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Abstract. Coastal Surveillance Through Observation of Ocean Color (COASTLOOC) oceanographic expeditions were conducted in 1997 and 1998 to obtain a synoptic view of the spatial distribution of different biological, chemical and physical variables across the land-to-sea gradient along the European coasts. A total of 379 stations distributed in six areas were visited: (1) 39 in the Adriatic Sea, (2) 38 in the Atlantic Ocean, (3) 57 in the Baltic Sea, (4) 85 in the English Channel, (5) 61 in the Mediterranean Sea and (6) 99 in the North Sea. A particular emphasis has been dedicated to the collection of a comprehensive set of apparent (AOPs) and inherent (IOPs) optical properties to document carbon fluxes at both the local and global scales. These radiometric quantities have been measured using traditional ship-based sampling, but also from a helicopter in shallow estuaries, which are more difficult to access from boats. Although that the COASTLOOC campaigns were carried out more than 20 years ago, the rich and historical dataset that has been collected has great potential to contribute to the development and evaluation of new bio-optical models adapted for optically-complex waters. Given that this unique dataset is still today frequently requested by other researchers, we present the result of an effort to compile and standardize data that will facilitate their reuse in other oceanographic studies. The dataset is available at https://doi.org/10.17882/75345 (Massicotte2022).

1 Introduction

Since the launch of the Coastal Zone Color Scanner (CZCS) by NASA in 1978, ocean color remote sensing has been used to monitor the state and the evolution of global marine ecosystems both in time and space. In open oceans, the main component that affects the variations in the inherent (IOPs) and apparent (AOPs) optical properties of seawater is phytoplankton, which is usually represented by the concentration of chlorophyll-a ((Morel and Prieur, 1977)). Many simple empirical spectral band ratio algorithms have been developed to link changes in remotely-sensed ocean color (OC), measured as reflectance, to the variations in chlorophyll-a concentration (see OReilly2019 for an extensive evaluation of OC band ratio algorithms). Because these algorithms perform surprisingly well, a plethora of studies have been conducted, notably about phytoplankton phenology (e.g., Vargas et al. 2009) and phytoplankton primary production (see Carr et al. 2006 and references therein).

2 Study area and sampling overview

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2.1 Study area and general sampling strategys

During the COASTLOOC campaigns, a total of 420 locations were visited. These locations were spread out along the coasts of the Mediterranean Sea (*n* = 41 in case 1 water, *n* = 61 in case 2 water), Adriatic Sea (n = 39), Baltic Sea (n = 57), North Sea (n = 99), English Channel (n = 85) and Atlantic Ocean (n = 38) Within each area, the stations were generally distributed along across-shore or along-shore transects to capture the land-to-sea gradients and document river plumes (Fig. 1B). Stations were sampled either with a helicopter or a ship between 1997-04-02 and 1998-09-25 (Fig. 2A). Compared to traditional ship-based sampling, the helicopter platform allowed to efficiently sample shallow estuaries, which can be difficult to access by boat (some samples were collected in waters as shallow as 1 m, Babin 2003). Combining both ship and airborne sampling approaches allowed covering the whole inshore to open-ocean aquatic continuum. The bathymetry (**?**) varied greatly across the stations, where it averaged 10 meters in the Adriatic Sea and 2 600 meters in the Case 1 Mediterranean Sea (Fig. 2B).

