
A11C-04 - A multi-UAS-platform approach to evaluating lake breeze impact on shoreline ozone during WiscoDISCO-21 (Invited)



Monday, 13 December 2021



08:10 - 08:15



Room 278-279 (Second, Convention Center)

Abstract

The mesoscale meteorology of lake breezes along Lake Michigan impacts local observations of high ozone events. Previous manned aircraft and UAS observations have demonstrated non-uniform ozone concentrations within and above the marine layer over water and within shoreline environments. During the 2021 Wisconsin's Dynamic Influence of Shoreline Circulations on Ozone (WiscoDISCO21) campaign, two UAS platforms, a fixed-wing (University of Colorado RAAVEN) and a multirotor (DJI M210), were used simultaneously to capture lake breeze during forecasted high ozone events at Chiwaukee Prairie State Natural Area in southeastern Wisconsin from May 21-26, 2021. The RAAVEN platform measured temperature, humidity, and 3-D winds during 2-hour flights following two separate flight patterns up to 3 times per day at altitudes reaching 500 m AGL. The M210 platform measured vertical profiles of temperature, humidity and ozone during 15-minute flights up to 6 times per day at altitudes reaching 120 m AGL near to a WI-DNR ground monitoring station (AIRS ID: 55-059-0019). This campaign was conducted in conjunction with the enhanced ozone monitoring plan from WI-DNR that included Doppler lidar wind profiler observations at the site. The team captured a range of lake breeze events, including development, abatement, and mid-day lake breeze persistence over the course of the campaign. Atmospheric profiles of meteorology and ozone, and comparison of domains across platforms, ground observations, and lidar will be discussed.

Plain-language Summary

Measurements of meteorology and ozone pollution were measured using unmanned aircraft systems at a shoreline location next to Lake Michigan, where ozone pollution episodes are frequent. Ground measurements and doppler winds

were also used to capture the changes in low altitude meteorology that is impacted by the presence of the lake. The relationship between ozone pollution and the movement of marine air on land during a lake breeze will be discussed.

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