Supplementary material

Bio-optical properties and ocean colour satellite retrieval along the coastal waters of the Western Iberian Coast (WIC)

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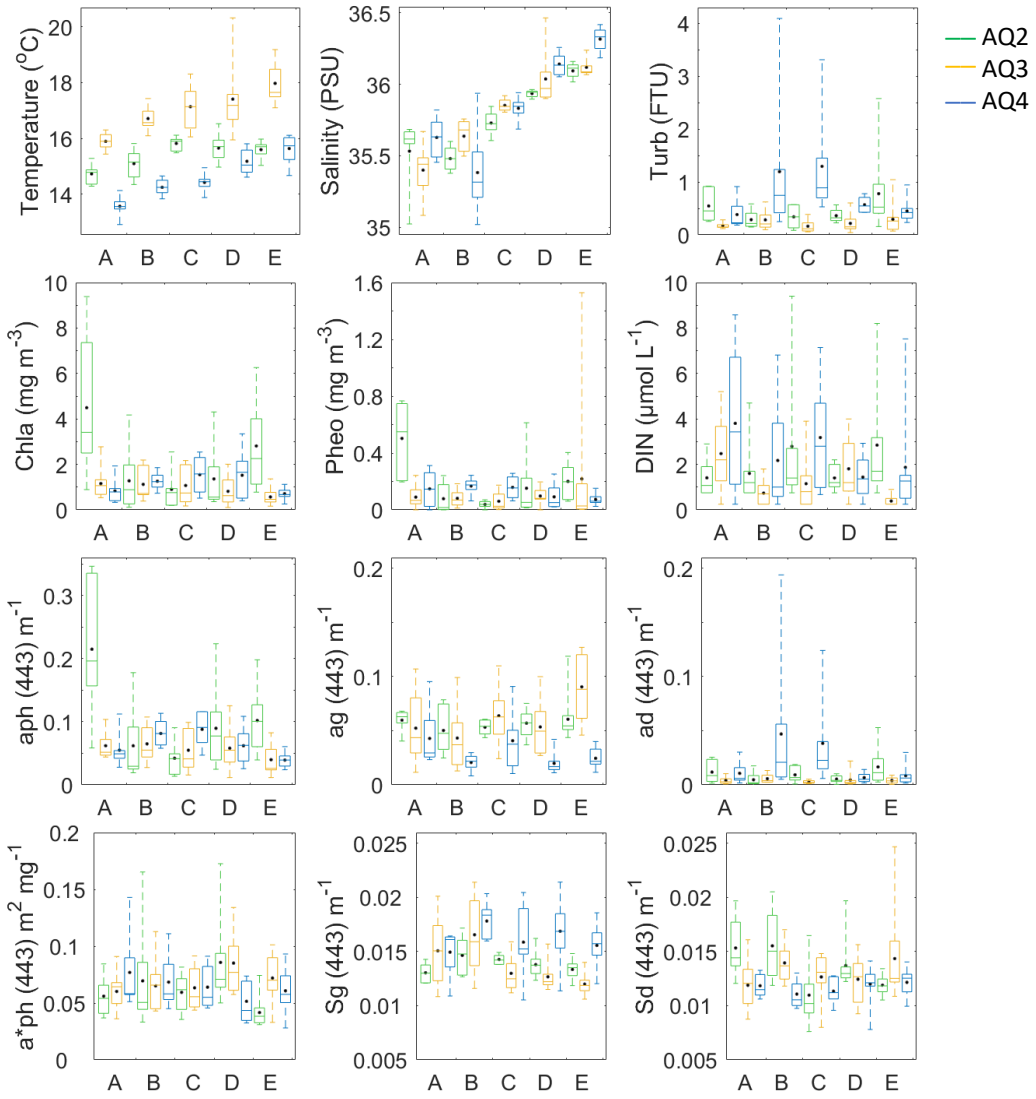


Figure S1. Boxplot with average (black dots) by area (A to E) and oceanographic campaign (AQ2, AQ3 and AQ4) of the parameters: temperature (°C), salinity (PSU), turbidity (FTU), chlorophyll *a* concentration (Chl*a*,

mg m^{-3}), pheopigments (Pheo, mg m^{-3}, sum of Pheophorbide *a* and Pheophytin *a*), dissolved inorganic nitrogen (DIN = ammonia + nitrate + nitrite, µmol L^{-1}; data from [22]), phytoplankton absorption coefficient (a_{ph}, m^{-1} at 443 nm) and mass-specific phytoplankton absorption coefficient (a^*_{ph}, $m^2 mg^{-1}$ at 443 nm), gelbstoff or coloured dissolved organic matter - CDOM (a_g, m^{-1} at 443 nm) and slope (S_g, between 350 to 500 nm and reference wavelength at 443 nm), and detritus or non-algal absorption coefficient (a_d, m^{-1} at 443 nm) and slope (S_d, between 350 to 500 nm and reference wavelength at 443 nm).

Table S1. Average, standard deviation, minimum and maximum by area (A to E) and oceanographic campaign (AQ2, AQ3 and AQ4) of the parameters: temperature (°C), salinity (PSU), turbidity (FTU), dissolved inorganic nitrogen (DIN = ammonia + nitrate + nitrite, µmol L^{-1}), concentration of chlorophyll *a* (Chl*a*, mg m^{-3}), pheopigments (Pheo, mg m^{-3}, sum of Pheophorbide *a* and Pheophytin *a*), total absorption coefficient (without water absorption, $a_{t\text{-}w}$, m^{-1} at 443 nm), phytoplankton absorption coefficient (a_{ph}, m^{-1} at 443 nm), mass-specific phytoplankton absorption coefficient (a^*_{ph}, $m^2 mg^{-1}$ at 443 nm), detritus or non-algal absorption coefficient (a_d, m^{-1} at 443 nm) and slope (S_d, between 350 to 500 nm and reference wavelength at 443 nm), gelbstoff or coloured dissolved organic matter - CDOM (a_g, m^{-1} at 443 nm) and slope (S_g, between 350 to 500 nm and reference wavelength at 443 nm), a_{dg} ($a_{dg} = a_d + a_g$, m^{-1} at 443 nm) and slope of $a_{dg} = a_d + a_g$ (S_{dg}, between 350 to 500 nm and reference wavelength at 443 nm).

