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Radiometric Responsivity or Calibration Coefficient Determination and Data Calibration

2019

WG4

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Sensor Calibration and Characterisation: Measurement Process and its Inversion

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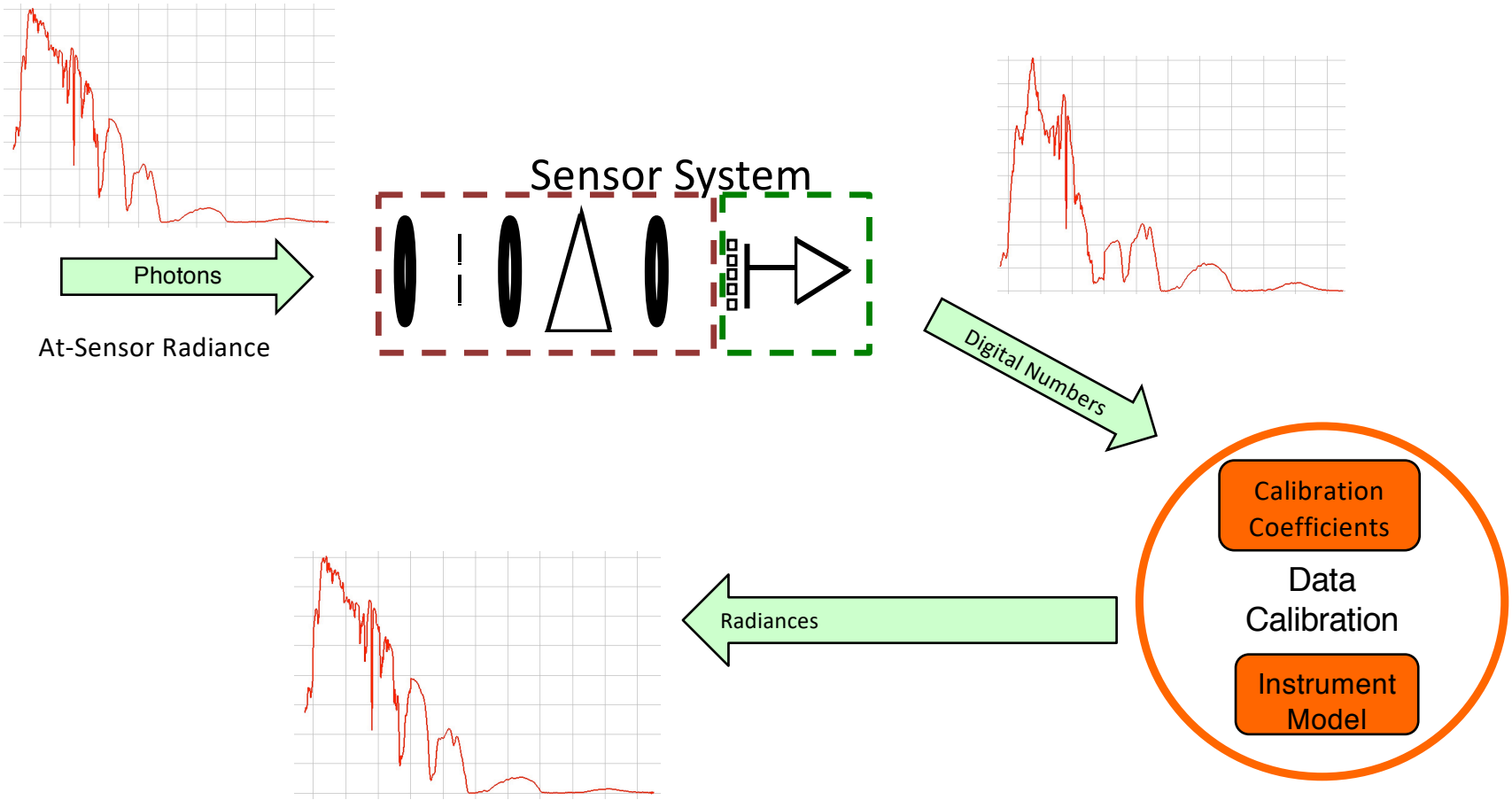

