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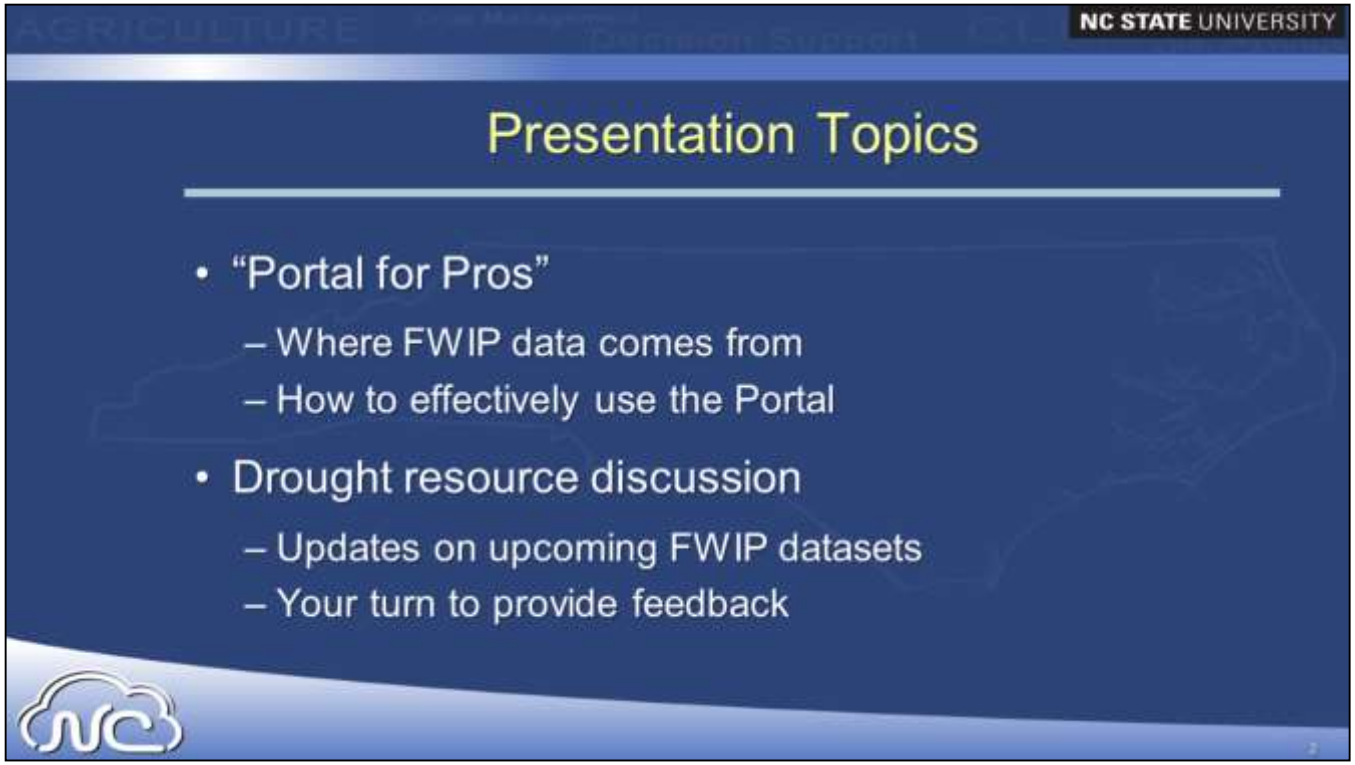
Using the Fire Weather Intelligence Portal and Assessing Current Drought Resources

Corey Davis

PFC Meeting

August 2, 2018

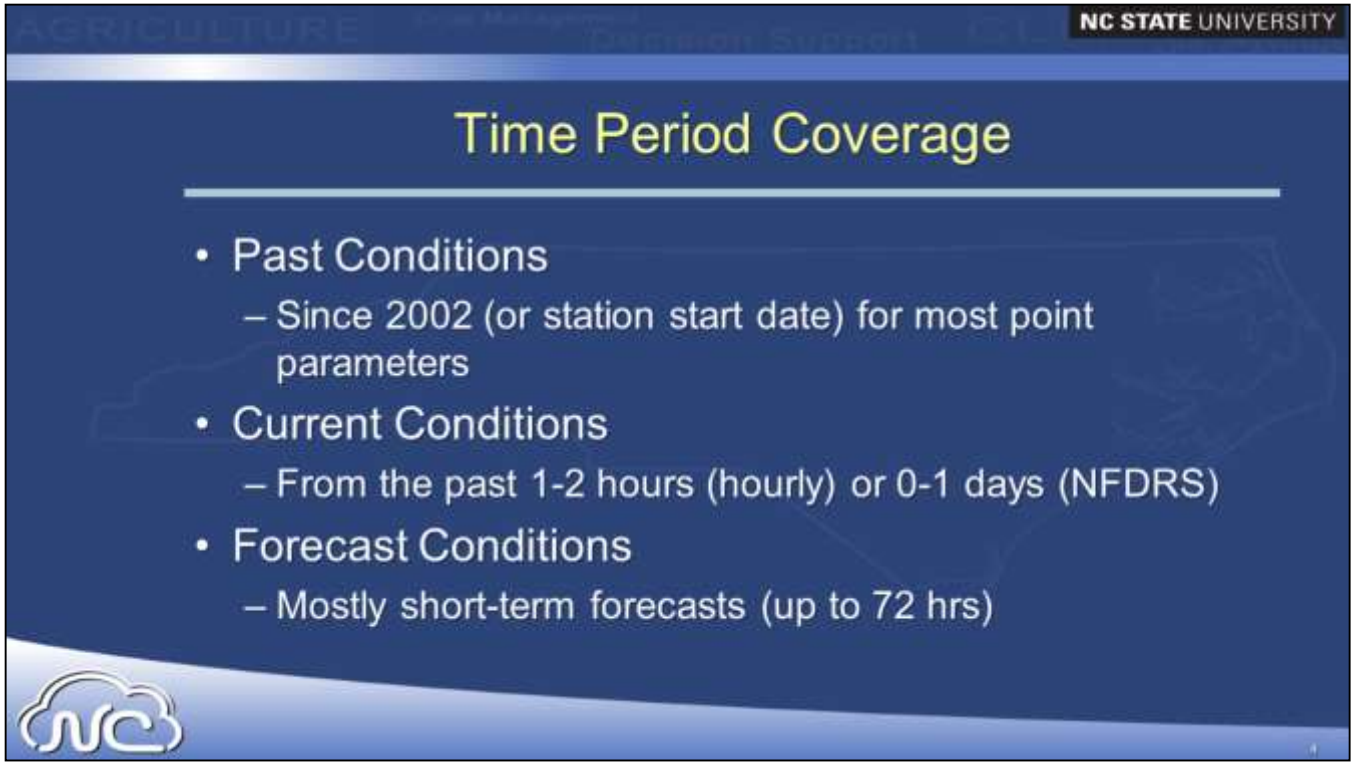
NORTH CAROLINA CLIMATE OFFICE



This presentation assumes that you're familiar with the basics of the Fire Weather Intelligence Portal. It will cover some of the advanced features and datasets available in the Portal.

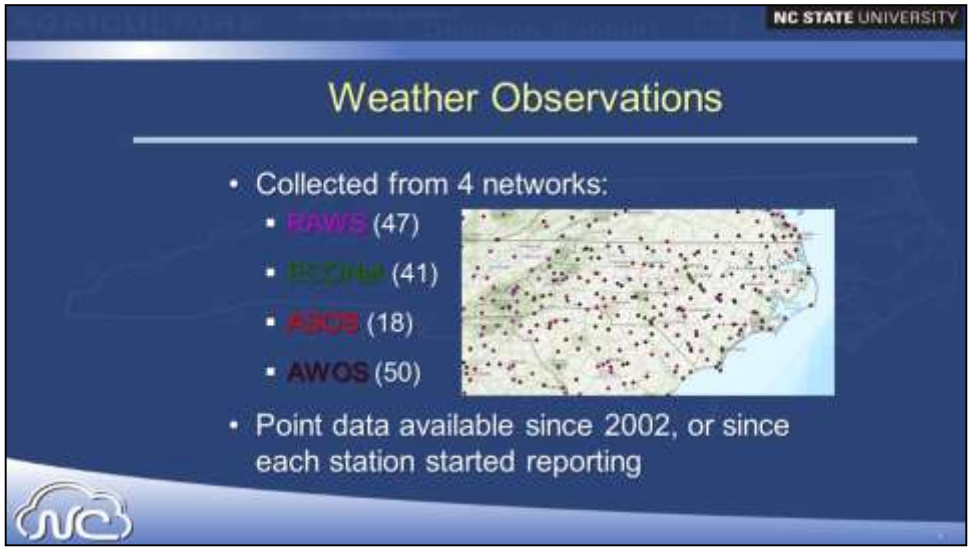
Toward the end of the presentation, we will go over some new datasets that will be added to the Portal and you'll have an opportunity to share your ideas.

