Outline - CALPUFF Modeling Course
University of Santiago, Santiago, Chile
March 10-14, 2008

Course Instructors

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A CALPUFF course will be held March 10-14, 2008 at the University of Santiago in Santiago, Chile. The five day course will be split into two sessions with separate registrations. The first session will be held Monday, March 10 through Wednesday, March 12. Session 1 is the basic introductory CALPUFF course designed for people with limited or no experience with the CALPUFF modeling system. A second session covering advanced topics will be held for two days starting on Thursday, March 13 through Friday, March 14. This session is designed as a continuation of the basic course covered in Session 1, or for users with some experience with the model. Attending both sessions is recommended for users wishing to obtain a complete overview of the capabilities of the modeling system covering both basic and advanced features.

See the CALPUFF web site (www.src.com) for the registration form. Attendees may sign up for Session 1 or Session 2, or both sessions.

Session 1: Introductory Session (3 days)
Monday, March 10-Wednesday, March 12, 2008

Session 2: Advanced Topics Session (2 days)
Thursday, March 13-Friday, March 14, 2008

The outline of the course material for each session is described below.

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Session 1:
Monday, March 10 - Day 1 – Morning

1. OVERVIEW (8:30 am - 12:30 noon)
   - 1.0 Introduction
   - 1.1 Background
     - 1.1.1 Puff vs. Plume Models
     - 1.1.2 Comparison with other models
     - 1.1.3 Regulatory Status
   - 1.2 CALPUFF modeling system overview
   - 1.3 Major features of the CALPUFF modeling system
     - 1.3.1 Geophysical & meteorological preprocessors
     - 1.3.2 Meteorological modeling
     - 1.3.3 Dispersion modeling
     - 1.3.4 Postprocessing & display

BREAK

   - 1.4 Summary of data requirements
     - 1.4.1 Minimum data requirements
     - 1.4.2 Advanced data inputs
     - 1.4.3 On-line datasets and links
   - 1.5 Model runtime requirements
   - 1.6 Recent developments and ongoing work
     - 1.6.1 Technical advances
     - 1.6.2 Ease-of-use considerations
   - 1.7 Applications of the modeling system
   - 1.8 Model evaluation studies

LUNCH (12:30 - 1:30 pm)

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Monday, March 10 - Day 1 – Afternoon

2. HANDS-ON COMPUTER EXERCISES (1:30 pm - 5:00 pm)
   - 2.1 Installation of the software and new GUIs
   - 2.2 Overview of Graphical User Interfaces (GUIs)
     - 2.2.1 Menu commands
     - 2.2.2 Online Help system
     - 2.2.3 Overview of main models
   - 2.3 Hands-on work with case study problems
     - 2.3.1 Sample model files and standard model test simulations
     - 2.3.2 No-Observations simulation (Sydney, Australia) using MM5 data

Tuesday, March 11 - Day 2 – Morning

3. TECHNICAL DESCRIPTION OF CALMET (8:30 am – 12:00 noon)
   - 3.1 Wind fields
     - 3.1.1 Initial guess field
       - Interpolation
       - Vertical extrapolation
       - Bias parameters
     - 3.1.2 Diagnostic wind module (Step 1 adjustments)
       - Initial guess field
       - Kinematic effects
       - Terrain blocking
       - Slope flows
     - 3.1.3 Objective analysis (Step 2 adjustments)
       - Interpolation
       - Vertical extrapolation
       - Influence parameters
       - Smoothing
       - O'Brien adjustment
       - Divergence minimization

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   - 3.2 Boundary layer modules
     - 3.2.1 Overland boundary layer formulation
     - 3.2.2 Overwater boundary layer formulation

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Tuesday, March 11 - Day 2 – Morning

4. METEOROLOGICAL AND GEOPHYSICAL PROCESSORS – Part 1
   - 4.1 Upper air processors (READ62)
   - 4.2 Surface meteorological processors (SMERGE)
   - 4.3 Meteorological data display (PRTMET)
   - 4.4 Terrain and land use processors and data bases (TERREL, CTGPROC, MAKEGEO)
   - 4.5 Precipitation processors (PMERGE, PXTRACT)
   - 4.6 Overwater data (SEA.DAT files) – BUOY program

5. GUI Utilities
   - 5.1 COORDS
   - 5.2 BPIP Plot
   - 5.3 AER2CAL
   - 5.4 CALWindRose
   - 5.5 Scavenging Coefficient Calculator
   - 5.6 SUBDOMN
   - 5.7 UAMAKE
   - 5.7 SurfSizer and SurfExporter
   - 5.8 MultiUnixToDOS
   - 5.9 FEPS2BAREM
   - 5.10 PICtoReport
   - 5.11 ReplaceEM

LUNCH (12:00 noon – 1:00 pm)