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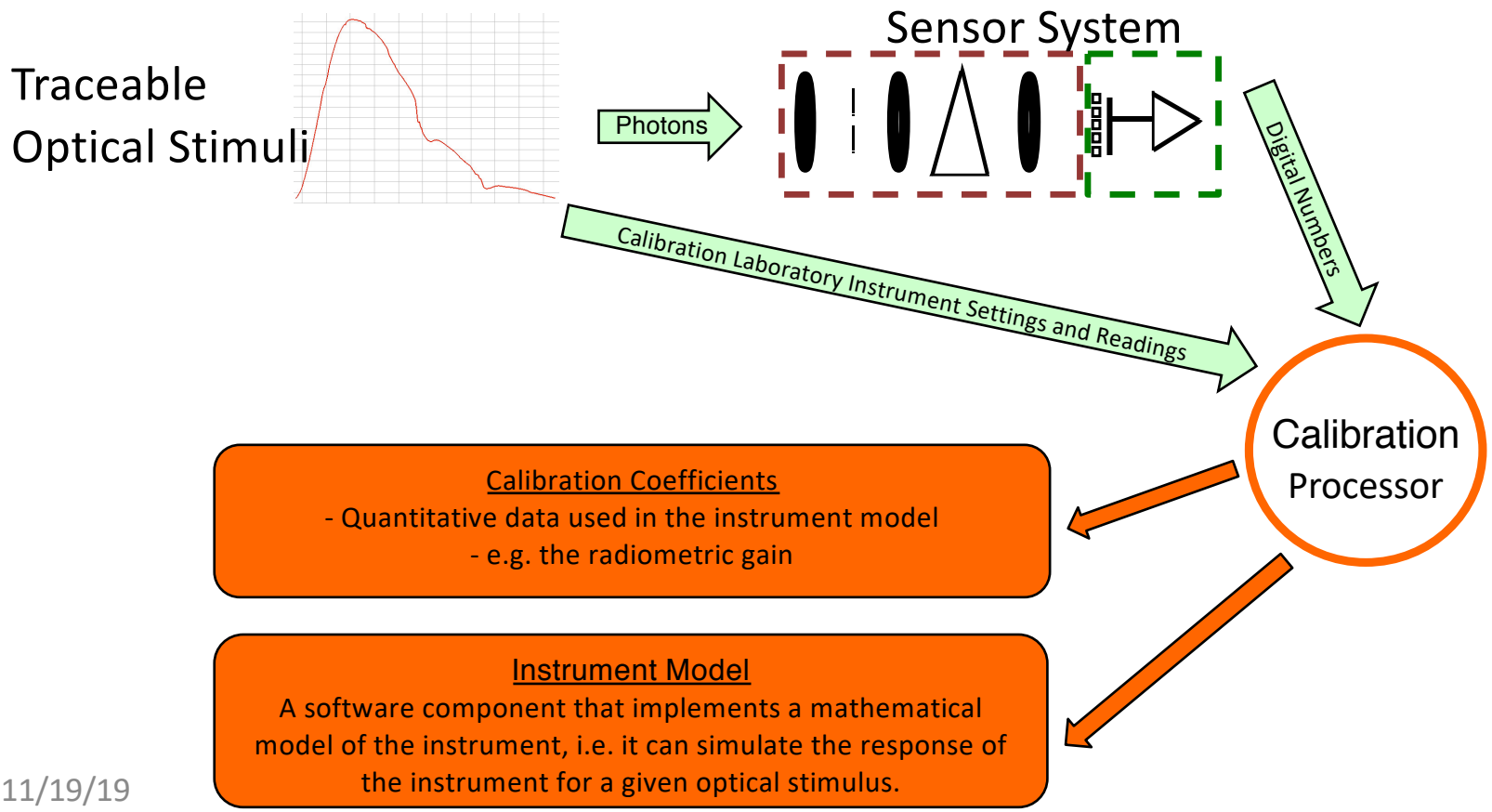
Calibration and Characterisation



