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Japan - ASEAN
Science, Technology and
Innovation Platform

AUN/SEED-Net

JICA

100th Anniversary of
Chula Engineering 2013

Research Collaboration

Liquefaction Potential Analysis in the Northern Part of Thailand

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Chulalongkorn University-Kyoto University

2015 – present

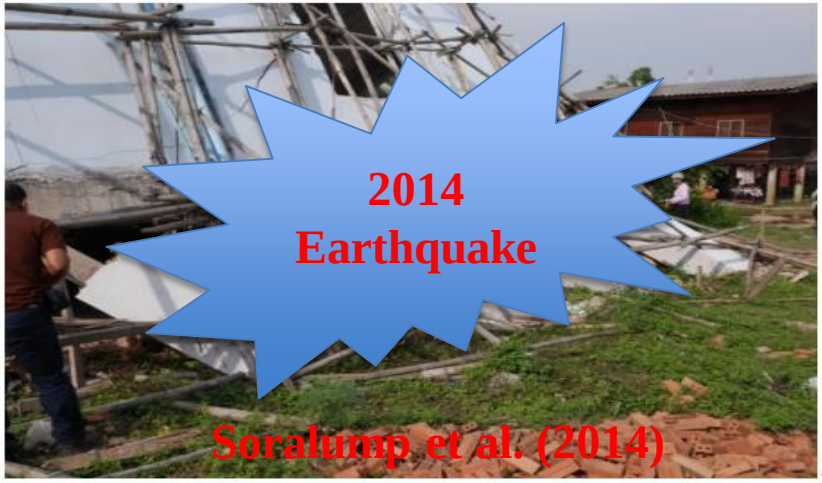
Outline

- Earthquake in the northern part of Thailand
- Preliminary study
- Plan for collaborative study
- Site investigation and field tests
- Next step
- Previous collaborations under AUN/Seed-net

Earthquake in the Northern Part of Thailand

- The 6.8 Mw Earthquake hit Myanmar and Northern part of Thailand on March 24, 2011. Recently, The 6.3 Mw Earthquake hit Chiang Rai on May 5, 2014.
- The most impacted area is Chiang Rai
- Preliminary Study is conducted to observe liquefaction potential, especially in Chiang Mai and Chiang Rai.
- Expand the liquefaction study to understand liquefaction potential in detail

Damages from Earthquakes in the Northern Part of Thailand



Liquefaction

Research Plan

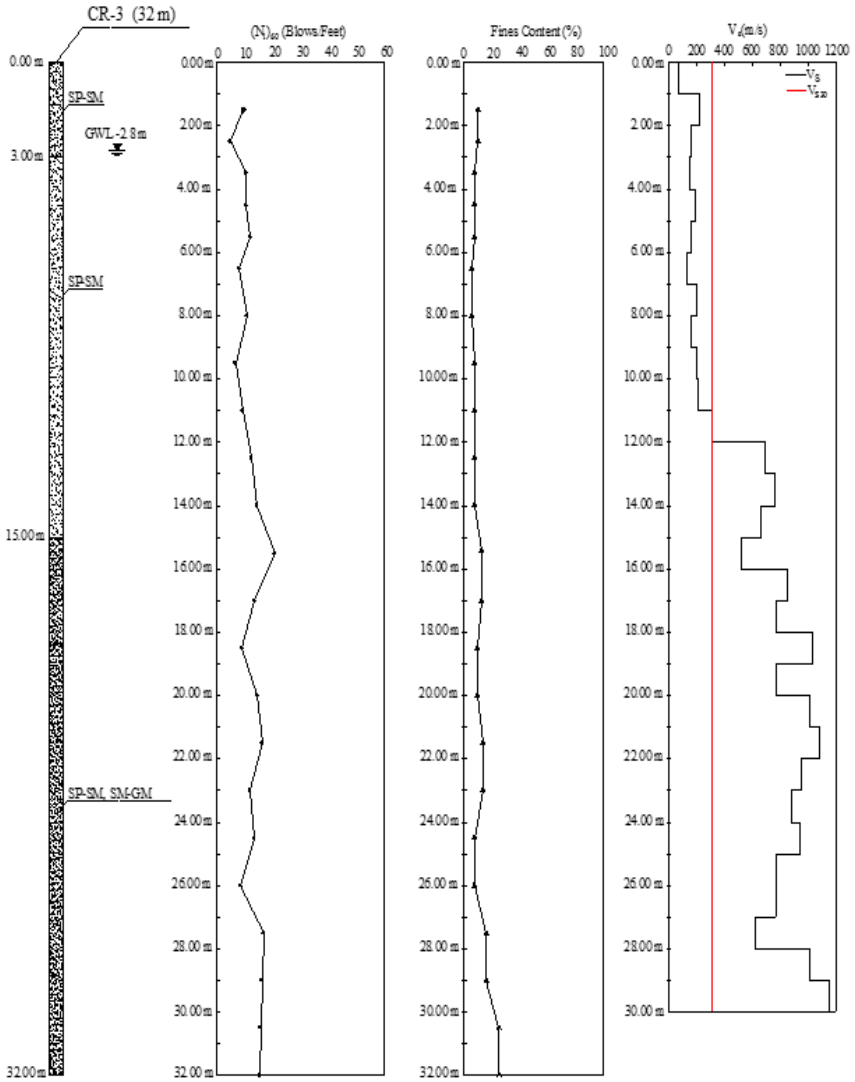
- A number of borehole profiles in the study area are collected.
- Preliminary studies, such as 1D site response analysis, have been conducted.
- In total 10 locations, microtremor observations have been conducted in Chiang Rai province, Thailand, in March, 2016.
- In Japan, from May 2016 to January 2017, Mr. Mase will conduct microtremor observations near boreholes to confirm the observation properly estimating soil layers.

