

Supplemental Information for:

Mapping water quality in nearshore reef environments using airborne imaging spectroscopy

By: Kelly L. Hondula, Marcel König, Brice K. Grunert, Nicholas R. Vaughn, Roberta E. Martin, Jie Dai, Elahe Jamalnia, and Gregory P. Asner

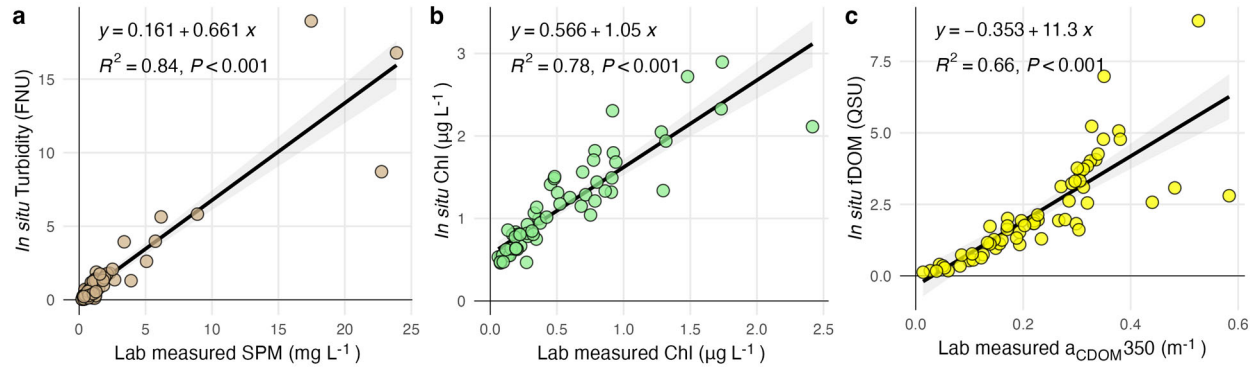


Figure S1. Relationship between field and laboratory measurements of water quality parameters.

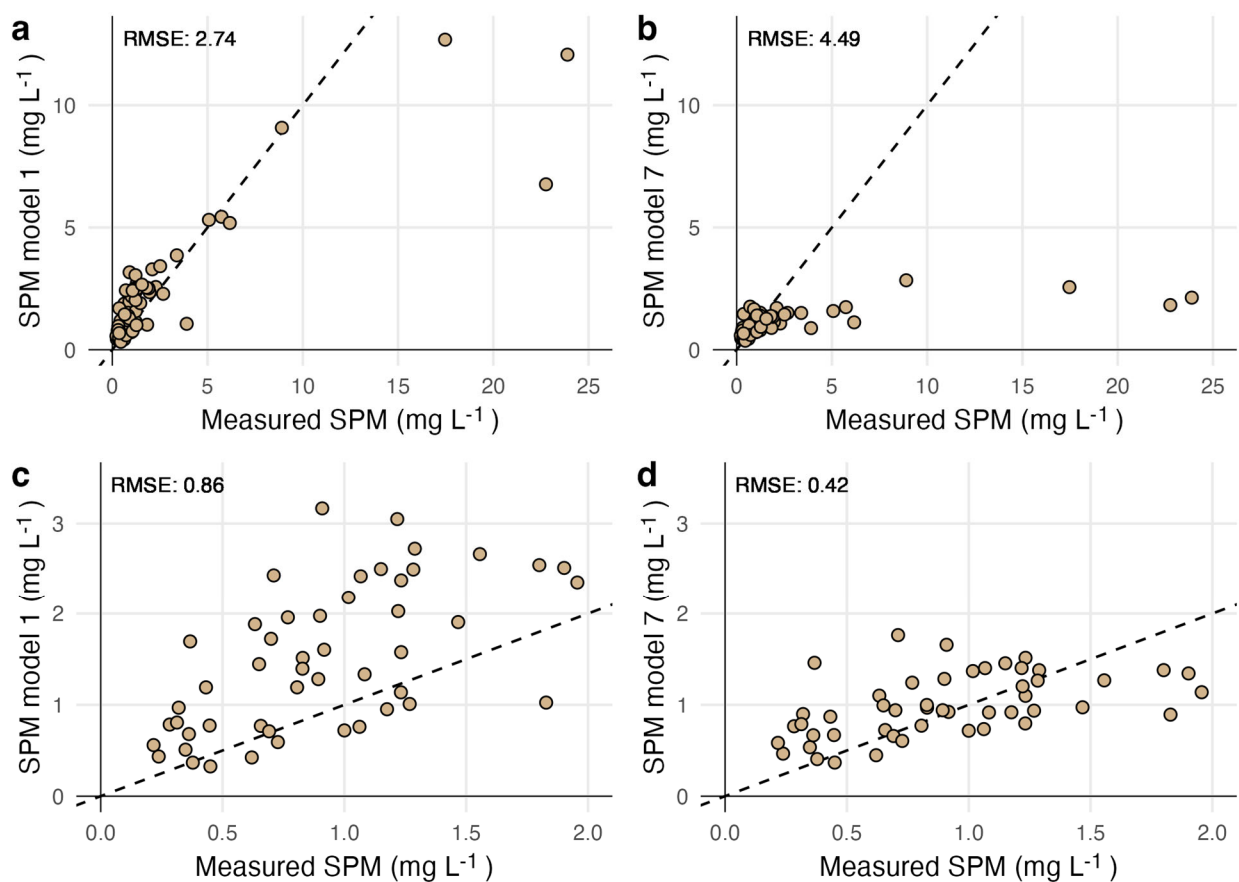


Figure S2. Comparison of SPM 1 (a, c) and SPM 7 (b, d) model estimates over the full range of measured SPM values (top row, $n = 62$), and for only stations with measured SPM less than 2 mg L^{-1} (bottom row, $n = 49$). Dashed lines indicate a 1:1 relationship.

