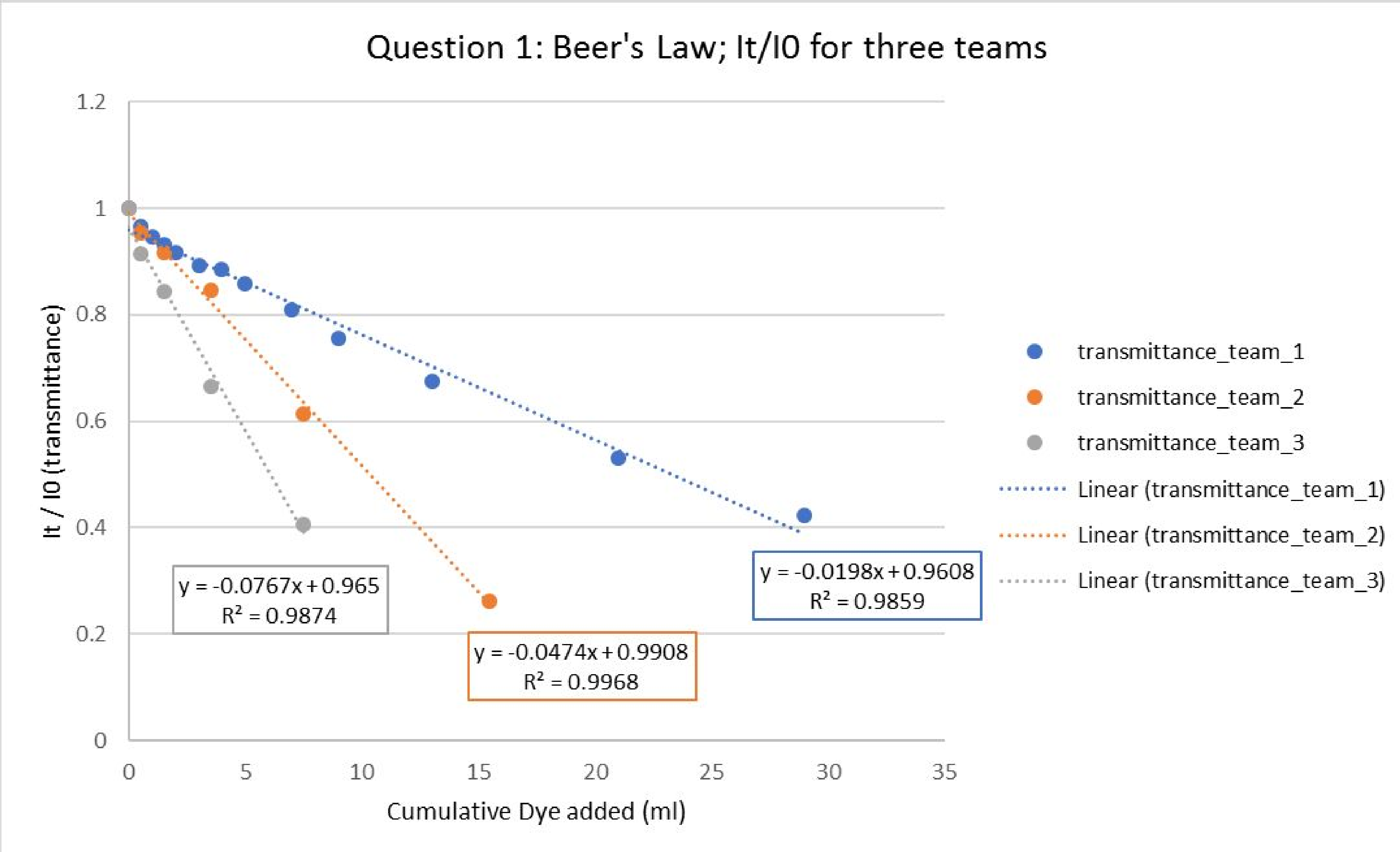
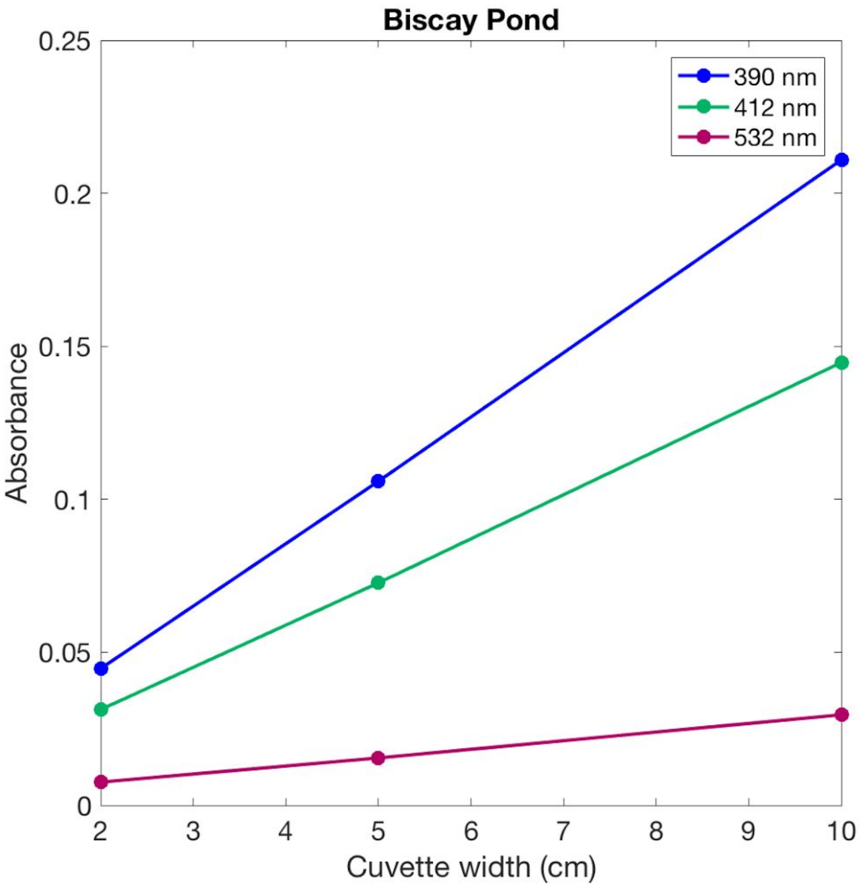
Lab 2: CDOM Absorption

