

COLLABORATIVE RESEARCH SURVEY ON MARINE FISHERIES RESOURCES AND ENVIRONMENT IN THE GULF OF THAILAND 2018

Distribution of CDOM in Surface Water and Sub- surface Chlorophyll Maxima Depth around the Gulf of Thailand

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Outlines

- **Introduction**
- **Material and Methods**
- **Results and Discussion**

What is CDOM?

- Colored or Chromophoric Dissolved Organic Matter
- absorbs the ultraviolet light and decomposes to release tannin, an organic pollutant that causes the water to turn murky
- Largely uncharacterized. Includes proteins/amino acids, possibly pigment degradation products, “humic materials” and secondary metabolites like lignin phenols
- Historically, only terrestrial discharge sources were considered

How to estimate CDOM in study area

$$R_{rs}(\lambda) = \frac{L_w(\lambda)}{E_d(\lambda, 0^-)}$$

$R_{rs}(\lambda)$
deconstruction

$$r_{rs}(\lambda, 0^-) = \frac{R_{rs}(\lambda)}{0.52 + 1.7R_{rs}(\lambda)}$$

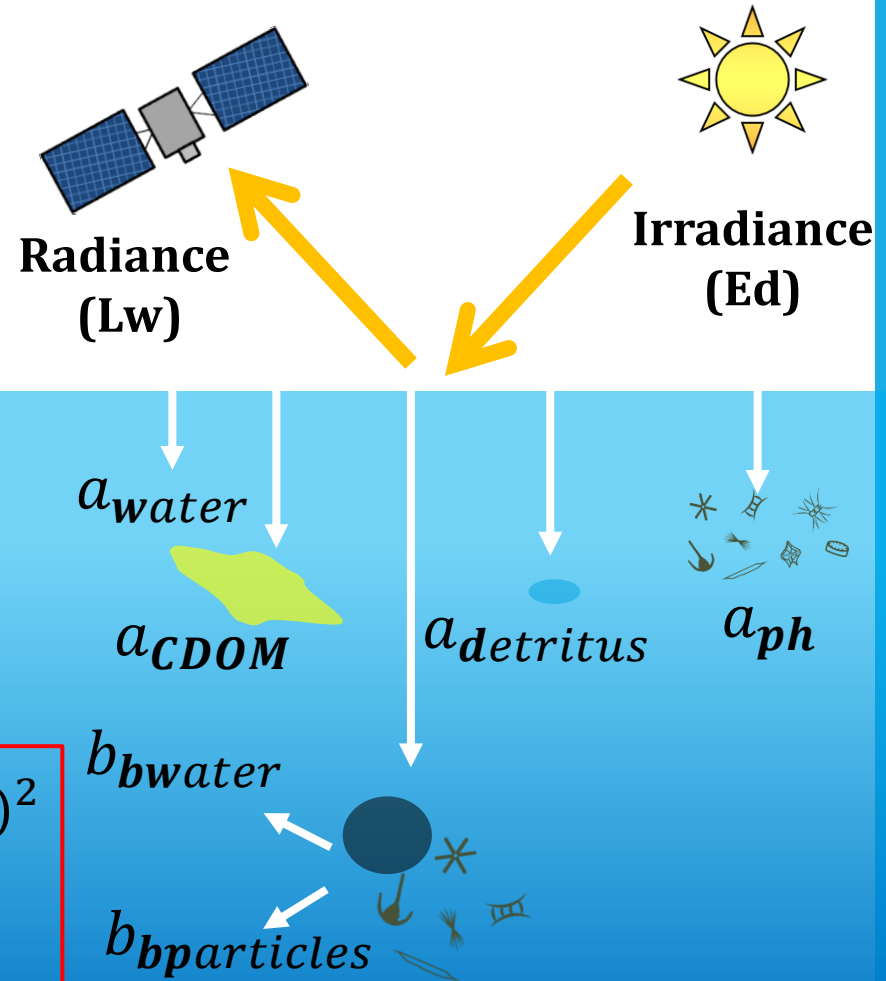
IOP_s

(Lee et al., 2002)

