

Tiger Team Supports Oil & Gas Emissions Research

*By Ben Kaldunski
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Members of NASA's Air Quality Applied Sciences Team (AQAST) are using satellites to monitor emissions of methane, formaldehyde and NO₂ from oil and natural gas extraction and distribution to help air quality managers in regions that have experienced rapid growth in those industries.

AQAST member Anne Thompson, a senior scientist at NASA's Goddard Space Flight Center and adjunct faculty member at Penn State and the University of Maryland, is leading a Tiger Team focused on creating more accurate profiles of emissions from the oil and gas industry. Thompson and fellow Tiger Team members are currently participating in the fourth deployment of NASA's Deriving Information on Surface Conditions from Column and Vertically Resolved Observations Relevant to Air Quality (DISCOVER-AQ) aircraft and ground campaign in the Colorado Front Range.

The **Front Range Air Pollution and Photochemistry Experiment (FRAPPÉ)**, in collaboration with DISCOVER-AQ, is a comprehensive effort to understand the complex interaction of emissions and atmospheric conditions that cause the region to experience poor air quality during summer months. The Tiger Team is focusing on air quality and emissions near oil and gas operations in Weld County, Colorado, from aircraft and ground site measurements of both campaigns. Scientific updates from the DISCOVER-AQ campaign can be accessed [here](#).

In addition to their work on DISCOVER-AQ, Thompson and Debra Kollonige of University of Maryland are working to determine changes in methane emissions near oil and gas production sites using satellite data. They are focusing on anomalies observed from 2008-2014 in order to compare the satellite data against ground level and aircraft measurements. The goal of the research project is to validate current products and to determine the accuracy of existing emissions inventories.

Brad Pierce, a senior researcher at the National Oceanic & Atmospheric Administration (NOAA), is working to develop high resolution NO₂ column data to compare emissions from oil and gas extraction sites with the 2011 National Emissions inventory (NEI) and the WRAP Phase III oil and gas inventory. Pierce's presentation at the AQAST meeting can be accessed [here](#), and Kollonige's presentation can be accessed [here](#).

Kollonige and Pierce also delivered a joint presentation at the Midwest and Central States regional air quality meeting hosted by the Central States Air Resources Agencies (CenSARA) and Lake Michigan Air Directors Consortium (LADCO) in late April. Thompson said air quality managers who attended that meeting were very interested in oil and gas activities and the impact of associated emissions on air quality from North Dakota to Texas.

Their presentation at the CenSARA meeting highlighted the use of various satellite products. Kollonige discussed methane measurements retrieved from the Tropospheric Emissions Spectrometer (TES) instrument in California's San Joaquin Valley where natural gas and oil operations are prevalent. The TES measurements were verified by measurements collected from NASA's P3B aircraft during the second deployment of the DISCOVER-AQ campaign in January 2013.

Pierce discussed NO₂ measurements in North Dakota where satellite data are not obscured by emissions from other sources in urban areas. Without picking up emissions from other sources, the Visible Infrared Imaging Radiometer Suite (VIIRS) was able to pinpoint emissions from a single

wellpad, indicating an extremely high level of detail and accuracy for future emissions monitoring from the satellite instrument.

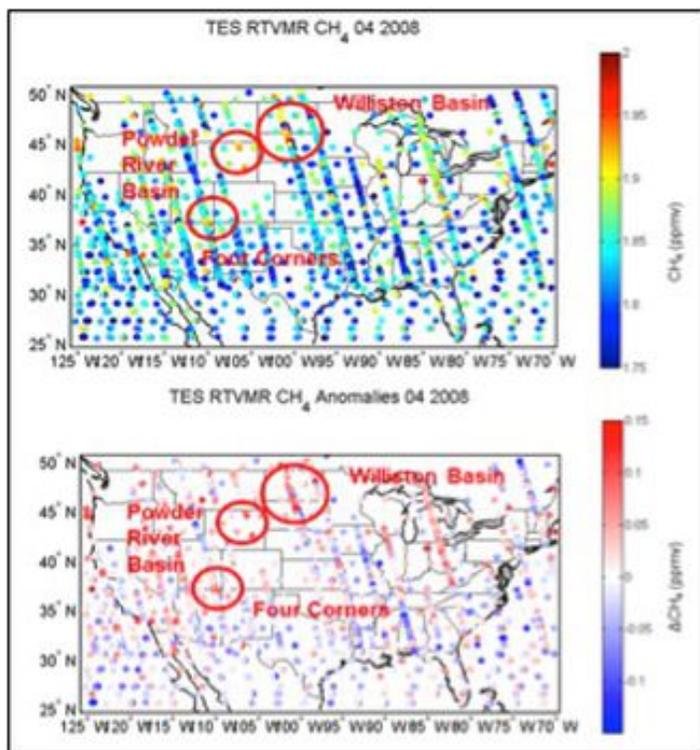
Dr. Anne Thompson is the lead investigator for the Oil & Gas Tiger Team and an adjunct professor at University of Maryland College Park. Thompson is a member of AQAST, a NASA-funded team of air quality experts that strives to use advanced air quality science to develop new tools for air quality managers. More information about Dr. Thompson's work can be found at this [website](#).

Sources and media coverage

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The top chart shows methane concentrations measured in the mid-troposphere by TES in April 2008. (Bottom) Methane anomalies, referenced from mean background concentrations, showing enhancements for the highlighted locations (Image Courtesy of NASA).



This map shows emissions from the oil and gas sector from the 2011 NEI. Pierce's research compares NO₂ column data to the NEI inventory to determine whether air quality managers can use satellites to obtain more accurate measurements (Image Courtesy of NASA).