We would like to thank the editor for handling our manuscript and the reviewer for providing constructive and supportive comments based on their reading of the paper. Please find our responses (regular text) to the reviewer's comments (**bold text**).

(RC2) #line 21 – define FRP acronym

(AC) We have defined this in Line 19.

(RC2) #line 71 – '(Zhang et al., 2015)'

(AC) We have corrected the missing opening bracket at the start of the citation in Line 75 in the revised manuscript.

(RC2) #line 163 – typo - 'T ^{3} 600 K'

(AC) Apologies – this was meant to read "T > 600 K." We have made this change to the revised manuscript.

(RC2) #line 213 – 'measure'

(AC) We have corrected this typo in the revised manuscript.

(RC2) #Fig 2 – Closing bracket missing on plot y-axis

(AC) We have corrected this typo in the revised manuscript.

(RC2) #line 322 – define FREM acronym

(AC) We have defined this in the revised manuscript

(RC2) #Figure 5/line 301– for clarity it would be beneficial to include the percentage of observations which were detected as containing flaming combustion (e.g. AKBD > 1.5). It appears to be the majority in the plots although in reality most observations are in the smouldering phase (e.g. Fig 3) which has less variation in values.

(AC) The reason that the smoldering observations do not appear to be dominating in number over the flaming-identified observations in Fig. 5 is because the points are stacked on top of each other. However, as you say, most points are in fact identifying the fire in the smoldering dominated stage – which you can see in other figures, such as Fig. 3. We cannot make the points any smaller in Fig. 5, otherwise the colors of the points (and therefore MCE) would not be visible. We agree that including the percentage of observations when the K-line was detected would be beneficial and have now included this in the updated Fig. 5 plot. Thank you for the suggestion.

(RC2) #line 430 what is the spatial resolution of the hyperspectral data used in this analysis? To what extent does spatial resolution influence the detection of pixels containing flaming activity?

(AC) The spatial resolution of the data of Fig. 7b is 4 m, and the size of the area covered by the scene is 1020 x 2160 m. We have made this clear in the caption in our revised manuscript.

The question with regards to the effects that spatial resolution of the hyperspectral data has on K-line detection is a good one.

For a constant spectral resolution, the magnitude of the K-line (AKBD) for a given amount of flaming combustion is expected to decrease linearly with increasing measurement area, as the signal from the flaming area starts not to fill the pixel and instead becomes a smaller proportion of the overall pixel area (which may include a surrounding non-flaming area and indeed non-fire background). Using this assumption, we adjusted for the differences in the field of view between the two spectrometers used in the lab study (SVC HR1024i and the Ocean Insight OCEAN-HDX-XR) by applying a linear adjustment factor based on the measurement area differences. This resulted in the measured radiances of the fires agreeing well in the wavelength overlap of the two spectrometers after the adjustment (except for at the K-line peaks due to differences in spectral resolution), as shown in Fig. 2a. Figure R1 below shows an expanded plot of the two spectra in Fig. 2a in the region where the wavelengths measured overlap.

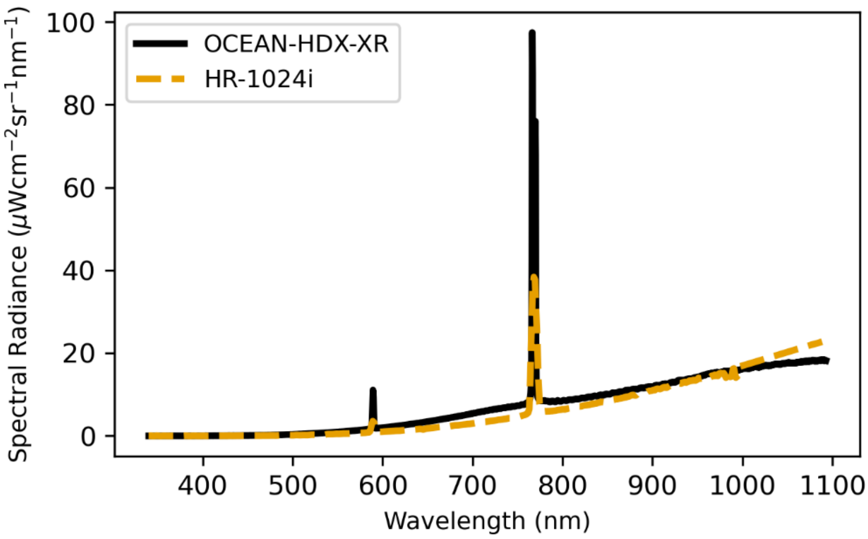

Figure R1. Emission spectra as measured by the OCEAN-HDX-XR (Ocean Insight) and HR1024i (SVC) at wavelengths where the two spectrometers overlap. The magnitudes have been adjusted for differences in measurement area between the spectrometers. Expanded view of Fig. 2a in the original manuscript.