Tuesday, March 11 - Day 2 – Afternoon

6. HANDS-ON COMPUTER EXERCISES (1:00 pm - 5:00 pm)
   - 6.1 Hands-on work with case study problems
     - 6.1.1 No-Observations simulation (Sydney, Australia with TIBL)
     - 6.1.2 Complex terrain near-field simulation (Pocatello, Idaho)

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Wednesday, March 12 - Day 3 – Morning

7. TECHNICAL DESCRIPTION OF CALPUFF (8:30 am – 12:00 noon)
   - 7.1 Solution of puff equations – puffs vs. slugs
   - 7.2 Dispersion coefficients
   - 7.3 Building downwash
   - 7.4 Plume rise
   - 7.5 Overwater and coastal dispersion
   - 7.6 Chemical transformation
     - 7.6.1 MESOPUFF II chemistry
     - 7.6.2 RIVAD/ARM3 chemistry
     - 7.6.3 Chemistry files (CHEM.DAT, OZONE.DAT)
   - 7.7 Dry deposition
   - 7.8 Wet removal
   - 7.9 Complex terrain
     - 7.9.1 ISC-type of terrain adjustments
     - 7.9.2 CTDM-type of terrain adjustments
     - 7.9.3 Integrated terrain adjustment approach

   BREAK (10:15 am – 10:30 am)

   - 7.10 Emissions data
     - 7.10.1 Point sources
     - 7.10.2 Area sources
     - 7.10.3 Volume sources
     - 7.10.4 Line sources
   - 7.11 CALPUFF meteorological data options
     - 7.11.1 CALMET meteorological data (CALMET.DAT) file
     - 7.11.2 ISC meteorological data (ISCMET.DAT) file
     - 7.11.3 CTDM meteorological data (SURFACE.DAT, PROFILE.DAT) files
     - 7.11.4 Other options (site-specific turbulence data – PROFILE.DAT)
   - 7.12 Odor modeling
   - 7.13 Memory management

Wednesday, March 12 - Day 3 – Afternoon

8. HANDS-ON COMPUTER EXERCISES (1:00 pm – 5:00 pm)
   - 8.1 Santiago case study –urban environment and complex terrain

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Session 2 (2 days): Advanced Topics
Thursday, March 13 - Day 4 – Morning

9. OVERVIEW AND REVIEW (8:30 am - 12:00 noon)
   - 9.0 Introduction
   - 9.1 Background
   - 9.2 CALPUFF modeling system overview
   - 9.3 Major new features of the CALPUFF modeling system
   - 9.4 Recent developments and ongoing work
     - 9.5.1 Technical advances
     - 9.5.2 Ease-of-use considerations
   - 9.5 Applications of the modeling system
   - 9.6 Model evaluation studies

10. Parallel Session with 9 Overview (for attendees continuing from Session 1)
    HANDS-ON COMPUTER EXERCISES (8:30 am – 11:30 am)
    - 10.1 Continuation of Santiago urban case
    - 10.2 Accidental release (Texas case study)

11. OVERVIEW OF ADVANCED TOPICS (11:30 am-12:00 pm)

LUNCH (12:00 – 1:00 pm)

Thursday, March 13 - Day 4 – Afternoon

12. HANDS-ON COMPUTER EXERCISES (1:00 pm - 5:00 pm)
    - 12.1 Accidental release (Texas case study) with subhourly time steps
    - 12.1 Santiago urban case (advanced application)

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Friday, March 14 - Day 5 – Morning

13. SPECIAL TOPICS (9:30am – 12:00 noon)
    - 13.1 Urban modeling (traffic modeling, NO_2 from NO_x)
    - 13.2 Flares
    - 13.3 Chemistry – Ammonia Limiting Method (ALM)
    - 13.4 Use of boundary conditions
        - 13.4.1 Time-varying user-specified inflow boundary conditions
        - 13.4.2 Using Eulerian modeling data
    - 13.5 Source types – Points, volumes, lines and area sources
    - 13.6 Seasonal changes to GEO.DAT file
    - 13.7 Boundary conditions
    - 13.8 Building downwash
    - 13.9 Dry deposition of particulate matter
    - 13.10 Advanced features of CALMET
        - 13.10.1 Barriers
        - 13.10.2 Subhourly data
        - 13.10.3 Use of prognostic data (MM5, WRF, other models)
        - 13.10.4 Kinematic effects

14. ADVANCED FEATURES OF CALPUFF PROCESSORS (8:30 am – 9:30 am)
    - 14.1 CALPOST
    - 14.2 APPEND
    - 14.3 CALSUM
    - 14.4 POSTUTIL
    - 14.5 CALMM5, CALRUC. CALRAMS, CALETA

LUNCH (12:00 – 1:00 pm)

Friday, March 14 - Day 5 – Afternoon

15. HANDS-ON COMPUTER EXERCISES (1:00 pm - 5:00 pm)
    - 15.1 Advanced complex terrain case (Idaho with barriers)
    - 15.2 Coastal application in complex terrain (Koeberg, South Africa case study)
    - 15.3 Cooling tower visible plume (fogging) application