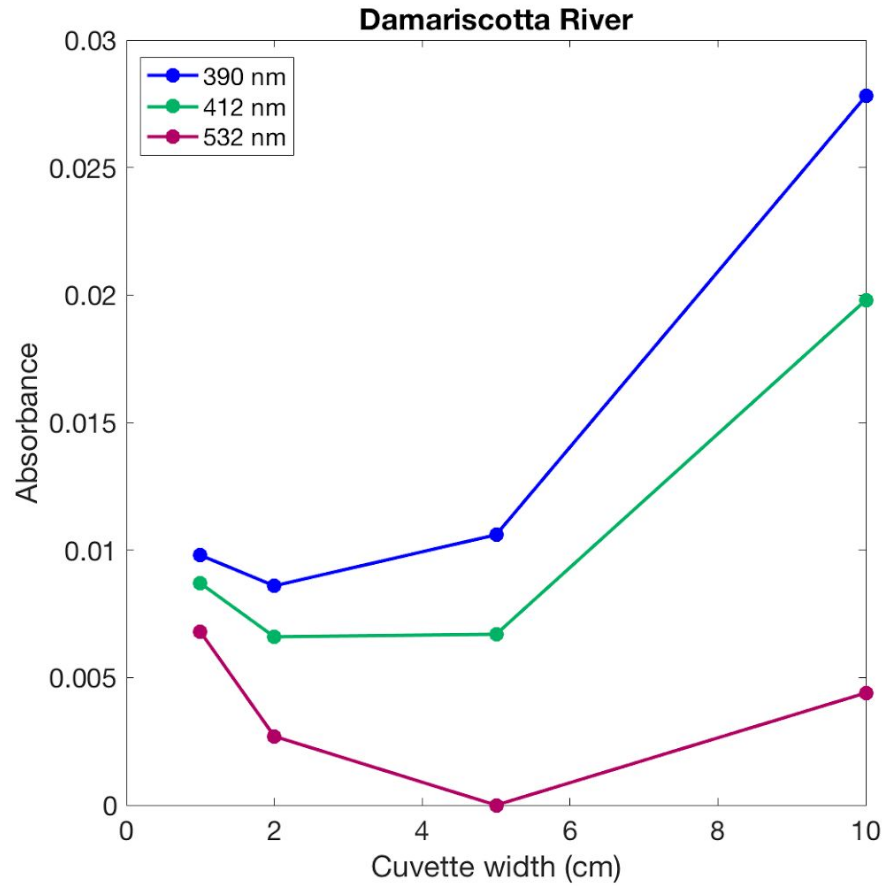
By: The Best Ocean Optics Class Yet

Beer's Law: Concentration

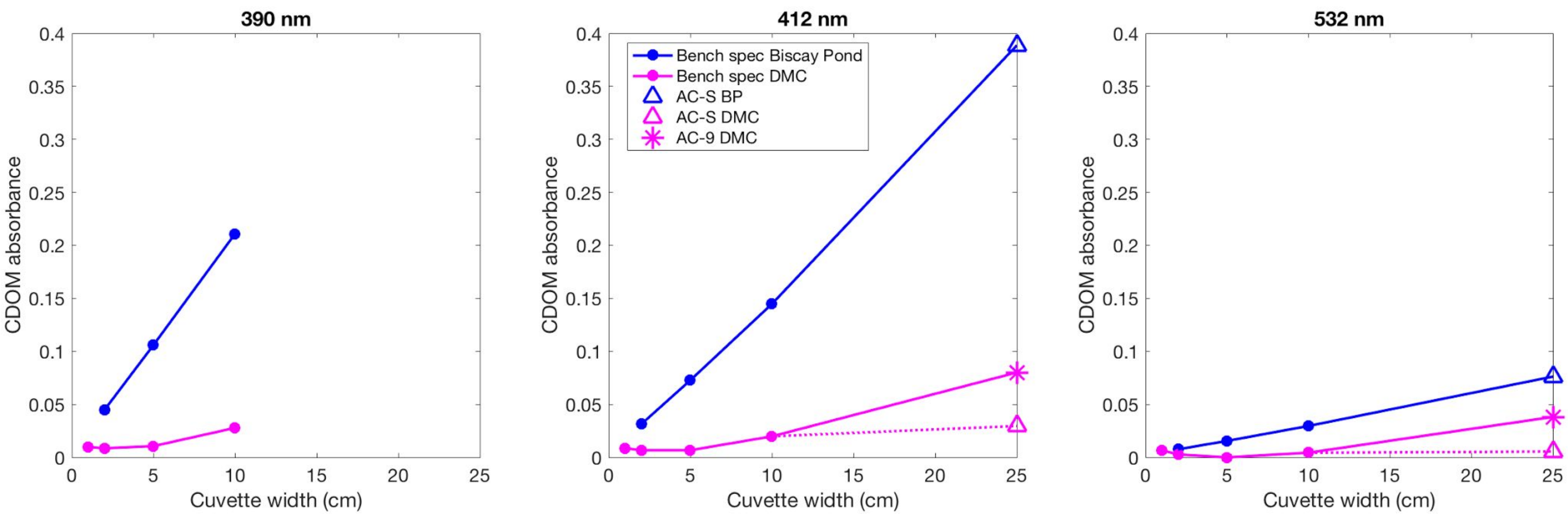


Beer's Law: Pathlength

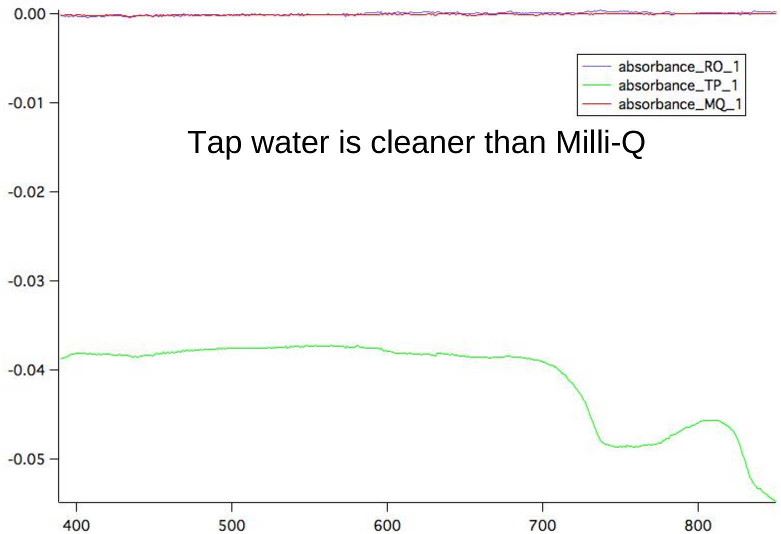




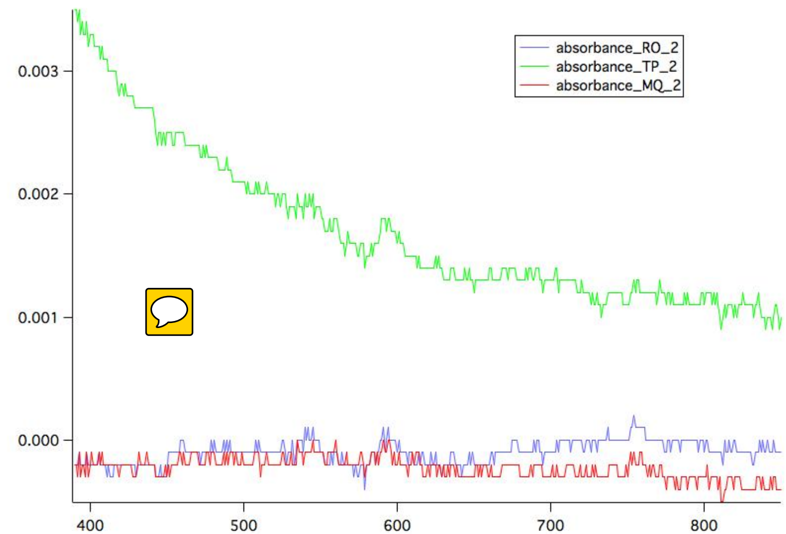
Beer’s Law: Pathlength



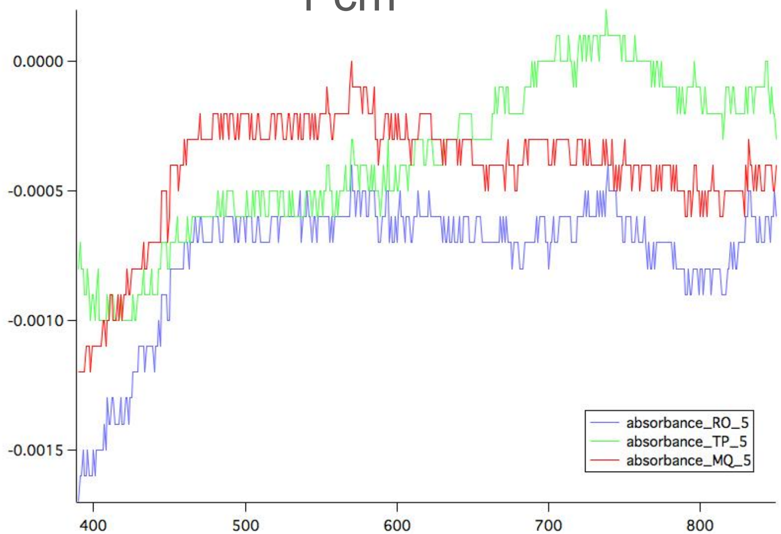
Comparison of RO and Tap Water Spectra



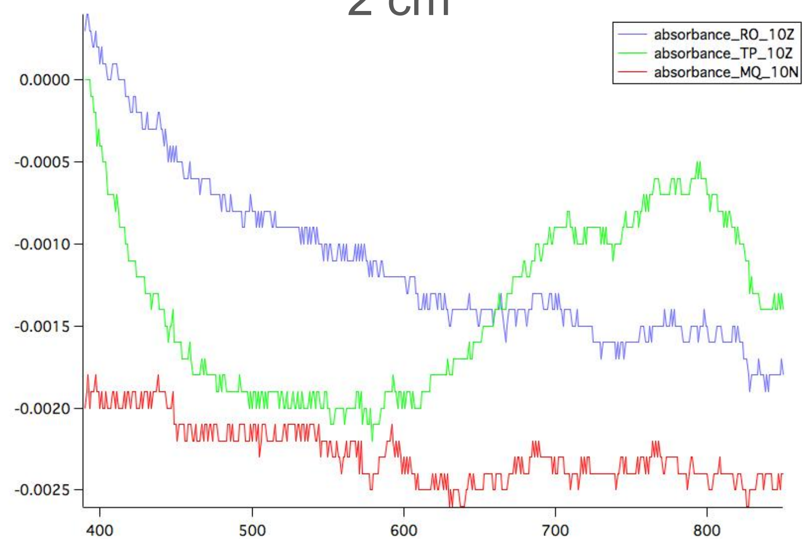
1 cm



2 cm

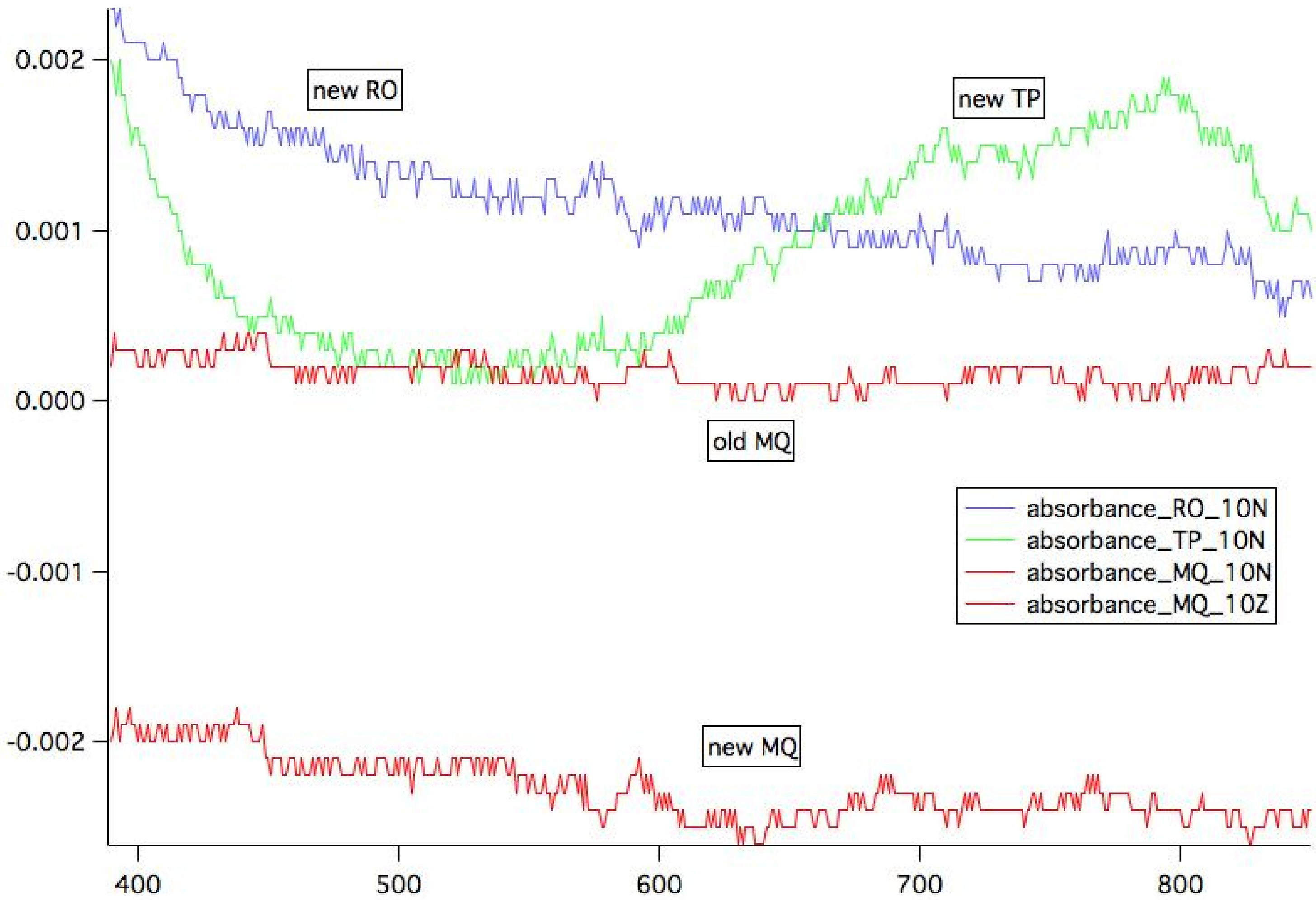


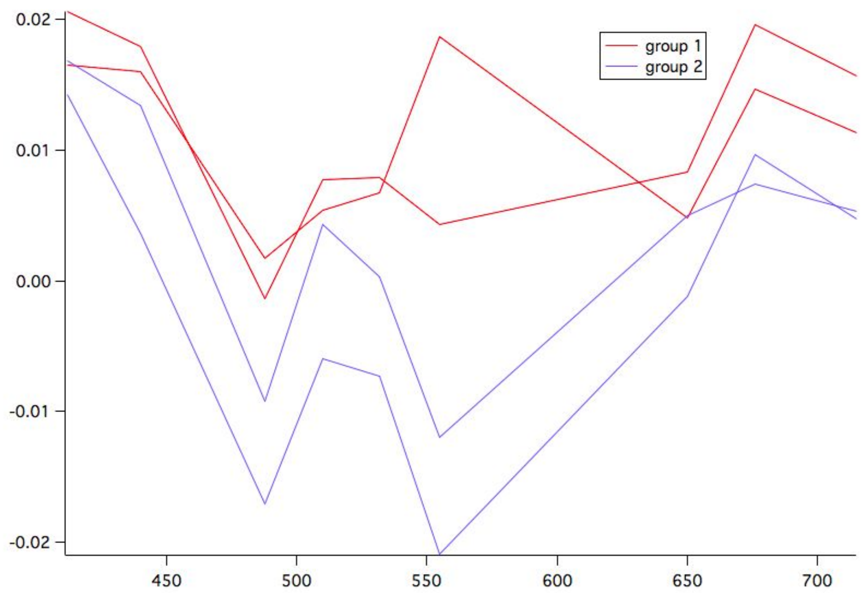
5 cm

