Field Evaluation
Air Quality Egg v.2
Ozone Sensor

South Coast AQMD

AQ-SPEC
Air Quality Sensor Performance Evaluation Center

Background

- From 11/23/2015 to 01/26/2016, three **Air Quality Egg v.2** ozone (O_3) sensors were deployed in Rubidoux and run side-by-side a Federal Reference Method (FRM; EPA approved) instrument measuring the same pollutant

- Air Quality Egg v.2 (AQE; *3 units tested*):

Each AQE v.2 unit carried:

  - An electrochemical gas sensor (non-FRM) by http://www.spec-sensors.com/ that measured the same pollutant: Ozone (ppb)
    - Unit cost: ~$200
  - Time resolution: 1-min
  - Units IDs: AQE1, AQE2, AQE3

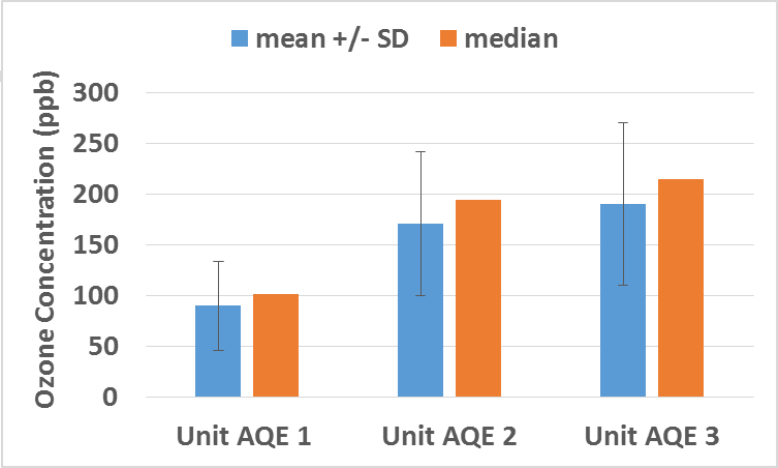
- SCAQMD FRM/FEM instruments:
  - O_3 instrument; cost: ~$7,000
    - Time resolution: 1-min
  - Meteorological station (wind speed, wind direction temperature, relative humidity, and pressure)
    - Unit cost: ~$5,000
    - Time resolution: 1-min

Data validation & recovery

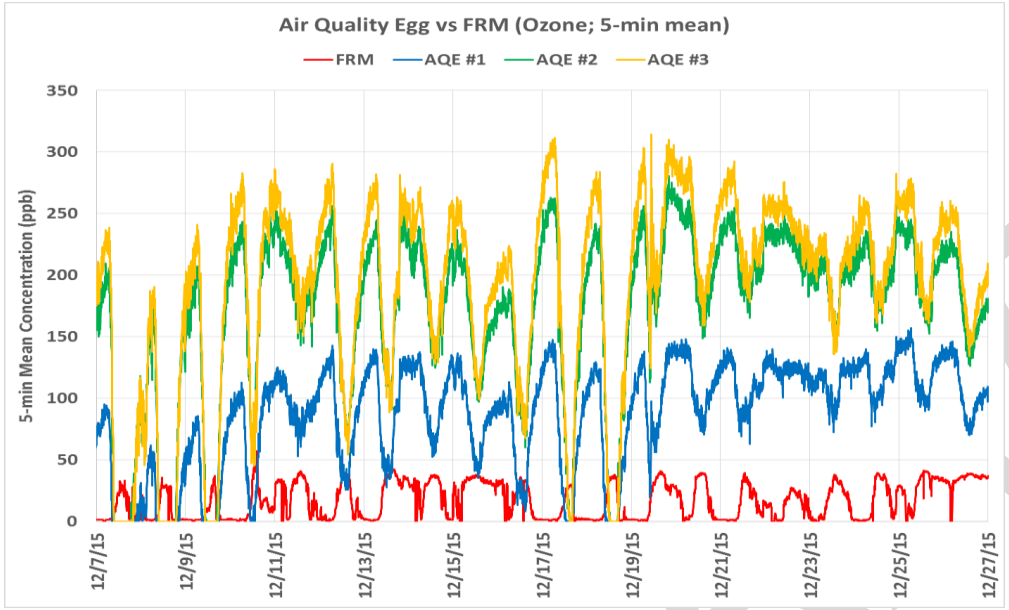
- Basic QA/QC procedures were used to validate the collected data (i.e. obvious outliers, negative values and invalid data-points were eliminated from the data-set)
- Data recovery for Ozone from all three was close to 100%

