

# Rapid Synthesis of SIP-Relevant Science Questions from Texas Air Quality Studies

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- SIP-Relevant science questions have been identified by TCEQ.
- Working Group participants and leaders have been identified.
- Research approaches for specific questions are being developed.

# RSST Report Schedule

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- Interim Progress Report
  - May 31, 2006
- First Science Synthesis Report of SIP-Relevant Science Questions
  - July 15, 2006
- Preliminary Rapid Science Synthesis of TexAQS II Results
  - October 31, 2006
- Final Rapid Science Synthesis of TexAQS II Results
  - August 31, 2007

# SIP-Relevant Science Questions

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*Description of ozone and PM formation mechanisms, as observed and inferred independent of regulatory modeling*

- Question a: Which local emissions are responsible for the production of high ozone in Houston, Dallas, and eastern Texas? Are different kinds of emissions responsible for transient high ozone and 8-hour-average high ozone (i.e.,  $\geq 84$  ppbv)?
- Working Group: David Parrish (leader), Tom Ryerson, Joost deGouw, Basil Dimitriades, Dave Allen, Mark Estes

# SIP-Relevant Science Questions

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*Description of ozone and PM formation mechanisms, as observed and inferred independent of regulatory modeling*

- Question b: How do the structure and dynamics of the planetary boundary layer and lower troposphere affect ozone and aerosol concentrations in Houston, Dallas, and eastern Texas?
- Working Group: John Nielsen-Gammon, Bob Banta (co-leaders), Allen White, Christoph Senff, Wayne Angevine, Bryan Lambeth, Lisa Darby, Carl Berkowitz

# SIP-Relevant Science Questions

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*Description of ozone and PM formation mechanisms, as observed and inferred independent of regulatory modeling*

- Question c: Are highly-reactive VOC and NO<sub>x</sub> concentrations still at the same levels in Houston as they were in 2000? How have they changed spatially and temporally? Are there specific locations where particularly large quantities of HRVOCs are still being emitted? Are those emissions continuous or episodic? How well do the reported emissions inventories explain the observed concentrations of VOCs and NO<sub>x</sub>?
- Working Group: David Parrish (leader), Dave Allen, Carl Berkowitz, Yulong Xie, Joost deGouw, Tom Ryerson, Mark Estes, Dave Sullivan, John Jolly

# SIP-Relevant Science Questions

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*Description of ozone and PM formation mechanisms, as observed and inferred independent of regulatory modeling*

- Question d: What distribution of anthropogenic and biogenic emissions of ozone and aerosol precursors can be inferred from observations?
- Working Group: David Parrish, Dave Allen (co-leaders), Tom Ryerson, Chuck Brock, Joost deGouw, Carl Berkowitz, Dave Sullivan, Yulong Xie, Mark Estes, John Jolly

# SIP-Relevant Science Questions

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*Description of ozone and PM formation mechanisms, as observed and inferred independent of regulatory modeling*

- Question e: Are there sources of ozone and aerosol precursors that are not represented in the reported emissions inventories?
- Working Group: David Parrish (leader), Tom Ryerson, Chuck Brock, Joost deGouw, Dave Sullivan, John Jolly, Dave Allen

# SIP-Relevant Science Questions

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## *Sensitivity to VOC and NO<sub>x</sub> emission reductions*

- Question f: How do the mesoscale chemical environments (NO<sub>x</sub>-sensitive ozone formation vs radical-sensitive ozone formation) vary spatially and temporally in Houston, Dallas and eastern Texas? Which mesoscale chemical environments are most closely associated with high ozone and aerosol?
- Working Group: David Parrish, Basil Dimitriades (co-leaders), Dave Allen, Harvey Jeffries, Will Vizuete, Daewun Byun, Yulong Xie, Carl Berkowitz, Mark Estes, Ken Schere

# SIP-Relevant Science Questions

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*Background ozone and aerosol concentrations and the role of regional transport*

- Question g: How do emissions from local and distant sources interact to determine the air quality in Texas? What meteorological and chemical conditions exist when elevated background ozone and aerosol from distant regions affect Texas? How high are background concentrations of ozone and aerosol, and how do they vary spatially and temporally?
- Working Group: David Parrish, Dave Allen, (co-leaders), John Jolly, Bryan Lambeth, Dave Sullivan, Basil Dimitriades, Chuck Brock, Mike Hardesty

# SIP-Relevant Science Questions

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*Background ozone and aerosol concentrations and the role of regional transport*

- Question h: Which areas within Texas adversely affect the air quality of non-attainment areas within Texas? Which areas outside of Texas adversely affect the air quality of non-attainment areas within Texas?
- Working Group: David Parrish, Dave Allen (co-leaders), John Jolly, Mark Estes, Greg Yarwood, Basil Dimitriades, Dave Sullivan, Chuck Brock, Mike Hardesty

# SIP-Relevant Science Questions

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## *Other SIP-relevant science questions*

- Question i: Why does the SAPRC chemical mechanism give different results than CB-IV? Which replicates the actual chemistry better?
- Working Group: Dave Allen, Greg Yarwood (co-leaders), Harvey Jeffries, Will Vizuete, Bill Carter, David Parrish, Stu McKeen, Joost deGouw, Mark Estes

# SIP-Relevant Science Questions

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## *Other SIP-relevant science questions*

- Question j: How well do forecast air quality models predict the observed ozone and aerosol formation? What are the implications for improvement of ozone forecasts?
- Working Group: Stu McKeen (leader), Greg Carmichael, Bryan Lambeth, Ken Schere, James Wilczak, Greg Yarwood, Daewon Byun, John Nielsen-Gammon, Mike Hardesty

# SIP-Relevant Science Questions

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## *Other SIP-relevant science questions*

- Question k: How can observation and modeling approaches be used for determining (i) the sensitivities of high ozone in the HGB non-attainment area to the precursor VOC and NO<sub>x</sub> emissions, and (ii) the spatial/temporal variation of these sensitivities?
- Working Group: Basil Dimitriades, David Parrish (co-leaders), Ted Russell, Harvey Jeffries, Will Vizquete, Mark Estes, Dave Sullivan, Tom Ryerson, Greg Yarwood

# SIP-Relevant Science Questions

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## *Other SIP-relevant science questions*

- Question I: What existing observational databases are suitable for evaluating and further developing meteorological models for application in the HGB area?
- Working Group: Bob Banta, Lisa Darby (co-leaders), John Nielsen-Gammon, Daewon Byun, Wayne Angevine, Mark Estes, Bryan Lambeth, Stu McKeen

# Guidelines for Formulation of Scientific Findings to be Used for Policy Purposes

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Is the Statement Sound?

Is the Statement Directional, and, Where Appropriate, Quantitative?

Is the Degree of Certainty or Uncertainty of the Statement Indicated Clearly?

Is the Statement Correct Without Qualification?

Is the Statement Clear and Unambiguous?

Is the Statement as Concise as it can be Made Without Risk of Misunderstanding?

Is the Statement Free of Scientific or Other Biases or Implications of Societal Value Judgements?

Have Societal Implications Been Described Objectively?

Have the Professional Biases of Authors and Reviewers Been Described Openly?