2.1.1 HEADING

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3 Conclusions

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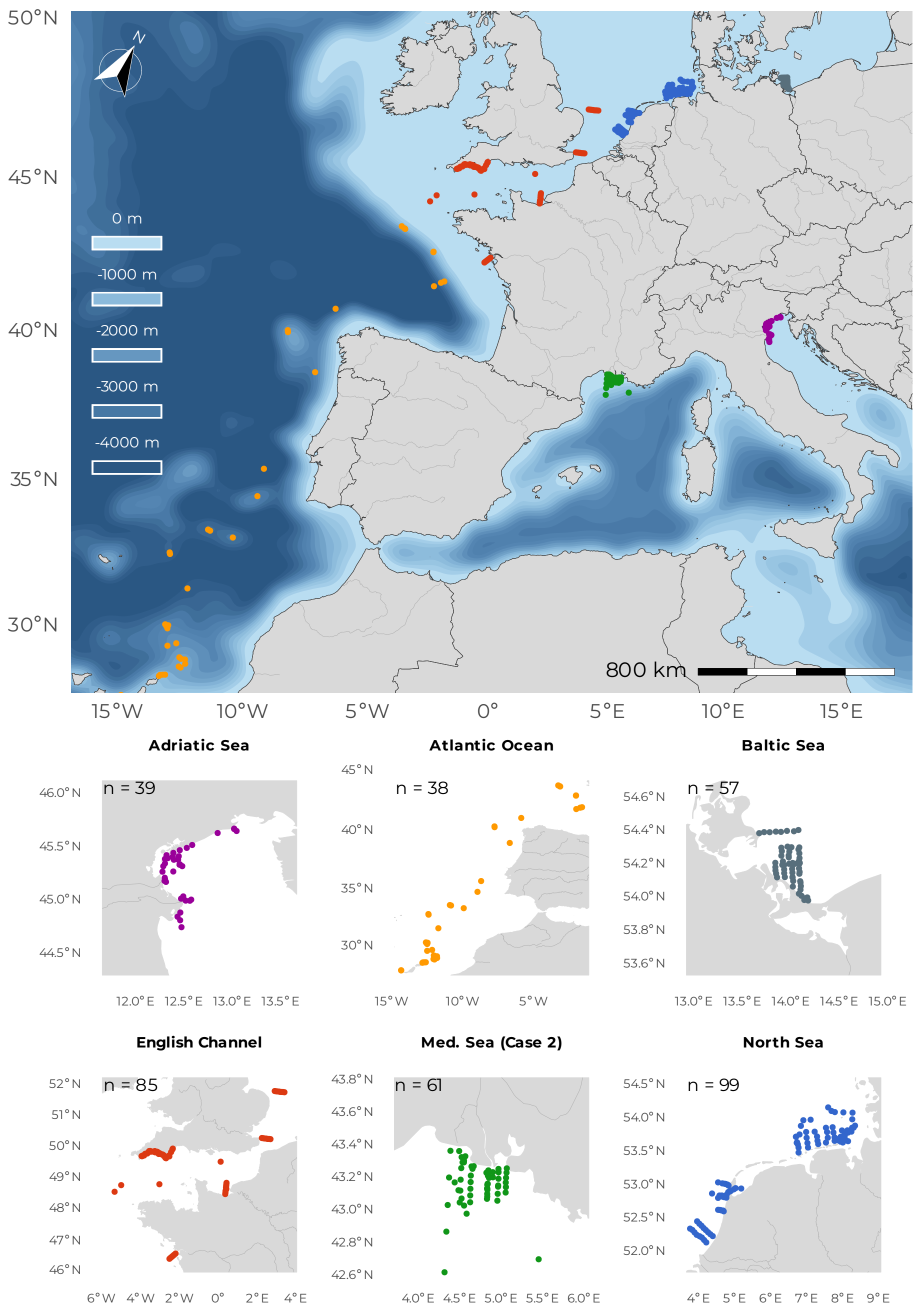
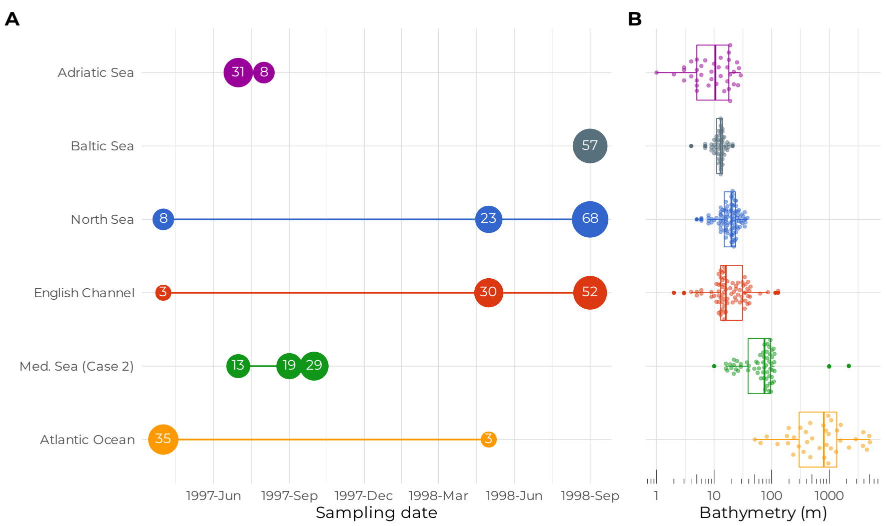


