In situ Measurements of the Fluorescence of Dissolved Organic Matter (FDOM)

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Why fluorescence instead of absorbance (UV-254)?

- **Potentially more robust** – UVA 254/DOC relationship changed while FDOM/DOC (ex370/em460) did not between locations on the McKenzie River, Oregon (Kraus et al 2010). Respective r^2 ; 0.73 and 0.92, n= 33.
- **Cost savings** – Fluorometer is < 1/2 cost of a field spectrophotometer.

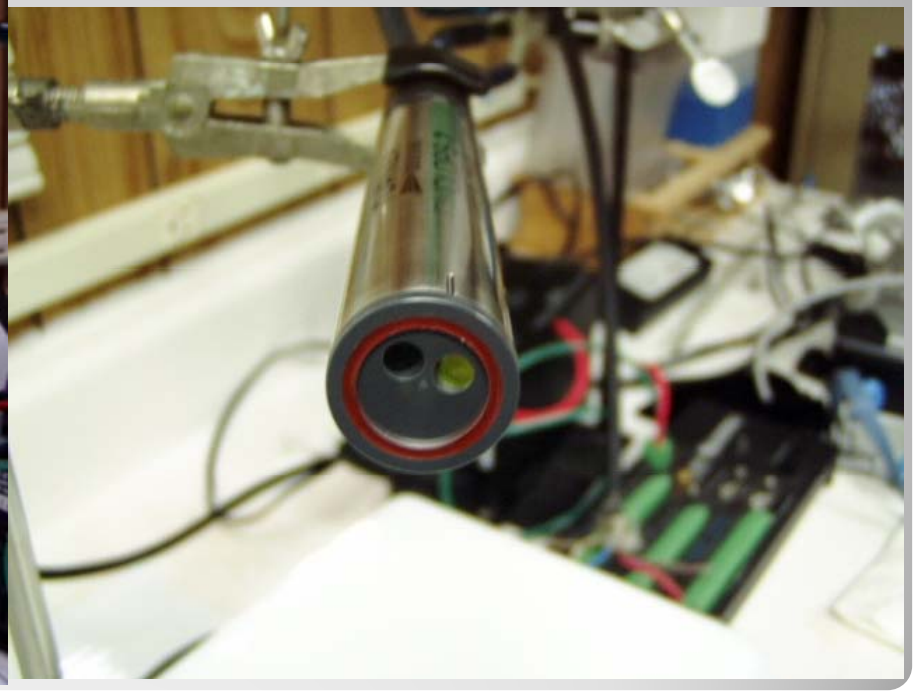
Historical Context

- **Since ~1963**
- **1975** Smart et al recommended fluorescence (ex 365 / em 400-700) over UVA-254 as a DOC proxy in freshwater (r^2 = 0.96 , n = 24).
- **Oceanography** FDOM-DOC correlations.