(Inherent Optical Properties)

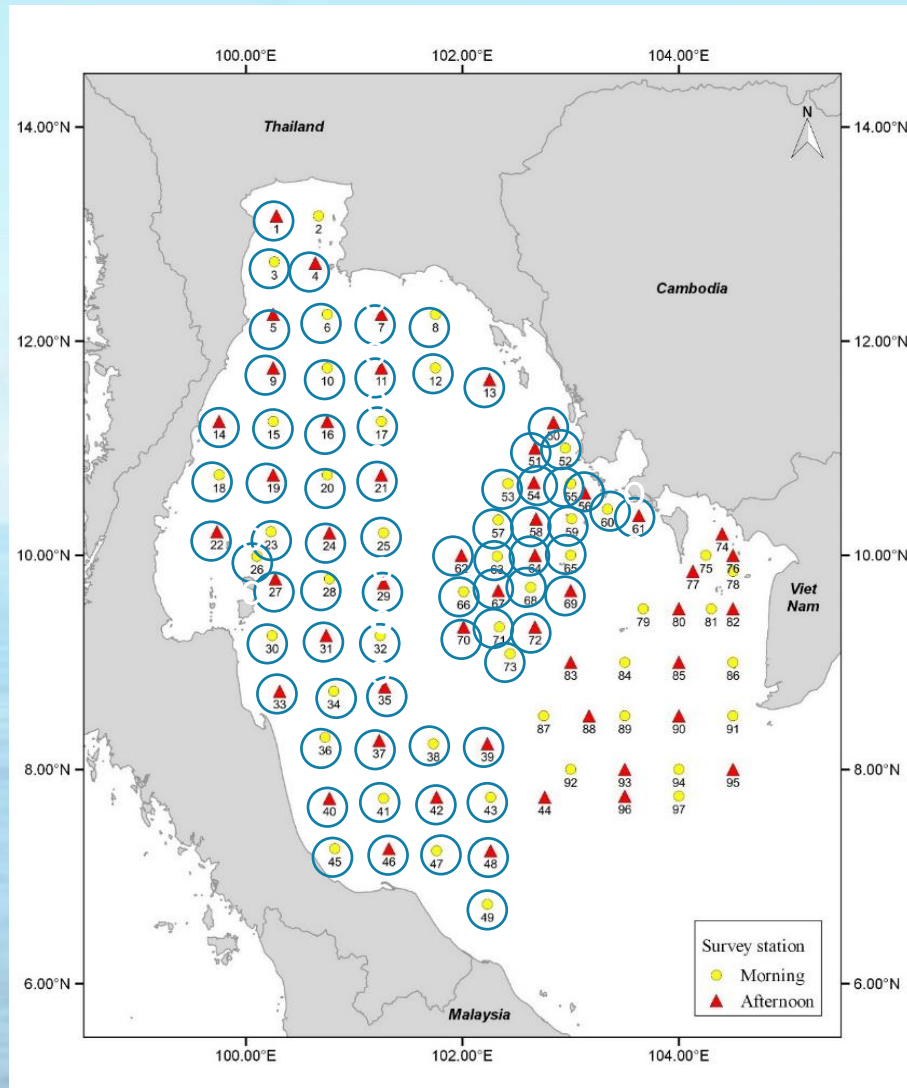
$$r_{rs}(\lambda, 0^-) = 0.0949u(\lambda) + 0.0794u(\lambda)^2$$

