

## Wildfire Smoke Spectra and Long Distance Atmospheric Transport

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Two spectrometers were used to measure wildfire smoke during the 2021 wildfire season in the Western United States. One spectrometer has a resolution of 0.5 nm and the other is an inexpensive spectrometer with a resolution of 15 nm. Measurements were compared with ground level PurpleAir monitors, ground level Utah Division of Air Quality measurement stations, and NOAA vertically integrated smoke transport maps for a 1-hour prediction. These were also compared to human visual detection as well.

The spectrometers were pointed in three directions: directly at the Sun, about  $5^\circ$  off from the Sun, and about  $20^\circ$  off from the Sun at “blue sky.” The Sun and/or background sky was the light source used to measure atmospheric absorption spectra of the air column. We clearly detected a signal that is dependent on smoke concentration. The general trend is for less blue-green light in the spectra and more orange-red exactly as one might expect. Surprisingly we were able to detect a signal even on days when you could not visually see evidence of smoke.

We are still analyzing fine detail in the spectra to see if there is any signal being detected by the high resolution spectrometer that is being missed by the low resolution instrument. Some preliminary tests have been completed using controlled burns. Future plans include drone measurements in situ while collecting the spectra of the controlled burns at varying distances. Some preliminary efforts on that will be reported here as well.