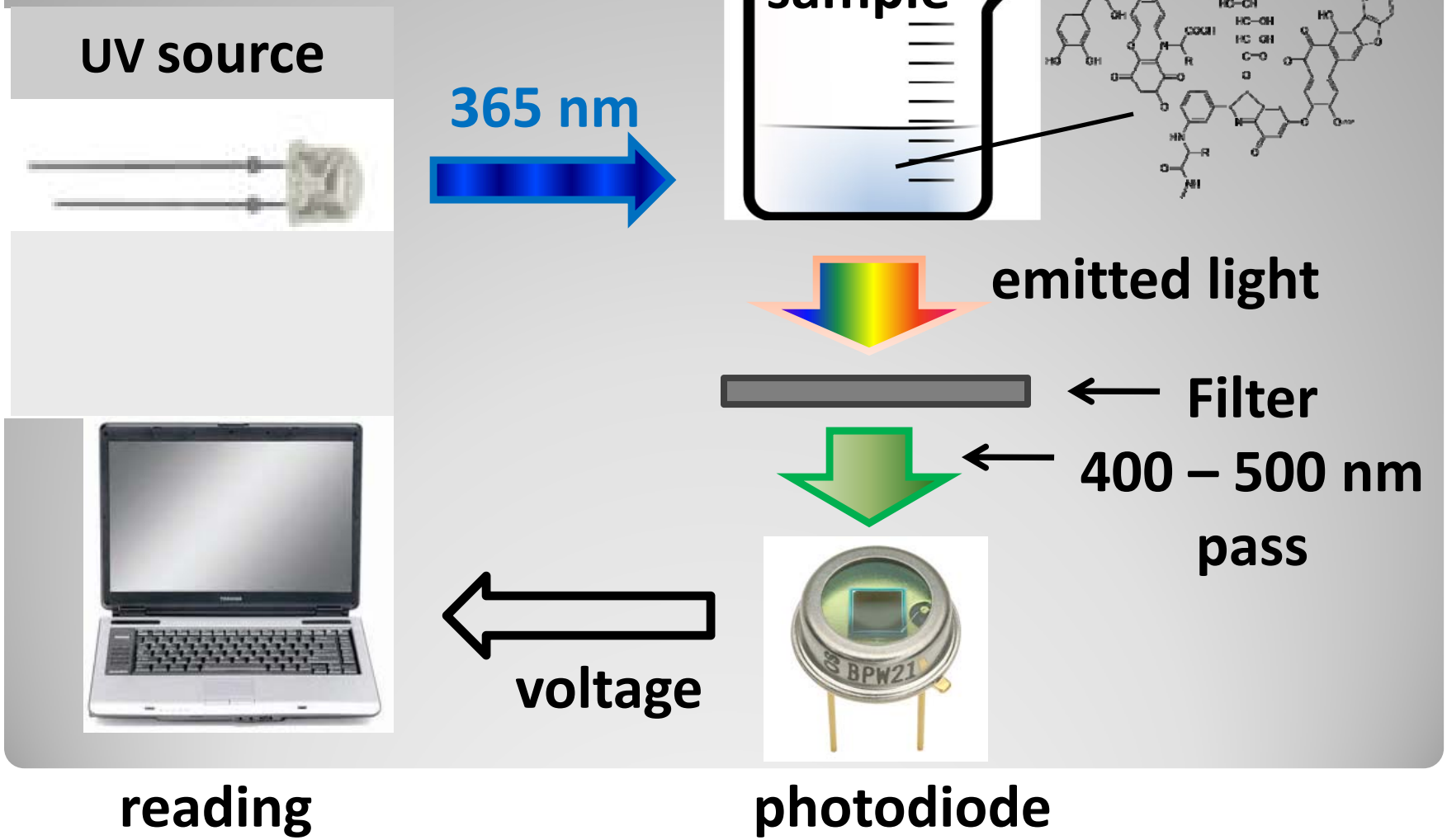
Recent in situ applications in California - USGS