The Portal was designed to be a real-time monitoring tool and a one-stop shop to help foresters find weather and fire risk information.



The Current and Forecast Conditions tabs auto-refresh every 10 minutes to load the most recent data.

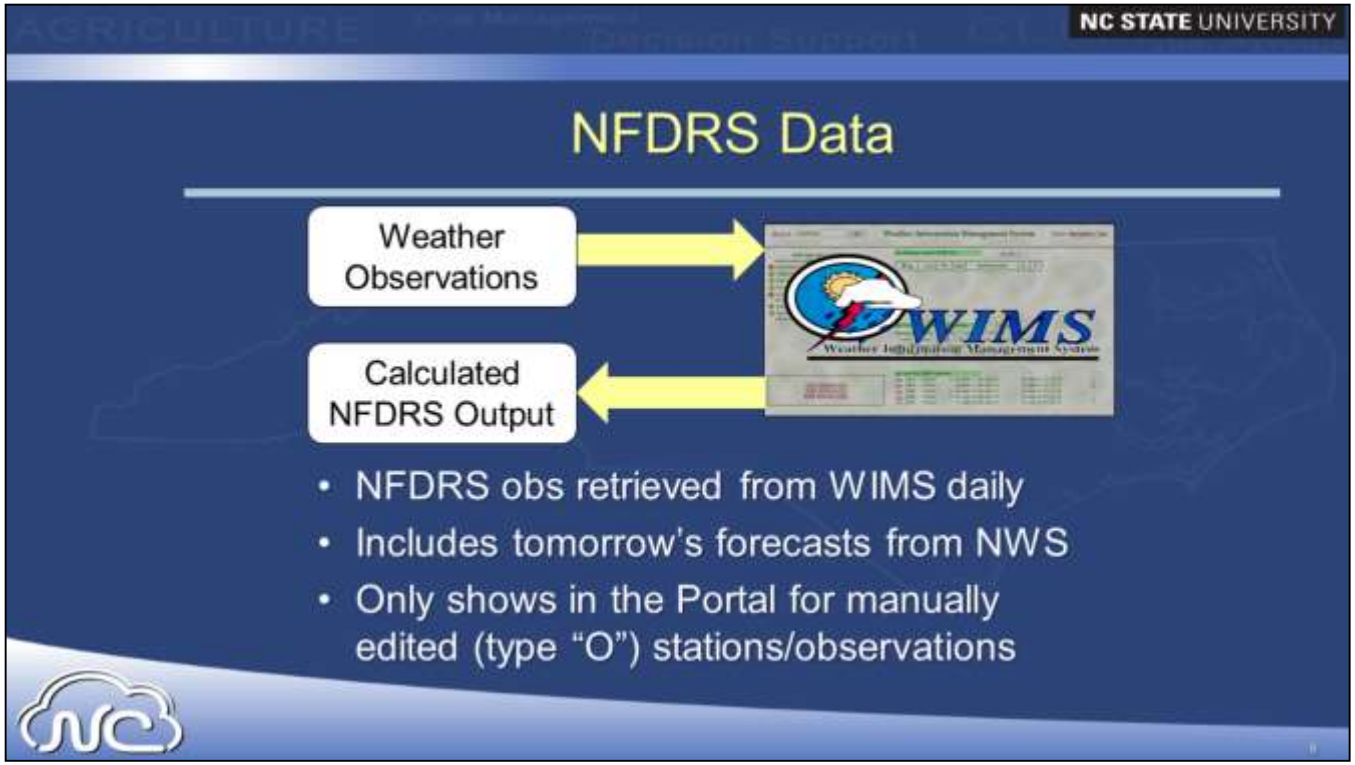
If you're viewing NFDRS data on the Current Conditions tab, it will show yesterday's data before about 3 pm ET. Today's data usually begins rolling in after that.



RAWS includes some portable RAWS, but someone generally needs to let us know about the new location – the metadata in MesoWest doesn't update automatically.

ECONet is the State Climate Office's set of 42 mesonet stations in NC. They measure some additional parameters such as soil temperature and moisture.

ASOS and AWOS are airport-based stations. They do not have solar radiation and 6-meter winds. However, we do use a log wind profile method to estimate 6-meter winds from their 10-meter winds.

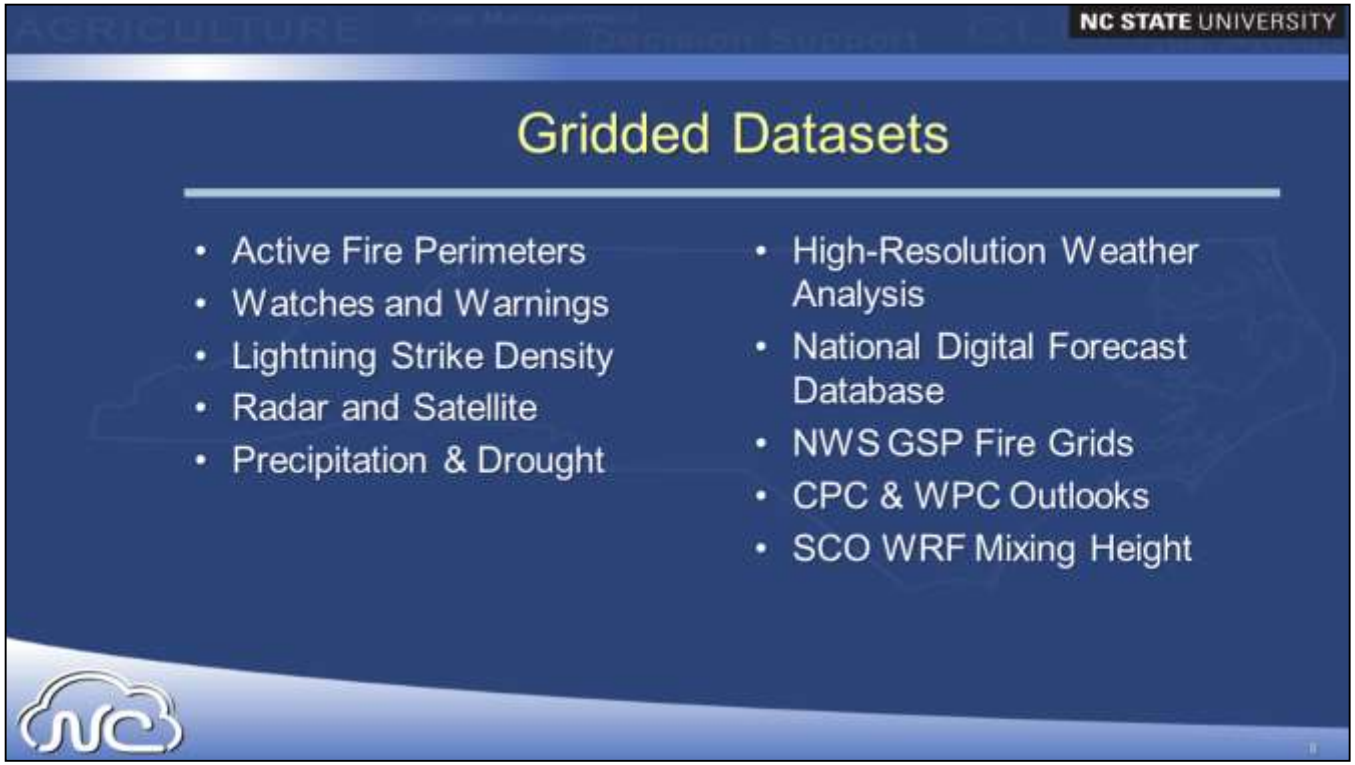


Weather data feeds into WIMS every day. For ECONet, ASOS, and AWOS stations in NC, we use the alternate gateway initially developed for Florida to upload the data. After 1 pm, NFDRS output becomes available and is automatically downloaded and displayed in the Portal. Later each afternoon, NWS offices will make next-day NFDRS forecasts for set station locations. Those are also retrieved and added to the Portal.

