

Motivation

- Lack of studies on wildfires in the mid-Atlantic US
- High wildland-urban interface on east coast puts more people at risk when a wildfire occurs
- Climate change uncertainty in precipitation patterns

Objectives

- Find patterns in specific weather variables leading up to historic wildfire events
- Compare fire weather risk indices to see if fires were forecasted

Methods

- 28 naturally occurring fires that burned 50+ acres (Short, 2022), ranging from 80 to 6574 acres (mean size = 1048 acres)
- Mid-Atlantic states: NY, PA, NJ, MD, VA, WV (Fig. 1)
- Variables analyzed: Max/min/mean temperature, mean dewpoint, precipitation, and max/min vapor pressure deficit (PRISM Climate Group, Oregon State University, accessed 2023)
- Relative humidity calculated with max temperature and mean dewpoint (Lawrence, 2005)
- Time series to show conditions in the year preceding each fire (Fig. 2 and 3)
- Student's t-test to compare means of the measured versus 30-year normals
- Examined the Storm Prediction Center's (SPC) fire forecast criteria and NOAA archives to see if fire risk was forecasted for the day of the fire (SPC Product & Report Archives)

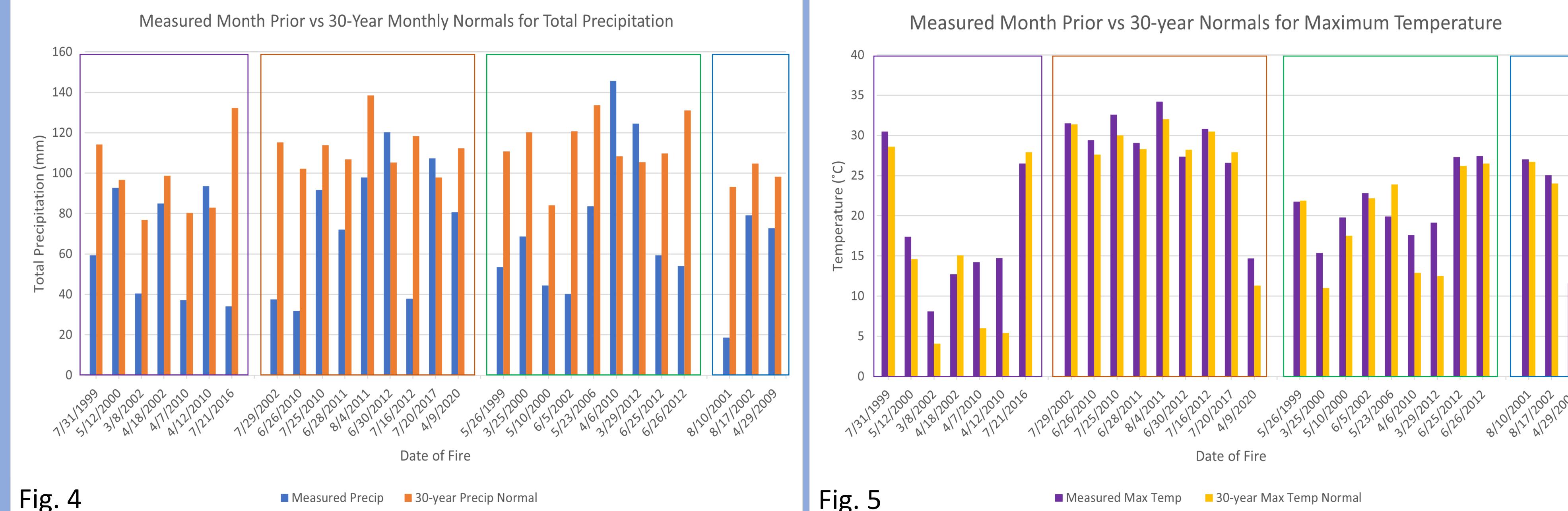
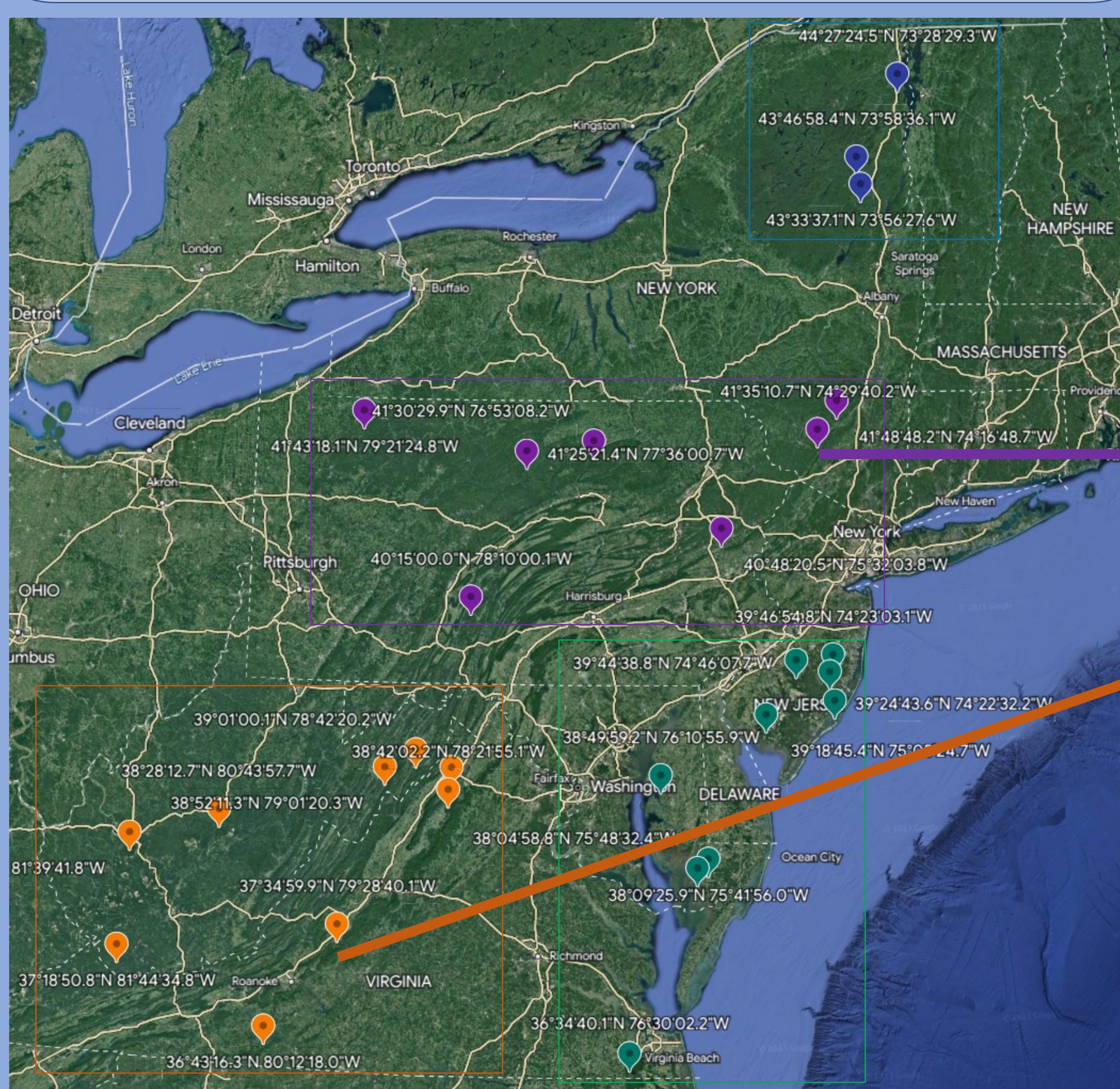


Fig. 4

Fig. 5

Results

Weather Variables:

- Precipitation one and two months prior to the fire was the only variable with a clear departure from the expected totals from the 30-year normal
- Figure 4 shows the general precipitation deficit for the month leading up to the fire compared to the 30-year normal precipitation total for that same month
- Student's t-test P value was below 0.05 for one and two months prior total precipitation
- All other variables had a P value above 0.05
- Figure 5 shows the graph of measured max temperature versus the 30-year max temperature normal for that month, differences are harder to see compared to the precipitation graph

