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

Vertical texture and organic carbon in four short core sediments of the Gulf of Thailand

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Supported by Southeast Asian Fisheries Development Center
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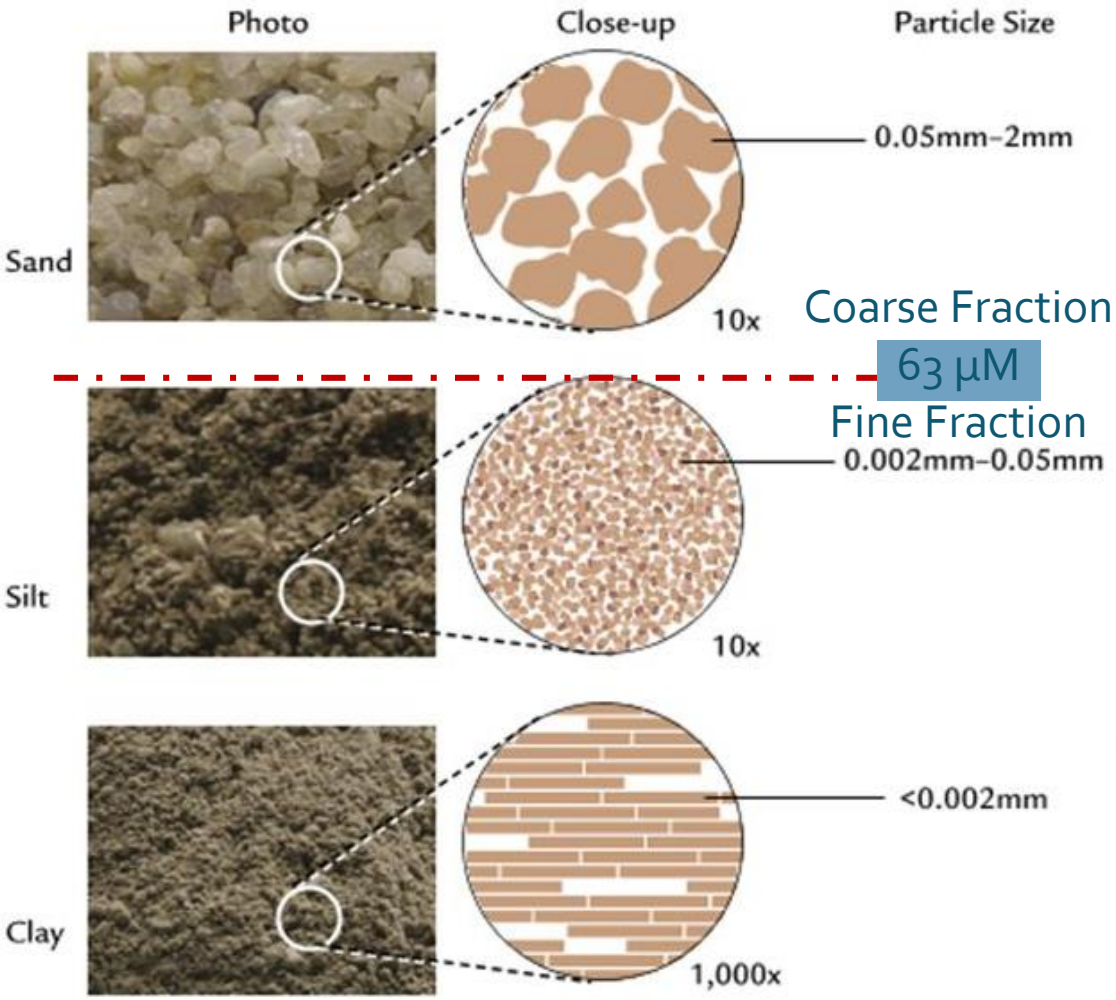
Significance

- **Texture** (grain size) - sediment characteristics :
  - Potential contaminant - surface absorption site
  - Sediment Layer Depth - anthropogenic input
- **Organic carbon** associates well **fine grain** sediment
  - Physiochemical parameters change (pH, Redox, O2)
  - Varied toxicity of potent contaminant (i.e. Hg)
- **Calcium Carbonate** content (dilution effect on contamination)