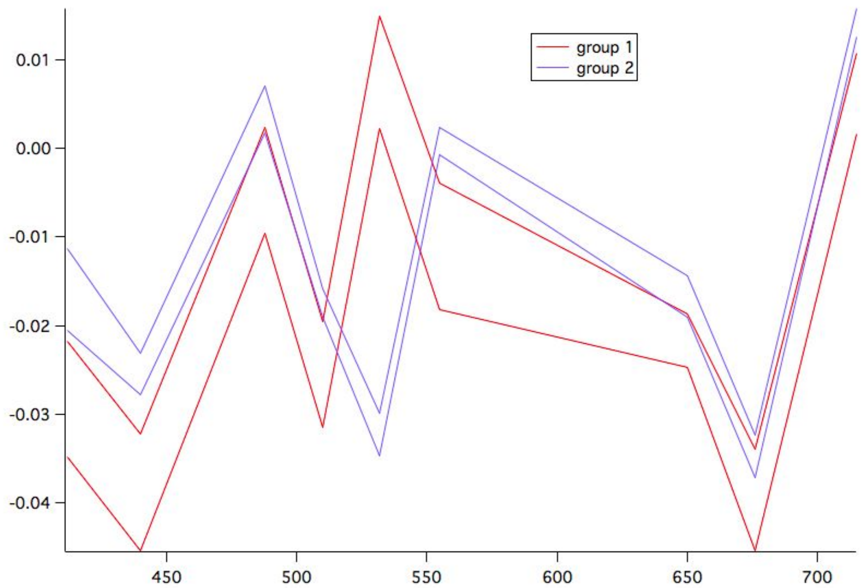


10 cm

Cuvette 10 cm Post-Correction







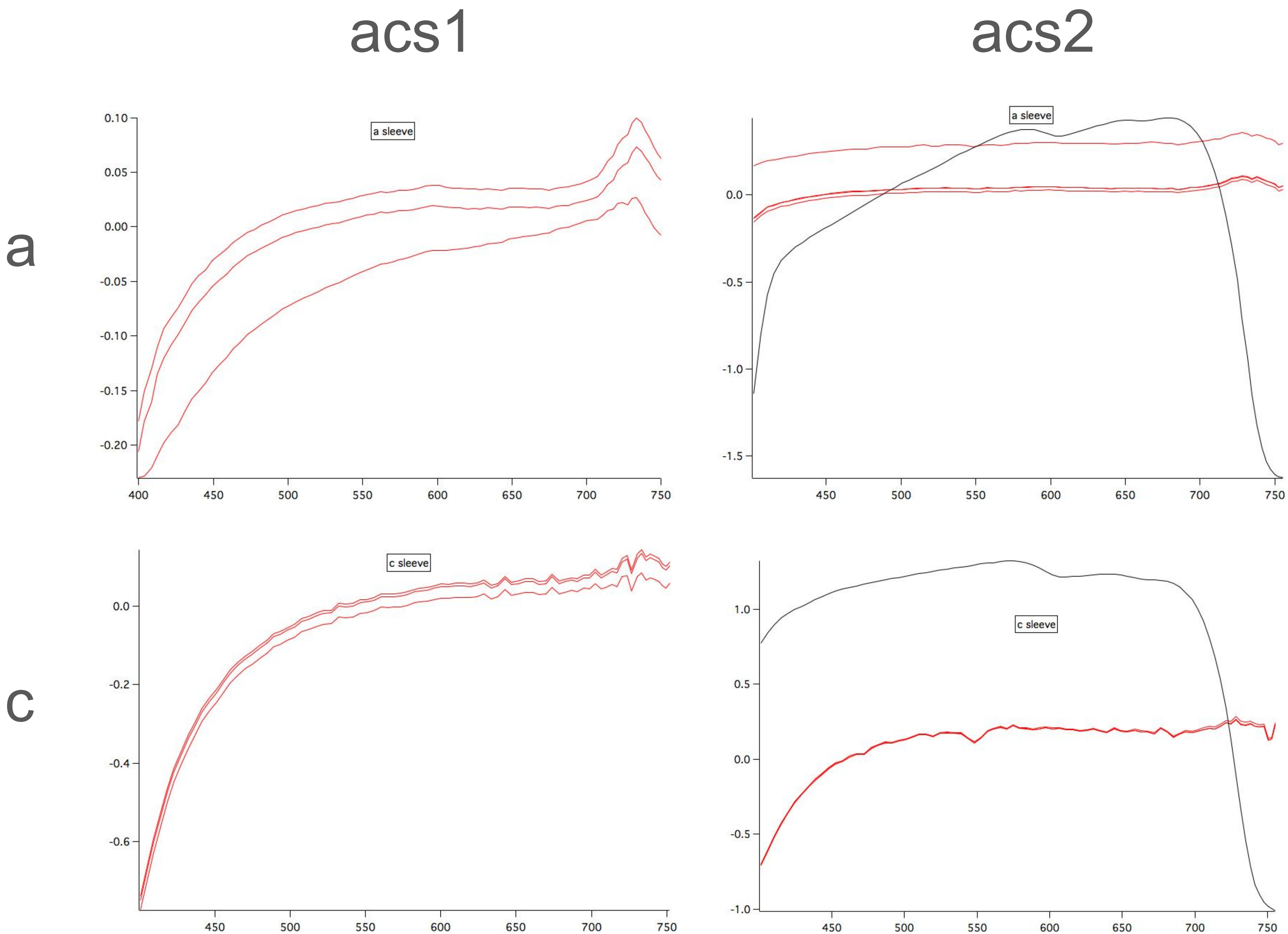
Pure Water Measurements: ac9

Absorption

- Largest variation in green
- Most wl measurements are within 0.005

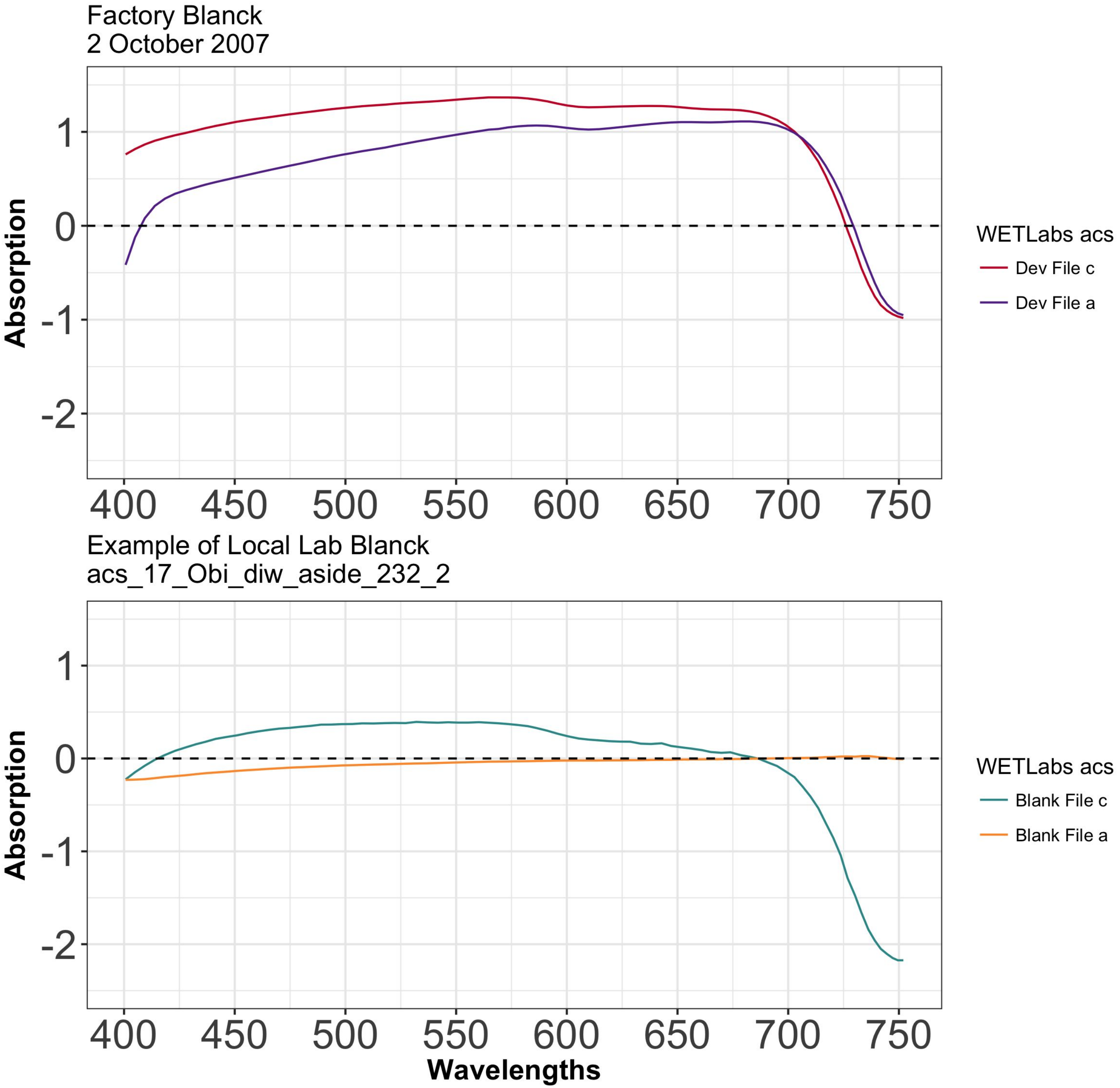
Attenuation

- Inversion at 532 nm



acs1
acs2
a
c
a sleeve
a sleeve
c sleeve
c sleeve
0.10
0.05
0.00
-0.05
-0.10
-0.15
-0.20
400
450
500
550
600
650
700
750
0.0
-0.5
-1.0
-1.5
-0.2
-0.4
-0.6
1.0
0.5

Spectrometer Blanks (2)



