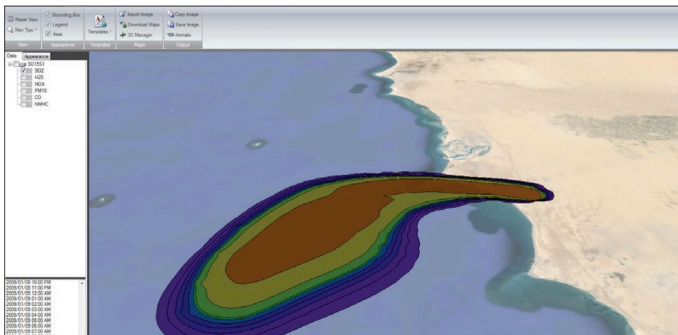# BREEZE CALPUFF

Continuous Release

CALPUFF is a multi-layer, multi-species, non-steady-state puff dispersion model which simulates the effects of time- and space-varying meteorological conditions on pollution transport, transformation, and removal. It includes algorithms for subgrid-scale effects and longer-range effects. It can be applied for long-range transport and for complex terrain. The CALPUFF modeling system is an important tool for regional haze (visibility) and fine particulate matter (e.g., $PM_{2.5}$) impact assessments over distances hundreds of kilometers from emission sources and also applies for certain near-field applications involving complex meteorological conditions.

BREEZE CALPUFF provides modelers with the tools and functionality to analyze and visualize modeling results.

BREEZE CALPUFF offers a complete user graphical interface and productivity enhancements for the U.S. EPA (U.S. Environmental Protection Agency)-approved CALPUFF modeling system, and the latest non-EPA-approved CALPUFF release. In addition to the CALPUFF model itself, this includes:

▶ **CALMET** – a diagnostic 3-dimensional meteorological model (that considers coastal effects, slope flows, kinematic terrain effects, terrain blocking effects, and a divergence minimization procedure) and a micro-meteorological model for overland and overwater boundary layers

▶ **CALPOST** – a post-processing package that computes time-averaged concentrations, deposition fluxes, and visibility impacts

▶ Numerous pre- and post-processors:
- READ62
- SMERGE
- PMERGE
- MAKEGEO
- CALSUM
- APPEND
- POSTUTIL

Features for Enhanced Productivity

BREEZE CALPUFF improves productivity by offering users many advantages that result in seamless, time-efficient modeling runs. The careful design streamlines all aspects from tv to model execution to results analysis. BREEZE CALPUFF saves you time and money by minimizing duplicate data entry and data entry mistakes.

▶ **Building Profile Input Program (BPIP)** - integrated BPIP utility automatically calculates building heights and projected building widths for simple, multi-tiered, and group structures

▶ **Coordinate Conversion** - input projections can be converted to other systems, such as latitude/longitude coordinates to UTM or Lambert Conformal coordinates

▶ **Object Visualization** - results and objects are easily visualized using the latest Windows-based technology

▶ **User-Friendly Interface** - easy-to-use toolbars and recognizable icons allow easy navigation throughout the application

▶ **Undo Feature** - undo recent actions

▶ **3D View** - view buildings and terrain in three dimensions

▶ **Multi-Window View** - view up to four windows simultaneously to compare graphical and text-based results

▶ **Data Explorer** - view project data in a spreadsheet view, allowing users to copy and paste directly from Microsoft Excel®, sort and edit data, and filter objects by data types

▶ **Data Downloads** - link to databases containing meteorological, terrain, and land use data

▶ **Map Tab** - import DXF file, shape file, or base map image to visualize model objects

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CALPUFF Contains Algorithms for Minimum Averaging Periods of 1 Hour for:

▶ Near-source effects
- Building downwash
- Partial plume penetration
- Transitional plume rise
- Subgrid scale terrain interactions

▶ Long range effects
- Pollutant removal by dry deposition and wet scavenging
- Chemical transformation
- Vertical wind shear
- Overwater transport

▶ Temporally and/or spatially varying flow fields
- Complex terrain: mountain-valley wind reversals, anabatic winds, katabatic winds
- Coastal effects
- Stagnation conditions
- Non-uniform land use patterns

▶ Visibility assessments and pristine area impact studies

▶ Criteria pollutant modeling, including application to State Implementation Plan (SIP) development

▶ Buoyant area and line sources

Seamless Integration with BREEZE 3D Analyst

BREEZE 3D Analyst (included with BREEZE CALPUFF) is a powerful post-processor that enables you to analyze and visualize data in time series, contour plots, and 3D isosurface and plane views; and to visualize the intersection/union of multiple data sets. It is useful for analyzing meteorological, terrain, and concentration data. Animated movies can be created for display in presentations and it is compatible with Golden Software's Surfer® application and Google Earth™.

Plotting

The plotting and graphing features in 3D Analyst allow you to create impressive plots of modeling results and input datasets so that you can quickly analyze the data in both two and three dimensions. With BREEZE 3D Analyst, you can:

▶ Create custom contour levels for an entire project or individual datasets

▶ Customize all object properties to display only the results and objects you want to see

▶ View data from every angle with 2D plane views, 3D surfaces, and slices of 3D data in the XY, XZ, and YZ planes

▶ Plot data as a function of time and animate the time steps

▶ Use your mouse to view real-time data interpolation between receptors

▶ Plot data to Golden Software's Surfer application and Google Earth

▶ Create 3D templates that can be loaded with future projects to quickly recreate three dimensional display views

Data Manipulation

Not only can you display data, BREEZE 3D Analyst allows users to perform data manipulation simultaneously. Temporarily transform data with easy-to-use scaling and transformation tools to analyze how your results could change. You can also use the numerous tools to extract averages, percentiles, highs, and more, all from a single dataset.
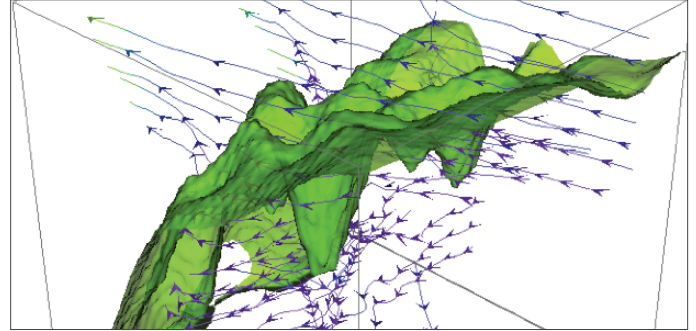
The graphical results of BREEZE 3D Analyst give your data clarity and power.

Our team of modelers, meteorologists, scientific software specialists, and PhDs are available to assist you with the science behind the software. For a software demonstration, contact BREEZE at +1 972.661.8881 or breeze@trinityconsultants.com.

Visit trinityconsultants.com/software/dispersion/CALPUFF to learn more.

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