

Satellite, Ship, and Aircraft-based Views of Gulf of Mexico Air Quality: The SCOAPE Project

Ryan M Stauffer

NASA Goddard Space Flight Center, USA

Author list (excluding presenting author)

Anne Thompson, Debra Kollonige, Niko Fedkin, Holli Wecht, Laura Judd, Scott Janz, Andrew Thorpe, Michael Eastwood, Robert Green

Abstract

Six years ago, BOEM (Bureau of Ocean Energy Management), the Agency with Air Quality (AQ) jurisdiction over the western and central United States Gulf of Mexico (GOM) waters, asked NASA to determine the feasibility of using satellite data to measure offshore pollution in a region of concentrated oil and natural gas (ONG) operations. To study this issue NASA and BOEM conducted the May 2019 Satellite Coastal and Oceanic Atmospheric Pollution Experiment (SCOAPE) cruise in the GOM. SCOAPE addressed both technological and scientific issues related to measuring nitrogen dioxide (NO₂, a common air pollutant) over the GOM, including contrasting near-shore and deepwater regimes (Thompson et al., 2023; <https://doi.org/10.1029/2022EA002473>). Generally, AQ conditions were cleaner over deepwater except in the immediate vicinity of large ONG platforms. However, methane, a potent greenhouse gas, sampled both continuously and periodically in whole-air samples, was larger near shore among myriad smaller platforms. To place the SCOAPE cruise results into context, we used long-term satellite NO₂ time-series from OMI (2005-2023) and TROPOMI (2018-2023) to evaluate NO₂ trends over the GOM (Fedkin et al., 2024; <https://doi.org/10.1029/2023EA003165>). Offshore regions show modest NO₂ growth since 2005, but a sharp decline near large urban areas. Given the April 2023 launch of the geostationary TEMPO (Tropospheric Emissions: Monitoring of Pollution) AQ satellite and BOEM's enhanced emphasis on offshore greenhouse gas monitoring, a June 2024 SCOAPE-II is planned in the GOM with ship, and aircraft NO₂ (GCAS) and methane (AVIRIS-III) measurements. We discuss preliminary results from SCOAPE-II and compare results from the 2019 SCOAPE.

Early Career Scientist

NO, I am not an early career scientist.

IGAC Activities

TOAR: Tropospheric Ozone Assessment Report