These are our responses to comments from Reviewer #1

We are grateful to the anonymous reviewer for their careful review and valuable comments on this manuscript. The constructive feedback provided has been instrumental in strengthening the manuscript, and we appreciate the opportunity to address the reviewer's suggestions during the revision process. We have carefully considered all comments and revised the manuscript accordingly. Reviewer comments and our detailed responses are provided below.

RC1: (to be pasted in the response form)

Line 39:

Typo. Please delete redundant phrase: is "… remineralization and flocculation (Eisma, 1986)(occur". Should be "… remineralization and flocculation (Eisma, 1986)."

Response:

Thank you for the recommendation. Text changed to, "remineralization and flocculation (Eisma, 1986) occur."

Table 1:

I suggest removing subscripts in parameters description e.g aCDOMa, apb. This is looking awkward. It is methodological correct to define measured parameters as" aCDOM(l) – Colored Dissolved Organic Matter absorption spectrum, ap(l) particulate absorption spectrum, and place those definitions below table.

Response:

Thank you for this suggestion. Superscripts removed and changed to: aCDOM = Absorption of colored dissolved organic matter, aP = Particulate absorption

Line 232:

Please define the symbol – Rrs.

Response:

This correction also applies to a comment by RC2; please see the correction provided in RC2 comment line 232-234.

Line 250:

The description of filtration methods regarding CDOM sampling. Usage of both filter types used – 0.7 mm GF/F and 0.45 mm cellulose acetate filters is methodologically incorrect. The community accepted definition of soluble compounds present in water is the remaining filtrate after passing through 0.2 mm filters. So, in all your measured absorption spectra of filtered water either through – 0.7 mm GF/F or 0.45 mm cellulose acetate filters, there will be particulate absorption signal, than need to be corrected. This contribution could be significant in sediment loaded riverine and deltaic water. Please communicate if that issue has been considered during data analysis and how it influenced the uncertainty of measured CDOM absorption spectra.

Response:

We understand that 0.22 µm filters are commonly used in ocean optics studies as recommended in e.g. IOCCG reports. However, this study focuses across terrestrial and marine scientific communities partly on particle-rich, turbid coastal environments where larger pore size filters (0.45 µm and 0.7 µm) are recommended and necessary to allow adequate filtration of water samples. Previous studies (Supplementary Fig. S1 in Juhls et al., 2020) conducted in similar environments (Lena River) have shown that the difference in absorption measurements between 0.22 µm and 0.45 µm filters is typically below 5%, while the mean absolute difference in DOC concentrations between 0.45 µm and 0.7 µm filters is approximately 2.5%. While we cannot completely exclude minor contributions from particles passing

through larger pore-size filters, previous comparisons suggest that this uncertainty is small relative to the observed variability across the fluvial–marine gradient and does not affect the main conclusions.

A correction has been made in line 259 of the manuscript text where (Supplementary Fig. S1 in Juhls et al., 2021) has been replaced with "(Supplementary Fig. S1 in Juhls et al., 2020)."

Table 2:
Please harmonize the terminology used in Table 2 in column describing sensors. In all methods describe for measurements of remote sensing reflectance: radiometric profiles, floating radiometer or above water radiometric measurements, the measured water leaving radiance spectrum Lw(l) shall be divided by the measured spectrum of incident solar irradiance at the sea surface Es(l). So usage of terms such as: "Global solar irradiance" or "Downwelling incident irradiance" are not correct. Please harmonize terminology in Table 2.
Response:
Thank you, we have adapted the table.

Campaign	Instrument type	Deployment	Sensor type	Spectral range/resolution
MALINA 2009 (Massicotte et al., 2021)	Compact Optical Profiling System (C-OPS)	Profile	Downwelling irradiance (E_d) (mW m^{-2} nm^{-1} sr^{-1}) Upwelling radiance (L_u) (mW m^{-2} nm^{-1} sr^{-1})	320-780 nm @ specific wavelengths
Nunataryuk 2019 (Lizotte et al., 2023)	Compact Optical Profiling System (C-OPS)	Profile	Downwelling irradiance (E_d) (mW m^{-2} nm^{-1} sr^{-1}) Upwelling radiance (L_u) (mW m^{-2} nm^{-1} sr^{-1})	395-865 nm @ specific wavelengths
PeCaBeau 2021 (Broder et al., 2022)	TriOS Ramses	Above-water	Downwelling radiance from sky, (L_{sky})(λ,+10m) (mW m^{-2} nm^{-1} sr^{-1}) Upwelling radiance, (L_u) (mW m^{-2} nm^{-1} sr^{-1}) Downwelling irradiance from the sky, (E_d) (λ,+10m) (mW m^{-2} nm^{-1})	300-850 nm @ 4 nm increments
	TriOS Ramses	Floating	Upwelling radiance mounted 6 cm below the water surface, L_u(λ,-0.06m) (mW m^{-2} nm^{-1} sr^{-1}) Upwelling radiance (L_u)	300-850 nm @ 4 nm increments
	TriOS Ramses	In-water	Upwelling radiance (L_u) (mW m^{-2} nm^{-1} sr^{-1}), 2x Downwelling irradiance (E_d) (mW m^{-2} nm^{-1} sr^{-1})	300-850 nm @ 4 nm increments
FLOCHAR 2024	TriOS Ramses	Above-water	Downwelling radiance from sky, (L_{sky}) (mW m^{-2} nm^{-1} sr^{-1}) Upwelling radiance (L_u) (mW m^{-2} nm^{-1} sr^{-1}) Downwelling irradiance from the sky, (E_d) (mW m^{-2} nm^{-1} sr^{-1})	350-950 nm @ 2.5 nm increments
	TriOS Ramses	Floating	Upwelling radiance (L_u) (mW m^{-2} nm^{-1} sr^{-1}) Downwelling irradiance (E_d) (mW m^{-2} nm^{-1} sr^{-1})	350-950 nm @ 2.5 nm increments
	TriOS Ramses	Profile	Upwelling radiance (L_u) (mW m^{-2} nm^{-1} sr^{-1}) Downwelling irradiance (E_d) (mW m^{-2} nm^{-1} sr^{-1})	350-950 nm @ 2.5 nm increments

Line 271:
“In situ measurements of bio-optical properties are essential for the calibration and validation of OCRS algorithms” Please define abbreviation OCRS when used for the first time.
Response:
Thank you for the suggestion. The text has been updated to: "In situ measurements of bio-optical properties are essential for the calibration and validation of ocean color remote sensing (OCRS) algorithms."