

## MAPPING THE WORLD'S LARGEST NATURAL GAS LEAK AND OTHER METHANE SOURCES USING HIGH RESOLUTION SPECTROSCOPY

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CH<sub>4</sub> is a potent greenhouse gas with a 100-year Global Warming Potential more than thirty times larger than CO<sub>2</sub> if carbon-climate feedbacks are considered. In urban areas such as Los Angeles, anthropogenic methane emissions are poorly characterized because of the large diversity of sources: landfills, sewage treatment plants, agriculture, leaks in the natural gas distribution system, cattle and dairy farms, thermogenic emissions from oil fields and seeps. The California Laboratory for Atmospheric Remote Sensing (CLARS), operated by the Jet Propulsion Laboratory, is a mountaintop facility overlooking most of the Los Angeles basin, equipped with JPL-built Fourier transform spectrometers for measurements of the slant column abundances of several greenhouse gases including methane with high spatial and temporal resolution. This presentation will cover several topics including the design features of the two FTS instruments, spectroscopic issues associated with the retrieval of slant column abundances, and uncertainty analysis. One FTS has been in continuous operation since 2011, providing sufficient data to identify several CH<sub>4</sub> emission hot spots in the LA basin. On October 23, 2015, a well pipe suffered a failure in a natural gas storage facility in Aliso Canyon, northwest of downtown Los Angeles resulting in a massive CH<sub>4</sub> plume transported by winds throughout the LA basin. The CLARS FTS captured the plume propagation throughout the 4-month duration of the leak. We will show how the emission ratio method may be employed to derive a lower bound to the CH<sub>4</sub> emission rate from the leaking well without the use of complex atmospheric transport models. The CLARS measurement system provides a small-scale example of the data that would be acquired by an imaging FTS on a geostationary space platform.<sup>a</sup>

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