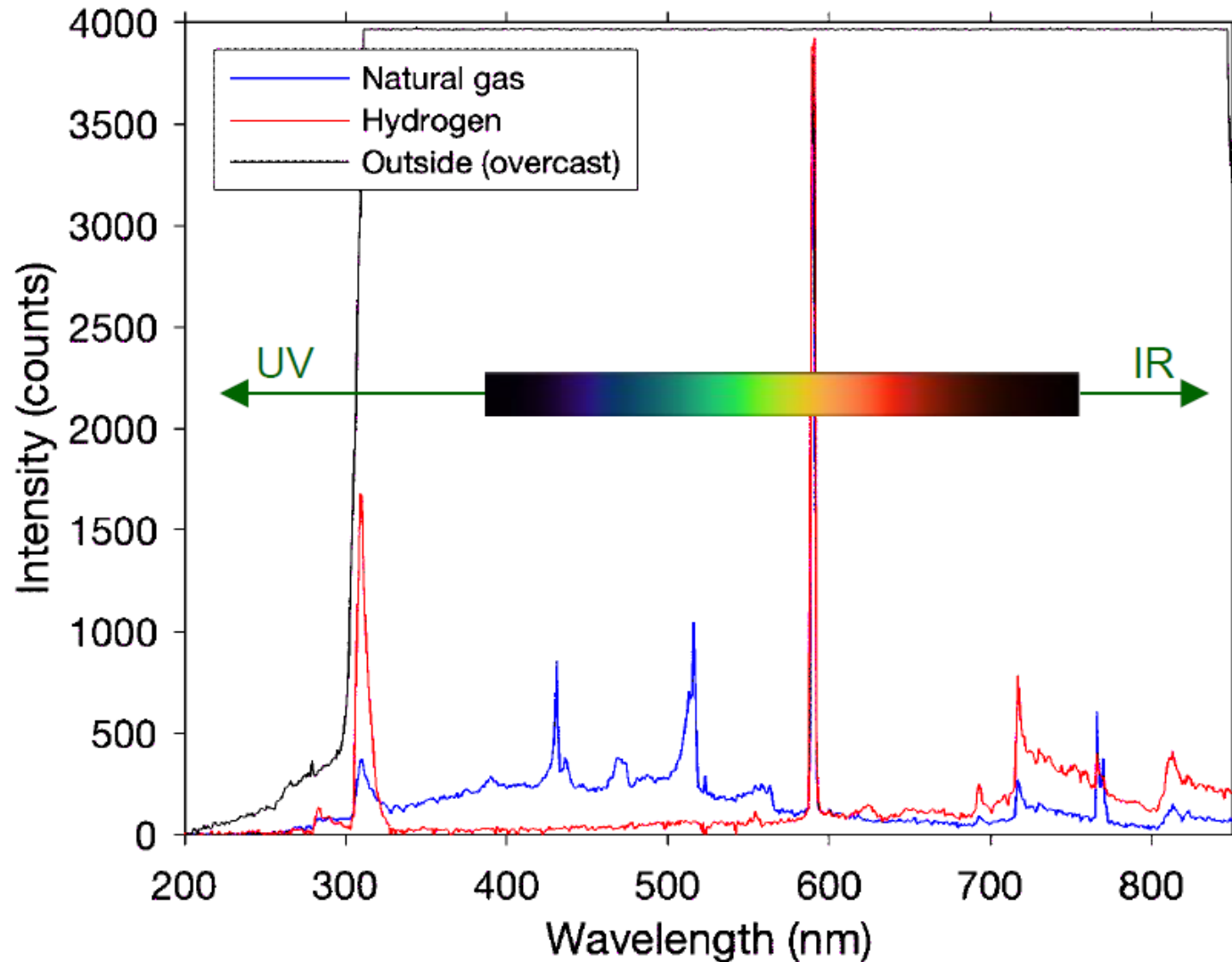


Hydrogen flame visibility

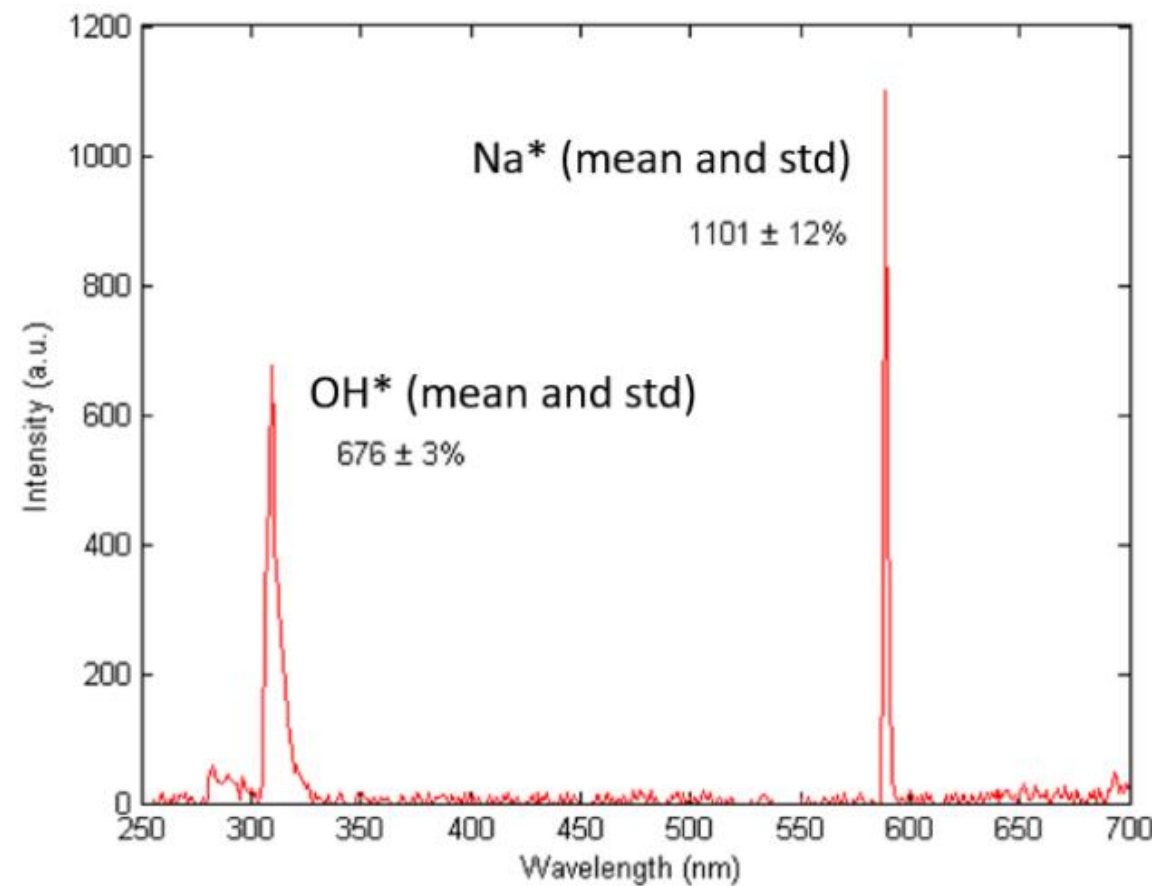
Future Fuels CRC RP1.4-10

Spectra



Approx. λ (nm)	Origin
310 (and 285)	OH*
430	CH*
515	C ₂ Swan bands
589	Na
Visible continuum (400-700)	Soot and/or CO ₂ *
IR continuum (>700)	H ₂ O* (with some CO ₂ * peaks)