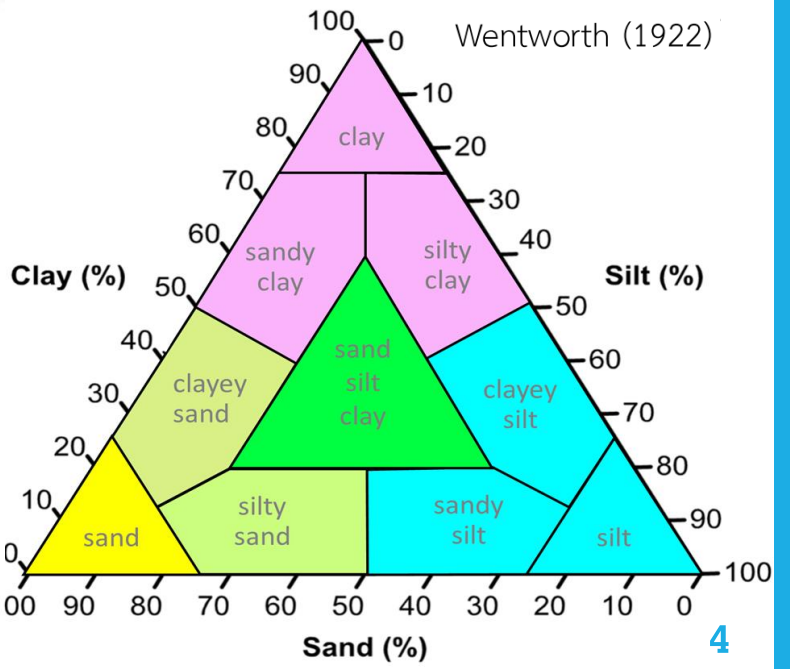
Grain size and Texture



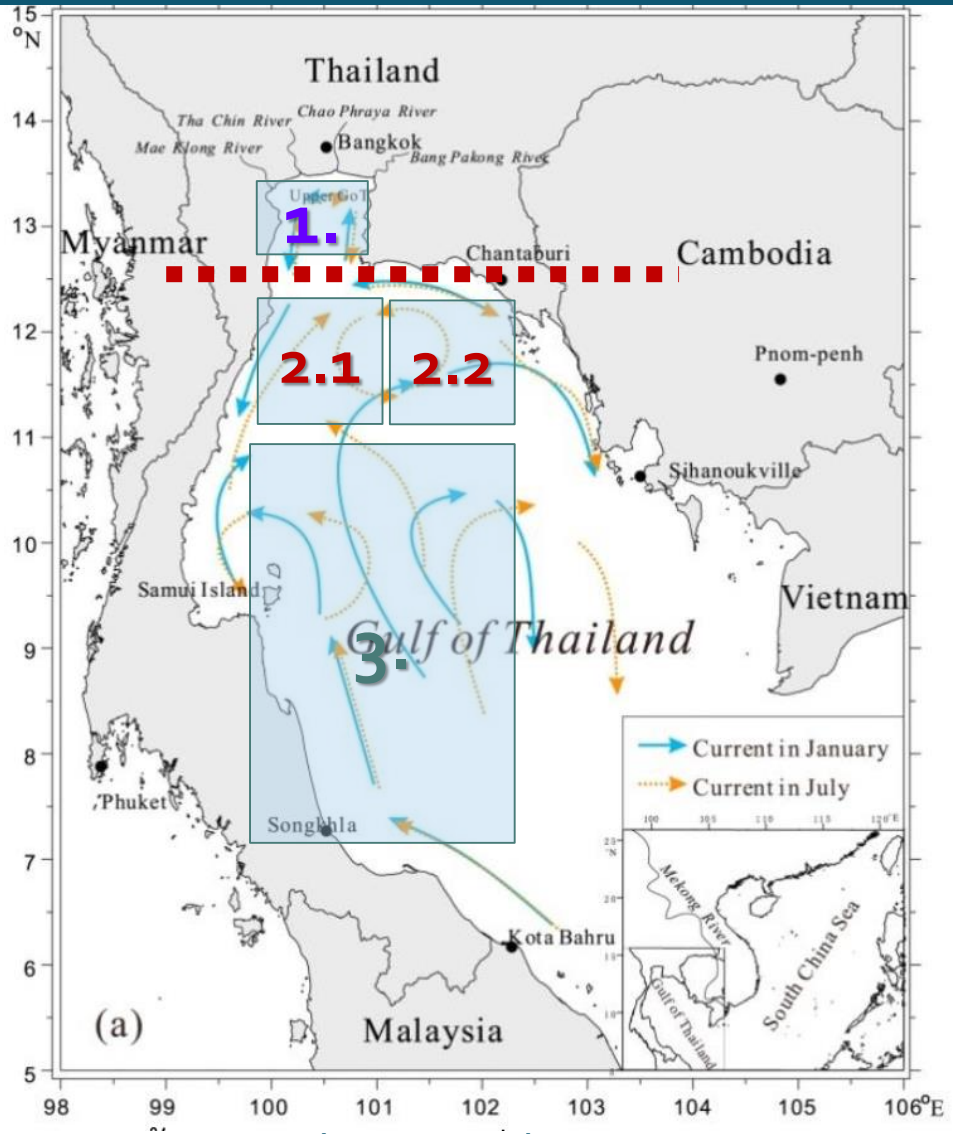
https://support.rainmachine.com/hc/en-us/article_attachments/214639948/slide_7.jpg

Application

- Characters
- Deposition Environment
- Source and Potent pollutant Identification
- Sedimentation rate and process



Sed. Texture in the Gulf of Thailand



Buranapratheprat and Bunpapong, 1998

Sediment Texture (Silty Clay)

1. The Upper GOT

- Finer grain (<63µM) mostly Silty clay (riverine input)
- High % sand particle

2. The Middle GOT (2 gr.)

2.1. Silty Clay and SandSiltClay and Sand (% Sand high)

2.2. Clayey Sand, SandSiltClay and Sand

3. The Lower GOT

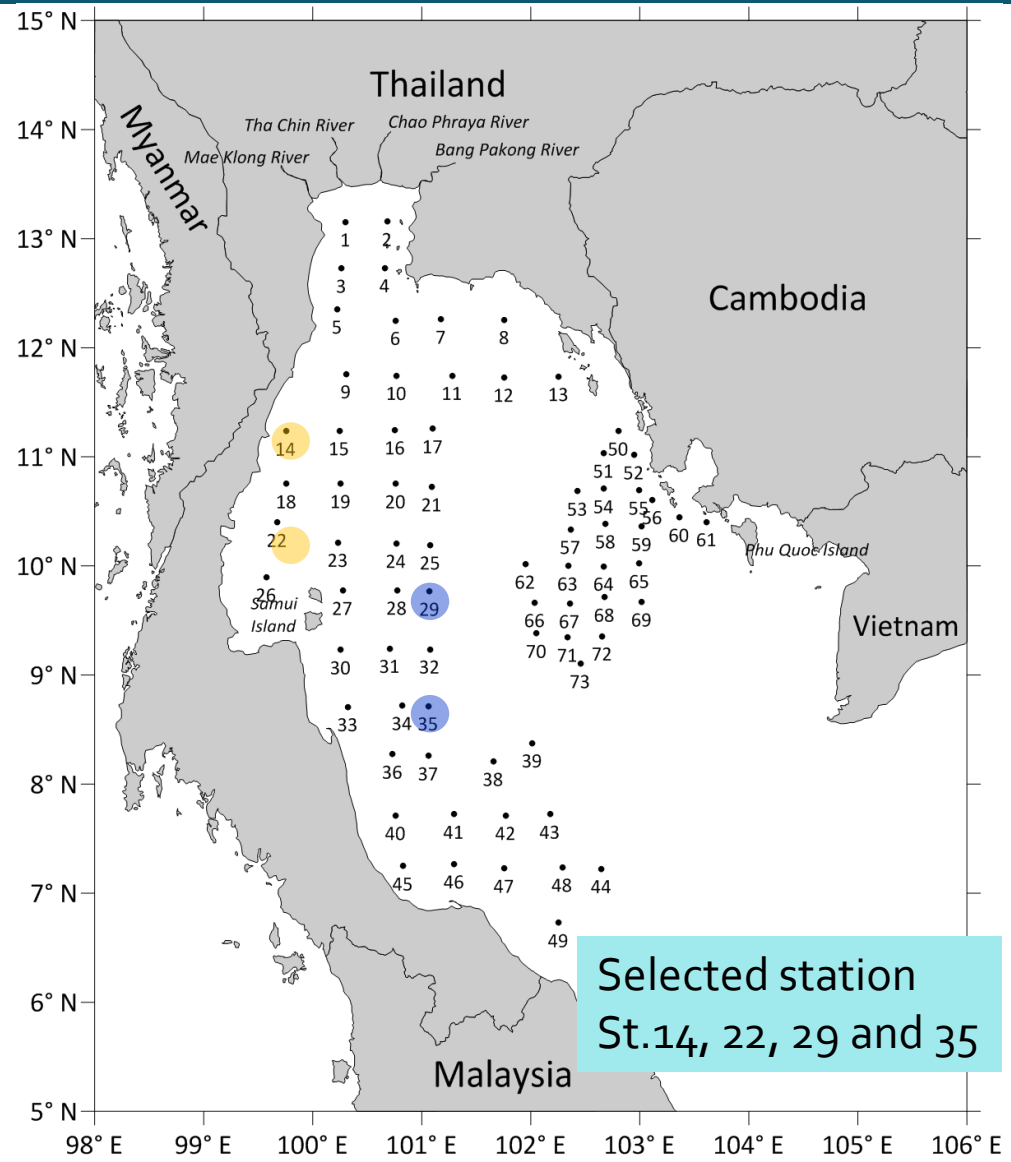
- SiltyClay, SandSiltClay

Sansittisakunlird, 2014

Scope of this study

- 4 selected sediment cores from research survey SEAFDEC-2018
- Sediment grain size
  - wet-sieving and sedimentation method
  - X-ray radiography
- Organic content and carbonate content
  - Readily oxidizable organic carbon
  - Reduce with depth or with increase sand

Method of Study – Sediment sampling



Selected station
St.14, 22, 29 and 35

Box Corer

Method of Study – Sediment section

Core Section

1 cm layer – (sample)

3 cm layer – (discard)