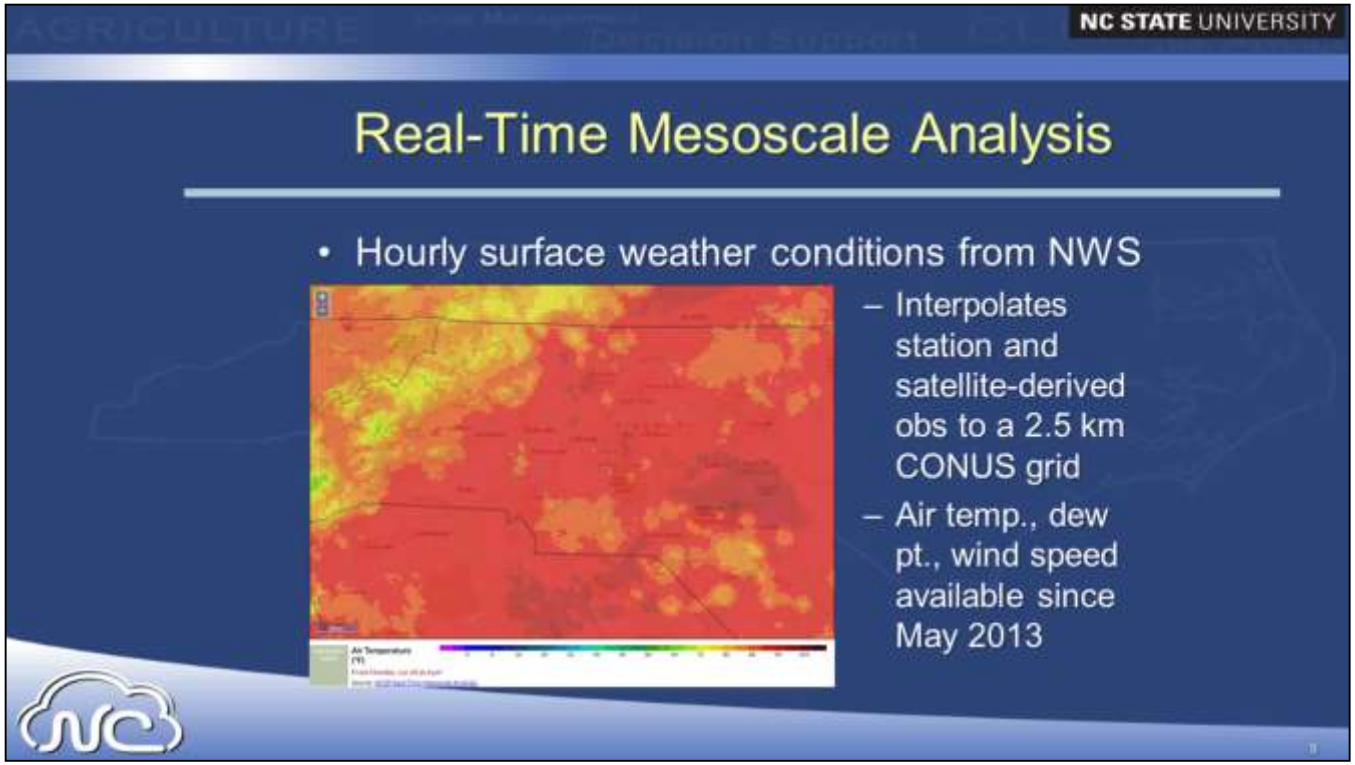
One of the most common questions is "why isn't a certain station showing any NFDRS data today?". Usually, it's because that station's 1300 observation hasn't been manually edited yet.

DENSCA was created by Denver Ingram and Kevin Scasny from SACC. It combines several other fire risk indices into a single number, which means you don't necessarily need to be knowledgeable about specific parameters and their local variations.

Their analysis has found that fire activity tends to increase when DENSCA drops below 35. We're hoping to do some evaluation in North Carolina to confirm this.

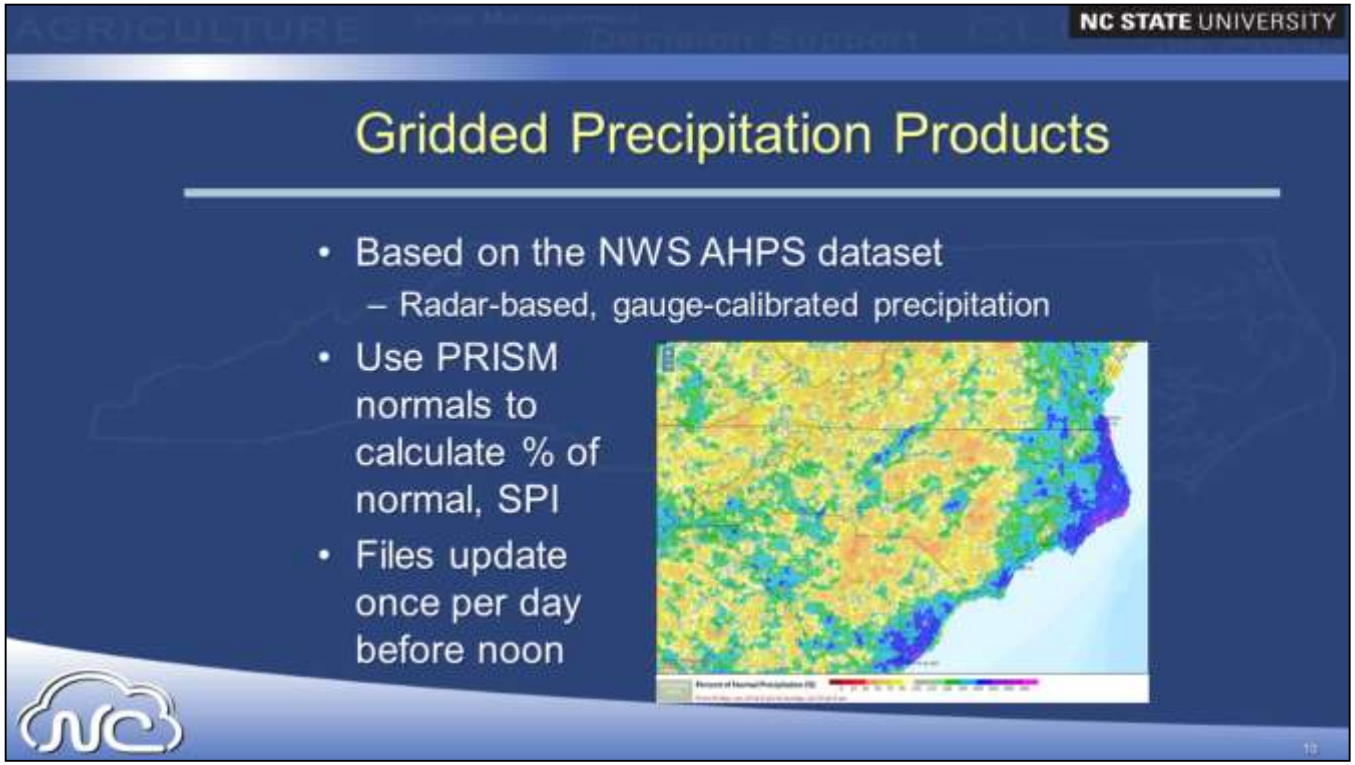


Many of these datasets are also available in the NWS Enhanced Data Display, but several are unique to the Portal.

