

# Light (smear) carried from the unrecorded Eagle bands on the infra-red end

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23/09/2010

## Summary

*This report shows the scale of the effect that smear originating from unrecorded bands can have on the used band range, depending on the integration time used. The smear found was compared to recorded light to see what the percentage of the recorded light is the smear carried from unrecorded bands. It was discovered that with the lowest used integration times smear can account for up to 70% of the recorded light for certain bands, whereas for mid-range times that can reach up to 15% for those bands.*

## Procedure

To get an approximation of the light coming from the unrecorded bands of wavelengths 1329.33 to the last unused wavelength, the 2009 calibration data for Eagle was used. Taken from;

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/users/rsg/arsf/scratch_space/2009_cal/20091214/se14_12_09_cal/medians
```

N00E4101-2-halfthelines.raw-median.bil-bands\_as\_lines.bsq in particular was the file used.

To compare with real data from Ethiopia, ET07\_01-2009\_299\_Afar\_north, the bandset considered as recorded is from wavelength 987.24 (the first band wavelength in ET299), with a total number of bands 252 and spectral binning of 2.

Two sets of results were created;

1. Unrecorded smear over the recorded\* lamp data
2. Unrecorded smear over the recorded Ethiopia data

\*band range that corresponds to the recorded ET299 band range

The unrecorded smear can only come from the lamp

data. The graphs below will show how vital a role the unrecorded smear plays with respect to each set of data. This is done, as the label says, by dividing the smear value right before the first used band over the recorded light for each of the following bands.