Study area

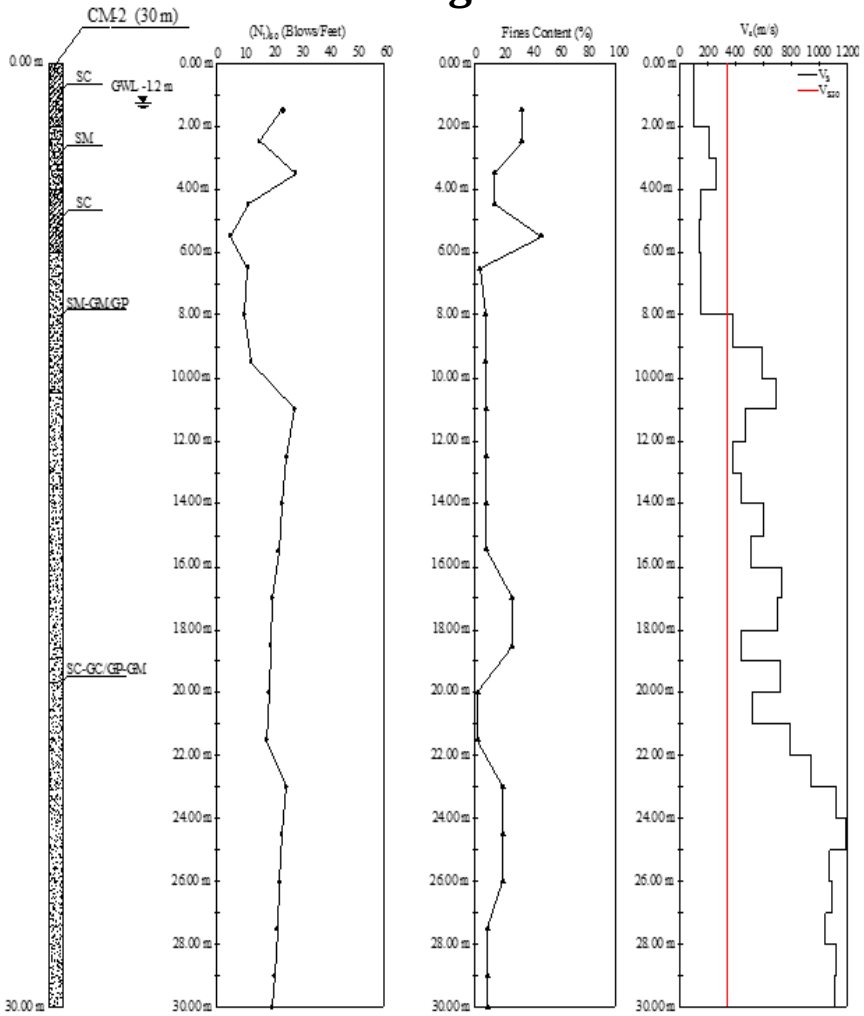
- Compare the rough estimation of Soil Liquefaction Potential in Chiang Mai and Chiang Rai.
- Study the liquefaction in empirical and simple seismic response analysis
- Observe the subsoil interpretation
- Help to determine the specific area that should be detailed to study

