

TCEQ's High Priority SIP-Relevant Science Questions and Leaders (L), Participants (P) and Observers (O) in Working Groups within the Rapid Science Synthesis Team

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

- 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., ≥ 84 ppbv)?

L – David Parrish, P – Tom Ryerson, Joost deGouw, Basil Dimitriades, David Allen, Mark Estes, Bernhard Rappenglück, O – Noor Gillani

- 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?

Co-L – Robert Banta & John Nielsen-Gammon, P – Allen White, Christoph Senff, Wayne Angevine, Bryan Lambeth, Lisa Darby, Bright Dornblaser, Daewon Byun, Bernhard Rappenglück, O – Carl Berkowitz, Noor Gillani

- C** Are highly-reactive VOC and NO_x emissions and resulting ambient 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 HRVOC are still being emitted? Are those emissions continuous or episodic? How well do the reported emissions inventories explain the observed concentrations of VOC and NO_x ?

L – David Parrish, P – David Allen, Joost deGouw, Tom Ryerson, Mark Estes, David Sullivan, John Jolly, Eric Williams, Barry Lefer, O – Yulong Xie, Carl Berkowitz, Noor Gillani. **Note:** To answer the last part of question C, TCEQ must define the inventory to which the observations must be compared.

- D** What distribution of anthropogenic and biogenic emissions of ozone and aerosol precursors can be inferred from observations?

Co-L – David Allen & David Parrish, P – Tom Ryerson, Charles Brock, Joost deGouw, David Sullivan, Mark Estes, John Jolly, Eric Williams, Barry Lefer, Bernhard Rappenglück, O – Yulong Xie, Carl Berkowitz, Noor Gillani

- E** Are there sources of ozone and aerosol precursors that are not represented in the reported emissions inventories?

L – David Parrish, P – Tom Ryerson, Charles Brock, Joost deGouw, David Sullivan, John Jolly, David Allen, Eric Williams, Barry Lefer, Bernhard Rappenglück

Sensitivity to VOC and NO_x emission reductions

- F** How do the mesoscale chemical environments (NO_x -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?

Co-L – Basil Dimitriades & David Parrish, P – David Allen, Harvey Jeffries, William Vizuete, Daewon Byun, Mark Estes, Kenneth Schere, Barry Lefer, Bernhard Rappenglück, O – Yulong Xie, Carl Berkowitz

Background ozone and aerosol concentrations and the role of regional transport

- 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?

Co-L – David Allen & David Parrish, P – Bryan Lambeth, David Sullivan, Basil Dimitriades, Charles Brock, Michael Hardesty, Steve Brown, Joost deGouw, Bernhard Rappenglück, Brad Pierce, Wallace McMillan, Kevin Bowman, David Winker, Tim Bates

- 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?

Co-L – David Allen & David Parrish, P – Mark Estes, Greg Yarwood, Basil Dimitriades, David Sullivan, Charles Brock, Michael Hardesty, John Jolly, Bryan Lambeth, Brad Pierce, Wallace McMillan, Kevin Bowman, David Winker

Other SIP-Relevant science questions

- I** Why does the SAPRC chemical mechanism give different results than CB-IV? Which replicates the actual chemistry better?

Co-L – David Allen & Greg Yarwood, P – Harvey Jeffries, William Vizuete, Bill Carter, David Parrish, Stuart McKeen, Daewon Byun, Joost deGouw, Barry Lefer, Bernhard Rappenglück, O – Mark Estes, Noor Gillani

- J** How well do forecast air quality models predict the observed ozone and aerosol formation? What are the implications for improvement of ozone forecasts?
- L – Stuart McKeen, P – Gregory Carmichael, Bryan Lambeth, Kenneth Schere, James Wilczak, Greg Yarwood, Daewon Byun, John Nielsen-Gammon, Michael Hardesty

- 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_x emissions, and (ii) the spatial/temporal variation of these sensitivities?

Co-L – Basil Dimitriades & David Parrish, P – Ted Russell, Harvey Jeffries, William Vizuete, Mark Estes, David Sullivan, Tom Ryerson, Greg Yarwood, Barry Lefer, Bernhard Rappenglück, O – Noor Gillani

- L** What existing observational databases are suitable for evaluating and further developing meteorological models for application in the HGB area?

L – Lisa Darby, P – Robert Banta, John Nielsen-Gammon, Daewon Byun, Wayne Angevine, Mark Estes, Bryan Lambeth, Stuart McKeen

Note: Letter designations are for convenience only and do not denote priority. Questions in blue have been designated by TCEQ to receive special emphasis.