AGDISP Help Contents

AGDISP Help contains an Index to all of the available topics in the program and a description of each input or program screen. To examine the available topics, click on Index.

To examine any input or program screen, click on Help, then Index, then find the topic area of interest and click on it. More easily, position the cursor at the appropriate input or program screen, then use the **F1** function key to bring up the topic area of interest immediately.

AGDISP Index

Wet Bulb Temperature

Wind Direction

Wind Speed

Wind Speed Details

Wind Type

Wing Vertical Distance

< 141 um

Percentage of volume in drop sizes less than or equal to 141 microns.

1 Hour Average Concentration plot

A plot (from the View menu) of the vertical distribution of the 1 hour average concentration through the Flux Plane . Concentration is in nanograms of active ingredient per liter air; vertical distance is in feet or meters. The position of the Flux Plane relative to the edge of the application area is shown on the plot for reference, as is the height of the canopy (if one has been defined). Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

About AGDISP

A brief summary of the development of AGDISP, including the version number of the program and a button for General Operating Instructions.

Active Fraction

The volume fraction of spray material in the tank mix that is active ingredient. Its value must be greater than 0 and less than or equal to the Nonvolatile Fraction.

Advanced Settings

The Advanced Settings screen permits changes in specific modeling parameters, including: Height for Wind Speed Measurement, Maximum Computational Time, Maximum Downwind Distance, Vortex Decay Rate OGE, Vortex Decay Rate IGE, Aircraft Drag Coefficient, Propeller Efficiency, Ambient Pressure, Ground Reference Height, Save Trajectory Files, Save CALPUFF Data, Half-Boom Effect, Default Swath Offset, Specific Gravity (Carrier and Active/Additive), and Evaporation Rate.

Knowledge of these parameters, and how changes in these parameters affect model predictions, is essential before changing any of them.

Aircraft

A description of the spray aircraft, containing Aircraft Type and Properties. User-defined indicates that data have been entered manually or modified from other selection types. The User Library may be accessed here to Add Current Aircraft to the Library, or Select From or Modify the Library. Library (or Select) invokes the Aircraft Library screen. Properties include (where applicable): Aircraft Name, Aircraft Type, Semispan or Rotor Radius, Weight, Typical Spraying Speed, Propeller RPM or Rotor RPM, Propeller Radius, Biplane Separation, Planform Area, Number of Engines, Engine Vertical Position, Engine Forward Position, Engine Horizontal Position(s), Wing Vertical Distance, Boom Vertical Distance, and Boom Forward Distance.

Aircraft Drag Coefficient

A constant multiplying the dynamic pressure created by the flying aircraft, multiplied by its Planform Area, to represent the aircraft drag. Its default value is 0.1.

Aircraft Library

Database containing properties required for modeling available aircraft. Filter may be used to choose from Any aircraft in the library, Any Fixed Wing aircraft in the library, Any Helicopter in the library, or select the Aircraft Name. The applicable entries may be examined in Browse Filtered Entries, which summarizes the aircraft properties, and where the Browse buttons 1st, Prev, Next and Last may be used to move through the library.

Aircraft Planform Area

Surface area of the wing (in square feet or square meters). Its value is normally between 14.8 and 44.6 sq m (160 and 480 sq ft).

Aircraft Semispan

Length of one-half of the wing (in feet or meters), measured from the center of the aircraft to one of its wingtips. The lower wing is used for a biplane. Its value is normally between 3.0 and 9.1 m (10 and 30 ft).

Aircraft Type

One of two aircraft types may be selected: either fixed-wing aircraft or helicopter.

Aircraft User Library

A database containing aircraft created, selected, or modified by the user: a personal aircraft library. The Name identifies the entries. The aircraft is represented by its Properties. Delete Entry deletes the displayed aircraft from the library.

Aircraft Weight

Assumed half-loaded weight of the aircraft (in pounds or kilograms). Its value is normally between 250 and 63650 kg (550 and 140000 lb).

Air Speed

Air speed (in miles per hour or meters per second) of the wind tunnel at which a Drop Size Distribution is desired from the Drop Size Library. This speed should be consistent with the Aircraft Flight Speed in any model application. Its value is normally between 17.88 and 71.52 m/s (40 and 160 mph).

Ambient Pressure

Atmospheric air pressure (in millibars), used in the calculation of Wet Bulb Temperature depression. Its default value is 1013 mb.

Application Layout plot

A plot (from the View menu) of the ground deposition up to 300 m (1000 ft) on either side of the edge of the application area. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Application Technique

The application of Liquid or Dry materials may be specified.

Area Average Deposition plot

A plot (from the Deposition Assessment Toolbox) of the average deposition on an area of Downwind Width defined by the user. The horizontal axis represents the distance (in feet or meters) between the downwind edge of the application area and the near-field edge of the area. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Area Coverage Boundary

The area boundaries over which coverage is to be assessed in the Spray Block Details Toolbox are defined by X (horizontal on the screen, in feet or meters) and Y (vertical on the screen, in feet or meters) points, simply collected (the last point connects to the first). Insert, Delete, and Clear aid in editing the list. Import and Export provide ways of moving the data in and out of the table.

Atmospheric Stability

A description of the stability of the atmosphere. Day (from one hour after sunrise to sunset) selects a Solar Insolation level (reflecting the intensity of the incoming solar radiation incident on the earth's surface). The selection bar permits Strong, Moderate, Slight, or Weak Insolation conditions. Night (from sunset to one hour after sunrise) selects a Cloud Cover level. The selection bar permits Overcast, Thinly Overcast, and Less Than 3/8th Cloud Cover. At run time the wind speed profile, background turbulence level, and vortex decay rate are modified by this selection and the Wind Speed level entered by the user, recovering the effects of the appropriate Pasquill stability class (strongly unstable, moderately unstable, slightly unstable, neutral, slightly stable, and stable).

Average Depth

The assumed depth (in feet or meters) of the water body. The default depth is 2 m (6.28 ft) for a pond and 0.15 m (0.5 ft) for a wetland.

Average Diameter

The volume-averaged drop diameter (in microns) representing a drop size category.

Barrier Height

The height (in feet or meters) of the riparian barrier positioned upwind of the stream.

Barrier Porosity

The porosity of the barrier, with 0 for a solid wall and 1 for no barrier.

Batch Operations

The Batch Operations screen (from the Run menu) selects previously-saved AGDISP input data files for batch operation, checks each of the selected data files for data consistency, and runs them sequentially. Files to Process contains a listing of the data files to run, while the buttons control the list of file names: the Add button adds a file name to the list of file names to run, while the Remove button deletes the highlighted file name from the list of file names. The Start button begins Run Calculations. Messages provides an input summary of the current file during calculations, while Status indicates computation progress for the current file. The Close button exits the Batch Operations screen.

Biplane Separation

Vertical distance (in feet or meters) between the two wings of a biplane. Its value is normally between 1.2 and 3.6 m (4 and 12 ft).

Boom Forward Distance

Horizontal distance of the spray boom or dry spreader (in feet or meters) from the trailing edge of the wing to the spray boom dry spreader (for a fixed-wing aircraft), or from the rotor shaft plane to the spray boom or dry spreader (for a helicopter). Its value is normally between 0 and -0.6 m (0 and -2 ft) for a fixed-wing aircraft (the spray boom or dry spreader is behind the trailing edge of the wing), and 6.1 and –0.6 m (20 and -2 ft) for a helicopter (the spray boom or dry spreader may be considerably forward of the rotor shaft plane).