Spectra



Coflow



No coflow



1SLPM

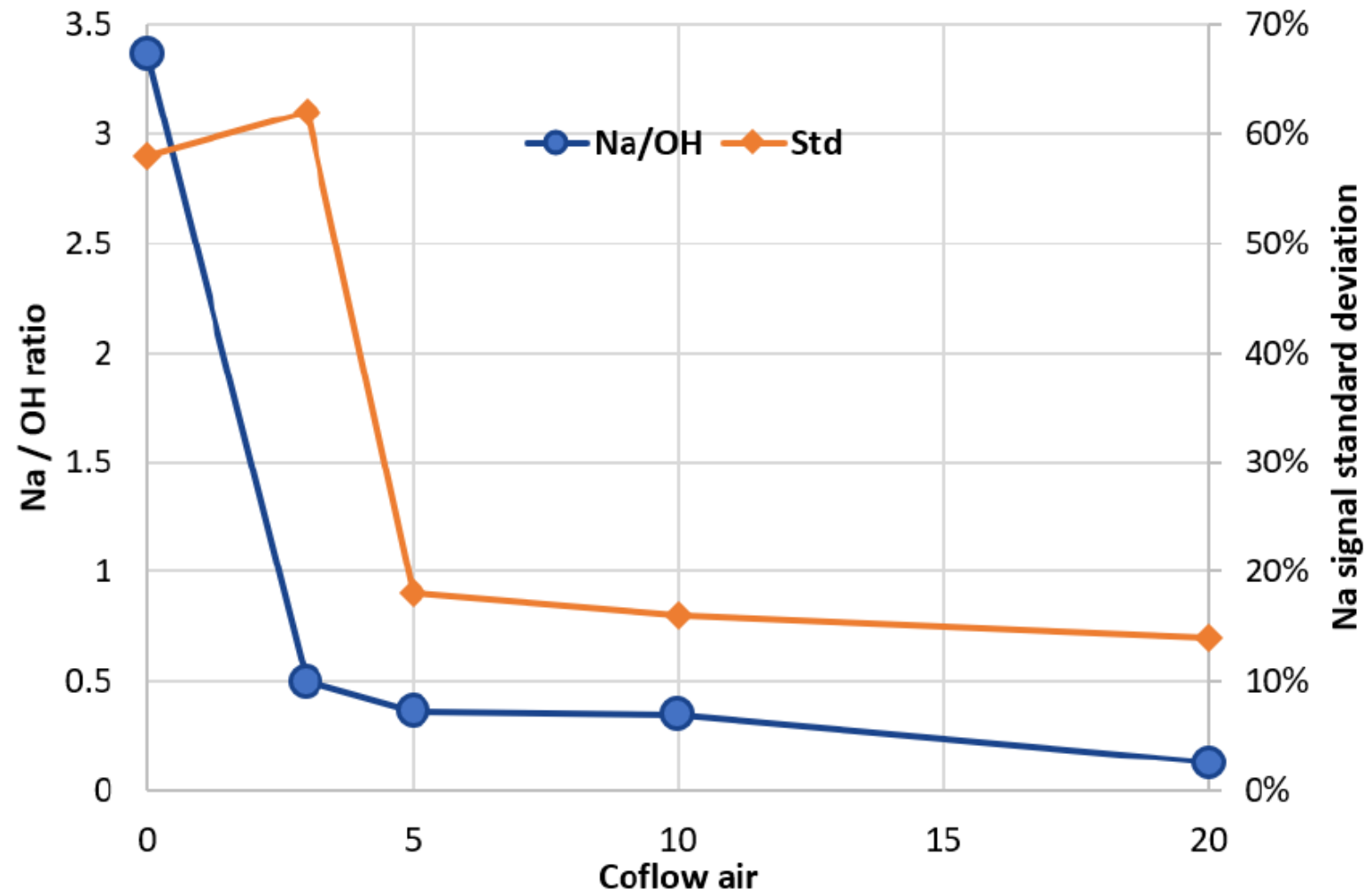


20SLPM



45SLPM

Coflow



Reynolds number



Re=1000



Re=2000



Re=4000

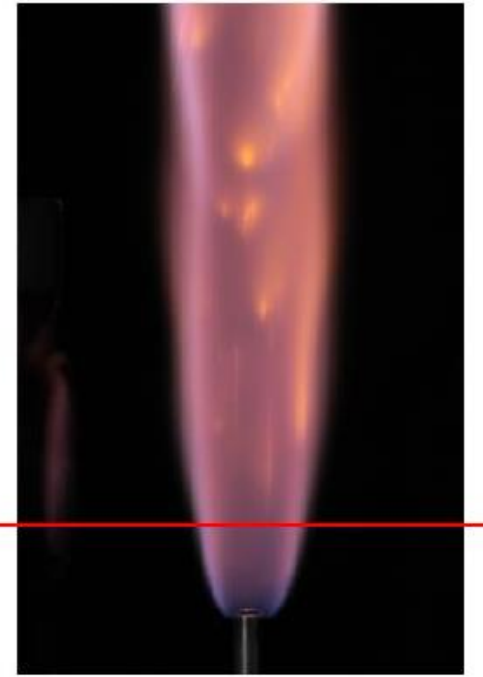
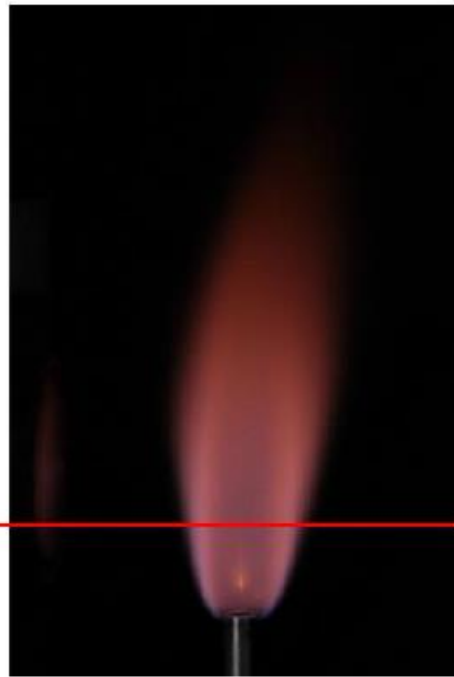
Reynolds number

