**WRAP 2014 Shake-Out Study**

**Updated Phase III Schedule**

August 22, 2019

**INTRODUCTION**

Under Phases I and II of the WRAP 2014 Shake-Out Study, new 2014 36/12-km photochemical grid model (PGM) modeling platform were developed cumulating in annual 2014v1 36/12-km CAMx and CMAQ base case simulations and model performance evaluation. The final 2014v1 Shake-Out model configurations included the following, with more details on the webpage[[1]](#footnote-2):

* CAMx v6.5 and CMAQ v5.2.1.
* WAQS 36-km 36US and 12-km 12WUS domain WRF meteorology using one-way grid nesting.
* EPA’s 2014 GEOS-Chem for Boundary Conditions (BCs).
* WRAP 2014v1 emissions (2014NEIv2 with a few western state updates).
* BEIS biogenic emissions.
* CAMx: Oceanic Emissions processor for SeaSalt (SSA) and DMS with DMS renamed as SO2 since CAMx v6.5 does not have explicit DMS chemistry.
* SMOKE Briggs plume rise for fire emissions.
* CMAQ: in-line SSA and no DMS.

**2014 SHAKE-OUT PHASE III SCOPE-OF-WORK (SOW)**

The following is a brief summary of the WRAP Phase III SOW.

**Task 1: 2014v2 Shake-Out Base Case Modeling**

Task 1.1: Preliminary PGM Sensitivity Tests using 2014v1 Modeling Platform

Objective: Investigate model performance and other issues that can be performed before the revised 2014 GEOS-Chem and 2014v2 emissions are available.

* Coastal SO4 overestimation issue in CAMx.
* Switch to CAMx v7.0.
* Switch to CMAQ v5.3.
* Investigate bi-direction ammonia deposition scheme in CAMx.
* Re-visit MEGAN vs. BEIS biogenic sensitivity tests.
* PPT on Preliminary Sensitivity Simulations.

Task 1.2: Revised 2014 GEOS-Chem Simulation.

Objective: Conduct 2014 GEOS-Chem using approach used in recent 2016 GEOS-Chem to generate new PGM 36-km GCBCs and perform Jan/Jul sensitivity tests to evaluate new GCBCs.

* 2014 GEOS-Chem Simulation
* Process to generate 2014 GCBC
* CAMx Jan/Jul GCBC Sensitivity and MPE
* PPT on 2014 GCBC Update

Task 1.3: 2014v2 SMOKE Emissions Modeling

Objective: SMOKE modeling of 2014v2 emission updates including all new California emissions and other western state updates.

* SMOKE California 2014v2 emissions.
* SMOKE other Western States 2014v2 emissions.
* Merge 2014v2 anthropogenic emissions.
* Transfer 2014v2 emissions and SMOKE set-up from UNC to Ramboll and IMWD.

Task 1.4: Fire Plume Rise Sensitivity

Objective: Test WRAP fire plume rise approach in CAMx and compare results against using SMOKE Briggs plume rise.

* Process 2014 fire emissions from AirSci using WRAP plume rise processor.
* CAMx 2014 sensitivity runs for high fire period (e.g., Jul – Sep).
* MPE focusing on fire impact days.
* PPT on results.

Task 1.5: Additional PGM Sensitivity Tests

Objective: Conduct additional sensitivity tests using updated 2014 GCBCs and 2014v2 emissions.

* New MEGAN v3.1 vs. BEIS emissions.
* Other TBD.

Task 1.6: 2014v2 Annual Shake-Out PGM Modeling

Objective: Conduct Annual CAMx and CMAQ annual 2014v2 36/12-km Shake-Out Modeling and MPE

* CAMx v7.0 annual 2014v2 36/12-km two-way nest using BEIS.
* CAMx v7.0 annual 2014v2 36/12-km two-way nest using MEGAN v3.1.
* CMAQ v5.3 annual 2014v2 36/12-km one-way nest using BEIS.
* CMAQ v5.3 annual 2014v2 36/12-km one-way nest using MEGAN v3.1.
* PPT on 20114v2 and MPE.

Task 1.7: Natural and ZROW Modeling

Objective: Conduct linked 2014 GEOS-Chem and PGM 36/12-km modeling for a Natural (no anthropogenic emissions) and ZROW (no international anthropogenic emissions – Zero-Out Rest of World).

* 2014 GEOS-Chem Natural Simulation.
* 2014 36/12-km PGM Natural Simulation.
* 2014 GEOS-Chem ZROW Simulation.
* 2014 36/12-km PGM ZERO Simulation.
* PPT on Natural and ZROW results.

Task 1.8: Broad-Based Anthro vs. Natural PM Source Apportionment

Objective: Conduct CAMx 2014v2 36/12-km PSAT Source Apportionment modeling separating contributions of natural and anthropogenic emissions.

* CAMx 2014v2 36/12-km two-way PSAT using 2014 GCBC and 2014 Natural GCBCs and separate tracking of U.S. and non-U.S. anthropogenic emissions.
* Post-processing of PSAT results.
* PPT on PSAT results.

**Task 2: Representative Baseline Modeling**

Task 2.1: Representative Baseline EGU Emissions and Temporal Profiles

Objective: Develop plan for adding other emissions (i.e., PM, CO, NH3 and VOC) to current Representative Baseline and 2028 future year EGU emissions.

