fDOM: A closer look at fluorescent Dissolved Organic Matter measurement

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What is CDOM & fDOM?

Chromophoric / Colored Dissolved Organic Matter (CDOM):
• Refers to organic matter that absorbs strongly in the UV

fluorescent Dissolved Organic Matter (fDOM):
• Refers to the fraction of CDOM that fluoresces
Fluorescence:
Absorption of a photon leading to emission of a photon of a longer wavelength

How is fDOM Measured?

Sample Volume 
~25mm³

UV LED 
(excitation)

EXO fDOM 
fluorometer optics

Fluorescence detector 
(emission)

Attributes:
• Sensitive
• Fast
• Non-invasive
• Simple

Theory of Fluorescence

1) Electrons excited by light source
2) Electrons reach a high energy state
3) Energy loss occurs within a few nano seconds
4) Energy loss observed as fluorescent light of a longer wavelength
EXO fDOM Probe

Sensor Hardware, Probe Meta-Data Storage

UV Source

Titanium, Welded Housing

Wet-Mate Connector

Damage Resistant, Sapphire Lens

Dimensions
- Length: 13.1 cm
- Diameter: 1.5 cm

Output – Nomenclature
- fDOM RFU
- fDOM QSU
- fDOM ppb
Field Testing

Continuous Monitoring (or Sampling)
- Event monitoring (temporal/spatial)
- Anti-fouling solutions
- Full water quality sensor suite
High Turbidities can result in underestimates of fDOM

- The level of interference will be site specific and relate to particle size and composition
- Data correction is possible with simultaneous turbidity measurement and development of a site specific correction factor

Interferences – Particle Scattering
Proposed fDOM Correction Factor (Downing et al. 2012):

Temperature

- fDOM has Inverse Relationship to Temperature
- \( \sim 1\% / \text{degree C} \)

Downing et al. (2012), Henderson et al. (2009), Watras et al. (2011)

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FDOM_{\text{corr}} = FDOM_{\text{raw}} + \rho(T_{\text{meas}} - 25)/ r_p(\text{FNU}) \times r_d(\text{A}_{254})
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Thank you!

For more information on EXO visit…
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Contact us at…
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