Figure 1. My caption



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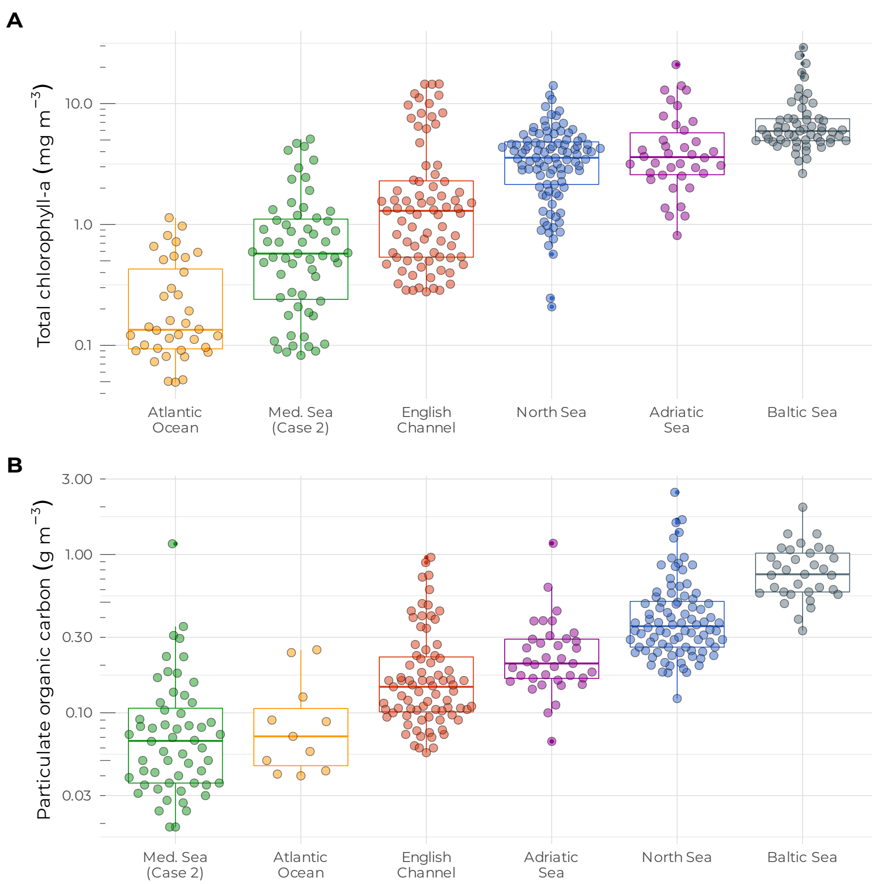


