CALPUFF Modeling Course Outline
Paris, France
September 17-19, 2007

Monday, September 17 - Day 1 – Morning

1. OVERVIEW (9:00 am - 12:00 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 (10:00 am - 10:15 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

LUNCH (12:00 - 1:00 pm)

Monday, September 17 - Day 1 – Afternoon

   - 1.7 Ongoing and future developments (1:00 pm – 2:00 pm)
     - 1.7.1 Technical advances
     - 1.7.2 Ease-of-use considerations
     - 1.7.3 Evaluation studies
     - 1.7.4 On-line datasets and links

2. HANDS-ON COMPUTER EXERCISES (2:00 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 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

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Tuesday, September 18 - Day 2 – Morning

3. TECHNICAL DESCRIPTION OF CALMET (9:00 am - 10:15 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 (10:15 am – 10:30 am)

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Tuesday, September 18 - Day 2 – Morning (Continued)

4. METEOROGICAL AND GEOPHYSICAL PROCESSORS (10:30 am – 12:00 am)
   - 4.1 Upper air processors (READ62)
   - 4.2 Surface meteorological processors (SMERGE)
   - 4.3 Precipitation processors (PMERGE, PXTRACT)
   - 4.4 Overwater data (SEA.DAT files)
   - 4.5 Meteorological data display (PRTMET)
   - 4.6 Terrain and land use processors and data bases (TERREL, CTGPROC, MAKEGEO)
   - 4.7 Prognostic processors (CALMM5, CALRUC, CALRAMS, CALETA)

LUNCH (12:00 – 1:00 pm)

Tuesday, September 18 - Day 2 – Afternoon

5. CALPUFF POST-PROCESSORS (1:00 pm – 2:00 pm)
   - 5.1 CALPOST, APPEND, CALSUM, POSTUTIL

6. HANDS-ON COMPUTER EXERCISES (2:00 pm – 5:00 pm)
   (Meteorological and Geophysical Processing)
   - 6.1 Simulation Exercises – No-Obs simulation
   - 6.2 Complex terrain near-field simulation (Pocatello, Idaho case study)

Wednesday, September 19 - Day 3 – Morning

7. TECHNICAL DESCRIPTION OF CALPUFF (9:00 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)
     - 7.6.4 NO_3 prediction refinement
   - 7.7 Dry deposition
     - 7.7.1 VD.DAT
   - 7.8 Wet removal

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Wednesday, September 19 - Day 3 – Morning (Continued)

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
- 7.9.4 Terrain processors (OPTHILL, CTDMPLUS)

BREAK (10:00 am – 10:15 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
7.14 Discussion on CALPUFF applications

LUNCH (12:00 – 1:00 pm)

Wednesday, September 19 - Day 3 – Afternoon

8. HANDS-ON COMPUTER EXERCISES (1:00 pm - 5:00 pm)
(CALPUFF Dispersion Modeling and Postprocessing)
   - 8.1 Coastal application in complex terrain (Koeberg, South Africa case study)
   - 8.2 Accidental release (Texas coastal application)
   - 8.3 Cooling tower visible plume (fogging) application
   - 8.4 Gulf of Mexico coastal long range transport application