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Coincident Observations of Dye and Drifter Relative Dispersion over the Inner Shelf

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Supporting Information for
Coincident observations of dye and drifter relative dispersion over the inner shelf

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The $K_d(490)$ estimates (Mueller, 2000; NASA, 2009) are a good general indicator of water clarity because the non-water optically active components of absorption and scattering can contribute significantly to the diffuse attenuation at that wavelength (while it is dominated by CDOM, phytoplankton or non-algal particulates at shorter wavelengths and by water absorption after ~ 570 nm). The diffuse attenuation at other wavelengths (in the absence of dye fluorescence) can be estimated from the $K_d(490)$ determination (Austin & Petzold, 1986. See table and plot below). For the clearest waters of the study ($K_d = 0.05 \text{ m}^{-1}$), this would put the penetration depth ($z_{90} = 1/K_d$, the thickness of the water layer from which $\sim 90\%$ of the water-leaving photons come from, Gordon & McCluney, 1975) around 12 m for the excitation bands and around 5 m for the emission bands. For the more turbid waters ($K_d = 0.333 \text{ m}^{-1}$), the $1/K_d$ depth for the excitation bands would be around 4 m and around 3 m for the emission bands. Note that the K_d algorithms used here were mostly designed for oceanic waters and likely underestimate K_d in turbid waters. However, the highest $K_d(490)$ values considered here ($\sim 0.33 \text{ m}^{-1}$) remain relatively low and suggest conditions of limited turbidity in general so the algorithms may still be reasonably accurate.

Kd(490) = 0.05 m⁻¹

ex

λ (nm)	Kd(λ)	1/Kd(λ)
545	0.0787	12.70
550	0.0806	12.41
555	0.0843	11.86
560	0.0871	11.47

em

λ (nm)	Kd(λ)	1/Kd(λ)
590	0.1707	5.86
595	0.2137	4.68
600	0.2669	3.75

Kd(490) = 0.333 m⁻¹

ex

λ (nm)	Kd(λ)	1/Kd(λ)
545	0.2512	3.98
550	0.2464	4.06
555	0.2441	4.10
560	0.2416	4.14

em

λ (nm)	Kd(λ)	1/Kd(λ)
590	0.3077	3.25
595	0.3511	2.85
600	0.4056	2.46

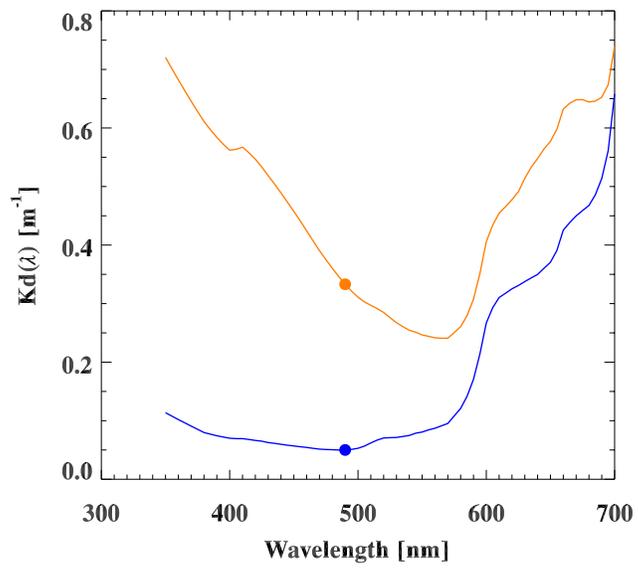
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K_d spectra reconstructed from the $K_d(490)$ values using the approach described in Austin & Petzold (1986) for the 2 extreme cases of $1/kd = 20$ m (blue) and 3 m (orange).