



# **Proceedings of the Twelfth**

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## 1. INTRODUCTION

Phase II of the Advanced Texas Air Quality Model (ATAQM) has been implemented for the Texas Natural Resources Conservation Commission (TNRCC) to support simulations of the August 25-31, 1998 ozone-exceedance episode in the 8-county Houston-Galveston Non-Attainment Area. ATAQM is a new, state-of-science modeling system that should significantly improve upon recognized deficiencies in current meteorological modeling systems used to drive air quality models in support of State Implementation Planning. ATAQM Phase II consists of the Fifth-Generation PSU/NCAR Mesoscale Model Version 3 (MM5v3); the TOPMODEL-based Land Atmosphere Transfer Scheme (TOPLATS; Famiglietti and Wood, 1994; Peters-Lidard et al., 1997) land surface hydrology model; and a Sea-Surface Atmosphere Transfer Scheme (SSATS). The TOPLATS model is driven with both in situ and remotely sensed estimates of key meteorological variables, including solar radiation and precipitation, and the SSATS model is driven with observed Sea Surface Temperature (SST) data from a combination of in situ (NOAA PORTS) and remotely sensed (CoastWatch AVHRR products) sources. This modeling system is fully documented at [http://www.emc.mcnc.org/projects/TNRCC-projects/tnrcc\\_public.html](http://www.emc.mcnc.org/projects/TNRCC-projects/tnrcc_public.html). Below, we discuss the model configuration and results for the episode.

## 2. APPROACH

### 2.1. TOPLATS Configuration

The TOPLATS Study Domain (TSD) for this project was set by mosaicking 8-Digit Hydrologic Unit Code watersheds provided by the National Hydrography Dataset (NHD) (USGS, 2001). This domain was chosen to include all watersheds that contain areas of Harris County (Houston), Texas as well as all counties that border Harris. Using this one-county buffer region as a guideline, the domain to model for TOPLATS was set as a large portion of the Eastern Coastal Plains of Texas with an area of approximately 96,000 square kilometers. The region covers an expanse from Matagorda Bay in the most southern point (28.07 N) to near Waco, Texas in the north (31.81 N), and from Lake Charles, Louisiana

in the east (93.01 W) to the suburbs of Austin, Texas at the westernmost location (97.37 W)(Figure 1).

The region chosen for this project is much larger than those typically used in previous TOPLATS studies, and is only possible due to the parallel techniques and high performance I/O that have been implemented as part of this research (Coats et al., 1999; Peters-Lidard et al., 1999). The TOPMODEL concept assumes that base flow is the same throughout the watershed of interest, and when the watershed is much larger than 500 square kilometers in area, this assumption may be invalid. Therefore for a large region such as the HGA study requires, the domain is subdivided into smaller watersheds suitable for TOPLATS. In total the region has been divided into 173 watersheds (Figure 2), each of which has watershed-specific parameters required for TOPLATS.

Parameters for TOPLATS were estimated using readily available Digital Elevation Model (DEM), landcover and soils databases. TOPLATS was then "spun-up" for the period January 1-August 24, prior to coupling, using observed forcing data, including NEXRAD WSR88D precipitation, observed solar radiation, and observed surface-station meteorology including wind-speed, temperature, relative humidity, etc. More details about the TOPLATS databases and spin-up are available online at:

[http://www.emc.mcnc.org/projects/TNRCC-projects/ATAQM/ataqmll\\_report1.pdf](http://www.emc.mcnc.org/projects/TNRCC-projects/ATAQM/ataqmll_report1.pdf)

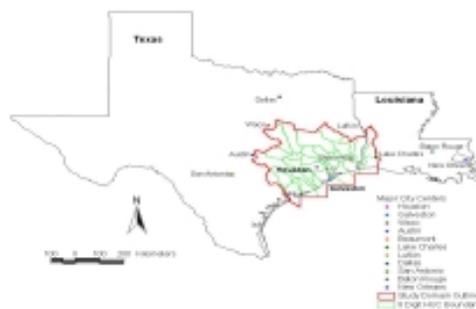


Figure 1. Houston-Galveston study region.