Parameter	Stats	A			B			C			D			E			Campaigns			All data
		AQ2	AQ3	AQ4	AQ2	AQ3	AQ4	AQ2	AQ3	AQ4	AQ2	AQ3	AQ4	AQ2	AQ3	AQ4	AQ2	AQ3	AQ4	
Temperature (Temp, °C)	Average	14.73	15.90	13.57	15.10	16.71	14.25	15.82	17.14	14.43	15.66	17.41	15.18	15.60	17.97	15.64	15.41	17.06	14.73	15.79
	Stand. Dev.	±0.37	±0.31	±0.36	±0.49	±0.42	±0.29	±0.25	±0.82	±0.35	±0.53	±1.30	±0.46	±0.28	±0.64	±0.48	±0.54	±1.04	±0.85	±1.30
	Minimum	14.29	15.44	12.92	14.35	16.09	13.84	15.49	16.06	13.88	14.97	15.95	14.61	15.04	17.10	14.68	14.29	15.44	12.92	12.92
	Maximum	15.29	16.31	14.13	15.82	17.43	14.66	16.12	18.31	14.95	16.53	20.32	15.81	15.98	19.18	16.11	16.53	20.32	16.11	20.32
Salinity (Sal, PSU)	Average	35.53	35.40	35.63	35.48	35.64	35.38	35.73	35.85	35.83	35.94	36.04	36.14	36.09	36.12	36.32	35.79	35.82	35.91	35.84
	Stand. Dev.	±0.25	±0.17	±0.14	±0.08	±0.10	±0.30	±0.08	±0.04	±0.09	±0.02	±0.18	±0.08	±0.05	±0.06	±0.08	±0.27	±0.30	±0.38	±0.32
	Minimum	35.02	35.08	35.45	35.38	35.50	35.02	35.61	35.81	35.69	35.90	35.90	36.05	36.02	36.07	36.19	35.02	35.08	35.02	35.02
	Maximum	35.68	35.67	35.82	35.60	35.76	35.94	35.85	35.92	35.94	35.96	36.47	36.26	36.16	36.24	36.42	36.16	36.47	36.42	36.47
Turbidity (Turb, FTU)	Average	0.55	0.17	0.38	0.29	0.28	1.19	0.34	0.16	1.30	0.36	0.22	0.57	0.78	0.29	0.45	0.48	0.23	0.73	0.47
	Stand. Dev.	±0.30	±0.06	±0.28	±0.16	±0.19	±1.33	±0.21	±0.12	±1.04	±0.13	±0.17	±0.15	±0.67	±0.27	±0.20	±0.42	±0.18	±0.77	±0.54
	Minimum	0.25	0.12	0.18	0.15	0.10	0.25	0.09	0.06	0.53	0.23	0.04	0.42	0.16	0.07	0.23	0.09	0.04	0.18	0.04
	Maximum	0.92	0.28	0.91	0.59	0.62	4.09	0.57	0.39	3.31	0.57	0.60	0.78	2.58	1.04	0.94	2.58	1.04	4.09	4.09
Dissolved inorganic nitrogen (DIN, µmol L^{-1})	Average	1.41	2.47	3.81	1.60	0.73	2.17	2.79	1.15	3.18	1.40	1.81	1.44	2.85	0.39	1.87	2.04	1.28	2.37	1.87
	Stand. Dev.	±0.87	±1.66	±3.24	±1.35	±0.56	±2.54	±3.31	±1.32	±2.49	±0.54	±1.29	±0.88	±2.42	±0.22	±2.23	±1.95	±1.31	±2.37	±1.94
	Minimum	0.75	0.25	0.25	0.75	0.25	0.25	0.75	0.25	0.67	0.75	0.25	0.25	0.75	0.25	0.25	0.75	0.25	0.25	0.25
	Maximum	2.90	5.20	8.58	4.70	1.80	6.81	9.40	3.90	7.14	2.20	4.00	2.93	8.20	0.90	7.52	9.40	5.20	8.58	9.40
Chlorophyll-a (Chla, mg m^{-3})	Average	4.49	1.16	0.83	1.28	1.12	1.26	0.90	1.07	1.55	1.36	0.81	1.52	2.81	0.57	0.71	2.12	0.92	1.11	1.38
	Stand. Dev.	±3.25	±0.68	±0.55	±1.33	±0.70	±0.38	±0.87	±0.86	±1.01	±1.39	±0.62	±1.14	±1.95	±0.33	±0.28	±2.14	±0.65	±0.76	±1.46
	Minimum	0.89	0.53	0.33	0.12	0.39	0.73	0.19	0.17	0.52	0.36	0.10	0.40	0.78	0.16	0.26	0.12	0.10	0.26	0.10
	Maximum	9.38	2.78	1.93	4.17	2.19	1.86	2.55	2.17	2.54	4.31	2.01	3.34	6.26	1.36	1.12	9.38	2.78	3.34	9.38
Pheopigments (Pheo, mg m^{-3})	Average	0.50	0.09	0.15	0.08	0.08	0.17	0.04	0.06	0.16	0.15	0.10	0.09	0.20	0.22	0.07	0.19	0.12	0.12	0.14
	Stand. Dev.	±0.27	±0.07	±0.13	±0.10	±0.06	±0.07	±0.03	±0.07	±0.10	±0.22	±0.06	±0.09	±0.13	±0.45	±0.04	±0.22	±0.23	±0.09	±0.20
	Minimum	0.20	0.00	0.00	0.00	0.01	0.06	0.00	0.00	0.06	0.01	0.00	0.02	0.06	0.00	0.02	0.00	0.00	0.00	0.00
	Maximum	0.77	0.24	0.31	0.24	0.18	0.24	0.07	0.17	0.26	0.61	0.20	0.25	0.40	1.53	0.15	0.77	1.53	0.31	1.53
Total absorption coefficient ($a_{t\text{-}w}$, m^{-1} at 443 nm)	Average	0.286	0.118	0.108	0.117	0.114	0.149	0.105	0.121	0.167	0.152	0.116	0.088	0.179	0.134	0.072	0.164	0.121	0.111	0.132
	Stand. Dev.	±0.127	±0.044	±0.032	±0.079	±0.047	±0.088	±0.037	±0.061	±0.054	±0.074	±0.047	±0.040	±0.069	±0.051	±0.018	±0.095	±0.048	±0.059	±0.073
	Minimum	0.100	0.061	0.065	0.047	0.046	0.073	0.061	0.050	0.063	0.076	0.040	0.040	0.111	0.073	0.043	0.047	0.040	0.040	0.040
	Maximum	0.433	0.221	0.148	0.274	0.196	0.334	0.168	0.209	0.209	0.304	0.182	0.159	0.286	0.217	0.101	0.433	0.221	0.334	0.433
Phytoplankton absorption coefficient (a_{ph}, m^{-1} at 443 nm)	Average	0.215	0.062	0.055	0.062	0.065	0.081	0.042	0.055	0.088	0.090	0.058	0.062	0.102	0.040	0.039	0.098	0.055	0.062	0.072
	Stand. Dev.	±0.111	±0.020	±0.027	±0.055	±0.029	±0.022	±0.028	±0.034	±0.027	±0.063	±0.033	±0.030	±0.055	±0.024	±0.011	±0.081	±0.028	±0.029	±0.055
