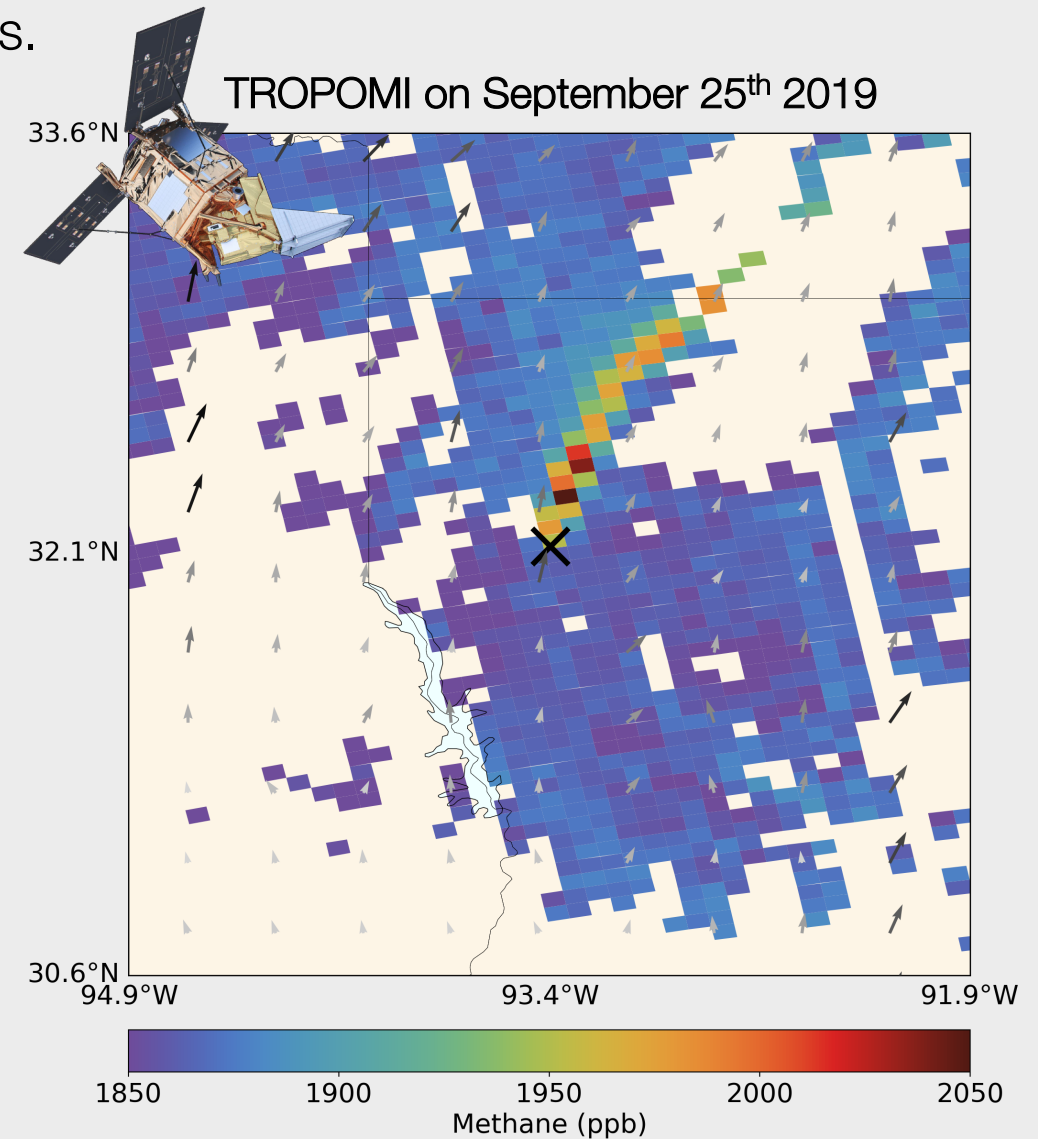
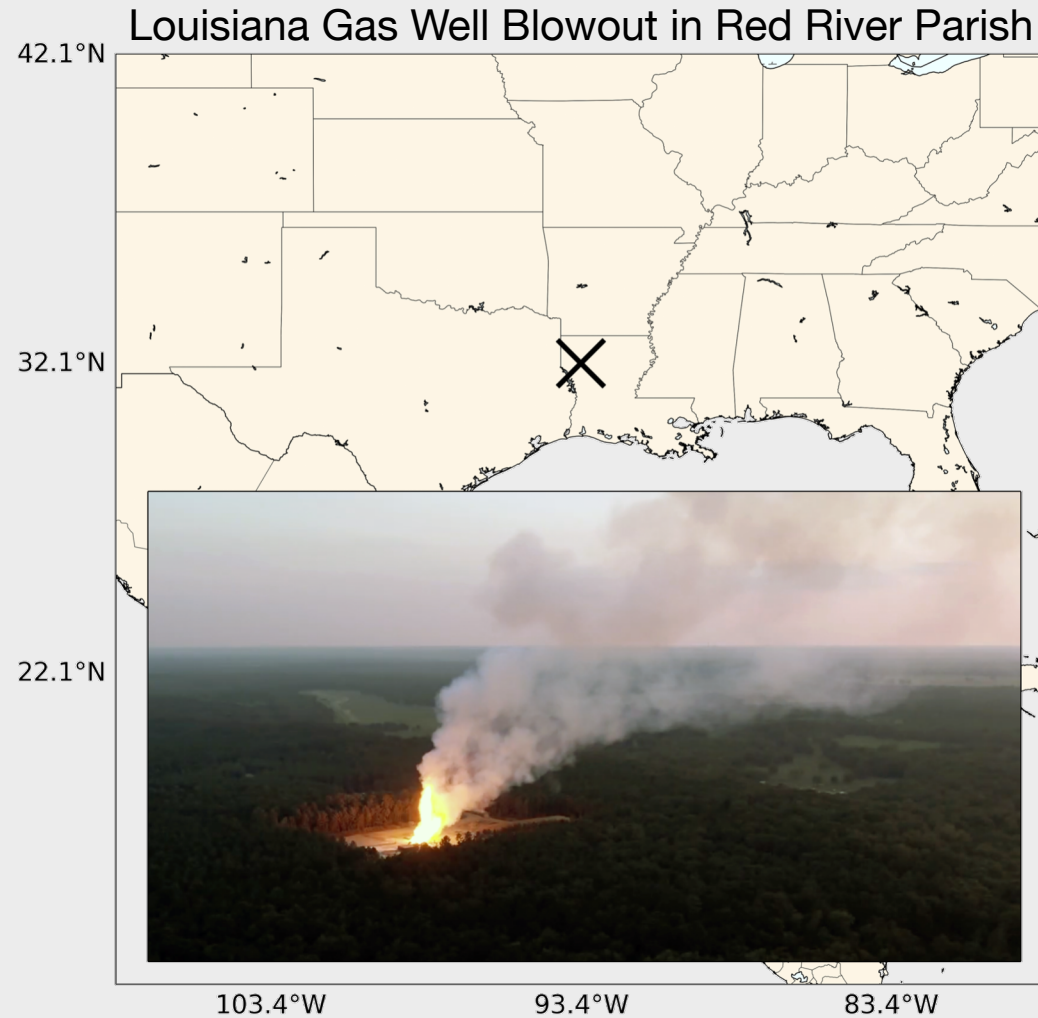
Drone footage: Phin Percy Jr., TROPOMI Image Credit: ESA

