Interrogating new science with low cost monitoring approaches: needs, pitfalls, and opportunities

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A long, long, long time ago (for sensors, at least)
The first air sensors for consumer use

This system, called “Lambda Sond,” will be on every 1977 Volvo 240 series car sold in California. The California Air Resources Board is very impressed. They’ve called it “virtually pollution free... safety standards for cars in the future.”

It was no accident that the government selected Volvo for this safety program. Of all the cars involved in preliminary crash testing, Volvo showed significantly greater potential for occupant protection than any car in its class.

G.M. AND FORD

Between them, G.M. and Ford have bought 13 Volvos to study and analyze. After years of following the “bigger is better” philosophy, they’re introducing “trim, sensibly-sized” cars. Maybe they feel there’s something to be learned from a company that’s been making trim, sensibly-sized cars for 50 years.

THE STATE OF CALIFORNIA

California has the strictest automobile emissions requirements in the nation. And it gets stricter all the time. While some car makers were loudly protesting that these requirements could not be met, Volvo was quietly working on a new type of emissions control system that would not only meet these standards, but exceed them.

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VOLVO OWNERS

The ultimate test of any car is how the owner feels about it. Volvo owners seem to be happier than the owners of other cars. In fact, when new Volvo owners were asked in a recent nationwide survey how they felt about their cars, more of them said they were “completely satisfied” or “very satisfied” than did the owners of any car made by G.M., Ford, Chrysler or American Motors. Now that you know who’s impressed with Volvo, you can take a test drive and impress the most important person of all: yourself.
They’re here!

Photo Credit: Benjamin Charlson
And everywhere!
Epidemiology (in one slide)

• Exposure linked to health outcomes.
• Exposure only *estimated* from central monitors.
• Lots of exposure misclassification.
• Uncertainty $\rightarrow$ controversy.
• Controversy $\rightarrow$ ineffective policy


Mancuso et al., 2012.
LCS to Improve Scale

From EUSDR
Satellite retrieval and LCS?
Douai Region
LCS Needs

• Take more risks, admit & accept failures
• Common QA/QC approaches
• Data harmonization/standardization
• Move beyond PM.
• Type 1 fun.
LCS Pitfalls

• Measurement uncertainty
  • Exposure misclassification
  • Technical interferences
• Underestimated costs, data overflow
• Long term drift
• Understanding indoor AQ/invasive data collection
• For most, no DMS
LCS successes (but be careful of ethics)

- Purple Air, Clarity, Acclima, Aircube, CityLab, Luftdaten, Village Green, CairClip, and on and on...
LCS Opportunities (Health-focused)

- QA/QC platforms, and sensor quality leveling on the way.
- Spatial extension of ref data (with caveats)
- Education/outreach
- Peltier/Martin project – how LCS can fill gaps
  - Personal monitoring + epi
  - Personal monitoring + clinical
- Important for issues of justice/equity.
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