The integration time for a flight project greatly affects the importance of the smear carried and so different integration times (most commonly used in the current set of projects in the workspace, identified by an especially long series of piping by Mike) were tested and plotted.

The shorter the integration time the greater the role that the smear plays. There is a small number of projects with integration times as low as 6 or 4 and even 1, where this light can have a much larger effect.

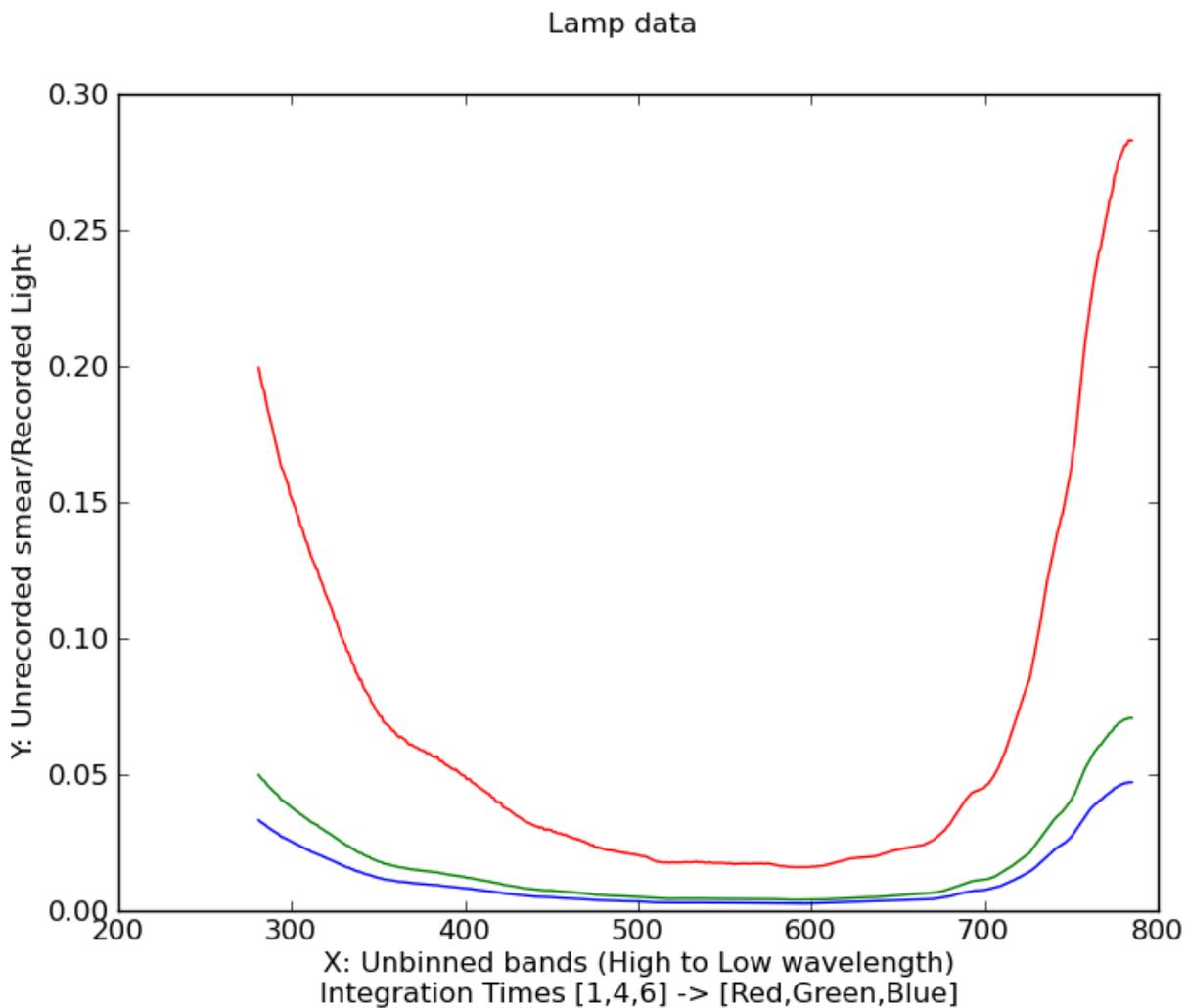