Data collection

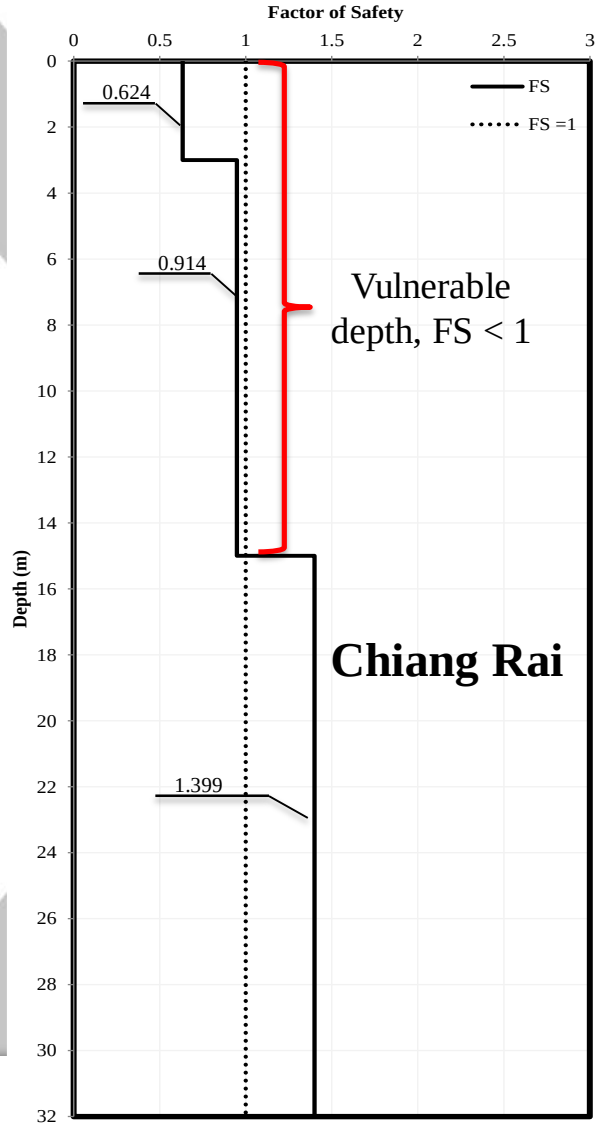
Chiang Rai



Chiang Mai

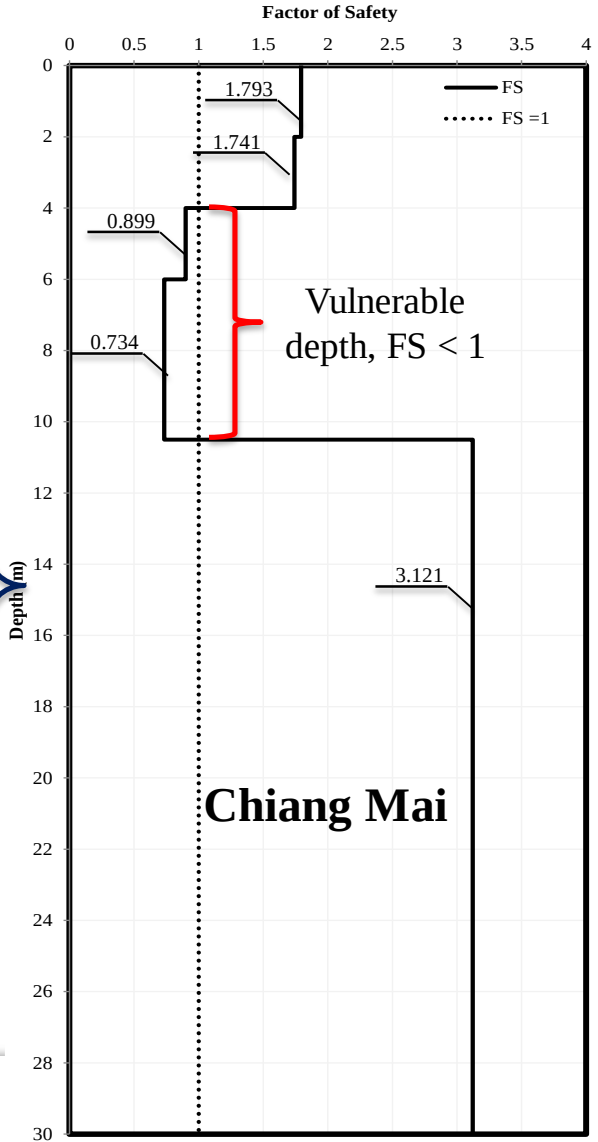