Calibration Discussion

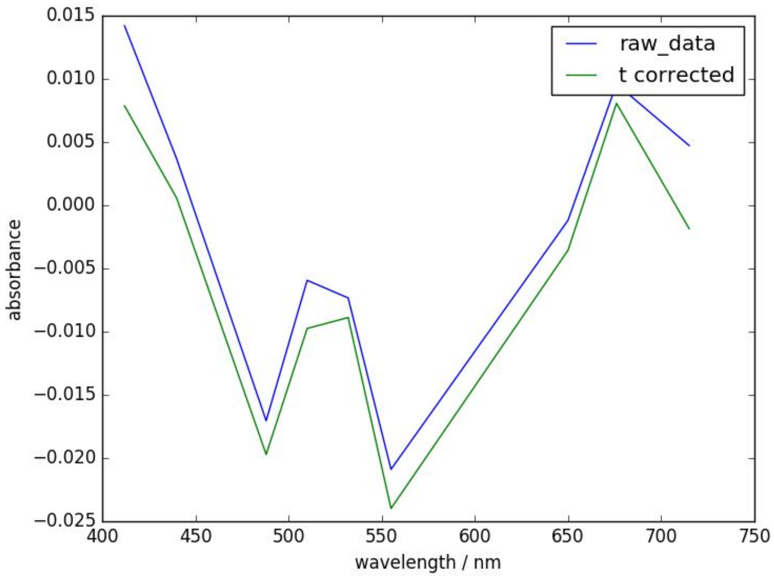
- Blanks signals are not similar to the device files ones
  - Sensor drift during travel, storage, over time
  - Temperature differences, ours 3-4 degs C warmer
  - Possible presence of bubbles
  - Differences in quality of water sample (MiliQ vs RO)

- Beyond… environment temperature is outside of usable instrument range, light leakage, dirty or scratched sensors

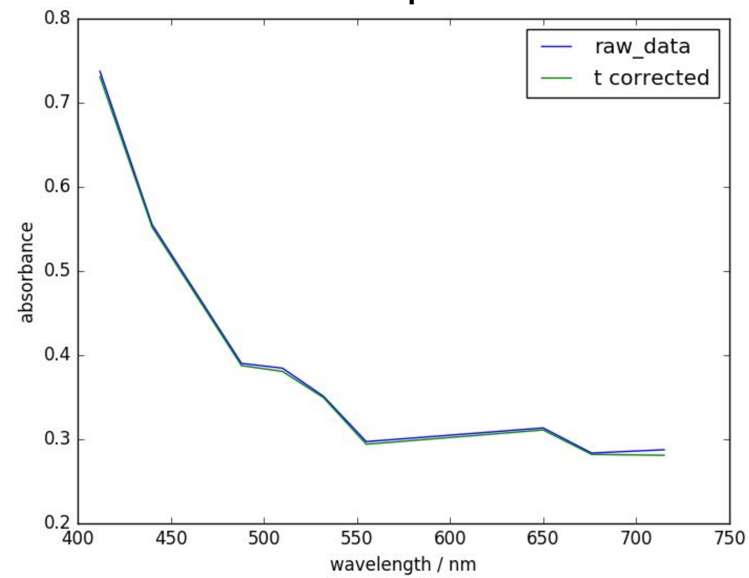
Temperature Effect: ac-9 (a tube)