Boom Vertical Distance

Vertical distance of the spray boom or dry spreader (in feet or meters) from the trailing edge of the wing to the spray boom or dry spreader (for a fixed-wing aircraft), or from the rotor blade plane to the spray boom or dry spreader (for a helicopter). Its value is normally between 0 and -1.5 m (0 and -5 ft) for a fixed-wing aircraft (the spray boom or dry spreader is below the trailing edge of the wing), and -1.8 and –3.6 m (-6 and -12 ft) for a helicopter (the spray boom or dry spreader is considerably below the rotor blade plane).

Bucket Swing Distance

The maximum side-to-side movement of the bucket spreader. The bucket exit is positioned at the Boom Vertical Distance and the Boom Forward Distance on the Aircraft screen.

Calculation Log

A summary of the computational details for the most recent (current) run (under the View menu). Buttons Save or Print the contents of the Log on the selected printer.

CALPUFF Base Z Elevation

Base Z Elevation represents a single base elevation (in meters) representative of the field being sprayed. It will be used as the base elevation for all CALPUFF sources produced by AGDISP.

CALPUFF Flight Direction

Flight Direction (degrees from North) defines the direction of the spray line relative to the beginning point for all CALPUFF sources produced by AGDISP.

CALPUFF Spray Line Beginning X Coordinate

Spray Line Beginning X Coordinate (in km) should be entered in a coordinate system consistent with the configuration of the CALPUFF run, based on the sources produced by AGDISP.

CALPUFF Spray Line Beginning Y Coordinate

Spray Line Beginning Y Coordinate (in km) should be entered in a coordinate system consistent with the configuration of the CALPUFF run, based on the sources produced by AGDISP.

CALPUFF Spray Line Length

Spray Line Length (in km) defines the length of the spray line for all CALPUFF sources produced by AGDISP.

Canopy

A description of the canopy, containing Canopy Name, Canopy Type (None, Height, Story, and Optical), Canopy Properties, Properties, and Preview. None removes the canopy type. Height type enters only Canopy Height. For Story and Optical canopy types the user enters the Vegetative Element Size, Vegetative Element Type, Temperature, and Relative Humidity. For Story type the user enters Stand Density and describes the canopy by Tree Height (in feet or meters) from the ground up, Tree Diameter (in feet or meters), and Probability of Penetration (0 to 1). The Insert, Delete, and Clear buttons may be used to edit the Tree Envelope table. For Optical type the user may select from an Optical Tree Library, then modify Tree Height and LAI, from the ground up, or describe the canopy by Tree Height (in feet or meters) and Cumulative LAI. The Insert, Delete, and Clear buttons may be used to edit the Leaf Area Index Envelope table. Preview represents the canopy profile information provided by the user.

Canopy Deposition plot

A plot (from the View menu) of the volume fraction of spray material captured by the canopy. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Canopy Displacement

The effective displacement of the canopy, used to reconfigure the wind speed profile. Default is 0.7 times the Canopy Height.

Canopy Height

The height (in feet or meters) of the canopy cover above the ground. A height of 0 m (0 ft) recovers a non-canopy calculation. Height Canopy calculations stop when the canopy height is reached.

Canopy Roughness

The effective Surface Roughness of the canopy, used to reconfigure the wind speed profile. Default is 0.14 times the Canopy Height.

Coefficient of Variation

Relative standard deviation of the deposition pattern in the spray block. An acceptable value of COV is 0.3, implying a 30% variation in deposition pattern around the mean (or average) deposition level predicted in the spray block.

Coefficient of Variation plot

A plot (from the View menu) of the Coefficient of Variation in the spray block as a function of Effective Swath Width (in feet or meters). Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Component

The various substances that make up the tank mix.

Cumulative LAI

The Leaf Area Index of the canopy, measured from the ground up.

Cumulative Volume Fraction

Sum of the Incremental Volume Fraction; the total volume fraction in a drop size distribution equals 1.0.

Deposition Assessment

The Deposition Assessment calculator screen consists of input in Deposition Area Definition, selecting either an aquatic body, a terrestrial point, or a terrestrial area. An aquatic body requires inputs for the Downwind Width of the water body and its Average Depth; a terrestrial area requires input for the Downwind Width of the area. In Calculations the user enters either Distance to the Water Body, Point, or Area from the Edge of the Application Area, Initial Average Deposition, or Initial Average Concentration (if applicable). The value entered by the user is denoted in red, and the other values are calculated based on the deposition profile. Calculations are performed with the Calc button. The Toolbox data may be printed on the selected printer with the Print button. Plot and Export apply to averaged deposition profiles.

Deposition plot

A plot (from the View menu) of the downwind ground deposition for the conditions specified. Downwind distance is measured in feet or meters from the edge of the application area, which is assumed to be located ½ Swath Width plus the Swath Displacement distance downwind of the most downwind aircraft flight path centerline. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard. Deposition units are specified in Edit Preferences.

Discrete Receptors

By default, deposition is recovered from the computational grid constructed beneath the flight lines. Specific locations may be examined by additional receptors placed by the user. Type identifies the type of receptor, either 0 for a flat card with a collection efficiency of 100%, 1 for a flat plate or ribbon, 2 for a cylinder, or 3 for a sphere. (X,Y,Z) Location (in feet or meters) locates the receptor horizontally on the screen, vertically on the screen, and height above the ground. (X,Y,Z) Normal defines the outward normal direction of the receptor surface. Size (in inches or centimeters) defines the Element Size of the receptor. Deposition provides the results of the calculation. Insert, Delete, and Clear aid in editing the list. Import and Export provide ways of moving the data in and out of the table.

Distance Accountancy plot

A plot (from the View menu) of the Total Accountancy in distance downwind, for tank mix still aloft, evaporated, on the ground (deposited), and captured by the canopy. Only the most downwind flight line is examined. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Distance from Edge of Application Area

The distance (in feet or meters) from the edge of the application area to the water body or area across which a point or integrated average is desired. The default distance is 61 m (200 ft).

Downwind Width

The assumed width (in feet or meters) of the water body or area across which an integrated average deposition is desired. The default width is 63.61 m (208.7 ft).

Drop Size

Commonly expressed as Drop Diameter in microns.

Drop Size Distribution

The volume fraction in each drop size category. The DSD screen contains the Drop Distribution Type and the resulting Drop Distribution. The Drop Distribution Name is at the top of the screen. User-defined implies that data have been entered manually or modified from other selection types, in particular Interpolate (to create a smooth drop size distribution from the data entered); Import (to enter data from a file containing the drop size distribution); and Parametric (to create a drop size distribution from its Dv0.5 and Relative Span). The User Library may be accessed to Add Current drop size distribution to the Library or Select From or Modify the Library. Reference Distributions are the ASAE and BCPC drop size distributions. USDA ARS Nozzle Models (or Select) invokes an additional screen for entering the required model data and running a regression algorithm and recovering a drop size distribution. USDA FS Rotary Atomizer Models (or Select) invokes an additional screen for entering the required model data and running a regression algorithm and recovering a drop size distribution for a rotary atomizer.

The drop size distribution data may be manipulated by clicking on a table entry (placing an invisible cursor at the end of the selected number), then changing its value; the Insert button inserts a blank row above the current row; the Delete button deletes the current row; while the Clear button removes the contents of the selected entries. The columns are Average Diameter (in microns), Incremental Volume Fraction, and Cumulative Volume Fraction. The Dv0.5 and Relative Span of the selected data are displayed.

