

Ohio Wesleyan University

Digital Commons @ OWU

---

Student Symposium

2023

---

Apr 20th, 5:10 PM - 6:00 PM

## Monitoring Air Quality Post-Environmental Disasters Using Remote Sensing

Abigail Kline

*Ohio Wesleyan University*

Follow this and additional works at: <https://digitalcommons.owu.edu/studentsymposium>



Part of the [Environmental Sciences Commons](#)

---

Kline, Abigail, "Monitoring Air Quality Post-Environmental Disasters Using Remote Sensing" (2023).  
*Student Symposium*. 1.

[https://digitalcommons.owu.edu/studentsymposium/2023/poster\\_session\\_2/1](https://digitalcommons.owu.edu/studentsymposium/2023/poster_session_2/1)

This Poster is brought to you for free and open access by the Student Scholarship at Digital Commons @ OWU. It has been accepted for inclusion in Student Symposium by an authorized administrator of Digital Commons @ OWU. For more information, please contact [sbchaney@owu.edu](mailto:sbchaney@owu.edu).



# Monitoring Air Quality Post-Environmental Disasters Using Remote Sensing

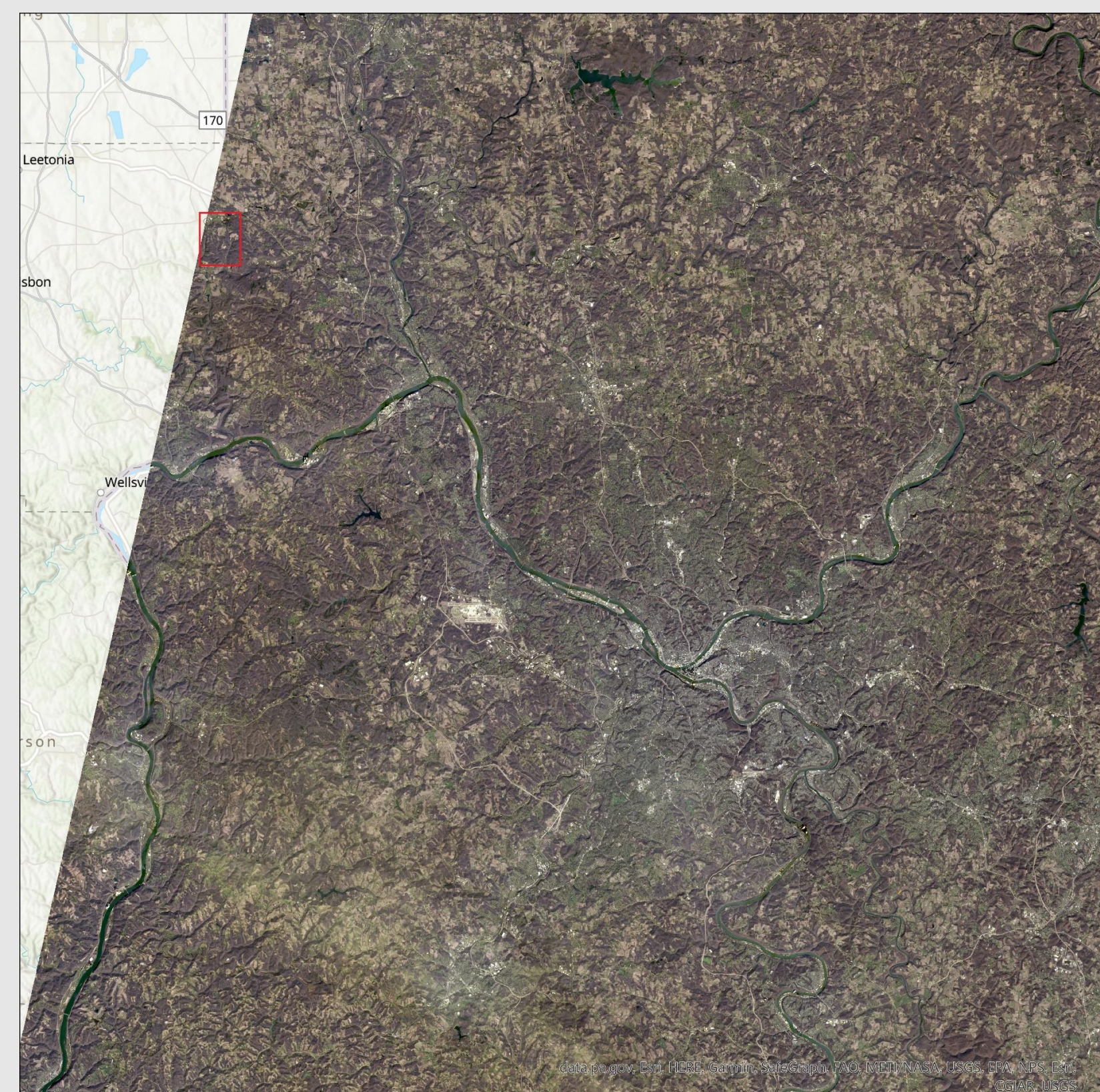
Abigail Kline advised by Dr. John Krygier

Ohio Wesleyan University Department of Environment and Sustainability

## Abstract

- The East Palestine, Ohio train derailment and subsequent chemical release caused vinyl chloride and particulate matter to be released into air and waterways
- Air pollution is a major environmental and health hazard, and GIS/ remote sensing may be a viable method to monitor
- Landsat satellites allow readily available satellite data from before, closely after, and longer after the event to be freely accessed
- Monitoring for discrepancies between days may allow us to begin to monitor air pollution in this way