1 cm layer – (sample)

3 cm layer – (discard)

Freeze dried

Method of Study – X-ray radiograph

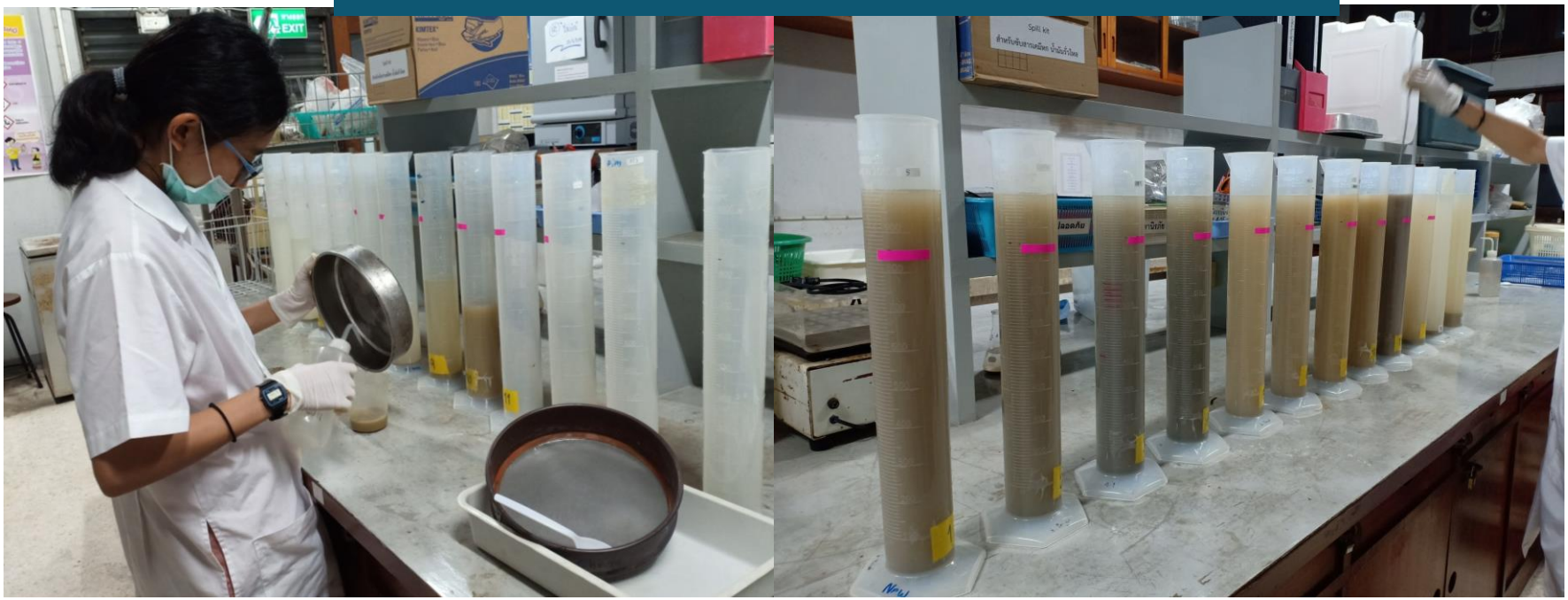
X-ray radiography

Method of Study – Sediment Analysis

Freeze-dried and analysis

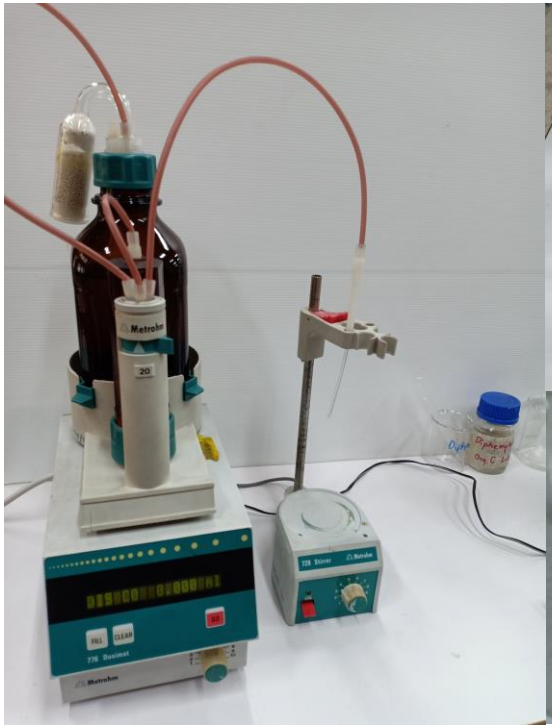
Grain size analysis (wet saving with sedimentation method, U.S. GEOLOGICAL SURVEY OPEN-FILE REPORT 00-358)

Wet sieving and sedimentation

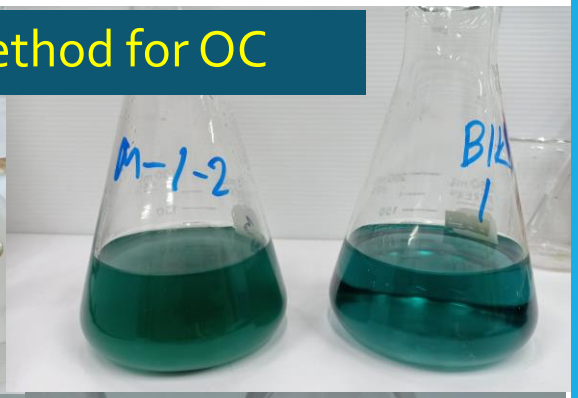


Method of Study – %OC and $CaCO_3$

- Readily Oxidizable Organic Carbon in Sediment -- Walky-Black Method (back titration of unreacted strong oxidixing agent), (Loring and Rantala, 1992)
- $CaCO_3$ - Acid-base back titration of unreacted acid with $CaCO_3$ with NaOH (Sompongchaiyakul , 1989)



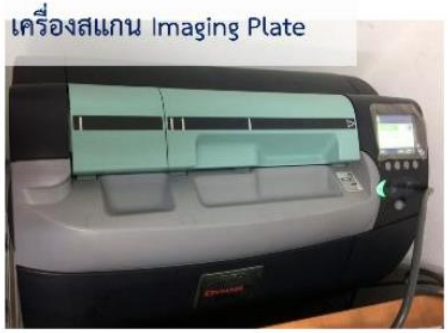
Walky-Black method for OC



Acid Base Titration for $CaCO_3$

Method of Study – X-ray radiograph

X-ray radiography – EVO 300, 170-180 kV with 3 mA – 1 min



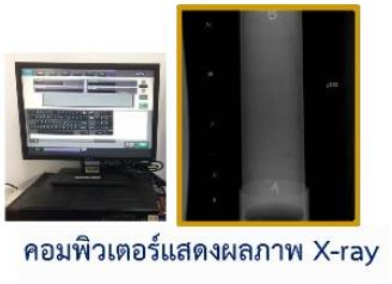


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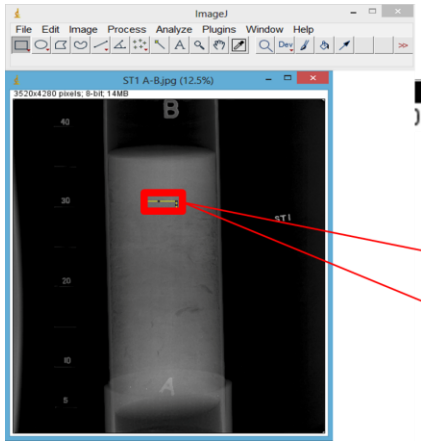
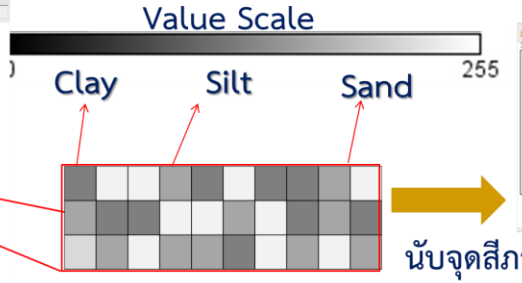
Image Processing





