CALPUFF Modeling System

CALPUFF is a multi-layer, multi-species non-steady-state puff dispersion model that simulates the effects of time- and space-varying meteorological conditions on pollution transport, transformation and removal. CALPUFF can be applied on scales of tens to hundreds of kilometers. It includes algorithms for subgrid scale effects (such as terrain impingement), as well as, longer range effects (such as pollutant removal due to wet scavenging and dry deposition, chemical transformation, and visibility effects of particulate matter concentrations).

--***Please read the following before accessing the CALPUFF modeling system***--

The files associated with this system, e.g., executables/source code, preprocessors, associated utilities, test cases, selected meteorological data sets and documentation can be found on Exponent's website. Support documents related to CALPUFF can be found on this website and are listed below. Exponent will provide updates and changes as necessary for the CALPUFF modeling system on their website. Users entering the Exponent website will have the opportunity to register their e-mail addresses in order to receive notices of any updates to the system. This registration is voluntary and not necessary to access the system files.

Upon entering the Exponent website, you will see the CALPUFF Model listing on the left-hand panel. To access the system code, click on "*DOWNLOAD"*, then click on "Skip Registration" if you do not want to register. Go to Exponent.

CALPUFF Regulatory Updates and Consequence Analysis

The current regulatory version of the CALPUFF Modeling System includes:

- CALPUFF version 5.8.5, level 151214
- CALMET version 5.8.5, level 151214
- CALPOST version 6.221, level 080724

For every update of the "EPA-Approved" version of the CALPUFF Modeling System, a consequence analysis is performed by USEPA using an update protocol that identifies what model changes have been made and their implications based on the analysis results. This analysis compares the base CALPUFF Modeling System (i.e., current regulatory version) with the beta (i.e., proposed updated version).

Summary of Update Process (PPT)(40 pp, 3.5 M, 2005)

07-26-16 UPDATE

The EPA has approved an update of CALMET and CALPUFF from V5.8.4 (dated July 31, 2013) to V5.8.5 (dated December 14, 2015). This update includes code changes described in Model Change Bulletin H (MCB-H (TXT)(27 K, 2015)). These changes include fixes to bugs in the implementation of PRIME downwash, along with updates to eliminate specific compilation and list file errors.

12-04-13 UPDATE

The EPA has approved an update of CALMET and CALPUFF from V5.8 (dated June 23, 2007) to V5.8.4 (dated July 31, 2013). This update includes portions of code changes described in Model Change Bulletin E (MCB-E(15 K, 2008)), MCB-F (TXT)(15 K, 2008) and MCB-G (TXT)(13 K, 2011). The EPA has approved only those portions of the Model Change Bulletins that are recognized as bug fixes. All other code changes (enhancements and new features) are not included at this time. A Modification of CALPUFF and CALMET Memorandum (PDF)(131 pp, 9 M, 2013) is available and describes bug fixes versus enhancements in this update of CALPUFF and CALMET. Note that the EPA-Approved version of CALPOST remains V6.221 (level 080724).

08-27-12 UPDATE

The EPA-Approved version of CALPOST has been updated from version 5.6394 (level 070622) to version 6.221 (level 080724). Version 6.221 includes "Method 8" (MVISBK = 8, M8_MODE = 5, MVISCHECK = 1), which utilizes the revised IMPROVE equation per the Federal Land Managers' Air Quality Related Values Work Group (FLAG) revised October 2010 Phase 1 Report.Exit This update only effects CALPOST and no other program in the CALPUFF System of programs. The EPA-approved version of CALPUFF remains version 5.8 (level 070623), and the EPA-Approved version of CALMET is still version 5.8 (level 070623).

02-15-12 UPDATE

The EPA is releasing the Documentation of the Evaluation of CALPUFF and Other Long Range Transport Models using Tracer Field Experiment Data (PDF)(242 pp, 8 M, 2012) (EPA Contract No: EP-D-07-102, Work Assignment No: 4-06). This EPA report documents the evaluation of various Long Range Transport (LRT) dispersion models using several inert tracer study field experiment data. The tracer studies used include:

1. 1980 Great Plains Field Experiment (GP80),
2. 1975 Savannah River Laboratory Field Experiment (SRL75),
3. Cross Appalachian Tracer Experiment (CAPTEX), and
4. European Tracer Experiment (ETEX).