DMC Dock

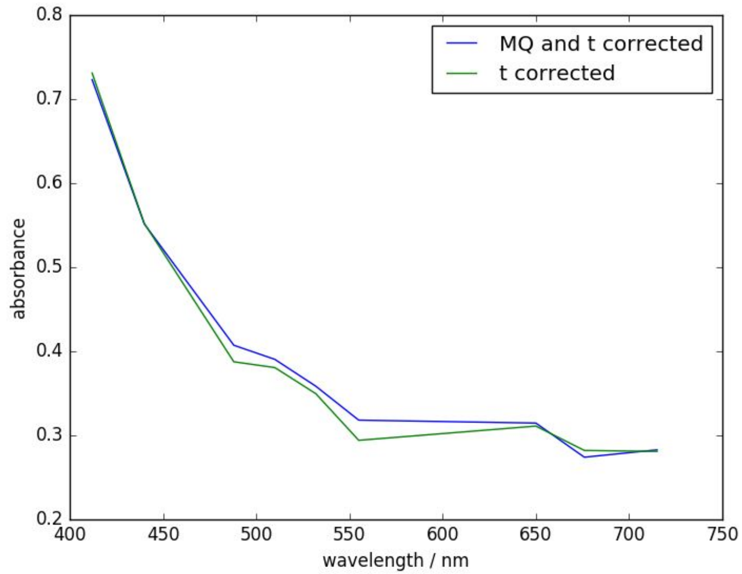
Milli-Q



Sample



Sample Reference Corrected

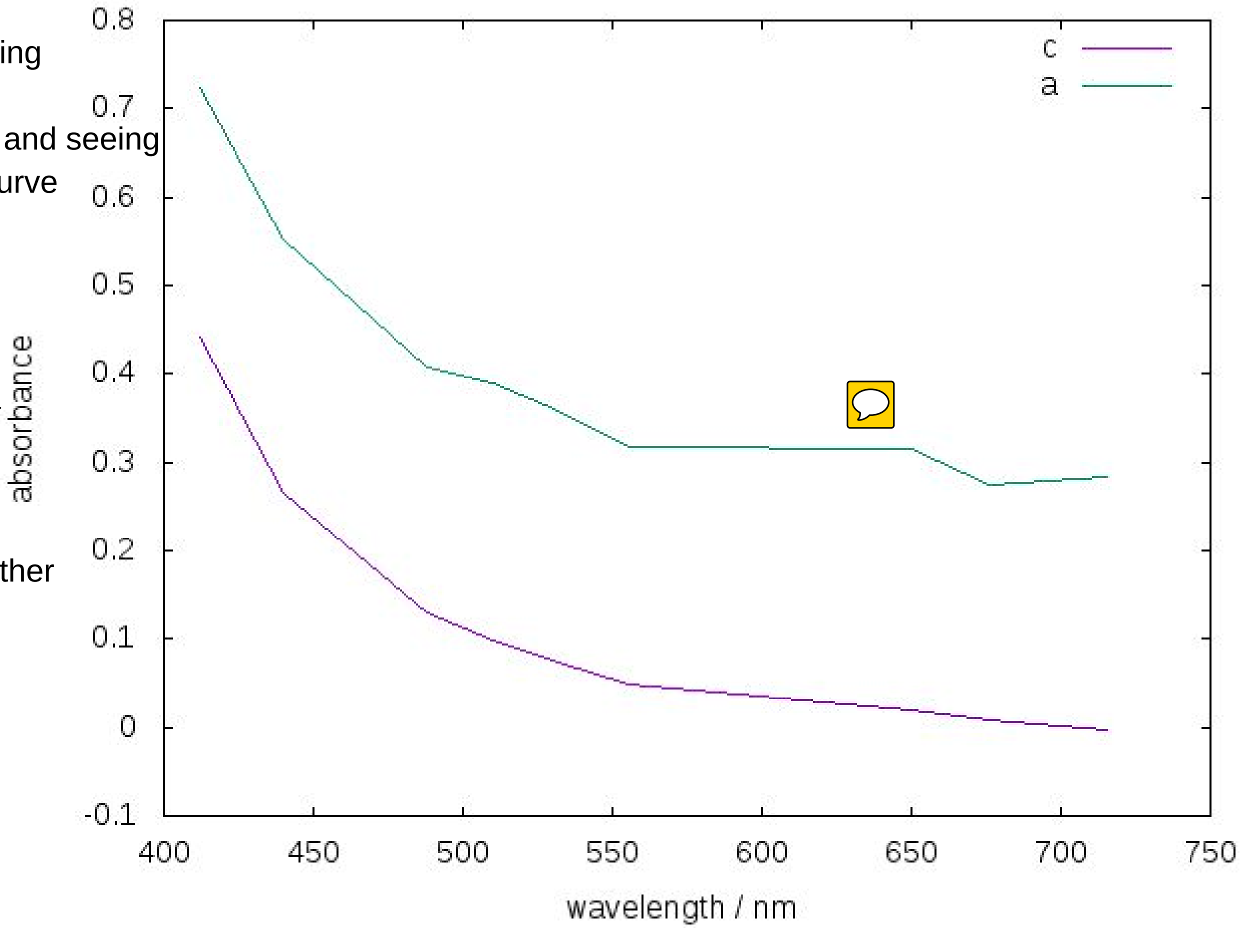


Comparison of A and C Tube

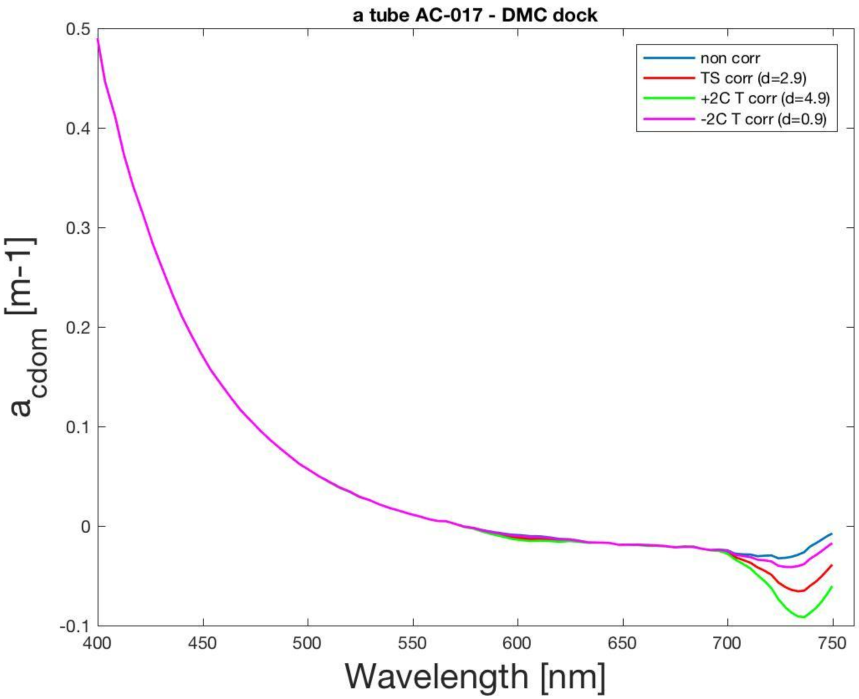
C should be higher than a because this is a sample of CDOM
C looks okay
A is too high - maybe it could be bubbles

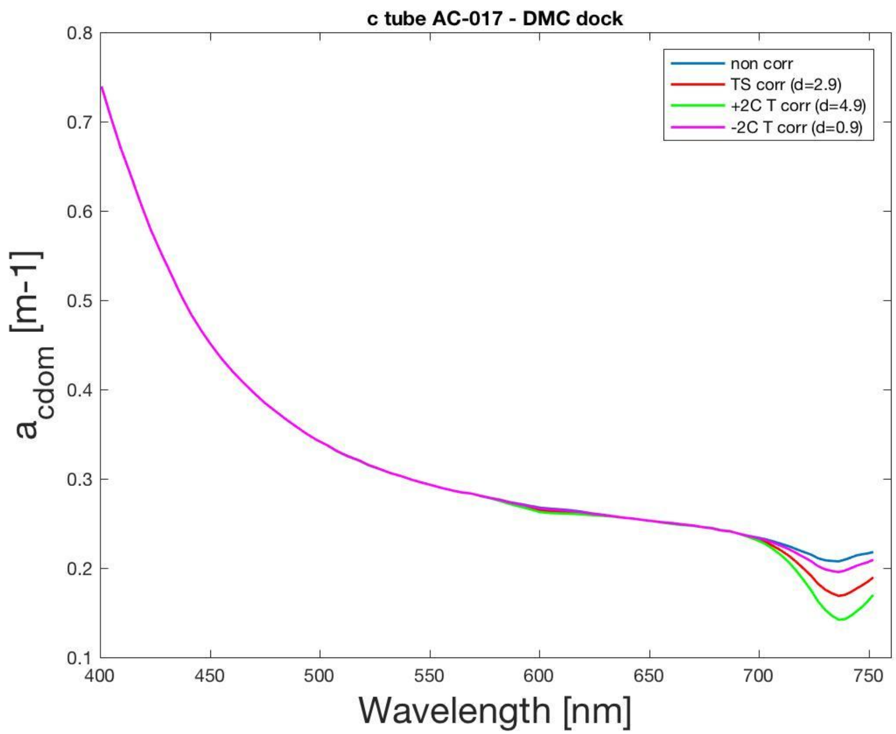
You can make a fake CDOM plot using the coefficients from Collin's paper and seeing if the exponential curve from the published numbers is close to yours

You can also use a vicarious calibration by using the c calibration on the other ones