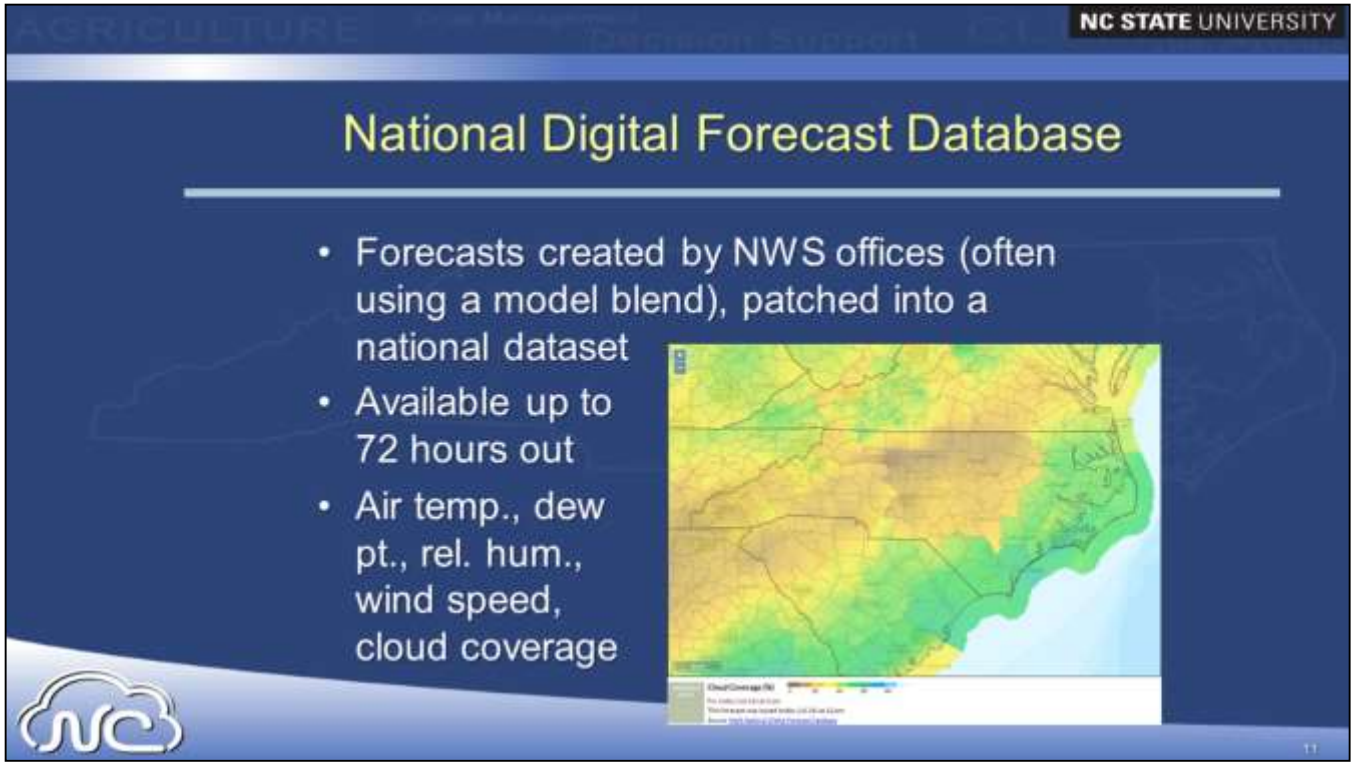


This dataset is spatially continuous and fairly high resolution, so you can easily identify hot and cold spots, or where the driest air is located.

These analyses serve as the initial conditions for the NWS's NDFD, and they can also be used for NDFD verification.

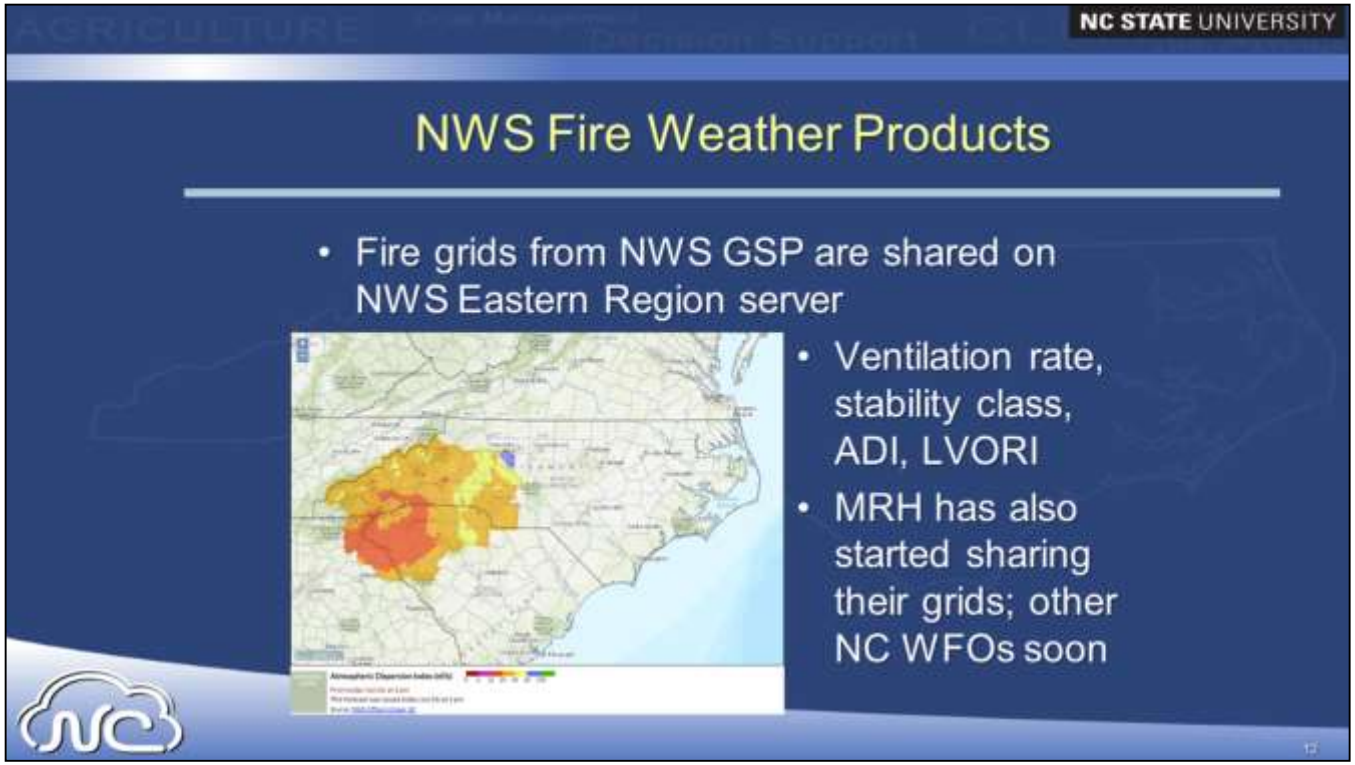


These products use precipitation estimates from the NWS's radar network, then calibrate that data using surface-based rain gauges.