$$u(\lambda) = \frac{b_b(\lambda)}{a(\lambda) + b_b(\lambda)}$$



Study Area

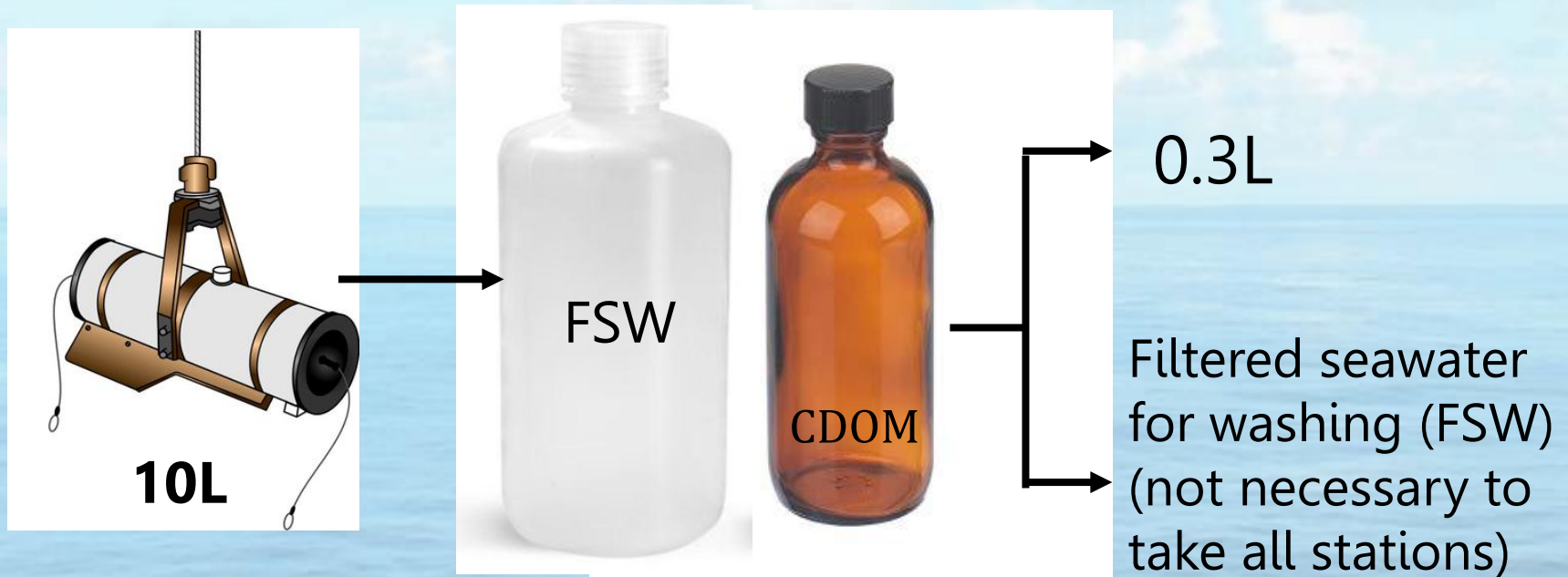
Station map 72 stations



Materials and Methods

Water collection

Seawater at surface
(or SCM and below SCM)



① Wash (3 times) the bottles by the seawater

② Collect the water samples

Materials and Methods

FSW

Materials

- $0.2\mu m$ Whatman Nucleopore polycarbonate filters
- Flask to collect the filtered water
- Vacuum pump : <0.01 Mpa

Methods

- Filtrate the collected water through the $0.2\mu m$ filters under <0.01 Mpa,
- Rinse (3 times) the flask with small volume of the filtered water,
- Collect the FSW to wash the funnels after filtering.

Materials and Methods

CDOM

Materials

- Sampling water : 300ml
- $0.2\mu m$ Whatman Nucleopore polycarbonate filters
- Vacuum pump : <0.01 Mpa



Materials and Methods

CDOM

Method

- Filtered water through $0.2\mu m$ filter (Vacuum pump <0.01 MPa) into the same glass bottle,
- Collect the last 100ml in the washed glass brown bottle,
- Store the samples in a refrigerator ($4^{\circ}C$), avoiding light and high temperature

Lab work

MPS-2400 spectrophotometer
(Shimadzu Corp.) with 10-cm cell.

