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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

Date Submitted: February 15, 2006

Report for the **Monthly** period:

Starting Date January 1, 2006 Ending Date January 31, 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 December by the two research teams include the following:

- As part of Task 2.1, CSR continued work on the New Eastern Texas Land Use Land Cover (LULC) Classification. Additional improvements were made to the draft land cover data intersecting the USGS-defined NLCD 2001 mapping zones 36 and 37. For portions of South Texas, Louisiana, and Mississippi, the NLCD 2001 land cover classes were mapped to the New Eastern Texas Land Use Land Cover (LULC) classes. The additional raster land cover data was added to the original East Texas extent to complete the Louisiana side of the Houston-Galveston-Beaumont-Port Arthur (HGBPA) modeling subdomain. Southern areas of Louisiana, Mississippi, and Texas were added for the East Texas modeling domain. Null pixels exist in the northern and extreme western portions of this dataset, where USGS NLCD 2001 land cover data has not been released. As part of the activities described under Task 2.1, the following datasets were completed: LULC_30m_EastTX_domain.img (30 meter land cover data for the East Texas domain), LULC_30m_HGBPA_domain.img (30 meter land cover data for the HGBPA subdomain), and LULC_30m_zones36_and_37.img (30 meter land cover data for mapping zones 36 and 37). All files are in ERDAS Imagine format, which can be viewed and analyzed in ArcGIS, ERDAS Imagine and ENVI. The datasets were compiled using the Albers Equal Area projection with parameters for the continental USA.

- As part of Task 2.1, the finalized HGBPA land cover data were reprojected into the TCEQ Lambert Conformal Conic map projection required for air quality modeling and were resampled to 10-meter grid cells. Land cover classes were reclassified, using GIS tools and the USEPA's Level III and Level IV Ecoregions, to correspond to classes used for calculating average leaf biomass density by the USDA Forest Service using the UFORE model. The biogenics-related calculations were performed as part of the TERC-funded project mentioned in past monthly progress reports. The CEER team is preparing to use the data with the GloBEIS model to estimate biogenic emissions for the HGBPA modeling subdomain.

- As part of Task 2.1, the CSR team modified the GeoProcessing model and script mentioned in the December progress report to prepare Landsat-derived land cover data for ingestion into the GloBEIS modeling environment. The model and script development constitute the solution to the large file size problem identified in the November report. CSR began to document tools used to prepare land cover data for ingestion into the CAMx and GloBEIS models with the modeling teams at CEER and TCEQ.

- The CEER team completed an initial assessment of the air quality and dry deposition impacts of the MODIS and AVHRR IGBP land cover products for the August 22-September 6, 2000, Houston SIP episode included in Task 2.2. The methodology and preliminary results of this effort have been described in an extended abstract submitted to the Air & Waste Management Association for inclusion in the proceedings for the AWMA national conference in June 2006. The extended abstract is currently undergoing review and will be available upon request. The CEER team is currently using the Ozone Source Apportionment Technology (OSAT) tool in CAMx to assess if and how changes in the land cover datasets for dry deposition impact the contribution of various emission sources to ozone concentrations in the region.

- The CEER team also conducted sensitivity studies focused on the mapping of the IGBP land cover classifications to the CAMx land cover categories as part of Task 2.2.

- Although not funded under this grant, the CEER team continues to pursue related work with NCAR to compare the MODIS Vegetation Continuous Fields (VCF) product to existing mappings of tree cover in Eastern Texas.

- Under Task 2.4, preparation continued at CSR to develop the time series of cloud-free composite AVHRR NDVI data to support the measurement of drought stress during 1999-2000. For this purpose, data from the 1995-2001 compilation of NOAA-14 AVHRR data were selected. The next step will involve generating median and average values for each pixel location for various time intervals extending from 1995 to 2001. Departures from the median and average values will then be compared to changes in the Palmer Drought Sensitivity Index to explore the relationship between drought stress observed by satellite observations and estimated from precipitation records and field reports.

- The CSR team obtained new algorithms from NASA that are being compiled, configured and tested to support the generation of products from the CSR direct broadcast receiving station to support the production of improved MODIS NDVI products as described in Task 2.4 and the aerosol optical thickness analysis to be developed under Task 2.5.

- In the first direct comparison of the soil moisture measurements obtained by the AMSR-E instrument on the NASA Aqua satellite as part of Task 2.6, the CSR team examined daily soil moisture products in relation to daily precipitation records for Texas and surrounding states during the final week of September and first week of October 2005. The AMSR-E soil moisture products exhibit a distinctive pattern associated with heavy rainfall that accompanied the landfall of Hurricane Rita during that two-week period.

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, 2.2, 2.4, 2.5 and 2.6, with specific subtasks 2.1.3, 2.2.2, 2.4.1, 2.4.2, 2.5.2 and 2.6.1 receiving primary attention.

Section II: Problems/Solutions

Problem(s) Identified (Please report anticipated or unanticipated problem(s) encountered and its effect on the progress of the project)	*The rapid completion of the Landsat-derived land cover database to be used for the GloBEIS model is contingent on the availability of the completed USGS National Land Cover Dataset 2001, which is used to supplement and improve the CSR land cover product.*
Proposed Solution(s) *(Please report any possible solution(s) to the problem(s) that were considered/encountered)*	*In December 2005, USGS released data for mapping zones 36 and 37. Unfortunately, only the southern half of mapping zone 37 for Texas was released. The USGS was contacted regarding future data availability, but could not provide a release date. CSR will continue to pursue the issue of the delivery of the missing portion of the dataset with the USGS.*
Action(s) Conducted and Results *(Please describe the action(s) taken to resolve the problem(s) and its effect)*	*The continued delay of the release of the NLCD 2001 for mapping zones 37, 32 and 35 could impact completion of land cover production for the East Texas domain, the Dallas-Fort Worth subdomain and the Austin-San Antonio subdomain, but does not affect the HGBPA subdomain.*

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)*

The CSR team will complete tool documentation, and will begin land cover classification for the four-county DFW non-attainment area.

The CEER team will use the New Eastern Texas Land Use Land Cover (LULC) data for the Houston-Galveston-Beaumont-Port Arthur (HGBPA) area in GloBEIS to estimate biogenic emissions. The air quality impacts of the new biogenic emission estimates will be assessed using

CAMx and will be compared with the results obtained using the data from Wiedinmyer et al. (2001) that currently serve as the standard input for modeling performed by TCEQ.

The CSR team will refine the relationship between drought stress as represented in the NDVI measurements from the NOAA AVHRR and NASA MODIS instruments and the PDSI records of changing climatic conditions, with particular emphasis on the PDSI regions covering eastern Texas.

Date: *February 15, 2006*

Authorized Project Representative's Signature

NOTE*: Please attach any additional information that you feel should be a part of your report or that may be required to meet the deliverable requirements for tasks completed during this reporting period.*