	Minimum	0.058	0.044	0.028	0.019	0.027	0.058	0.014	0.016	0.047	0.025	0.011	0.026	0.040	0.012	0.024	0.014	0.011	0.024	0.011
	Maximum	0.346	0.104	0.112	0.178	0.107	0.113	0.090	0.099	0.116	0.223	0.125	0.108	0.198	0.082	0.061	0.346	0.125	0.116	0.346
Mass-Specific phytoplankton absorption (a^*_{ph}, $m^2 mg^{-1}$ at 443 nm)	Average	0.056	0.060	0.077	0.069	0.065	0.068	0.059	0.063	0.064	0.086	0.085	0.051	0.042	0.072	0.061	0.062	0.070	0.063	0.065
	Stand. Dev.	±0.018	±0.017	±0.033	±0.042	±0.022	±0.024	±0.018	±0.019	±0.024	±0.040	±0.026	±0.018	±0.012	±0.020	±0.019	±0.033	±0.022	±0.024	±0.026
	Minimum	0.037	0.036	0.051	0.033	0.043	0.045	0.035	0.044	0.046	0.050	0.058	0.032	0.031	0.033	0.028	0.031	0.033	0.028	0.028
	Maximum	0.084	0.091	0.143	0.165	0.113	0.111	0.082	0.091	0.091	0.173	0.134	0.074	0.074	0.101	0.093	0.173	0.134	0.143	0.173
Detritus absorption coefficient (a_d, m^{-1} at 443 nm)	Average	0.012	0.004	0.011	0.005	0.006	0.047	0.009	0.003	0.038	0.005	0.004	0.007	0.017	0.004	0.009	0.010	0.004	0.020	0.011
	Stand. Dev.	±0.010	±0.003	±0.010	±0.006	±0.004	±0.068	±0.007	±0.002	±0.044	±0.003	±0.007	±0.004	±0.016	±0.003	±0.008	±0.011	±0.004	±0.036	±0.022
	Minimum	0.002	0.001	0.002	0.000	0.002	0.005	0.001	0.001	0.006	0.000	0.001	0.002	0.003	0.000	0.002	0.000	0.000	0.002	0.000
	Maximum	0.026	0.010	0.030	0.018	0.013	0.194	0.019	0.005	0.124	0.010	0.022	0.014	0.053	0.009	0.030	0.053	0.022	0.194	0.194
Slope of a_d (S_d, 350-500 at 443 nm)	Average	0.015	0.012	0.012	0.016	0.014	0.011	0.011	0.013	0.011	0.014	0.012	0.012	0.012	0.014	0.012	0.013	0.013	0.012	0.013
	Stand. Dev.	±0.003	±0.002	±0.001	±0.003	±0.002	±0.001	±0.003	±0.002	±0.001	±0.002	±0.002	±0.002	±0.001	±0.004	±0.001	±0.003	±0.003	±0.001	±0.003
	Minimum	0.012	0.009	0.011	0.012	0.012	0.010	0.008	0.008	0.010	0.012	0.009	0.008	0.011	0.011	0.010	0.008	0.008	0.008	0.008
	Maximum	0.020	0.016	0.013	0.021	0.017	0.013	0.016	0.015	0.013	0.020	0.016	0.014	0.013	0.025	0.014	0.021	0.025	0.014	0.025
CDOM absorption coefficient (a_g, m^{-1} at 443 nm)	Average	0.060	0.052	0.043	0.050	0.043	0.021	0.053	0.064	0.041	0.057	0.053	0.020	0.061	0.091	0.025	0.056	0.062	0.029	0.050
	Stand. Dev.	±0.010	±0.031	±0.028	±0.021	±0.031	±0.007	±0.007	±0.028	±0.029	±0.012	±0.024	±0.009	±0.021	±0.030	±0.009	±0.016	±0.033	±0.019	±0.028
	Minimum	0.040	0.012	0.023	0.025	0.013	0.008	0.044	0.024	0.010	0.037	0.027	0.011	0.044	0.046	0.012	0.025	0.012	0.008	0.008
	Maximum	0.068	0.107	0.095	0.079	0.099	0.030	0.061	0.110	0.091	0.075	0.100	0.042	0.119	0.127	0.040	0.119	0.127	0.095	0.127
Slope of a_g (S_g, 350-500 at 443 nm)	Average	0.013	0.015	0.015	0.015	0.017	0.018	0.014	0.013	0.016	0.014	0.013	0.017	0.013	0.012	0.016	0.014	0.014	0.016	0.015
	Stand. Dev.	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
	Minimum	0.012	0.011	0.011	0.013	0.012	0.016	0.014	0.011	0.011	0.012	0.012	0.011	0.012	0.011	0.012	0.012	0.011	0.011	0.011
	Maximum	0.014	0.020	0.016	0.017	0.021	0.020	0.015	0.016	0.020	0.016	0.016	0.021	0.015	0.014	0.019	0.017	0.021	0.021	0.021
$a_g + a_d$ absorption coefficient (a_{dg}, m^{-1} at 443 nm)	Average	0.072	0.056	0.054	0.055	0.049	0.068	0.062	0.066	0.079	0.062	0.058	0.026	0.077	0.095	0.033	0.066	0.066	0.049	0.061
	Stand. Dev.	±0.017	±0.032	±0.031	±0.027	±0.033	±0.073	±0.010	±0.029	±0.044	±0.014	±0.030	±0.011	±0.033	±0.032	±0.012	±0.024	±0.034	±0.041	±0.035
	Minimum	0.042	0.012	0.025	0.026	0.015	0.015	0.048	0.025	0.016	0.037	0.028	0.015	0.052	0.047	0.013	0.026	0.012	0.013	0.012
	Maximum	0.090	0.117	0.113	0.096	0.104	0.221	0.078	0.114	0.142	0.084	0.122	0.052	0.172	0.135	0.057	0.172	0.135	0.221	0.221
Slope of a_{dg} (S_{dg}, 350-500 at 443 nm)	Average	0.013	0.015	0.014	0.015	0.016	0.014	0.014	0.013	0.013	0.014	0.013	0.016	0.013	0.012	0.015	0.014	0.014	0.015	0.014
	Stand. Dev.	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
	Minimum	0.012	0.011	0.011	0.013	0.012	0.011	0.013	0.011	0.011	0.012	0.012	0.011	0.011	0.011	0.012	0.011	0.011	0.011	0.011
	Maximum	0.014	0.020	0.016	0.017	0.021	0.016	0.014	0.016	0.018	0.016	0.016	0.018	0.014	0.014	0.018	0.017	0.021	0.018	0.021