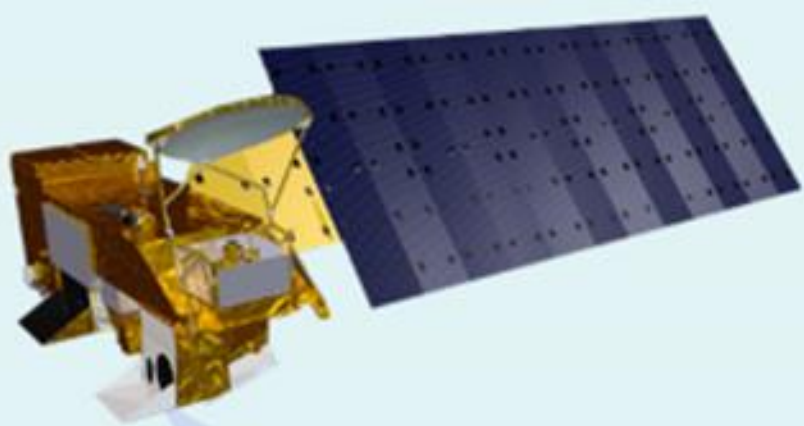


The optical density of CDOM ($OD_{CDOM}(\lambda)$) was measured in a 10-cm quartz cylinder cell from 300-800 nm in 1-nm increments using a multi-purpose spectrophotometer (MPS-2400, Shimadzu) with reference to Milli-Q water.

CDOM absorption coefficients ($a_{\text{CDOM}}(\lambda)$, m^{-1})

$$a_{\text{CDOM}}(440) = \frac{2.303 [\text{OD}_{\text{CDOM}}(440) - \text{OD}_{\text{null,CDOM}}]}{l}$$

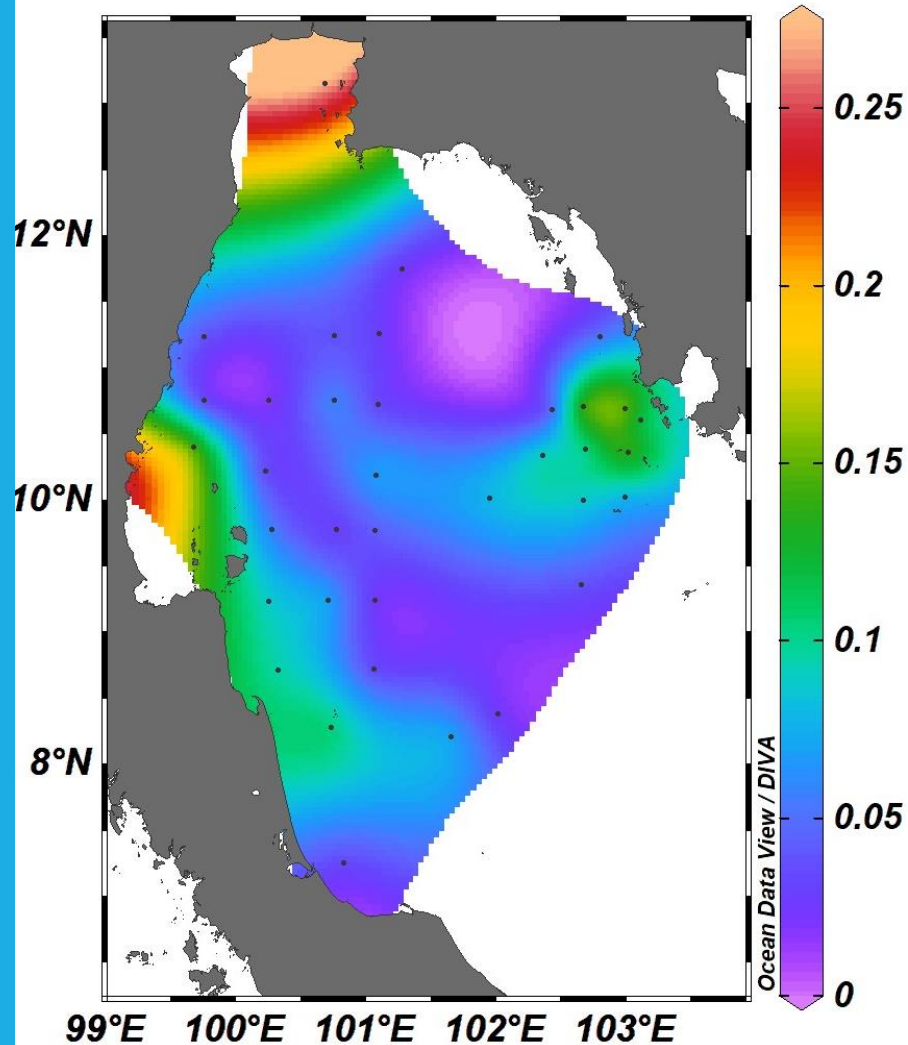
- The salinity difference was minimized by subtracting the mean value of $\text{OD}_{\text{CDOM}}(\lambda)$ 700 nm ($\text{OD}_{\text{null,CDOM}}$) from the whole spectrum and were calculated
- $l = 0.1$ is the optical pathlength (m)