Drop Size Distribution plot

A plot (from the View menu) of the volume fraction in each drop size category, either incrementally or cumulatively (totaling 1.0). Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

The Drop Size Distribution plot may access the initial distribution, the downwind distribution (for droplets depositing between the edge of the application area and the Flux Plane Distance), the vertical profile distribution or Transport Aloft (for droplets passing through the Flux Plane), the spray block distribution (for droplets depositing within the spray block), and the canopy distribution (for droplets depositing within the canopy).

Dry Delivery

The volume fraction in each particle size category. The particle size distribution data may be manipulated by clicking on a table entry (placing an invisible cursor at the end of the selected number), then changing its value; the Insert button inserts a blank row above the current row; the Delete button deletes the current row; while the Clear button removes the contents of the selected entries. The Import button permits data entry from a file containing the particle size distribution. The columns are Average Diameter (in microns), Incremental Volume Fraction, and Cumulative Volume Fraction. The Dv0.5 and Relative Span of the selected data are displayed. Equivalent Particle Diameter is the diameter of a sphere with the same volume as the dry particle.

Additional inputs specify the Particle Sphericity and application details for the Venturi Spreader (Exit Width, Edge Angle, and Exit Speed), Radial Spreader (Disc Radius and Rotation Rate), and Bucket Spreader (Swing Distance). The spreader location may be changed on the Aircraft screen.

Dv0.1

The drop diameter (in microns) at which 10 percent of the spray volume is in drops smaller than this value, and 90 percent is in drops larger than this value.

Dv0.9

The drop diameter (in microns) at which 90 percent of the spray volume is in drops smaller than this value, and 10 percent is in drops larger than this value.

Engine Forward Position

The position of the engine (in feet or meters) measured horizontally from the trailing edge of the wing to the plane of the propeller. Its value is normally between 0.6 and 7.3 m (2 and 24 ft).

Engine Horizontal Position

The position of the engine(s) (in feet or meters) measured horizontally from the centerline of the aircraft to the centerline of the engine(s). Up to 4 engines may be symmetrically specified on an aircraft.

Engine Vertical Position

The position of the engine (in feet or meters) measured vertically from the trailing edge of the wing to the propeller shaft. Its value is normally between 0.6 and -1.8 m (2 and -6 ft).

Evaporation Rate

The rate at which solid or liquid material is converted into a vapor or gas. Its value is normally between 2.47 and 84.76 sq um / deg C / sec, with a further correction for low relative wind speeds.

Export

The Export screen (from the File menu) presents Notes (as a record of the calculation), Results for Export (selecting one or more of the available model outputs), Options (whether to add Header information to the file), and Delimiter (the separator between the columns of data). The data are in column format. The export file always contains an identification line.

Export CALPUFF Data

The Export CALPUFF Data screen (from the File menu) presents the five inputs needed to convert the AGDISP calculation results into a format consistent with the input files into CALPUFF. These inputs include CALPUFF Spray Line Beginning X Coordinate, CALPUFF Spray Line Beginning Y Coordinate, CALPUFF Base Z Elevation, CALPUFF Spray Line Length, and CALPUFF Flight Direction.

Export Toolbox

The Export button from Toolboxes presents Notes, selects the Delimiter between the columns of data, and Options (whether to add Header information to the file).

File menu

This menu on the menu bar selects:

New – To reinitialize the current data with the default data, overwriting all current data;

Open – To open a previously saved data file (with the default extension of AG); calculations may or may not have been performed on these data; the data in the opened data file become the current data; all current data are overwritten with the information found in the selected data file;

Save – To save the current data into the opened data file; if no opened data file exists, Save behaves like Save As;

Save As – To save the current data into a new data file or select an existing data file; when selecting an existing data file, any data in the existing data file will be overwritten;

Export – To save data for later importing into other graphics packages or data analysis programs;

Export CALPUFF Data – To transfer data from AGDISP to an external file for later correction and input into CALPUFF;

Print Preview – To display on the screen the appearance of output intended for the printer;

Print Setup – To display the system default settings for Printer Type, Page Orientation and Paper Size and Source; plus move into additional Printer Options;

Print – To print the input data on the selected printer; and

Exit – To exit AGDISP (a warning message will appear if current data or plot options have not been saved).

Flight Direction

The direction of the spray lines across the defined spray block. Here the wind direction relative to the spray lines has already been set on the AGDISP main input screen. The sliding scale may also be used to set the value desired.

Flight Line Reps

This screen permits the user to set the Number of Reps of each flight line (spaced by Swath Width), moving to the left to move away from the edge of the application area. The first flight line location is adjusted with Swath Displacement on the Main screen. An optimization routine may be invoked to generate as uniform a deposition pattern in the spray block as possible. The Reset button sets all Reps to 1.

Flux Plane

The vertical plane through which to recover the spray material still aloft when the Flux Plane Distance is reached. At the Flux Plane the Vertical Profile, 1 Hour Average Concentration, and Vertical Profile Drop Size Distribution are evaluated. The position of the Flux Plane also identifies the location of the Riparian Barrier in the Stream Assessment calculation.

Flux units

Flux may be specified in numerator units of ozf (fluid ounces), gal (gallons), lbm (pounds mass), l (liters), g (grams), kg (kilograms), mg (milligrams), um (micrograms), and ng (nanograms); and in denominator units of in3 (cubic inches), ft3 (cubic feet), cm3 (cubic centimeters), m3 (cubic meters), and l (liters).

Fraction Aloft plot

A plot (from the View menu) of the fraction of active material aloft downwind for the conditions specified. Downwind distance is measured in feet or meters from the edge of the treated field, which is assumed to be located ½ Swath Width plus the Swath Displacement distance downwind of the most downwind aircraft flight path centerline. Buttons Close the plot, change the plot appearance (Plot Options), **Print** the plot on the selected printer, and Copy the plot to the Clipboard.

Gaussian Deposition plot

A plot (from Gaussian Far-Field Extension) of the downwind ground deposition for the conditions specified. Downwind distance is measured in feet or meters from the edge of the application area. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Gaussian Far-Field Extension

The Gaussian Far-Field Extension develops the downwind deposition to 20 km, based on a Gaussian formulation of the aerial spray scenario. Input to the model consists of the Handoff Distance (from the Lagrangian model to the Gaussian model), Spray Line Length, and Surface Layer Mixing Height. For Handoff Distance: Automatic the program computes the downwind travel distance for the aircraft vortices to decay completely. For Surface Layer Mixing Height: Automatic the program selects the mixing height based on the atmospheric stability level. Calculations are performed with the Calc button. These calculations involve recovery of the Lagrangian details at the Handoff Distance and calculation of the Gaussian deposition farther downwind. Buttons may be used to Plot the Gaussian deposition and Export it to a file. The Gaussian deposition may be further analyzed with Deposition Assessment.

General Operating Instructions

The AGDISP user interface is written in Visual Basic and comes with several operating restrictions and simplifications. Among these are the following: (1) The Delete key does not work, but Backspace does. (2) Libraries may be accessed by a single-click on the radio button to the left of the selection. If the library has already been selected, a double-click is needed to enter the library again, or the Select button to the right of the selection may be clicked. (3) Most screens contain two buttons for exiting the screen: OK and Cancel. OK accepts all data on the screen as new data, and sets a flag that forces computation. Cancel reverts back to the old data on the screen when the user first entered it. (4) An option under Run permits Revert to Last Calculations, to recover the last set of model inputs and their subsequent calculations.

The User Manual should be consulted for all model operational details.

