



10,000 years climate history of Lake Kumphawapi, northeast Thailand



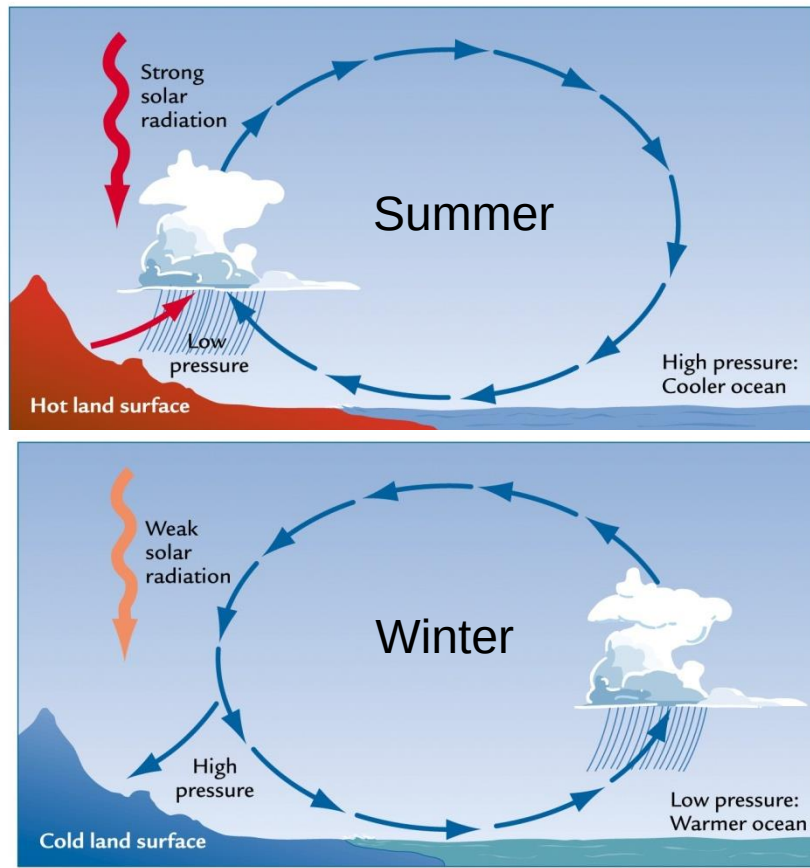
Sakonvan Chawchai (Moo)

ATPER2013 Conference
1st -2nd June 2013



Asian Monsoon and Thailand

A monsoon is defined as a seasonal reversing wind caused by a temperature gradient between the continent and the ocean (Wang et al., 2005; Clift and Plumb, 2008).