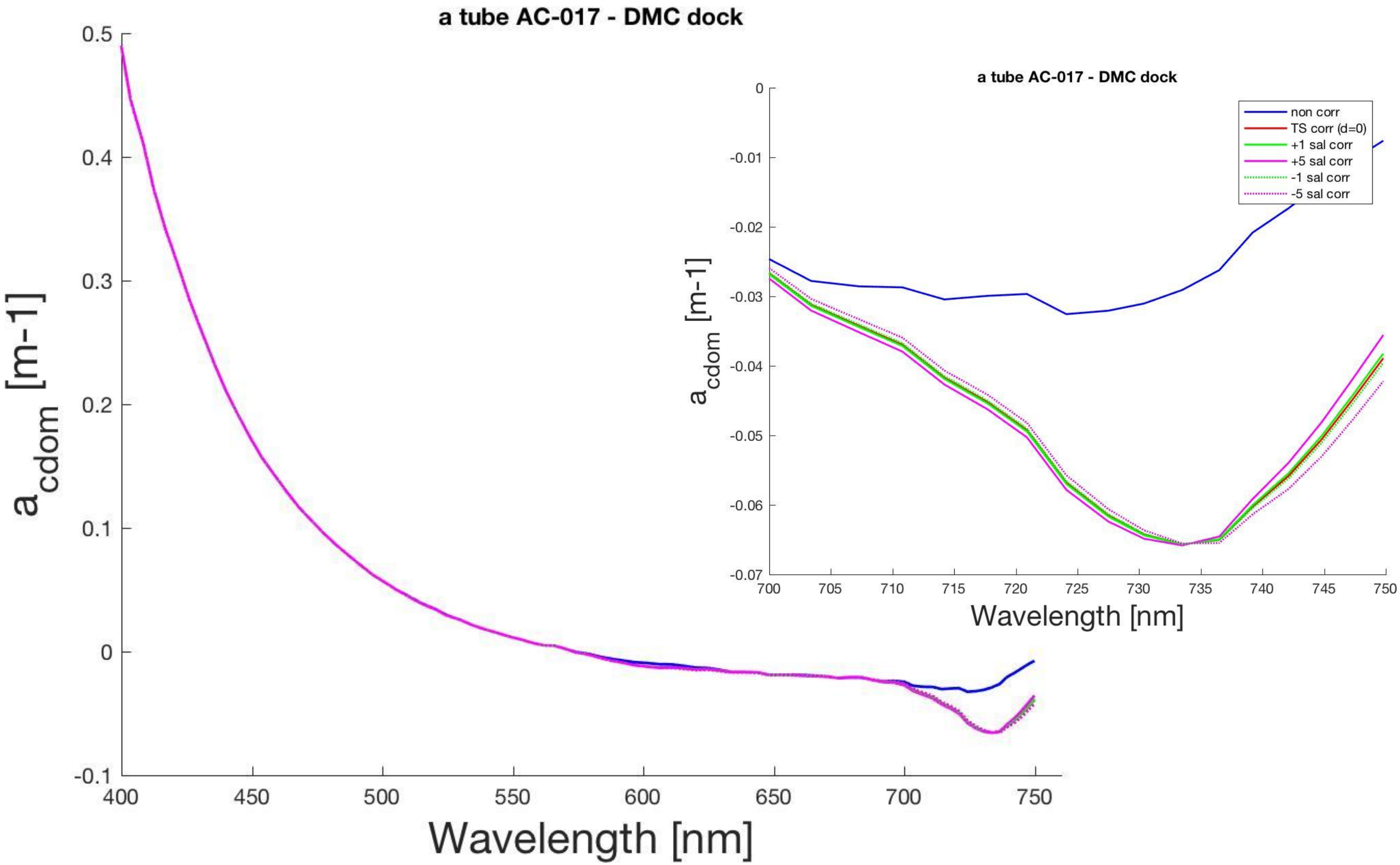


Temperature Effect on DMC dock sample: ac-S

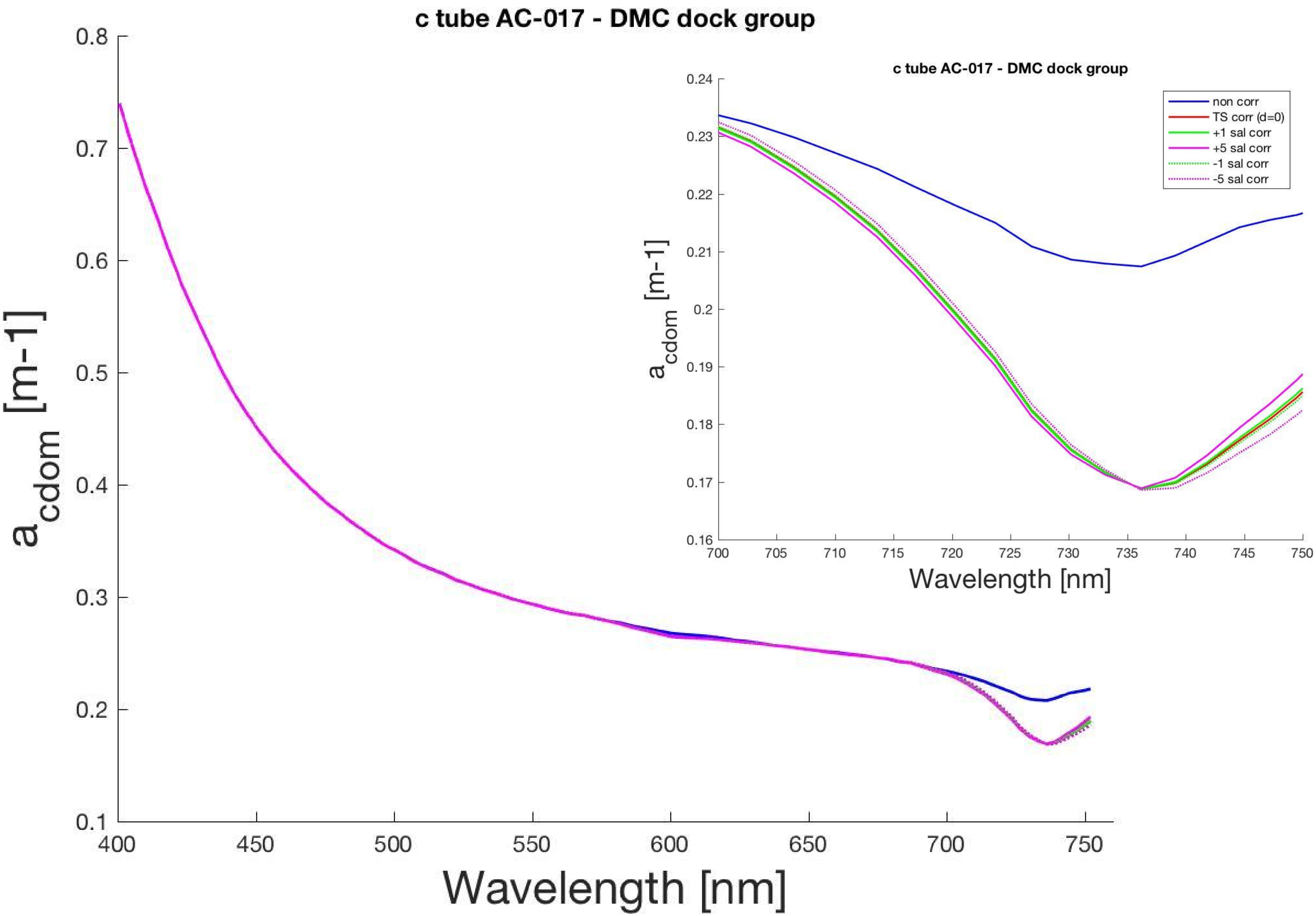




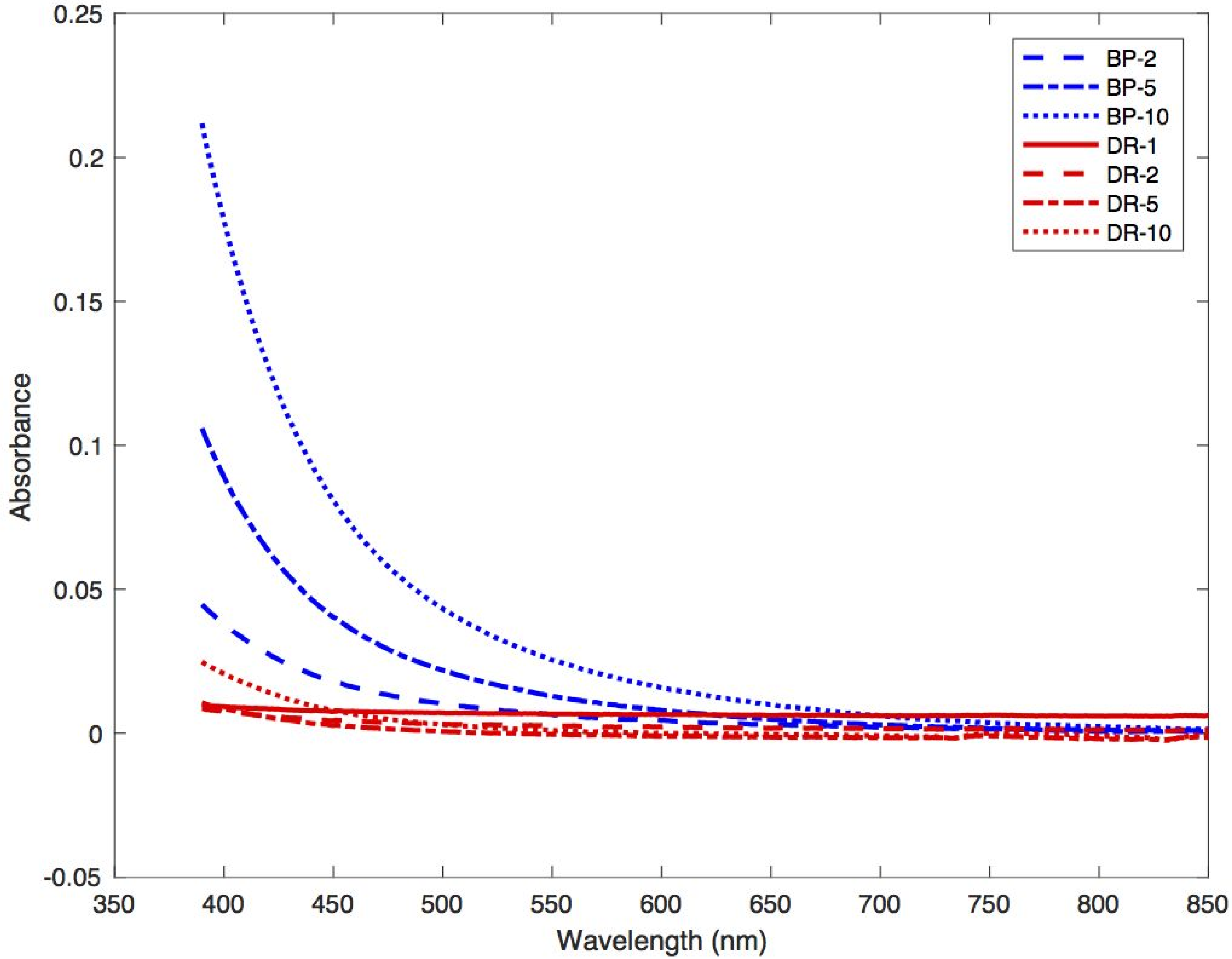
Salinity Correction on DMC dock sample: ac-S



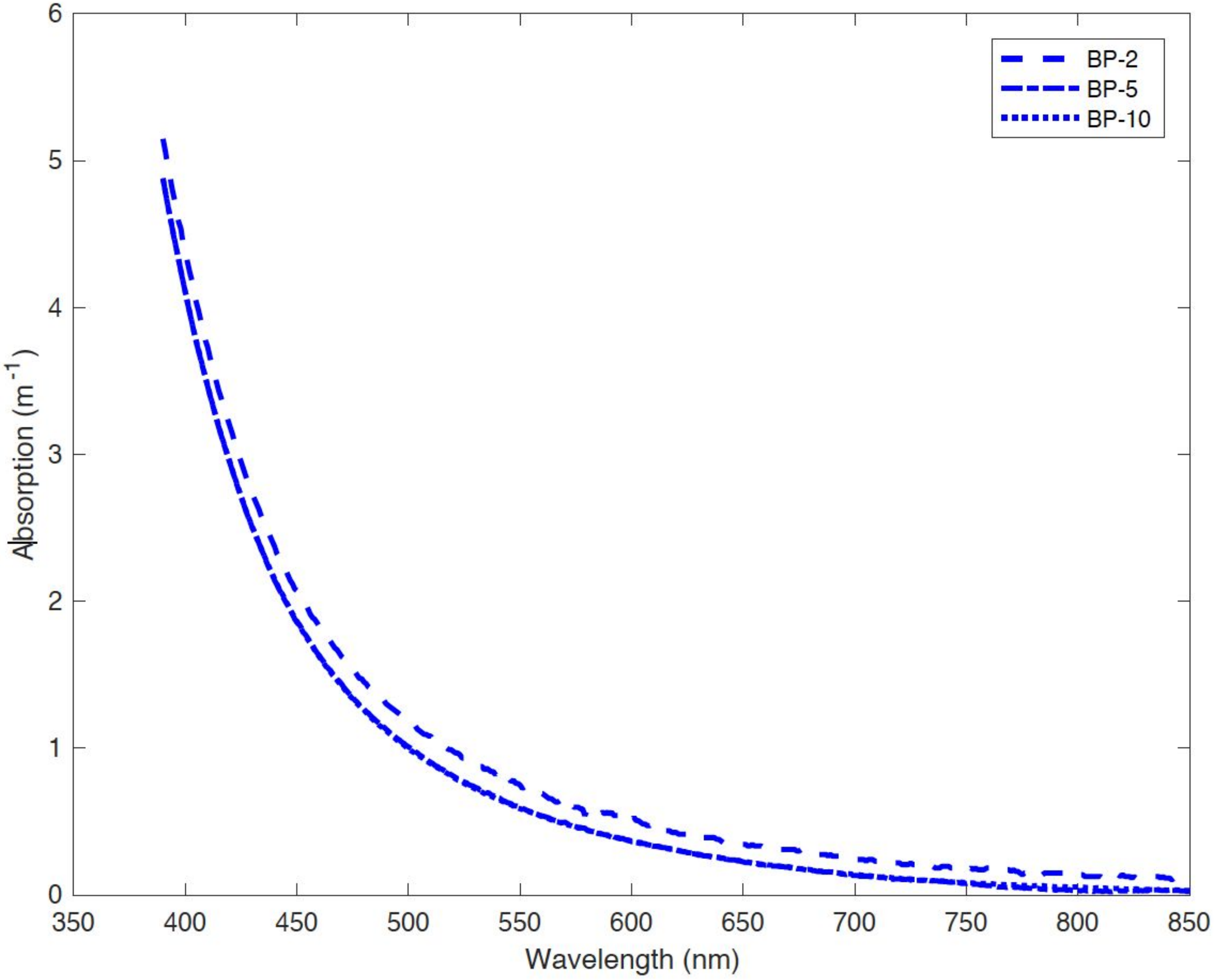
Salinity Correction on DMC dock sample: ac-S