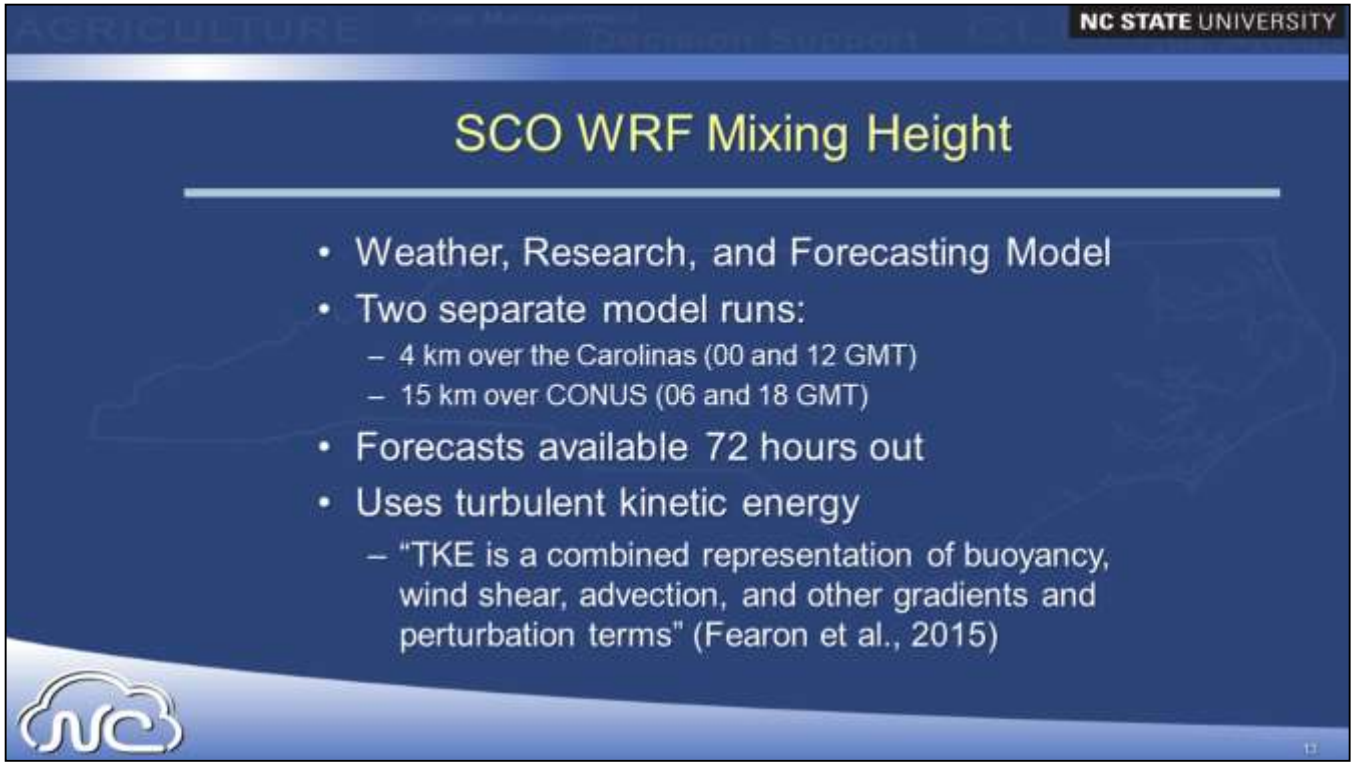


Each NWS office can use a different blend of models or tweak their forecasts, which is why you may sometimes see jumps in values from one office's forecast area to another.

Like RTMA, these files are available at 2.5 km resolution.

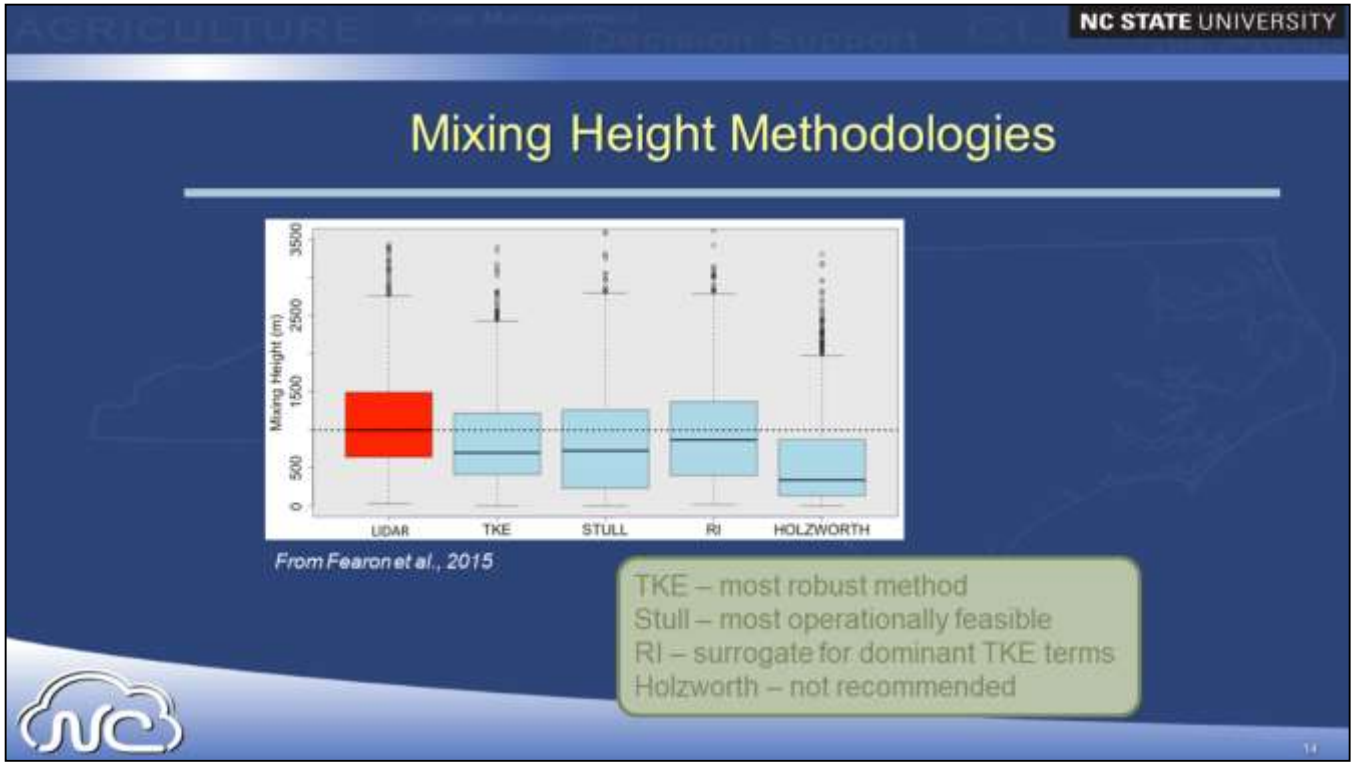


A few years ago, the NWS in Greenville, SC, began sharing forecast grids for their fire weather products with us. They are now providing that script to other offices that cover NC, so we hope to have statewide coverage of these grids soon.



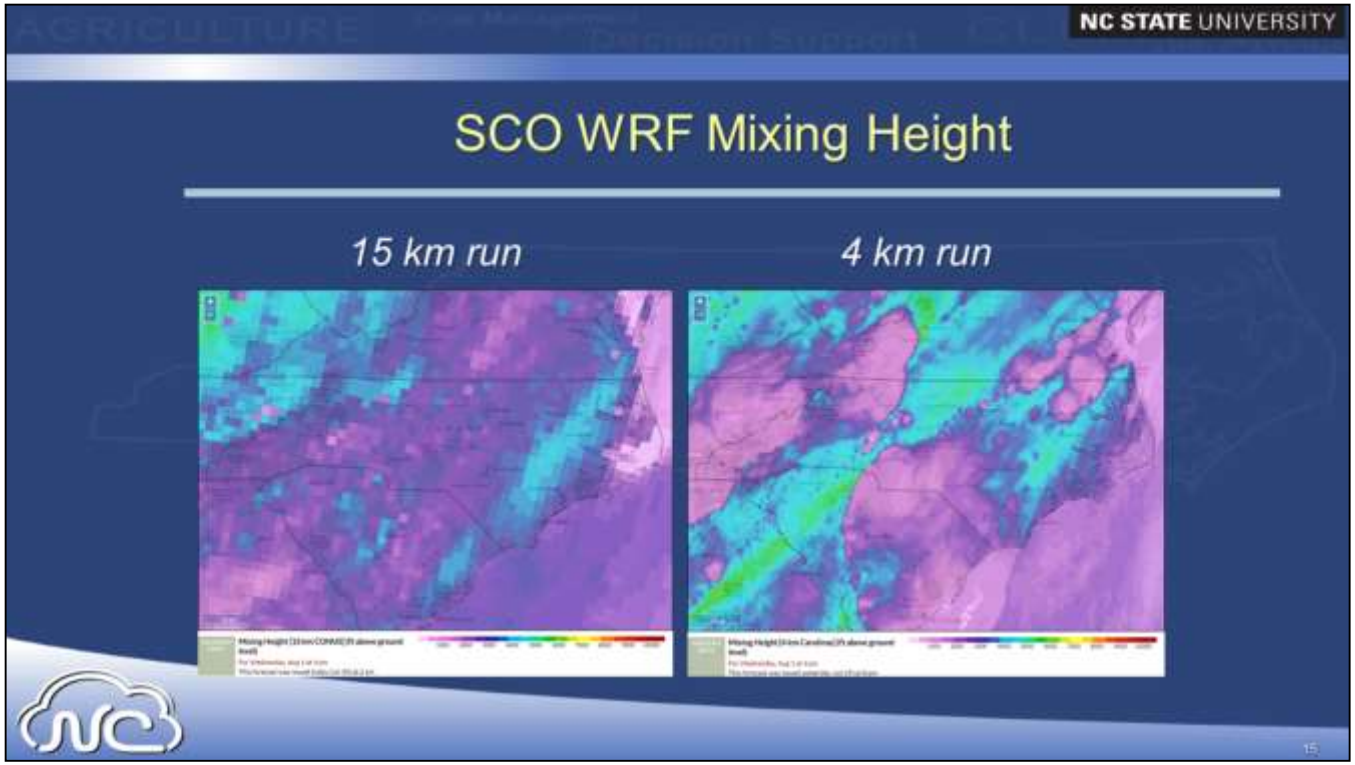
Even though a model may start running at 12 GMT, it takes time to complete the run and create the output. Results are usually available around 8 hours after the run start time.

