



The Future of Air Quality Modeling: An Regulated Party's Perspective on Confidence in Their Use

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QUESTION

WHAT DOES IT TAKE TO TELL MY COMPANY THAT THE SIP PLAN CONTROL STRATEGIES ARE ACCEPTABLE AND EQUITABLE-EVEN THOUGH IT WILL COST US?

(BASED ON 25 YEAR PERSPECTIVE OF ONE NON-MODELER FROM INDUSTRY WITH CALIFORNIA BACKGROUND AND BIAS)

ANSWER

CONFIDENCE THAT BOTH MODELING AND CORROBORATIVE DATA ANALYSIS CAN EXPLAIN PROCESSES ASSOCIATED WITH OZONE OR PM FORMATION, INCLUDING TRANSPORT-

AND TO DEGREE POSSIBLE, HOW OZONE OR PM SHOULD RESPOND TO PRECURSOR REDUCTION

ABILITY TO EXTEND MODELING BEYOND EPISODIC TO SEASONAL, AND HAVE ACCEPTABLE PERFORMANCE USING MULTIPLE MEASURES OF PERFORMANCE

SUCCESSFULLY CONDUCT OF RIGOROUS MODEL EVALUATION AND UNCERTAINTY ANALYSIS

BUT HAVING CORRECT SIGNAL IS MUCH MORE IMPORTANT THAN DEMONSTRATION OF ATTAINMENT (WHICH SHOULD BE DROPPED AS A REGULATORY REQUIREMENT)

WHAT BUILDS CONFIDENCE-I

MODEL FORMULATION REPRESENTS STATE OF SCIENCE WHICH INCLUDES AMONG OTHER THINGS:

- UPDATE OF CHEMISTRY, ESPECIALLY AROMATICS AND SOA FORMATION FOR PM 2.5
- IMPROVEMENTS IN PROGNOSTIC MET MODEL (TEMPERATURE, HUMIDITY, ETC AT SURFACE AND ALOFT).
- IMPROVE MASS CONSERVATION
- EMISSIONS (TEMPORAL, SPATIAL, SOURCE PROFILES)
- INCORPORATION OF NON-DETERMINISTIC APPROACH

WHAT BUILDS CONFIDENCE-II

ENHANCED "ROUTINE" DATA BASE TO ALLOW SEASONAL MODELING AND INDEPENDENT DATA ANALYSIS.

- TEMPORAL AND SPATIAL COVERAGE BASED ON PAST EXPERIENCE (MODELING AND DATA ANALYSIS) AND UNDERSTANDING OF POLLUTANT FORMATION
- HIGH QUALITY MEASUREMENTS OF VOC, NITROGEN, AND PM 2.5 COMPONENT SPECIES ALONG WITH OXIDANTS (OH, H₂O₂) WITH AVERAGING TIMES USEFUL FOR MORE RIGOROUS EVALUATION OF MODEL PERFORMANCE
- HIGH RESOLUTION SURFACE AND ALOFT AIR QUALITY/MET PARAMETERS, INCLUDING BOUNDARY CONDITIONS

WHAT BUILDS CONFIDENCE-III

NEW/IMPROVED DATA ANALYSIS APPROACHES FOR CORROBORATIVE/ WEIGHT OF EVIDENCE (EXAMPLES)

- IMPROVEMENTS IN INDICATOR SPECIES FOR UNDERSTANDING OZONE PRECURSORS
- DEVELOPMENT OF INDICATOR SPECIES APPROACH FOR SECONDARY AEROSOLS
- BETTER RETROSPECTIVE ANALYSES TO UNDERSTAND DIFFERENCES BETWEEN MODEL PREDICTION AND WHAT REALLY OCCURRED
- MORE STRESSFUL TESTS/ANALYSES FOR DIAGNOSTIC ANALYSIS FOR INDIVIDUAL MODULES (MET, EMISSIONS, AIR QUALITY)

ARE WE THERE YET?