## Area of Interest



## True Color Composite

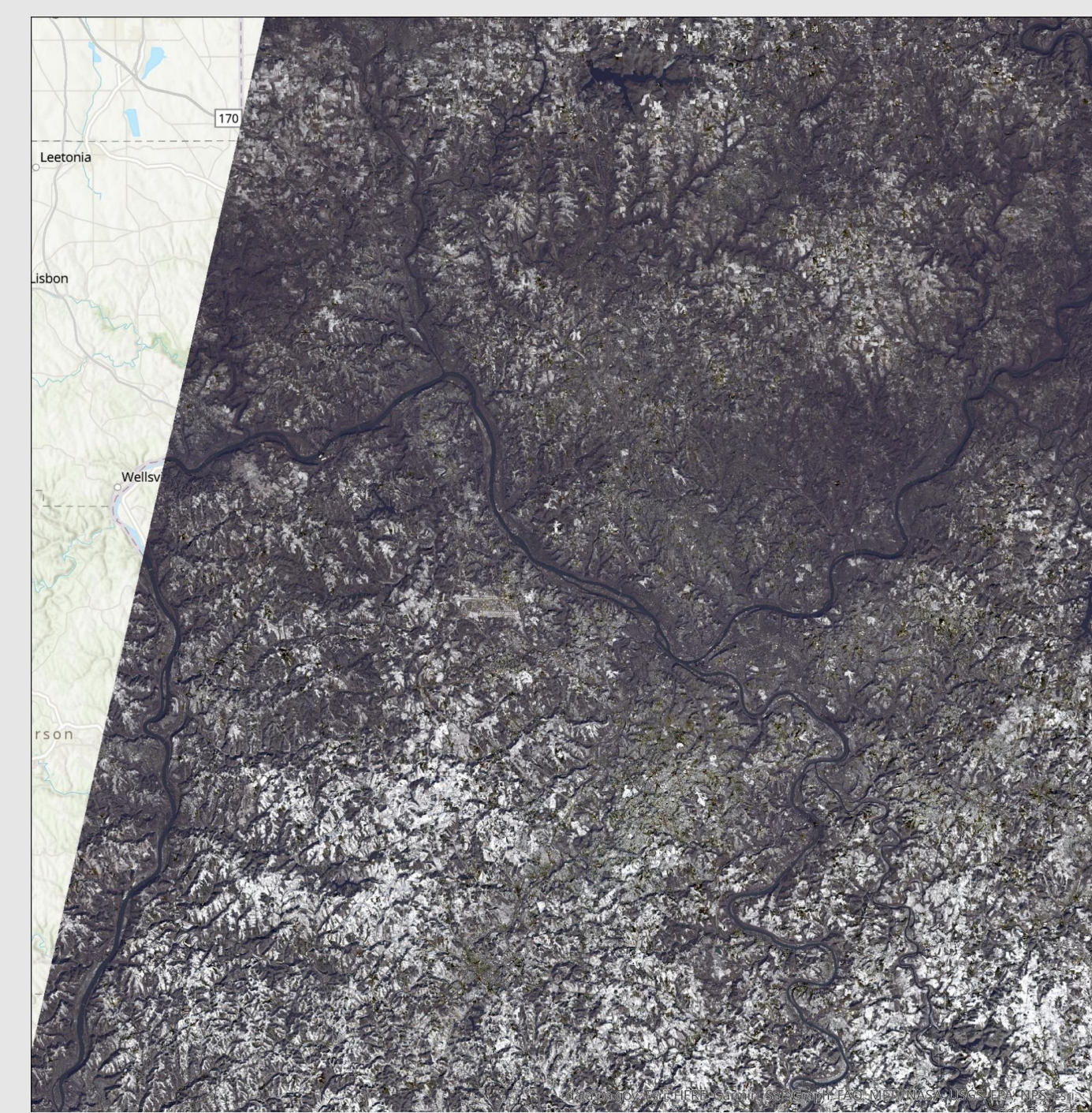


Figure 1: True color for 02/02/2023

## Band 1 TOA Reflectance

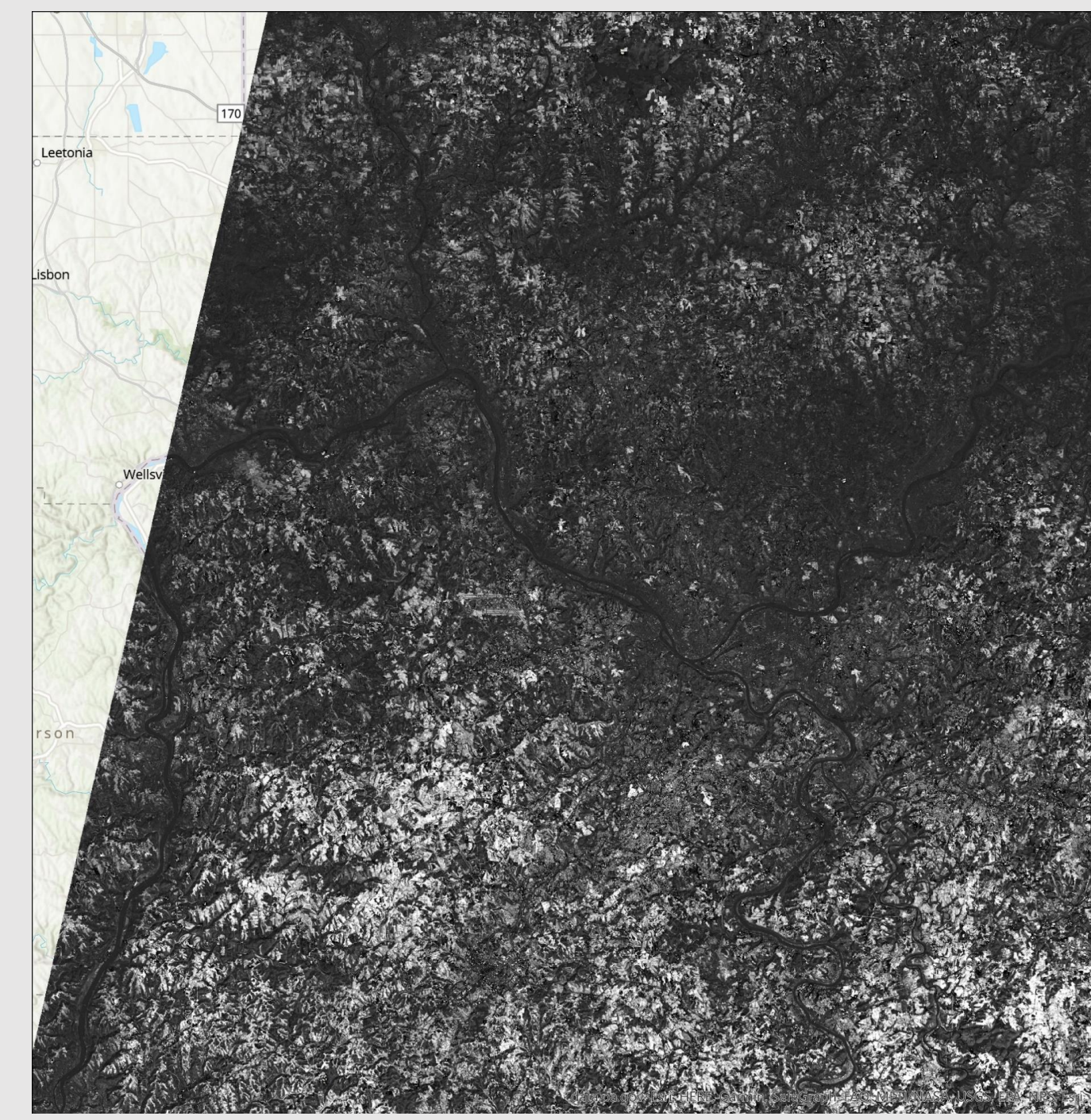


