

HARC Project H45 Interim Report for Task Group A
**Modeling Strategy in Support of TexAQS-II and 8-Hour
Ozone Assessment**

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PROJECT SUMMARY: Modeling Strategy in Support of TexAQS-II and 8-hour Ozone Assessment, Task Group A.

The main objective of the Second Texas Air Quality Study (TexAQS-II) for 2005 and 2006 is to understand emissions and processes associated with the formation and transport of ozone and regional haze in Texas. The target research area is the more populated eastern half of the state, roughly from Interstate 35 eastward. Accurate meteorological and photochemical modeling efforts are essential to support this study and further enhance modeling efforts for establishing the State Implementation Plan (SIP) by Texas Commission on Environmental Quality (TCEQ). An air quality forecasting (AQF) system for Eastern Texas has been developed to provide these data and to further facilitate retrospective simulations to allow for model improvement and increased understanding of ozone episodes and emissions. This report summarizes key activities of the AQF system development project and describes a framework to provide model performance evaluation.

We perform two-day air quality forecasting simulations with the 12-km Eastern Texas regional domain, and the 4-km Houston-Galveston area (HGA) domain utilizing a 48-CPU Beowulf Linux computer system. The dynamic boundary conditions are provided by the 36-km resolution conterminous US (CONUS) domain CMAQ simulations. Initial meteorological conditions are provided by the daily ETA forecast results. The results of individual runs are stored and made available to researchers and state and local officials via internet to study the patterns of air quality and its relationship to weather conditions and emissions. The data during the pre- and post-processing stages are in tens of gigabytes and must be managed efficiently during both the actual real-time and the subsequent computation periods. The nature of these forecasts and the time at which the initial data is available necessitates that models be executed within tight deadlines. A set of complex operational scripts is used to allow automatic operation of the data download, sequencing processors, performing graphical analysis, building database archives, and presenting on the web.

The present air quality forecasting project is intended not only to provide needed support for TexAQS-II field study but also to help define the best practice for modeling 8-hour ozone by testing various elements of the appropriate modeling strategy. It is required to present the AQF results in a comprehensive fashion to the scientists as well as to the public. As part of the forecasting simulation, we are developing performance evaluation metrics. This task includes development and implementation of automated procedures for computing the performance evaluation metrics, the establishment of archive procedures for the subset of model output necessary for performance evaluation, and the identification of procedures for generation of graphical displays of model performance. The forecasting results are evaluated daily with meteorology and air quality measurements from the Continuous Air Monitoring Stations (CAMS).

Most of project tasks for the Task Group A have been completed. We have overcome many problems related with the real-time air quality forecasting. Accomplishments for this project

until now are; (1) Development of the operational modeling support infrastructure: Hardware, software, and other operational infrastructure have been established to support the operational air quality forecasting project; (2) Testing of the real-time system performance: The performance of the real-time air quality forecasting system was evaluated against the TexAQS 2000 episode data. The real-time emissions modeling and air quality modeling systems provide comparable modeling results as the assessment study results of the H12/HRB project.; (3) Establishment of real-time trajectory forecasting framework: The real-time trajectory system is now linked both the observational database and MM5 forecasting results to provide real-time forward and backward trajectory analysis and forecasting; and (4) Development of methods to real-time emissions inputs: SMOKE, BEIS3, and GloBEIS3 software are modified to process Texas emissions inventories for real-time forecasting.

The focus of research for the remaining project period will be on the Task Group B to perform model evaluation of the tetroon study, Task Group C to operate and evaluate daily ozone forecasting, and Task Group D, to perform Eastern Texas source apportionment study of ozone production by highly reactive and other volatile organic compounds.