Results



CDOM [440 nm] @ Layer=first

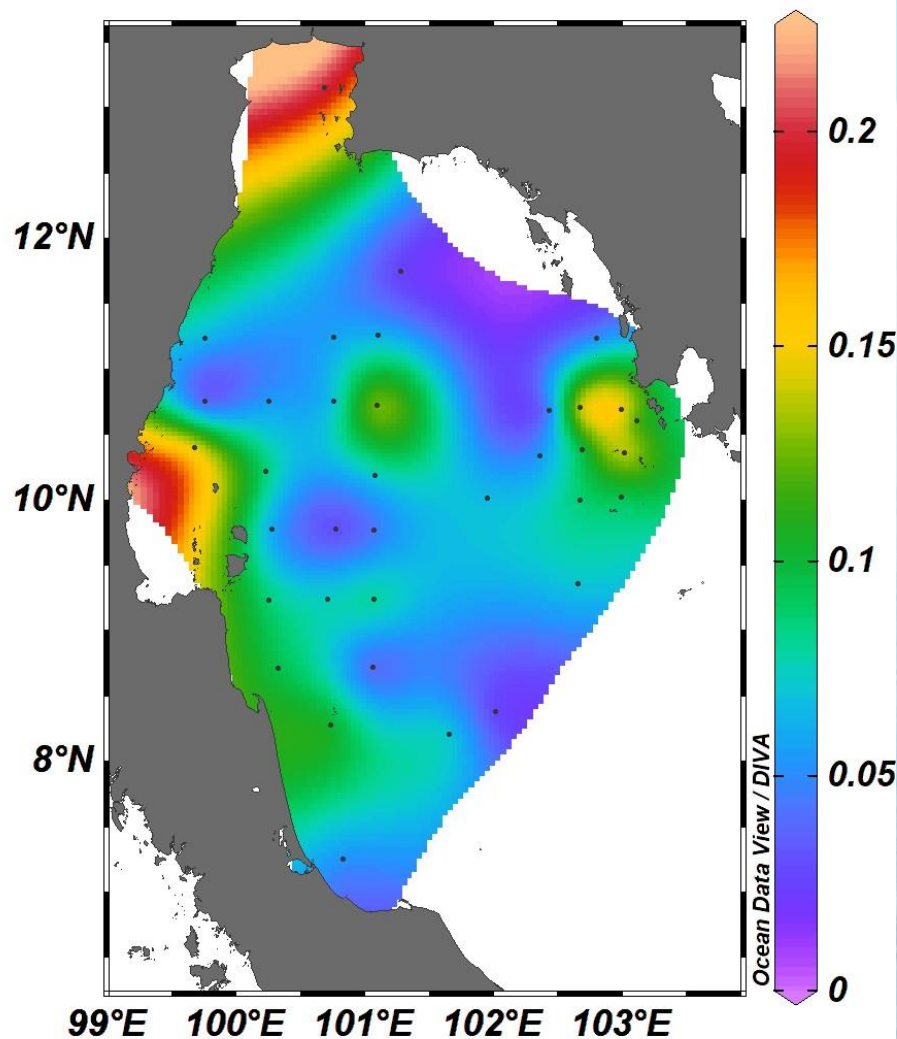


Surface Layer

- The CDOM concentration $0.02 - 0.27 \text{ m}^{-1}$
- High CDOM ($>0.2 \text{ m}^{-1}$) : the Upper GOT & Southern part along the coast of Surat Thani Province
- It gradually decreased towards the offshore