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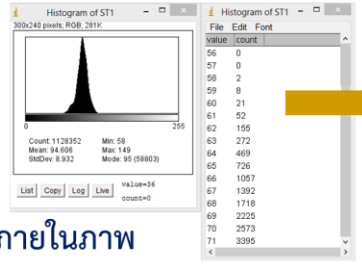
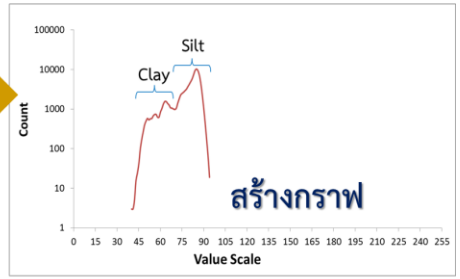
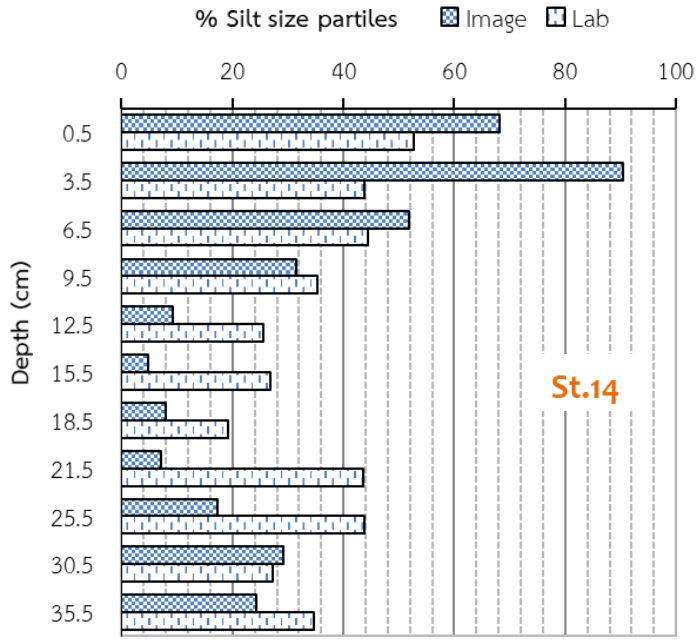
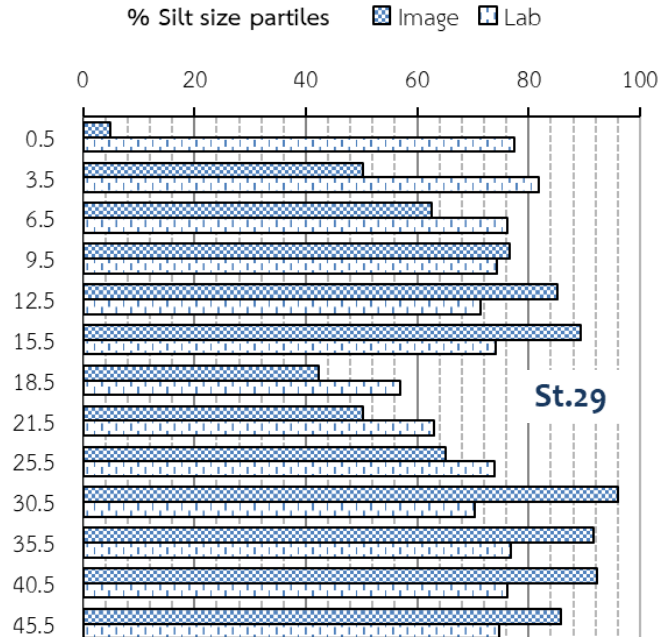
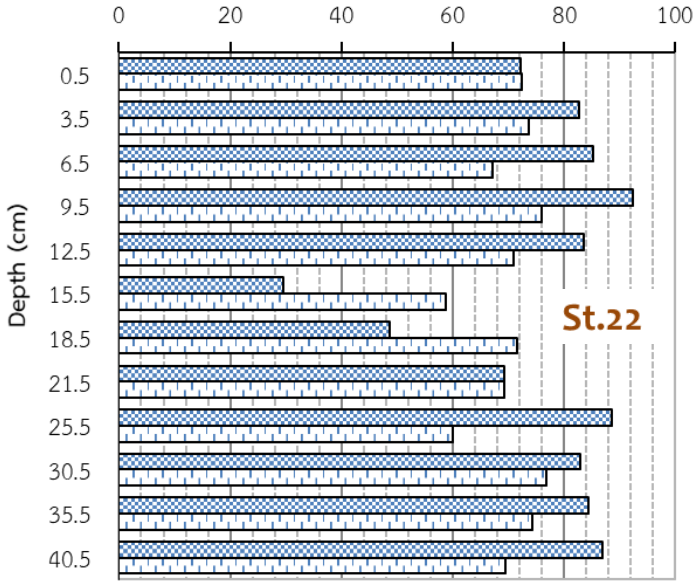