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Pre-processing of DN's

- Dark current correction
- Normalisation to integration time

$$DN = \frac{DN_{light} - DN_{dark}}{IT}$$

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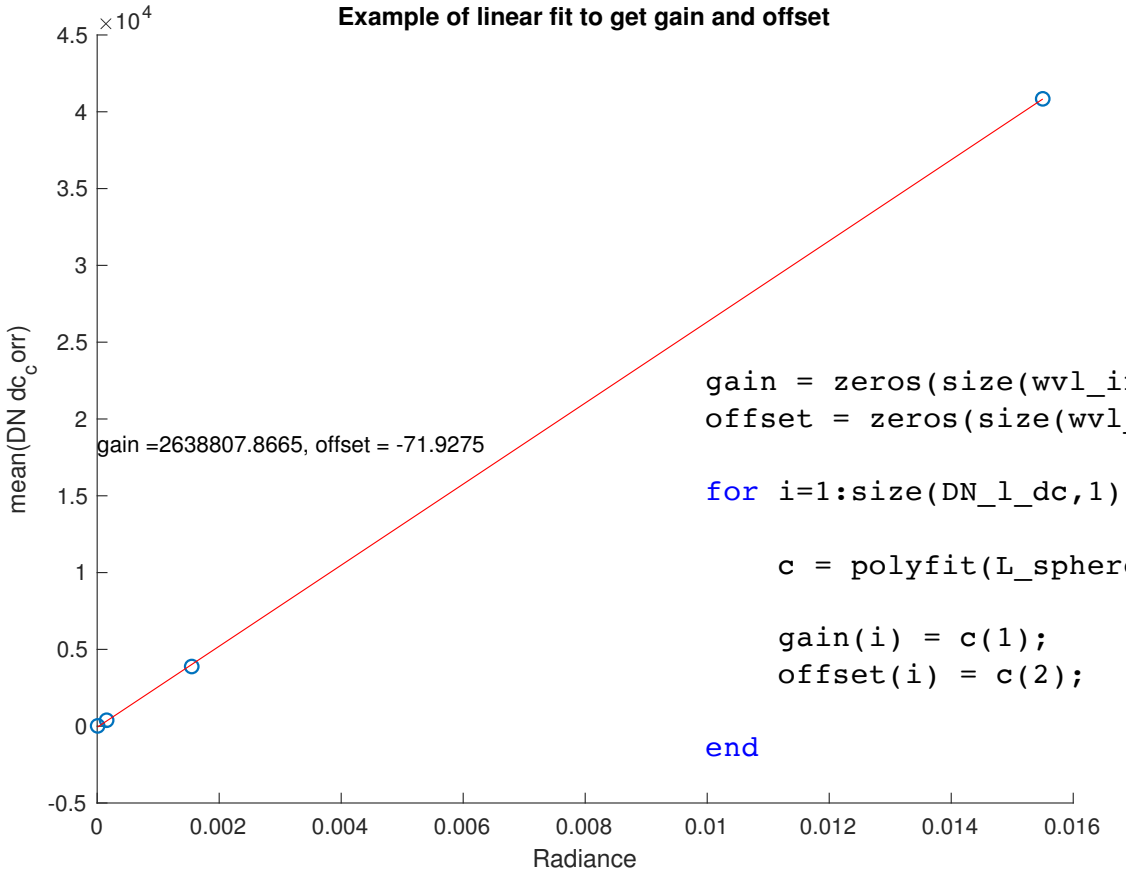
Straight Line Calibration per Band

This is the instrument responsivity.

DN = gain x L + o

L = (DN – o) / gain




```
gain = zeros(size(wvl_instr));
offset = zeros(size(wvl_instr));

for i=1:size(DN_l_dc,1)

    c = polyfit(L_sphere(i,:), DN_l_dc(i,:), 1);

    gain(i) = c(1);
    offset(i) = c(2);

end
```