ID=1.8mm

ID=5.5mm

ID=1.8mm

ID=5.5mm



Re=110

Re=1500

Premixing



No premixing



$\phi = 2$

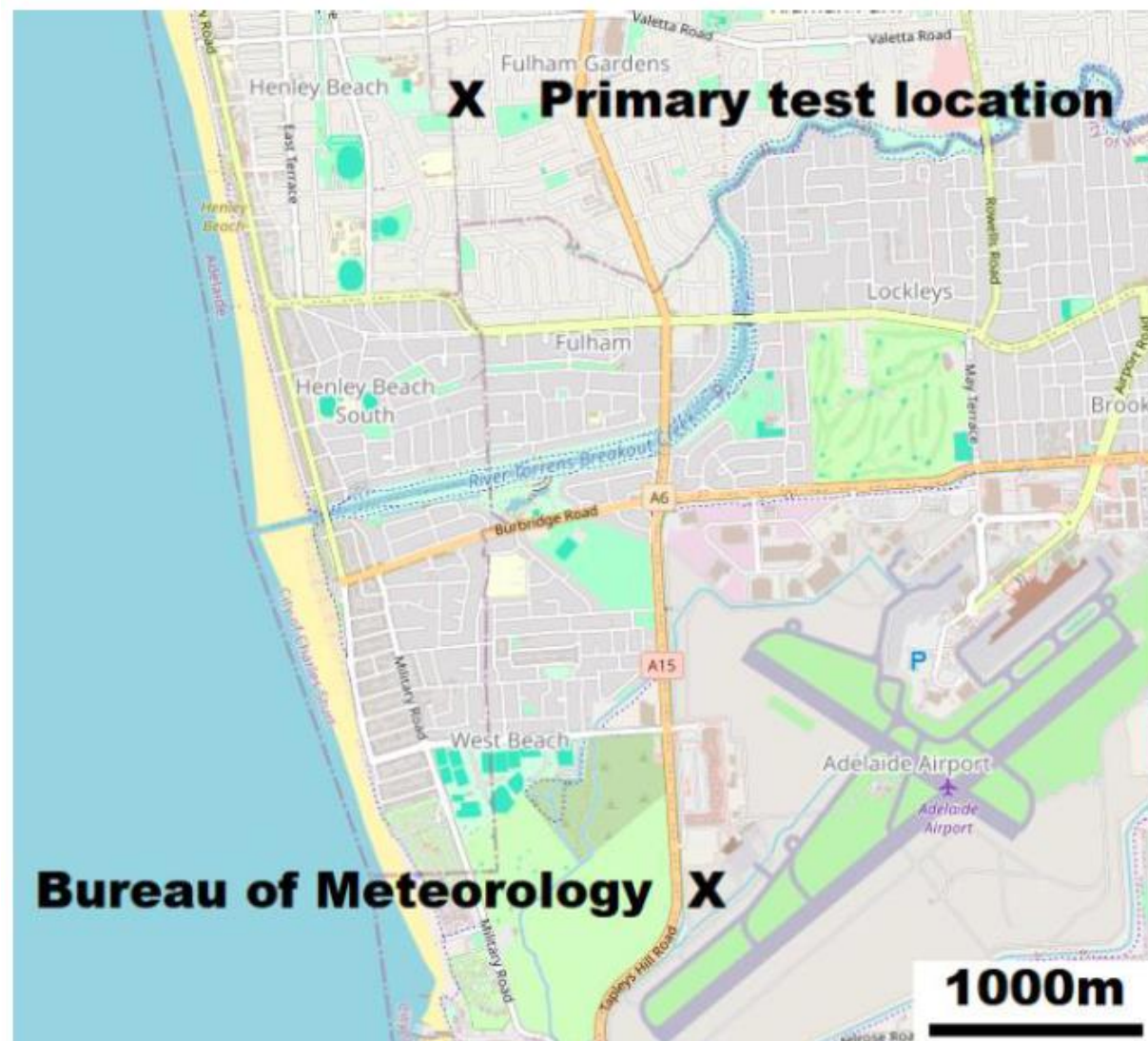