The LRT dispersion modeling was performed primarily by the U.S. Environmental Protection Agency (EPA) during 2008 to 2010 and builds off several previous LRT dispersion modeling

studies that evaluated models using tracer study field experiments. The work was performed primarily by Mr. Bret Anderson while he was with EPA Region VII, EPA/OAQPS and the United States Forest Service (USFS).

Disclaimer: Although this work was reviewed by EPA and approved for publication, it may not necessarily reflect official Agency policy.

05-27-09 UPDATE

The EPA is releasing the DRAFT document Reassessment of the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report: Revisions to Phase 2 Recommendations (PDF)(56 pp, 1 M, 2009) at this time to provide additional technical information in support of the May 15, 2009 Memo, Model Clearinghouse recommendations (PDF)(14 pp, 643 K, 2009) to U.S. EPA Region 8 regarding the Otter Tail BART modeling protocol. The purpose of this document is to inform the modeling community of our concerns regarding the CALPUFF modeling system for long range transport (LRT) applications, and to notify the community of our plans for addressing these concerns. The draft revisions to the IWAQM Phase 2 recommendations provided in this document are still undergoing internal testing to assess their viability for meeting the technical objectives of this reassessment. Some sections are still under development and will be incorporated in future updates to the DRAFT document.<

06-29-07 UPDATE

The EPA has approved an update in CALPUFF from V5.711a (dated July 16, 2004) to V5.8 (dated June 23, 2007). This update includes code changes described in Model Change Bulletin B (MCB-B TXT)(62 K, 2005)), MCB-C (TXT)(66 K, 2006) and MCB-D (TXT)(45 K, 2007). CALMET has been updated from V5.53a (dated July 16, 2004) to V5.8 (dated June 23, 2007). The new codes are based on the VISTAS-series codes (CALPUFF V5.756 and CALMET V5.726) with the main changes being the addition of a regulatory switch in CALMET and switch settings recommended by the USEPA to configure the models to be consistent with the prior regulatory versions. A Model Update Report (PDF)(32 pp, 500 K, 2008) is available and describes the CALPUFF and CALMET updates in greater detail.

06-15-06 UPDATE

The EPA has approved an update to CALPUFF from v5.7 (dated April 2, 2003) to v5.711a (dated July 16, 2004) as described in Model Change Bulletin A (MCB-A (TXT)(16 K, 2004)).

Support Documents

A Comparison of CALPUFF Modeling Results To Two Tracer Field Experiments (PDF)(48 pp, 1 M, 1998)
An Analysis of the Calmet/Calpuff Modeling System In A Screening Mode (PDF)(56 pp, 1 M, 1998)
A Comparison of CALPUFF with ISC3 (PDF)(50 pp, 1 M, 1998)
Application of CALMET/CALPUFF and MESOPUFF II to Compare Regulatory Design Concentrations for a Typical Long-Range Transport Analysis (PDF)(88 pp, 486 K, 2002)
Peer Review of Calmet/Calpuff Modeling System (PDF)(40 pp, 1 M, 1998) Note: Part of Appendix F and all of Appendix G are unavailable in electronic form.
Response to Peer Review Comments of Calmet/Calpuff Modeling System (PDF)(5 pp, 16 K, 1998)
Technical Issues Related to CALPUFF Near-field Applications (PDF)(16 pp, 145 K, 2008)

Support Literature

Bennett, M.J, M.E. Yansura, I.G. Hornyik, J.M. Nall, D.G. Caniparoli and C.G. Ashmore, 2002. Evaluation of the CALPUFF Long-range Transport Screening Technique by Comparison to Refined CALPUFF Results for Several Power Plants in Both the Eastern and Western United States. Proceedings of the Air & Waste Management Association's 95th Annual Conference, June 23-27, 2002; Baltimore, MD. Paper #43454.

Levy, JI; Spengler, JD; Hlinka, D; Sullivan, D; Moon, D (2002): Using CALPUFF to evaluate the impacts of power plant emissions in Illinois: mode sensitivity and implications. Atmos. Environ. Vol 36(6):1063-1075.

Zhou, Y; Levy, JI; Hammitt, JK; Evans, JS (2003): Estimating population exposure to power plant emissions using CALPUFF: a case study in Beijing, China. Atmos. Environ. Vol. 37(6):815-826