Potassium Emission Lines as Tool for Remote Sensing of Biomass Burning

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Fires and biomass burning are important contributors to atmospheric pollution with the quantity and type of pollutants emitted depending strongly on the fire phase (flaming or smoldering) [1]. The spectrum of burning biomass contains prominent potassium emission lines at 767 nm and 770 nm. These emission lines are only produced during flaming combustion potentially allowing highly accurate characterization of fire phase. Additionally, since the potassium emission lines are in the near-infrared region of the electromagnetic spectrum, they can be detected with low-cost silicon sensors instead of the more expensive thermal sensors typically used for fire detection [2]. Previous studies have attempted to use potassium emission lines for fire detection with hyperspectral instruments but have had mixed results due to the relatively low spectral resolution (~10nm) of the instruments used [2-5].

In this poster presentation, we show that potassium emission lines are detectible in wildfire spectra under low-light conditions using the TROPOMI instrument and during the day using the OCO-2 instrument. Additionally, we show that the potassium emission lines can be isolated from the background solar and atmospheric spectra using principal component analysis (PCA), and that the emission lines correlate well with fire radiative power (FRP).

Preferred mode of presentation: Poster

References

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