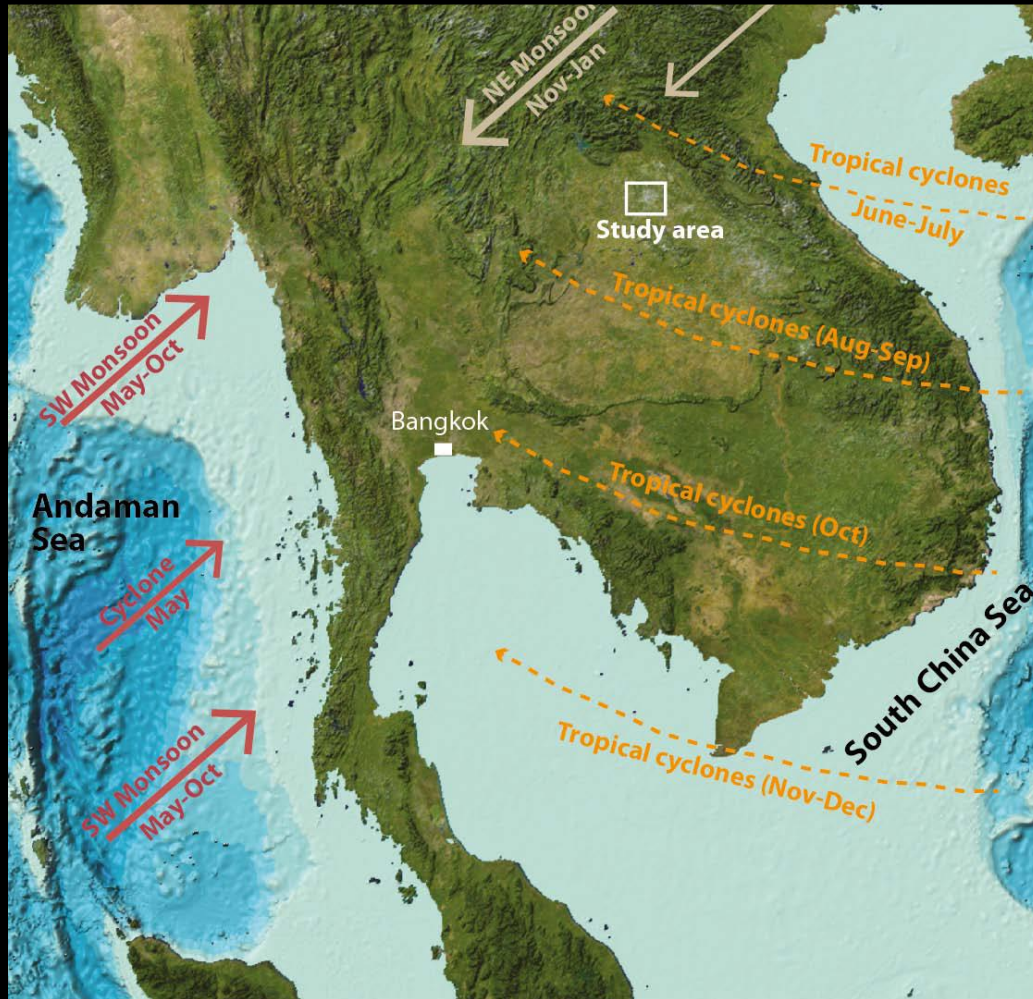
B Winter monsoon

Ruddiman, 2001



Wang et al, 2005

Monsoon in Thailand

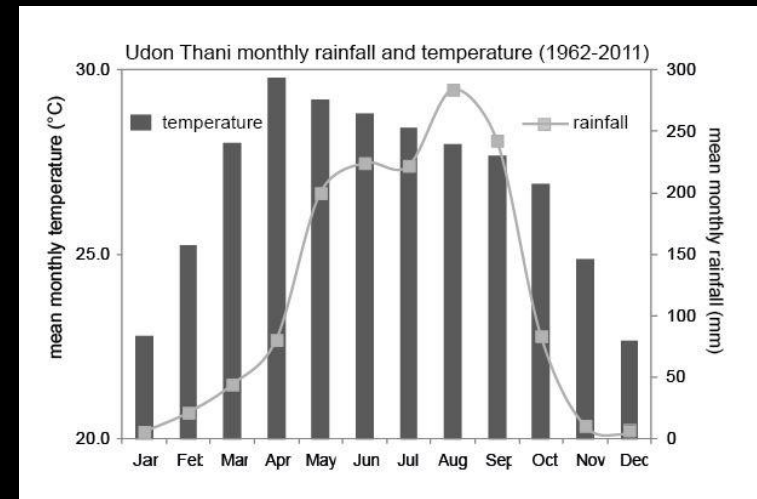


Modified from Meteorological Department, Thailand

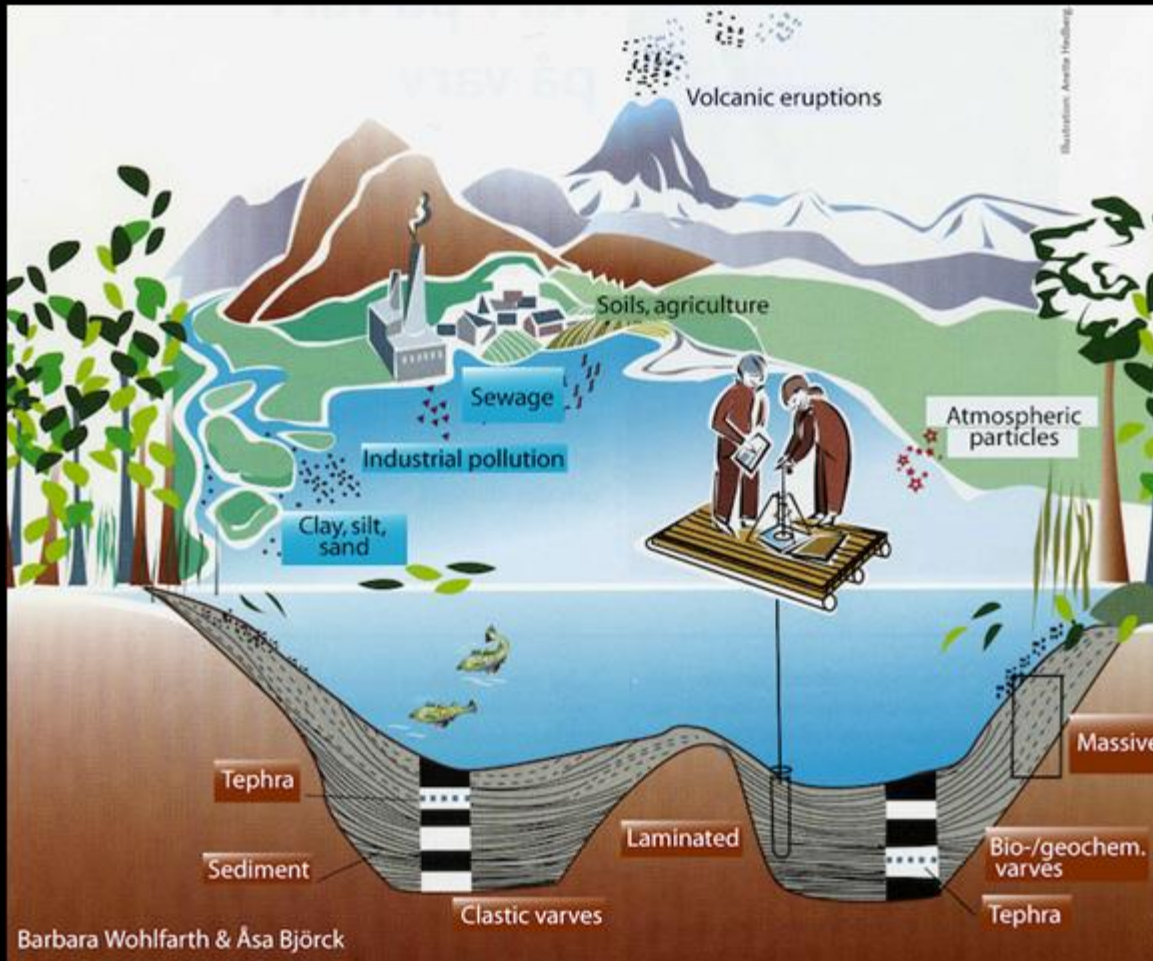
Mean annual precipitation of the study area is ~1455 mm, 88% of which falls between May and October.



www.thailand-business-news.com



Why do we collect mud from the bottom of a lake?



