# The Oklahoma Dispersion Model

The Oklahoma Dispersion Model is a useful tool that can be used to estimate current and future conditions for the downwind dispersion of gases and small particulates released near the surface.  Its applications include smoke dispersal from wildfires or prescribed burns, pesticide drift from ground or aerial applications, and animal odors associated with animal agriculture.  The focus of the model is on concentrations at the surface (where people live and crops grow) at downwind distances up to several miles.  Thus, the Oklahoma Dispersion Model can serve as an operational management tool for scheduling activities so as to minimize downwind concentrations to sensitive non-target areas.

The Oklahoma Dispersion Model can be accessed via the OK-FIRE web site, located at:

### http://okfire.mesonet.org

In the SMOKE section of the web site, click on "Current/Recent Surface Dispersion" to access products for current and recent dispersion; click on "Forecast Surface Dispersion" for products dealing with future dispersion conditions.  The available products will now be discussed.

**Current/Recent Surface Dispersion**

Color-coded maps and site-specific products for both dispersion conditions (ability of the atmosphere to dilute a pollutant) and transport direction (where the pollutant plume is headed) are available.  These products are created using data from the Oklahoma Mesonet, the state's automated weather station network of 120 stations.

Dispersion Maps

The Oklahoma Dispersion Model (ODM) breaks the atmosphere into six dispersion categories:  "Excellent" (EX, category 6); "Good" (G, category 5); "Moderately Good" (MG, category 4); "Moderately Poor" (MP, category 3); "Poor" (P, category 2); and "Very Poor" (VP, Category 1).  As one moves from excellent toward very poor conditions, dispersion (vertical and horizontal mixing) gets progressively worse and downwind surface concentrations near or at the plume centerline become higher.  The dispersion condition maps are color-coded per these six categories.  The current dispersion map is updated

every 5 minutes using the latest Mesonet data. An example of such a map from 11 p.m. on November 18, 2001 is shown below.
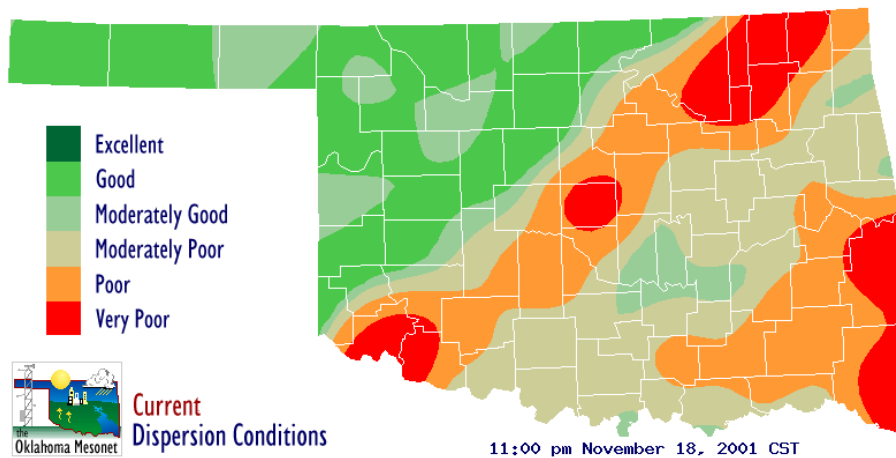


A strong cold front (see map below) was crossing the state at this time. Dispersion conditions were poor to very poor just ahead of the front, as well as in sections of southeast Oklahoma. Behind the front, dispersion conditions improved greatly.

Weather Maps

In addition to the dispersion conditions, it's important to know the direction the pollutant plume is headed, especially if there are any sensitive downwind non-target areas. For this purpose, the surface fire weather map can be used to show current conditions. Wind vector maps are also available. These maps are updated every 5 minutes using the latest Mesonet data. Temperature (red) is shown in the upper left of the Mesonet location (solid dot) and relative humidity (green) in the lower left. Wind speed and direction are denoted in purple (see legend for explanation). Wind blows from the flag(s) parallel to the staff toward the Mesonet site dot. A circle around the dot denotes calm winds. An example map from the same time as above is shown below.
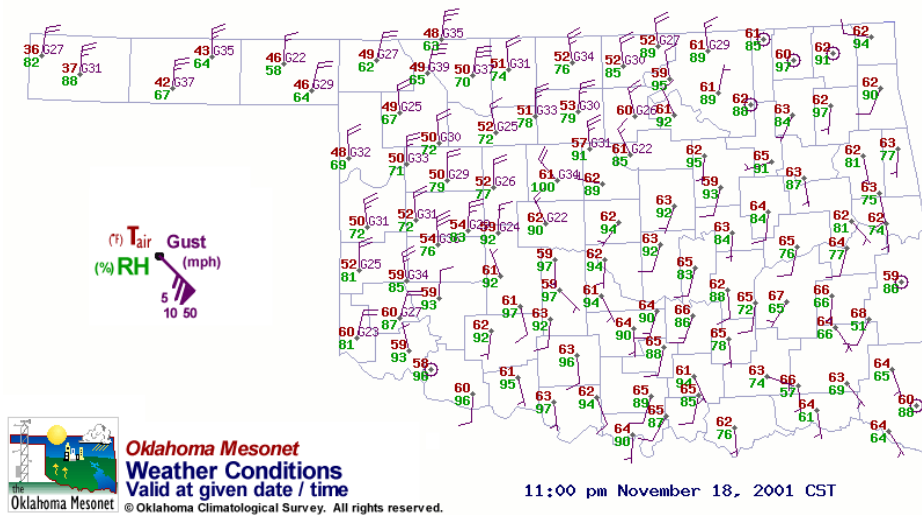
Dispersion condition and wind vector maps are also available going back 120 hours (5 days).  In addition, charts and tables going back 5 days showing dispersion and wind conditions are available.

**Forecast Surface Dispersion**

The latest 84-h NAM forecast is used to produce similar maps (dispersion conditions and wind vectors) at hourly increments through the end of the forecast period.  In addition, charts and tables of dispersion conditions and wind information are available through the forecast period.  An example of such a chart (although not through the the full 84-hour period) is shown below.  Dispersion conditions (green) are expected to fall into the "Poor" category (2.0) between 3 and 7 a.m. the next morning, and then increase to "Excellent" (6.0) between noon and 2 p.m. the next afternoon.  Wind direction (diamond symbols) and wind speed (dark blue) is also portrayed.