RHETORICAL QUESTION

FOR OZONE-NO, BUT SLOWLY MAKING PROGRESS

- MORE AND BETTER DATA BASES, HARDER TO GET ADEQUATE PERFORMANCE (MY OBSERVATION)
- NEED TO MOVE TO SEASONAL MODELING BUT ABILITY TO EVALUATE IS VERY LIMITED
- DATA ANALYSIS SOMEWHAT AFTERTHOUGHT & MANY TIMES AND UNDERFUNDED

FOR PM 2.5-NO, NOT SURE WHERE WE ARE

- TO DATE, NO REAL TEST OF PM MODELING PERFORMANCE UNDER RIGOROUS CONDITIONS
- SEE POINTS 2 & 3 FOR OZONE

DATA BASES FOR BOTH MODELING AND ANALYSIS

- REALITY IS THAT WE WON'T AND CAN'T RUN EXPENSIVE INTEGRATED DATA COLLECTION/ MODELING PROGRAMS EVERYWHERE
 - NEED TO ENHANCE AMBIENT AND MET MONITORING WELL BEYOND COMPLIANCE AND DESIGN LONG TERM NETWORK TO PROVIDE APPROPRIATE DATA
 - FOR EXAMPLE, FIRST EFFORT TO IDENTIFY AND DESIGN NETWORK FOR CENTRAL CALIFORNIA-ESTIMATED COST ABOUT \$ 10 MM.
 - NEED TO REFINE, AND THEN IMPLEMENT AND DETERMINE IF APPROACH IS VIABLE IN OTHER PARTS OF U. S.



WHAT WILL IT TAKE TO GET THERE-II

IMPROVEMENTS IN MODEL

PROGRAMS IN CAL. REGIONAL AIR QUALITY STUDIES ARE:

- **ADDRESSING MODEL FORMULATION QUESTIONS RAISED EARLIER, EXCEPT CHEMISTRY**
- **BUILDING BETTER LINKAGES AND IMPROVING PERFORMANCE ALOFT BETWEEN MET AND A.Q.**
- **IMPROVING DETAILED EMISSIONS INVENTORY, AS WELL AS EMISSIONS MODEL**
- **SUPPORTING DEVELOPMENT OF UC DAVIS EXTERNALLY MIXED PM MODEL FOR PM 2.5**
- **DEVELOPING ASSOCIATED COMPUTER RESOURCES FOR DATA BASE MANAGEMENT AND SHARING**

WHAT WILL IT TAKE TO GET THERE-III

NEW APPROACHES TO CORROBORATIVE DATA ANALYSIS (SOME EXAMPLES)

- **DEVELOPMENT OF METHODS TO USE SURFACE/ALOFT MEASUREMENTS TO MIMIC MODELED WINDS**
- **BETTER CHARACTERIZATION OF DIFFERENT MET REGIMES ASSOCIATED WITH OZONE AND PM EXCEEDANCES**
- **MORE DETAILED UNDERSTANDING OF VERTICAL MIXING AND DIFFERENCES IN CHEMISTRY FOR NITRATE FORMATION FOR PM**
- **DETAILED EXAMINATION OF SOURCE-RECEPTOR RELATIONSHIPS BETWEEN OZONE & PRECURSORS AND EMISSIONS OVER PRIOR DECADE**
- **CONTINUED REFINEMENT OF CONCEPTUAL MODELS FOR OZONE AND PM**

INFRASTRUCTURE ISSUES

- REGIONAL PROGRAMS SHOULD BE INCLUSIVE
 - INDUSTRIES AND ENVIRONMENTAL INTERESTS MUST BE REPRESENTED, AND BE PART OF DECISION PROCESS UP TO STRATEGY DEVELOPMENT
 - MUST HAVE FUNDING MECHANISM THAT CAN ACCEPT ALL MONEY, SUCH AS JOINT POWERS AGENCY
 - ALL TECHNICAL WORK MUST BE OPEN ACCESS
- FUNDING
 - IMPORTANT TO HAVE ALL PARTIES CONTRIBUTE SO THEY ARE FULL PART OF PROCESS
 - NEED TO MARKET BENEFITS AND SELL PROGRAM TO STATE, FED. AGENCIES, AND CONGRESS

ADDITIONAL SUPPORT

MOVE TO ADOPT RECENT RECOMMENDATIONS OF:

- NAS PANEL ON AIR MANAGEMENT

- NARSTO OZONE, PM STATIGIC ASSESSMENTS AND EMISSIONS INVENTORY ASSESSMENT



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REVIEW AND COMMENTS

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