Figure 2: Band 1 reflectance on 02/02/2023

## Bands 1 and 8 Composite

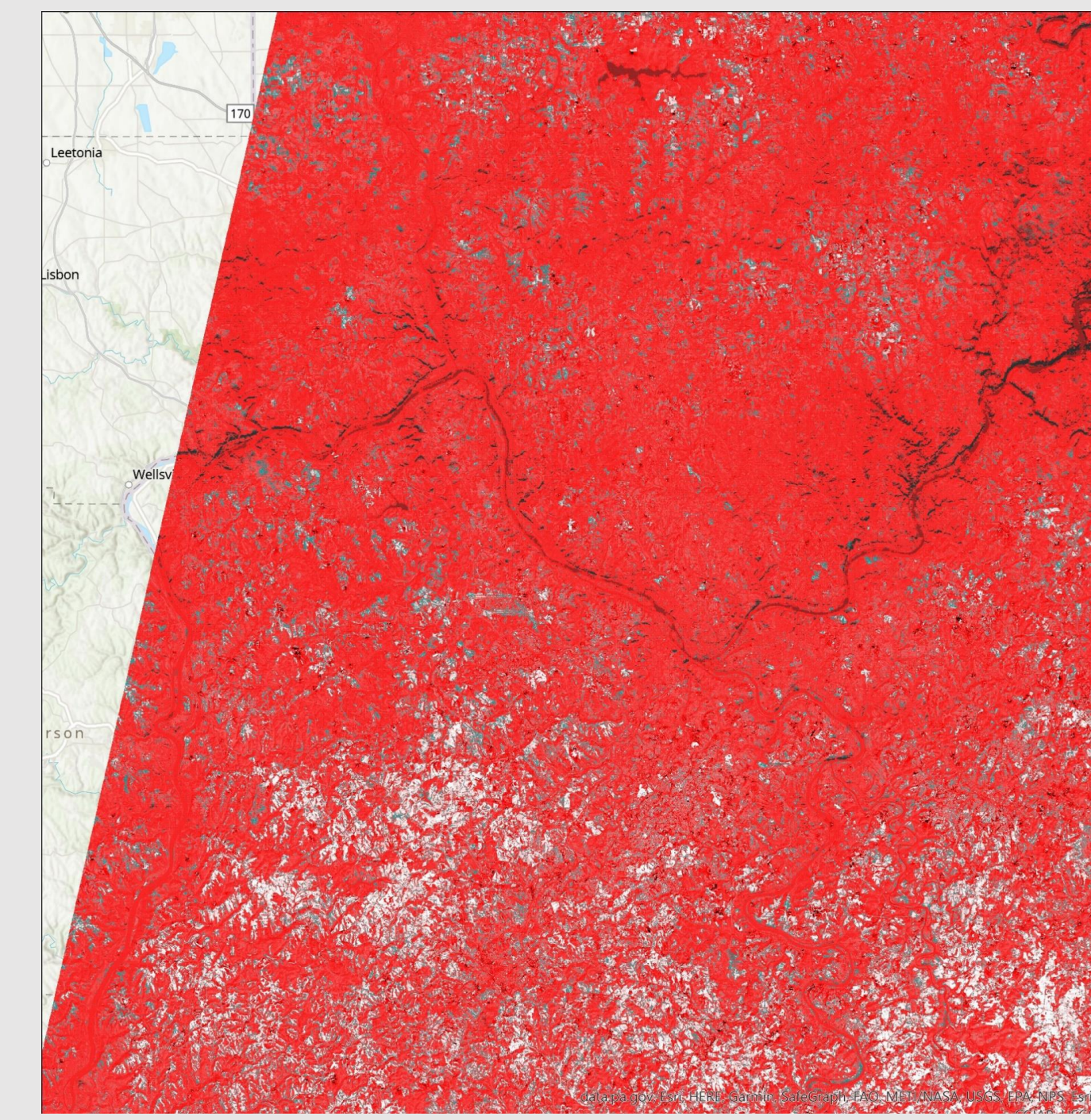


Figure 3: Bands 1 and 8 composite raster on 02/02/2023

## Iso Cluster Unsupervised