OK-FIRE WORKSHOP - LAB EXERCISE #2

FIRE DANGER Products

HOME PAGE

Go back to the Home page (click on the OK-FIRE logo within the black horizontal bar at the top of whatever page you are on within OK-FIRE). In a one-column table beneath the name of your primary station (and secondary, if you have one) you'll find listed the most recent fire danger conditions for that station in the "Fire Danger" section).

a) *For your default (primary) Mesonet site, what are the most recent values for 1- and 10-hr Dead Fuel Moisture?*

b) *What are the most recent values for Burning Index and Ignition Component?* *Note that there is a zoomed-in regional map for the current Burning Index centered about your primary Mesonet station.*

c) *What is the corresponding "Current Fire Danger" level (colored fire danger rectangle)?*

d) *What is the time for which these fire danger conditions are valid?* *Note the fire model runs every 15 minutes.*

e) *What is the latest value for 16" plant available soil moisture ("Soil Moisture")?*

Now click on "Soil Moisture", which will take you to the current map for 16" soil moisture.

What is the potential for large growing-season wildfires (>= 1000 acres) at this Mesonet location given suitable fire weather conditions? *(noting the value, look at the color legend) As far as large wildfire potential, this map is valid only for the months of May through October, but is displayed every month of the year to provide continual assessment of soil moisture conditions across the state.*

Click on your browser's back button to return to the home page (or click on OK-FIRE logo).

f) *What is the latest Relative Greenness at this Mesonet site?*

g) *What is the NFDRS Fuel Model currently being used at this site?*

Note that you can change the fuel model right on the home page for the default station by going to the pull-down menu under "Current Fuel Model for [station name]" at the bottom of the left menu section.

NOTE: Before we start looking in depth at the fire products, it is important to note which variables are influenced by *RELATIVE GREENNESS* and *FUEL MODEL*. **ONLY the four fire danger indices (BI, SC, ERC, and IC) are influenced by the satellite's assessment of greenness [*Relative Greenness (RG)*] and the fuel model currently being used. All other variables are independent of RG and fuel model.**

CURRENT Fire Danger

Besides the home page, where you can see current fire danger conditions listed for up to two stations, as well as a regional Burning Index map centered on your default station, you can also go to "Current Station Conditions" and "Current Maps", the first two items in the left menu section.

Current Station Conditions

Note that you can click "Current Station Conditions" in the left menu section to see ALL of the most recent fire danger related variables for your primary (default) Mesonet station (or any station that you choose). Not all variables are shown on the home page due to space and importance, but here you can find the values of such variables as 100-hr and 1000-hr dead fuel moisture.

Current Maps

Click on "Current Maps" in the left menu section. Scroll down to the "Fire Danger" maps section (or click on "Fire Danger" in the horizontal menu bar underneath the OK-FIRE logo bar).

Click on the "Burning Index" map.

a) In which sections of the state would a fire be most intense if it existed at the map time?

Note that Burning Index as well as SC, ERC, and IC are based on the 500-m resolution Relative Greenness and default fuel model distribution, which may be unrealistic in certain areas of the state (e.g., Model A being used in areas of bare agricultural fields with no fuel at all).

Use your browser back button and click on the "1-hr Dead Fuel Moisture" map.

b) Do the areas noted in (a) show any correlation with the distribution of 1-hr dead fuel moisture?

c) In what parts of the state would a wildfire spread the most rapidly? *(see "Spread Component" map)*

d) In what areas would a wildfire requiring suppression action be most likely to start from an ignition source such as a firebrand? *(see "Ignition Component" map)*

e) According to the KBDI map, what areas of the state are showing the highest levels of drought at this time? Do these areas generally correlate with the 16" percent soil moisture map or are there notable discrepancies?

PAST Fire Danger

As with the fire weather variables, note that fire danger map animations over past periods are available in the "Past & Forecast Animated Maps" section (left menu item) and that charts and tables showing values at specific Mesonet sites over past periods are available in the "Past & Forecast Charts/Tables" section (left menu item). In both of these sections, the user has the ability to go back a year (52 weeks) for longer-term variables (e.g., 100-hr DFM, 1000-hr DFM, Soil Moisture, RG) and back 30 days for shorter-term variables (e.g., BI, 1-hr DFM, 10-hr DFM). We don't have time to explore these products now, but you can do so later at your leisure.

FORECAST Fire Danger

Forecast Charts

Go back to the home page. Note that under the two regional maps there is a 12-hour forecast chart for Burning Index (orange) for the default station, and, under the data tables, another such chart for the secondary station, if there is one. This particular chart also shows forecast 1-hr precipitation (blue).

For your default station, what is the highest Burning Index that is forecast over the next 12 hours and when does it occur?

Note that you can also generate forecast charts (and tables) of fire danger variables through the entire 84-hr forecast period in the "Past & Forecast Charts/Tables" section.