Ground Reference Height

The height at which the deposition is computed. Its default value is 0 m (0 ft).

Half Boom Effect

The aircraft is positioned ½ Swath Width downwind and only the upwind nozzles are operational on the most downwind aircraft flight line.

Height Accountancy plot

A plot (from the View menu) of the Total Accountancy in height, for tank mix still aloft, evaporated, and captured by the canopy. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Helicopter Rotor Radius

Radius (in feet or meters) of the helicopter rotor blade. Its value is normally between 3 and 9.1 m (10 and 30 ft).

Helicopter Rotor RPM

Rotational speed of the helicopter rotor blade. Its value is normally between 240 and 400 RPM.

Help menu

This menu on the menu bar selects:

Contents – To display the contents of the Help file;

Using Help – To describe the operation of the Help facility;

About AGDISP – A brief summary of the model.

Incremental Volume Fraction

The portion of the spray contained in each drop size category.

Initial Average Concentration

The average concentration within a defined water body at the time of deposition, in nanograms per liter or parts per trillion.

Initial Average Deposition

The average deposition over a defined Downwind Width at the time of deposition. Deposition units are specified in Edit Preferences.

Input Summary

An output screen (from the View menu) summarizing the current inputs to AGDISP. Buttons are used to Save the screen or Print it on the selected printer.

Instream Chemical Decay Rate

The first-order rate constant defined from the aerobic aquatic decay rate or aerobic aquatic DT50. The DT50 is the time required (in days) to dissipate 50% of the initial active concentration, and is converted to the Instream Chemical Decay Rate with the formula 0.693/DT50. The default value is 0.

Maximum Downwind Distance

The maximum distance downwind of the AGDISP model simulation. Its default value is 795 m (2600 ft).

Mean Deposition

The average deposition within the spray block. Deposition units are specified in Edit Preferences.

Mean Deposition plot

A plot (from the View menu) of the mean deposition in the spray block as a function of Effective Swath Width (in feet or meters). Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard. Deposition units are specified in Edit Preferences.

Metric-English Units Conversion Table

To convert metric to English:

Multiply [m] by 3.2808 to get [ft]

Multiply [m/s] by 2.237 to get [mph]

Multiply [km/hr] by 0.6214 to get [mph]

Multiply [kg] by 2.205 to get [lbs]

Multiply [sq cm] by 0.1550 to get [sq in]

Multiply [sq cm] by 0.001076 to get [sq ft]

Multiply [sq m] by 10.76 to get [sq ft]

Multiply [ha] by 2.471 to get [ac]

Multiply [L] by 0.2642 to get [gal]

Multiply L/ha] by 0.1069 to get [gal/ac]

Multiply [gm/L] by 0.008346 to get [lbs/gal]

Multiply [bar] by 14.5 to get [psia], subtract 14.7 to get [psig]

Multiply [deg C] by 1.8, then add 32 to get [deg F]

Multiple Application Assessment

The Multiple Application Assessment calculator consists of input for Wind Rose, Control, and Meteorology. The Wind Rose may be selected from the Library or input from a User-defined file. Mean Library values may be plotted with the upper Plot button. Data Selection permits the user to limit the Maximum Wind Speed examined and select the Month Increment for the generation of the wind rose. The Direction to Sensitive Area may be selected. The resulting wind rose may be plotted with Plot Wind Rose Probability.

Control enables the user to select the number of applications (Events per Year) and the Number of Years for multiple applications. Meteorology permits the user to select appropriate temperature and relative humidity values. Calculations are performed with the Calc button. These calculations involve repeated AGDISP runs for incrementally increasing values of wind speed, until the maximum desired wind speed has been reached. The wind rose data is then accessed for controlled sampling of wind speed and wind direction, to recover the 95^{th} percentile deposition pattern from multiple applications to the field. Buttons may be used to Plot the summary deposition profiles and Export them to a file. The EXAMS button will export data to a file that begins with a header identifying key inputs to the AGDISP calculation that produced the deposition patterns, followed by all distances examined (feet or meters), then by each controlled sample deposition pattern (represented by curvefit coefficients). The controlled sample average deposition may be further analyzed with Deposition Assessment.

Multiple Application Assessment plot

A plot (from Multiple Application Assessment) of two deposition patterns (in Fraction of Applied) as a function of distance downwind (in feet or meters): controlled sample average deposition and the maximum deposition computed by AGDISP across the data selected. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Multiple Application Assessment run

The Multiple Application Assessment Calculations screen (from Multiple Application Assessment) runs the current input data to generate deposition predictions that span crosswind speeds from 1 m/s to the maximum specified. Messages summarizes the important inputs, while Status shows the calculation progress. The Start button begins the calculations; while either the Stop or Close button stops the calculations (at the end of the current drop size). Calculation times are nearly linear with the number of wind speeds considered. Screen savers should be disabled when running AGDISP.

Multiple Application Assessment User Defined

The user may alternatively enter a consistent wind rose dataset stored in a data file. The first line of the file must contain two numbers, the average Temperature (in deg C) and the Relative Humidity (in %). The next line must contain the integer Wind Speed of 2 (in meters per second). The next lines must contain 36 numbers representing the frequencies of occurrence of a wind speed of 2 m/sec in a Wind Direction between 0 and 10 deg N, 10 and 20 deg N, etc. The description for 3 m/sec follows, then 4 m/sec, etc., until the maximum wind speed has been described. The maximum wind speed is limited to 20 m/sec. The sum of the frequencies of occurrence over all wind speeds entered must equal 1. A partial sample of an appropriate user-defined wind rose file is:

20.0 42.0

2

0.00358211 0.00193017 0.00245183 0.00206058 0.00261703 0.00285178

0.00265181 0.00266919 0.00185192 0.00339953 0.00216492 0.00230403

0.00351255 0.00310392 0.00478194 0.00388642 0.00497322 0.00372992

0.00439069 0.00199972 0.00227794 0.00204319 0.00175628 0.00204319

0.00189539 0.00167803 0.00123461 0.00202581 0.00151283 0.00226925

0.00217361 0.00151283 0.00240836 0.00208667 0.00316478 0.00204319

3

0.01054636 0.00577311 0.00584267 0.00523405 0.00471239 0.00545142

0.00517319 0.00556444 0.00376469 0.00598178 0.00381686 0.00546880

0.00756417 0.00763372 0.01318947 0.01292864 0.02074494 0.01577172

0.01745844 0.00765111 0.00745983 0.00466022 0.00474717 0.00472108

0.00370383 0.00399075 0.00262572 0.00426897 0.00405161 0.00585136

0.00585136 0.00483411 0.00675558 0.00652953 0.00969430 0.00818147

4

0.00773805 0.00372122 0.00407769 0.00238228 0.00231272 0.00221708

0.00203450 0.00234750 0.00173019 0.00273875 0.00170411 0.00305175

0.00373861 0.00412986 0.00796411 0.00835536 0.01522397 0.01185922

0.01486750 0.00653822 0.00642519 0.00396467 0.00320825 0.00336475

0.00210406 0.00178236 0.00149544 0.00210406 0.00186061 0.00369514

0.00417333 0.00402553 0.00475586 0.00492975 0.00729464 0.00625130

Multiple Application Assessment Wind Rose plot

A plot (from Multiple Application Assessment) of the wind rose probability as a function of Wind Direction. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Nonvolatile Fraction

The volume fraction of spray material in the tank mix that will not evaporate during application, including both active and inert ingredients. Nonvolatile Fraction must be between 0 and 1.

