Title:	Wildfire smoke event high ozone concentration general calibration model with z-score normalization using a low-cost metal oxide sensor
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Submission:	Either Poster or Presentation
Primary Topic Area:	Monitoring/Measurements
Secondary Topic Area:	Monitoring/Measurements

Abstract Body:

Wildfire smoke contains large quantities of ozone precursors, such as volatile organic compounds and nitrogen oxides which can react in the atmosphere causing high ozone concentration. Although the importance of ozone monitoring has been recognized and resulted in routine ozone measurements, the spatial coverage of the typical ozone sensors is not adequate to resolve high spatial ozone concentration gradients associated with smoke events.

Ozone is an oxidizing agent and, therefore, can be detected via the metal oxide sensor that is part of the University of Utah network of low-cost air quality sensors (AirU). A multiple linear regression (MLR) calibration model has been developed to convert the sensor signal to ozone concentrations. The oxidizing species measurements from four AirU metal oxide sensors co-located with the ozone measurements at the Hawthorne Division of Air Quality (DAQ) station were used to develop such a calibration model. The MLR model was built based on three variables, the AirU metal oxide sensor signal, the AirU sensor temperature, and the DAQ solar radiation. The calibration model was further improved by conducting z-score normalization before calculating the MLR calibration model. The z-score normalization process addressed inherent baseline differences among the various low-cost metal oxide sensors and improved the universal applicability of the calibration model.

The MLR calibration model was used to estimate the ozone concentration across the Salt Lake Valley using the network of AirU sensors during the wildfire smoke event from August 21-24, 2020. Applying the MLR calibration model to the network of AirU sensors provided higher-resolution spatial ozone estimates that are impossible to obtain from the DAQ sensors alone. The presented method allows leverage of the AirU sensors to resolve spatial gradients of ozone concentrations critical in validating models targeted at predicting ozone concentration during wildfire events.

Abstract Picture: