Regional and local meteorology influences high-resolution tropospheric ozone concentration in the Los Angeles Basin

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BACKGROUND
- LA Basin exists on a coast-to-mountain gradient with increasing temperatures towards the mountains where summer inversions trap pollutants (NO₂, CO, VOCs)
- Los Angeles and South Coast Air Basins are designated as severe and extreme non-attainment areas
- Current models forecast and report ozone at a resolution of 4km², but local ozone likely varies at a much higher resolution

RESEARCH QUESTIONS:
1. How variable is ozone pollution at <4 km scales across the Los Angeles Basin?
2. How does micro-meteorology drive fine-scale ozone pollution?
3. How well can models capture spatio-temporal variation in ozone?

METHODS
- 3 campaigns to deploy O₃ & meteorological sensors by partnering with citizen scientists in 2 4km² quads (Fig. 1)
- Stations were equipped with anemometers, relative humidity, & air temperature sensors and EPA federal equivalent O₃ sensors
- O₃ sensors were calibrated in lab under same O₃ control concentrations
- Field data visualized and publically available in near real time, ran in parallel to WRF-Chem model to predict O₃ concentrations.

How variable is ozone pollution at <4km² scales?

How does micro-meteorology drive highly local ozone pollution?

CONCLUSIONS
- Ozone concentration varies spatially at scales less than 4km² with complex diel and seasonal dynamics.
- Point sources have an important role in ozone pollution and can influence fine-scale ozone distributions.
- Regional model captures regional variation and mean ozone, but local variation needs further improvements to simulate O₃ variability.

MODELS AVAILABLE AT:
esmc.uiowa.edu/ca