


Air Quality
Odor, Dust and Greenhouse Emissions

Measurements and Control Strategies

AIR EMISSIONS FROM CATTLE FEEDYARDS AND DAIRIES



Featuring a team of scientists and engineers from:




Funded in large part by Special Research Grants from:



Measurement Methods

Brent Auvermann, Texas AgriLife Research



What Are "Fugitive" Emissions?

Not these...



...but these

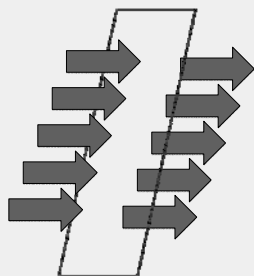


Ground
Level
Area
Sources



What Do We Mean by "Flux?"

MASS
per unit TIME
per unit AREA

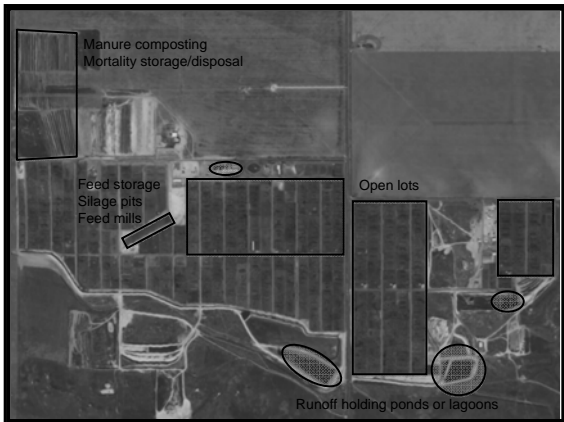


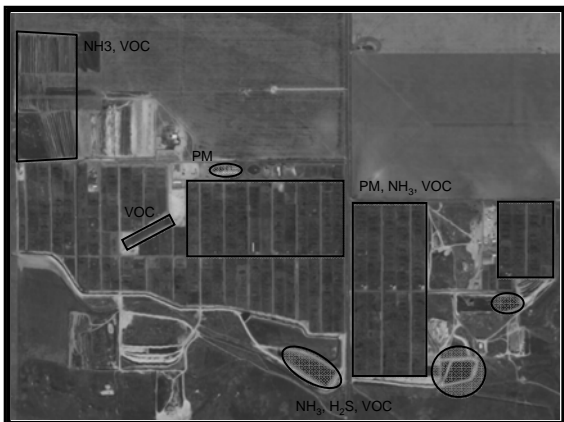


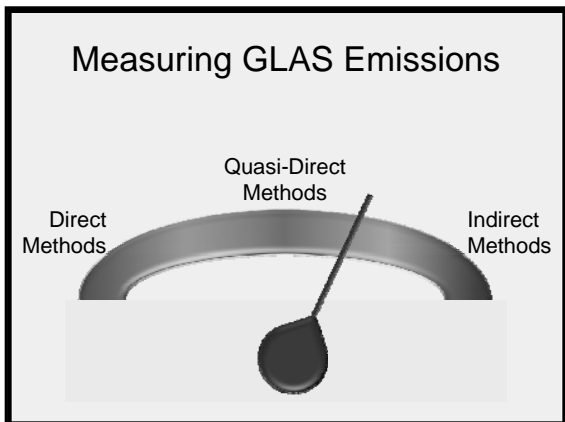










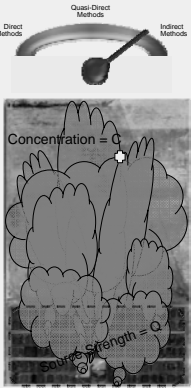


Direct Methods

- Actually measuring the quantity of interest
- No such animal in the case of GLAS
- Methods that get closest:
 - Eddy accumulation
 - Flux chambers

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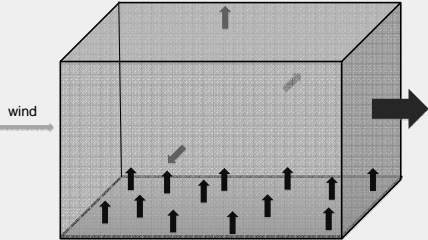


Indirect Methods

- Measuring something other than the quantity of interest (e. g., concentration)
- Inferring the emission rate from a dispersion model
- Sensitive to errors in the measurements and the governing assumptions

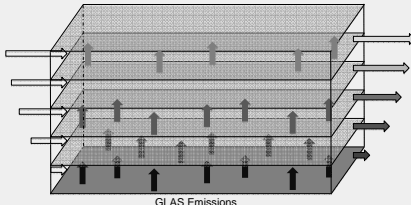
$$Q = \frac{c}{\text{Atmospheric Dispersion}}$$

Box Model – The General Idea



Integrated Horizontal Flux

(a special case of the box model)



Both wind speed and mass concentration vary with elevation

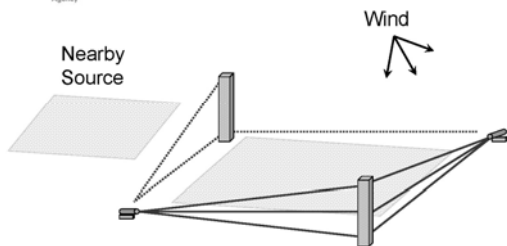
Accounting Methods

- Tracking 100% of inputs into all of the significant output streams (mass balance)
- Tracking the mass ratios of reactive to non-reactive constituents (e. g., N:P)
- Generally provide upper limit on the estimates generated by other means

Vertical Radial Plume Mapping



Four Corners Technique



Adapted from Mangum (2008)

Summary

- Direct measurement of fugitive emission rates from ground-level area sources is virtually impossible
- Many indirect methods available; no single method is best for all scenarios
- Multiple independent methods should converge on a narrow range of estimates

Q&A

Q&A Participants

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