Air Quality Egg; intra-model variability

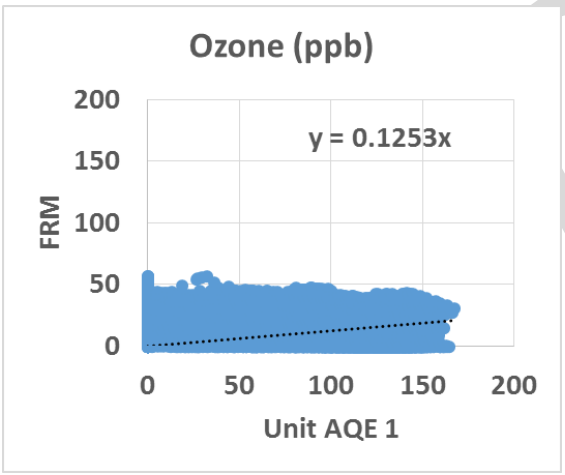
- Substantial measurement variability was observed between the three sensor units

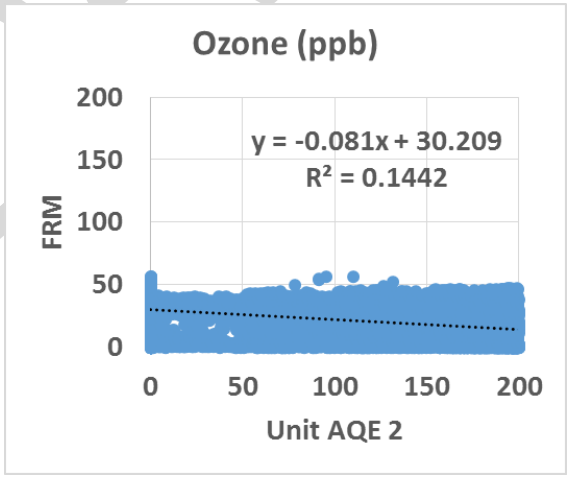


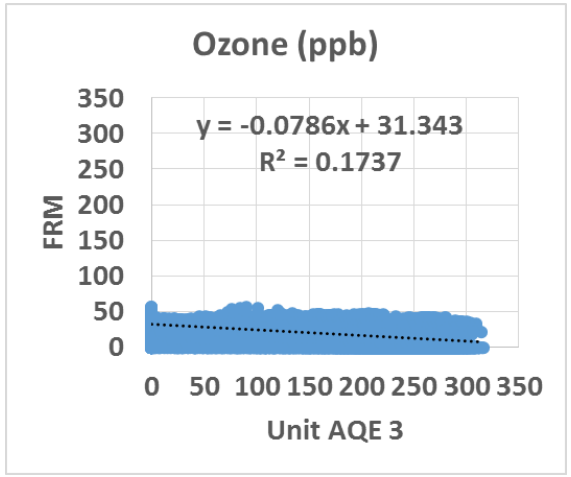
Air Quality Egg vs FRM (Ozone; 5-min mean)



- Ozone measurements from all three AQE sensors correlate poorly with the corresponding FRM data ($R^2 < 0.20$)
- All units largely overestimated measured ozone concentrations
- These sensors do not seem to track the diurnal ozone variations reported by the FRM instrument; a potential interference (cross-sensitivity) with ambient NO_2 may explain some of these results







Discussion

- Overall, the three Air Quality Egg v.2 sensors were reliable (i.e. no down time over a period of about two months) with a high data recovery close to 100%. However, they showed substantial intra-model variability
- Ozone data measured using the Air Quality Egg v.2 sensors do not correlate well with the corresponding FRM ozone data
- The sensor units tested do not track the diurnal ozone variations provided by the FRM instrument, possibly due (at least in part) to potential cross-sensitivity with ambient NO_2
- These sensors largely overestimated the FRM ozone measurements. It should be noted that no sensor calibration was performed by SCAQMD Staff prior to the beginning of this field testing
- Chamber testing under known target / interferent gas concentrations and controlled temperature and relative humidity conditions is necessary to fully evaluate the performance of the three Air Quality Egg v2 ozone sensors

- All results are still preliminary