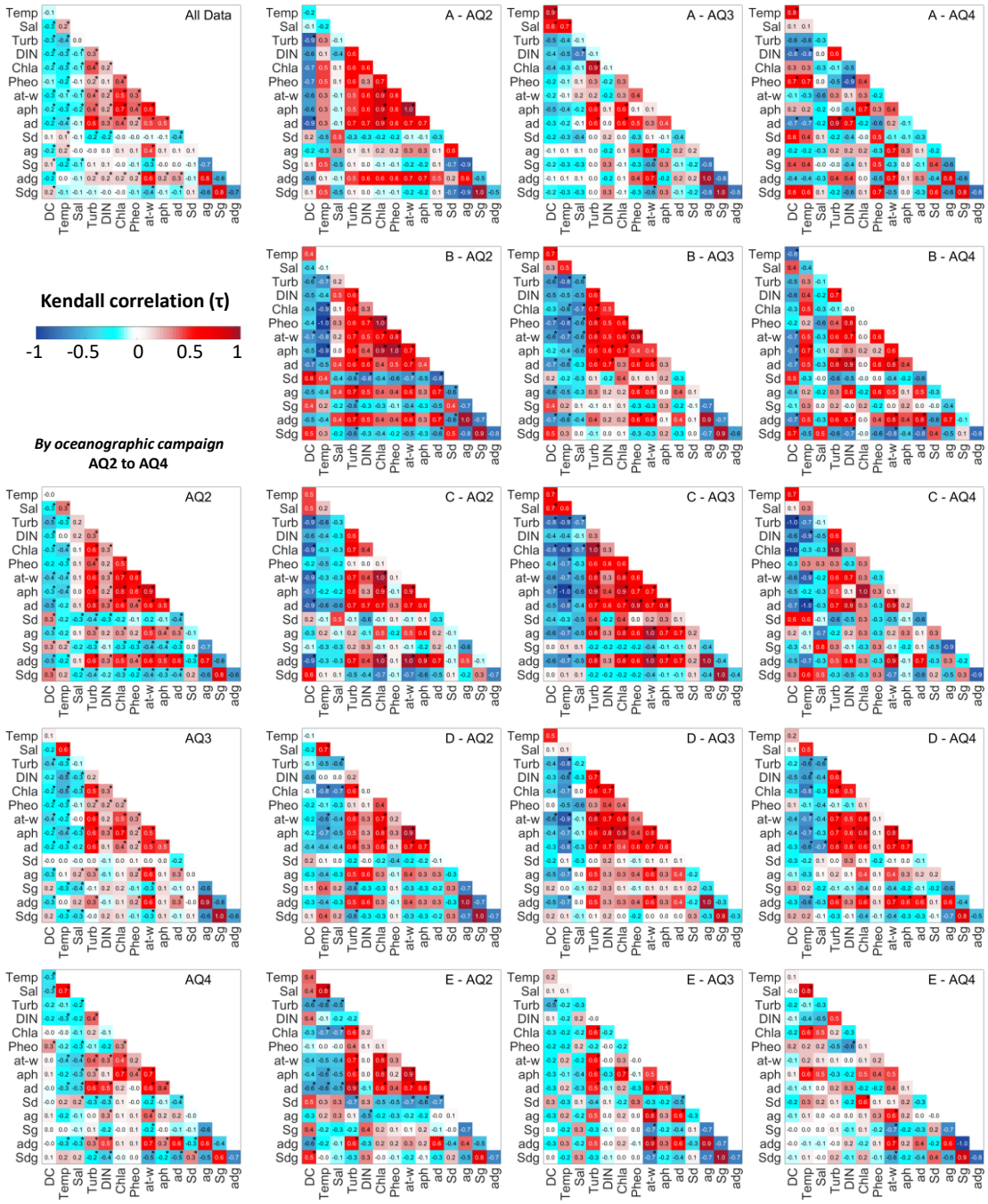


Figure S2. Kendall correlation coefficient (τ, ± 0 to 1) and their significance ('*', p-value <=0.05) between the normalized in situ parameters by area (A to E), and oceanographic campaign (AQ3 to AQ4). The following parameters were considered: temperature (Temp, °C), salinity (Sal, PSU), turbidity (Turb, FTU), dissolved inorganic nitrogen (DIN = ammonia + nitrate + nitrite, µmol L^{-1}), concentration of chlorophyll *a* (Chl*a*, mg m^{-3}), pheopigments (Pheo, mg m^{-3}, sum of Pheophorbide *a* and Pheophytin *a*), total absorption coefficient (without water absorption, $a_{t\text{-}w}$, m^{-1} at 443 nm), phytoplankton absorption coefficient (a_{ph}, m^{-1} at 443 nm), detritus or non-algal absorption coefficient (a_d, m^{-1} at 443 nm) and slope (S_d, between 350 to 500 nm and reference wavelength at 443 nm), gelbstoff or coloured dissolved organic matter - CDOM (a_g, m^{-1} at 443 nm) and slope (S_g, between 350 to 500 nm and reference wavelength at 443 nm), a_{dg} ($a_{dg} = a_d + a_g$, m^{-1} at 443 nm) and slope (S_{dg}, between 350 to 500 nm and reference wavelength at 443 nm).