Notes

An editable screen (from the View menu) that may be used to store information about the current AGDISP run. Information on this screen appears in the Input Summary for the model run. Buttons may be used to Save the screen or Print it on the selected printer.

Notes Export

An editable screen that may be used to store information about the current data about to be Exported. Buttons may be used to Save the screen or Print it on the selected printer.

Notes Toolbox

An editable screen that may be used to store information about the current Toolbox data about to be Exported. Buttons may be used to Save the screen or Print it on the selected printer.

Nozzle Forward Distance

Horizontal distance of the nozzle (in feet or meters) from the spray boom. Its value is normally 0.

Nozzle Horizontal Distance

Horizontal distance of the nozzle (in feet or meters) along the spray boom from the centerline of the aircraft.

Nozzle Name

The name designation of the nozzle (for example: 8002, D4-45), perhaps along with a description of its Tip Number, Orifice Size, or Orifice Number.

Nozzle Orientation

The spray angle of the nozzle: 0 degrees (back) releases spray material co-flowing with the airstream (flight speed), while 90 degrees (down) releases spray material normal to the airstream. Its value is normally between 0 and 90 deg.

Nozzle Pressure

The pressure applied across a nozzle to force spray material through it.

Nozzle RPM

Rotation rate of a rotary atomizer.

Nozzles

A description of the number and location of all nozzles along the spray boom, with a screen containing the Nozzle Installation Properties, Nozzles, and Generate Regular Distribution. Nozzle Installation Properties include Aircraft information, reference values for the Wing Semispan or Rotor Radius, and % of Nozzle Distribution Extent to the most outboard nozzle on both the left and right sides of the aircraft. Nozzles may be edited to Add a nozzle to the table or Delete the selected nozzle(s). The graphical representation displays the nozzle positions from the rear or top, come in closer (+) or move back (-), or fill the screen (Fit). The user may Sort the nozzles or Import nozzle positions. Nozzles may be moved by entering their Horizontal, Vertical, and Forward locations relative to the spray boom.

The user may alternatively generate a uniformly spaced nozzle distribution by entering two of the following: Total Number of Nozzles, % of Distribution Extent along the spray boom, and Spacing between Nozzles. Generate Regular Distribution computes the nozzle positions horizontally along the spray boom.

Nozzle Vertical Distance

Vertical distance of the nozzle (in feet or meters) from the spray boom. Its value is normally 0 or negative (below the boom).

Number Deposition plot

A plot (from the View menu) of the downwind ground deposition, based on the number of drops deposited, for the conditions specified. Downwind distance is measured in feet or meters from the edge of the application area, which is assumed to be located ½ Swath Width plus the Swath Displacement distance downwind of the most downwind aircraft flight path centerline. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard. Deposition is in drops/cm2.

Number of Engines

The number of engines on a fixed-wing aircraft.

Number of Flight Lines

The effective upwind dimension (or width) of the spray area is computed by multiplying the Number of Flight Lines by the Swath Width of the aircraft. Its value must be between 1 and 50.

Numerical Values

The Numerical Values screen (from the View menu) displays computed results for the current Drop Size Distribution (Dv0.1, Dv0.5 and Dv0.9 in microns, Relative Span, and < 141 um in % of volume), Drift Potential (an indicator of the relative amount of drift for airborne spray and droplet deposition), Deposition (Coefficient of Variation and Mean Deposition), and Accountancy of Active values of percentage of active material that landed in the canopy (Canopy Deposition), that landed in the spray block (Application Efficiency), that landed downwind (Deposited Downwind), that remains aloft at the end of the calculation (Airborne Drift), and percentage of released material that evaporated (Carrier Evaporated). Buttons may be used to Save the Numerical Values screen or Print it to the selected printer.

Optical Tree Library

A pull-down menu containing Tree Heights and Cumulative LAI for a selection of Eastern hardwoods.

Parametric Drop Size Distribution

A screen permitting entry of Dv0.5 and Relative Span. The Root-Normal technique is used to generate the drop size distribution. On Output the user may select either Drop Size Classification (selecting the ASABE drop size distribution with a Dv0.5 closest but smaller than the entered value), or Drop Size Distribution (to generate the distribution with drop categories consistent with the drop size range the distribution actually covers).

Particle Sphericity

The ratio of the surface area of a sphere with the same volume as the dry particle, to the surface area of the dry particle.

Plot Options

The Plot Options screen modifies the appearance of the current plot. Up to five curves may be plotted in any plot, by clicking on the appropriate Data selection and Data Source to bring up Current Data, Saved Results (to select previous AGDISP results), or Dropsize Library Entry (opening the Drop Size Library). The Color and Style of the plotted line may be changed here as well, along with the Legend Font and whether to show the Legend. The Clear button returns the Data Sources to the default configuration. The X axis (horizontal on the screen) and Y axis (vertical on the screen) may be manually rescaled (from Auto to Fixed), plotted Logarithmically, or have a Grid added. Scale Font may also be changed. The Save button saves the current plot settings and makes them apply to all plots; the Defaults button reverts to program defaults, overriding any saved settings. If plot settings are changed but not saved, AGDISP will prompt before exit.

Preferences

Preferences (from the Edit menu) personalize the operation of AGDISP by preselecting its operating pattern on new data sets, including Units (English or metric), Deposition Units and Flux Units (numerator and denominator), and whether to Pause before calculations begin, Suppress Calculation Warnings, Suppress Calculation Errors, Suppress Model Feature Warnings, or Show About screen on startup. The path to the User Library name is selected here. Preferences are stored in the AGDISP.INI file.

Print Preview

To display model output on the screen. Buttons Close the screen, point to the Previous page, move to the Next page, and Zoom in on the current page.

Propeller Efficiency

The engine efficiency of the propeller on a fixed-wing aircraft. Its default value is 0.8.

Propeller Radius

Length (in feet or meters) of the propeller blade, measured from the hub to its tip. Its value is normally between 0.6 and 1.8 m (2 and 6 ft).

Propeller RPM

Rotational speed of the propeller blades. Its value is normally between 1000 and 3000 RPM.

Radial Rotation Rate

The rotation rate of the rotary spreader in RPM.

Recharge Rate

The flow rate per distance (in gallons per second per mile or cubic meters per second per kilometer) of fresh water entering the stream. The default value is 0.

Relative Humidity

Ratio of the actual vapor pressure (the partial pressure exerted by vapor or water in the atmosphere) of the air to the saturation vapor pressure (in percent). Its value is normally between 5 and 100 percent.

Relative Span

A parameter representing the breadth of the drop size distribution, (Dv0.9-Dv0.1)/Dv0.5.

Riparian Barrier

A description of the riparian barrier positioned downwind of the application area. The riparian barrier is specified by its Height, Porosity, Vegetative Element Size, and Vegetative Element Type. The wind field in the vicinity of the stream is corrected for the presence of the barrier.

Riparian Interception Factor

The fraction of active material removed from the air by its interception with a vegetative barrier positioned upwind of the area of interest (such as a stream). The default value is 0.

Rotary Atomizer Flow Rate

The flow rate through the rotary atomizer (from 1 to 6.6 gpm).

Run Calculations

The Run Calculations screen (from the Run menu) runs the current data to generate ground deposition, pond-integrated deposition, and flux plane results. Messages summarizes the important inputs, while Status shows the calculation progress. The Start button begins the calculations; while either the Stop or Close button stops the calculations (at the end of the current drop size).

