**PROJECT 2.16 GDIT**

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

**Date of request**: 5/1/2024

**Project 2.16 Version 1**

**Brief description:** Support of EQUATES source apportionment project for prescribed fire (RX-EQ)

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

**Contact persons:** Kirk Baker/James Beidler/George Pouliot **Reply no later than:** 5/9/2024

**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 36US3 pollutant concentrations to specific fire source categories for the years 2016 through 2023. Tasks included preparing CMAQ-ready emissions files based on EQUATES emissions and generating emissions reports.

**Task 1 Creating CMAQ-Ready fire sector emissions for 2016 through 2023 for 36US3 domain.**

The contractor shall generate fire sector emissions for CMAQ input for years 2016 through 2023. CMAQ input files shall cover the spatial extent of the 36US3 domain. VOC speciation shall be based on Carbon-Bond. The contractor shall include CO2 emissions on the CMAQ input file for all point fire files. Separate inln/stack group files shall be generated for 1) U.S. wildfire, 2) U.S. prescribed fire, 3) U.S. agricultural fire, and 4) non-U.S. fire. The wild, prescribed, and agricultural fires shall have emission factors based on the newest version of SERA implemented into the BlueSky Pipeline. The contractor shall ensure that the newest emission factors are using for agricultural emissions as well through verification with James Beidler.

The fire emissions shall be based on the following sets of activity data: GeoMAC/WFIGS, ICS-209, HMS, PFIRS CA polygons, Calmapper/Calfire polygons, BLM polygons, FACTS polygons, and MTBS. Data sources not available for all or most of these years (such as any state submitted data) shall not be used for this project.

Other activity related methods that should be incorporated into this dataset follow:

* Treat all HMS detects in WA not associated with another data set or flagged as ag as a pile burn.
* Use the older acres per pixel map for 2016, 2017, and 2018. Use the newer one (from the 2020NEI) for 2019 forward to reflect the higher resolution of the newer satellite instruments.
* Classify crop residue burns using the 240 m year-specific CDL (see “Review of California 2022 HMS Detects” attachment).
* Filter the detects from 2019 forward with the HMS detect filter described in the attached pptx

The contractor shall also generate a gridded emissions file that includes only emissions from “open burning” and a new nonpt set of emissions files that do not contain “open burning” emissions. These emissions shall be processed for the 12US1 domain and consistent with the scenario used for EQUATES for years 2016 through 2019. Other years should based on the emissions scenario provided in Table 1. The “open burning” group should include the following SCCs: 2610000500, 2610000400, 2610000100, and 2610030000.

Table 1. Anthropogenic emissions scenarios for open burning

|  |  |
| --- | --- |
| **Year** | **Emissions Scenario** |
| 2016 | EQUATES |
| 2017 | EQUATES |
| 2018 | EQUATES |
| 2019 | EQUATES |
| 2020 | 2020ha2\_cb6\_20k |
| 2021 | 2021hb\_cb6\_21k |
| 2022 | TBD |
| 2023 | TBD |

The contractor shall make tagging assignments for the point source fire emissions files using SMOKE by setting the IGROUP variable on the stack\_groups file to match the tag assignment indicated in this task. The othna sector should have IGROUP=1 for Canada fires and IGROUP=2 for all other fires (Mexico and the Caribbean). The wildfire and pile burn sectors should all have IGROUP=1 (no tagging differentiation of these emissions). The U.S. prescribed fire file shall have IGROUP=1 for broadcast burns, IGROUP=2 for grassland burns, IGROUP=3 for pile burns, and IGROUP=4 for all other fires on that file. The U.S. agricultural fire file shall have the IGROUP set to match specific SCC codes that refer to crop types as shown in Table 2.

Table 2. Mapping of SCC codes for ag burning emissions to tags (IGROUP)

|  |  |  |  |
| --- | --- | --- | --- |
| **SCC** | **SCC** | **SCC Description** | **IGROUP** |
| 2801500000 | Ag | Unspecified | 10 |
| 2801500141 | Ag | Soybeans | 1 |
| 2801500150 | Ag | Corn | 2 |
| 2801500160 | Ag | Cotton | 3 |
| 2801500171 | Ag | Fallow | 4 |
| 2801500220 | Ag | Rice | 5 |
| 2801500250 | Ag | Sugar | 6 |
| 2801500262 | Ag | Wheat | 7 |
| 2801500264 | Ag | Soybeans | 8 |
| 2811020002 | Prescribed | Rangeland/Pasture | 9 |

New CMAQ ready emissions files should have “rxequates” as the emissions scenario label on each file so that it is easy to differentiate these emissions from other projects and iterations for the same year.

New CMAQ ready emissions files generated as part of this task shall be archived under /asm/MOD3DATA/CMAQ\_TS/<year>\_12US1/emis/cb6r\_ae6\_2024<date>\_RXEQ/cmaq-ready/<category name>

**Task 2: Creating CMAQ-Ready fire sector emissions for 108HEMI domain.**

The contractor shall generate fire emissions for the 108HEMI domain using information from the FINN emissions model for the entire years of 2020, 2021, 2022, and 2023. VOC speciation shall be based on Carbon Bond.

New CMAQ ready emissions files generated as part of this task shall be archived under /asm/MOD3DATA/CMAQ\_TS/<year>\_108HEMI/emis/cb6r\_ae6\_2024<date>\_RXEQ/cmaq-ready/<category name>

**Task 3: Creating emission total files**

The contractor shall generate annual emissions totals for all premerged CMAQ emissions input files for the years 2016 through 2023. These reports shall be in ascii comma delimited format and include these pollutants: NOX, VOC, PM2.5, SO2, CO, CO2, and NH3. None of these pollutants need to be speciated. Not all categories will have CO2 emissions. In addition to major sectors, emission totals shall be generated for each of the tagged subcategories on the point fire files (prescribed, agricultural, and othna files). Anthropogenic sectors shall be based on the emissions scenarios shown in Table 1 of this task. Anthropogenic sectors can be based on 12US1 emissions modeling and the fires can be based on the new 36US3 emissions modeling done as part of this work order.

**Schedule of Deliverables:**

Task 1: July 1, 2024

Task 2: July 1, 2024

Task 3: August 1, 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 Kirk Baker, James Beidler and George Pouliot.*