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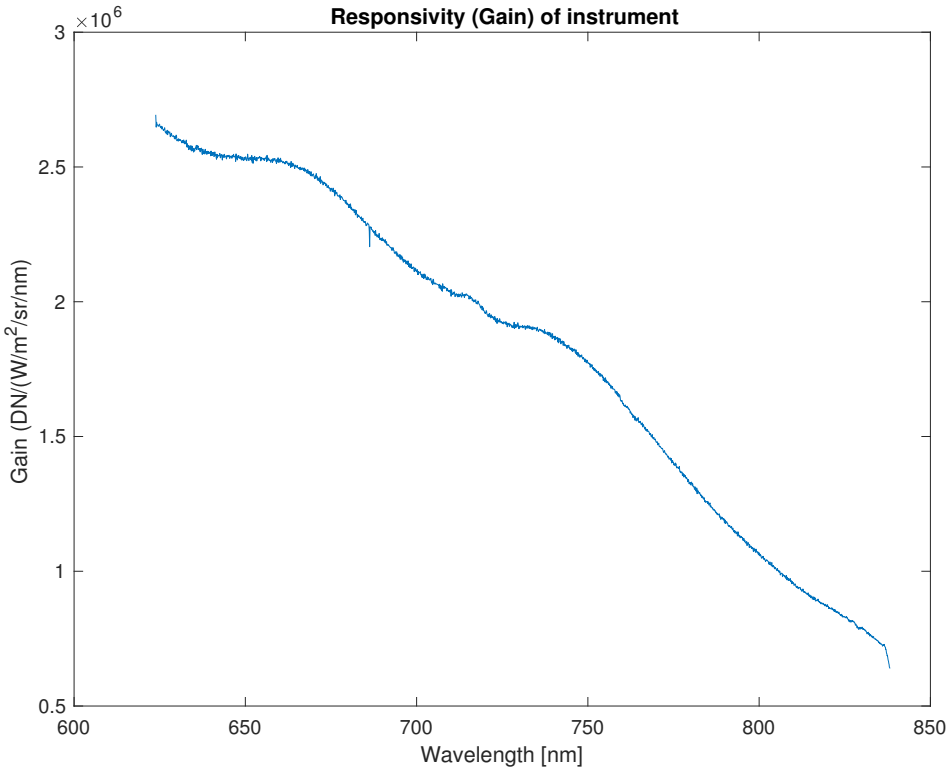
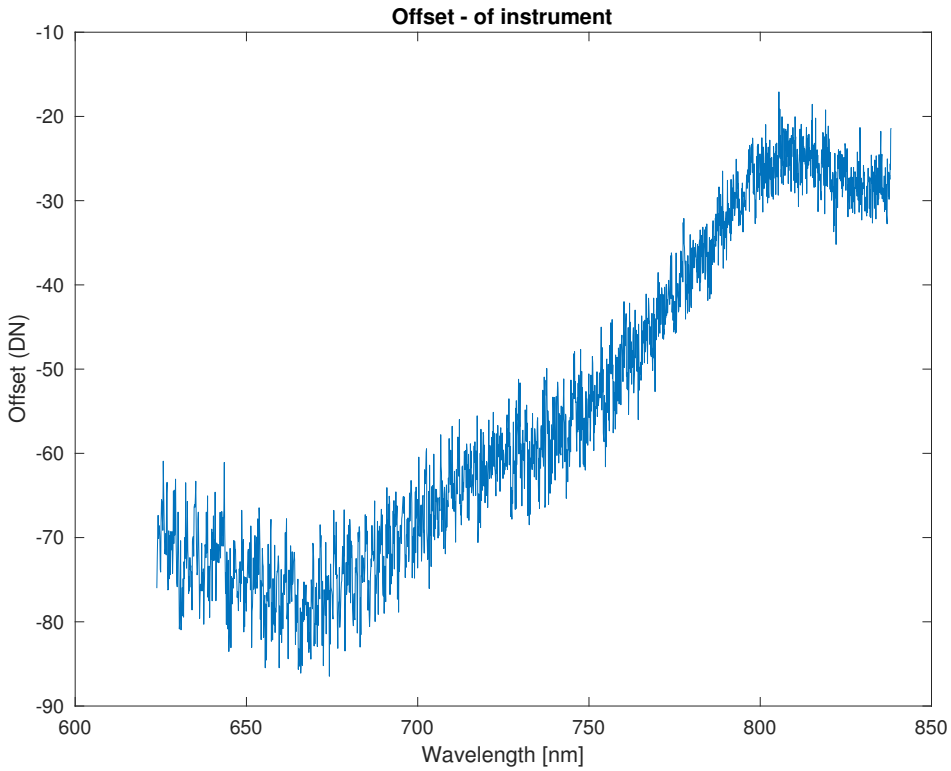
Instrument Responsivity: Gain and Offset