TKE is a robust method for calculating mixing height because along with factoring in buoyancy and shear, it accounts for the advection of turbulence from elsewhere vertically and horizontally. It's tougher to use operationally because it requires finely-spaced data, but this sort of data is available in some computer models.



In the comparison study by Fearon et al., TKE had the smallest spread in values while also having a mean relatively similar to the LIDAR-derived mixing height measurements.

Most NWS offices currently use the Holzworth method but are expected to transition to the Stull method within the next few years.



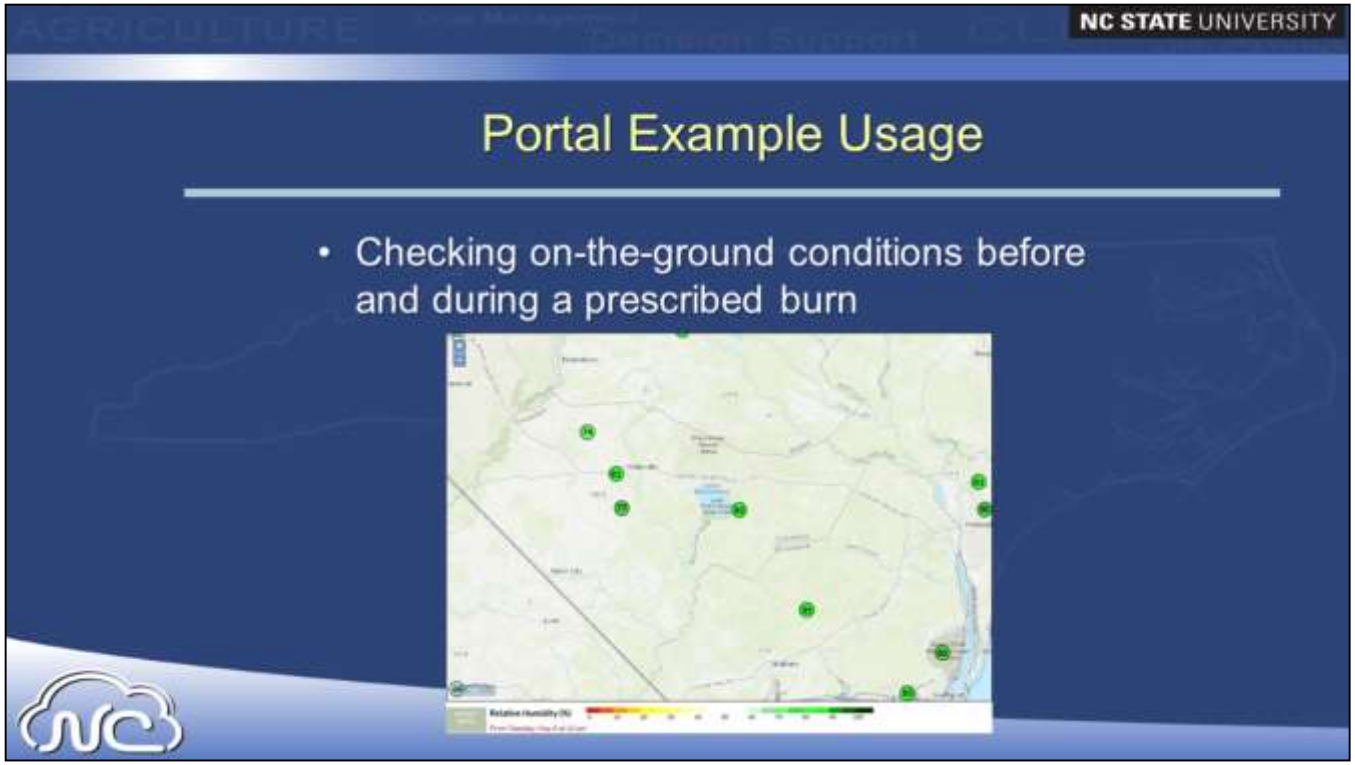
One key difference between the 15 km and 4 km runs is how they handle convection.

Showers and thunderstorms are roughly 5 to 10 km wide, so a 15 km model can't resolve individual cells. Instead, it uses convective parameterization to estimate the likelihood of convection occurring within a given grid cell. If that chance is greater than zero, it can be reflected in the mixing heights and other parameters, making it seem like shower activity will be more widespread than it actually is.

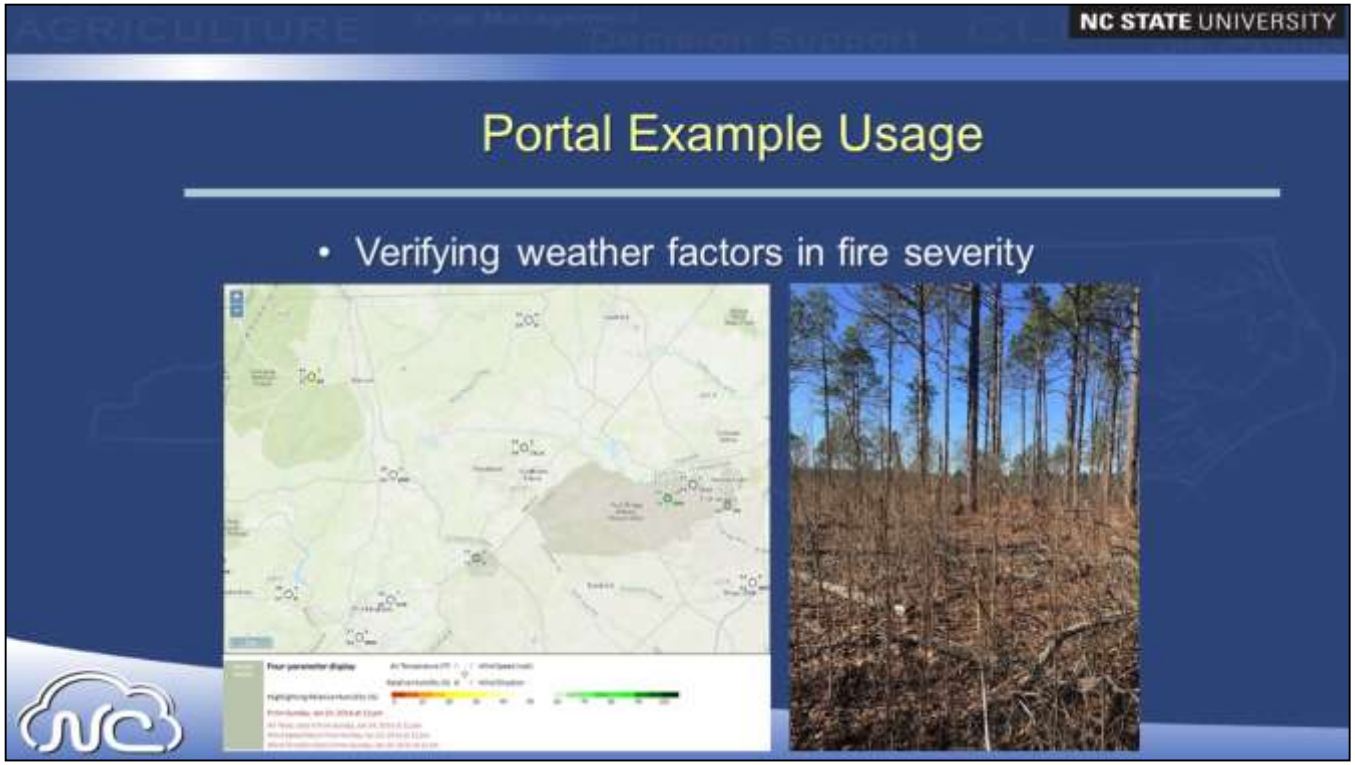
The 4 km model can explicitly resolve convective showers and storms, but these features aren't the most predictable, especially more than a few hours into the future. Just because the 4 km run shows convection in one place and not in another (such as spots with higher mixing heights) doesn't mean that's how it will actually happen!