$\phi = 1$



$\phi = 0.6$

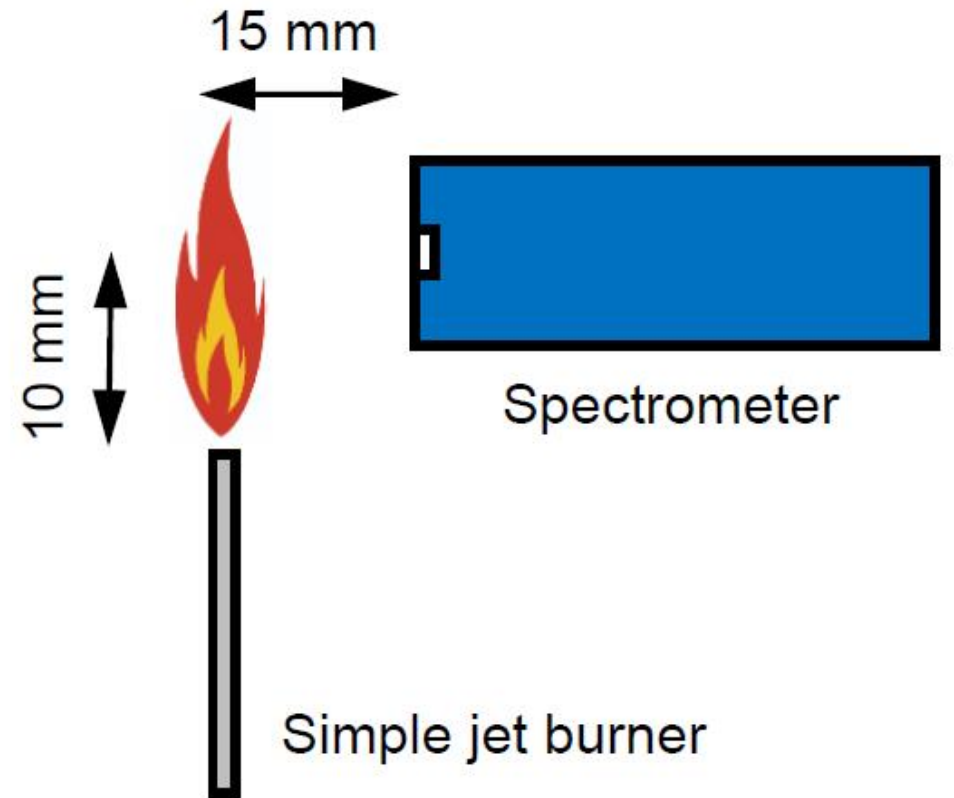
Test location



Experimental configuration