- It's possible to document the prevailing environmental and climatic conditions
- Lake sediments can provide a window into the past
- Understanding long-term climate dynamics in the Asian monsoon region

Wohlfarth & Björck

The study of lake sediments

Lithostratigraphy	Magnetic susceptibility	¹⁴ C Chronology	Itax -XRF	LOI	TOC	TN	TS	CNS stable isotopes	Pollen & Phytolith	Diatom	Biogenic Silica (Bsi)
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Physical

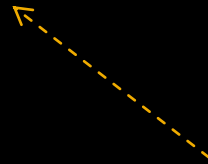
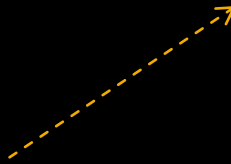
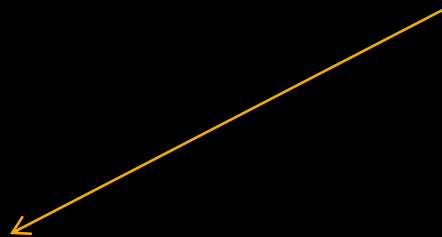
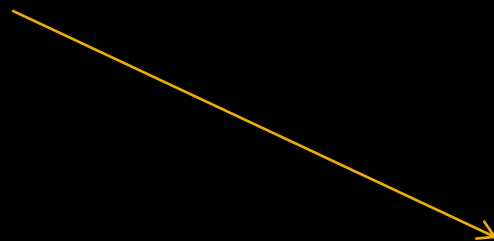
Chemical