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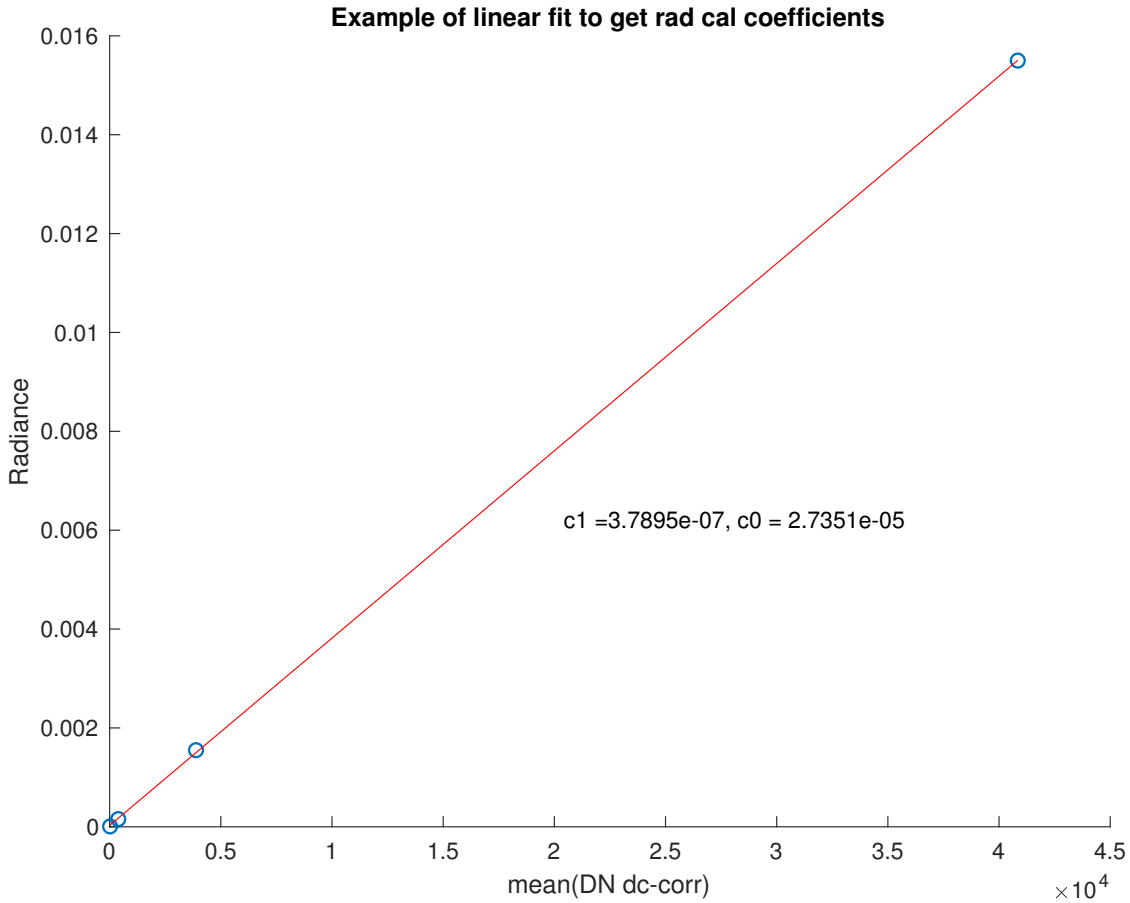
Determination of Calibration Coefficients



