

Ground-truth Validation of VIIRS Nightfire for Gas Flaring Estimates

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A series of 24 nighttime gas flares were run at the John Zink LLC test facility in Tulsa, Oklahoma, in January and February 2018. The flares were lit at the time of the VIIRS overpass, so they could be detected by VIIRS with clear sky and wind speed < 20 mph local weather. The test plan included three sizes of low pressure natural gas flares with flowrates of 750, 7500 and 75000 lb/hour, and double-stack flares with small and medium flowrate combinations. The flares were observed by Suomi NPP and NOAA-20 satellites from nadir, medium angle and side views. During the calibration experiment the flares were filmed by 2 ground-based video cameras and a hyperspectrometer. This is the first ground truth validation for the relation between the flared volume (BCM) and the Planck curve fitted to the flare infrared signature detected at nighttime by VIIRS (Nightfire algorithm). The experiment has confirmed the correlation between flow rate and satellite-derived radiative heat with 0.99 R². This calibration can be used in the satellite-based estimates of the natural gas flaring at the oil field or national level.

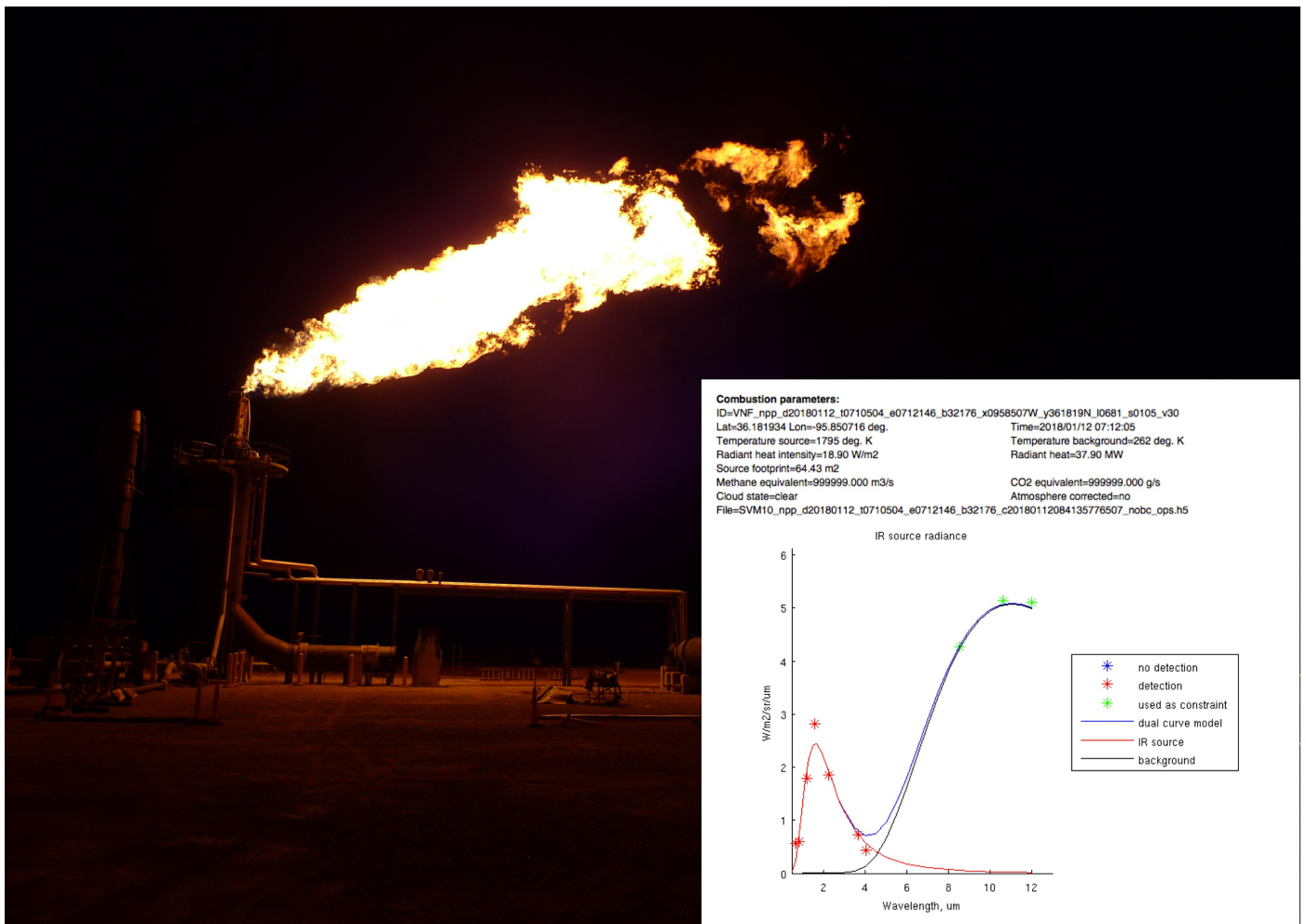


Figure 1. Test flare with 75000 lb/hour flowrate and its Nightfire signature.