Figure 3. My caption

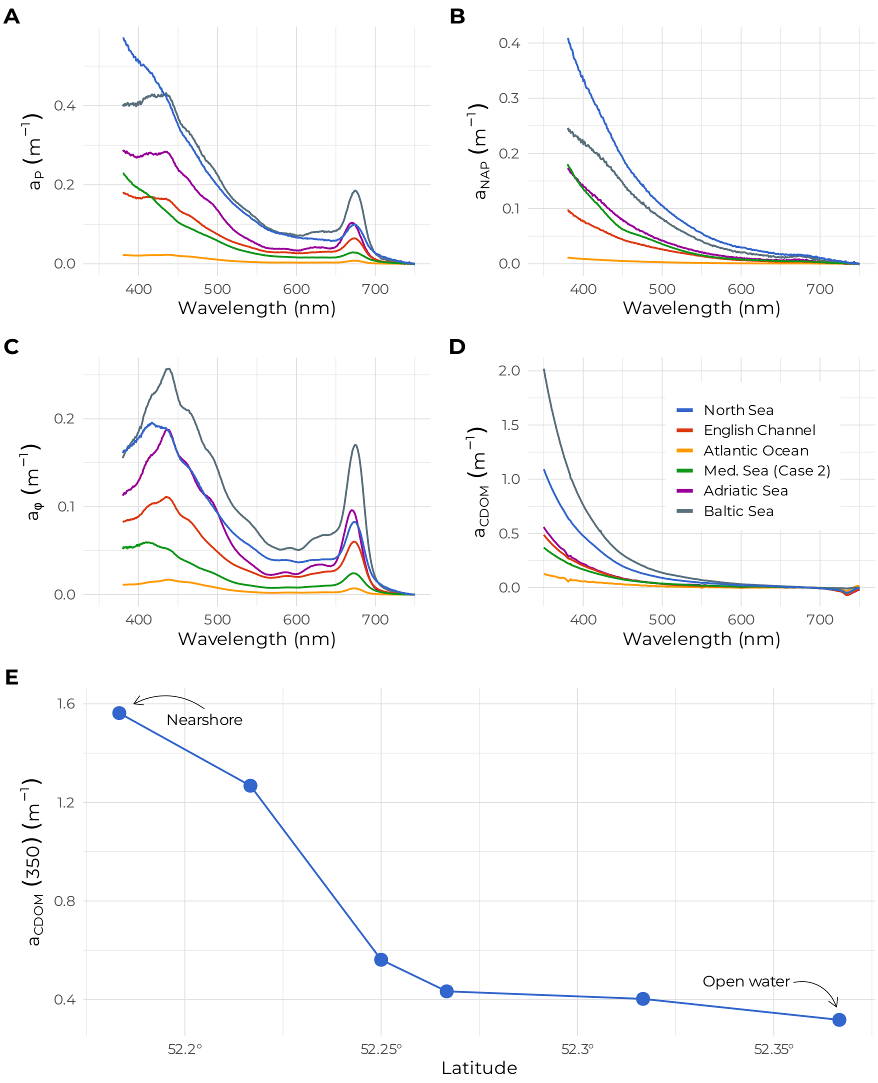
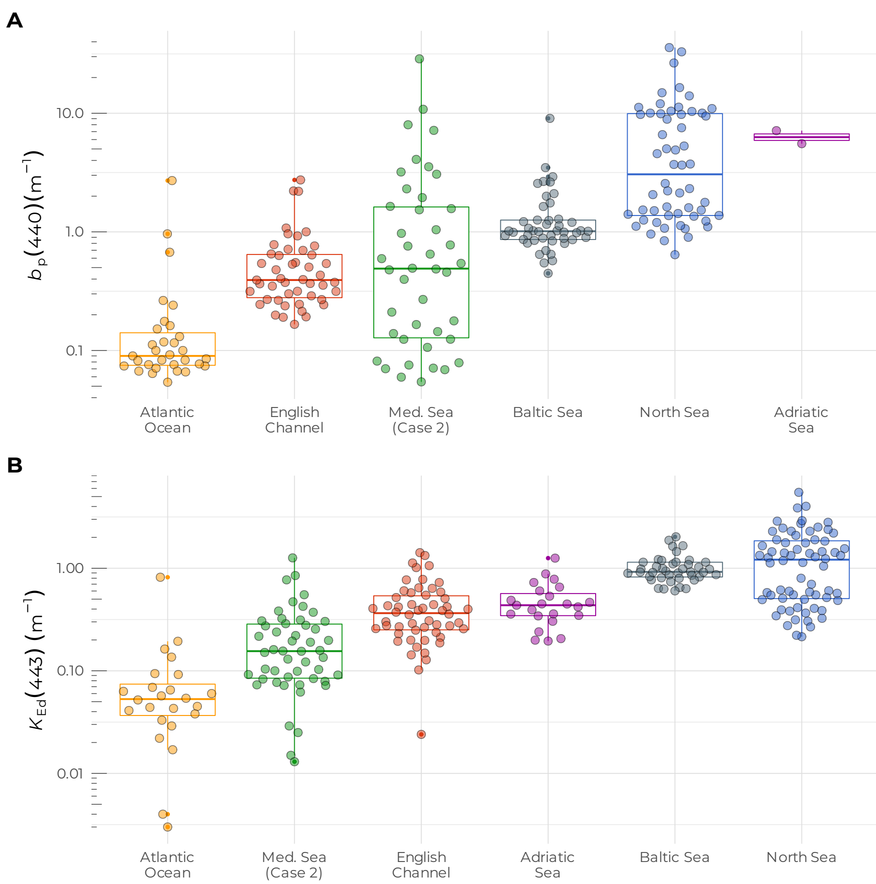