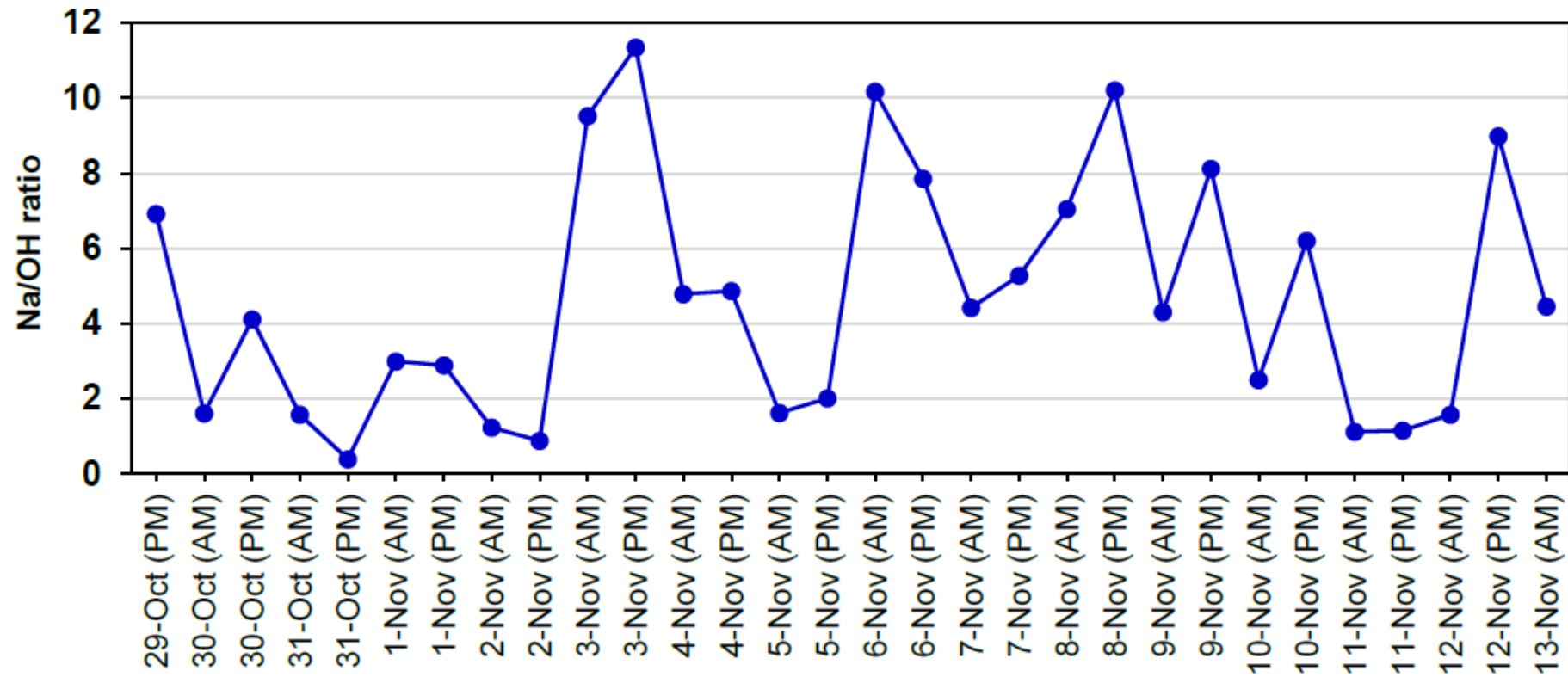


(a) Photograph

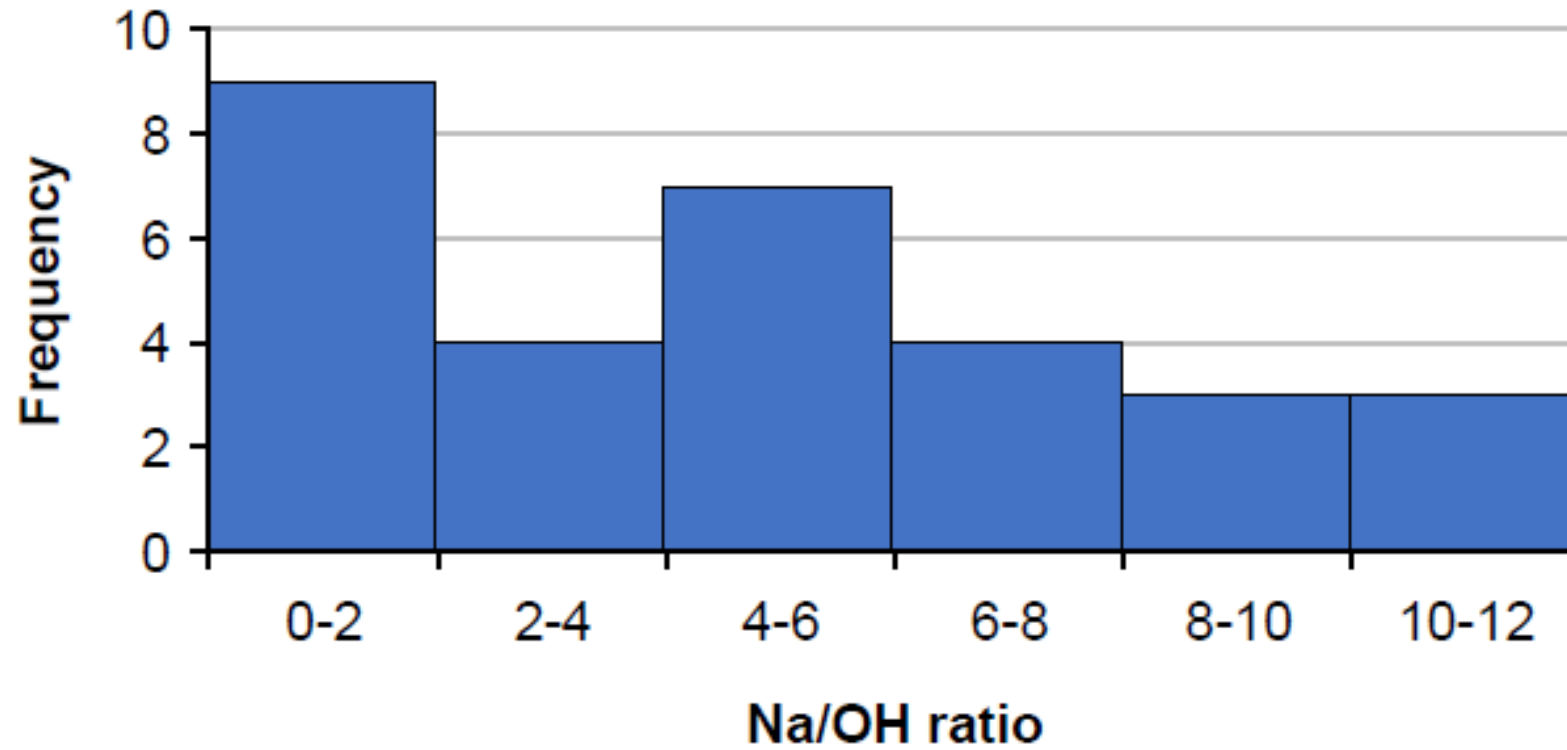


(b) Schematic diagram (side view)