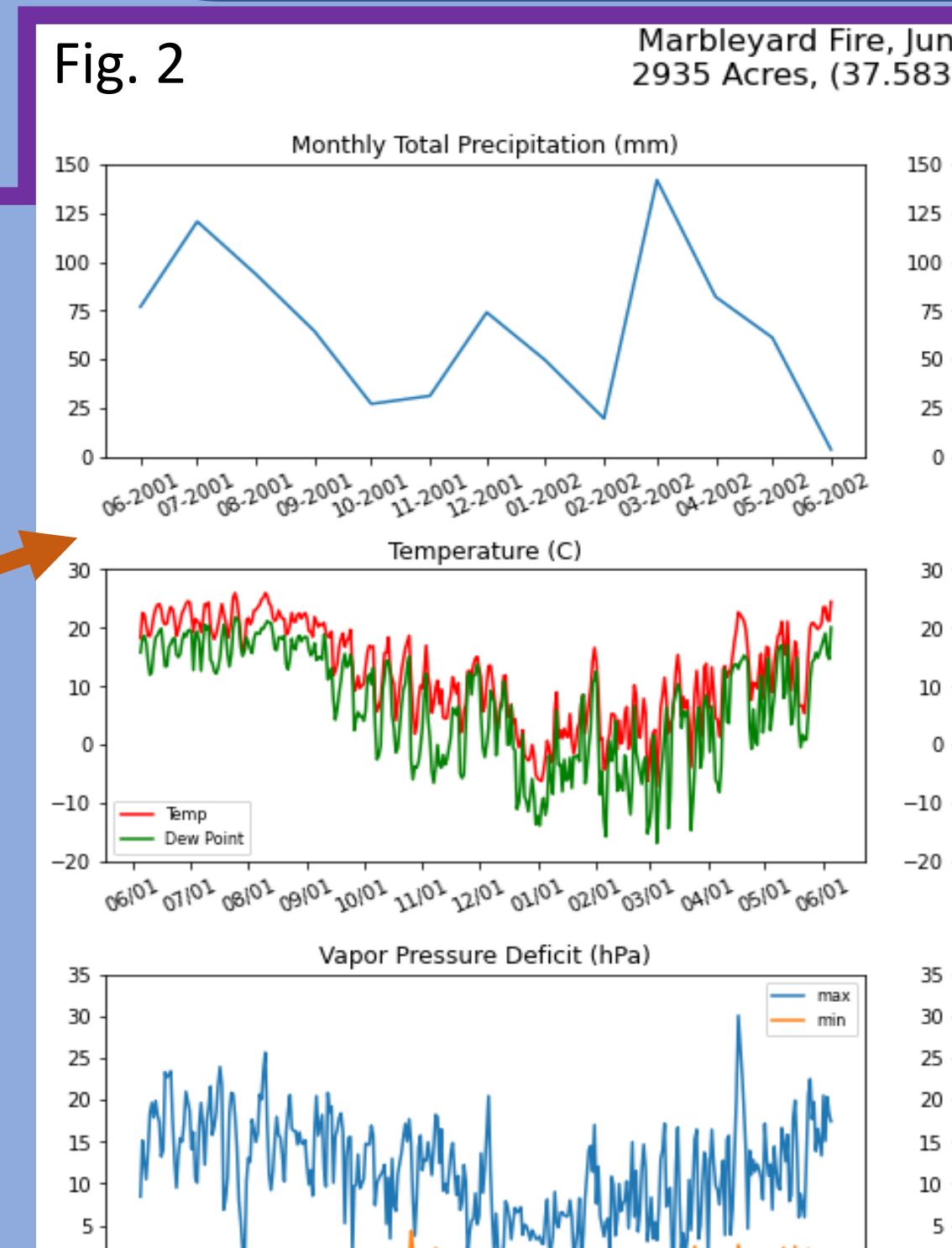
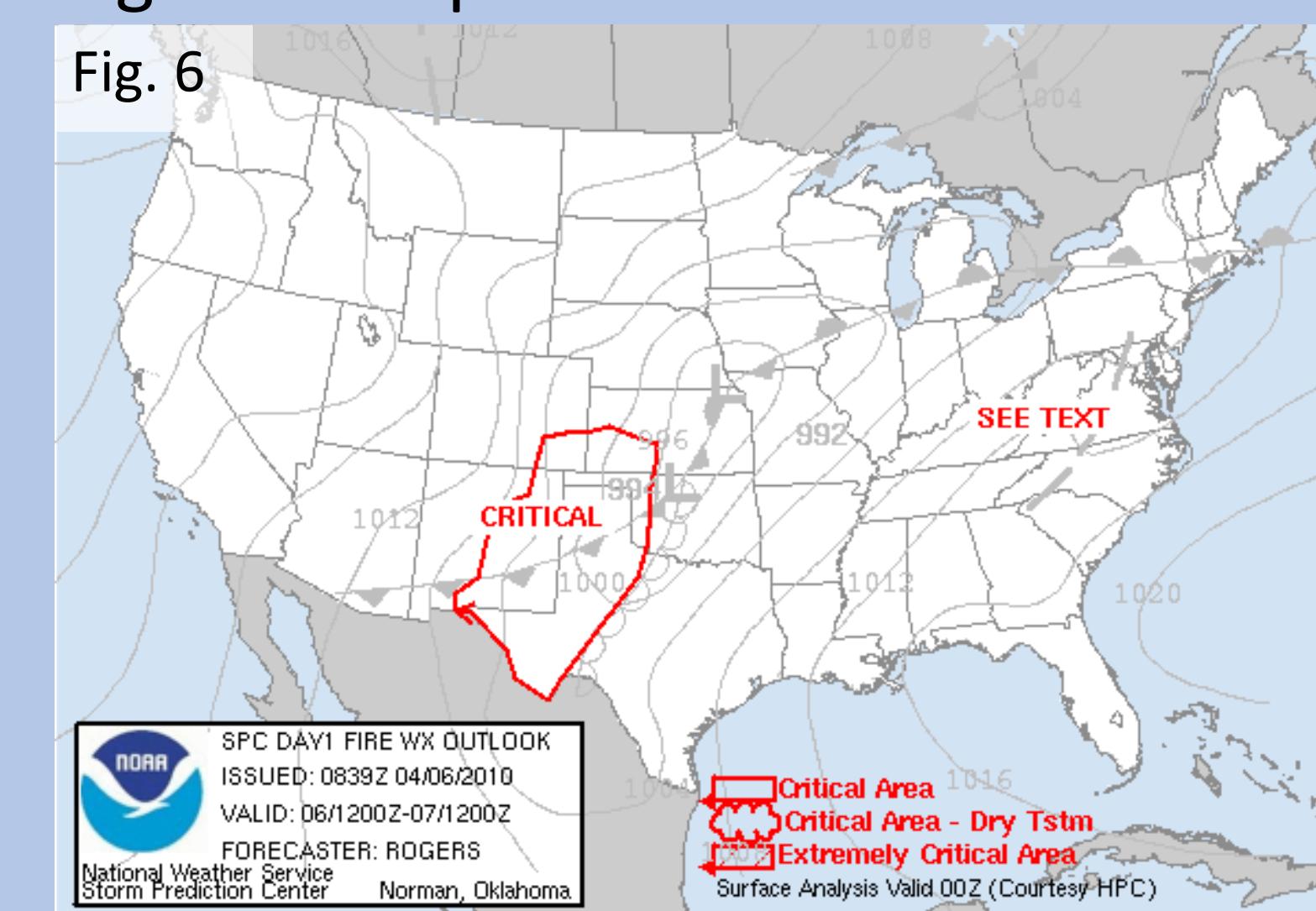


Fig. 2

Fig. 3

Fire Weather Forecasting:

- Archive for SPC fire forecasting started June 4th, 2002
- Eight of our fires occurred before this date, so only 20 fires were looked at with this database
- Forecasting includes circled areas of concern, with a synopsis below the product that summarizes the conditions that day
- Four fires had a "SEE TEXT" as seen in figure 6, where potential concern for fire weather was discussed but was not serious enough for an official warning such as the circled "critical" area over parts of Texas and New Mexico
- Two fires had something mentioned in the synopsis underneath the image, but no "SEE TEXT" on the map
- The other 14 fires had no warning or mention in the synopsis



- Future work should include:
 1. A larger sample of fires; human and naturally caused
 2. Using the SPC fire forecast criteria to see if the conditions listed were met by the actual fire
 3. Expanding the study to look at more fire risk indices to provide insight into which are most reliable for the east coast, leading to potentially developing our own, east coast specific fire forecasting criteria

Climate Change Uncertainties:

- Existing climate models suggest more precipitation in the winter, spring, and summer, and less in the fall for the east coast (Liu et al., 2013)
- Based on historical fire-precipitation patterns for this region, more research is needed to understand how projected periods of low precipitation could impact wildfire risk

References



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