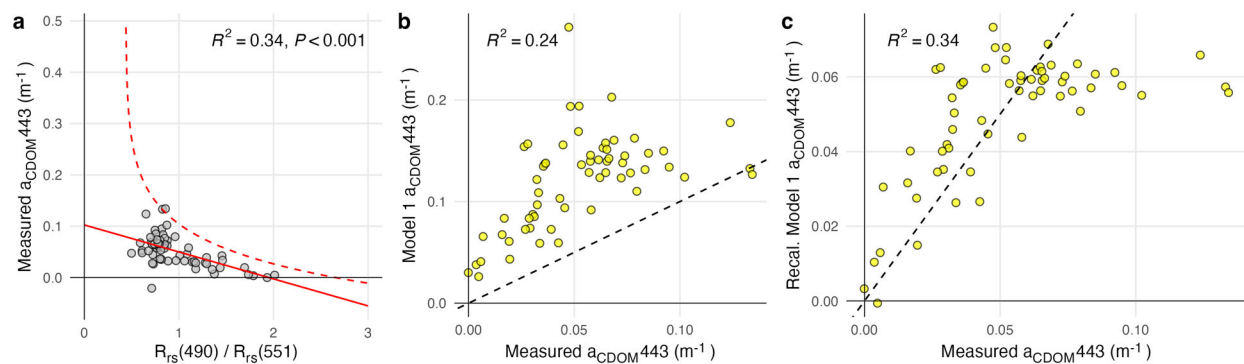


Figure S3. CDOM model estimates before and after recalibration. (a) Relationship between the ratio $R_{rs}(490)/R_{rs}(551)$ and measured $a_{CDOM}(443)$. The dashed red line shows the Model 1 relationship using original coefficients and the solid red line shows the recalibrated model. Center and right panels show the performance of the original (b) and recalibrated (c) model CDOM 1, as the relationship between estimated and measured $a_{CDOM}(443)$. In (b) and (b) the dashed line indicates a 1:1 relationship.

Table S1. Model performance on ISOFIT 4C corrected spectra for all models tested. Accuracy and sensitivity refer to classification above or below the selected thresholds for each parameter as described in Section 2.3 of the main text. For CDOM algorithms, % wins only compares algorithms with the same reference wavelength. ** Indicates models applied using re-calibration coefficients for this study. See the main text for model descriptions.

	RMSE	R ²	MAE	Bias	%wins	Accuracy	Sensitivity
Suspended particulate matter models							
SPM 1	2.74	0.76	1.20	-0.08	18%	62%	89%
SPM 2	3.29	0.58	1.49	-1.31	11%	48%	44%
SPM 3	3.31	0.61	1.67	-1.35	10%	45%	89%
SPM 4	3.34	0.64	1.54	-0.06	8%	40%	89%
SPM 5	3.53	0.62	2.39	1.77	8%	31%	89%
SPM 6	3.76	0.52	1.72	0.70	23%	57%	89%
SPM 7	4.49	0.39	1.63	-1.30	23%	67%	0%
Chlorophyll <i>a</i> models							
Chl 1 **	0.46	0.16	0.29	-0.11	96%	62%	42%
Chl 12	0.74	0.05	0.55	-0.22	15%	44%	25%
Chl 2	9.23	0.05	6.79	6.76	0	50%	100%
Chl 3	11.6	0.06	5.48	5.48	0	53%	100%
Chl 7	11.9	0	5.11	0.13	2%	46%	25%
Chl 4	13.6	0	9.96	-6.15	0	50%	13%
Chl 5	91.8	0.03	36.6	21.49	0	50%	54%
Chl 6	139	0	74.2	74.23	0	50%	100%
Chl 8	210	0	131	131	2%	53%	100%
Chl 9	257	0.05	103	103	0	54%	100%
Chl 1	380	0	98.0	98.0	0	55%	100%
Chl 10	796	0.01	196	78.7	0	52%	46%
Chl 1	2657	0	562	562	0	51%	100%
Chl 11	7795	0.01	994	-989	13%	58%	79%
Colored Dissolved Organic Matter models							
CDOM 1 **	0.03	0.34	0.02	0.00	65%	87%	6%
CDOM 1	0.08	0.24	0.07	0.07	6%	44%	100%
CDOM 2 **	0.08	0.49	0.06	0.00	97%	97%	6%
CDOM 3	0.15	0.28	0.13	0.13	19%	50%	100%
CDOM 4 ($\theta_z = 60^\circ$)	0.23	0.11	0.16	0.16	7%	47%	100%
CDOM 4 ($\theta_z = 30^\circ$)	0.24	0.11	0.17	0.17	2%	42%	100%
CDOM 4 ($\theta_z = 0^\circ$)	0.24	0.11	0.17	0.17	5%	38%	100%
CDOM 7	0.27	0.05	0.10	0.08	29%	69%	100%
CDOM 5	0.29	0.18	0.16	0.14	68%	73%	100%
CDOM 2	0.41	0.26	0.36	0.36	3%	3%	100%
CDOM 6	0.61	0.10	0.32	0.32	74%	74%	100%
CDOM 8	3.2	0.04	2.16	2.16	0	0%	100%
CDOM 9	22	0.01	3.47	3.47	26%	26%	100%