Run menu

This menu on the menu bar selects:

Run Calculations - To perform calculations for the input entered;

Revert to Last Calculations - To recover all inputs and results from the previous computation in the present AGDISP session; and

Batch Operations - To assemble a set of AGDISP data files for running calculations sequentially.

Save CALPUFF Data

This option generates the data needed for the construction of an input data file to CALPUFF, an advanced non-steady-state meteorological and air quality modeling system. After completion of the AGDISP calculation, the data are exported (with Export CALPUFF Data) under the File menu.

Save Trajectory Files

This option generates a set of files named dsb001, dsb002, …, dsb200 on the AGDISP directory, overwriting any existing files with these names. The first line of each file contains the drop number, the total number of drops, the number of nozzles, and the volume fraction in that drop size. Each succeeding set of lines contains the time (in seconds), followed by a line for each nozzle, with those lines containing the nozzle number, the (x, y, z) location of the droplet (in meters), the standard deviation of the spray material around the droplet (in meters), and the drop size (in micrometers).

Settling Velocity plot

A plot (from the View menu) of the settling velocity as a function of drop size. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Sideslope Terrain Angle

Angle input (in degrees) for the amount of positive sideslope (+, ground slopes toward the right wingtip of the aircraft and away from the left wingtip of the aircraft) or negative sideslope (-, ground slopes away from the right wingtip of the aircraft and toward the left wingtip of the aircraft).

Specific Gravity

The density of the tank mix or nonvolatile fraction. The ratio of the mass of a material to the mass of an equal volume of water at a specific temperature such as 20 deg C. Thus, the specific gravity of water is 1.0, while the specific gravity of oil is 0.8. Its value is normally between 0.78 and 1.35.

Spray Block Area Coverage

Results for a specified Area Coverage Boundary, giving the total area within the defined boundary and the average deposition within that area.

Spray Block Area Coverage plot

A plot (from the View menu) of the percentage of area covered in the spray block as a function of Fraction of Applied. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Spray Block Boundary

The spray block boundaries are defined as X (horizontal on the screen, in feet or meters) and Y (vertical on the screen, in feet or meters) points, simply connected (the last point connects to the first). Insert, Delete, and Clear aid in editing the list. Import and Export may be used to move data in and out of the table.

Spray Block Deposition

The contour levels of active, nonvolatile, or unevaporated in the Spray Block Deposition plot. The contour levels may be set automatically by the program, or by the user. The numerator and denominator units may be specified, as well as the component to plot (active, nonvolatile, or unevaporated).

Spray Block Deposition plot

A plot (from the View menu) of the ground deposition within the spray block, across all flight lines. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard. Deposition units are specified in Edit Preferences.

Spray Block Details

The Spray Block Details calculation screen consists of input to Define the geometry (Spray Block Boundary, Discrete Receptors, and Area Coverage Boundary); set the Flight Direction; the Deposition; Plotting Control (on/off display of the Spray Block Boundary, Flight Lines, computational Grid, Contour Lines, and Area Coverage Boundary on the Spray Block Details plot); and Area Coverage results. The calculation is undertaken with the Calc button, displayed with the Plot button, and saved with the Export button.

Spray Block Details plot

A plot of the deposition across the spray block. The units of the contours and the component type are shown on the plot for reference. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Spray Block Statistics

The Spray Block Statistics calculator takes one of the entered values of Coefficient of Variation, Effective Swath Width, and Mean Deposition, and computes the other two parameters. Calculations are performed with the Calc button. The Toolbox screen may be printed on the selected printer with the Print button.

Spraying Speed

The speed of the aircraft during spraying. Its value is normally between 8.9 and 62.6 m/s (20 and 140 mph).

Spray Line Length

The length (in feet or meters) of the spray block in the direction of the spray lines. This direction is assumed to be parallel to the stream.

Spray Material

A description of the material sprayed, with a screen containing Properties, Fractions, Tank Mix, and Calculation Control. In Properties, the name identifies the material, a check box turns evaporation on or off, and Spray Volume Rate is entered as a Rate with Units. Fractions allows entry of a specific Active Fraction and Nonvolatile Fraction. Calculation Control set on Fractions will calculate spray material composition and display a pie chart.

Alternately, the user may select Tank Mix for Calculation Control, and enter the % of Tank Mix and nonvolatile fraction for the Active and Additive Solutions. A Calculation will provide the % of Tank Mix that is Carrier and a pie chart of the Spray Material composition.

Spray Volume Rate

The rate (in gallons per acre or liters per hectare; pounds per acre or kilograms per hectare) at which the tank mix is applied to the spray area. Its value is normally between 2.3 and 140.3 L/ha (0.25 and 15 gal/ac).

Stand Density

The number of trees per area (in stems per acre or stems per hectare).

Stream Assessment

The Stream Assessment calculator screen consists of input in Geometry and Control. Geometry permits entry of all needed inputs: Spray Line Length; Turn-Around Time; Stream Width; Stream Depth; Stream Flow Rate (with a computation of Stream Speed); Distance from Edge of Application Area to Center of the Stream; Distance from Edge of Application Area to Riparian Barrier; Riparian Interception Factor; Instream Chemical Decay Rate; and Recharge Rate. These inputs drive the stream equation once AGDISP has been run to generate the integrated deposit on the surface of the stream. The Riparian Interception Factor may be computed with the Compute button.

Results may be recovered by either time or distance plots, choosing the distance increment (in feet or meters) and times (in seconds) desired, or the time increment (in seconds) and distances (in feet or meters) desired. The model will automatically generate appropriate time and distance values if so requested (Automatically set distance/time values), based on built-in plotting increments. The single-point answer is also available (entering Time in seconds or Distance in feet or meters, and recovering Time, Distance, and Peak Concentration). Calculations are performed with the Calc button, leading to a Plot of concentration (in nanograms per liter or parts per trillion) as a function of distance (in feet or meters) or time (in seconds), and an Export to a file that will contain the deposition profiles. The EXAMS button will export data to a file that begins with a header identifying key inputs to the AGDISP calculation that produced the initial conditions for the stream model, followed by three columns of data: time (seconds), distance (feet or meters), and initial concentration to the stream (ng/L) for each spray line.

Stream Assessment plot

A plot (from Stream Assessment) of the stream concentration profile (in nanograms per liter) as a function of distance (measured in feet or meters from the center of the treated field in the direction of the flight path of the aircraft) or time (measured in seconds after deposit on the surface of the stream), for one to four calculated times or distances downstream. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Stream Depth

The depth (in feet or meters) of the stream.

Stream Flow Rate

The flow rate (in gallons per second or cubic meters per second) of the stream.

Stream Width

The width (in feet or meters) of the stream during loading.

Surface Cover Types

A further description of the use of Surface Roughness and its implementation in AGDISP.

Surface Details

Specific surface parameters for describing the wind speed profile: Surface Roughness (no canopy) or Canopy Roughness and Canopy Displacement (with canopy). Surface Roughness summarizes typical surface roughness values.

Swath Displacement

During windy conditions, an applicator will spray upwind of the target swath to account for direct displacement of the spray swath by wind. The amount the pilot offsets upwind of the target swath is dependent on wind conditions and may vary from 25 percent of a swath to 2 full swath widths. Swath Displacement is the upwind distance the last downwind flight line is shifted to account for swath offset due to wind, Release Height, and Drop Size Distribution. The edge of the application area (set to 0) is initially defined as ½ Swath Width downwind of the farthest downwind flight line (with only this offset, the Swath Displacement would be 0). Swath Offset may be changed in Advanced Settings. The Swath Displacement settings allows the user to offset the flight lines an additional distance from the edge of the application area, including a Swath Displacement of -½ Swath Width (measuring the edge of the application area from the Aircraft Centerline) to eliminate Swath Displacement altogether. The Flux Plane Distance is measured relative to the selected Swath Displacement (including the original ½ Swath Width).