Fig 1. Band range according to the Ethiopian range

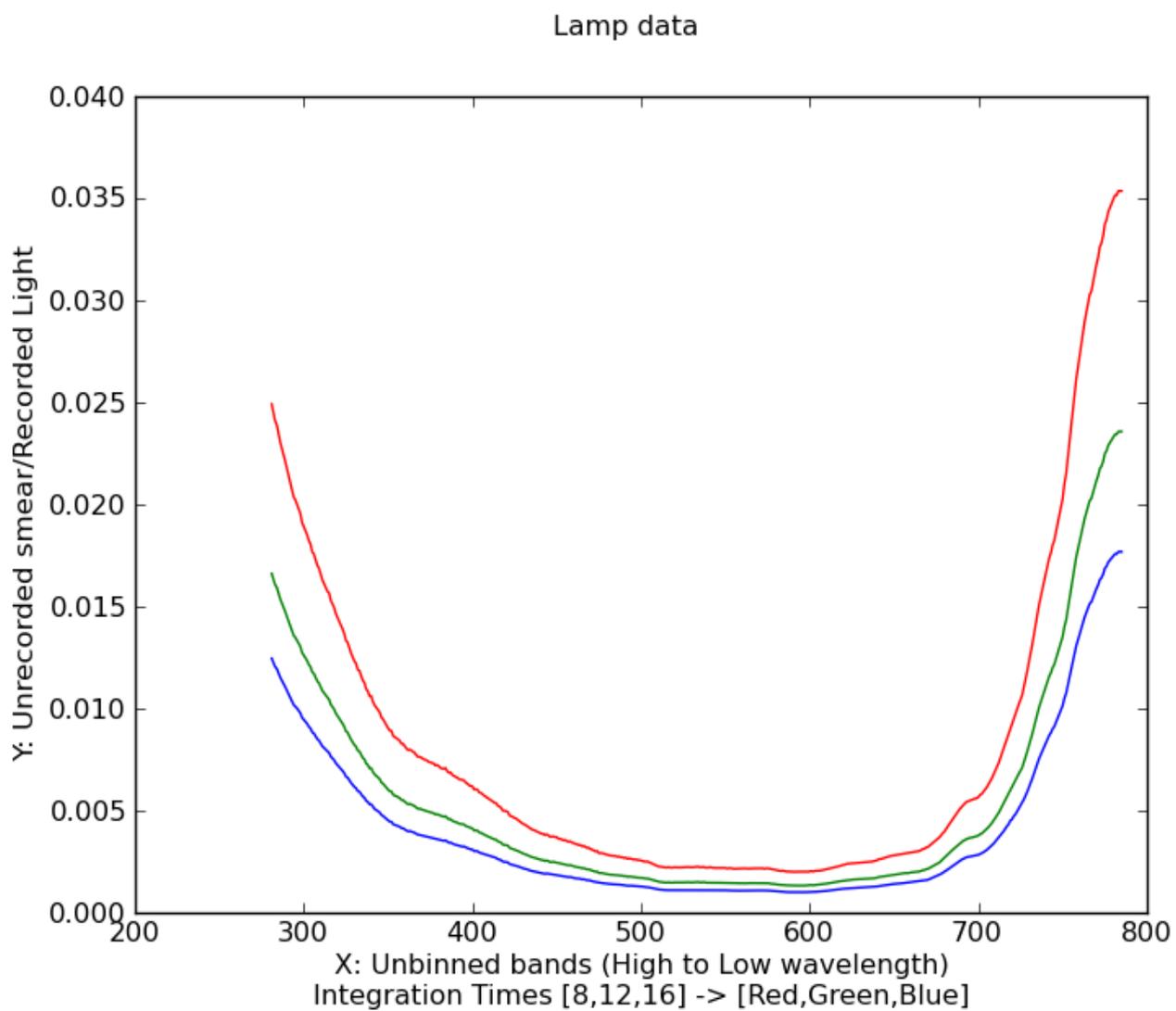


Fig 2. Band range according to the Ethiopian range

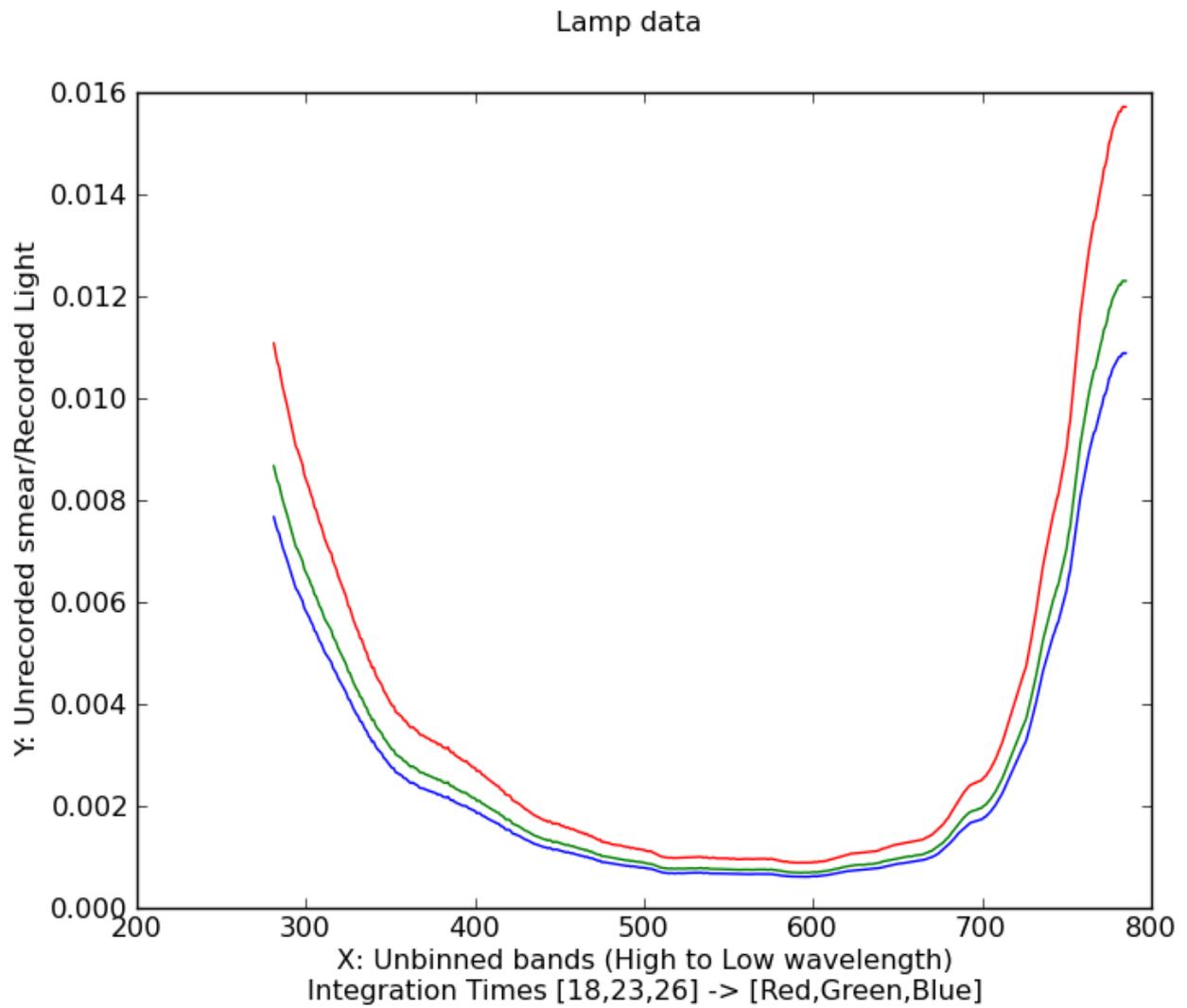


Fig 3. Band range according to the Ethiopian range

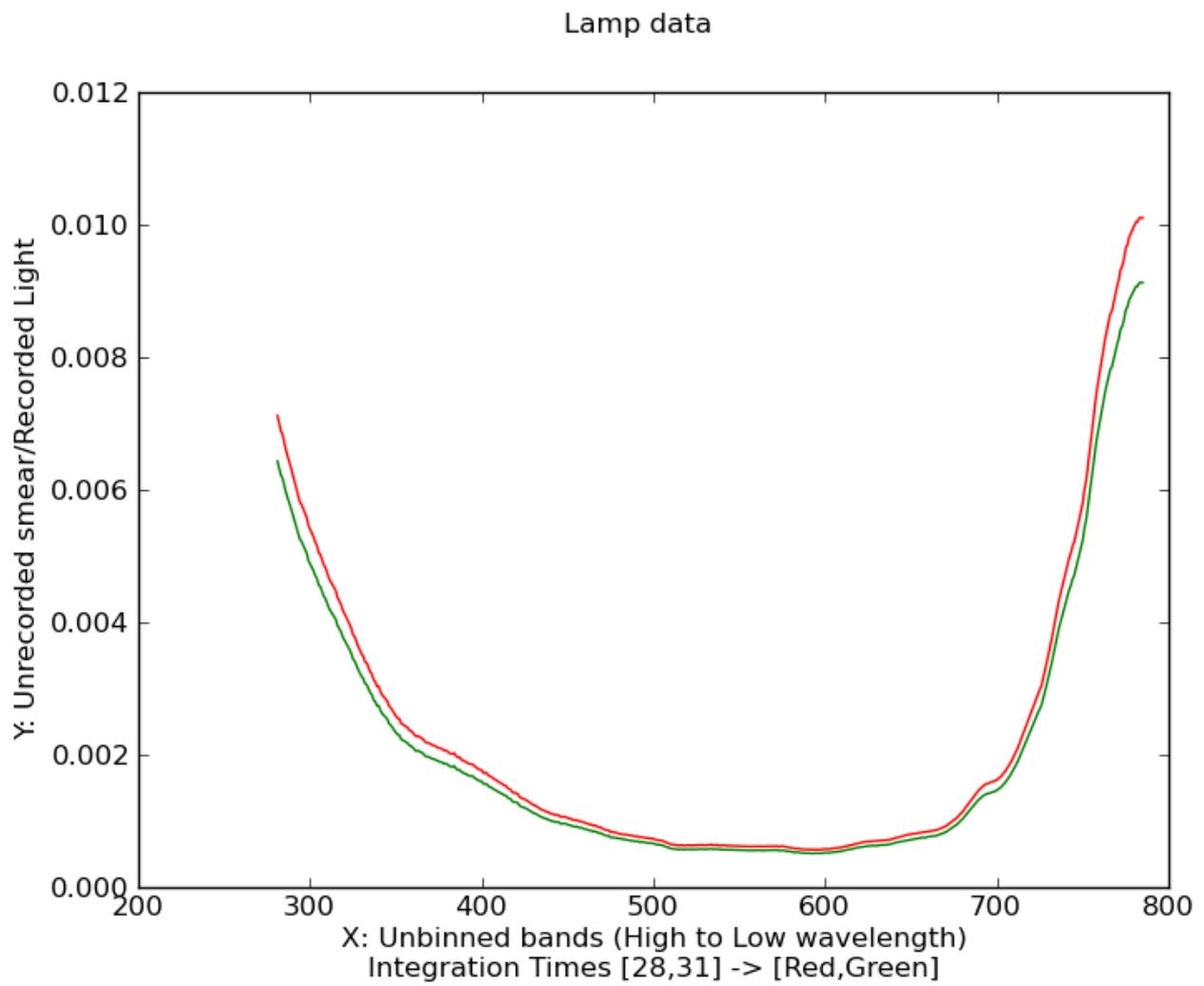


Fig 4. Band range according to the Ethiopian range

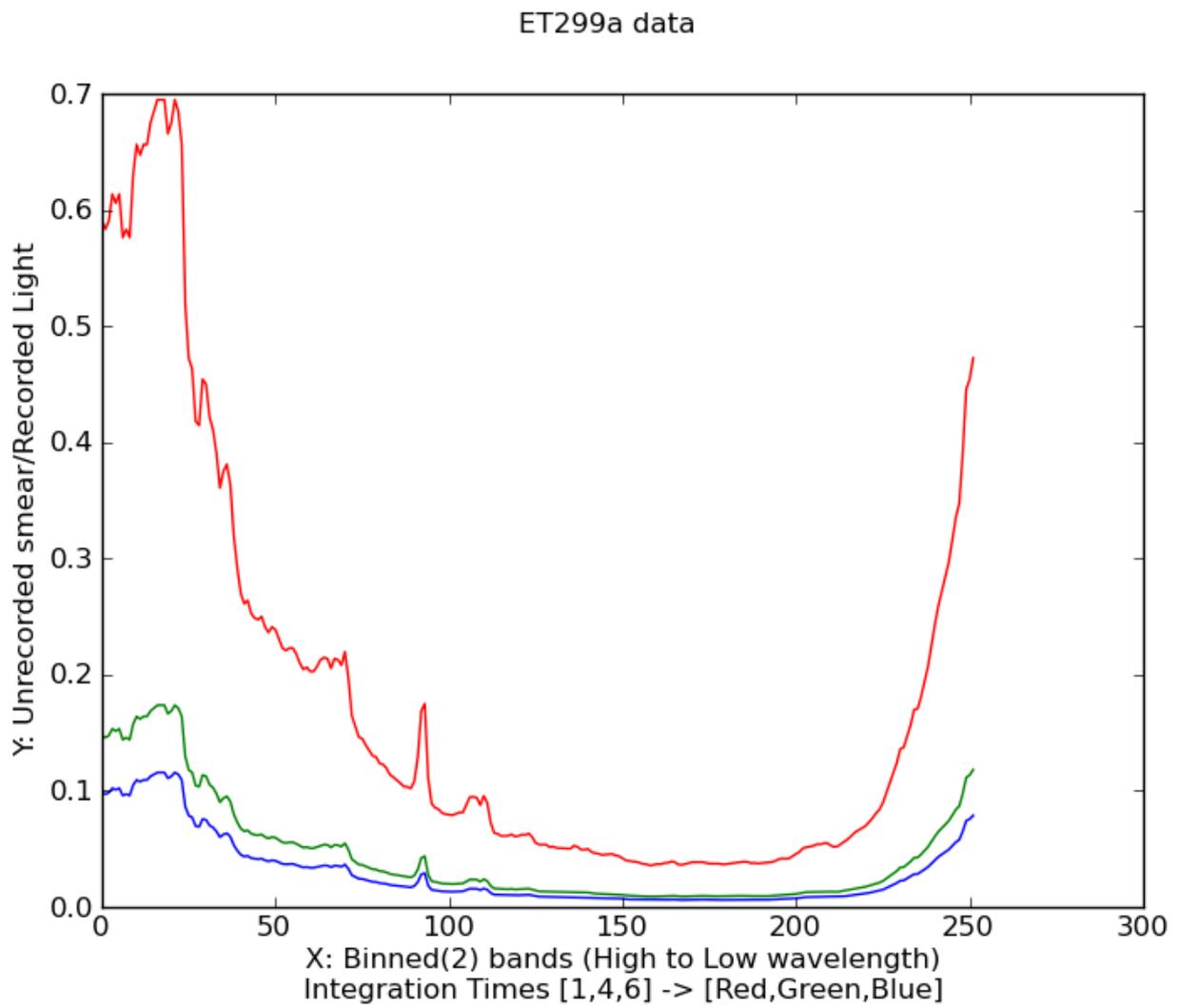


Fig 5. Band range is the recorded range

ET299a data

