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Meta-analytical insights into organic matter enrichment in the surface microlayer

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Introduction

The supplementary information includes 2 figures presenting additional analyses supporting the main text. The table presented lists the data sources used in the meta-analysis and the types of variables extracted from each study.

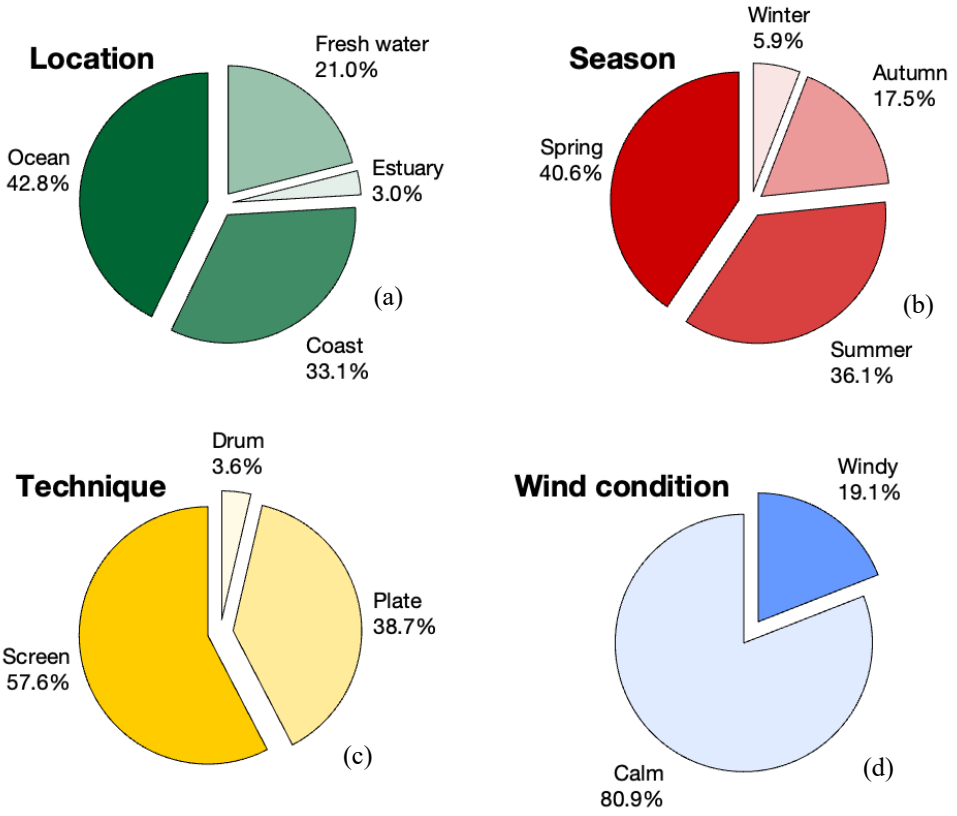

Figure S1: A graphical summary presenting the distribution of the reference studies across four main research attributes. Percentage of data across (a) sampling location, (b) sampling seasons, (c) sampling techniques and (4) wind conditions. Seasons were defined following de Boyer Montégut et al. (2004) (i.e. Boreal winter spans from January to March and Austral winter spans from July to September, with the other seasons defined accordingly). Wind condition is considered to be 'calm' when the wind speed is < 6.6 ms^{-1} (Reinthaler et al., 2008) and vice versa.