Swath Offset

Default Swath Displacement, adding to the Swath Displacement specified on the Main screen.

Swath Width

Swath Width is the spacing between adjacent flight lines (in feet or meters). The Swath Width times the Number of Flight Lines gives the width of the spray area. Its value is normally between 4.6 and 91.4 m (15 and 300 ft).

Temperature

The ambient temperature (in degrees Fahrenheit or degrees Centigrade). Its value is normally between 0 and 51.7 deg C (32 and 125 deg F).

Time Accountancy plot

A plot (from the View menu) of the Total Accountancy in time, for tank mix still aloft, evaporated, on the ground (deposited), and captured by the canopy. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Title

A character string identifying the current data; this Title will appear at the top of each plot.

Toolbox menu

This menu on the menu bar selects the Deposition Assessment calculator, the Spray Block Statistics calculator, the Stream Assessment calculator, the Multiple Application Assessment calculator, Trajectory Details, and Gaussian Far-Field Extension.

Total Accountancy

Total Accountancy tracks the history of the tank mix from the time it is released, until the end of the simulation. The components tracked are that portion of the tank mix that has evaporated (the portion of Total Accountancy identified as Vapor), deposited on the ground (the portion identified as Ground), deposited within a canopy (identified as Canopy), and still aloft beyond the downwind edge of the computation (identified as Aloft). Total Accountancy always sums to 1.0 and may be plotted in time, height, or distance downwind.

Total Accountancy plot

A plot (from the View menu) of the final Total Accountancy. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Trajectory Details

The Trajectory Details calculator screen consists of a Trajectories display section and a Control section. The user may enter any reasonable drop size (in microns), select the Viewing position from behind the aircraft (Rear), above the aircraft (Above), or from the right side of the aircraft (Right). The scales are in either feet or meters. When Upslope or Sideslope Terrain Angles are present, Terrain Coordinates recovers the visually correct display. Plot initiates the trajectory calculations and the plot; Options modifies the plot scales; and Copy moves the plots to the Clipboard.

Trajectory Plot Options

The Plot Options screen modifies the appearance of the current trajectory plot. The X axis (horizontal on the screen) and Y axis (vertical on the screen) may be manually rescaled (from Auto to Fixed) to isolate on the downwind locations of interest.

Turn-Around Time

The time (in seconds) for an aircraft to change from spraying one spray line to spraying the next adjacent spray line upwind.

Upslope Terrain Angle

Angle input (in degrees) for the amount of upslope (+) or downslope (-) of the terrain.

USDA FS Rotary Atomizer Models

A regression model where measured drop size distributions through rotary atomizers were correlated. The screen contains entries for all of the values necessary for the regression model, including a Spray Material section (selecting either water, water with 1% w/w Sta-Put, water with 0.25% w/w Hasten, or Foray 76B neat) and a Spray Data section (entering values for Blade Angle and Rotation Rate). On Output the user may select Drop Size Classification (selecting the ASAE drop size distribution with a Dv0.5 closest but smaller than the entered value), or Drop Size Distribution (to generate the distribution with drop categories consistent with the drop size range the distribution actually covers). When OK is pressed, the regression model computes the drop size distribution.

User Library

The name and path location to a library maintained by the user. This library contains two sections: Drop Size Distribution and Aircraft. Unlike the other libraries in AGDISP, the contents of the User Library may be manipulated by the user.

Vegetative Element Size

The catch size of the receptor, either as a discrete collector or representative of a canopy or riparian barrier (in inches or centimeters). This characteristic dimension is taken as the projection of the maximum width of the receptor in a plane normal to the direction of the flow. The element sizes are defined where appropriate as: flat plate or ribbon shorter length, cylinder diameter, or spherical diameter.

Vegetative Element Type

The aerodynamic shape that best represents the vegetative element, either as a flat plate or ribbon, cylinder, or sphere.

Venturi Edge Angle

The maximum angle of the venturi spreader exit relative to straight back.

Venturi Exit Speed

The particle exit speed from the venturi spreader.

Venturi Exit Width

The width of the venturi spreader exit. The venturi exit is positioned at the Boom Vertical Distance and the Boom Forward Distance on the Aircraft screen.

View menu

This menu on the menu bar selects:

Notes – To display pertinent user information about the current run;

Input Summary – To examine a summary of the input data;

Numerical Values – To examine pertinent summary information for the current data;

Calculation Log – To review solution details for the current data;

Drop Size Distribution – To plot the incremental or cumulative volume fraction for Initial, Downwind, Vertical Profile, Spray Block, and Canopy;

Settling Velocity – To plot the settling velocity;

Deposition – To plot the ground deposition;

Number Deposition – To plot the ground deposition in terms of number of drops;

Transport Aloft – To plot the flux through the Flux Plane;

1 Hour Average Concentration – To plot the 1 hour average concentration through the Flux Plane;

Application Layout – To plot ground deposition on either side of the edge of the application area;

Coefficient of Variation – To plot COV as a function of Effective Swath Width;

Mean Deposition – To plot mean deposition in the spray block as a function of Effective Swath Width;

Fraction Aloft – To plot the fraction of active material aloft;

Spray Block Deposition and Area Coverage – To plot ground deposition within the spray block or its area coverage effects;

Canopy Deposition – To plot the canopy deposition;

Time Accountancy – To plot Total Accountancy of the tank mix in time;

Distance Accountancy – To plot Total Accountancy of the tank mix in distance.

Height Accountancy – To plot Total Accountancy of the tank mix in height; and

Total Accountancy – To plot the final Total Accountancy of the tank mix;

Volume Median Diameter (Dv0.5)

The drop diameter (in microns) that divides the spray volume into two equal parts. For example, a Dv0.5 of 150 microns means that 50 percent of the spray volume is in drops smaller than 150 microns, and the remaining 50 percent is in drops larger than 150 microns.

Vortex Decay Rate

The rate of decay of the wingtip vortices due to the action of atmospheric turbulence. Two values may be set: out of ground effect (OGE) and in ground effect (IGE). The model transitions smoothly between the two, as the aircraft vortices descend toward the surface. Their default values are 0.15 m/s (0.49 ft/s) and 0.56 m/s (1.84 ft/s), respectively.

Wet Bulb Temperature

The temperature produced by evaporation cooling to the point of saturation.

Wind Direction

The direction from which the wind is blowing, measured relative to the flight direction of the aircraft. The default model value is -90 deg, implying a crosswind direction blowing downwind to the right in the simulation.

Wind Speed

The wind speed (in miles per hour or meters per second) 2 m (6.28 ft) off the ground. Its value is normally between 0.45 and 8.94 m/s (1 and 20 mph).

In a neutral atmospheric surface layer the wind speed profile is assumed logarithmic:

where is the wind speed at the Reference Height , z is vertical distance, and is Surface Roughness. Within a canopy the wind speed profile is assumed exponential:

where is the wind speed at the top of the canopy (z = H) and is the canopy index. Above a canopy the wind speed profile is assumed logarithmic (modified):

where is the reference wind speed above the canopy (matched to the wind speed profile without a canopy at z = 2H), d is the Displacement Height of the canopy, and is the Roughness Height of the canopy.