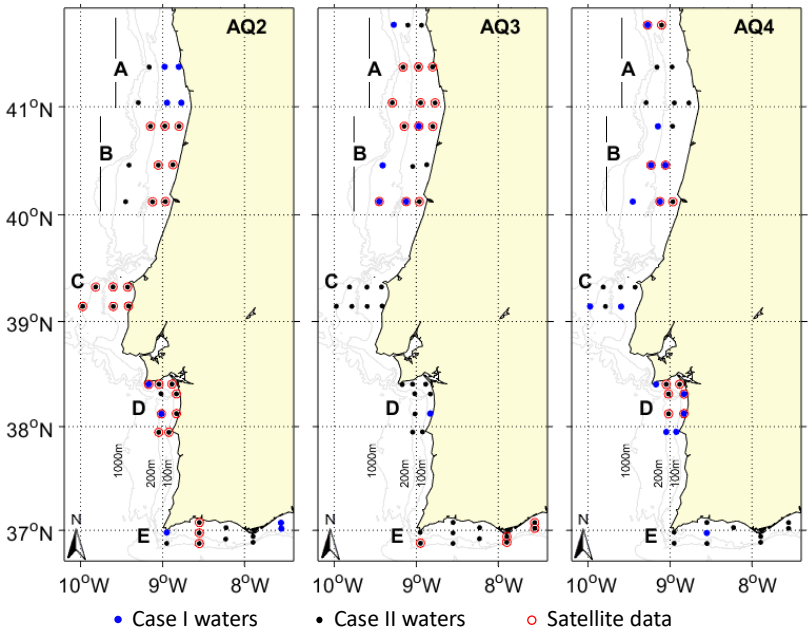


Figure S3. Distribution map of Case I (blue circles) and Case II (black circles) waters across different areas (A to E) and oceanographic campaigns (AQ2 - Spring, AQ3 - Autumn, and AQ4 - Early Spring). Locations with match-ups from OC-CCI satellite data are indicated by red circles (N=53).

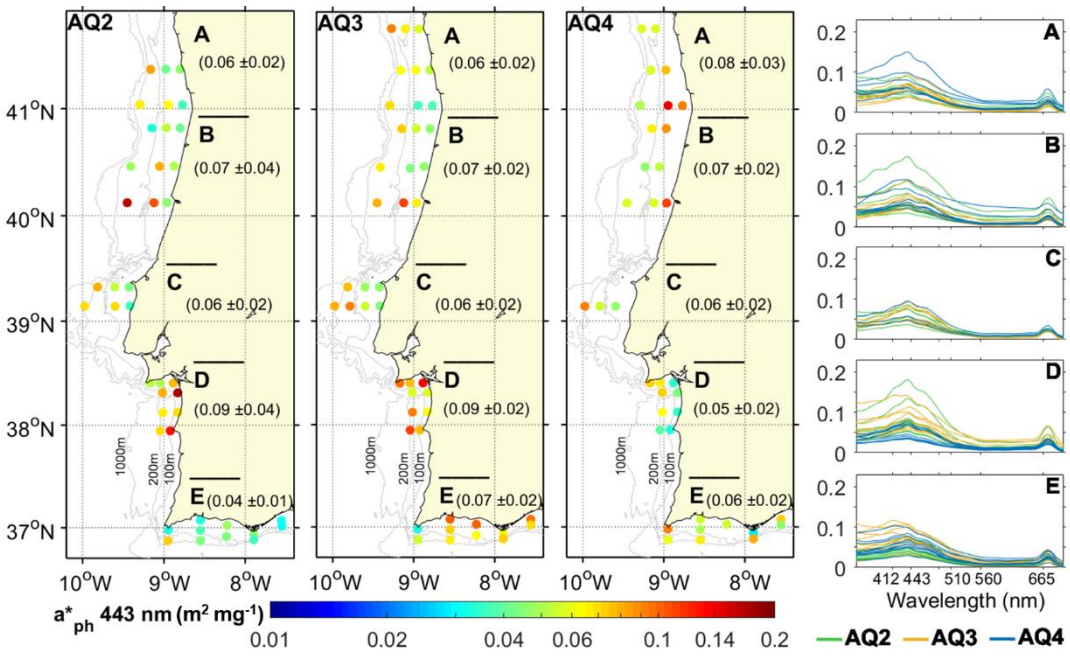


Figure S4. Distribution map of mass-specific phytoplankton absorption (a^*_{ph}, m^2 mg^{-1}, N=122) at wavelength (λ) 443 nm and their respective spectra (λ = 350 to 700 nm) by area (A to E) and oceanographic campaign (AQ2 - Spring, AQ3 - Autumn and AQ4 - early spring).