Biological

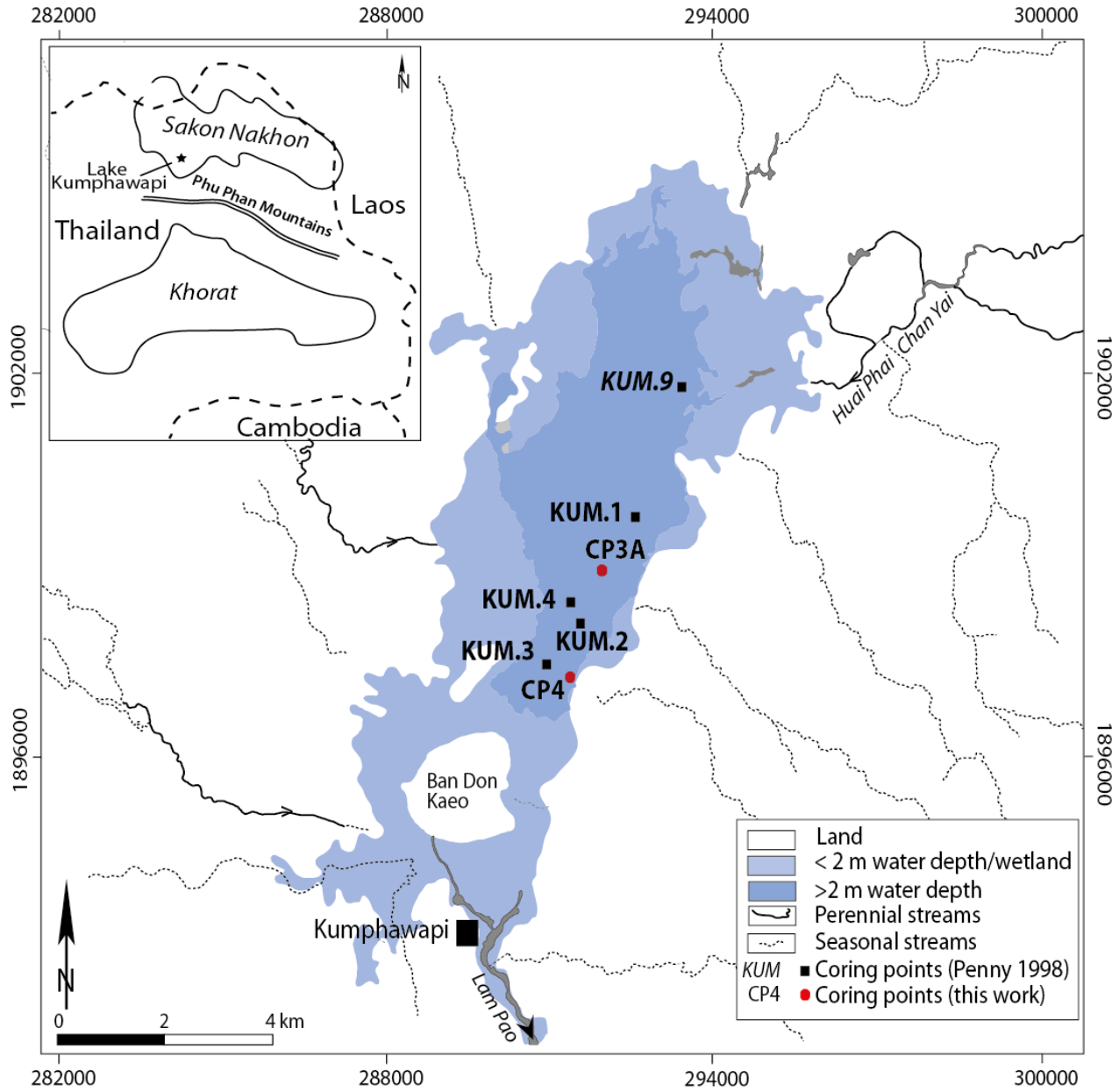
Environmental change

Climatic change

Anthropogenic Influences



Lake Kumphawapi, northeast Thailand



Second largest natural lake in northeast Thailand

Shallow lake covers an area of c. 32 km²

Coring sites CP3A and CP4 are the focus here

Geological and Hydrological Survey

Field work



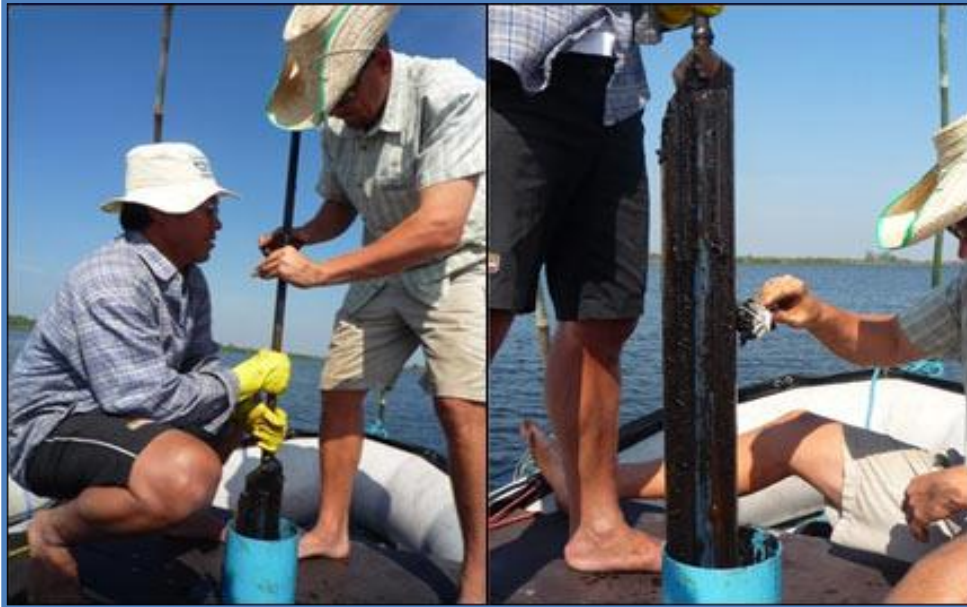
Surveying with the local people

Water depth measuring and test



Coring with a Russian Corer

Field work





Poaceae