Joannes D. Maasakkers<sup>1</sup>, Mark Omara<sup>2</sup>, Ritesh Gautam<sup>2</sup>, Alba Lorente<sup>1</sup>, Sudhanshu Pandey<sup>1</sup>, Paul Tol<sup>1</sup>, Tobias Borsdorff<sup>1</sup>, Sander Houweling<sup>1,3</sup>, and Ilse Aben<sup>1</sup>

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# TROPOMI detected clear plumes coming from the Louisiana blowout

The TROPOMI instrument observes atmospheric methane at up to  $7 \times 5.5 \text{ km}^2$  spatial resolution with daily global coverage, allowing the detection of methane plumes.



The event affected two wells and occurred in three phases

Burning at the wellhead



8/30 - 9/12

Venting at the wellhead



9/13 - 8/25

Burning at the flare pit

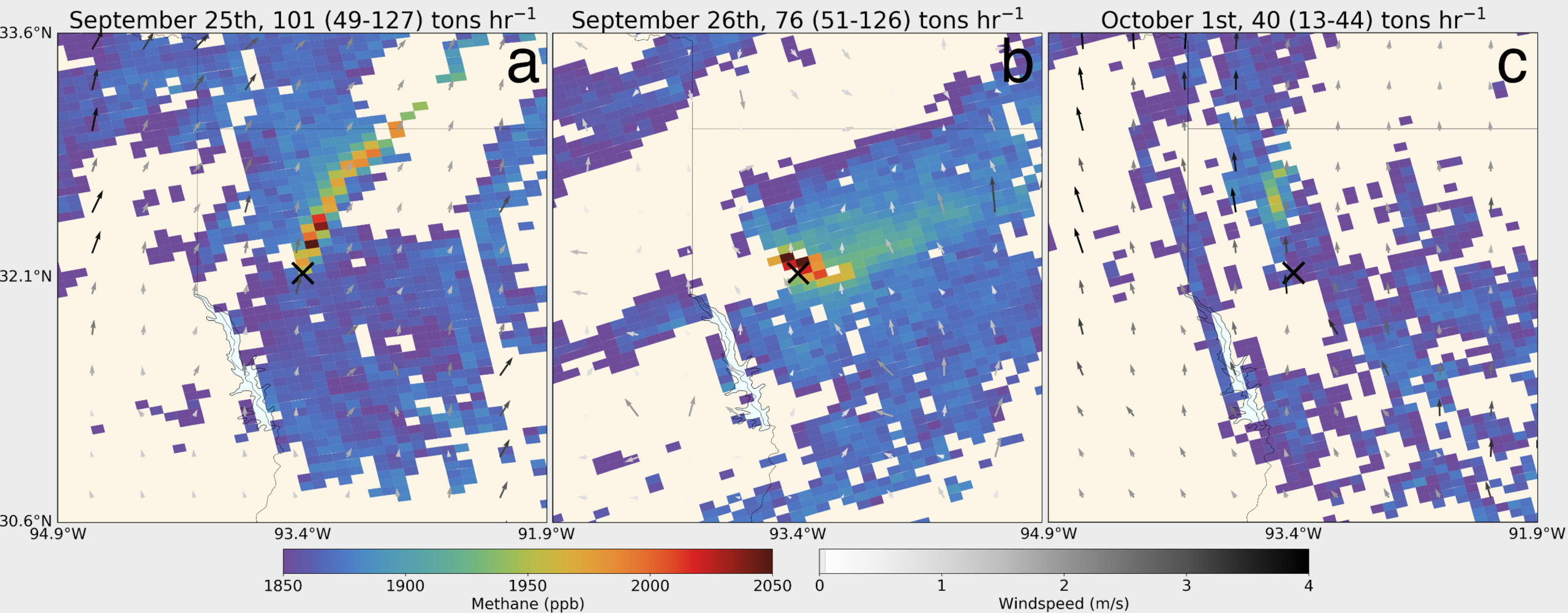


8/26 - 10/8

This sequence of events is confirmed by Sentinel-2 and Landsat-8/9 visual data, and by fire detections. The company responsible for the wells reported emissions of 63 Gg to the Louisiana Department of Natural Resources.

# Methane emissions can be estimated using TROPOMI

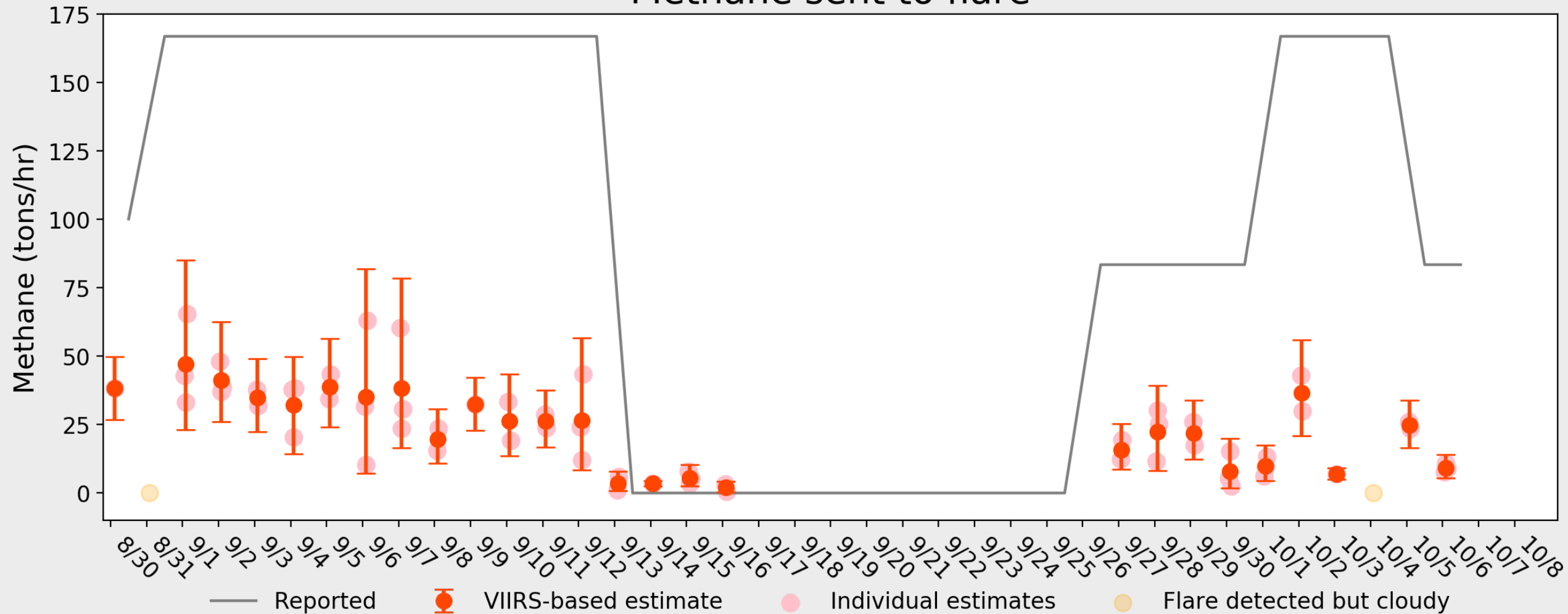
Several clear plumes are present in TROPOMI. We quantify emissions by comparing the observed signal to the best matching modeled plume from a model ensemble.