Wind Speed Details

The wind speed profile may be entered by entering up to ten Wind Heights and their corresponding Wind Speeds. Buttons for Insert, Delete, and Clear permit editing of the entered data.

Wind Type

Wind speed may be entered at a Single Height or in a Table of heights.

Wing Vertical Distance

The vertical distance (in feet or meters) from the trailing edge of the wing to the wingtip (to include the dihedral effect).

Beginning and Ending Months

The user may set the time interval to be used with Multiple Application Assessment. The pull-down menus provide this selection, between a beginning month and an ending month inclusive.

Deposition units

Deposition may be specified in numerator units of ozf (fluid ounces), gal (gallons), lbm (pounds mass), l (liters), g (grams), kg (kilograms), mg (milligrams), um (micrograms), and ng (nanograms); and in denominator units of in2 (square inches), ft2 (square feet), ac (acre), cm2 (square centimeters), m2 (square meters), and ha (hectares).

Direction to Sensitive Area

By default, the sensitive area is always assumed to be directly downwind of the most frequent Wind Direction. The user may specify this direction, based on the location of the sensitive area relative to the spray block.

Distance from Edge of Application Area to Riparian Barrier

The distance (in feet or meters) from the edge of the application area to the riparian barrier.

Distance from Edge of Application Area to Center of Stream

The distance (in feet or meters) from the edge of the application area to the center of the stream during loading.

Drop Size Distribution User Library

A database containing drop size distributions created, selected, or modified by the user: a personal drop size distribution library. The Name identifies the entries. The Drop Distribution is represented by Average Diameter (in microns), Incremental Volume Fraction, and Cumulative Volume Fraction. Delete Entry deletes the displayed drop size distribution from the library.

Edit menu

This menu on the menu bar selects:

Cut – To cut the highlighted information and store it in the Clipboard;

Copy – To copy the highlighted information into the Clipboard;

Paste – To paste information from the Clipboard back into the highlighted area or at the present cursor position;

Clear – To clear the highlighted information and not store it in the Clipboard; and

Preferences – To set various settings for computer or program operation parameters.

Events per Year

The user may set the number of applications per year to the spray block.

Flux Plane Distance

The horizontal distance downwind (in feet or meters) from the downwind edge of the application area to the Flux Plane. The downwind edge of the application area is defined as ½ Swath Width plus the Swath Displacement distance downwind of the most downwind aircraft flight path centerline. Its value is normally between 0 and 300 m (1000 ft) downwind.

Height for Wind Speed Measurement

The single height at which Wind Speed is measured. Its default value is 2 m (6.28 ft). This height is not specified when a wind speed table is supplied.

Main

The Main Input screen enters a Title to the run; in Aircraft accesses the Aircraft screen and enters Release Height, and Number of Flight Lines, and Number of Flight Line Reps; in Application Technique accesses the Nozzles and Drop Size Distribution screens (for liquid application) or the Details screen (for dry application); in Spray Material accesses the Spray Material screen; in Swath enters Swath Width and Swath Displacement; in Meteorology enters Wind Speed, Wind Direction, Temperature, and Relative Humidity; in Atmospheric Stability accesses the Stability screen; in Canopy accesses the Canopy screen and enters Canopy Roughness and Displacement; in Terrain enters Surface Roughness (or access Show Cover Types for typical values of Surface Roughness), Upslope Angle, and Sideslope Angle; in Transport enters Flux Plane Distance; and in Advanced Settings accesses the Advanced screen.

Maximum Computational Time

The maximum running time of the AGDISP model simulation. Its default value is 6000 seconds of simulated deposition.

Maximum Wind Speed

The user may set the maximum wind speed (in meters per second) to be used with Multiple Application Assessment. The pull-down menu provides this selection. The wind speed is limited to 20 m/s or the limiting speed found in the Library.

Meteorology

The user may set the Temperature and Relative Humidity for Multiple Application Assessment by one of three ways: (1) using the current data; (2) using generated data (recovered from the Library or user-defined Wind Rose file); or (3) user-defined (by simply entering the desired values.

Method of Application

AGDISP may be configured for aerial or ground application.

Multiple Application Assessment Library

The Multiple Application Assessment Library consists of 239 entries from the SAMSON database and 20 entries from a similar Canadian meteorological database. Each entry has been processed to recover the Wind Direction in 10 deg increments from Wind Speeds in 1 m/sec intervals for each month of the year. Typically, 30 years of hourly weather data (daylight only) have been analyzed at each weather station.

Multiple Application Assessment Library plot

A plot (from Multiple Application Assessment) of the monthly variation in Mean Temperature, Relative Humidity, Wind Speed, and Wind Direction. Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard.

Number of Years

The user may set the number of years multiple applications are made to the spray block.

Radial Disc Radius

The radius of the rotary spreader. The disc centerline is positioned at the Boom Vertical Distance and the Boom Forward Distance on the Aircraft screen.

Reference Drop Size Distribution

The American Society of Agricultural and Biological Engineers (ASABE) and British Crop Protection Council (BCPC) have established standard drop size distributions by which to classify nozzle performance.

Release Height

Height (in feet or meters) of the spray boom or dry spreader exit above the ground. Its value is normally between 1 and 30 m (3 and 100 ft).

Rotary Atomizer Blade Angle

The blade angle setting on the rotary atomizer (from 35 to 75 deg).

Spray Material Mixture

The Spray Material Mixture calculation permits the user to enter the % of Tank Mix and nonvolative fractions of Active and Additive Solution making up the Spray Material.

Surface Roughness

Height (in feet or meters) of the apparent surface cover on the ground beneath the aircraft and downwind. Surface roughness influences the shape of the Wind Speed profile, and must be specified even if a canopy is present, so as to recover the desired above-canopy wind speed profile.

Surface roughness is typically assumed to be 1/30 of the height of the actual surface cover. Some typical values are:

0.0001 m – smooth ice

0.0001 to 0.001 m – water

0.0001 to 0.02 m – snow

0.0003 m – desert sand

0.001 to 0.01 m – bare soil (higher if plowed)

0.003 to 0.01 m – grass 0.02 to 0.1 m high

0.04 to 0.10 m – grass 0.25 to 1 m high

0.04 to 0.20 m – crops

0.02 to 0.10 m – typical rural farmland

0.5 to 1.0 m – orchards

1.0 to 6.0 m – forests

0.4 to 2.0 m – suburban/towns

1.0 to 10.0 m – city centers

USDA ARS Nozzle Models

A regression model where measured drop size distributions through specified nozzles were correlated. The screen contains entries for all of the values necessary for the regression model, including a Nozzle section (selecting one of the measured nozzles and its Orifice Size); a Spray Material section (for information only); and a Spray Data section (entering values for Nozzle Body Angle or Nozzle Deflector Angle), and Pressure). On Output the user may select Drop Size Classification (selecting the ASABE drop size distribution with a Dv0.5 closest but smaller than the entered value), or Drop Size Distribution (to generate the distribution with drop categories consistent with the drop size range the distribution actually covers). When OK is pressed, the regression model computes the drop size distribution.

Vertical Profile plot

A plot (from the View menu) of the flux (Transport Aloft) through the Flux Plane. The position of the Flux Plane relative to the edge of the application area is shown on the plot for reference, as is the height of the canopy (if one has been defined). Buttons Close the plot, change the plot appearance (Plot Options), Print the plot on the selected printer, and Copy the plot to the Clipboard. Flux units are specified in Edit Preferences.