Sub-surface Layer

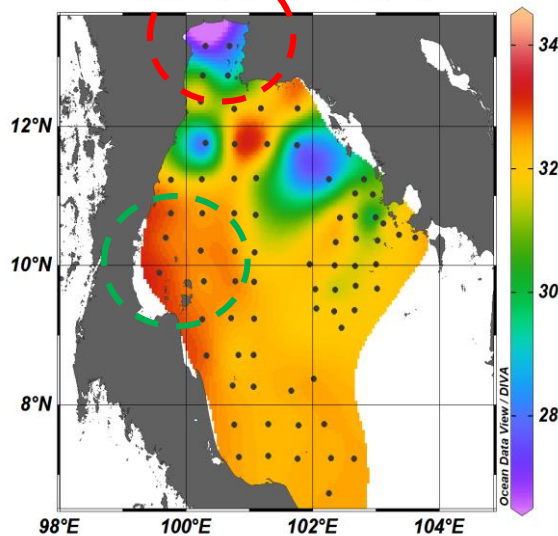
CDOM [440 nm] @ Layer=last



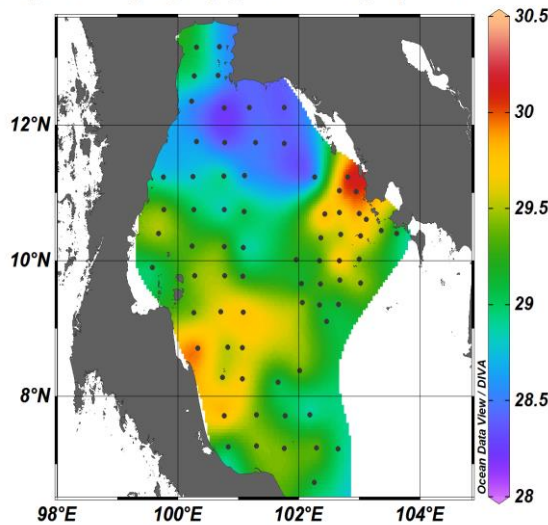
- The CDOM concentration $0.05 - 0.20 \text{ m}^{-1}$
- High CDOM ($>0.2 \text{ m}^{-1}$) : the Upper GOT & Southern part along the coast of Surat Thani Province