* Draft EGU Representative Baseline plan.
* Final EGU Task 2.Representative Baseline plan.

Task 2.2: Representative Baseline Emissions Modeling

Objective: SMOKE emissions modeling of Representative Baseline EGU, O&G and Fire emissions.

* SMOKE emissions modeling of Representative Baseline and 2028 EGU emissions.
* SMOKE emissions modeling of Representative Baseline O&G emissions.
* SMOKE emissions modeling of Representative Baseline Fire emissions.
* PPT on Representative Baseline emissions modeling.

Task 2.3: Representative Baseline PGM Modeling

Objective: Current representative Baseline CAMx and CMAQ modeling using 2014v2 platform.

* CAMx 36/12-km 2014v2 Representative Baseline modeling.
* CMAQ 36/12-km 2014v2 Representative Baseline modeling.
* PPT on Representative Baseline PGM modeling.

**Task 3: Dynamic Model Evaluation**

Task 3.1: Dynamic Evaluation Scoping

Objective: Develop plan for conducting 2002 to 2014 dynamic model evaluation using 2014v2 database.

* Draft plan for conducting dynamic evaluation.
* Final plan for conducting dynamic evaluation.

**Task 5: Management, IWDW Support and Reporting**

Task 5.1: Management and Reporting for Phase III

Objective: Monthly progress reports, IWDW data transfer, IWDW technical support, final report and IWDW Shake-Out Phase III webpage, and other management activities.

* Monthly progress reports and invoices.
* Data transfer to IWDW for all Phase III tasks.
* Shake-Out Phase III Final Report.
* Shake-Out Phase III webpage on IWDW.
* Technical support to IWDW.

**REVISED 2014V2 SHAKE-OUT PHASE III SCHEDULE**

For a variety of reasons, progress on Shake-Out Phase III has taken longer than originally planned. Table 1 below is a revised schedule for the major deliverables listed above with key Milestone Dates for reporting on deliverables with Webinars and an in-person meeting listed after the table.

Table 1. Revised Schedule for WRAP Shake-Out Phase III Task Deliverables.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Task** | **Description** | **Jul** | **Aug** | **Sep** | **Oct** |
| 1.1 | Preliminary Sensitivity Modeling | * Coastal SO4 * CAMx v7.0 * CAMx BiDi NH3 | * CMAQ v5.3 * PPT |  |  |
| 1.2 | Revised 2014 GEOS-Chem Simulation and GCBC Sens | * 2014 GEOS-Chem * 2014 GCBC * Jan/Jul CAMx GCBC | * PPT * Analysis |  |  |
| 1.3 | SMOKE 2014v2 Modeling | * SMOKE CA 2014v2 * SMOKE WUS 2014v2 | * PPT * Merge * O&G Correction | * O&G Correction * Merge * PPT * Transfer EI |  |
| 1.4 | Fire Plume Rise Sensitivity |  |  | * WRAP Process * CAMx Sens * MPE | * PPT |
| 1.5 | Additional PGM Sensitivity Tests w/ GCBC and 2014v2 |  | * MEGAN v3.1 | * CAMx MEGAN v3.1 * CMAQ MEGAN v3.1 |  |
| 1.6 | Annual 2014v2 Shake-Out Final Simulations |  | * 2014v2 CAMx BEIS | * 2014v2 CAMx BEIS * 2014v2 CMAQ BEIS * 2014v2 CAMx MEGAN * 2014v2 CMAQ MEGAN |  |
| 1.7 | 2014 GC and PGM NAT/ZROW |  | * 2014 GC NAT * 2014 GC ZROW | * 2014 GC ZROW * 2014 PGM NAT * 2014 PGM ZROW | * 2014 PGM NAT * 2014 PGM ZROW * PPT |
| 1.8 | Broad-Based PSAT |  |  |  | * CAMx PSAT * PPT |
| 2.1 | Rep. Base (RB) EGU Plan | * Draft EGU RB Plan | * Final EGU RB Plan |  |  |
| 2.2 | Representative Base SMOKE |  | * SMOKE RB O&G | * SMOKE RB EGU * SMOKE RB Fires |  |
| 2.3 | Representative Base PGM |  |  | * CAMx 36/12-km RB * CMAQ 36/12-km RB | * PPT |
| 3.1 | Dynamic Evaluation Scoping |  | * Draft Dyn Eval Plan | * Final Dyn Eval Plan |  |
| 5.1 | Manage Shake-Out Phase III | * Monthly Prog Rpt | * Monthly Prog Rpt * Transfer IWDW | * Monthly Prog Rpt * Transfer IWDW * Draft III Webpage * Draft III Report | * Monthly Prog Rpt * Transfer IWDW * Final III Webpage * Final III Report |

Milestone Deliverable Dates

* RTOWG Call **September 10, 2019** – Tasks 1.1 – 1.3
* Expanded RTOWG Call **October 15, 2019** – Tasks 1.4 to 1.7 & 3.1
* Proposed in-person meeting in Denver/FtCo (CIRA) **November 12, 2019** – Tasks 1.8 – 2.3

1. http://views.cira.colostate.edu/iwdw/docs/waqs\_2014v1\_shakeout\_study.aspx [↑](#footnote-ref-2)