Classification

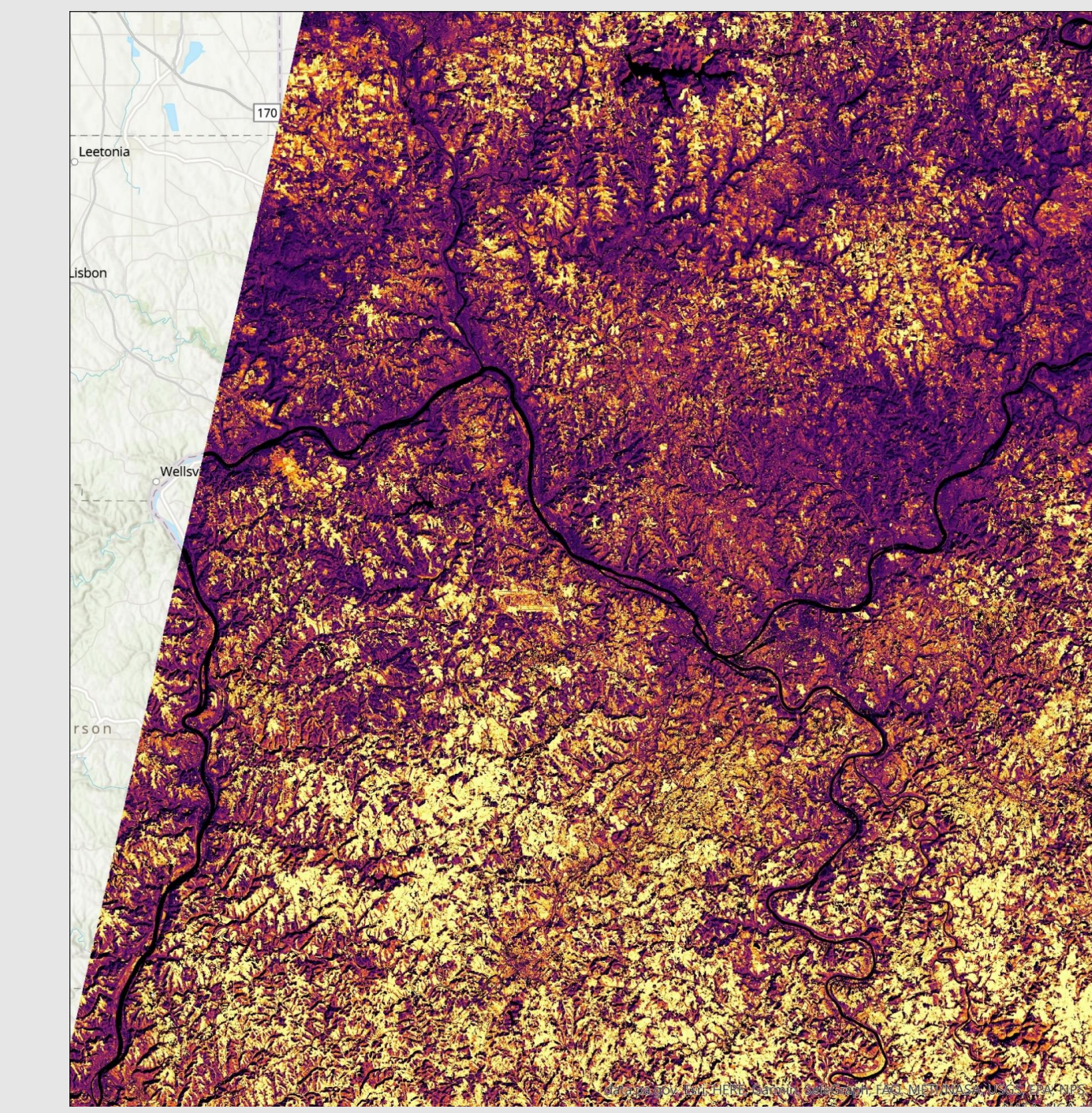


Figure 4: Iso Cluster Unsupervised Classification on 02/02/2023

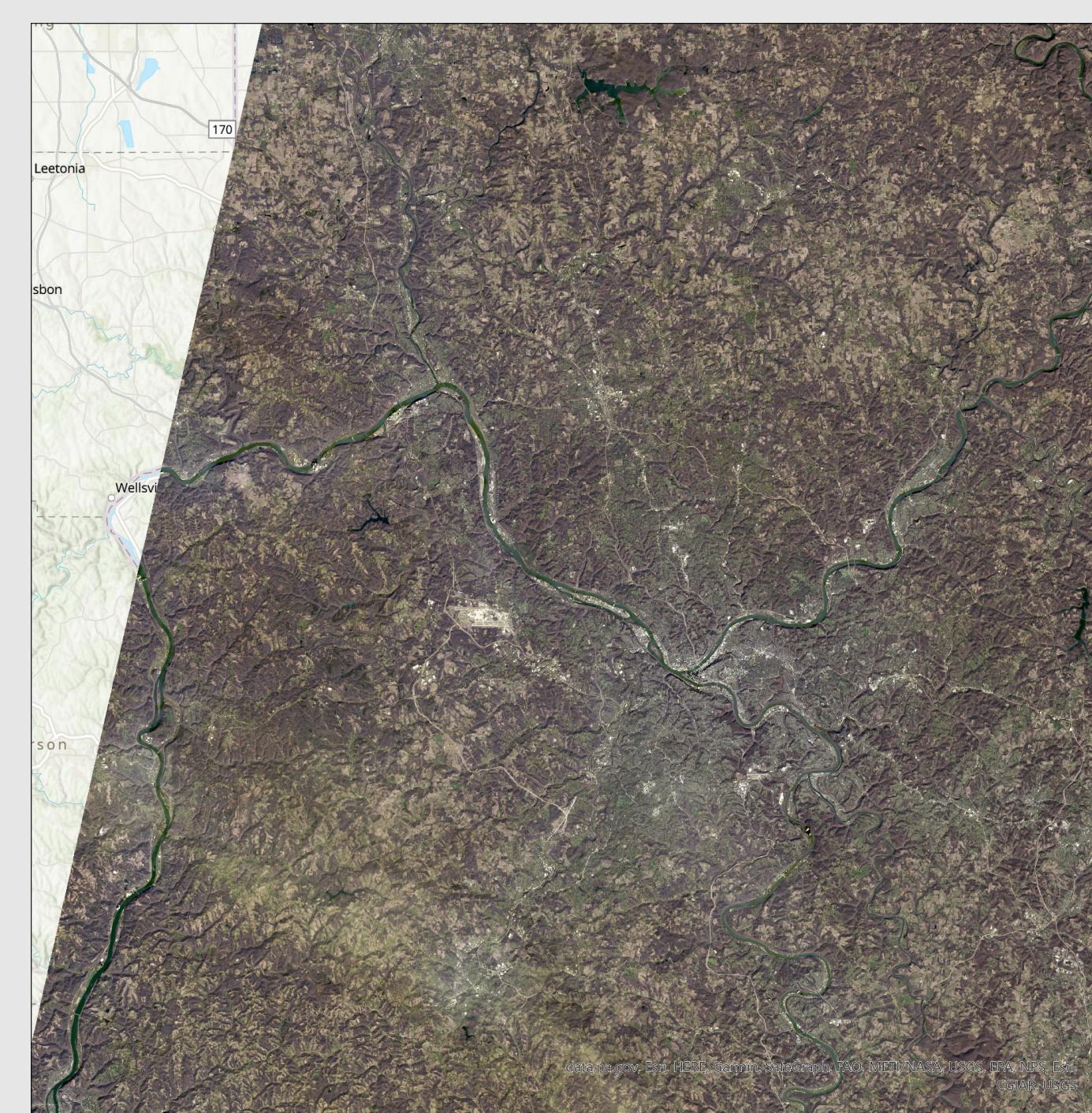
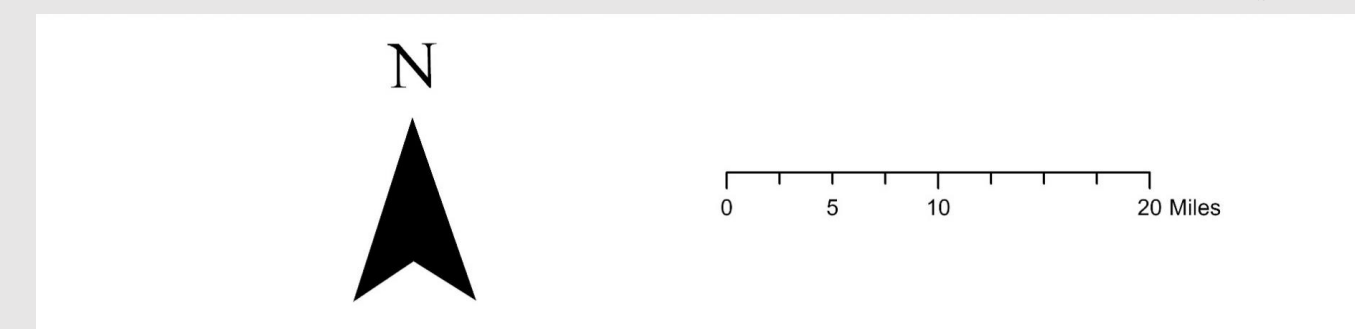