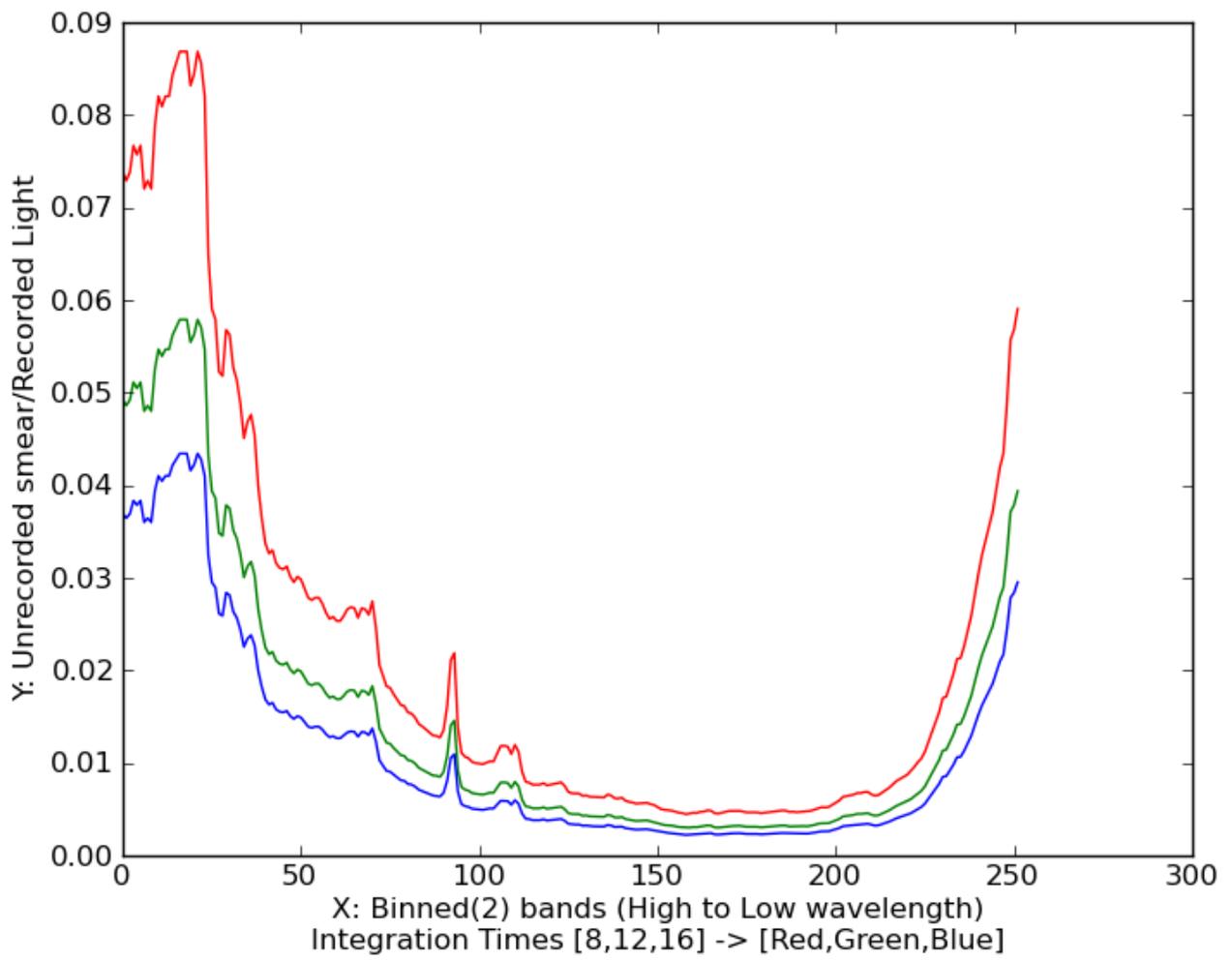


Fig 6. Band range is the recorded range

ET299a data

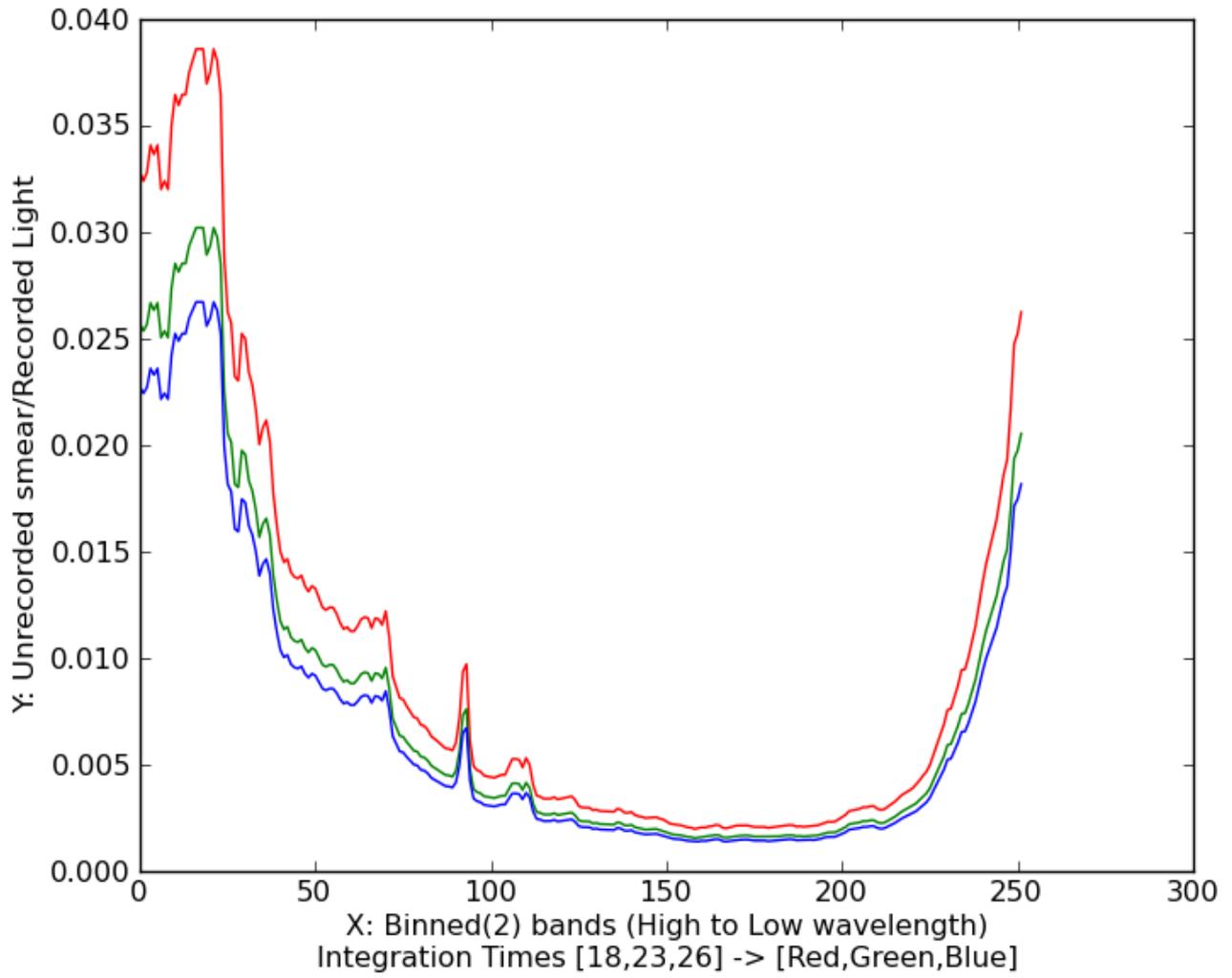


Fig 7. Band range is the recorded range

ET299a data

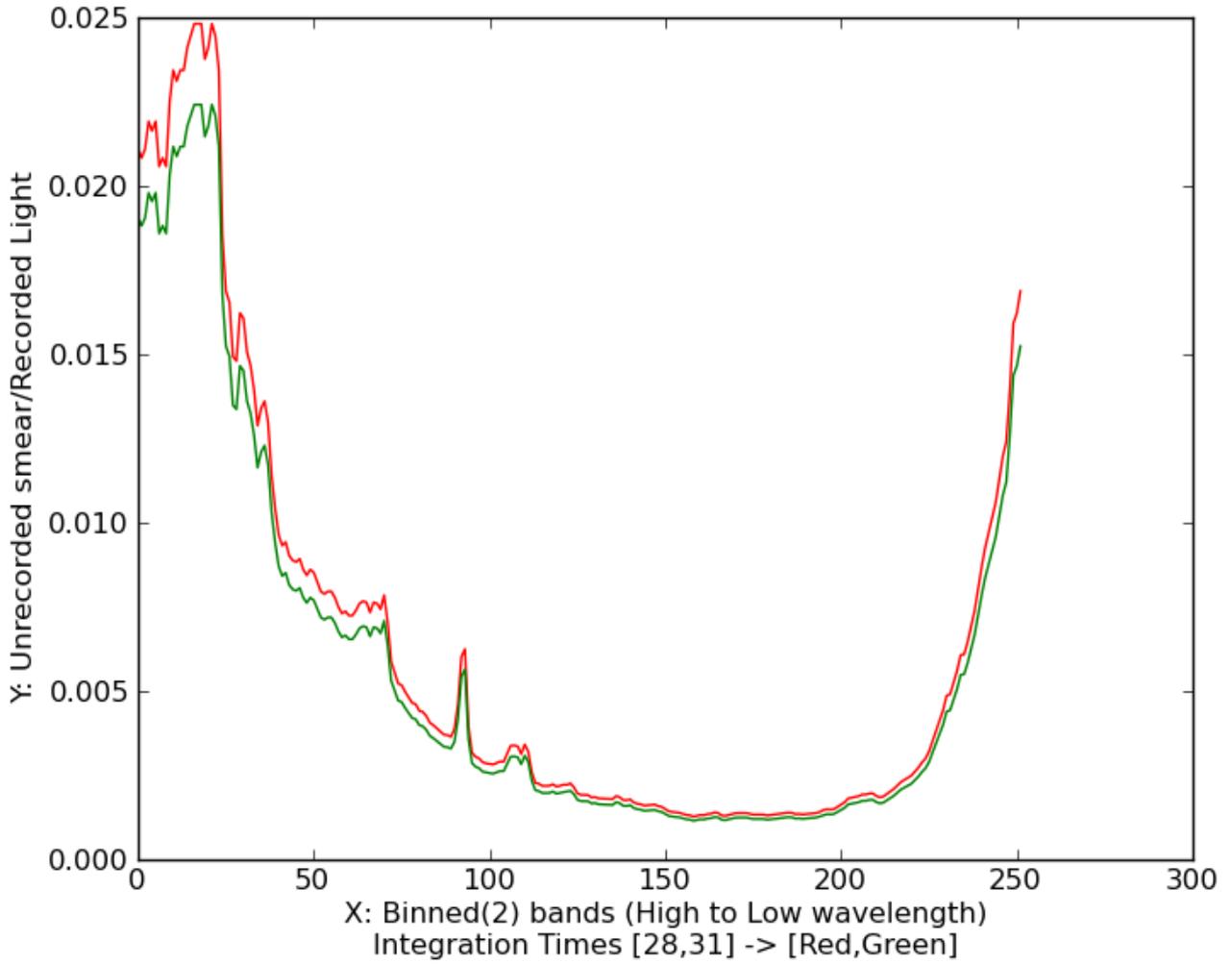


Fig 8. Band range is the recorded range

Because the integration time plays such a big part in the effect the smear has on the used data, a quick sampling was done on the most recent projects to see in what ranges the integration time tends to lie in.