$L = DN \times c1 + c0$

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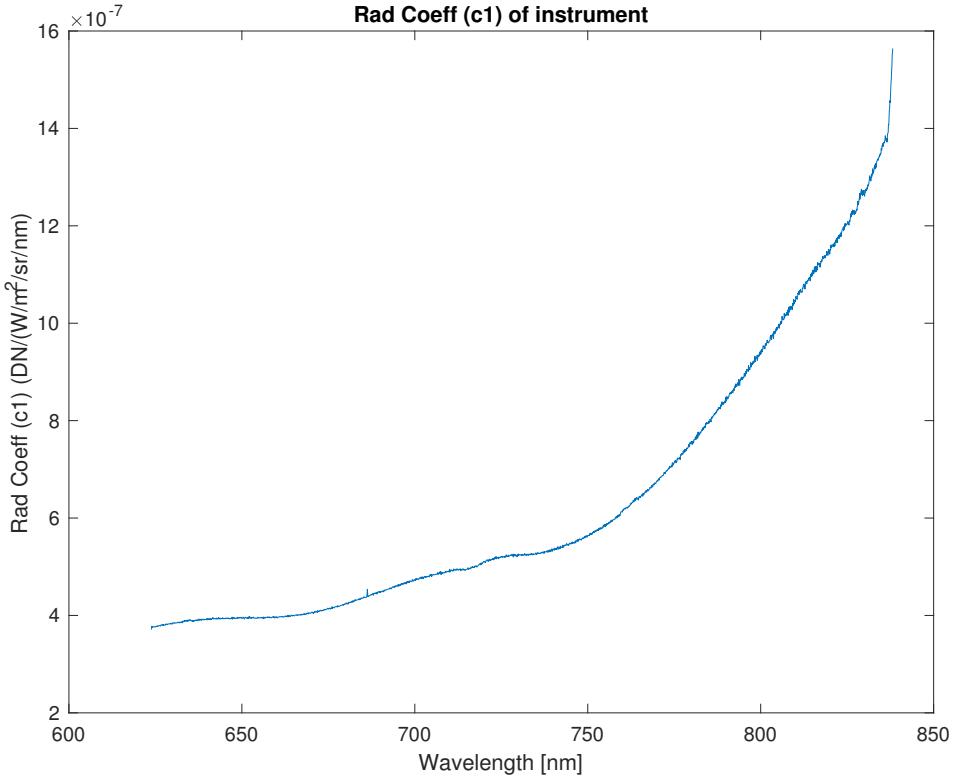
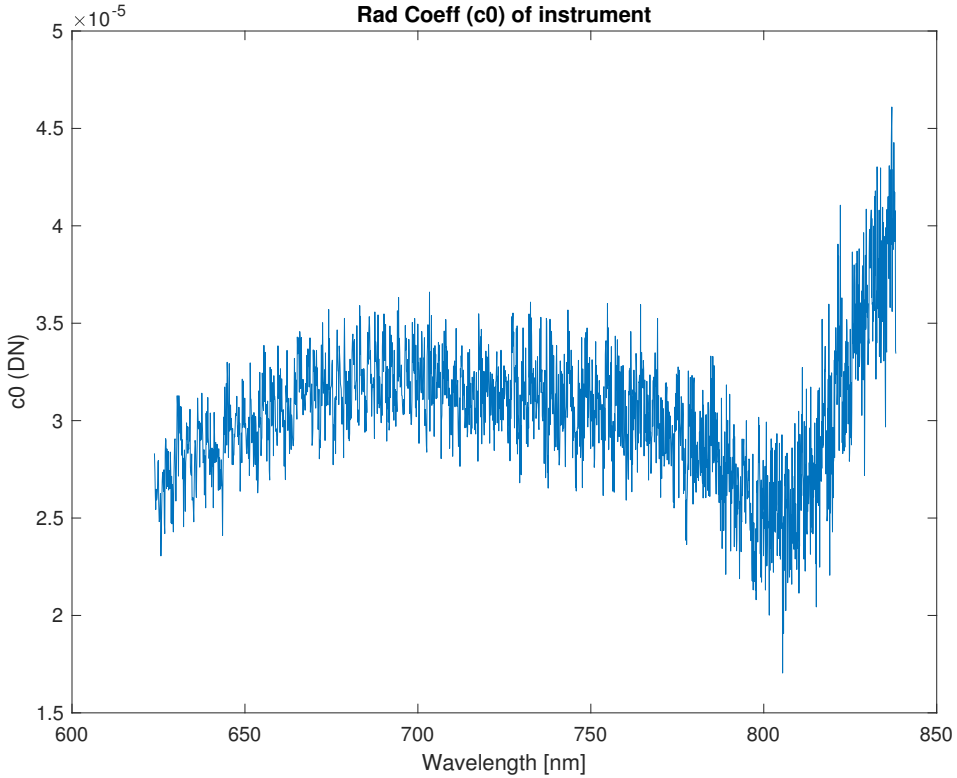
Determination of Calibration Coefficients





