**PROJECT 1.11 GDIT**

**CONTRACT GS-00F-057CA/68HERD23F0003, YEAR 1**

**Date of request**: 8/8/2023

**Project 1.11 Version 1**

**Brief description:** Support of EQUATES source apportionment project (EQUATES ISAM)

**Priority** (routine or emergency): Routine

**Contact person:** Kristen Foley/George Pouliot **Reply no later than:** 8/21/2023

**Project Description:** The purpose of this project is to support a source apportionment project under ACE.403.2.2 that will use CMAQ ISAM to attribute 12US1 pollutant concentrations to specific source categories for the years 2005, 2011, and 2018. Tasks included preparing CMAQ-ready emissions files based on EQUATES emissions and post-processing of CMAQ output.

**Task 1 Creating merged CMAQ-Ready EQUATES emissions for 2005, 2011, and 2018.**

The contractor shall take the 12US1 EQUATESv1.0 pre-merged emissions files and merge them into the following categories for years 2005, 2011, 2018. EQUATESv1.1 emissions shall be used for livestock and afdust\_adj. (Note that EQUATESv1.1 emissions were originally referred to as ‘version 2.0’.) 2018 wildfire emissions shall include the updates to emissions in California and Washington in July and August that were created for the CMAQv5.4 2018 model evaluation platform. The EPA will provide technical direction on whether the merged emissions files should be compressed in netCDF4 format using HDF compression.

Gridded merged files shall be archived under /asm/MOD3DATA/CMAQ\_TS/<year>\_12US1/emis/cb6r\_ae6\_2023<date>\_ISAM/cmaq-ready/<category name>

Table 1. Mapping of premerged emissions to gridded merged files

|  |  |  |
| --- | --- | --- |
| Merged Category | Category Name | Name of emissions folders on asm |
| US mobile onroad diesel | onroad\_diesel | onroad\_ca\_adj\_diesel, onroad\_diesel |
| US mobile onroad non-diesel | onroad\_nondiesel | onroad\_ca\_adj\_gas, onroad\_gas |
| US mobile nonroad | nonroad | nonroad\_diesel, nonroad\_gas |
| US mobile airports, rail | airports\_rail | airports, rail |
| All other gridded US anthropogenic sources | anthro\_other\_us\_gridded | livestock, afdust\_adj, nonpt, rwc |
| Canada and Mexico gridded anthropogenic sources | anthro\_cn\_mx\_gridded | onroad\_can, onroad\_mex, othafdust\_adj, othar, othpt, othptdust\_adj |

In addition to the merged emissions files above, the contractor shall organize a full set of CMAQ-ready emissions inputs the /asm folder listed above. The contractor shall use symbolic links to EQUATESv1.0 and EQUATESv1.1 emissions files for source categories on listed in Table 1. The EPA will provide technical direction on what version of emissions should be linked to the ISAM folder.

**Task 2: Running CMAQ simulations with ISAM option for 2005, 2011, and 2018.**

The contractor shall use emissions from Task 1 as inputs for 12US1 CMAQv5.4.0.3 simulations for 2005, 2011, and 2018. Updated boundary conditions generated from 108NHEMI simulations with a recent version of CMAQ will be provided by EPA. All other input files will match the original CMAQ EQUATES simulations for these years, including use of EQUATES WRFv4.1.1 output as the meteorological inputs.

Build and run scripts, namelist files, and the ISAM configuration file will be provided by EPA. The contractor shall perform a short test simulation and QA model output to confirm the model configuration is set up correctly. The contractor shall use two streams to run the 3 annual simulations on atmos: Years 2005 and 2018 will be run simultaneously, followed by 2011. Model output shall be archived under /asm/MOD3APP/CMAQv54\_ISAM/<year>\_12US1/BASE/OUTPUT. Archiving shall be performed at the conclusion of each simulation day and the daily post-processing described in Task 3a.

**Task 3: Post-processing CMAQ output for 2005, 2011, and 2018.**

The contractor shall post-process output from the CMAQ simulations in Task 2, including ISAM output. Post-processing shall be done as the simulations are still running, i.e., after each simulation day is complete, rather than waiting until the entire annual simulation is done.

3a. At the end of each simulation day, the contractor shall use the *combine* utility to generate gridded monthly files with hourly output for select concentration species and ISAM tags. Sample *combine* scripts and species definition files will be provided by EPA.

3b. At the end of each simulation month, using files generated for Task 3a the contractor shall use the *hr2day* utility to generate gridded monthly files with daily metrics for select pollutants and ISAM tags. A sample *hr2day* script will be provided by EPA.

3c. At the end of each simulation month, using files generated for Task 3a the contractor shall use the *calctmetric* utility to generate gridded monthly average concentration and monthly total deposition files. A sample *calctmetric* script will be provided by EPA.

3d. Gridded daily and monthly average concentration files and monthly total deposition files shall be archived on asm under /asm/MOD3APP/CMAQv54\_ISAM/<year>\_12US1/BASE/POST.

**Schedule of Deliverables:**

Task 1: September 15, 2023

Task 2: January 29, 2024

Task 3: February 12, 2024

Additional guidance

Any runs that are conducted on the “atmos” machines, the **MOD3EVAL** user group shall be used. All files shall have no expiration date. All deliverables shall be put in directories specified by the technical contact.

Within 30 days after the completion, the contractor shall deliver a brief report specifying the file names and locations of all files archived for the work request. *Archived files shall have group readable/writable permissions*. The files and variables to be retained will be specified by the technical contact for each project as technical guidance in the form of a Table. All other files pertaining to the project shall be deleted (and not stored in personal asm directories), in cooperation with the technical contact.

The contractor shall provide a cost estimate, broken out by task, for this project by the date specified above. This project shall be tracked separately from other projects. Quality assurance and control shall be in accordance with the approved Task Order Quality Assurance Project Plan, including monthly and final project QA postings at the GDIT SharePoint site. *The technical contacts for this work assignment are Kristen Foley and George Pouliot.*