CDOM and Others

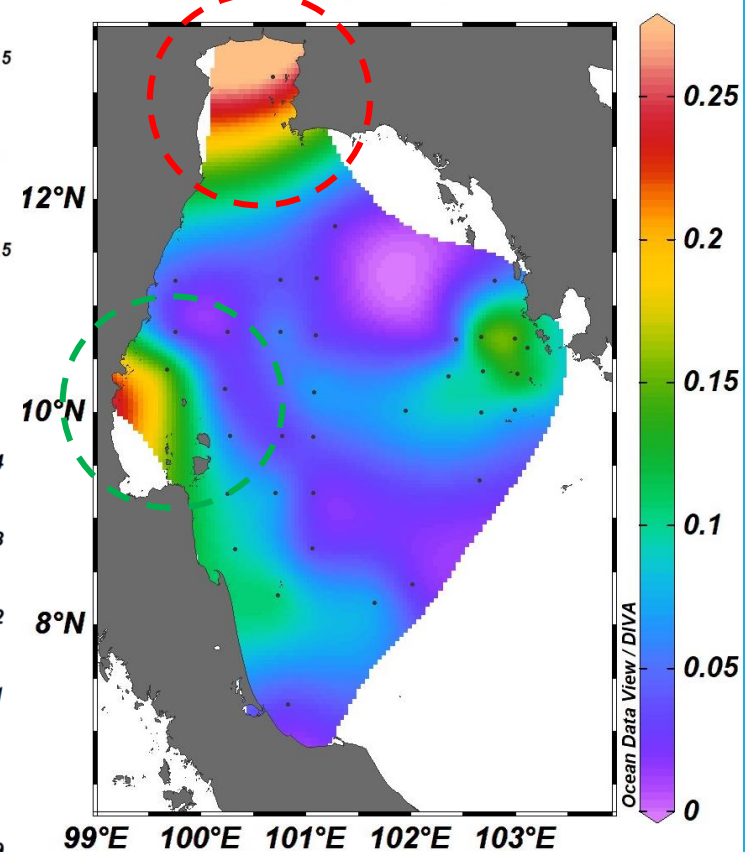
Salinity [PSU] @ Pressure [db]=first



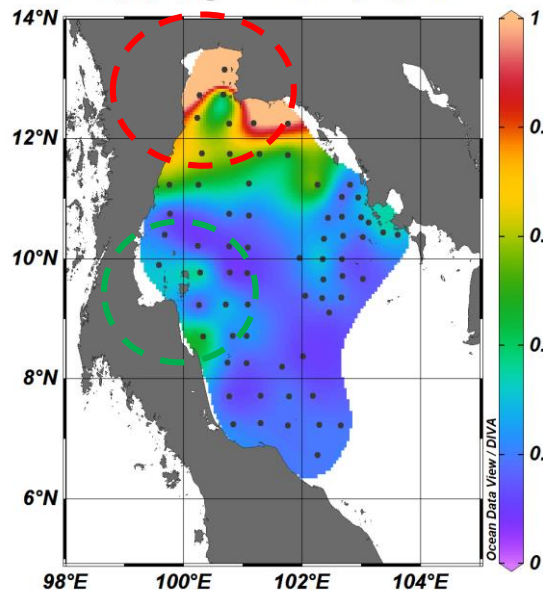
Temperature [deg C] @ Pressure [db]=first



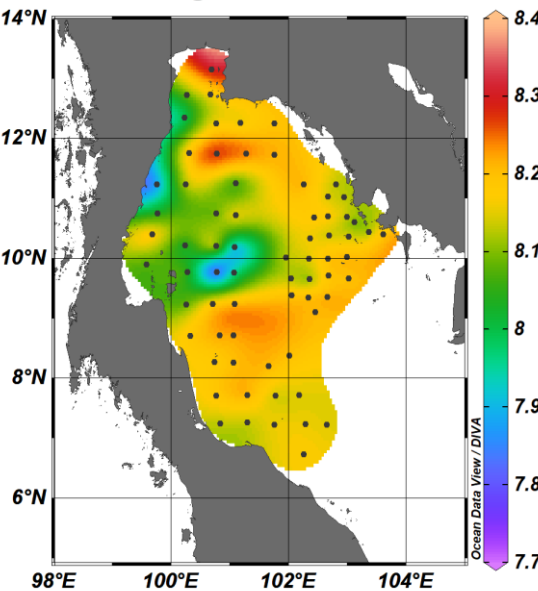
CDOM [440 nm] @ Layer=first



Chl-a [ug/l] @ Pressure [db]=first



pH @ Pressure [db]=first



Conclusion and Further Work

- CDOM data is related with Salinity data
- Finding the correlation of CDOM, APH, Salinity and Chl-a



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