

Ground-truth Calibration for the VIIRS Nightfire Detector of Gas Flares

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A series of 12 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 Soumi National Polar-orbiting Partnership (NPP) satellite overpass, so they could be detected by Visible Infrared Imaging Radiometer (VIIRS) with clear sky and wind speed < 20 mph local weather. The test plan includes 3 sizes of low pressure natural gas flares with flowrates of 750, 7,500 and 75,000 lb/hour observed by satellite from nadir, medium angle, and side view. During the calibration experiment the flares were filmed from 2 near-field sites. Total radiative heat from the flare and its short-wave infrared spectra were sampled exactly at the time of the satellite overpass. This is the first ground truth validation for the relation between the flared volume (BCM) and the Planck curve fitted to flare infrared signature detected by VIIRS (Nightfire). The experiment has confirmed the correlation between flow rate and satellite derived radiative heat with 0.99 R².



Figure 1. Large flowrate flare test at the moment of VIIRS overpass on January 12, 2018.