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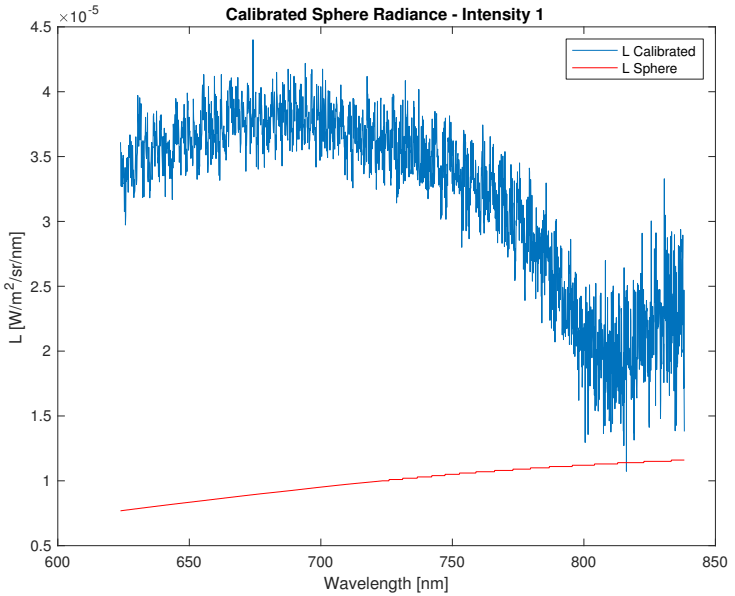
Data Calibration

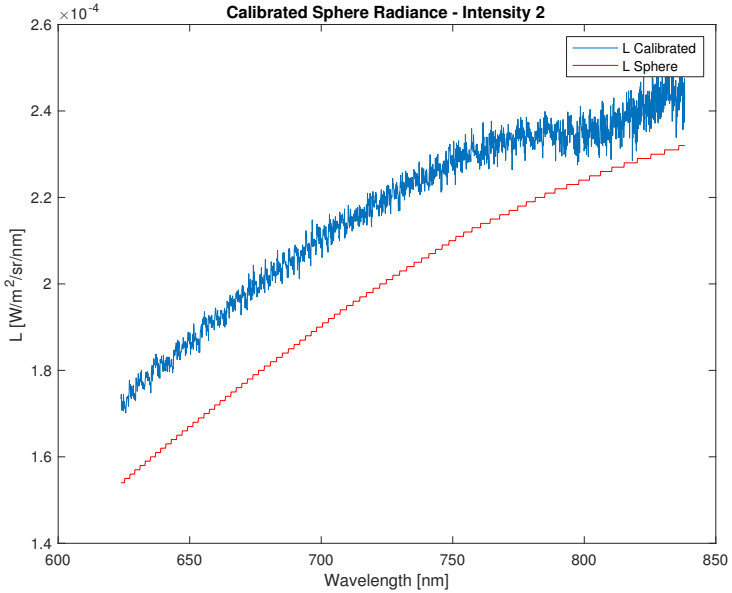
- This is the inversion of the instrument model: get L from measured DN