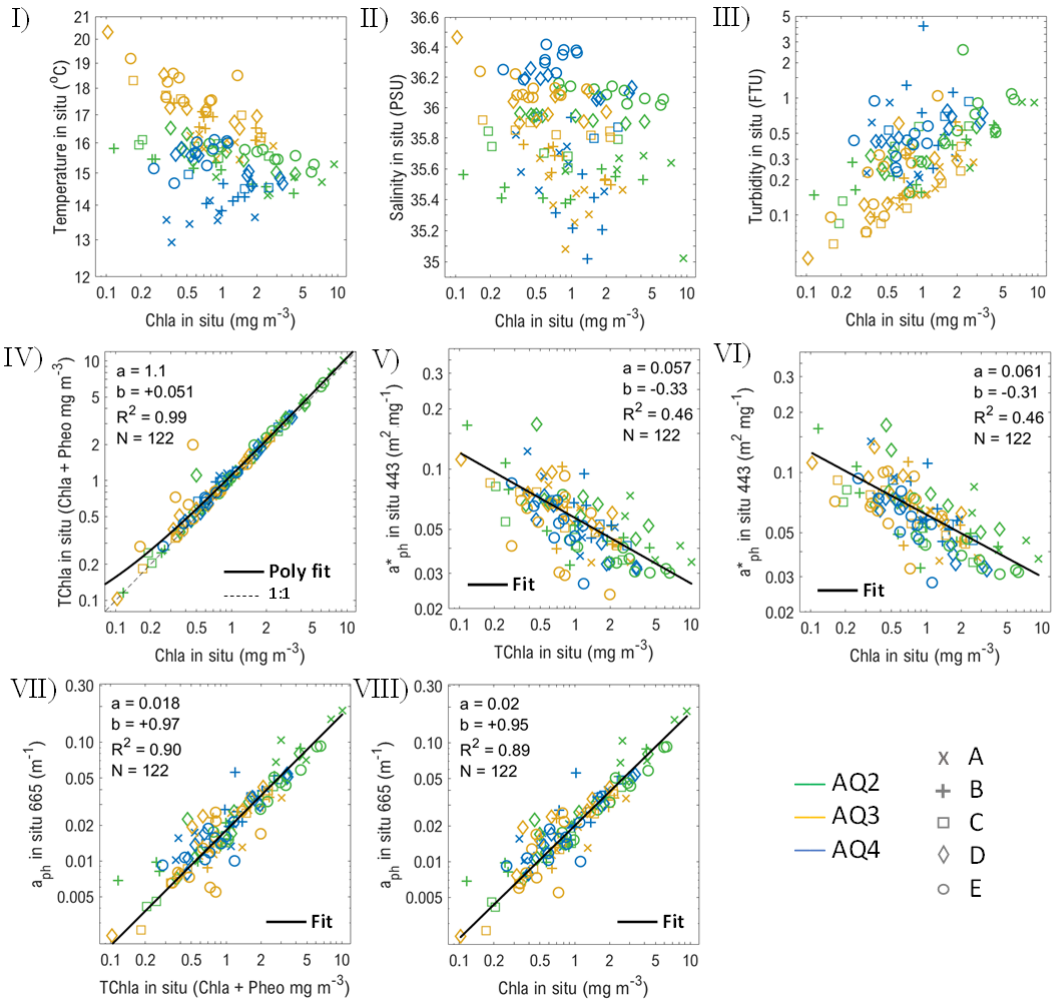


Figure S5. In situ relationships between I) Chl*a* (mg m^{-3}) versus sea surface temperature (°C), II) Chl*a* (mg m^{-3}) versus salinity (PSU), III) Chl*a* (mg m^{-3}) versus turbidity (FTU), IV) Chl*a* (mg m^{-3}) versus TChl*a* (Chl*a* + Pheo, mg m^{-3}), V) TChl*a* (mg m^{-3}) versus mass-specific phytoplankton absorption (a^*_{ph}, m^2 mg^{-1}, at 443 nm), VI) Chl*a* (mg m^{-3}) versus mass-specific phytoplankton absorption (a^*_{ph}, m^2 mg^{-1}, at 443 nm), VII) TChl*a* (mg m^{-3}) versus phytoplankton absorption (a_{ph}, m^{-1}, at 665 nm), and VIII) Chl*a* (mg m^{-3}) versus phytoplankton absorption (a_{ph}, m^{-1}, at 665 nm). Symbols represent the sampled areas (A to E) with different colours for each oceanographic campaign (AQ2 - Spring, AQ3 - Autumn and AQ4 - early spring).

Table S2. Relationships between in situ Chl*a* (mg m^{-3}), TChl*a* (Chl*a* + Pheo, mg m^{-3}) and phytoplankton absorption coefficient (a_{ph}, m^{-1}). The table contains the parameters in X and Y axis, dataset reference ("All": all in situ data; in situ data by spring, autumn and early spring campaigns; or references used to compare our dataset), number of samples (N), regression function (e.g., power law) and coefficients "a" and "b", r-squared (R^2). Relations obtained by Bricaud et al. [51, 50, 58, 42] and Loisel et al. [56] were named B95, B98, B04, B10 and L10, respectively. Relations obtained by Sá et al. [52] and the Algal 2 algorithm Antoine et al. [60] were named S15 and A2, respectively.

X axis	Y axis	Dataset reference	N	Function	a	b	R^2
Chl*a*	a_{ph} (443 nm)	All	122	Power law	0.0590	0.760	0.87
Chl*a*	a_{ph} (443 nm)	Spring (AQ2)	41	Power law	0.0580	0.780	0.88
Chl*a*	a_{ph} (443 nm)	Autumn (AQ3)	45	Power law	0.0620	0.640	0.83
Chl*a*	a_{ph} (443 nm)	Early spring (AQ4)	36	Power law	0.0590	0.710	0.71
TChl*a*	a_{ph} (440 nm)	B95	---	Power law	0.0383	0.651	---

TChl*a*	a_{ph} (440 nm)	B98	---	Power law	0.0378	0.627	0.90
TChl*a*	a_{ph} (440 nm)	B04	---	Power law	0.0654	0.728	0.93
TChl*a*	a_{ph} (440 nm)	B10	---	Power law	0.0617	0.930	0.97
TChl*a*	a_{ph} (443 nm)	L10	---	Power law	0.0543	0.764	0.91
TChl*a*	a_{ph} (443 nm)	All	122	Power law	0.0540	0.780	0.87
TChl*a*	a_{ph} (443 nm)	Spring (AQ2)	41	Power law	0.05397	0.794	0.89
TChl*a*	a_{ph} (443 nm)	Autumn (AQ3)	45	Power law	0.0569	0.639	0.76
TChl*a*	a_{ph} (443 nm)	Early spring (AQ4)	36	Power law	0.05544	0.616	0.73
a_{ph} (443 nm)	Chl*a*	Algal 2 (A2)	---	Power law	21.00	1.040	---
a_{ph} (443 nm)	Chl*a*	S15	73	Power law	47.00	1.240	0.86
a_{ph} (443 nm)	Chl*a*	All	122	Power law	30.00	1.200	0.87
a_{ph} (443 nm)	Chl*a*	Spring (AQ2)	41	Power law	28.00	1.100	0.88
a_{ph} (443 nm)	Chl*a*	Autumn (AQ3)	45	Power law	41.00	1.300	0.82
a_{ph} (443 nm)	Chl*a*	Early spring (AQ4)	36	Power law	32.00	1.200	0.68
a_{ph} (443 nm)	TChl*a*	All	122	Power law	31.83	1.168	0.88
a_{ph} (443 nm)	TChl*a*	Spring (AQ2)	41	Power law	29.96	1.121	0.89
a_{ph} (443 nm)	TChl*a*	Autumn (AQ3)	45	Power law	31.31	1.189	0.74
a_{ph} (443 nm)	TChl*a*	Early spring (AQ4)	36	Power law	32.23	1.170	0.71

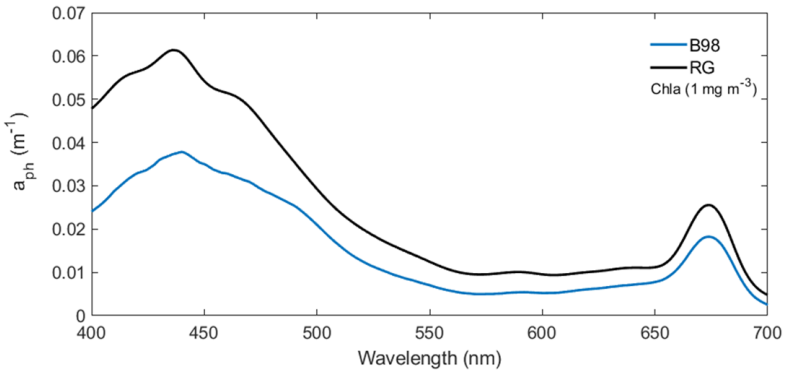


Figure S6. Comparison of coefficients derived from the relationships between Chl*a* (mg m^{-3}) and phytoplankton absorption coefficient (a_{ph}, m^{-1}) from Bricaud et al. [50] (B98) and from in situ regional (RG) coefficients from this study (available on request). The coefficients were applied for a Chl*a* concentration of 1 mg m^{-3}.