We have also included another plot (see Fig. R2) showing the higher spectral resolution data (OCEAN-HD-XR; FWHM: 1.1 nm) convolved to the spectral resolution of the lower spectral resolution data (HR1024i; FWHM: 3.5 nm). These, again, have been applied with the adjustment factor to account for the differences in measurement area. This shows that they agree well but with some minor differences that can be attributed to a couple of factors.

Firstly, the spectrometers had different measurement frequencies. The HR1024i had irregular acquisitions of between 4 and 7 sec separation. It was not clear which proportion of the 4 – 7 secs the spectra were being recorded vs. preparing for a new acquisition or processing the previous measurement. This was unlike the OCEAN-HDX-XR, which was constantly measuring the spectra, averaging every second. Therefore, we are unable to exactly convolve the OCEAN-HDX-XR data to that of the HR1024i temporally. However, as stated in the manuscript, AKBD retrievals from the spectrometers showed excellent agreement (R^2 of 0.99; with a linear best fit gradient of 0.381±0.002 – due to spectral resolution difference – and negligible intercept) when compared using the large amount of data we recorded over many experimental burns.

Another factor causing the difference is that the viewing geometries of the two spectrometers were slightly different as they could not physically be put any closer together, mainly due to the size of the HR1024i. This may have resulted in the 3-dimensional flames, which influence this region of the spectra more than the hot fuel, being viewed slightly differently.

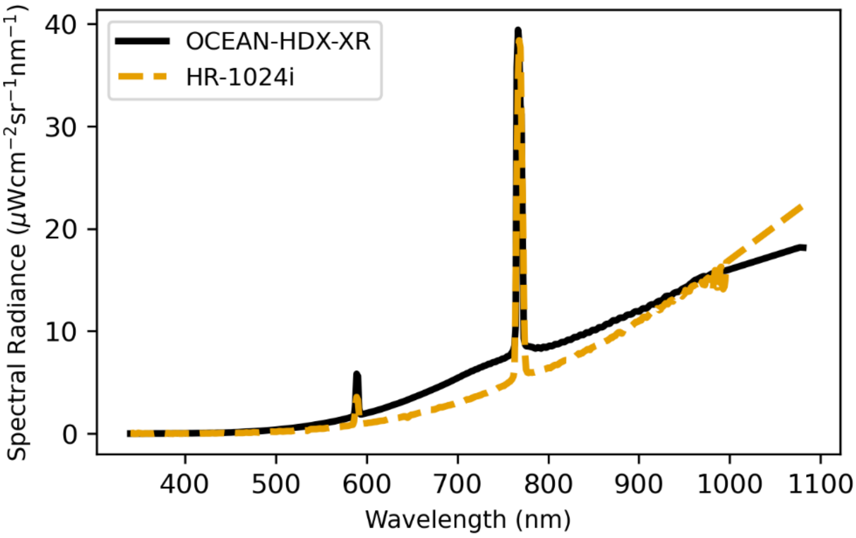

Figure R2. Emission spectra as measured by the OCEAN-HDX-XR (Ocean Insight) and HR1024i (SVC) from Fig. R1, but with the higher spectral resolution OCEAN-HDX-XR data (1.1 nm) convolved to the spectral resolution of the HR1024i data (3.5 nm).

In summary, after the adjustment factor has been applied the two measurements agree well but with some minor differences that can be expected. For this reason, we believe that our assumption above about how spatial resolution affects the AKBD retrieval is correct.

The flaming detection threshold of 1.5 $\mu Wcm^{-2}sr^{-1}nm^{-1}$ used in the analysis of the laboratory experiment refers to AKBD measured by the OCEAN-HDX-XR. This is equivalent to 0.57 $\mu Wcm^{-2}sr^{-1}nm^{-1}$ for both the HR1024i and the FENIX (from the airborne study), due to their different spectral resolution. This threshold was above the noise level of all the instruments.

For the airborne demonstration, the situation is rather similar to the lab fires. For instance, the airborne spectral fit indicated that the fire filled just over 20% of the measurement area of the laboratory VIS-SWIR spectrometer in the situation shown in Fig. 2a, and around 16% of the pixel in the airborne data example shown in Fig. 7c. This is due to the high spatial resolution that can be achieved with airborne data, meaning that the fire fills a considerable amount of each pixel, to a similar extent as in the laboratory study.

However, future work to apply these findings to satellite data would be expected to account for lower spatial resolution, meaning fire will likely fill a smaller proportion of pixels. Therefore, the threshold may have to be lowered. The effect of spatial resolution, spectral resolution, the noise of the instrument, and how these factors influence the detection threshold will all have to be considered for each particular application.

(RC2) References – a couple of references are missing details (e.g. Magidimisha et al and Urbanski, S.)

(AC) We have corrected these in the revised manuscript.

(RC2) Supplementary material - In some plots the legend would benefit from being repositioned or reducing the text in the legend to avoid overlapping the data

(AC) We have made changes (reducing text and/or moving legends out of the axes) in the revised manuscript to reduce the covering of data with the legends, which is particularly an issue in the MCE plots.