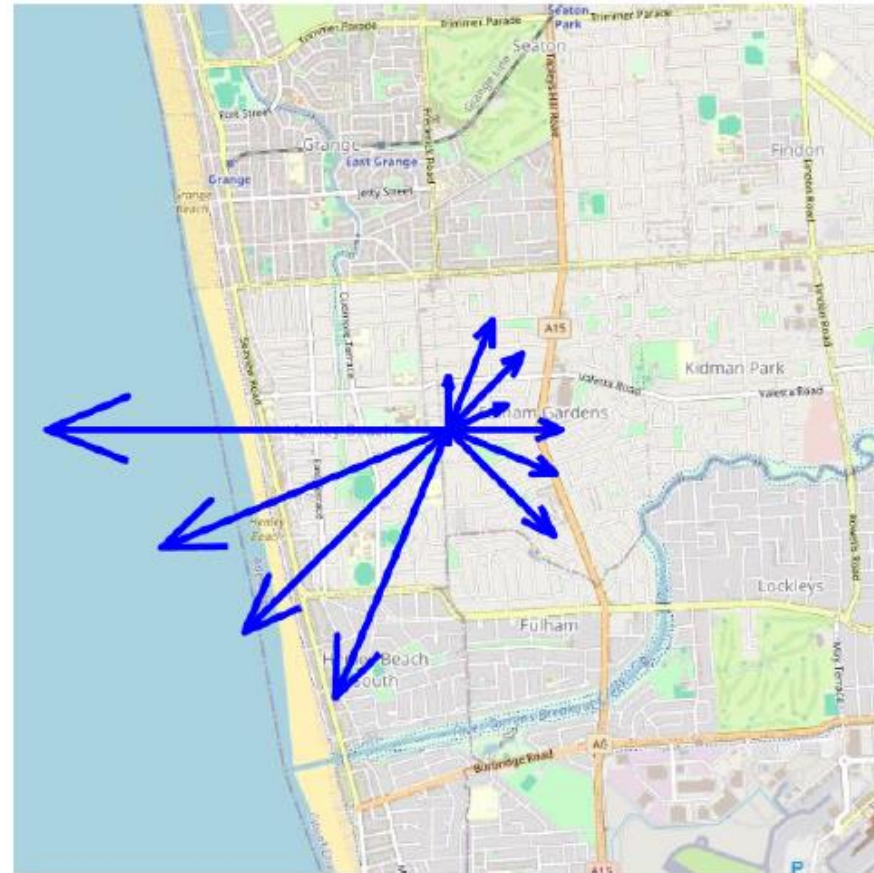
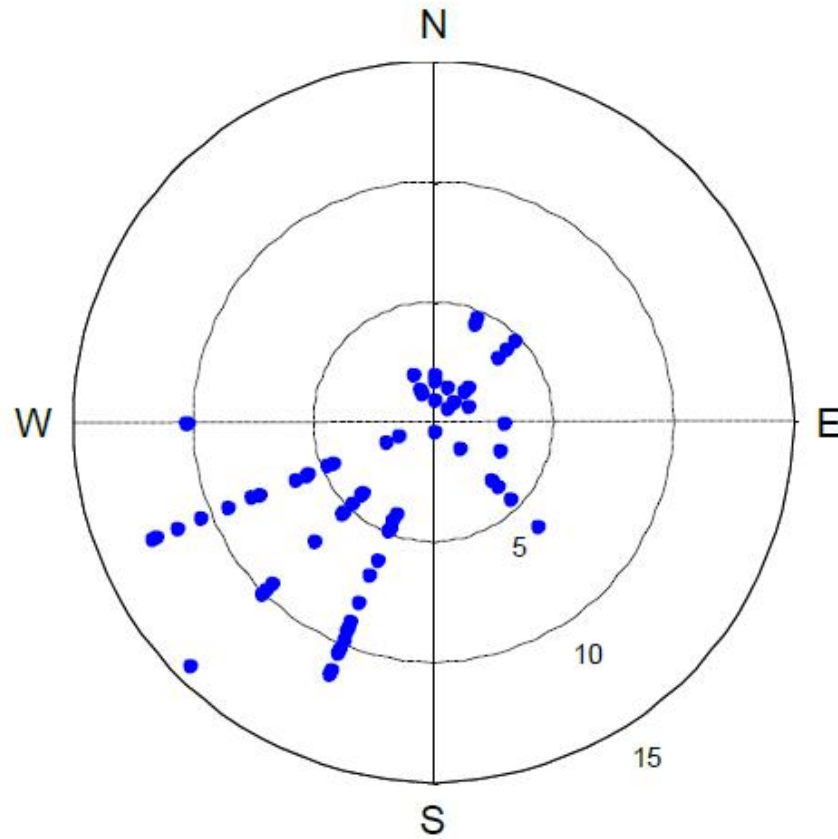
Temporal fluctuation