Preliminary Study of Liquefaction

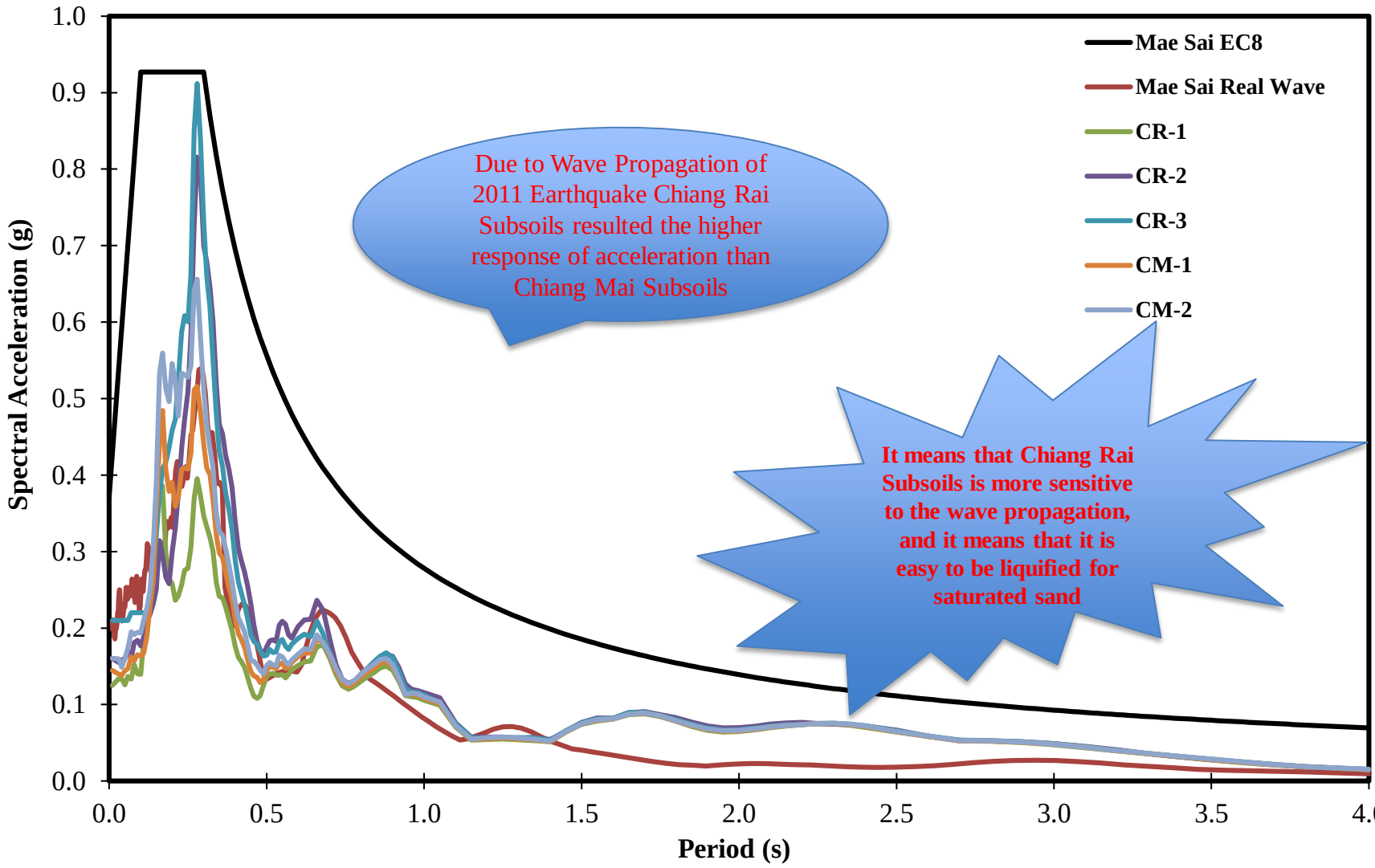


Empirical Study