Figure 5: True color for 02/18/2023

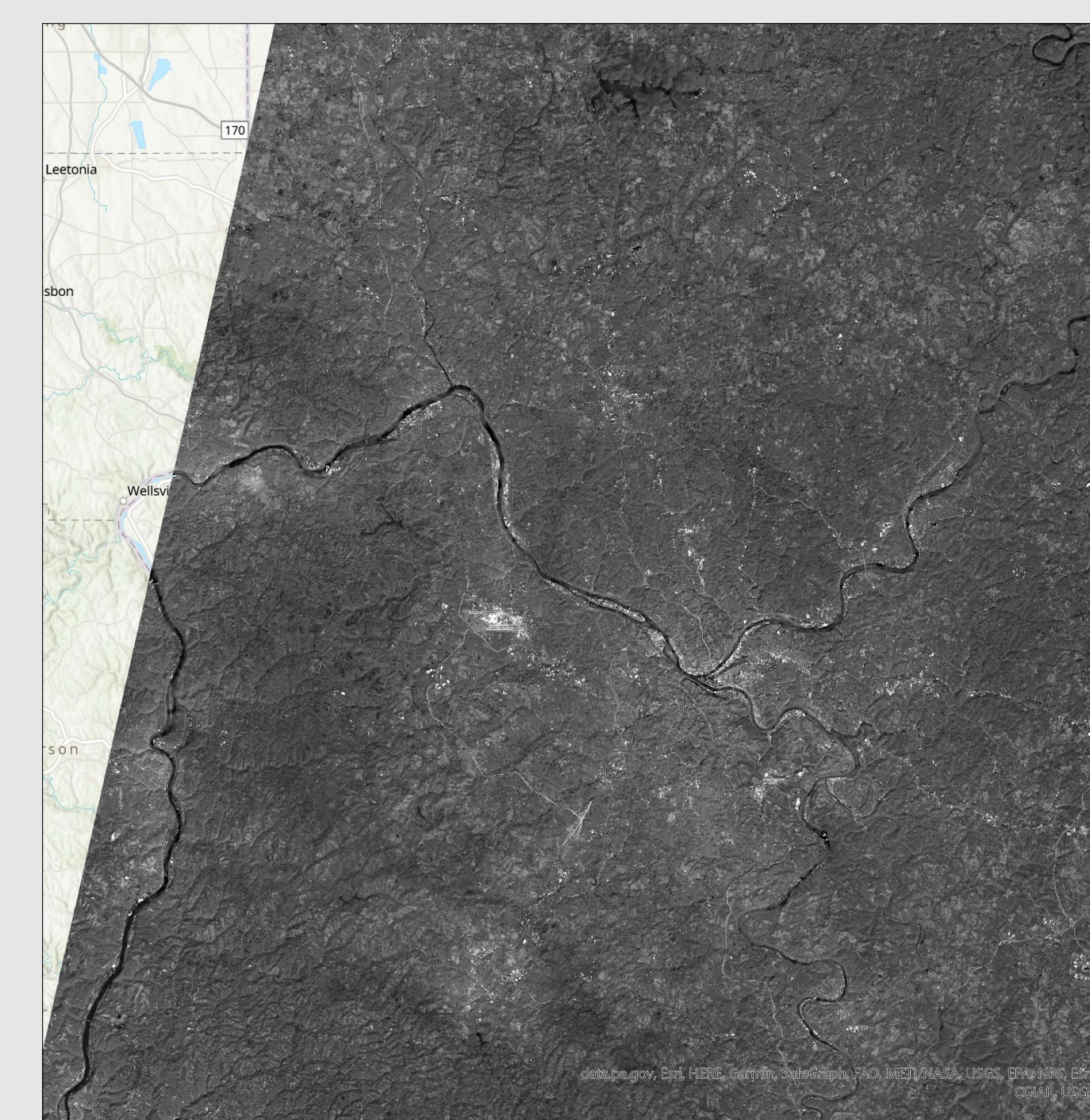


Figure 6: Band 1 reflectance on 02/18/2023

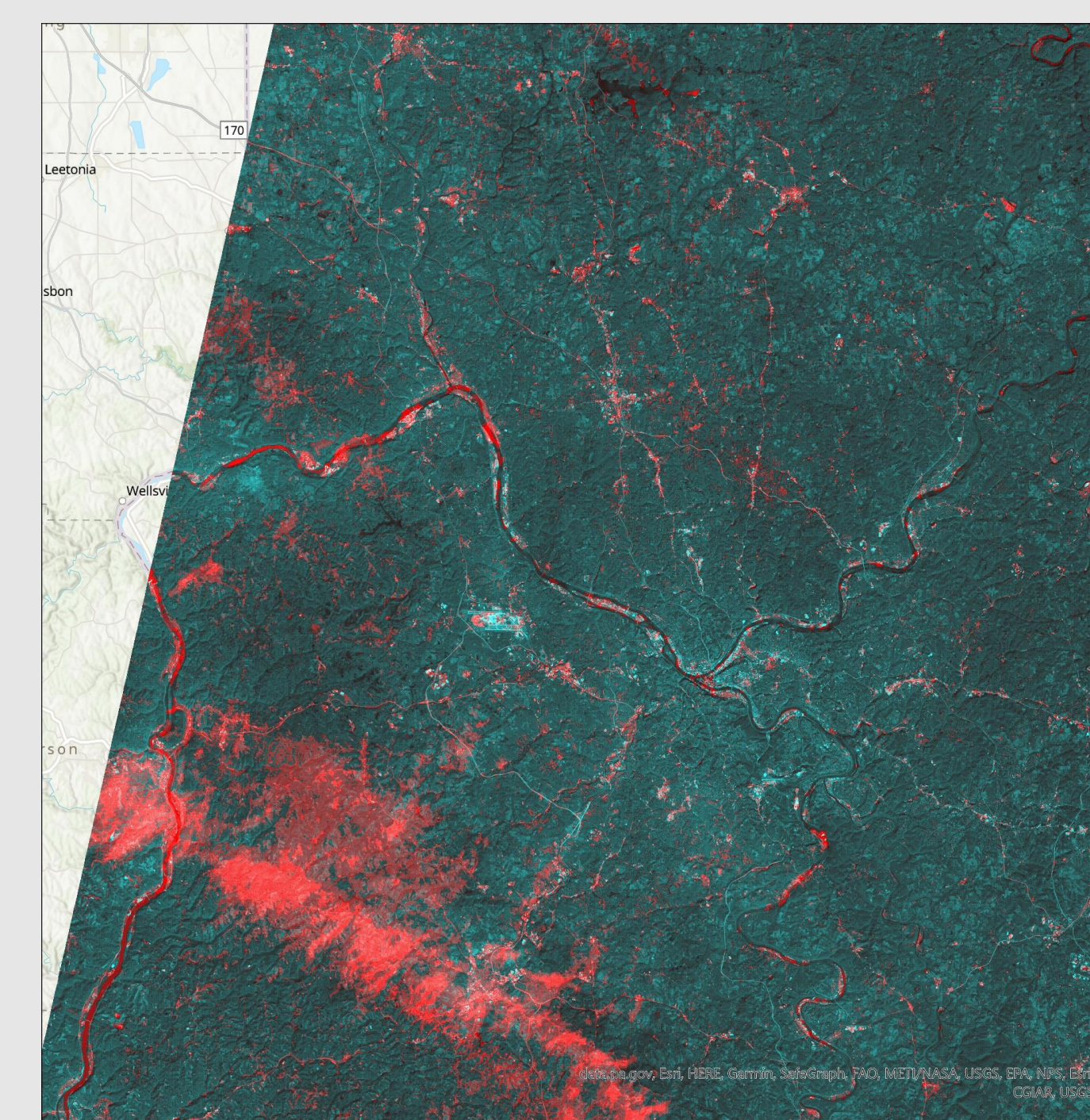


Figure 7: Bands 1 and 8 composite raster on 02/18/2023

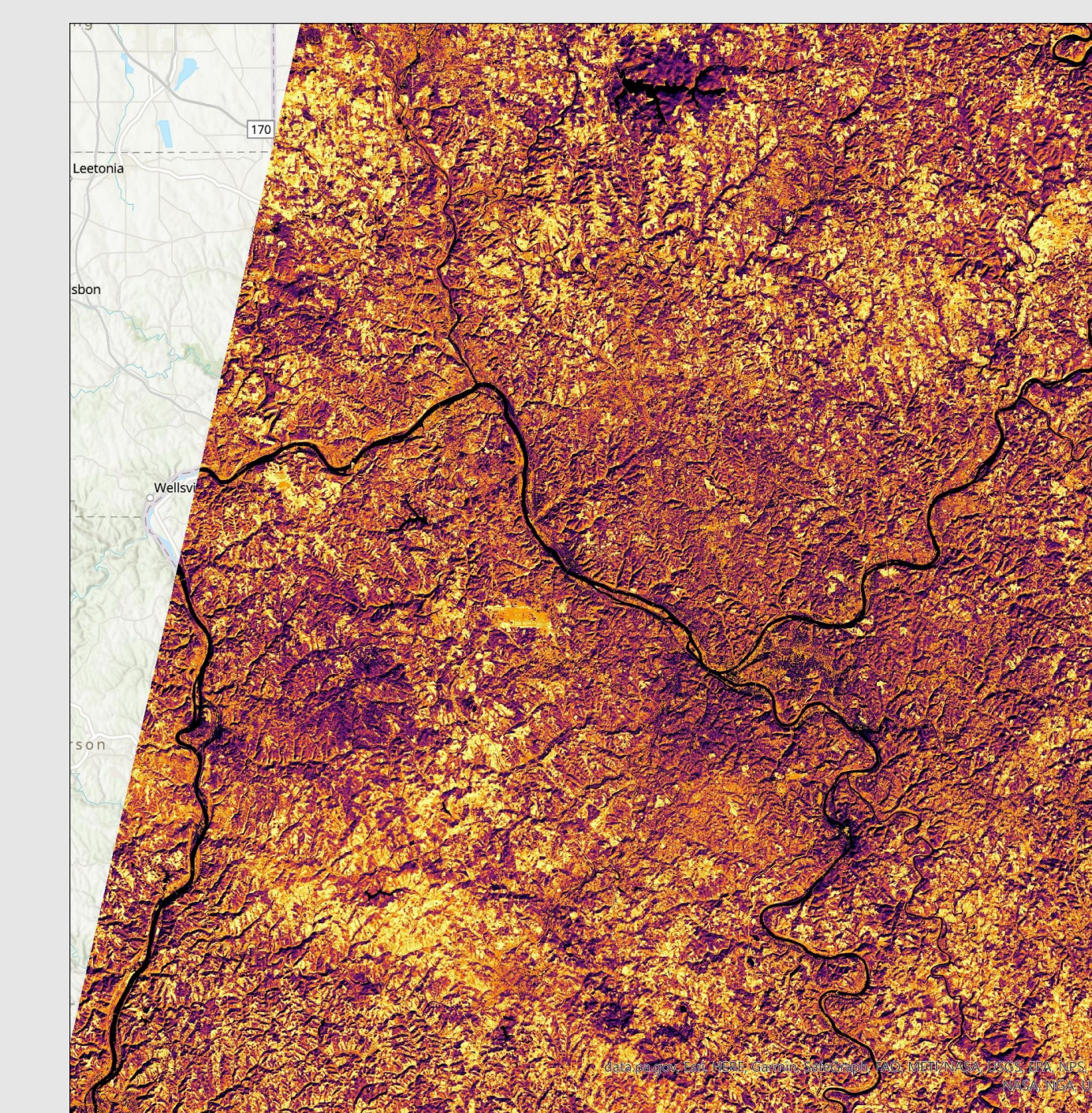


Figure 8: Iso Cluster Unsupervised Classification on 02/18/2023

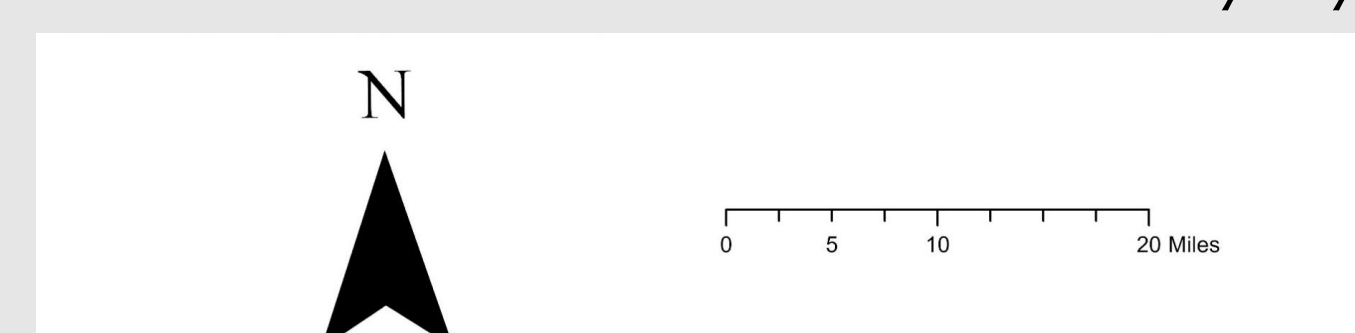


Figure 9: True color for 03/30/2023

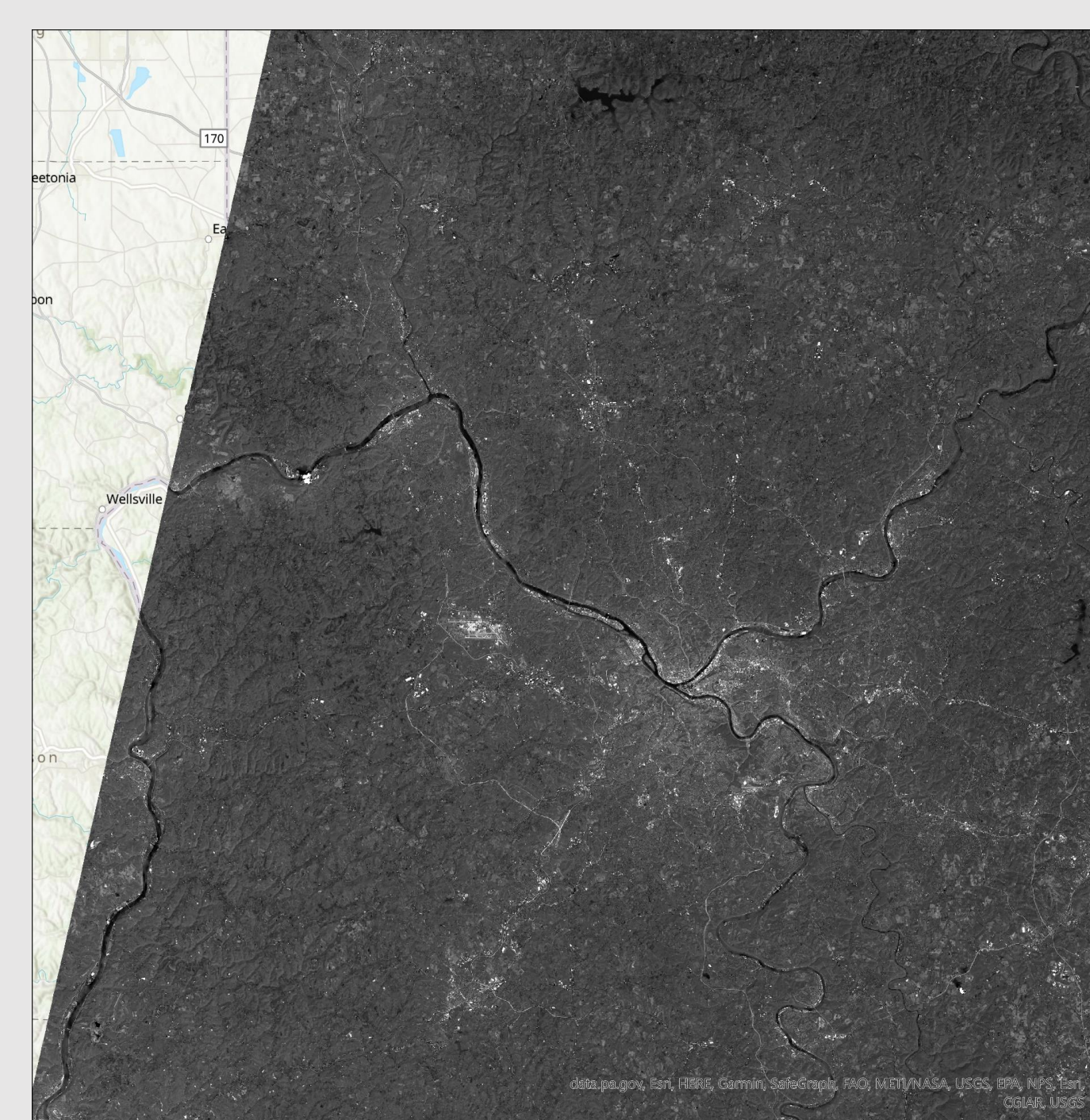


Figure 10: Band 1 reflectance on 03/30/2023

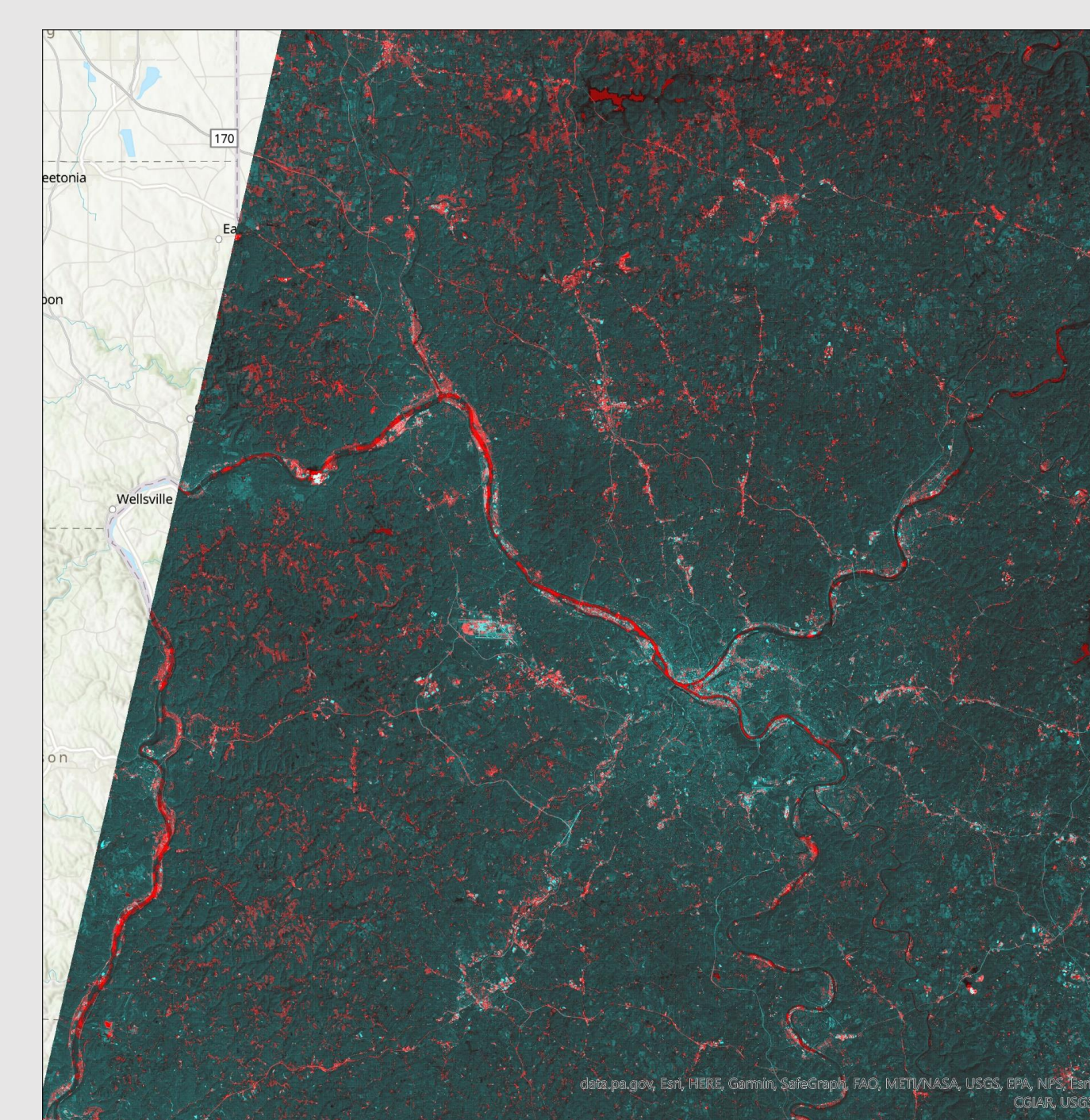


Figure 7: Bands 1 and 8 composite raster on 03/30/2023

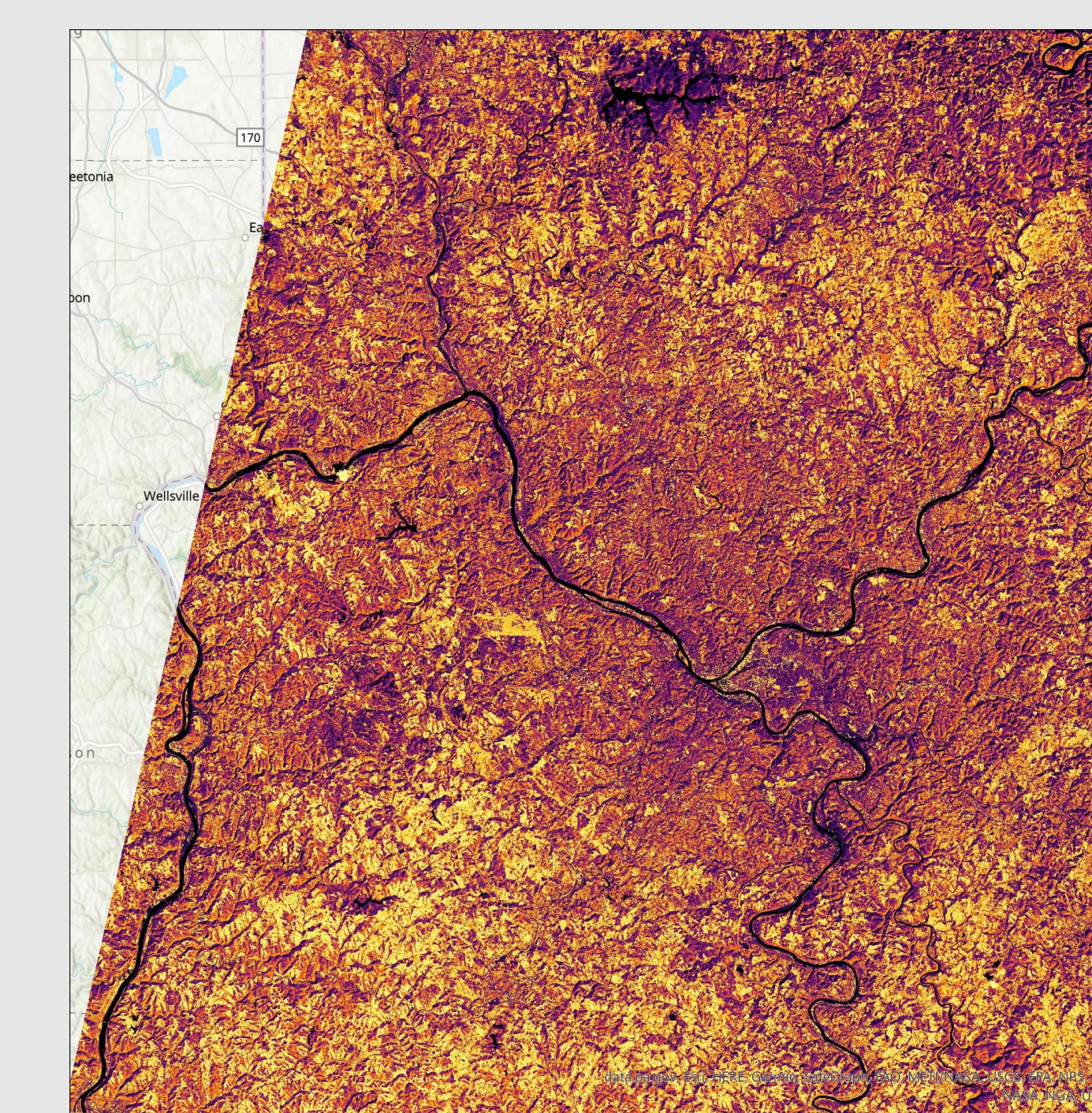
