

Estimation of CO₂ Emissions from Gas Flares Using Data Collected by the Suomi National Polar-orbiting Partnership (SNPP) Visible Infrared Imaging Radiometer Suite (VIIRS)

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NGDC has developed a system called Nightfire, which detects and characterizes sub-pixel combustion sources worldwide using nighttime data collected by the NASA-NOAA SNPP VIIRS. Nightfire takes advantage of the unique collection of visible, near-infrared and shortwave infrared nighttime collections made by the VIIRS. Initial detection of combustion sources is made in the VIIRS M10 band, centered in the shortwave infrared at 1.61 μm . The radiances from five additional spectral bands (DNB, M7, M8, M12 and M13) are examined to determine if they are also "hot". The radiances from the spectral channels with hot source detection are used to model the Planck curve using temperature and emission scaling factor as fitting variables. The sources appear as gray-bodies due to the fact that they are substantially smaller than the pixel footprints. Nightfire reports the temperature (degrees K), source size (square meters) and radiant heat (MW) of the hot sources. Gas flares are distinguished based on their high temperature and temporal persistence. Where the gas flares are free of clouds the quantity of methane being consumed is estimated (cubic meters per second). From this the CO₂ emissions are estimated in grams per second. Nightfire data can be accessed at http://www.ngdc.noaa.gov/eog/data/viirs_fire/viirs_html/download_viirs_fire.html.

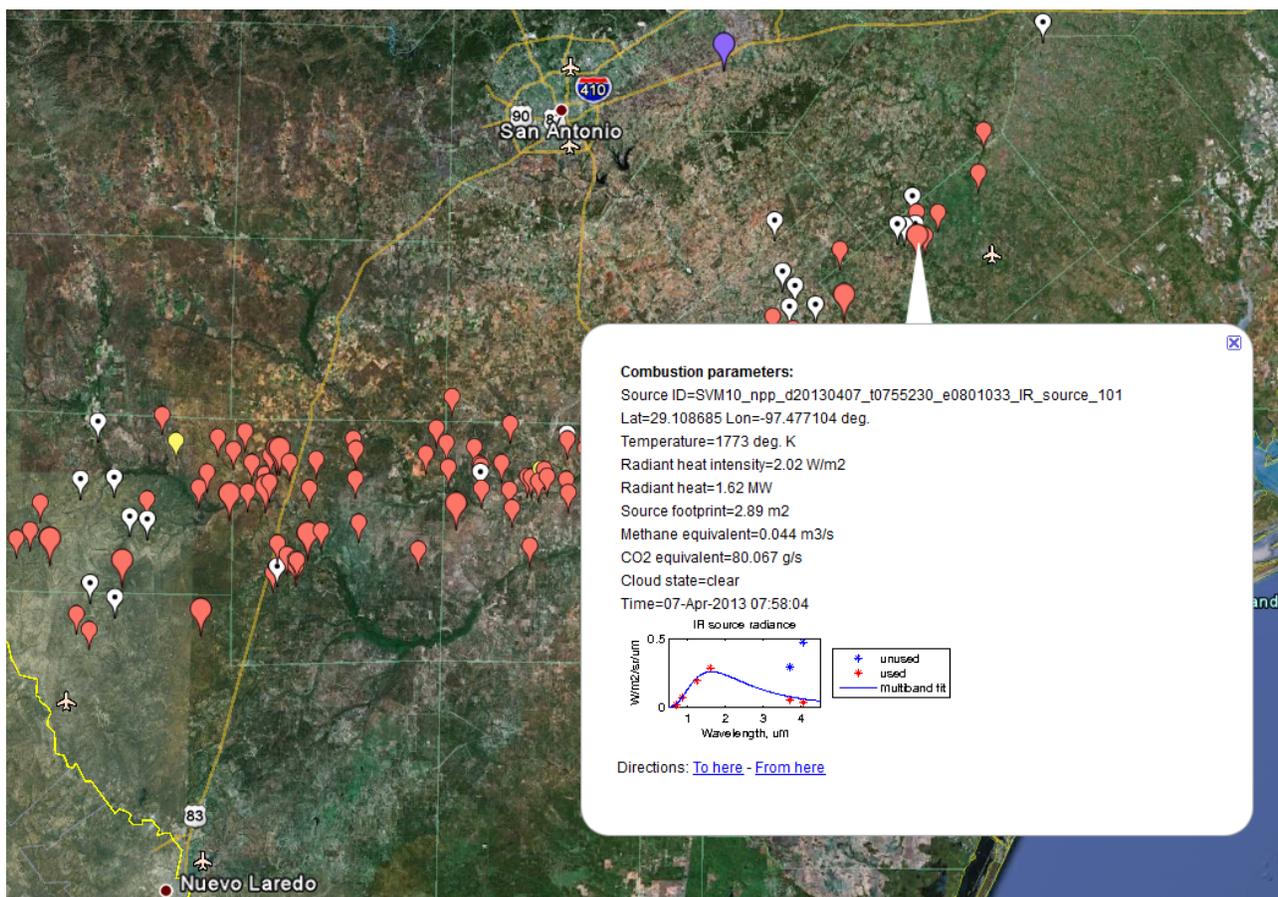


Figure 1. Nightfire results for a gas flare in Texas observed the night of April 7, 2013.