From the histogram below, the largest portion of projects are in the safer range of above 20 milliseconds. However a significant number of them lie around 15 ms and also some are concentrated in the much more crucial zone of below 9 milliseconds.

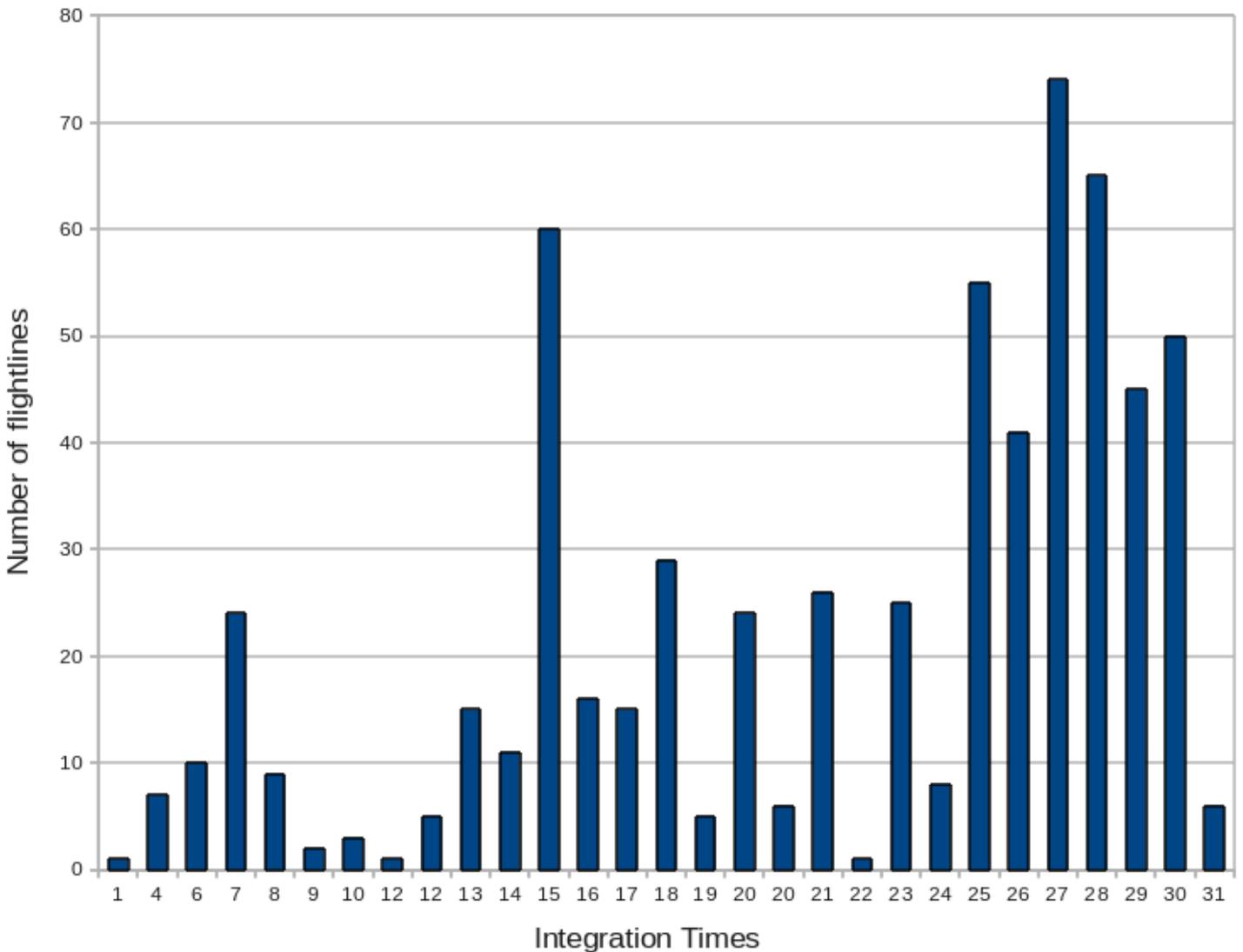


Fig 9. Number of flight lines currently in the arsf workspace that have been flown with the above integration times.