Forecast Maps

To see statewide forecast maps, go to "Past & Forecast Animated Maps" in the left menu section. The default mode is "Forecast" so you don't need to change that. In the pull-down Variable menu, if you scroll down you will see all the available fire danger variables you can animate (beginning with BI and ending with KBDI). Select "Burning Index" as your Variable. As you did with fire weather variables, click on the middle button (Play) beneath the map to start the animation through the 84-hour forecast period.

For your area of interest, when, if at all, is the Burning Index highest over the 84-hr forecast period?

EFFECT OF RELATIVE GREENNESS (RG) ON FIRE DANGER

Let's go to a region of the state to look at the differences in fire danger that can occur within short distances based on RG differences. **Note: RG differences in this part of the state may be minimal depending on the time of year you do this exercise!** For this example, we'll go to southwest Oklahoma.

*Click on **"Relative Greenness Zoom Map"** in the left menu area.*

Using this RG map, zoom into southwest Oklahoma and record the current RG values for the following stations (all of which have Model T as their default fuel model):

Cheyenne: RG = ____   Hollis: RG = ____   Medicine Park: RG = ____

*Now click on **"Past & Forecast Charts/Tables"**.*

One at a time, select each of the three stations listed above. For the first one, record below the highest value of Burning Index (BI) that occurs over the 84-hour forecast period *(select Burning Index in the "Product" field, then click "Get Data")*. For the next two stations, record the highest BI value that occurs **on the same day** that the max BI value occurs for the first station.

Cheyenne: BI = ____   Hollis: BI = ____   Medicine Park: BI = ____

Because these three stations have the SAME fuel model (T) and essentially the SAME forecast weather conditions, the fire danger differences are largely the result of the <u>different Relative Greenness values</u>.

Which station has the highest fire danger?   ***Why?***

FUEL MODELS

Changing Fuel Models

Let's now consider the Cheyenne station in Roger Mills County. *Select **"Default Fuel Model Zoom Map"** in the left menu area and zoom into that part of the state.*

What is the default fuel model for Cheyenne?

Let's now change the fuel model to Model F (intermediate evergreen brush). How does one do this?

> *Click on **"Station Fuel Model Options"** at the very bottom of the left menu area.*

Click on Cheyenne on the map (or select it in the pull-down menu). Note that T is listed as the default fuel model. To change to Model F, go to the fuel model list that you will find in "Change Current Fuel Model to:" and select Model F. Click "Save Fuel Model". Note that Model F is now listed as the current fuel model. Until you change it again, the fire model variables (BI, SC, ERC, IC) for Cheyenne in charts and tables will be based on Model F.

Effect of Fuel Model on Fire Danger

*Now click on **"Past & Forecast Charts/Tables"** in the left menu area.*

Let's go back to the Cheyenne station. Click the station on the map or select it in the pull-down menu. Let's look at the Burning Index forecast for Model F. Select "Burning Index" as the variable and then click "Get Data".

What is the highest value of Burning Index that occurs with Model F and on what day does it occur?

> Highest BI _____   Day _____

Use your back button on your browser to get back to the last page. Note that you can compare a second fuel model over the same forecast period. In the pull-down menu in the "Add Second Fuel Model" line, select the following models to compare with Model F. After you select a given second fuel model, hit "Get Data". Record the highest BI value (turquoise) occurring **on the same day** noted above.

Model G (forest with heavy downed fuels)	Highest BI _____
Model L (western perennial grasses)	Highest BI _____
Model R (hardwood forest)	Highest BI _____
Model T (tallgrass with open evergreen brush)	Highest BI _____

Note how fire danger varies according to the fuel model. The SAME weather that day is involved, the Relative Greenness value is the SAME, only the <u>fuel model is changing</u>. Which fuel model has the highest fire danger at a given time depends on the hourly weather conditions and the fuel characteristics of the given model, such as dead fuel load distribution among the four categories, dead fuel moisture, live fuel moisture, etc.

SATELLITE FIRE DETECTION

The most important satellite map for fire detection is the 3.9 micron infrared image. A direct link to that map is in the left menu section ("3.9 µ Infrared Satellite Map"). Click on this link. Fires (wildfires or prescribed fires) appear as distinct gray/black areas (often dots) against the light gray background *(lakes can also appear dark if their surface temperature is warmer than the surrounding land)*. Clouds are depicted in whites and will usually obscure any surface fires. This map, based on GOES-16 satellite imagery, is updated every 5 minutes with the time of the image shown in UTC at the bottom of the image (CST = UTC – 6 hours; CDT = UTC – 5 hours).

Are you able to you detect any current fires on this regional map? Where are they located?

Note that on a computer, you can zoom into this image by using the [Control +] combination multiple times and scrolling to the section of the map of interest. [Control –] will zoom out again, so you can get back to your prior website size setting. On some browsers you can right click on the map, select "View Image" (Firefox) or "Open Image in New Tab" (Chrome) to make the image full screen; then you can use the magnification icon (left click) to enlarge the image even further.

