

**CALPUFF Modeling Course Outline**  
**Scottsdale, Arizona**  
**May 6-8, 2008**

**Tuesday, May 6 - Day 1 – Morning**

1. OVERVIEW (8:30 am - 12:00 pm)
  - 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
    - 1.1.4 Near-field applications
  - 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 (10:30 am - 10:45 am)

- 1.4 Summary of data requirements
  - 1.4.1 Minimum data requirements
  - 1.4.2 Advanced data inputs
- 1.5 Computer requirements
- 1.6 Typical applications and uses of the model
- 1.7 Ongoing and future developments
  - 1.7.1 Technical advances
  - 1.7.2 Ease-of-use considerations
  - 1.7.3 Evaluation studies

LUNCH (12:00 - 1:00 pm)

**Tuesday, May 6 - Day 1 – Afternoon**

2. HANDS-ON COMPUTER EXERCISES (1:00 pm - 5:00 pm)
  - 2.1 Installation of the software and new GUIs
    - 2.1.1 On-line datasets and links
  - 2.2 Overview of Graphical User Interfaces (GUIs)
    - 2.2.1 Menu commands
    - 2.2.2 Online Help system
    - 2.2.3 Utilities, ISC3 conversion program
  - 2.3 Test case simulations
    - 2.3.1 Sample model files and standard model test simulations
    - 2.3.2 No-Observations simulation (Sydney case study)

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**Wednesday, May 7 - Day 2 – Morning**

3. TECHNICAL DESCRIPTION OF CALMET (8:30 am - 10:30 am)
  - 3.1 Wind fields
    - 3.1.1 Initial guess field
      - Interpolation
      - Vertical extrapolation
      - Bias parameters
      - Use of prognostic wind fields (MM5, RUC, Eta, RAMS datasets)
    - 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
  - 3.2 Boundary layer modules
    - 3.2.1 Overland boundary layer formulation
    - 3.2.2 Overwater boundary layer formulation
  - 3.3 Surface friction velocity
  - 3.4 Monin-Obukhov length
  - 3.5 Convective velocity scale
  - 3.6 Mixing height
  - 3.7 Stability class
  - 3.8 Precipitation and cloud data

**BREAK (10:30 am – 10:45 am)**

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**Wednesday, May 7 - Day 2 – Morning (Continued)**

4. METEOROLOGICAL AND GEOPHYSICAL PROCESSORS (10:45 am – 12:00 pm)
  - 4.1 Terrain and land use processors and data bases (TERREL, CTGPROC, MAKEGEO)
  - 4.2 Upper air processors (READ62)
  - 4.3 Surface meteorological processors (SMERGE)
  - 4.4 Precipitation processors (PMERGE, PXTRACT)
  - 4.5 Overwater data (BUOY program, SEA.DAT files)
  - 4.6 Meteorological data display (PRTMET)
  - 4.7 Prognostic processors (CALMM5, CALRUC, CALRAMS, CALETA)
  - 4.8 Postprocessors: CALPOST, APPEND, CALSUM, POSTUTIL

LUNCH (12:00 – 1:00 pm)

**Wednesday, May 7 - Day 2 – Afternoon**

5. HANDS-ON COMPUTER EXERCISES (1:00 pm – 5:00 pm)  
(Meteorological and Geophysical Processing)
  - 5.1 Complex terrain near-field simulation (Pocatello, Idaho case study)
  - 5.2 Advanced CALMET application (barriers)

**Thursday, May 8 - Day 3 – Morning**

6. TECHNICAL DESCRIPTION OF CALPUFF (8:30 am – 12:00 noon)
  - 6.1 Solution of puff equations – puffs vs. slugs
  - 6.2 Dispersion coefficients
  - 6.3 Building downwash
  - 6.4 Plume rise
  - 6.5 Overwater and coastal dispersion
  - 6.6 Chemical transformation
    - 6.6.1 MESOPUFF II chemistry
    - 6.6.2 RIVAD/ARM3 chemistry
    - 6.6.3 Chemistry files (CHEM.DAT, OZONE.DAT)
    - 6.6.4 NO<sub>3</sub> prediction refinement
  - 6.7 Dry deposition
    - 6.7.1 VD.DAT
  - 6.8 Wet removal

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**Thursday, May 8 - Day 3 – Morning (Continued)**

- 6.9 Complex terrain
  - 6.9.1 ISC-type of terrain adjustments
  - 6.9.2 CTDM-type of terrain adjustments
  - 6.9.3 Integrated terrain adjustment approach
  - 6.9.4 Terrain processors (OPHILL, CTDMPLUS)
- 6.10 Visibility
  - 6.10.1 FLAG methodology (Method 2)
  - 6.10.2 BART methodology (Method 6)
  - 6.10.3 New IMPROVE methodology (Method 8)
  - 6.10.4 Alternative techniques

BREAK (10:30 am – 10:45 am)

- 6.11 Emissions data – arbitrarily varying files (points, areas, volumes and lines)
- 6.12 CALPUFF meteorological data options
  - 6.12.1 CALMET meteorological data (CALMET.DAT) file
  - 6.12.2 AERMOD/AERMET meteorological data option
  - 6.12.3 ISC meteorological data (ISCMET.DAT) file
  - 6.12.4 CTDM meteorological data (SURFACE.DAT, PROFILE.DAT) files
  - 6.12.5 Other options (site-specific turbulence data – PROFILE.DAT)
- 6.13 Odor modeling
- 6.14 Memory management

LUNCH (12:00 – 1:00 pm)

**Thursday, May 8 - Day 3 – Afternoon**

- 7. HANDS-ON COMPUTER EXERCISES (1:00 pm - 5:00 pm)  
(CALPUFF Dispersion Modeling and Postprocessing)
  - 7.1 Gulf of Mexico coastal long range transport and visibility application
    - 7.1.1 Visibility Methods 2, 6 and 8 (new IMPROVE methodology)
  - 7.2 Accidental release (Texas coastal application)
  - 7.3 Cooling tower visible plume (fogging) application
  - 7.4 Coastal application in complex terrain (Koeberg, South Africa case study)