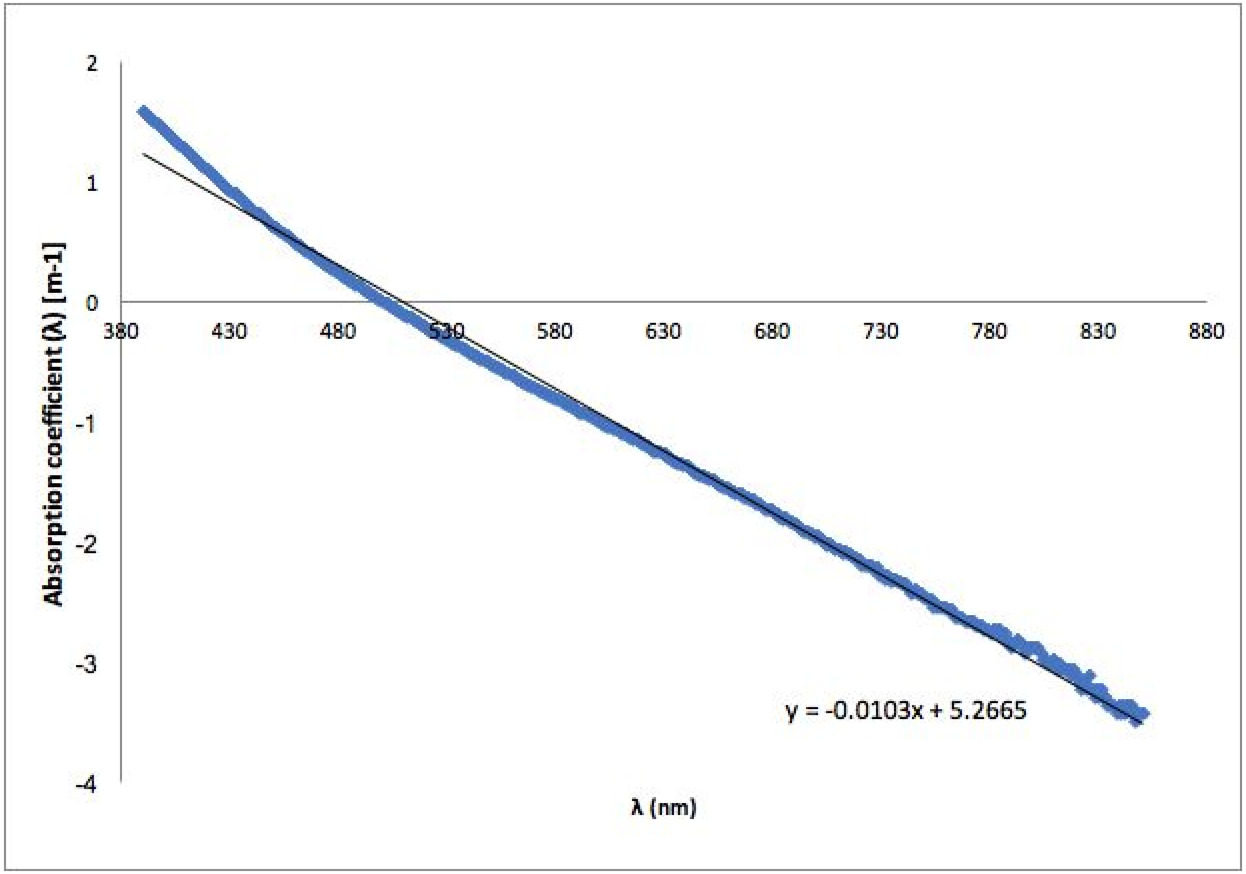
Absorbance Plots By Site



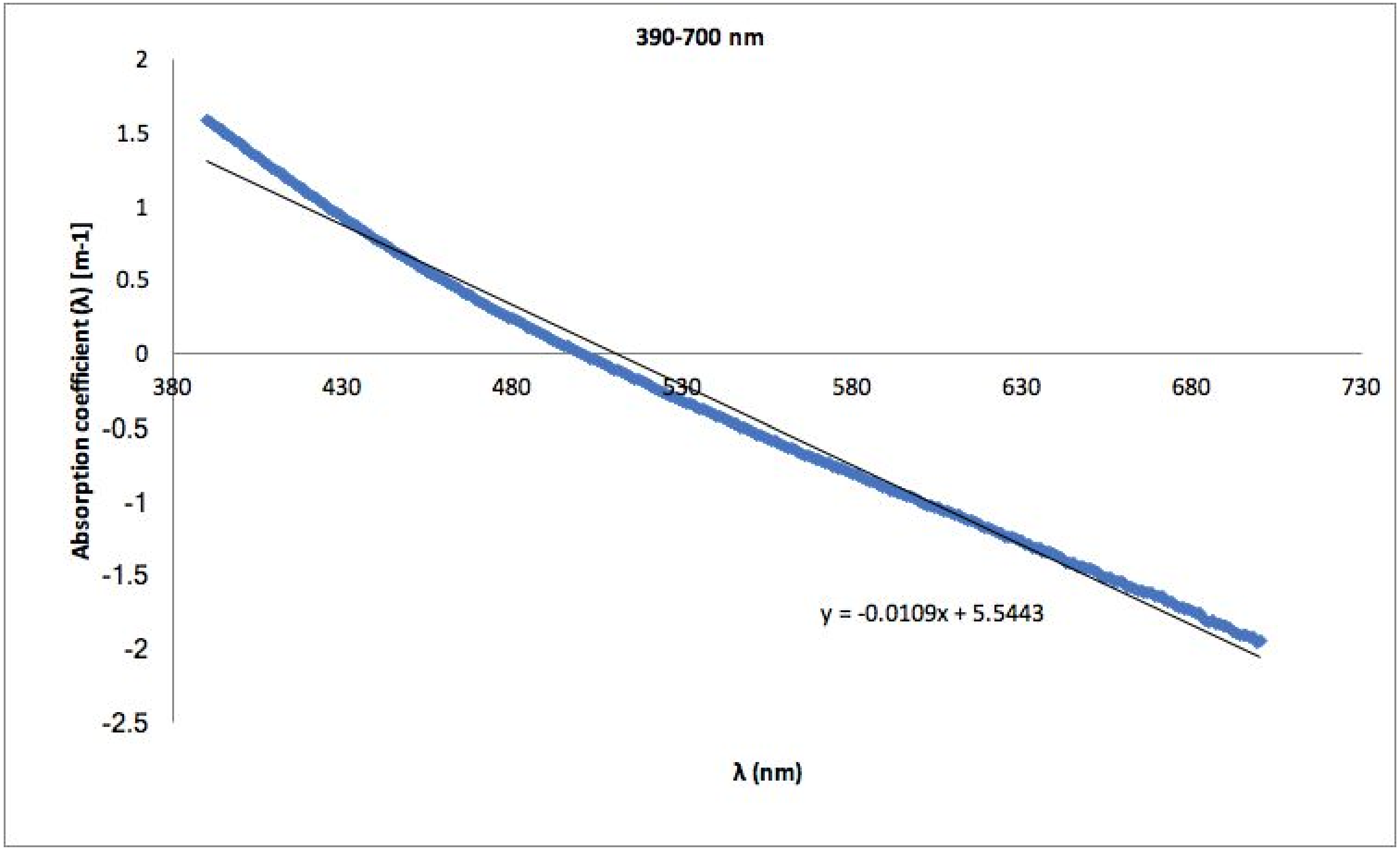
Absorption Plots by Path Length



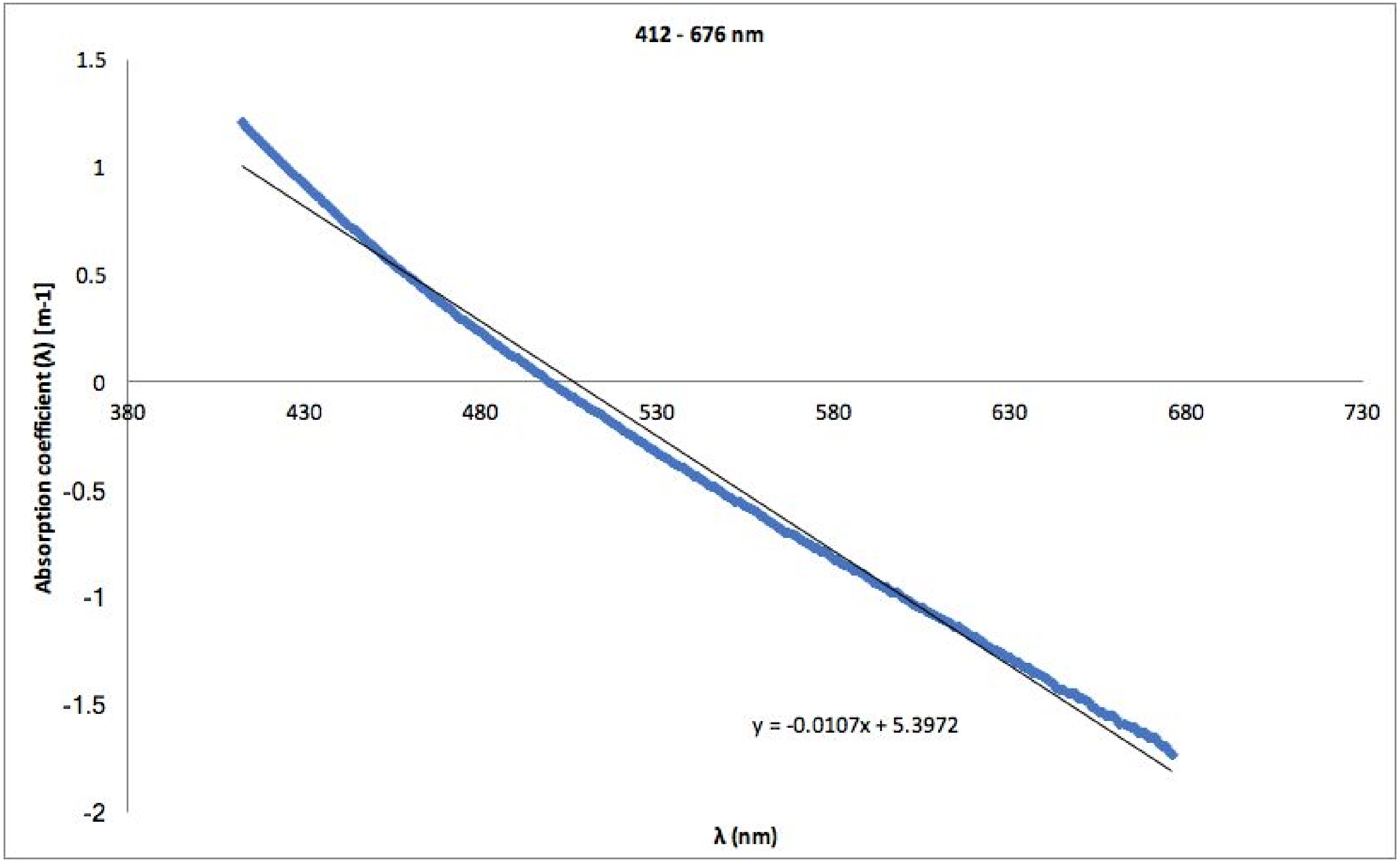
Spectral slopes (all wavelengths)