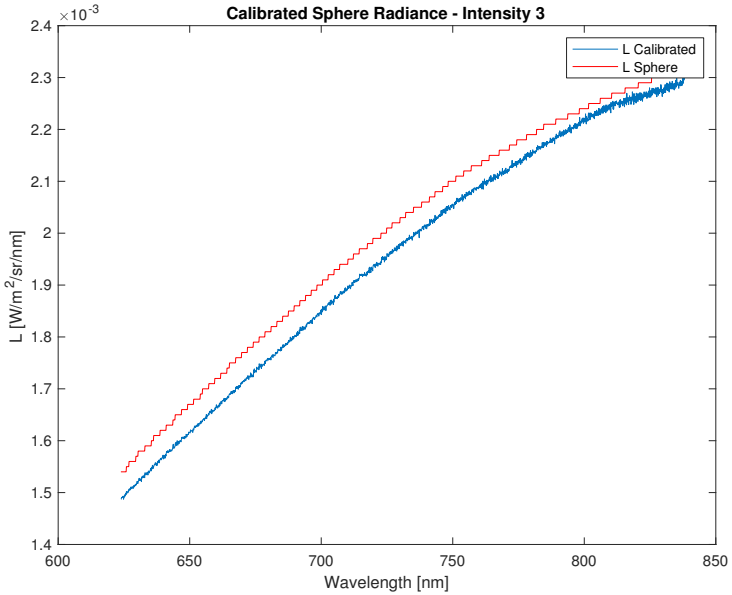
$$L = (DN - o) / gain$$

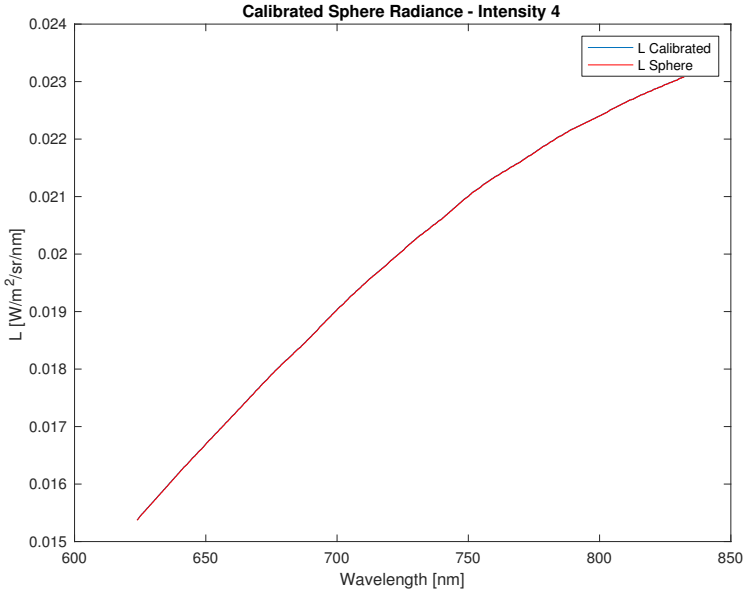
Data Calibration

Data calibration applied to all DN levels and comparison to sphere radiance









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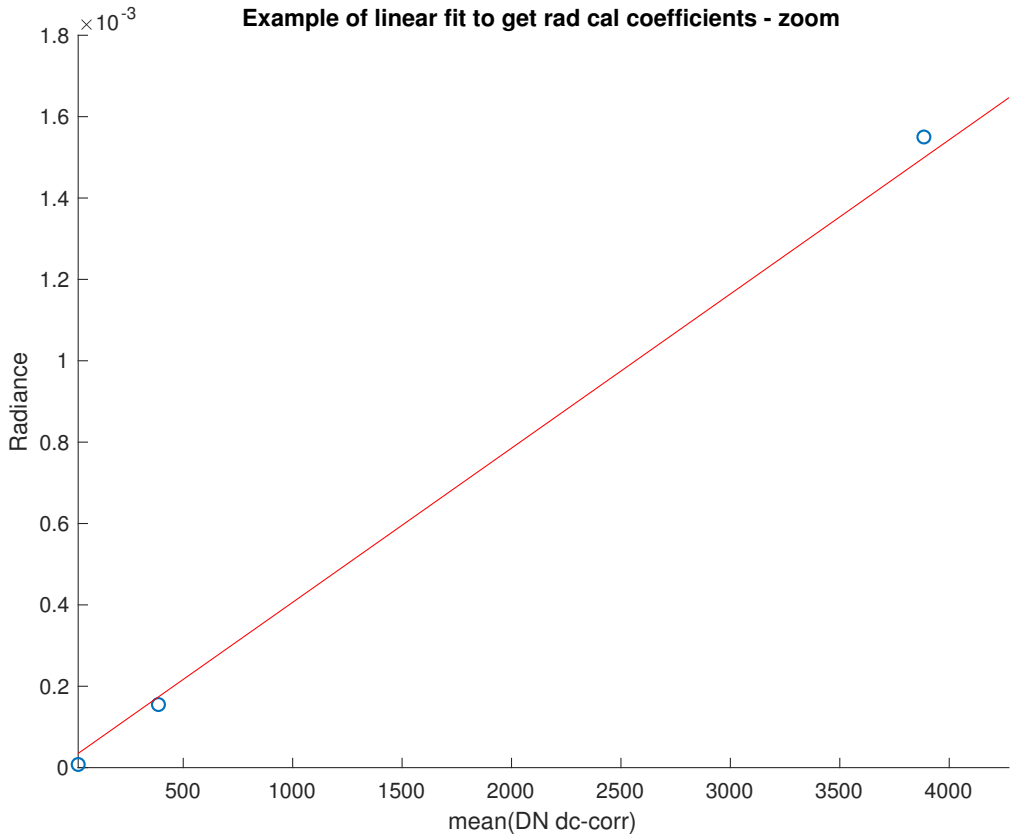
Is there something wrong with our calibration?



Errors for very low light levels: instrument is likely non-linear for low lights.

Possible solutions:

- Calibrate instrument in linear range
- Create a more complex model, e.g. 2nd order polynomial