# We estimate the amount of methane flared using VIIRS data

Flared methane can be estimated using nighttime VIIRS radiant heat. We quantify the flow rate using a parameterization calibrated with data from flaring wells with known gas flows.

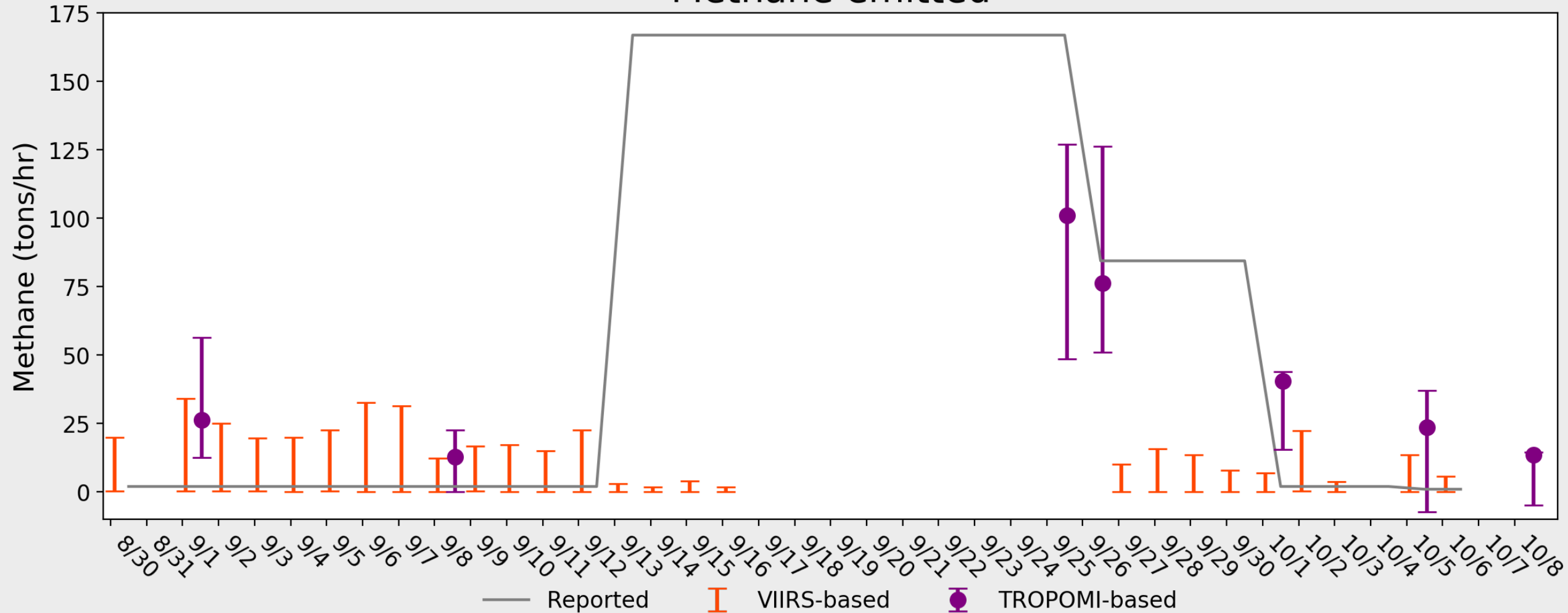
## Methane sent to flare



# We estimate emissions from the blowout by combining TROPOMI and VIIRS

We combine the VIIRS flared volumes with an estimated combustion efficiency to calculate emissions during flaring. We then incorporate the TROPOMI emission rates to estimate total emissions of 49 (21–63) Gg.

## Methane emitted





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