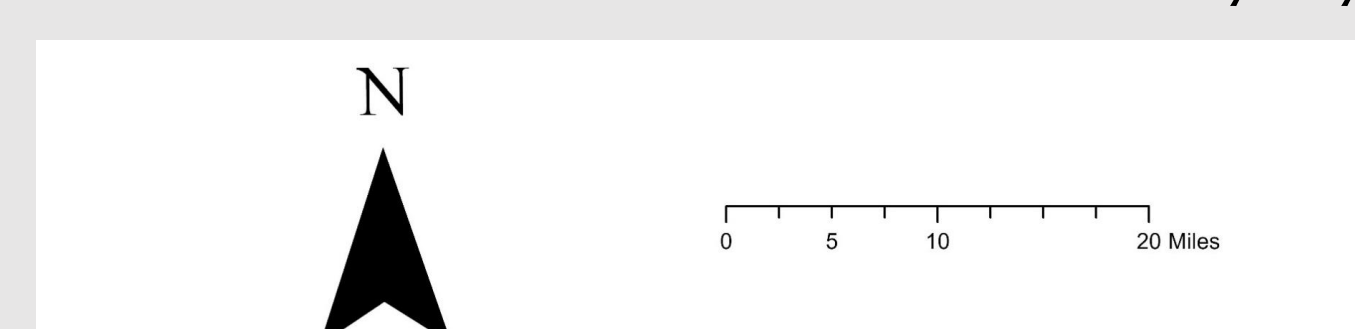


Figure 12: Iso Cluster Unsupervised Classification on 03/30/2023



## Limitations

- **Multispectral vs. Hyperspectral Scanners-** Landsat is a multispectral scanner, meaning that it is less specific
- **Air pollution data-** need a baseline to know for sure if data represents pollution

## Conclusions/ Further Work

Remote sensing may work as an alternative method to monitor air pollution, however more work is required to assess the reliability of this method. The data shows that an anomaly occurs downwind of the East Palestine area. However, without data to prove that the anomaly