Figure 4. My caption



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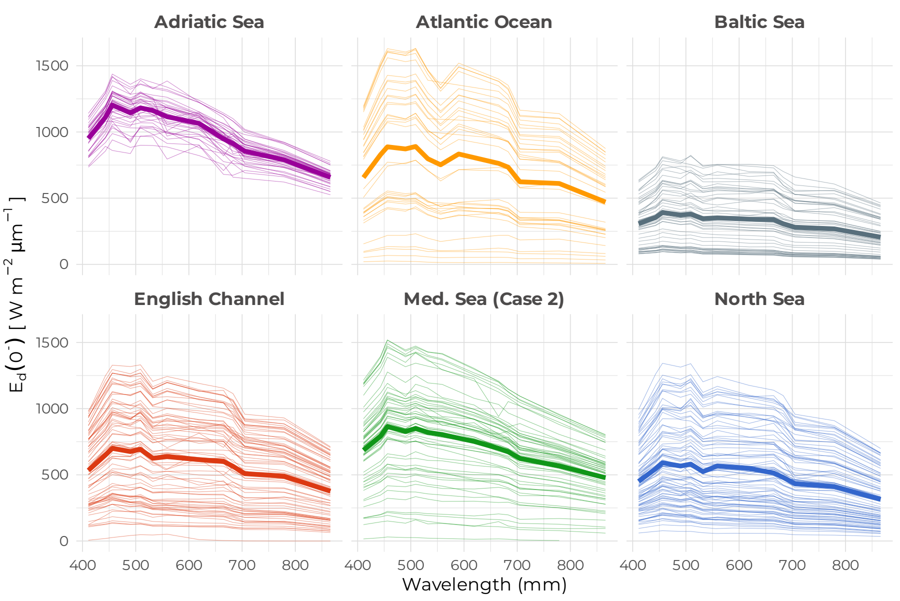