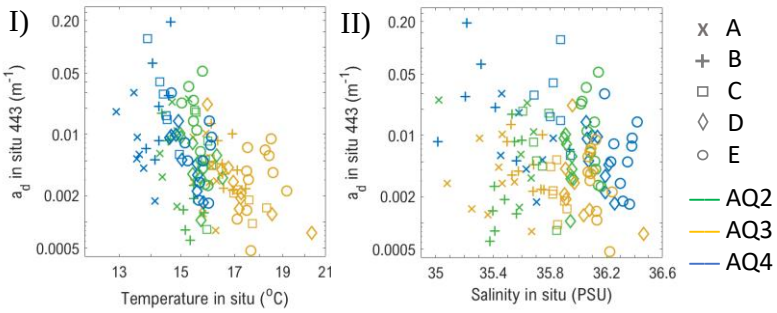


Figure S7. Relationships between the in situ absorption coefficient of non-algal particles or detritus (a_d, m^{-1}) at the wavelength (λ) 443 nm versus I) sea surface temperature (°C) and II) sea surface salinity (PSU).

Symbols and colours show the different areas (A to E) and oceanographic campaigns (AQ2 - Spring, AQ3 - Autumn and AQ4 - early spring), respectively.

Table S3. Relationships between in situ absorption coefficient of non-algal particles or detritus (a_d, m^{-1}), Chl*a* (mg m^{-3}), and turbidity (FTU). The table contains the parameters in X and Y axis, dataset reference ("All": all in situ data; in situ data by spring, autumn and early spring campaigns; or references used to compare our dataset), number of samples (N), regression function (e.g., power law) and coefficients "a" and "b", r-squared (R^2). Relations obtained by Bricaud et al. [42] were named B10, respectively.

X axis	Y axis	Dataset reference	N	Function	a	b	R^2
Chl*a*	a_d (443 nm)	B10	---	Power law	0.0067	0.675	---
Chl*a*	a_d (443 nm)	All	122	Power law	0.0092	0.436	0.04
Chl*a*	a_d (443 nm)	Spring (AQ2)	41	Power law	0.0066	0.673	0.42
Chl*a*	a_d (443 nm)	Autumn (AQ3)	45	Power law	0.0047	0.484	0.13
Chl*a*	a_d (443 nm)	Early spring (AQ4)	36	Power law	0.0164	0.074	0.00
Turb	a_d (443 nm)	All	122	Power law	0.2402	1.414	0.92
Turb	a_d (443 nm)	Spring (AQ2)	41	Power law	0.0219	1.034	0.87
Turb	a_d (443 nm)	Autumn (AQ3)	45	Power law	0.0146	0.810	0.48
Turb	a_d (443 nm)	Early spring (AQ4)	36	Power law	0.0254	1.415	0.96

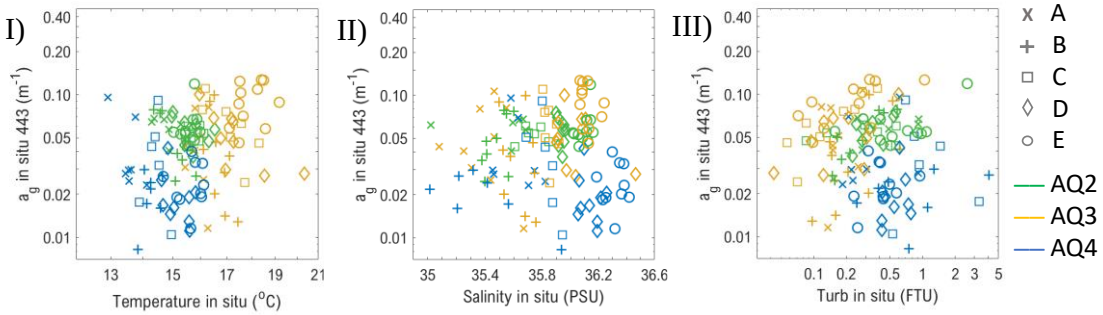


Figure S8. Relationships between the in situ absorption coefficient of coloured dissolved organic matter or gelbstoff (a_g, m^{-1}) versus I) temperature (°C), II) Salinity (PSU) and III) Turbidity (Turb, FTU). Symbols and colours show the different areas (A to E) and oceanographic campaigns (AQ2 - Spring, AQ3 - Autumn and AQ4 - early spring), respectively.

Table S4. Relationships between in situ Chl*a* (mg m^{-3}) and colored dissolved organic matter absorption coefficient (a_g, m^{-1}, 443 nm) compared to relations obtained by Bricaud et al. [42] (B10). The table contains the parameters in X and Y axis, dataset reference ("All": all in situ data; in situ data by spring, autumn and early spring campaigns; or references used to compare our dataset), number of samples (N), regression function (e.g., power law) and coefficients "a" and "b", r-squared (R^2).

X axis	Y axis	Dataset reference	N	Function	a	b	R^2
Chl*a*	a_g (440 nm)	B10	---	Power law	0.0340	0.619	0.03
Chl*a*	a_g (443 nm)	All	122	Power law	0.0500	0.091	0.02
Chl*a*	a_g (443 nm)	Spring (AQ2)	41	Power law	0.0550	0.100	0.16
Chl*a*	a_g (443 nm)	Autumn (AQ3)	45	Power law	0.0640	0.097	0.02
Chl*a*	a_g (443 nm)	Early spring (AQ4)	36	Power law	0.0280	0.100	0.03

Table S5. Retrievals results of the total (a_t, m^{-1}), phytoplankton (a_{ph}, m^{-1}) and CDOM+detritus (a_{dg}, m^{-1}) absorption coefficients with the algorithms QAA ([48], from OC-CCI data), GIOP [49] and GSM [47]. For GIOP algorithm a_{ph}, Chl*a* OC5CCI were used as an input with the default B98 [50] and the regional coefficients (RG) obtained from the power law relation between the in situ Chl*a* and a_{ph} (λ). The B98 and RG coefficients were also directly applied to the Chl*a* OC5CCI to empirically retrieve (ER) the a_{ph} (m^{-1}, at 443 nm). The statistical results contain the number of samples (N), average (Avg) and standard deviation (SD) of the in situ and retrieval parameters; the regression parameters: correlation coefficient (ρ), coefficient of determination (R^2), slope (S) and intercept (I); and the uncertainty estimations: bias (BIAS), mean squared error (RMSE), mean absolute error (MAE). The BIAS and MAE were applied following Seegers et al. (2018).