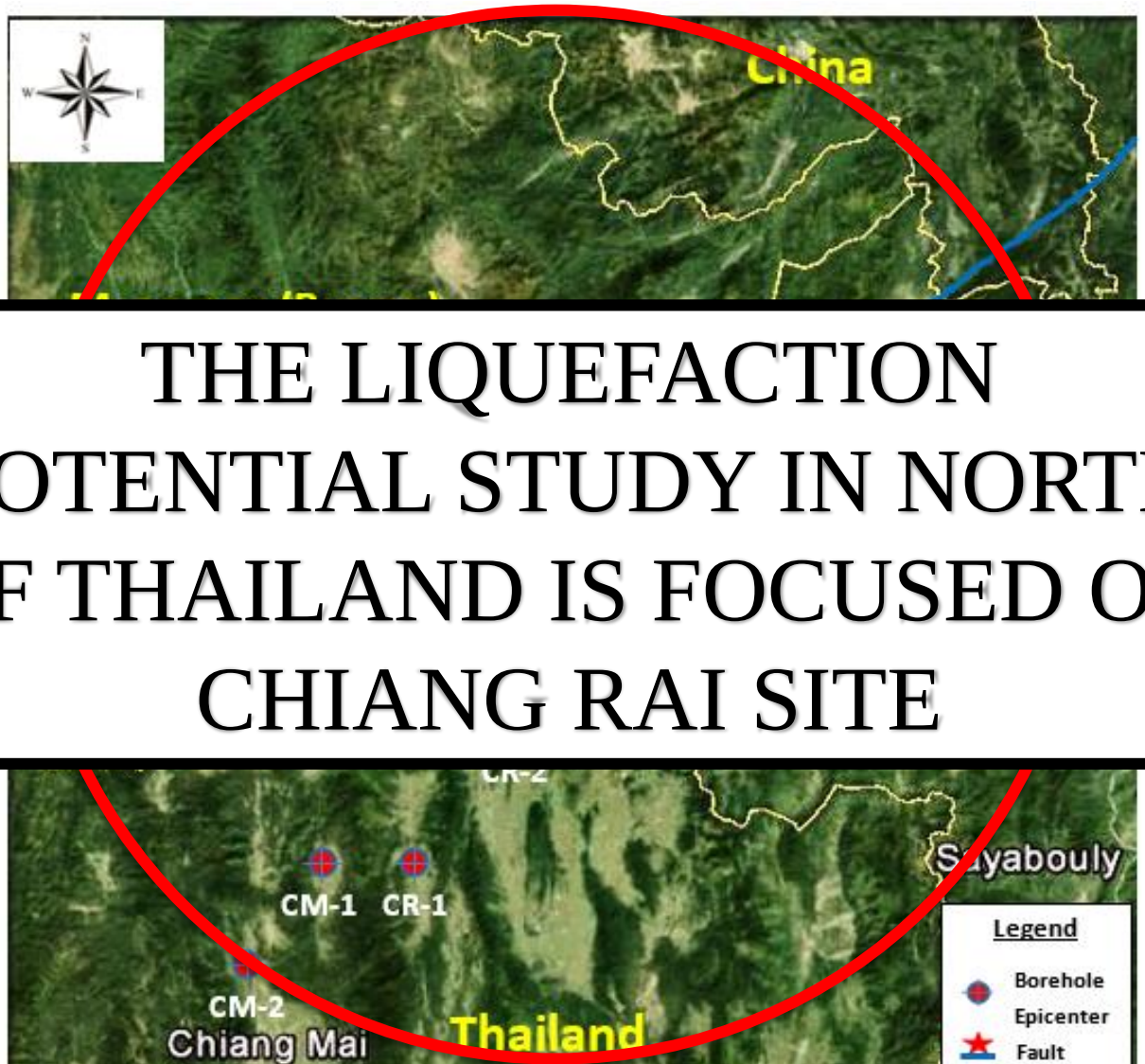
Conclusion is Chiang Rai is more vulnerable than Chiang Mai