Figure 6. My caption

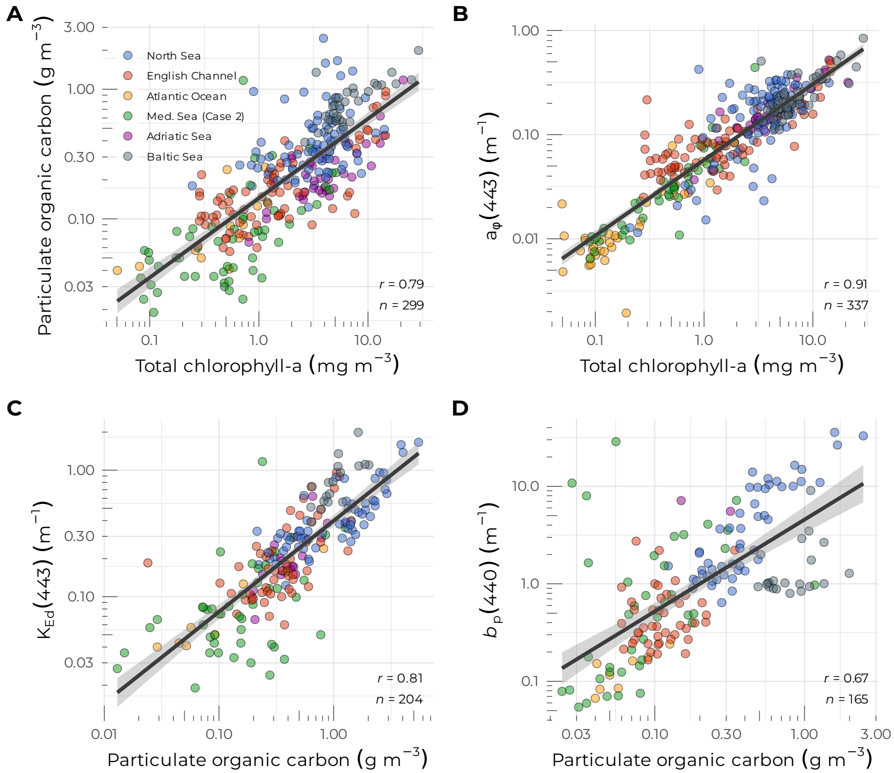

Figure 7. My caption

Table 1: List of measured parameters

Source file	Variable	Units	PI	Description
absorption.csv	wavelength	nm	M. Babin	
absorption.csv	a_p_m1	m^{-1}		Total particulate absorption
absorption.csv	a_nap_m1	m^{-1}		Non-algal absorption
absorption.csv	a_phy_m1	m^{-1}		Phytoplankton absorption
absorption.csv	a_phy_specific_m2_mg_chla_m1	m^{2} mg chla $^{-1}$		Specific phytoplankton absorption
absorption.csv	a_cdom_measured_m1	m^{-1}		Measured chromophoric dissolved organig matter absorption
absorption.csv	a_cdom_modeled_m1	m^{-1}		Modeled chromophoric dissolved organig matter absorption
ac9.csv	a_m1	m^{-1}		Particulate absorption
ac9.csv	c_m1	m^{-1}		Beam attenuation
ac9.csv	bp_m1	m^{-1}		Particulate scattering
bathymetry.csv	longitude	Degree decimal		Longitude of the pixel used to extract the bathymetry
bathymetry.csv	latitude	Degree decimal		Latitude of the pixel used to extract the bathymetry
bathymetry.csv	bathymetry_m	m		Bathymetry depth at the sampled stations
irradiance.csv	eu_w_m2_um	w m^{-2} µm $^{-1}$		Upward irradiance just beneath the water surface (Eu0-)
irradiance.csv	ed_w_m2_um	w m^{-2} µm $^{-1}$		Downward irradiance just beneath the water surface (Ed0-)
irradiance.csv	k_eu_m1	m^{-1}		Attenuation coefficient for upward irradiance (just beneath the water surface)
irradiance.csv	k_ed_m1	m^{-1}		Attenuation coefficient for downward irradiance (just beneath the water surface)
reflectance.csv	measured_reflectance_percent	Percent		Surface water reflectance
spectral_slopes.csv	s_cdom_nm1	nm^{-1}		Spectral slope that describes the approximate exponential decrease in aCDOM
spectral_slopes.csv	s_nap_nm1	nm^{-1}		Spectral slope that describes the approximate exponential decrease in aNAP

Table 1: List of measured parameters *(continued)*

Source file	Variable	Units	PI	Description
stations.csv	station			Unique ID of the sampled station. Can be used as unique key to merge the data across other files.
stations.csv	date			Date at which the measurement was made
stations.csv	depth_m	m		Depth at which the measurement was made
stations.csv	longitude	Degree decimal		Longitude of the sampling station
stations.csv	latitude	Degree decimal		Latitude of the sampling station
stations.csv	area			Region where the measurement was made. One of: (1) North Sea, (2) English Channel, (3) Atlantic Ocean, (4) Med. Sea (Case 2), (5) Adriatic Sea, (6) Baltic Sea
stations.csv	system			
stations.csv	gmt_time			
stations.csv	solar_zenith_angle	degree		Angle of the sun from the vertical
pigments.csv	chlorophyll_a_mg_m3	mg m^{-3}		Chloropyll-a
pigments.csv	chlorophyll_b_mg_m3	mg m^{-3}		Chloropyll-b
pigments.csv	chlorophyll_c_mg_m3	mg m^{-3}		Chloropyll-c
pigments.csv	pheopigment_mg_m3	mg m^{-3}		Pheopigment
pigments.csv	fucoxanthin_mg_m3	mg m^{-3}		Fucoxanthin
pigments.csv	hexanoyloxyfucoxanthin_19_mg_m3	mg m^{-3}		Hexanoyloxyfucoxanthin-19
pigments.csv	butanoyloxyfucoxanthin_19_mg_m3	mg m^{-3}		Butanoyloxyfucoxanthin-19
pigments.csv	alloxanthin_mg_m3	mg m^{-3}		Alloxanthin
pigments.csv	zeaxanthin_mg_m3	mg m^{-3}		Zeaxanthin
pigments.csv	prasixanthin_mg_m3	mg m^{-3}		Prasixanthin
pigments.csv	neoxanthin_mg_m3	mg m^{-3}		Neoxanthin
pigments.csv	violaxanthin_mg_m3	mg m^{-3}		Violaxanthin
pigments.csv	diatoxanthin_mg_m3	mg m^{-3}		Diatoxanthin

Table 1: List of measured parameters *(continued)*

Source file	Variable	Units	PI	Description
pigments.csv	diadinoxanthin_mg_m3	mg m^{-3}		Diadinoxanthin
pigments.csv	peridinin_mg_m3	mg m^{-3}		Peridinin
pigments.csv	carotene_mg_m3	mg m^{-3}		Carotene
pigments.csv	lutein_mg_m3	mg m^{-3}		Lutein
nutrients.csv	suspended_particulate_matter_g_m3	g m^{-3}		Suspended particulate matter
nutrients.csv	particulate_organic_nitrogen_g_m3	g m^{-3}		Particulate organic nitrogen
nutrients.csv	total_particulate_carbon_g_m3	g m^{-3}		Total particulate carbon
nutrients.csv	particulate_organic_carbon_g_m3	g m^{-3}		Particulate organic carbon
nutrients.csv	dissolved_organic_carbon_g_m3	g m^{-3}		Dissolved organic carbon
SPMR	TODO	TODO		TODO
SPMR				
SPMR				
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SPMR				
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SPMR				