					a_t (m^{-1})											**a_{ph} (m^{-1})**											**a_{dg} (m^{-1})**										
Algorithm	Input	Coeff.	Wavel. (nm)	N	In situ		Retrieved		S	I	ρ	R^2	BIAS	RMSE	MAE	In situ		Retrieved		S	I	ρ	R^2	BIAS	RMSE	MAE	In situ		Retrieved		S	I	ρ	R^2	BIAS	RMSE	MAE
					Avg.	SD	Avg.	SD								Avg.	SD	Avg.	SD								Avg.	SD	Avg.	SD							
QAA	---	---	443	53	0.142	0.064	0.105	0.051	0.724	0.002	0.690	0.476	0.720	0.217	1.516	0.070	0.042	0.032	0.025	0.371	0.006	0.476	0.227	0.413	0.470	2.484	0.065	0.038	0.066	0.037	0.938	0.005	0.466	0.217	1.020	0.274	1.618
GIOP	OC5CCI	---	412	53	0.168	0.075	0.137	0.067	0.844	-0.005	0.699	0.489	0.792	0.200	1.421	0.064	0.039	0.039	0.027	0.609	0.000	0.719	0.518	0.567	0.319	1.861	0.099	0.052	0.093	0.049	0.857	0.008	0.381	0.145	0.931	0.253	1.587
GIOP	OC5CCI	---	443	53	0.142	0.064	0.109	0.051	0.731	0.005	0.726	0.527	0.751	0.204	1.450	0.070	0.042	0.048	0.031	0.664	0.002	0.689	0.475	0.662	0.270	1.634	0.065	0.038	0.053	0.028	0.456	0.024	0.354	0.125	0.835	0.283	1.664
GIOP	OC5CCI	---	490	53	0.092	0.040	0.071	0.029	0.604	0.015	0.653	0.426	0.767	0.190	1.418	0.041	0.024	0.033	0.021	0.809	0.000	0.674	0.454	0.770	0.233	1.477	0.036	0.025	0.023	0.012	0.194	0.016	0.326	0.106	0.687	0.352	1.909
GIOP	OC5CCI	---	510	53	0.090	0.032	0.070	0.021	0.516	0.024	0.636	0.404	0.790	0.153	1.331	0.028	0.018	0.022	0.015	0.827	-0.002	0.724	0.524	0.719	0.253	1.570	0.029	0.021	0.016	0.008	0.152	0.012	0.327	0.107	0.607	0.389	2.040
GIOP	OC5CCI	---	560	53	0.092	0.020	0.077	0.009	0.301	0.049	0.568	0.323	0.844	0.097	1.198	0.012	0.010	0.008	0.007	0.619	0.001	0.683	0.467	0.588	0.348	1.926	0.018	0.013	0.007	0.003	0.094	0.005	0.334	0.111	0.414	0.503	2.592
GIOP	OC5CCI	---	665	53	0.459	0.021	0.450	0.015	0.665	0.144	0.737	0.543	0.980	0.015	1.027	0.026	0.018	0.020	0.015	0.794	-0.001	0.768	0.590	0.715	0.258	1.609	0.005	0.006	0.001	0.001	0.035	0.001	0.415	0.172	0.245	0.679	4.155
GIOP	OC5CCI	RG	412	53	0.168	0.075	0.138	0.067	0.843	-0.003	0.700	0.490	0.800	0.197	1.414	0.064	0.039	0.057	0.040	1.047	-0.010	0.699	0.489	0.823	0.229	1.482	0.099	0.052	0.076	0.046	0.700	0.007	0.349	0.122	0.738	0.296	1.719
GIOP	OC5CCI	RG	443	53	0.142	0.064	0.113	0.054	0.781	0.002	0.722	0.521	0.775	0.198	1.429	0.070	0.042	0.062	0.042	1.017	-0.009	0.671	0.450	0.830	0.230	1.470	0.065	0.038	0.044	0.026	0.371	0.019	0.326	0.106	0.663	0.334	1.858
GIOP	OC5CCI	RG	490	53	0.092	0.040	0.070	0.028	0.576	0.017	0.650	0.422	0.766	0.190	1.421	0.041	0.024	0.037	0.024	0.958	-0.003	0.648	0.420	0.857	0.225	1.462	0.036	0.025	0.019	0.011	0.163	0.013	0.301	0.091	0.545	0.414	2.150
GIOP	OC5CCI	RG	510	53	0.090	0.032	0.071	0.020	0.478	0.028	0.630	0.397	0.799	0.149	1.321	0.028	0.018	0.025	0.017	0.931	-0.001	0.693	0.480	0.858	0.222	1.469	0.029	0.021	0.013	0.008	0.129	0.009	0.302	0.091	0.481	0.455	2.311
GIOP	OC5CCI	RG	560	53	0.092	0.020	0.078	0.009	0.281	0.052	0.553	0.306	0.863	0.091	1.181	0.012	0.010	0.011	0.008	0.703	0.002	0.646	0.417	0.898	0.248	1.575	0.018	0.013	0.005	0.003	0.080	0.004	0.307	0.094	0.328	0.587	3.144
GIOP	OC5CCI	RG	665	53	0.459	0.021	0.452	0.018	0.801	0.084	0.724	0.525	0.985	0.015	1.026	0.026	0.018	0.022	0.018	0.969	-0.002	0.752	0.566	0.799	0.245	1.552	0.005	0.006	0.001	0.000	0.031	0.001	0.392	0.154	0.195	0.777	5.182
GSM	---	B98	443	53	0.142	0.064	0.097	0.039	0.507	0.025	0.702	0.493	0.693	0.219	1.534	0.070	0.042	0.035	0.017	0.267	0.016	0.595	0.354	0.523	0.360	1.974	0.065	0.038	0.055	0.030	0.455	0.026	0.294	0.086	0.861	0.291	1.696
ER	OC5	B98	443	53	---	---	---	---	---	---	---	---	---	---	---	0.070	0.042	0.038	0.017	0.344	0.014	0.806	0.650	0.582	0.274	1.765	---	---	---	---	---	---	---	---	---	---	---
ER	OC5	RG	443	53	---	---	---	---	---	---	---	---	---	---	---	0.070	0.042	0.061	0.033	0.743	0.009	0.807	0.652	0.895	0.148	1.289	---	---	---	---	---	---	---	---	---	---	---