1D Ground Response Analysis

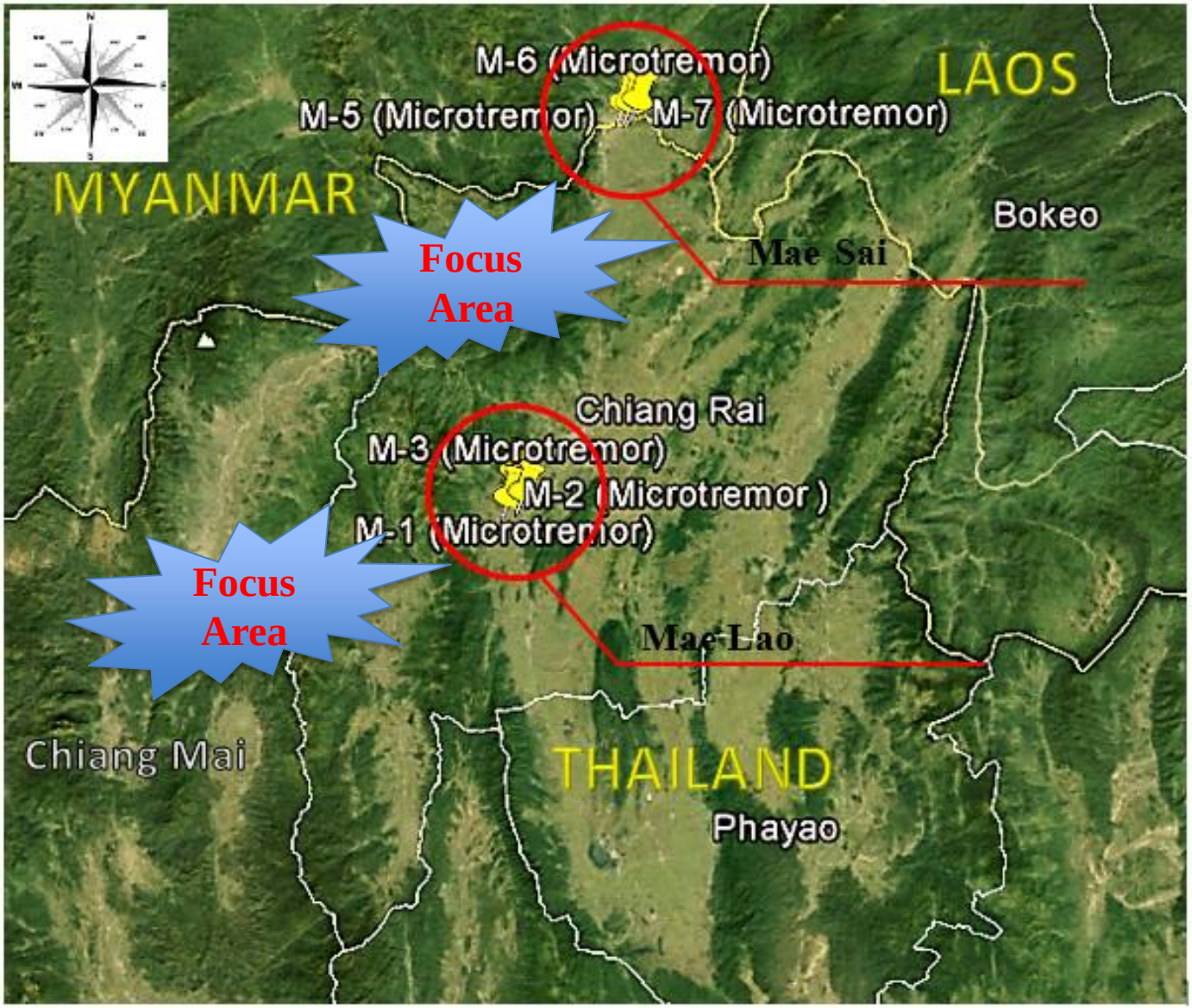


Results of Preliminary Study

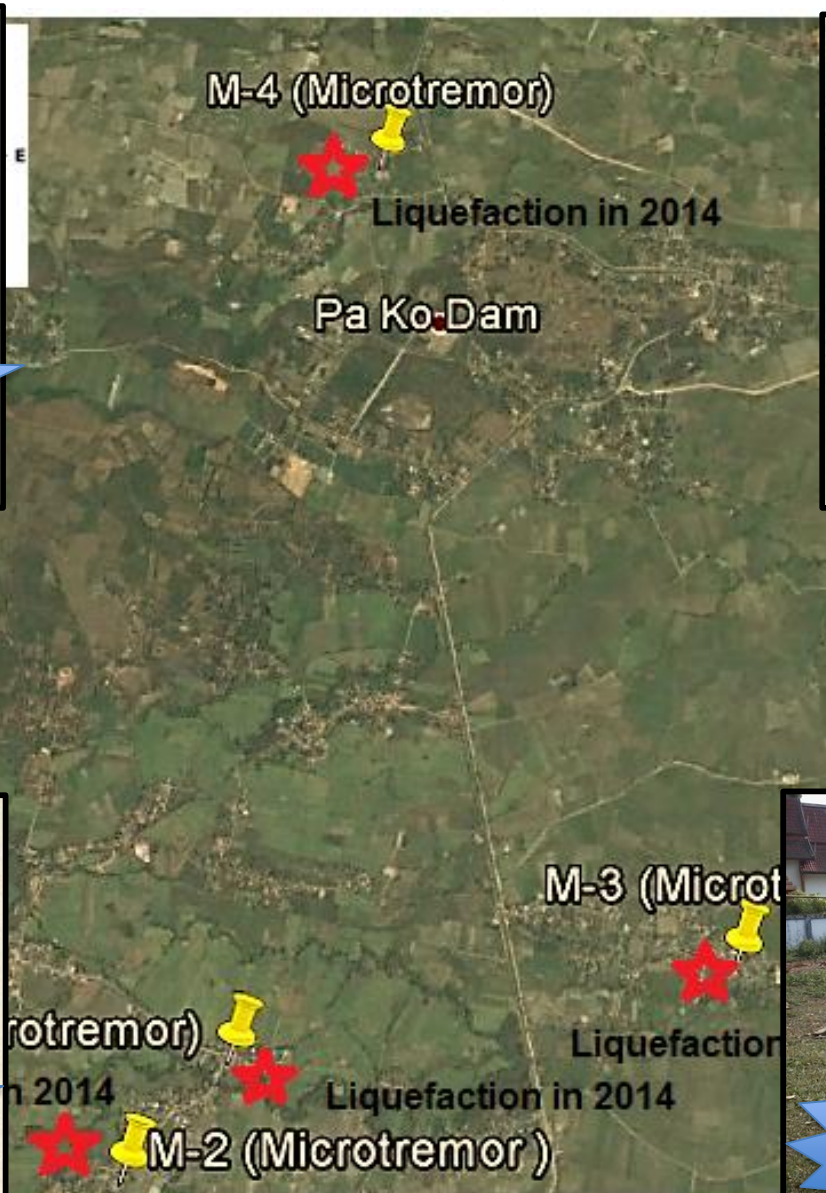


THE LIQUEFACTION POTENTIAL STUDY IN NORTH OF THAILAND IS FOCUSED ON CHIANG RAI SITE

Mictro-tremor Test



Micro-tremor Test (Mae Lao)



Micro-tremor Test (Mae Sai)

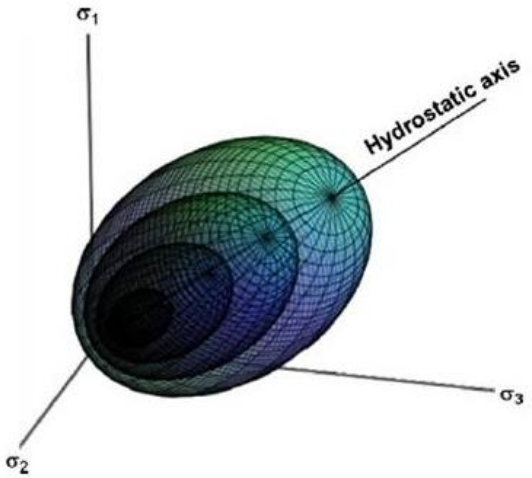
