3.027 Assessment of Satellite Capabilities to Detect Impacts of Gas and Natural Oil Activity, from Analysis of SONGNEX 2015 Aircraft Measurements.

Early Career Scientist

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Abstract:

In the last decade, the rate of domestic energy production from oil and natural gas has grown dramatically, resulting in increased concurrent emissions of methane and other volatile organic compounds (VOCs). Products of VOC oxidation and radical cycling, such as tropospheric ozone (O_3) and secondary organic aerosols (SOA), have detrimental impacts on human health and climate. The ability to monitor these emissions and their impact on atmospheric composition from remote-sensing platforms will benefit public health by improving air quality forecasts and identifying localized drivers of tropospheric pollution.

Instruments to be deployed on upcoming satellites, such as TROPOMI (2016 launch) and TEMPO (2018/19 projected launch), will be capable of measuring chemical species related to energy drilling and production on unprecedented spatial and temporal scales, however there is need for improved assessments of their capabilities with respect to specific applications. We use chemical and physical parameters measured via aircraft in the boundary layer and free troposphere during the Shale Oil and Natural Gas Nexus (SONGNEX 2015) field campaign to view chemical enhancements over tight oil and shale gas basins from a satellite perspective. Our in-situ data are used to calculate the

planetary boundary layer contributions to the column densities for formaldehyde, glyoxal, O_3, and NO_2; these emulated measurements are compared to TEMPO and TROPOMI capabilities in order to assess the degree to which their retrievals will be able to discern the signatures of oil and natural gas activity, and to ascertain the information that may be derived from trace gas enhancements.