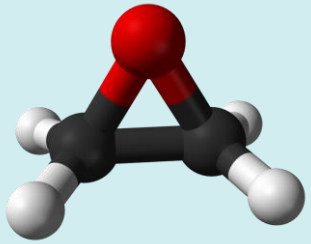
Laboratory Evaluation of Fugitive and Ambient Ethylene Oxide (EtO) Methods



ACE Board Scientific Counselors Subcommittee Meeting

October 12, 2021

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EtO Measurement Challenges

- Accurate EtO measurement poses significant challenges for ambient/near source monitoring and source/fugitive emissions testing measurement regimes

Source Emissions

Fenceline Monitoring

Ambient Monitoring

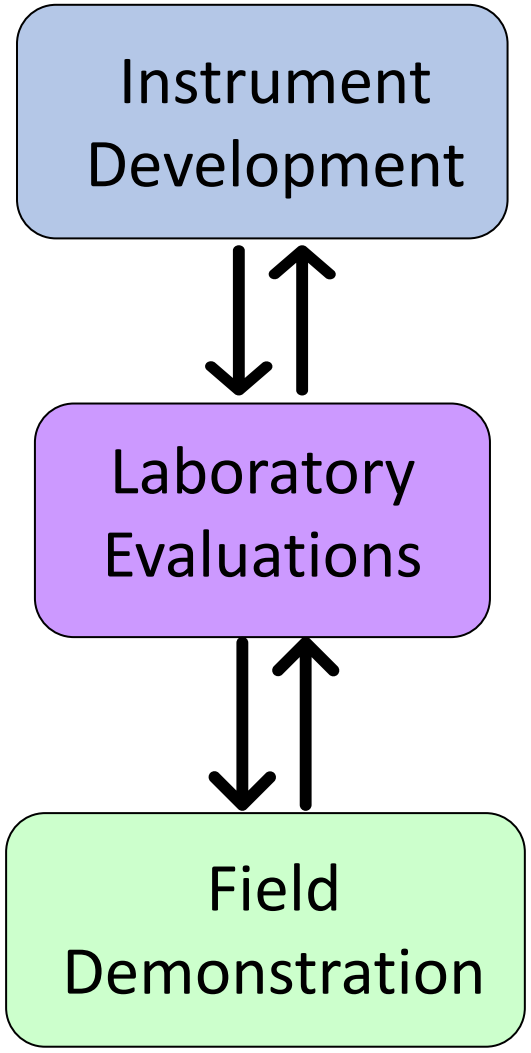
Source emissions characterization of EtO in complex sampling conditions

Fast, real-time EtO measurements for fugitive emissions detection and fenceline monitoring

Sensitive EtO methods (<10 pptv) for ambient air monitoring

EPA's EtO Method Development Research

- EPA is currently investigating a range of emerging measurement approaches and offline methods for targeted measurement applications (A-E 4.3)
- EtO methods are under evaluation both in the laboratory and in field testing for the following performance criteria:
  - Accuracy/precision
  - Sensitivity
  - Selectivity; interference effects
  - Ease of use
  - Suitability for measurement applications



EtO Chamber Method Intercomparison

Study Objective:

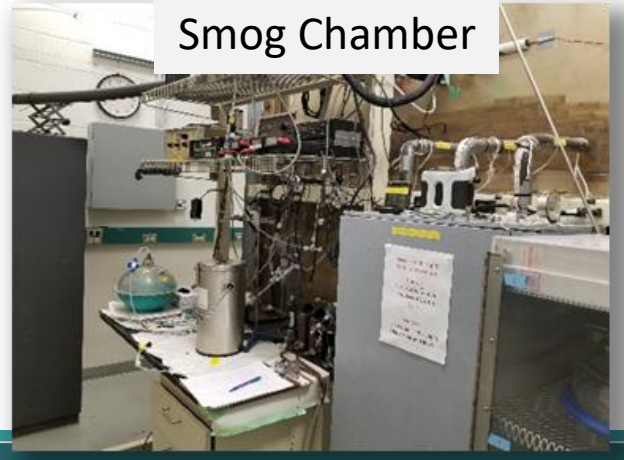
- Conduct laboratory intercomparison study to evaluate the performance of a range of offline and online EtO measurement methods under simulated atmospheres containing low ppb EtO concentrations

Approach:

- Stable EtO concentrations in high purity air were generated in a 14.5 m^3 smog chamber under controlled conditions
- Laser-based EtO analyzers and offline methods (EPA Method TO-15A, OSHA 1010) simultaneously sampled from the chamber under different test conditions (e.g., various humidities, addition of interfering species)

Impacts:

- Provide OAR and EPA Regional partners with critical information on the utility of emerging EtO measurement methods for near source ambient monitoring and fugitive emissions detection



Next Steps

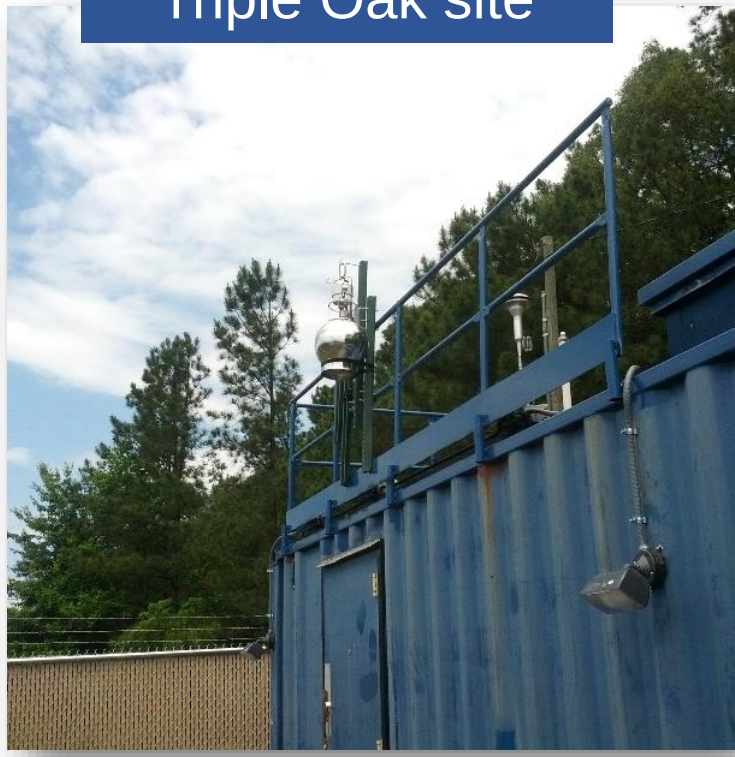
EtO Chamber Method Comparison

- Finalize offline and online EtO and interference gas and particle measurement data
- Conduct statistical testing to evaluate differences in mean EtO concentrations and influence of test conditions

Field Demonstration (Fall-Winter 2021)

- Conduct field demonstration of online and offline EtO methods to characterize ambient EtO concentrations

EPA/NC DENR
Triple Oak site



Thank you!

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