Cyperaceae



Saccharum spp



Typha angustifolia

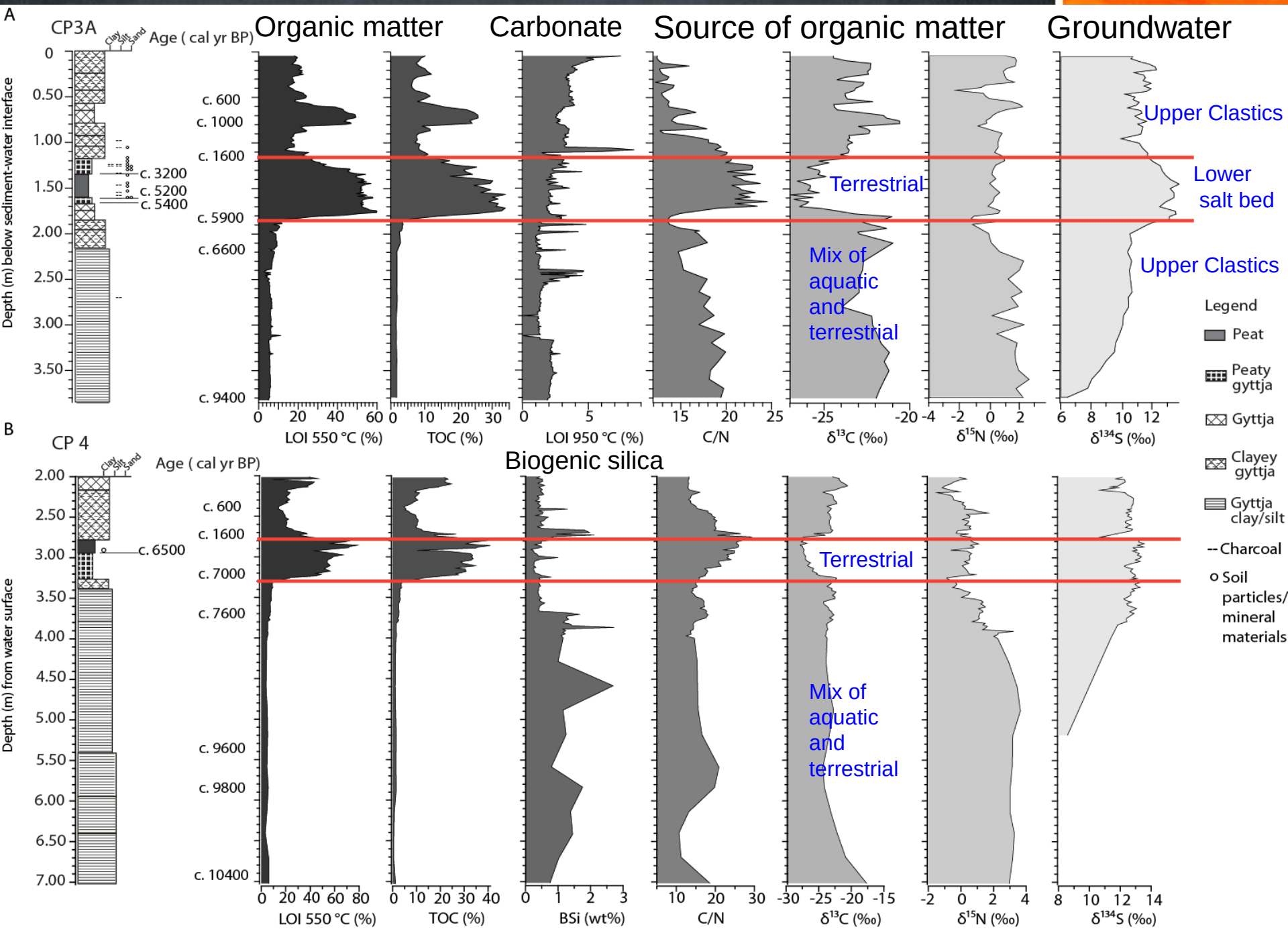
Classification

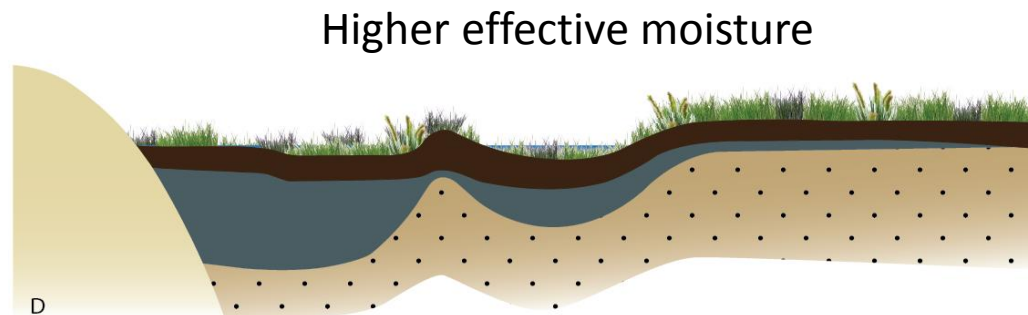
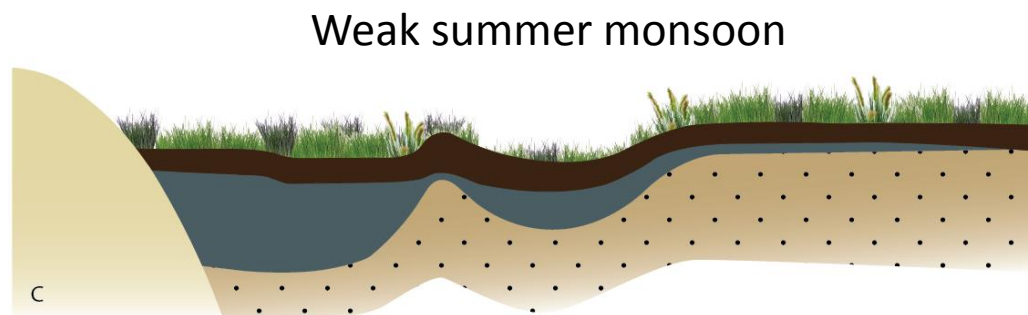
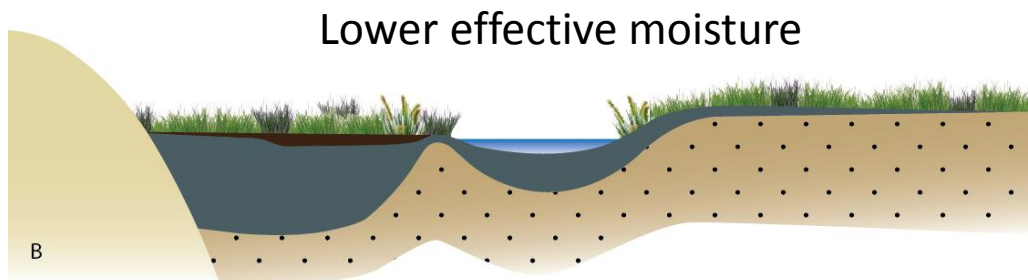
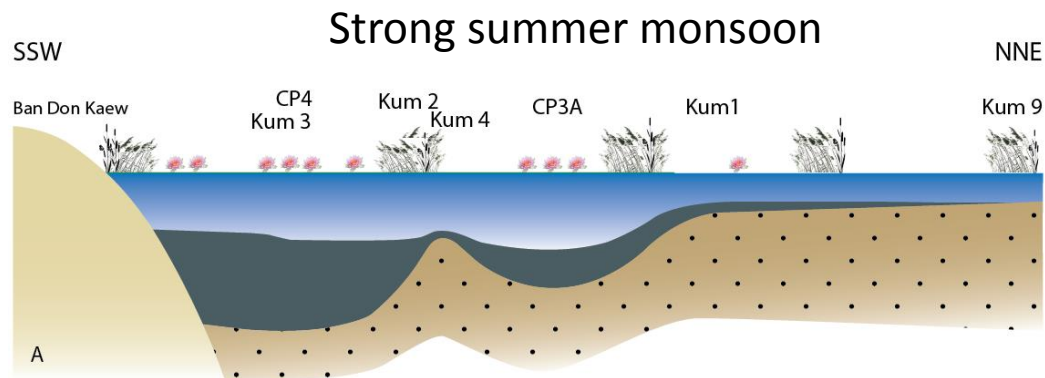
According to the vegetation type described by Penny (1998, 1999) I classified the wetland as swamp. The term peatland is used when peat is present and when the Kumphawapi basin was dominated by living plant layers and thick accumulations.



