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**Texas Commission on Environmental Quality
New Technology Research & Development (NTRD) Program
Monthly Project Status Report**

Contract Number: 582-5-70807-0009

Grantee: The University of Texas at Austin

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Report for the **Monthly** period:

Starting Date September 1, 2006 Ending Date September 30, 2006

Section I. Accomplishments *(Please provide a bulleted list of project accomplishments as well as a description of their importance to the project.)*

The project involves the collaboration of two University of Texas at Austin research centers: the Center for Space Research (CSR) and the Center for Energy and Environmental Resources (CEER). The CSR team is led by Melba Crawford (Co-PI), Gordon Wells (Co-PI) and Teresa Howard. The CEER team is led by Elena McDonald-Buller and David Allen.

Accomplishments in September by the two research teams included the following:

- As part of Task 2.1, CSR conducted fieldwork in September to collect land cover information in areas that are not well characterized by the U.S. Forest Service's Forest Inventory and Analysis (FIA) database. Data were collected in more than 24 counties. Areas targeted for data collection included those that were incorrectly classified in the draft New Eastern Texas Land Cover classification. Work funded by a separate HARC contract, but related to Task 2.1, resolved that severe restrictions placed on access to FIA data limited its usefulness as a source for ground truth data.
- Related to Tasks 2.1 and 2.2, CSR staff attended the North American Land Cover Summit held in Washington, D.C., from September 20-22. Attendance was by invitation only. Topics related to the coordination, development, and maintenance of land cover data for the United States, Canada, and Mexico. CSR staff acquired valuable information pertaining to the release of future continental U.S. land cover datasets. Attendance and travel were funded under a separate contract.
- As part of Task 2.2, a draft manuscript on the application of land cover data from satellite remote sensing observations for estimating dry deposition was completed by CEER. Following internal review, the manuscript will likely be submitted to the Journal of the Air & Waste Management Association. This report discusses the effect of changes in land use on dry deposition modeling in East Texas, primarily in the Houston-Galveston region, and examines possible sources for updated land cover data. CSR-prepared land cover inputs from MODIS, AVHRR and the CSR LULC data set were used in the CAMx model runs for the August 22 - September 6, 2000, modeling episode. Land cover and predicted dry deposition velocities and ozone concentrations using each data set were compared.
- Work was completed on the satellite measurements of leaf area index (LAI) under Task 2.3. The LAI time series was constructed based upon the following rule: If the QA/QC

flag for a pixel at a particular time was determined to be of poor quality, the LAI value for that pixel was then retrieved from the previous date LAI. If both dates had a poor QA/QC flag for a given pixel, then the LAI for that pixel was coded as the average LAI value for the composite time series. Urban areas are coded as 255 per the NASA standard reporting value. Water values are coded as 0. Six subsequent LAI raster products were resampled to 4-km spatial resolution. The 4-km LAI products were then reprojected into the Lambert spheroid projection used in the GloBEIS model. The raster data were converted to an ASCII format compatible with GloBEIS input standards.

- As part of Task 2.3, assessment of the air quality model sensitivity to the new LAI dataset prepared by CSR was completed by CEER. Documentation of the results is in preparation.
- In support of task 2.4.1, new refinements were completed to generate a high-resolution PDSI map from AVHRR NDVI deviation measurements and regional PDSI values. In this procedure, the 7-year, monthly median NDVI for each pixel is subtracted from the weekly composited, reconstructed NDVI to yield the NDVI deviation from median. The regional PDSI value is then divided by the average NDVI deviation for its region to yield a factor that is used to rescale the NDVI deviations to PDSI values. Based on this procedure, weekly PDSI products were generated for the 2000 period of study and have been provided for model evaluation.
- As part of Task 2.4, CEER received new PDSI input files from CSR that will be used to examine the impacts of drought on biogenic emissions during the 2000 modeling episode.
- Efforts also continued to support task 2.5.1, which evaluates a burn scar detection algorithm based the MODIS NIR 1.24 micron and 2.13 micron channels, as described in a 2004 paper by Rong-Rong Li. Initial evaluation of the algorithm indicates that it is able to detect burn scars of large fires. However, documentation indicates that the algorithm is also sensitive to several other factors: cloud shadows, water surfaces in sun glint and bright land surfaces. The initial evaluation of the products has also demonstrated that those factors, plus turbid water and mixed land-water pixels can confound the burn scar detection by producing false positives. Work is underway to explore the screening of the confounding features. Cloud shadows have been estimated from the MODIS cloud mask product, but the results are imperfect. The 2004 paper suggests thresholds that can be applied to several of the other MODIS 250-meter and 500-meter bands to screen some of the unwanted features; however, determining proper thresholds that can be consistently applied while still preserving burn scar sensitivity remains a challenge.
- For Task 2.6, CSR completed the portion of the final report that covers the soil moisture detection results using AMSR-E data.

Indicate which part of the Grant Activities as defined in the grant agreement, the above accomplishments are related to:

As noted, the accomplishments are primarily related to Tasks 2.1 through 2.5, with Subtasks 2.4.1 and 2.5.1 receiving particular attention.

Section II: **Problems/Solutions**

No particular problems were encountered during the reporting period.

Section III. Goals and Issues for Succeeding Period: *(Please provide a brief description of the goal(s) you hope to realize in the coming period and identify any notable challenges that can be foreseen)*

As part of Task 2.1, CEER's current efforts are focused on preparing biogenic emission estimates for August 2000 and August 2006 with the new CSR land cover dataset. The estimates will be used for comparisons with aircraft and satellite-based measurements occurring as part of the TexAQS II field campaign. CEER had already completed GloBEIS and CAMx runs with various land cover datasets for the 2000 modeling episode using meteorological data from MM5. This process is being repeated using observed surface temperatures and estimates of PAR. MM5 predictions of surface temperatures during the 2000 modeling episode were biased toward low values, which may significantly impact estimates of biogenic emissions. CEER is currently working with NOAA and Harvard to obtain meteorological data for August 2006 and will be generating isoprene emission estimates.

CSR will provide biomass data compiled by the Texas Forest Service as it becomes available.

CEER will use the new PDSI input files received from CSR to examine the impacts of drought on biogenic emissions during the 2000 modeling episode.

Final report preparation for completed tasks and other tasks nearing completion will continue.



Date: October 15, 2006

Authorized Project Representative's Signature