As urban areas develop regulations to limit atmospheric methane ($\text{CH}_4$), accurate quantification of anthropogenic emissions will be critical for program development and evaluation. However, relating emissions derived from process-level metadata to those determined from assimilating atmospheric observations of $\text{CH}_4$ concentrations into models is particularly difficult. Nonmethane hydrocarbons (NMHCs) can help differentiate between thermogenic and biogenic $\text{CH}_4$ emissions, as they are primarily co-emitted with the former; however, these trace gases are subject to the same limitations as $\text{CH}_4$. Remotely-sensed hyperspectral imaging bridges these approaches by measuring emissions plumes directly with spatial coverage on the order of $10 \text{ km}^2 \text{ min}^{-1}$. We identify the sources of and evaluate emissions plumes measured by airborne infrared hyperspectral imagers flown over the Los Angeles (LA) metropolitan area, which encompasses various $\text{CH}_4$ sources, including petroleum and natural gas wells and facilities. We quantify total $\text{CH}_4$ and NMHC emissions, as well as their relative column densities, at the point-source level to create fingerprints of source types. We aggregate these analyses to estimate the range of variability in chemical composition across source types.

Figure 1. Methane plume from a liquefied-compressed natural gas fueling station in Los Angeles, imaged three times 10 minutes apart, by the Mako hyperspectral sensor.