Nymphaoides indicum *Persicaria attenuata* *Eichhornia crassipes*

Ipomoea aquatica



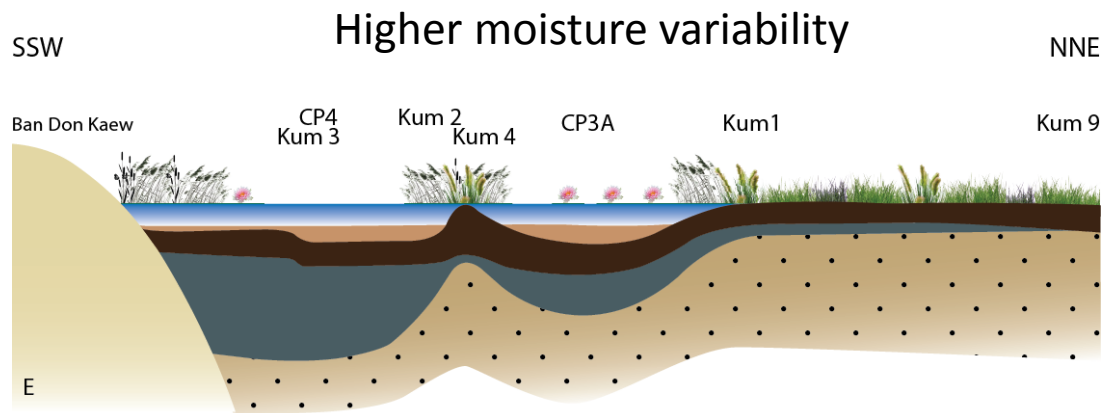


Legend

 Sandy clay loam/fine sand

 Clay loam/silty gyttja clay

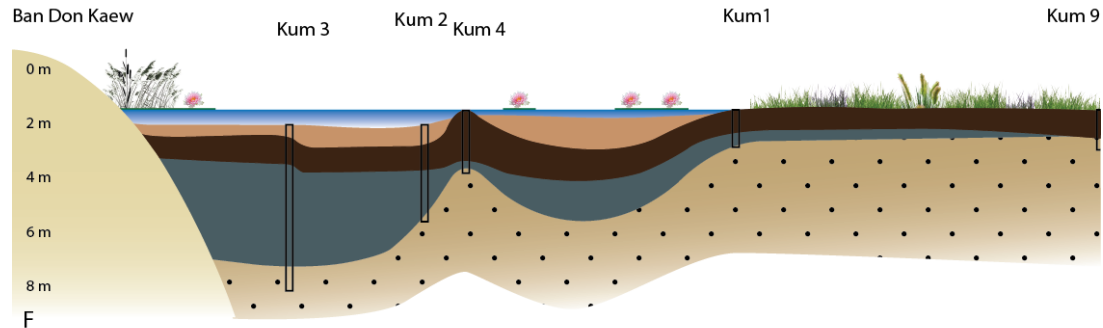
 Peaty gyttja/peat



c. 1800 cal yr BP
to 20th century

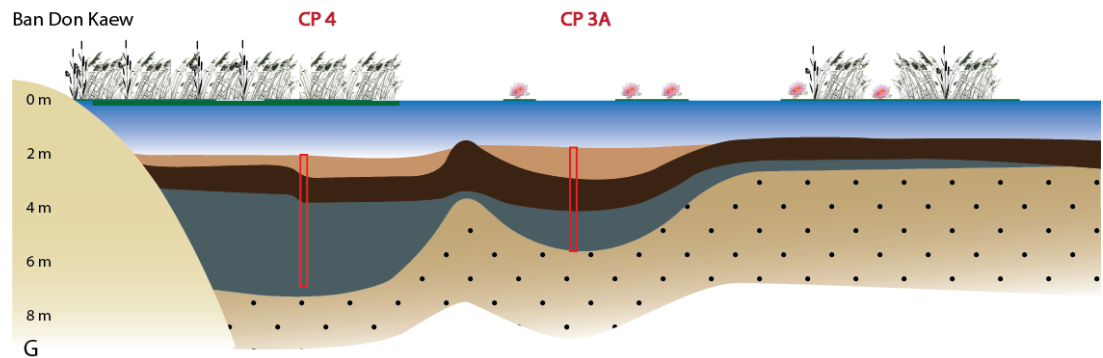
Legend

-  Sandy clay loam/fine sand
-  Clay loam/silty gyttja clay
-  Peaty gyttja/peat
-  Clayey gyttja