Next Step

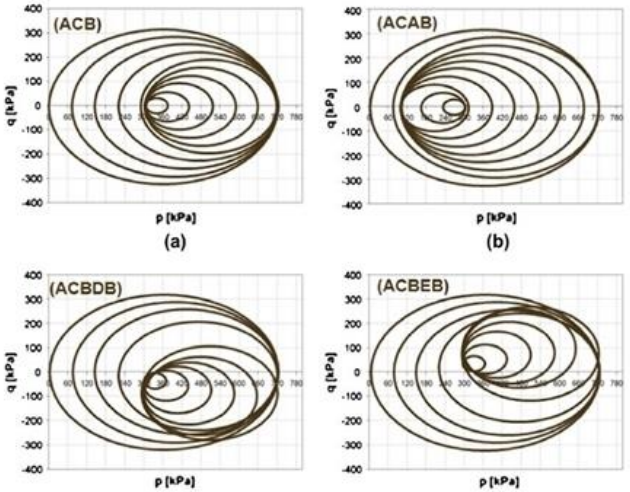
- Collect more data of the site investigation in the study area (i.e., boring log data and Vs)
- To validate numerical scheme for site response analysis, centrifuge test results will be utilized, then, site response analysis in Chiang Rai will be conducted at existing borehole locations.