is caused by air pollution due to the East Palestine disaster, it cannot be concluded that this is air pollution from the event. Additionally, the use of a hyperspectral scanner, which can better specify what wavelengths are being recorded by the sensor, is a viable starting place for more research, to see if the data anomaly can be specified to a wavelength that matches that of the air pollution type.

## References

- Saraswat, I., Mishra, R., & Kumar, A. (2017). Estimation of PM10 concentration from Landsat 8 OLI satellite imagery over Delhi, India. *Remote Sensing Applications: Society and Environment*, 8, 251–257. <https://doi.org/10.1016/j.rsase.2017.10.006>
- Survey, U.-. U. G. (n.d.). EarthExplorer. None. <https://earthexplorer.usgs.gov/>

## Methods

- Create multiple rasters using provided data to look for discrepancies between time frames
- **True Color-** colorized location/ date
- **Atmosphere Reflectance-** ratio of radiation reflected to incident solar radiation  
 $p' = Mp * Q_{cal} + A_p$
- **Composite of Bands 1 and 8-** Band 1 Visible Coastal Aerosol (0.43 - 0.45  $\mu\text{m}$ ) 30-m; Band 8 Panchromatic (PAN) (0.50 - 0.68  $\mu\text{m}$ ) 15-m
- **Iso Cluster Unsupervised Classification-** Uses all bands and groups pixels by type