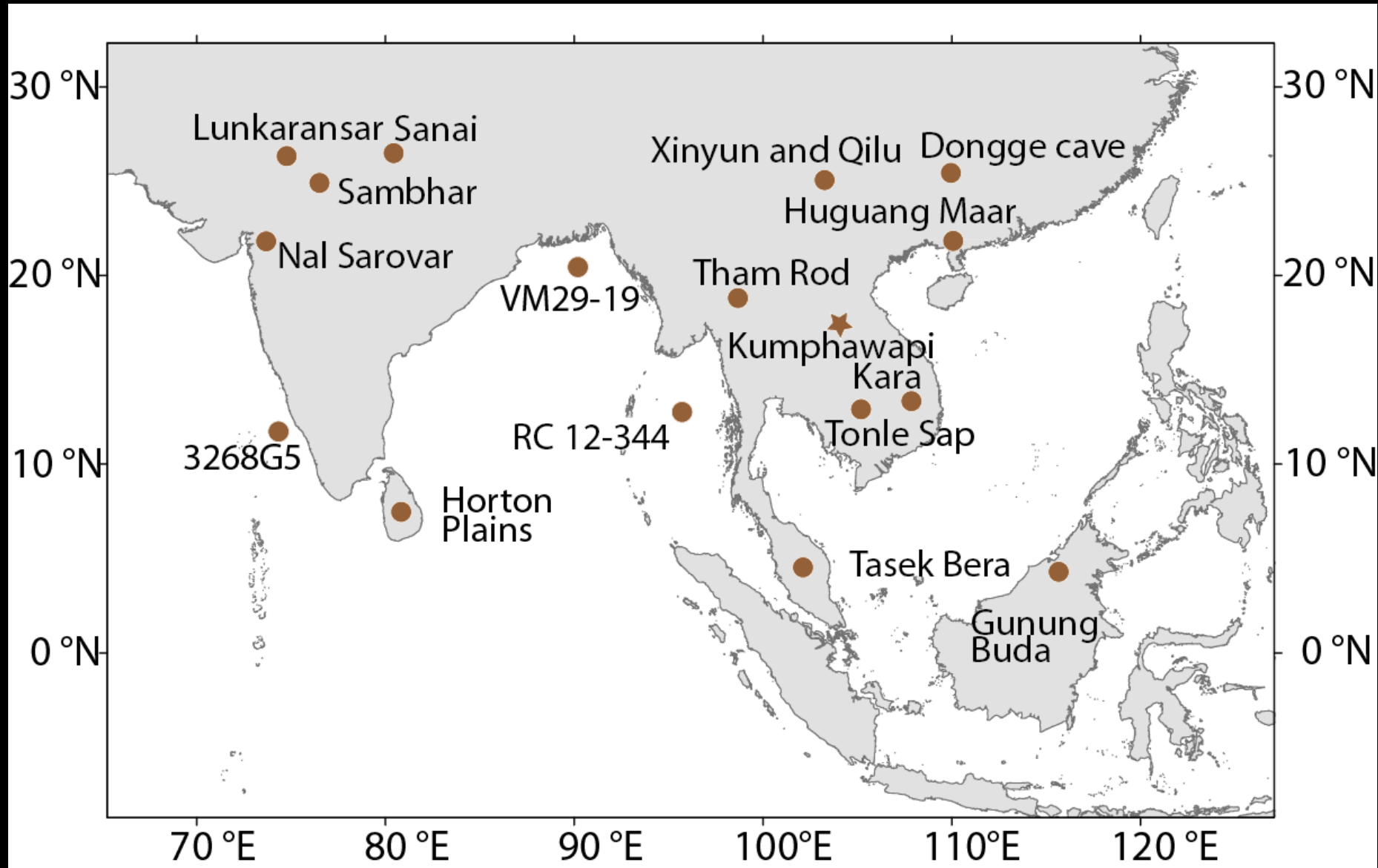
1993

Dam was built
and finished in
1994



2009-2010

Correlation to other Asian monsoon records



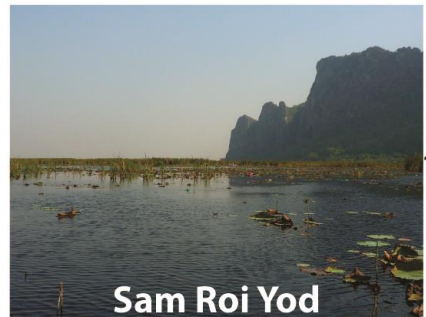
Conclusions

- ★ The present study shows that multiple sediment sequences and a variety of proxies need to be studied in large lakes, such as Lake Kumphawapi to assess the time transgressive response to past changes in hydroclimate conditions.
- ★ Kumphawapi's record provides the first comprehensive paleoclimatic and paleoenvironmental synthesis for northern Thailand.
- ★ The Holocene record of Lake Kumphawapi adds important paleoclimatic information for a region in Southeast Asia and allows discussing past monsoon variability and ITCZ movement in greater detail.