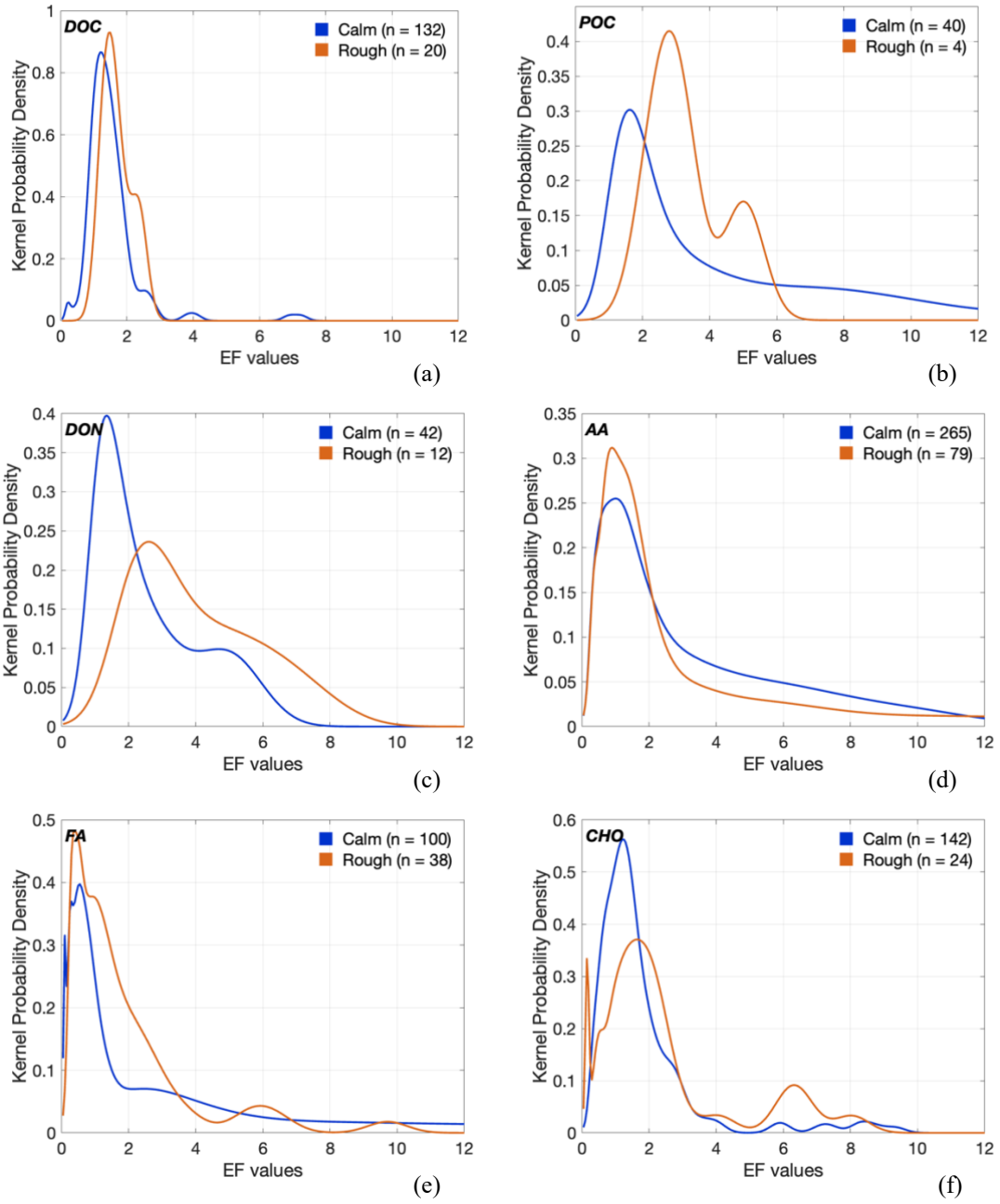

Figure S2: Enrichment variability in the SML under calm vs. rough wind regimes. PDFs illustrating varying enrichment patterns for (a) DOC, (b) POC, (c) DON, (d) AA, (e) FA and (f) CHO between calm (< 6.6 ms^{-1}) and rough (> 6.6 ms^{-1}) wind conditions. 'n' gives the respective sample sizes.

Table S1: Summary of the reference studies contributing to the SML-OM dataset. The citations are accompanied by primary and secondary data extracted from each study. The labels 'Ca', 'Wi', 'O', 'C', 'E', 'F', 'Sp', 'Su', 'A', 'W', 'S', 'P' and 'D' represent the following: 'Calm', 'Windy', 'Ocean', 'Estuary', 'Freshwater', 'Spring', 'Summer', 'Autumn', 'Winter', 'Screen', 'Plate' and 'Drum', respectively. The sampling depth of the ULW of each study is also given.

Reference studies	ULW depth (m)	Primary data												Secondary data			
		TOC	POC	DOC	TON	PON	DON	AA	FA	TEP	CHO	Proteins	Lipids	Wind speed	Location	Period	Method
Williams (1967)	15 – 20 cm		√			√								Ca	O	Sp, A, W	S
Dietz et al. (1976)	1 – 1.5 m		√	√		√									O, C, Fw		P
Sieburth et al. (1976)	8 m			√										Ca	O	SU	S
Meyers (1980)	30 cm			√											C	Sp	
Carlson (1983)	2 m		√	√											O, C, E	Sp, Su	S, P
Carlucci et al. (1985)	10 cm							√						Ca, Wi	O	Su, A	S
Henrichs and Williams (1985)	5 – 15 cm							√			√				C	Su	S
Williams et al. (1986)	1 – 15 cm		√	√		√	√				√	√	√	Ca	O, C	Su, A, W	S
Marty et al. (1988)	20 cm		√						√					Wi	O	Su, A	S
Kuznetsova and Lee (2002)	15 cm							√						Ca	C	Sp, Su, A, W	S
Kuznetsova et al. (2004)	15 cm							√						Ca, Wi	O	Sp	S, D
Hillbricht-Ilkowska and Kostrzewska-Szlakowska (2004)	0.5 cm				√	√								Ca	Fw	Su	P
Kuznetsova et al. (2005)	15 cm							√							C	Sp, Su	S
Gašparović et al. (2007)	10 cm		√	√		√			√					Ca	C	Su	S
Obernosterer et al. (2008)	5 m		√	√		√								Ca	O	A	S
Reinthaler et al. (2008)	30 cm			√			√	√						Ca, Wi	O	Su, A	P
Wurl and Holmes (2008)	1 m			√						√				Ca	O, E	Sp, W	P

Baastrup-Spohr and Staehr (2009)	epilimnion	√			√									Wi	Fw	Sp, Su	S
Cunliffe et al. (2009)	0.75 m			√						√				Mesocosm experiment			
Wurl et al. (2009)	1 m									√	√			Ca, Wi	C	Su	P
Hörtnagl et al. (2010)	0.2 – 0.5 m			√										Ca	Fw	Su	S
Wurl et al. (2011)	1 m									√	√			Wi	O, C	Sp, Su	P
Gao et al. (2012)	0.5 m	√												Ca	O	Su	P
Van Pinxteren et al. (2012)	1 m			√				√			√			Ca	O	Sp, Su, A, W	D
Huang et al. (2015)	0.5 m			√											C, Fw	Sp, Su, A, W	P, D
Astrahan et al. (2016)	1 m										√			Microcosm experiment			D
Chen et al. (2016)	20 cm			√				√			√			Ca, Wi	O, C	Sp	S
Barthelmeß et al. (2021)	2 m			√				√			√			Wi	O	W	S
Barthelmeß and Engel (2022)	20 cm			√				√			√			Wi	C	Sp. Su	P
Chen et al., (2022)	60 cm			√			√							Ca	C	Sp	S
Milinković et al. (2022)	1 m		√	√						√	√			Ca, Wi	C	Sp, Su, W	D

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