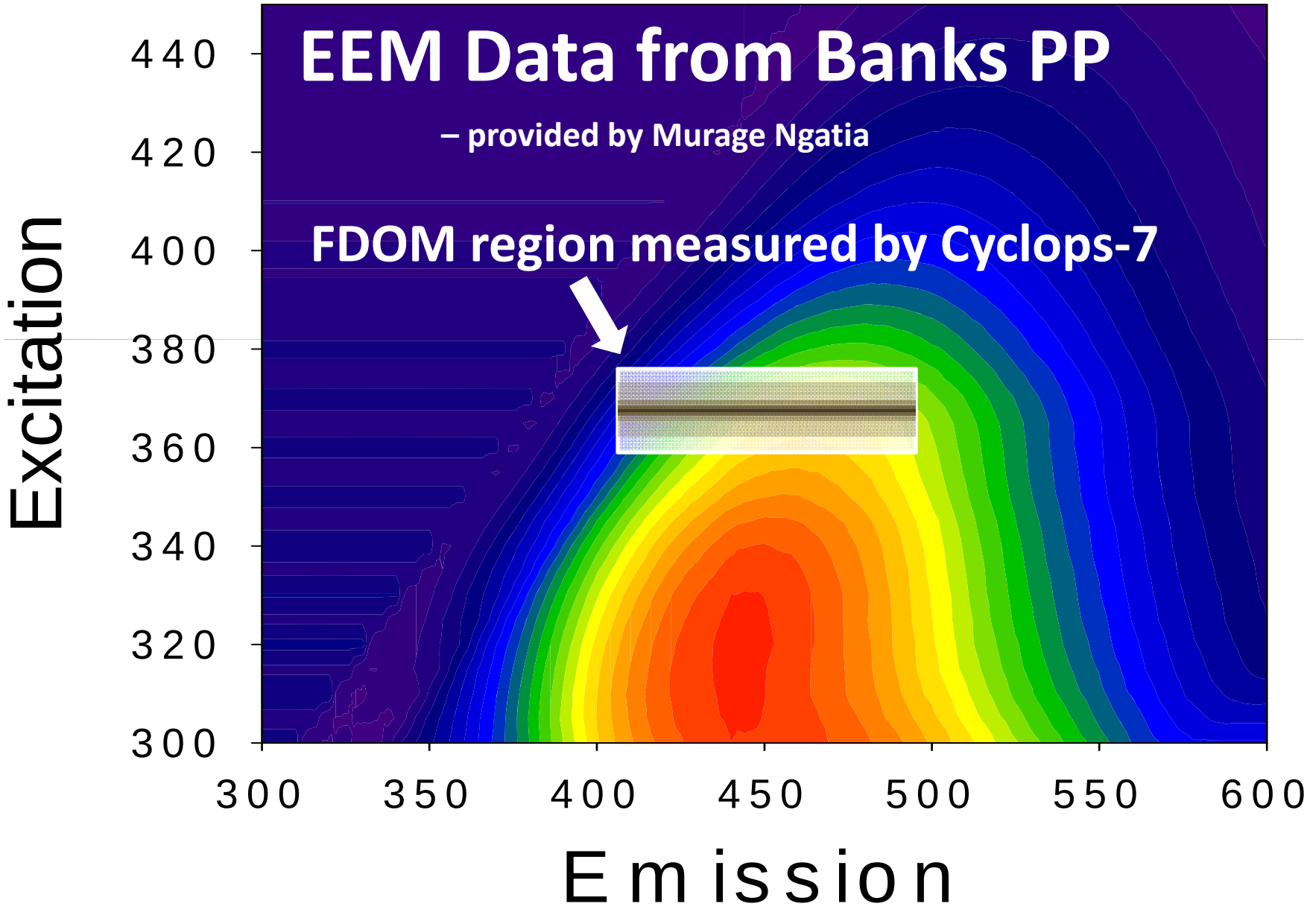
- **Sweetwater Reservoir** – Chula Vista, $r^2 = 0.96$, n = 18 (Downing et al 2008).
- **Browns Island** – Delta tidal wetland, $r^2 = 0.74$, n = 23 (Downing et al 2009).
- **Willow Slough** – Yolo County, multiparameter model: $r^2 = 0.98$, n = 18 (Saraceno et al 2009).