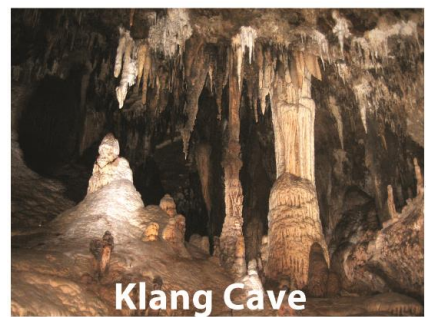
Thailand Monsoon Project



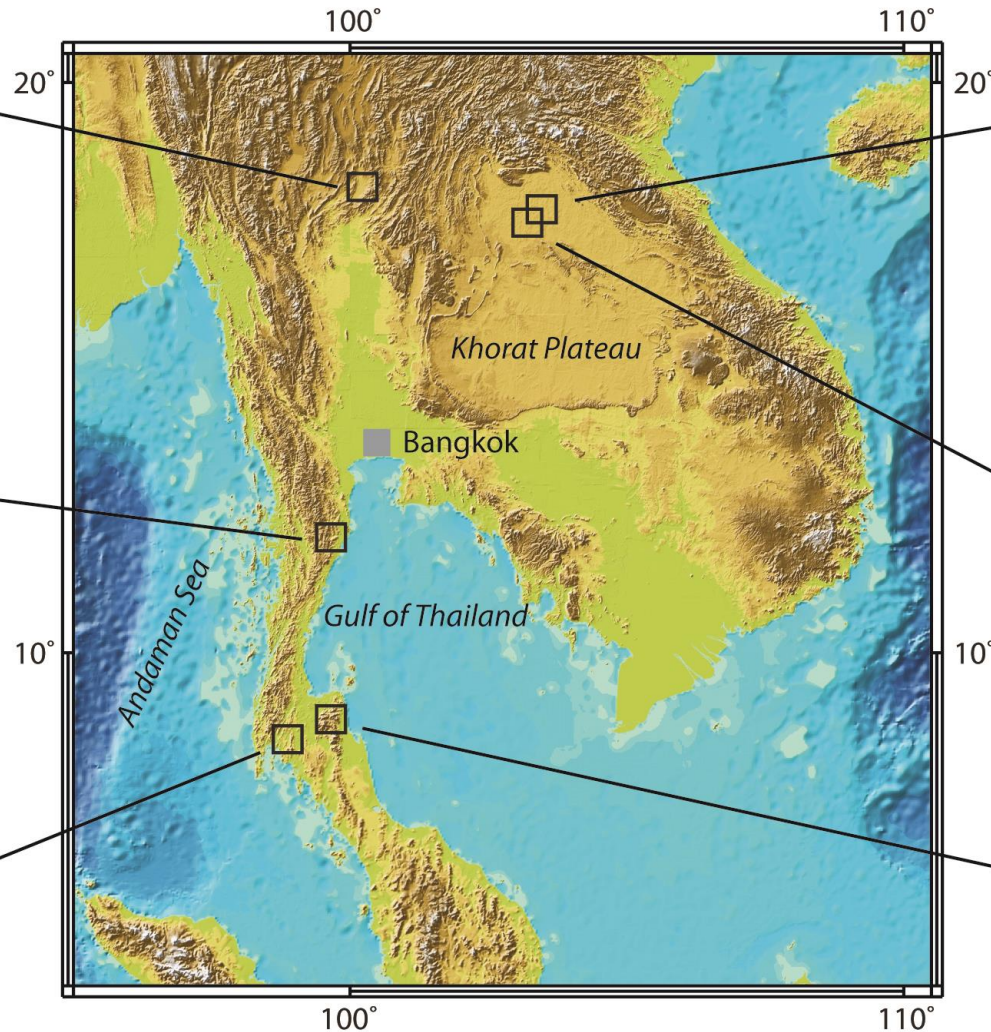
Nong Leng Sai



Sam Roi Yod



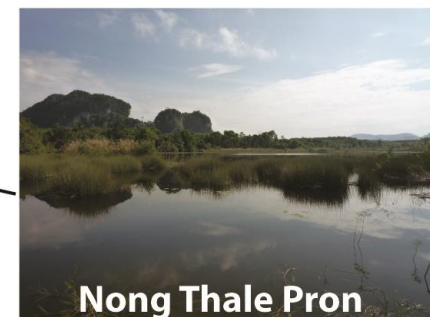
Klang Cave



Kumphawapi



Pa Kho



Nong Thale Pron

Publications

Wohlfarth, B., Wichuratree, K., Inthongkaew, S., Fritz, S.C., Blaauw, M., Reimer, P.J., Chabangborn, A., Löwemark, L., **Chawchai, S.**, 2012. Holocene environmental changes in northeast Thailand as reconstructed from a tropical wetland. *Global and Planetary Change* 92-93, 148-161.

Chawchai, S., Chabangborn, A., Wohlfarth, B., Kylander, M., Löwemark, L., Mörrth, M., Blaauw, M., Reimer, P.J., Fritz, S.C., Klubseang, W., 2013. Lake Kumphawapi - an archive of Holocene paleoenvironmental and paleoclimatic changes in northeast Thailand. *Quaternary Science Reviews* 68, 59–75.

If you are interested in Asian monsoon, please read about our research at

<http://www.geo.su.se/index.php/research/62-past-climates-and-environments-projects/487-asian-monsoon>

Or have a look at our fieldwork movie *Under the Eyes of the Buddha*

<http://www.youtube.com/watch?v=gt8N69nFExU>

[Part I Under the Eyes of the Buddha 2 – Traveling South](#)

[Part II Under the Eyes of the Buddha 2 – Traveling South](#)

Contributions to society



Thank you for your attention



Barbara Wohlfarth
Akkaneewut Chabangborn
Sherilyn Fritz
Malin Kylander
Ludvig Löwemark
Carl-Magnus Mörtz
Maarten Blaauw
Paula J Reimer
Wichuratree Klubseang
Suda Inthongkaew
Thanawat Jarupongsakul