Portal Strengths

- Emphasizes ground-truth surface observations
  - Additional networks, parameters
- Ideal for routine monitoring
  - Easy to access the same view each time you check

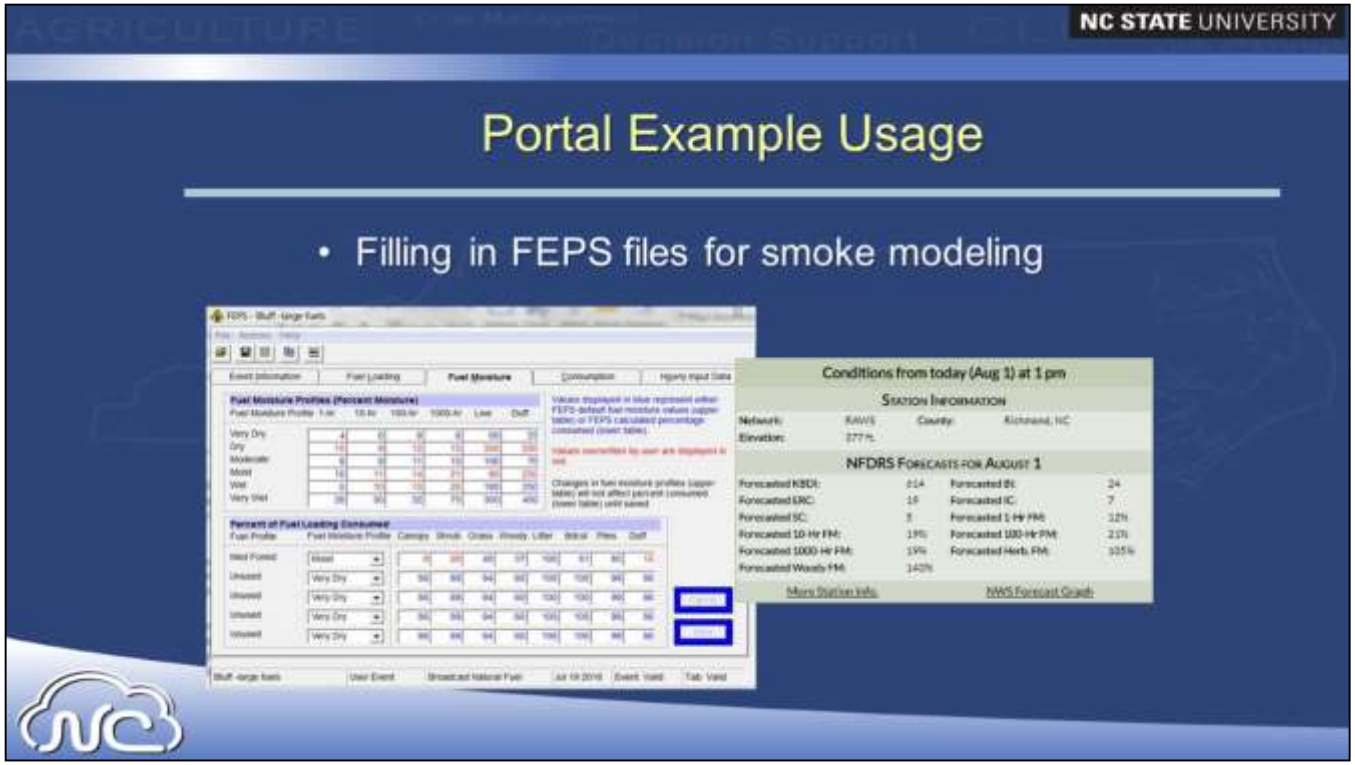


NC State Parks Service did a prescribed burn recently at Lake Waccamaw State Park, and they used the Portal (including the on-site portable RAWS station) to monitor conditions before, during, and after the burn.



You can use the Portal to check for the sources of “unexpected responses”.

The Nature Conservancy did a prescribed burn in southern Moore County in January 2016. They noticed a lot of scorching, and since they didn’t record on-site weather conditions that day, they checked the Portal. Nothing seemed abnormal with temperatures or relative humidities. So they checked some pre-burn photos from the site and saw there were lots of longleaf saplings with needles close to the ground, which contributed to the scorch depth. In this case, they used the Portal to rule out weather as a contributing factor.



Look on the Forecast Conditions tab and click on a station to view its forecasted fuel moisture values. Can use those 1, 10, 100, and 1000-hour FMs to fill in the fuel moisture profiles in FEPS.

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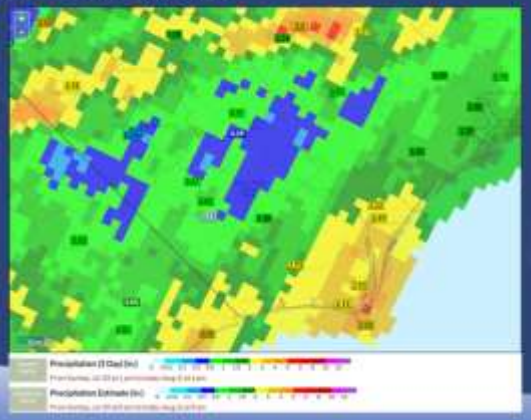
Portal Example Usage

- Routine daily monitoring of environmental moisture conditions



Because of the density of observations, the Portal is a good way to see how conditions look at a glance. NC Forest Service uses this to check for wet and dry spots around the state.

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Portal Limitations

- Lacking some forecast information and parameters
  - Vent rate, Burning Category, stability class, ADI, and LVORI from SCO WRF are in development
- Plan to add retrieval of gridded values on click
  - And meteograms for forecast data

Example Burning Category data calculated from SCO WRF model

To provide regional coverage of the smoke and fire products, we are developing them using our SCO WRF model data.

Basic information about Portal features and parameters is available from the main menu by clicking “About the Portal”.