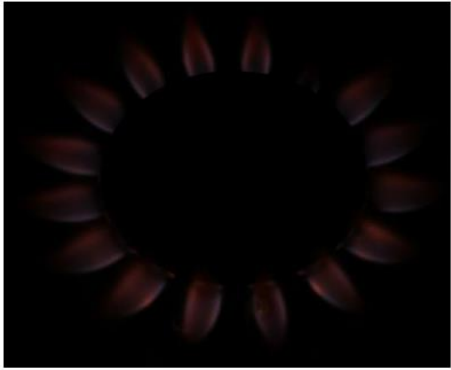
Histogram



Impact of wind direction



Cooktop photos



(a) 31st October ($\text{Na}/\text{OH} = 0.4$)



(b) 3rd November ($\text{Na}/\text{OH} = 11.4$)



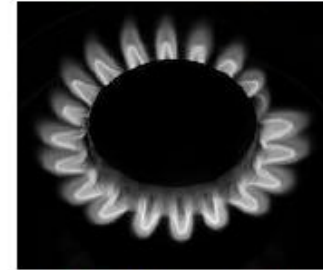
(a) Hydrogen cooktop flame



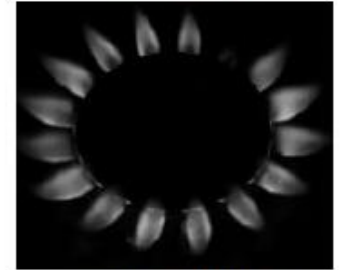
(b) Natural gas cooktop flame



(a) Natural gas @ ISO 400



(b) Hydrogen @ ISO 400



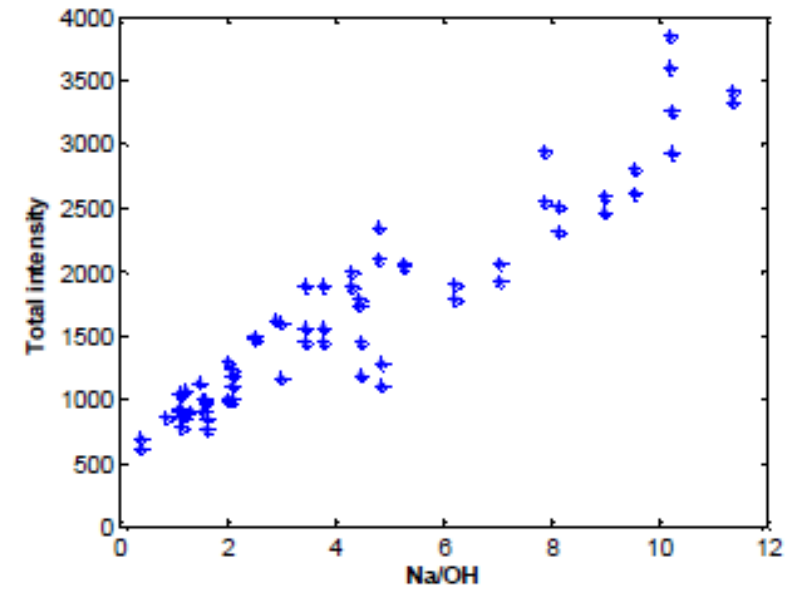
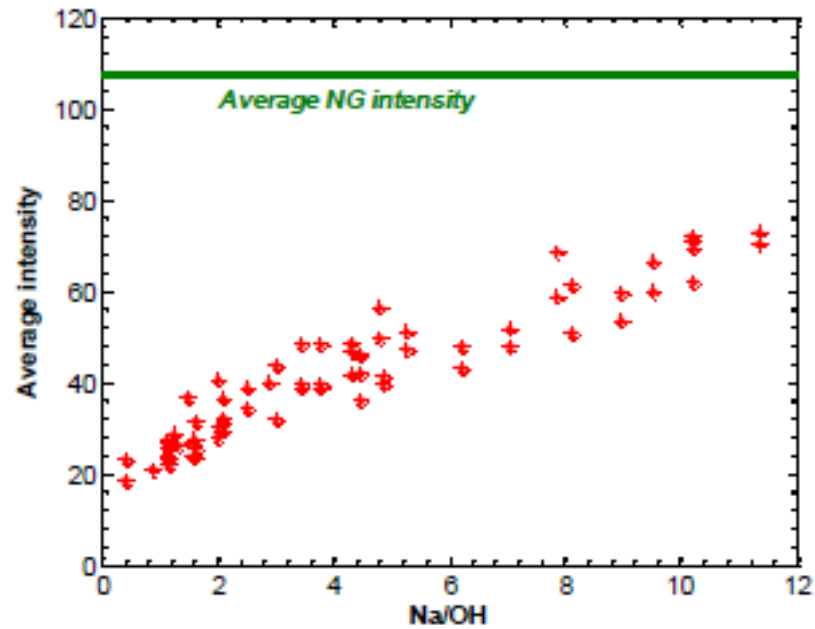
(c) Natural gas @ ISO 200