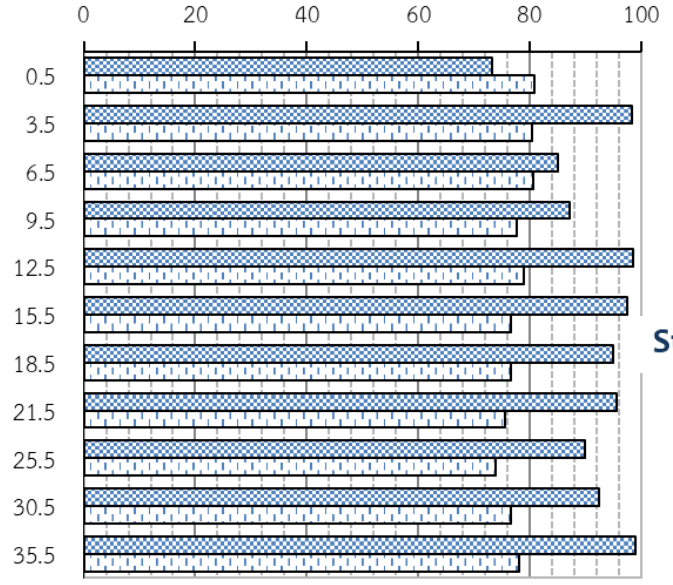


Result – Comparison X-ray Image and Lab grain size

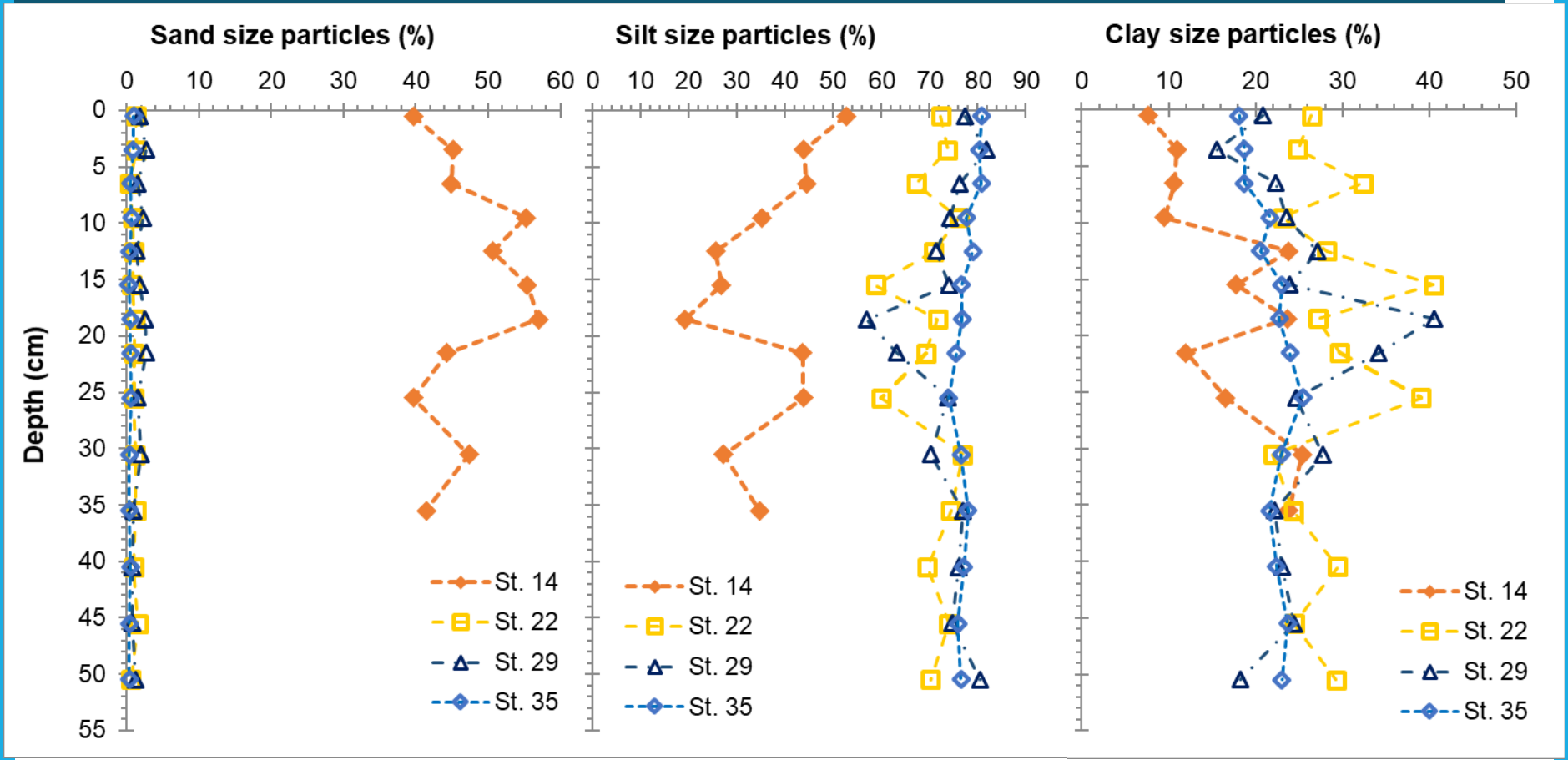








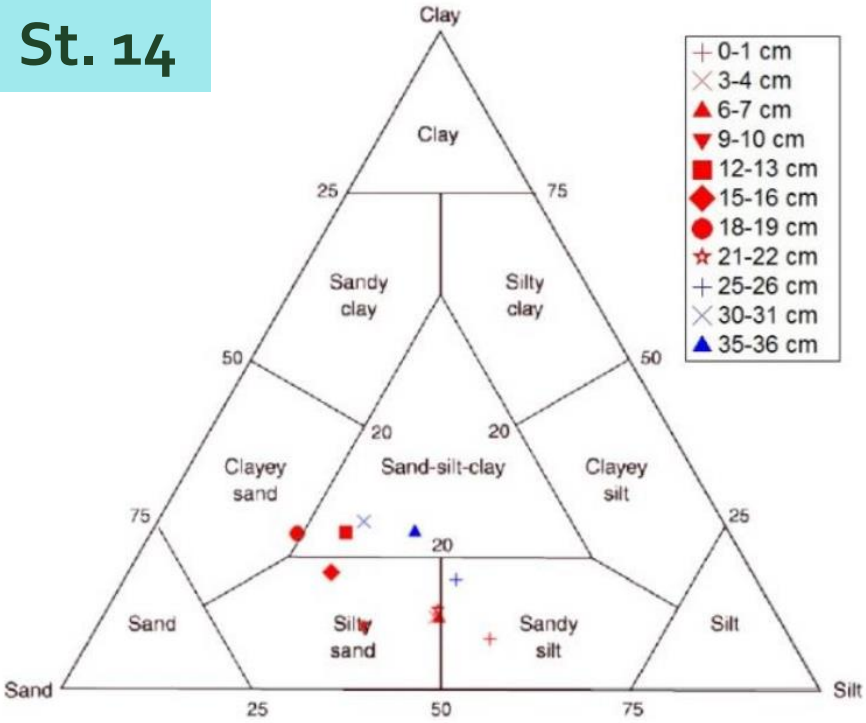
Result – Grain Size by station

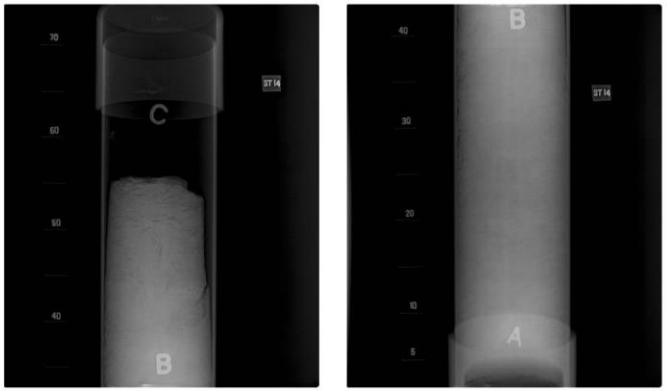


- Only **St.14** found greater %Sand (Less silt) texture => Silty/Clayey Sand
- In other station, silt – sized particles are dominant (70-80 %)
- % fine grain (silt+clay) > 90% (Clayey Silt, Silt)