4 Code availability

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5 Data availability

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6 Code and data availability

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Sample availability. TEXT

Video supplement. TEXT

Appendix A

A1

Table A1: Related COASTLOOC publication

Publications
Babin, M., Stramski, D., Ferrari, G. M., Claustre, H., Bricaud, A., Obolensky, G., & Hoepffner, N. (2003). Variations in the light absorption coefficients of phytoplankton, nonalgal particles, and dissolved organic matter in coastal waters around Europe. Journal of Geophysical Research: Oceans, 108(C7).
Begouen Demeaux, C., & Boss, E. (2022). Validation of Remote-Sensing Algorithms for Diffuse Attenuation of Downward Irradiance Using BGC-Argo Floats. Remote Sens. 2022, 14, 4500.
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Table A1: Related COASTLOOC publication *(continued)*

Publications
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Table A1: Related COASTLOOC publication *(continued)*

Publications
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Table A1: Related COASTLOOC publication *(continued)*

Publications
Zheng, G., & Stramski, D. (2013). A model based on stacked-constraints approach for partitioning the light absorption coefficient of seawater into phytoplankton and non-phytoplankton components. Journal of Geophysical Research: Oceans, 118(4), 2155-2174.

Author contributions. TEXT

Competing interests. TEXT

Disclaimer. TEXT

Acknowledgements. TEXT

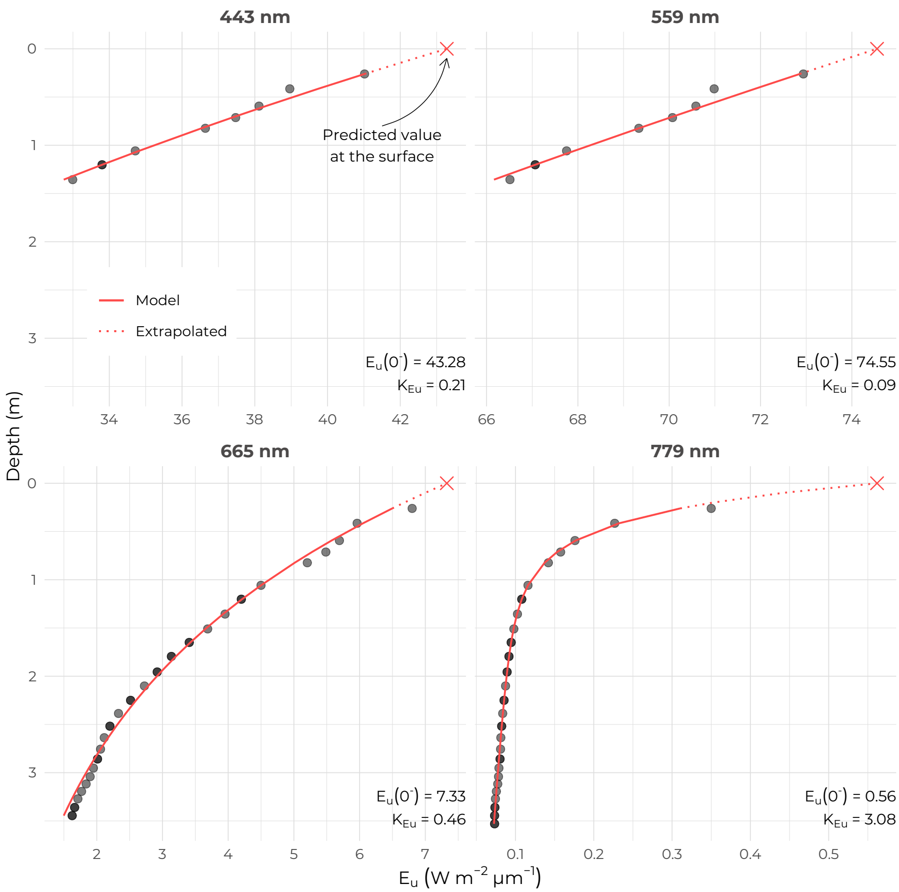

Figure A1. My caption

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