

Georgia Forestry Commission

Vsmoke-Web Explanation

Dan Chan

Apr 14, 2017

Explanation of the input fields of the V-smoke Web:

1. Location Lat/Lon: Pick a location on the map.

2a. Fire Size - Acre/Duration The actual acre used for the calculation is probably dividing the total equally by hours. But larger acre will have larger base footprint at the point of ignition.

2b. Ignition Method: There are only two options, **Head/Aerial**, and **Backing/Spot**.

Backing/Spot is the default choice and is the most commonly used ignition method for prescribed fires. Backing/Spot ignition method usually produce moderate intensity fires.

Head/Aerial will generate intense heat and as a results, most of the smoke will be lifted to the mixing height and will not be dispersed on the ground.

3. Fuel Type: The options are **Grass, Shrub, Litter, and Slash** and cross-referenced with **Light, Moderate** and **Heavy** for a total of 12 types. For each fuel type, a default **"Tons/Acre"** is assigned. If you prefer a different **"Tons/Acre"** than the default, you may enter it in the **"Tons/Acre"** field and it will take precedence.

4. Fuel Consumption: The options for **Fuel Moisture Scenario** are **Very Dry, Dry, Damp, and Wet**. Each Fuel moisture scenario has a default **% consumed**. If you prefer a different **"% Consumed"** than the default, you may enter it in the **"% consumed"** field and it will take precedence.

5a. Emissions- PM 2.5 Emission Factor: The default is 27 lbs/ton. If you prefer other values, you may enter it here. It will affect **"Particulate Emission Rate"** in a linear fashion.

5b. Emission – Particulate Emission Rate: It is dependent on **PM 2.5 Emission Factor, % Consumed, Tons/Acre, Acres and Duration**.

5c. Heat Release Rate: It is related to the amount of fuel burned. Therefore, this value is dependent on **% Consumed, Tons/Acre, Acres and Duration**. The higher the **Heat Release Rate**, more smoke will be lifted to the mixing height.

6a. Mixing Height: Smoke from fires will disperse better under higher mixing height. This value may be obtained from fire weather forecasts and will vary by location and time.

6b. Transport Wind: Smoke from fires will disperse better under strong transport wind speed. Transport wind direction will drive the smoke downwind. So, a northerly wind will bring smoke to the South. Transport Wind Speed and Direction value may be obtained from fire weather forecasts and will vary by location and time.

6c. Stability Class: The more unstable the atmosphere is, the better smoke will disperse. The atmosphere is progressively unstable from **Neutral, Slight Unstable, Moderately Unstable and Extremely Unstable**. This value may be obtained from fire weather forecasts and will vary by location and time.

8a. Background PM2.5: Default value is 5ug/m³, but it could be as low as 1-2 ug/m³.

8b. Plume Rise Fraction: This value varies from -1.0 to 1.0. The numerical value indicate the portion of smoke that will lift to the mixing height. A positive number means that the lifted up smoke will rise straight up without curtaining. A negative number means that the lifted up smoke will curtain as it rises. Because of the expected moderate heat from prescribed burns, smoke from prescribed burns is expected to curtain as it rises. So, **Plume rise fraction** usually has a negative value for prescribed burns. -0.5 is the default **Plume rise fraction** in this application. If you feel that more 75% of the smoke from your burn is lifted up, you may enter -0.75. If you feel that only 25% of the smoke from your burn is lifted up, you may enter -0.25.

9. HYSOLIT Info. Total Emission (PM2.5)= Particulate Emission Rate X Duration.