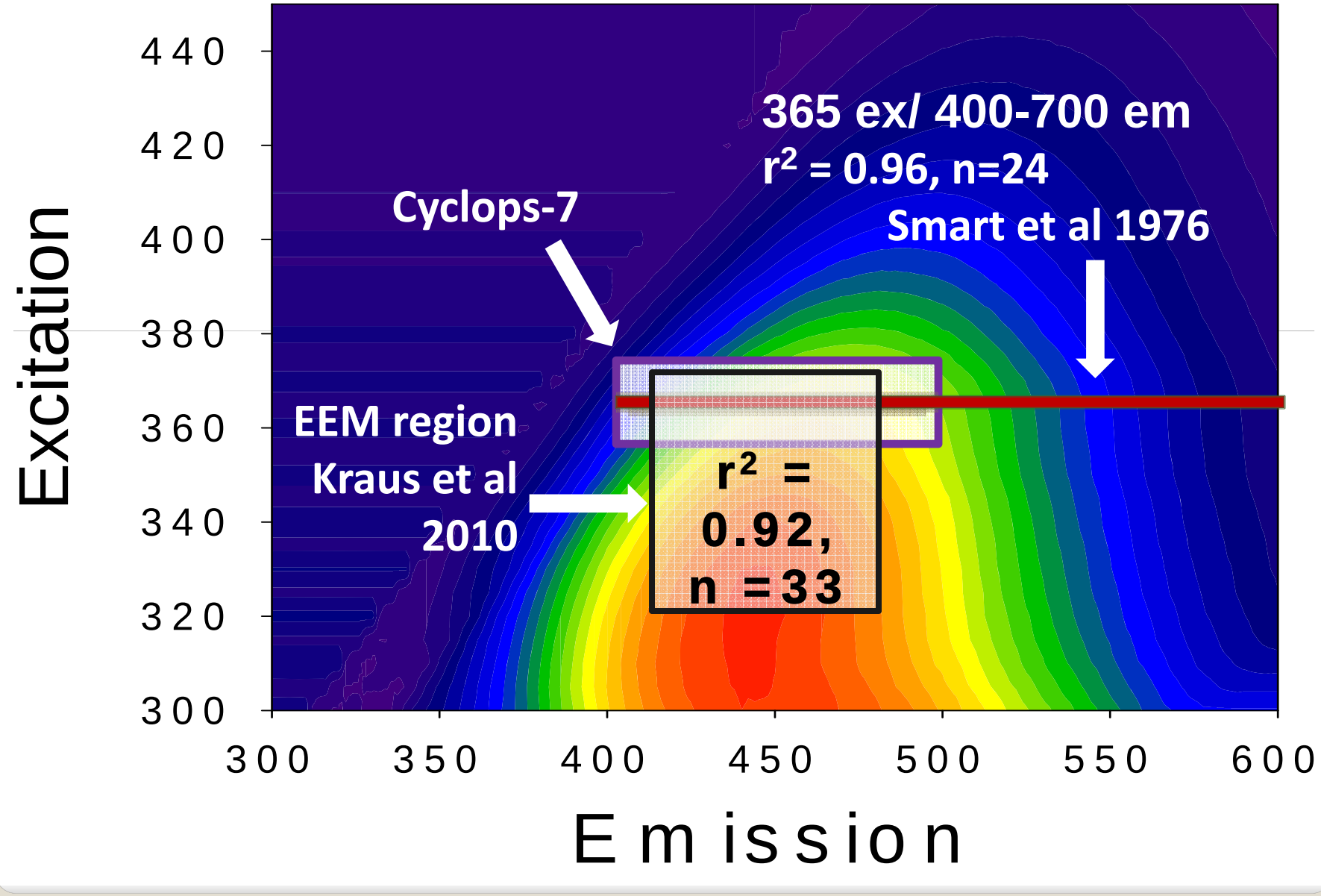
Cyclops-7



Fluorometer Conceptual Schematic




EEM Data from Banks PP
– provided by Murage Ngatia
FDOM region measured by Cyclops-7
Excitation
440
420
400
380
360
340
320
300
300
350
400
450
500
550
600
Emission


365 ex/ 400-700 em
r² = 0.96, n=24
Smart et al 1976
Cyclops-7
EEM region
Kraus et al
2010
r² =
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450
500
550
600
Emission

Study Overview

- 1 year deployment at Banks. August 2011
- Monitor performance.
- Regress DOC to FDOM and to UVA.
- Compare regressions.
- Document.

References

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- Kraus et al. 2010. Determining Sources of Dissolved Organic Carbon and Disinfection Byproduct Precursors to the McKenzie River, Oregon. Journal of Environmental Quality 39 2100-2112.
- Saraceno et al. 2009. High-frequency in situ Optical Measurements During a Storm Event: Assessing Relationships Between Dissolved Organic Matter, Sediment Concentration, and Hydrologic Processes.
- Smart et al. 1975. The relation of Fluorescence to Dissolved Organic Carbon in Surface Waters. Water Research 10 805-811.

Thank You
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