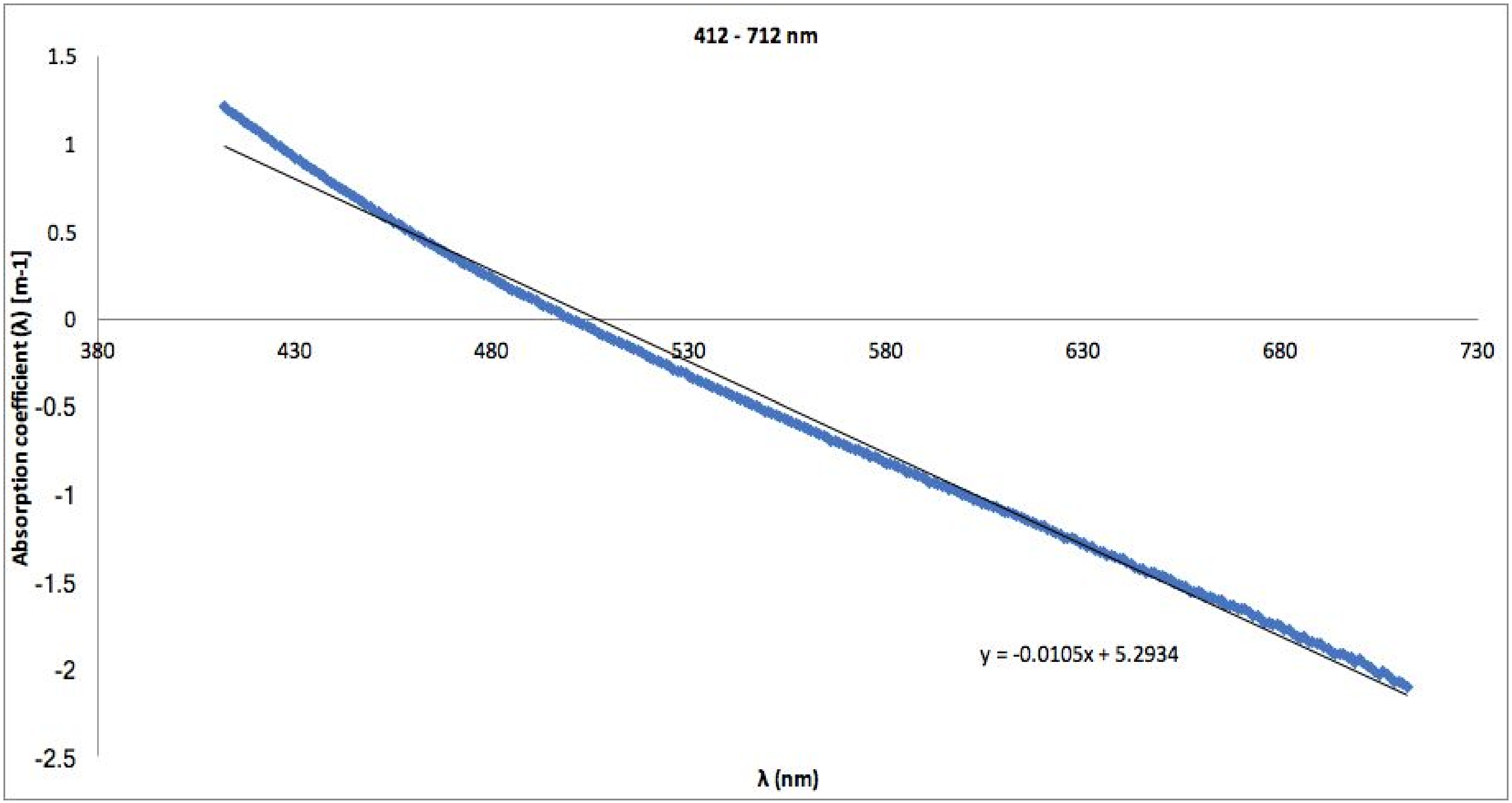
Spectral slopes (390-700 nm)



Spectral slopes (412-676 nm)



Spectral slopes (412-712 nm)



Spectral slopes (300-500 nm)

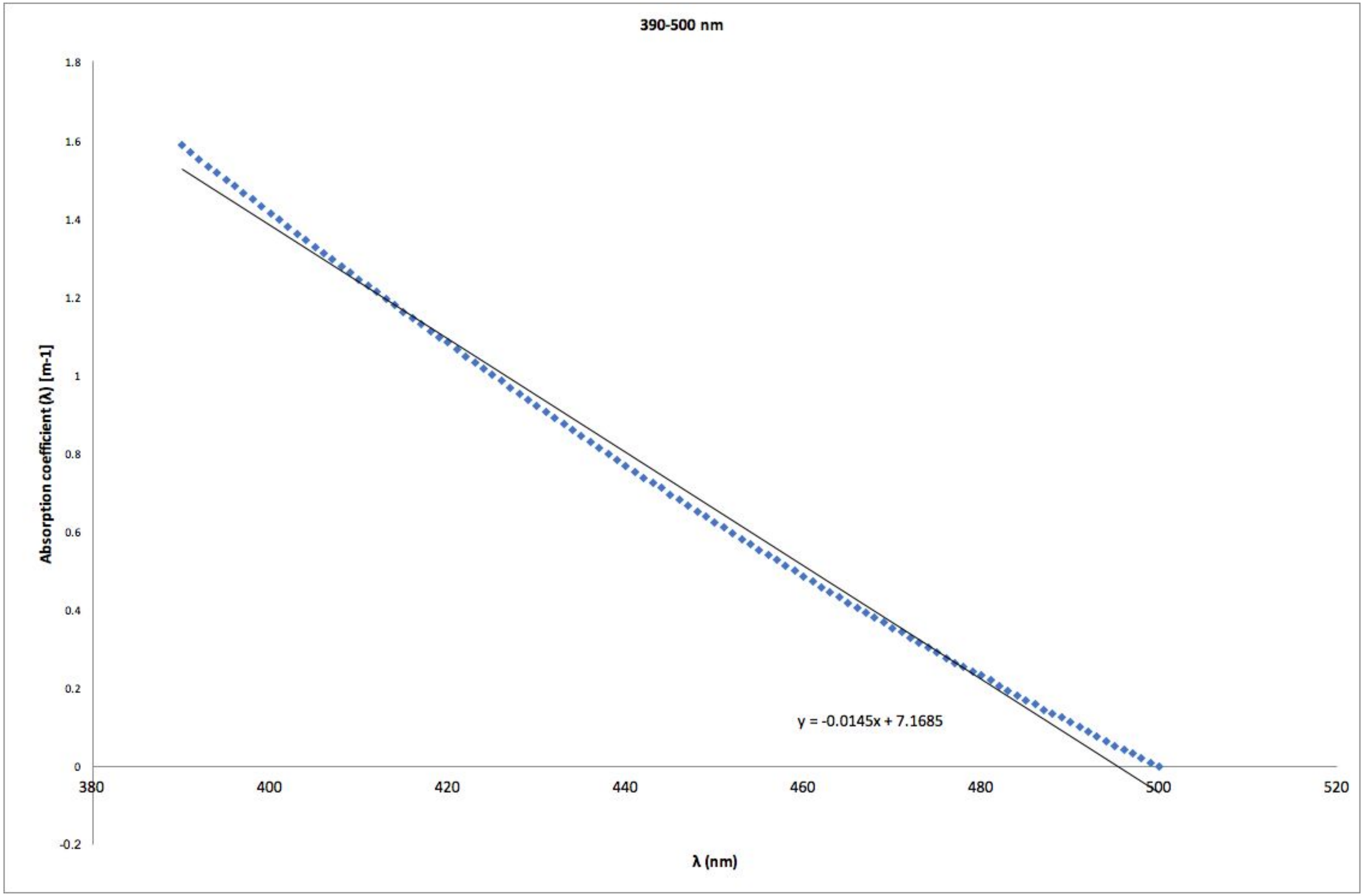


Table 1. Ranges for the exponential coefficient, $C2_x$, for gelbstoff and detritus for Eq. 6. Where coefficients were not listed, values were approximated from published spectra using an exponential model.

Reference	Site	Avg $C2_x$ (nm^{-1})
Gelbstoff		
Kalle 1966	Baltic, North Sea	0.018
Jerlov 1968		0.015
Kirk 1976	Lakes, coast	0.015
Lundgren 1976	Baltic	0.014
Kopelevich and Burenkov 1977	Indo-Pacific	0.017
Bricaud et al. 1981	Baltic	0.018
	Mauritania	0.015
	Gulf of Guinea	0.014
	Mediterranean	0.014
Okami et al. 1982	East Pacific	0.017
Kishino et al. 1984	Lake Kizaki	0.016
	Nabeta Bay	0.015
	East Pacific	0.014
Carder and Steward 1985	Gulf of Mexico	0.014
Davies-Colley and Vant 1987	Lakes	0.019
Maske and Haardt 1987	Kiel Harbor	0.016
Published mean ± SD		0.016±0.002
This study mean ± SD	San Juan Islands	0.017±0.003
Carder et al. 1989	Marine humic acid	0.011
	Marine fulvic acid	0.018
Detritus		
Kishino et al. 1986	NW Pacific Ocean	0.006
Maske and Haardt 1987	Kiel Harbor	0.014
Iturriaga and Siegel 1988	Sargasso Sea	0.011
Cleveland and Perry in prep.	Sargasso Sea	0.013
Morrow et al. 1989	Sargasso Sea	0.009
Published mean ± SD		0.011±0.002
This study mean ± SD	San Juan Islands	0.011±0.002