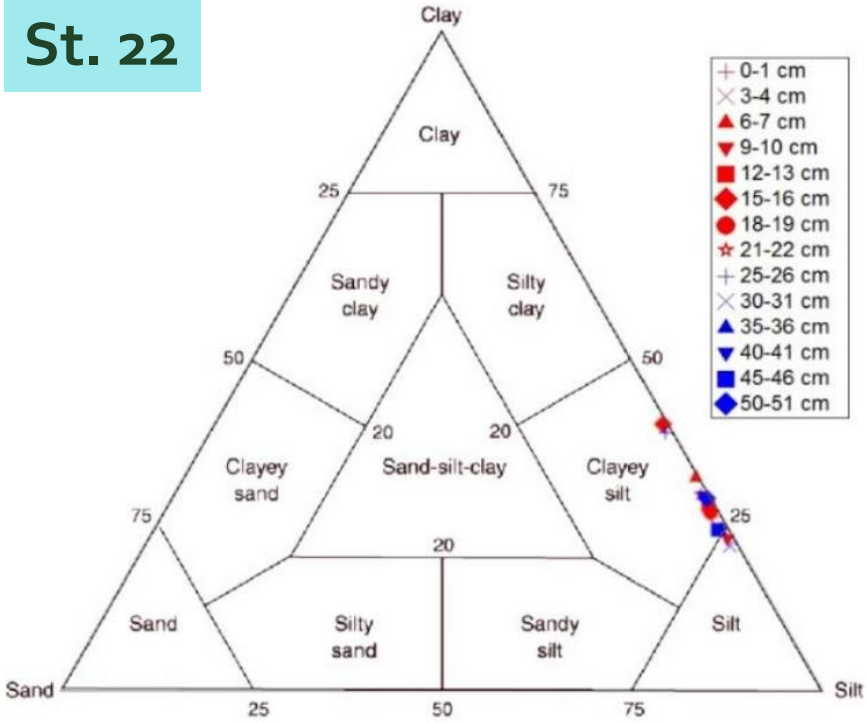
Result – Sed. Texture

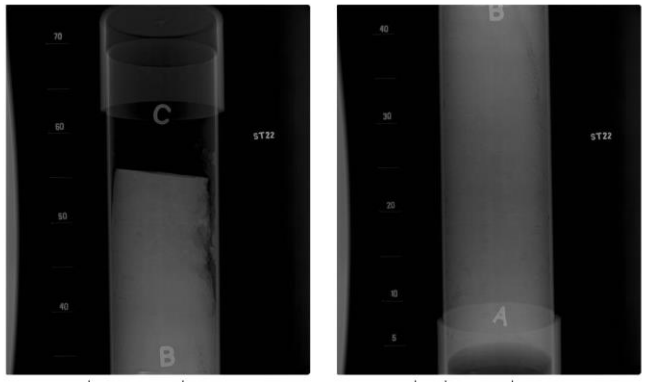
St. 14





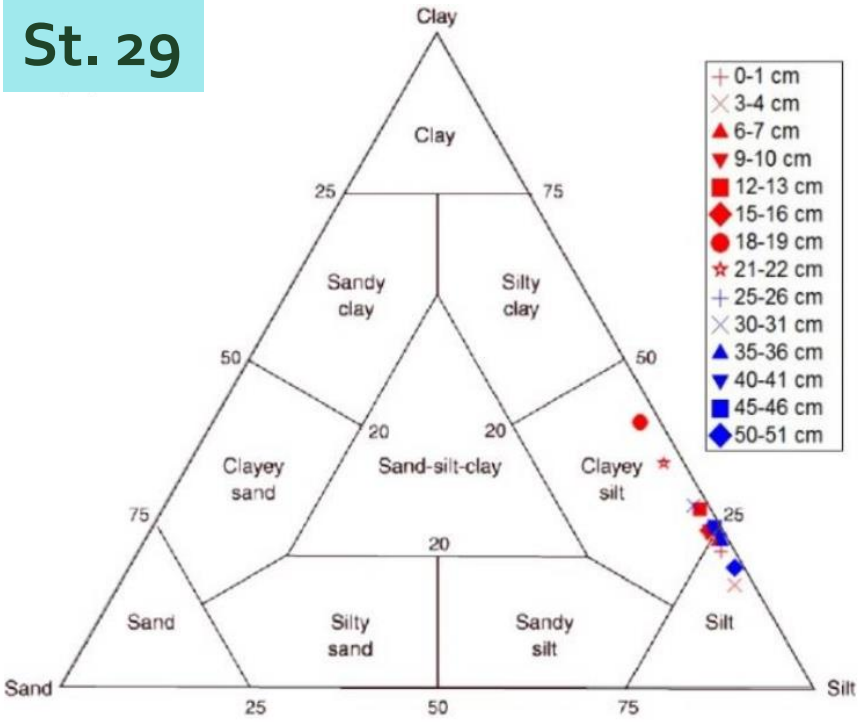
St. 22

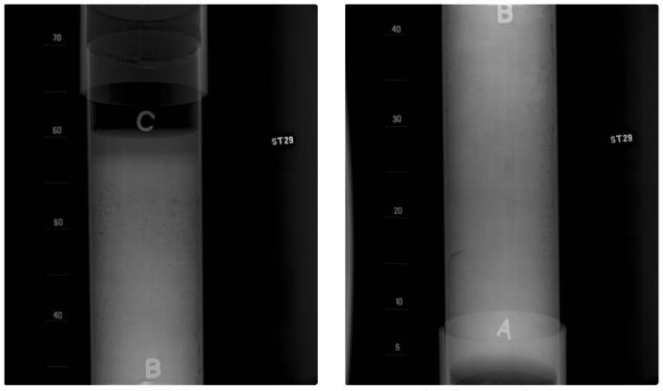




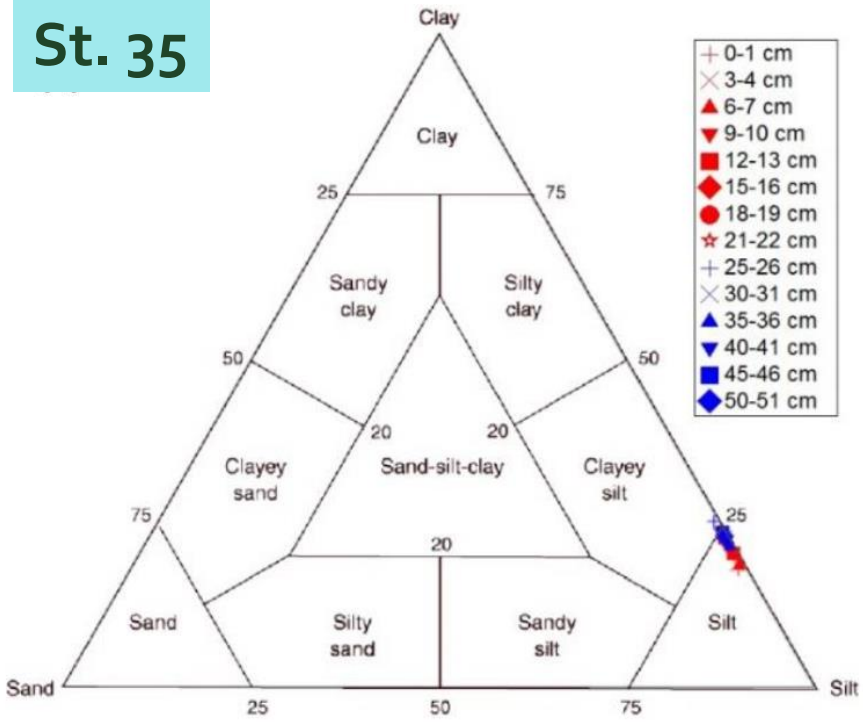
Result – Sed. Texture

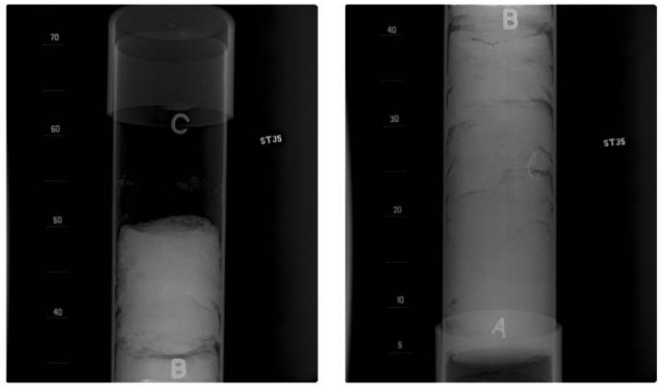
St. 29



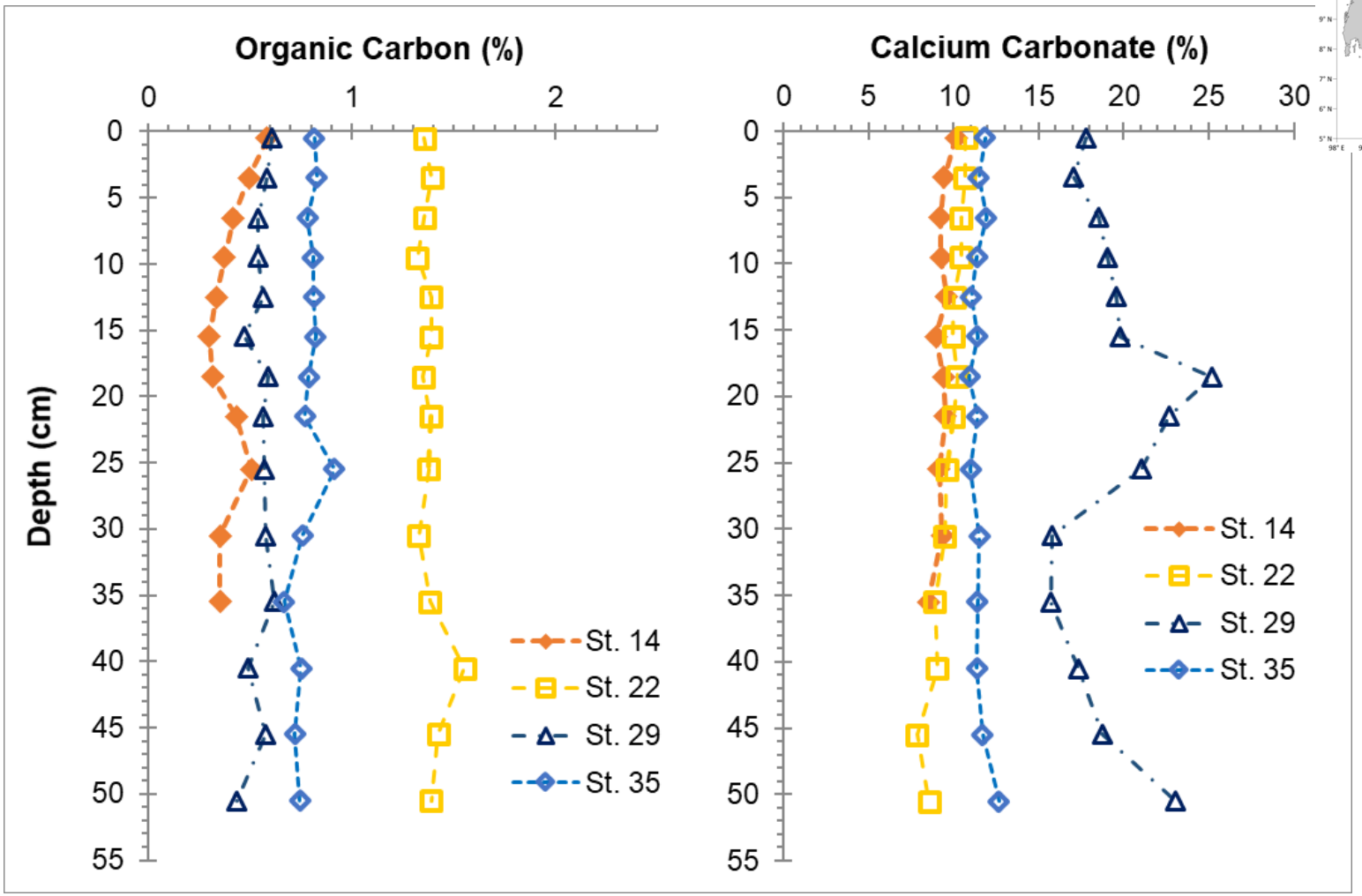


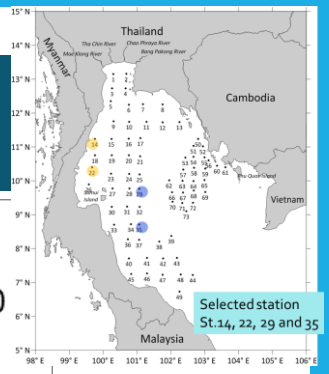
St. 35





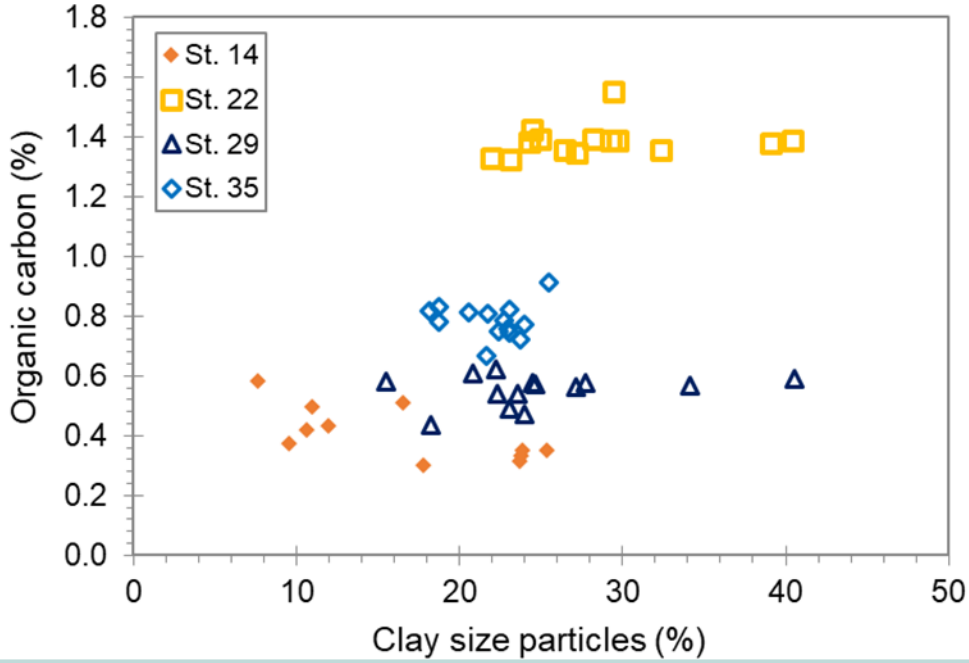
Result – %OC and $CaCO_3$

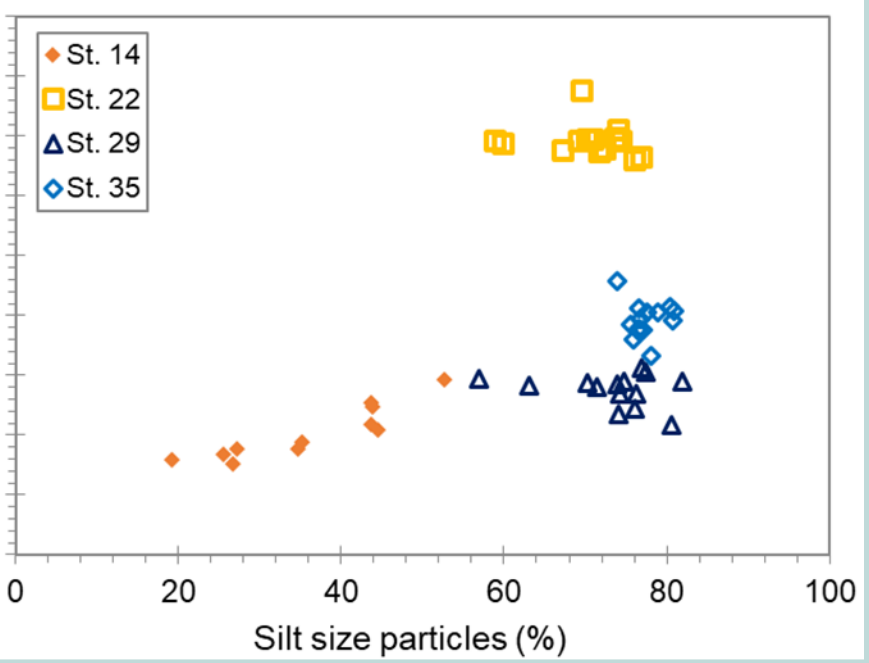




- %Organic Carbon ranged 0.32 (st.14) – 1.55 (st.22)
- % $CaCO_3$ ranged 7.8 (st.14) – 23 (st.29)