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Upcoming Additions to the Portal
and Drought Resource Engagement
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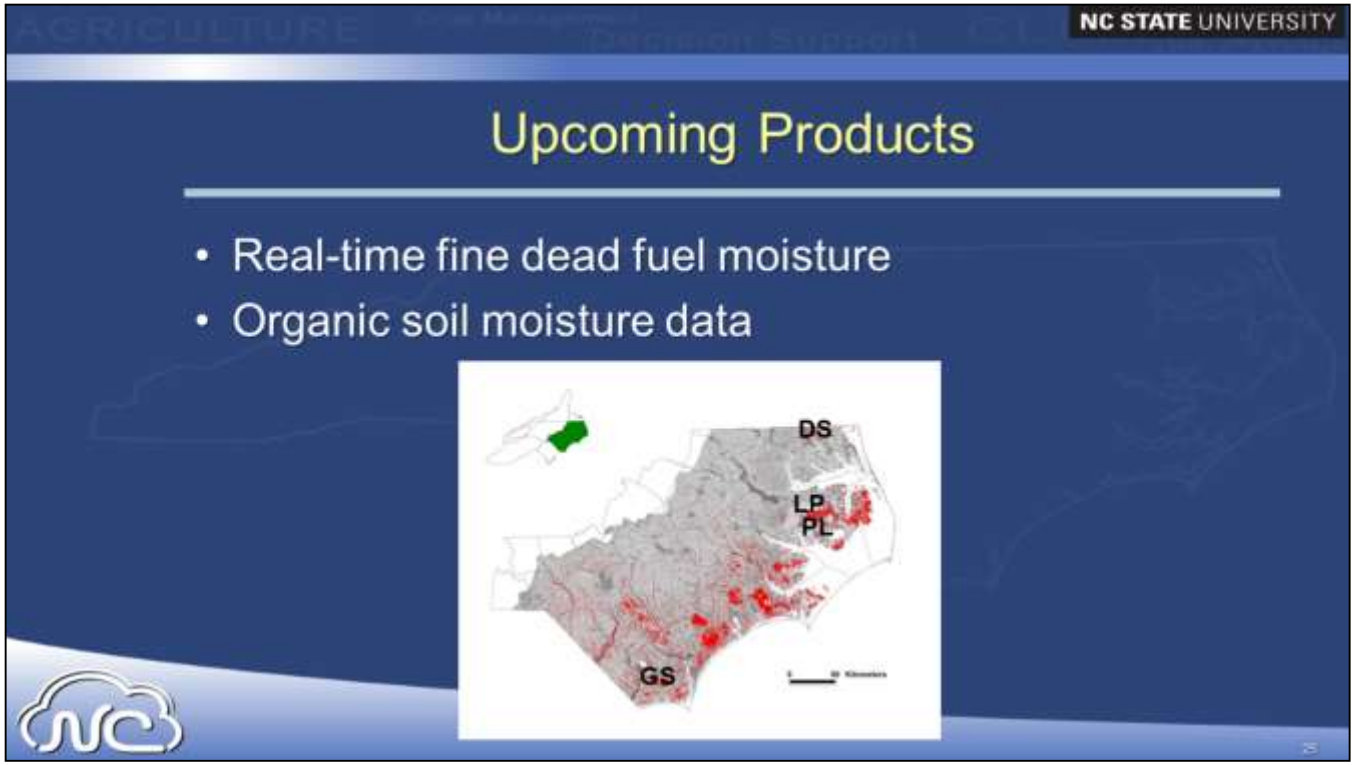
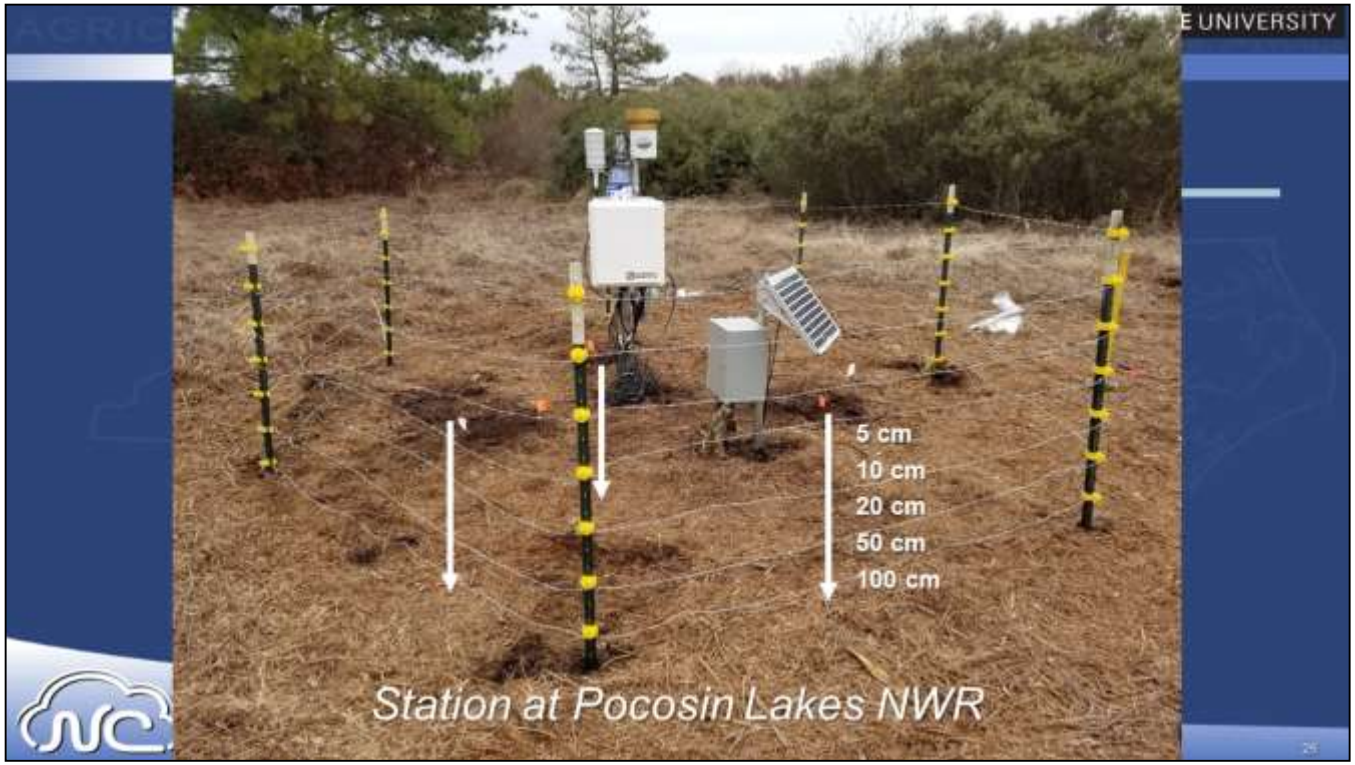
Recent additions have focused on drought/precipitation monitoring (US Drought Monitor boundaries, short-term forecasts from the Weather Prediction Center) and longer-range outlooks (temperature and precipitation outlooks from the Climate Prediction Center).



Since the 1-hour and 10-hour fuel moisture content shown in the Portal can be up to 24 hours old (from yesterday at 1 pm), users have requested a real-time fuel moisture content calculation. This is currently in development using Matt Jolly's FFMC research.

We are also deploying organic soil moisture monitoring stations in eastern NC. So far, two sites have been installed at Pocosin Lakes National Wildlife Refuge: one on a restored, wetter block and one in a drier block near Lake Phelps. Two other installations are planned for summer/fall 2018: at Green Swamp and Dismal Swamp.



At our organic soil moisture monitoring stations, the above-ground instrumentation includes a rain gauge and temperature/relative humidity sensors. Power is provided by a solar panel and a deep-cycle marine battery. We use a cellular antenna to communicate the data to our office once per hour.

Beneath the ground, we have 3 columns with 5 soil sensors in each at various depths. These sensors measure both soil moisture and soil temperature.

Using the Portal

- How often do you use the Portal?
- Which region(s) do you usually view?
- Which datasets do you view most frequently?
- Do you use the Portal by itself or alongside other products?
- Which external products do you look at for environmental monitoring?

Information Preferences

- How far in advance would you prefer to begin looking at forecast guidance?
  - 1-3 days? 1-2 weeks? Longer than that?
- How would you prefer to receive drought and fire risk information?
  - Actively from the Portal or other sites? Email or text message alerts for location(s) of interest? Social media?

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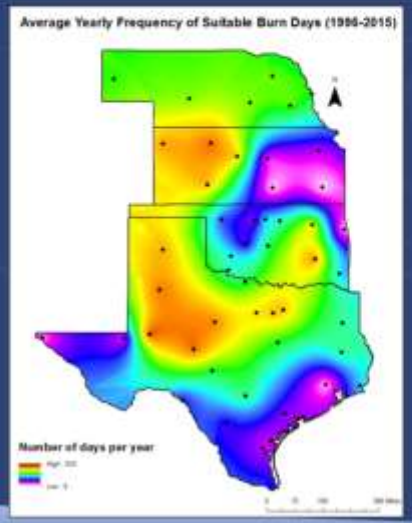
Other Questions & Discussion

- For prescribed burning purposes, is the Portal useful?
  - What would make it more useful?
- Would a prescribed burning climatology for NC be helpful?
- Other comments or ideas?



One of our staff members, Darrian Bertrand, worked on a prescribed burn day climatology for the Great Plains. We may do a similar analysis for North Carolina.

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Questions?

https://climate.ncsu.edu/fwip

Corey Davis

cndavis@ncsu.edu

919-513-1390