In addition to 3.9 micron maps, other satellite maps can be found in the "Satellite" maps section of "Current Maps" (left hand menu item). There are maps in two visible wavelength bands: Visible (Blue) and Visible (Red). Under clear to partly cloudy skies, the Visible (Blue) maps in particular are useful during the daylight hours for seeing features such as smoke plumes from wildland fires. These maps are also based on GOES-16 imagery and updated every 5 minutes. There are also maps for lower-level (about 10,000 feet elevation) water vapor.

OKLAHOMA BURN BANS

Click on "Oklahoma Burn Bans" in the left menu section. In this section the first link is to an interactive Oklahoma map of the current county and governor burn bans. The next two maps pertain to criteria that counties need to meet in order to be able to institute burn bans in their counties. The last link (second row) is to the current Oklahoma burn ban law, which sets the criteria that counties need to meet in order to institute burn bans.

Click on *"Current Oklahoma Burn Bans"* to see any county or governor-declared burn bans.

Is your county currently under a burn ban?

Click on *"Oklahoma Drought Map"* to see the latest weekly drought conditions. A county must have "Severe" (D2) or higher drought levels to qualify for a county-declared burn ban.

Does your county currently meet the drought criteria for a county burn ban?

What is the highest level of drought in your county, if any?

Click on *"3-Day Precipitation Forecast"*. No more than 0.5" of precipitation must be forecast over the next 3 days in order for a county to qualify for a burn ban *(needs to be white through green colors only)*.

What is the highest amount of precipitation forecast for your county over the next 3 days?

PUTTING IT ALL TOGETHER: YOUR SITE-SPECIFIC FIRE DANGER FORECAST

Following are the suggested steps you can go through when making a fire danger forecast for your area (see the PDF document "*Operational Procedures for Assessing Fire Danger*").

1) **Choose a nearby Mesonet station to use that has a GREENNESS level appropriate for the observed levels of greenness of your local wildland surface fuels *(zoom in on the map to see all the station values)*.**
    ("Relative Greenness Zoom Map" in left menu section; this map is updated daily with the latest satellite data)

Note: This step is especially important if you're in an agricultural area of the state, as you should not use a Mesonet station whose greenness level is heavily influenced by crops or bare fields and not representative of local wildland surface fuels.

STATION I'M USING = _____

2) **If different, change the primary Mesonet station on the HOME PAGE to the above selected station.**
(Click the station listed above the first (primary) station data column; then click on your selected station on the Oklahoma map or select it in the alphabetical station menu)

3) **Check the current FUEL MODEL for that primary Mesonet station and change it if you desire to model a different fuel complex.** (Select desired fuel model from fuel model menu located below "Current Fuel Model for (*station name*)" at the bottom of the left menu section)

Note: *We recommend using Model T as a reliable, "worst-case" scenario fuel model under most situations for Oklahoma fuels. However, if you wish to model just grasses, you can use Models A or L; or, if you're in forest settings, you can use Model R (hardwood forest) or Model P (pine forest). Other fuel models are available as well: Models B and F for brushy evergreen landscapes, Model G for forests with heavy downed fuels, and Model K for light slash.*

FUEL MODEL I'M USING = _____

4) **Look at the CURRENT weather and fire danger conditions in the station data tables and maps on the home page.**

What is the latest value of Relative Humidity?   *Wind Speed and Direction?*

Burning Index?   *Ignition Component?*   *1-hr Dead Fuel Moisture?*

Note: *For recent trends in any of these variables, go to "Past & Forecast Charts/Tables", select "Past" under Data Type, then select either "Charts" or "Tables" under Display Type, and then "Get Data".*

5) **Look at the *FORECAST* charts for RELATIVE HUMIDITY and WINDS.**
(See 12-hr chart on home page; for longer forecasts, go to "Past & Forecast Charts/Tables", select "Forecast" under Data Type, and then "Get Data"; use the default "Standard Meteogram" listed in the Variable menu)

What are the lowest values of relative humidity (green, first graph) and on what day(s) do they occur?

What are the highest wind speeds (blue, second graph) and on what day(s) do they occur?

6) **Look at the *FORECAST* charts for BURNING INDEX and 1 & 10-HOUR DEAD FUEL MOISTURE for the above selected station; Spread Component and Ignition Component may also be of value to you.**
(See 12-hr BI chart on home page; for longer forecasts and other variables, go to "Past & Forecast Charts/Tables", select "Forecast" under Data Type, then the variable(s) of interest in the Variable pull-down menu, then "Get Data")

What are the highest values of Burning Index over the forecast period and when do they occur?

What are the lowest values of 1 & 10-hour Dead Fuel Moisture and when do they occur?

Note: *For any of the fire danger model indices (BI, SC, ERC, IC), it is also useful to compare a second fuel model on the charts. Simply select another fuel model in the pull-down menu entitled "Add Second Fuel Model:" and click "Get Data". The second fuel model will show up in turquoise on the graph.*

Based on the information above, what would be your fire danger outlook
for wildland surface fuels in this geographical area over the next 84 hours?