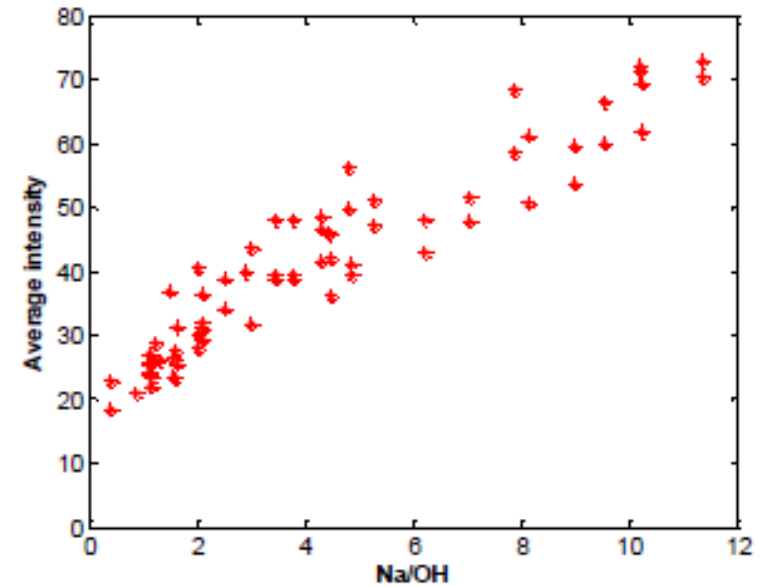
(d) Hydrogen @ ISO 200



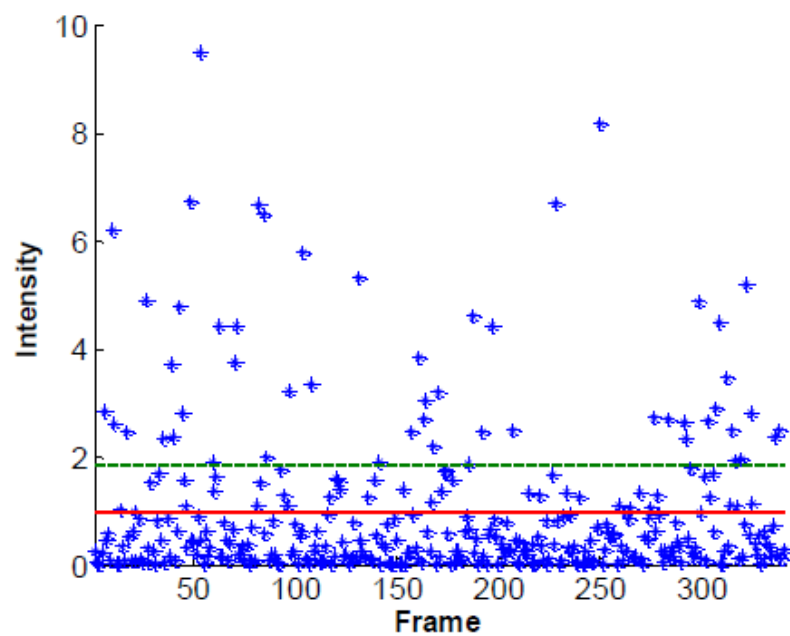
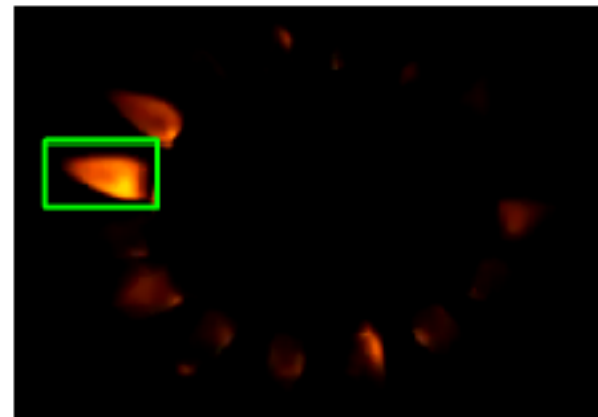
Correlation



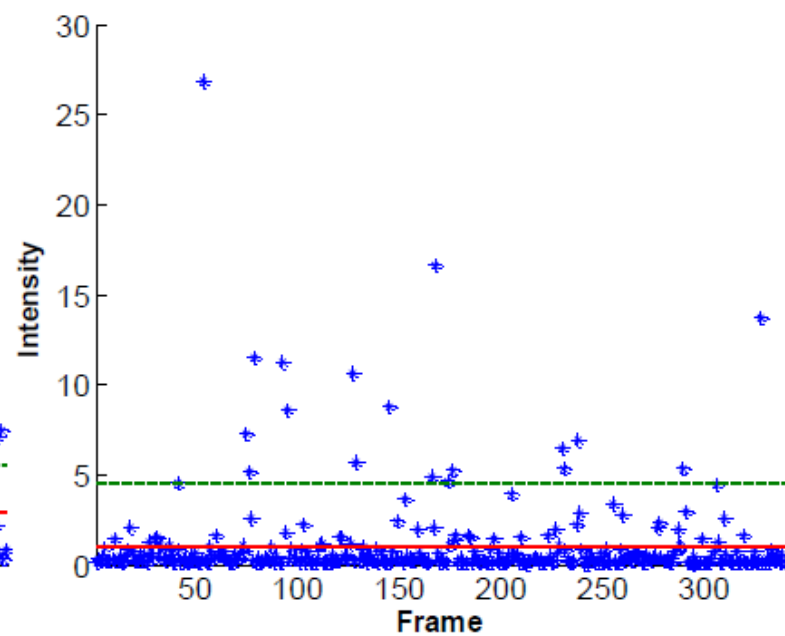
(a) Total intensity, calculated by sum of pixel values



Flickering



(a) $\text{Na}/\text{OH} = 7.9$



(b) $\text{Na}/\text{OH} = 1.6$

Acknowledgements

- Future Fuels CRC
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- Peter Ashman (The University of Adelaide)
- Paul Medwell (The University of Adelaide)