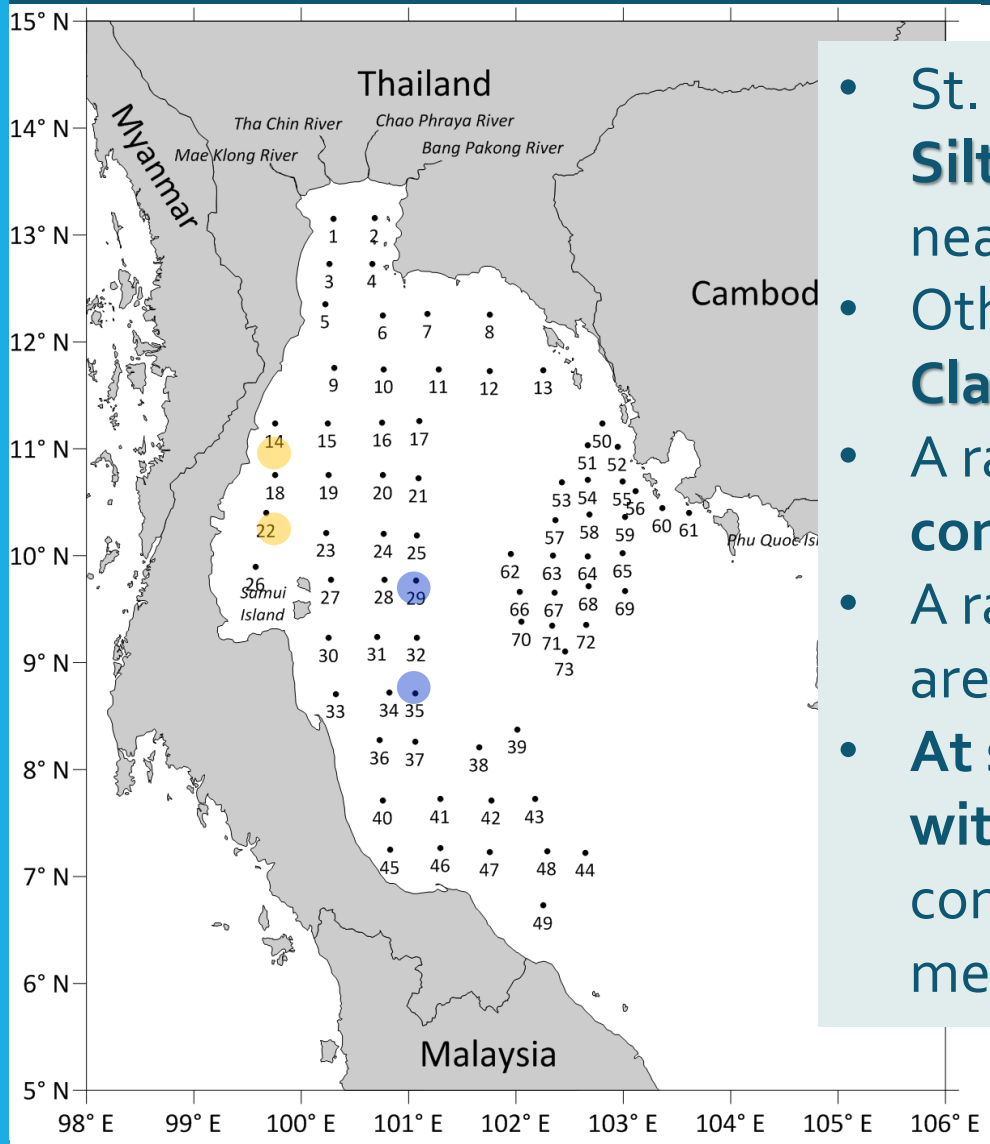
Result – % OC vs Fine grain





Not clear relation between organic carbon with fine grain sediment

Summary



- St. 14 sediment texture; **SiltySand/ClayeySand** – nearshore with local sand source
- Other station sediment texture; **ClayeySilt**
- A range of **organic carbon content = 0.32 – 1.55 %**
- A range of **$CaCO_3$** in core sample are **= 7-23 %**
- **At st.22** high % organic carbon **with 90% fine grain sediment**; a concern of potent pollution e.g. metals bounded particles

References

Buranapratheprat, A., and Bunpapong, M. 1998. A two dimensional hydrodynamic model for the Gulf of Thailand. In Proceedings of The IOC/WESTPAC Fourth International Scientific Symposium 469: 478.

Loring D.H. and R.T.T. Rantala. 1992. Manual for the geochemical analyses of marine sediments and suspended particulate matter, Earth-Science Reviews. 32(4), 235-283 ISSN 0012-8252. doi.org/10.1016/0012-8252(92)90001-A

Wentworth, C. K. 1922. A scale of grade and class terms for clastic sediments. The journal of geology 30(5): 377-392.

Sompongchaiyakul, P. 1989. Analysis of chemical species for trace metals in nearshore sediment by sequential leaching method. Master's Thesis, Department of Marine Science, Graduate School, Chulalongkorn University

Thank you