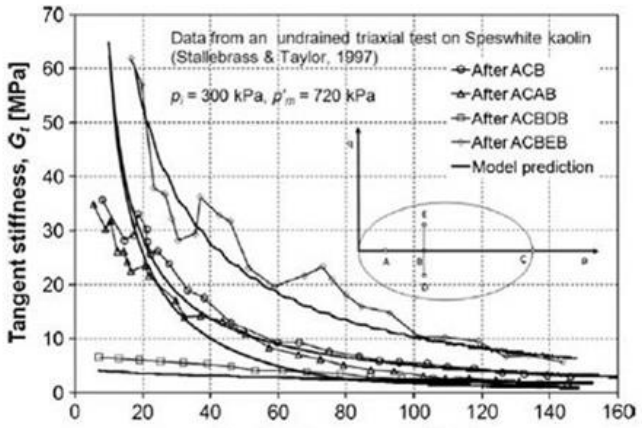
Collaboration + Connection

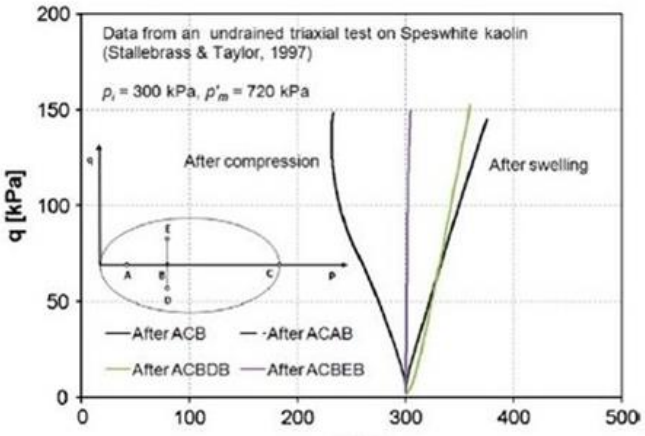
- Japanese Collaboration
  - Prof. Toshiyuki Mitachi (Hokkaido U.)
  - Prof. Hideki Ohta (TIT)
  - Prof. Takeshi Katsumi (Kyoto U.)
  - Prof. Akihiro Takahashi (TIT)
  - Dr. Satoshi Nishimura (Hokkaido U.)
  - Prof. Hiroyasu Ohtsu (Kyoto U.)
  - Dr. Tetsuo Tobita (Kyoto U.)
- AUN/Seed-net Alumni
  - Cambodian = 5
  - Filipino = 1
  - Indonesian = 2
  - Vietnamese = 2

Constitutive model for clay behaviour

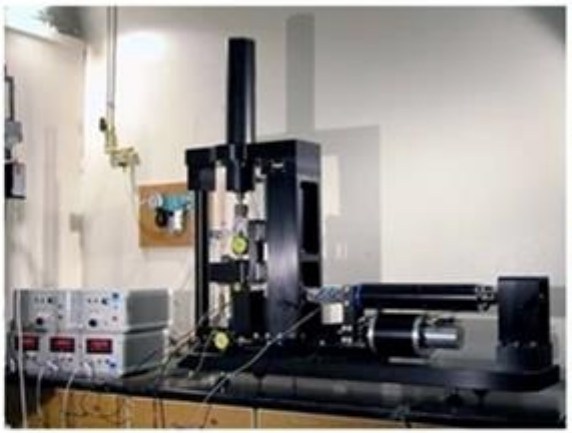


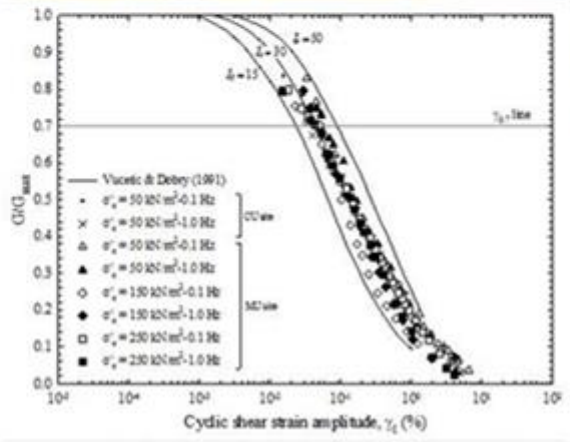


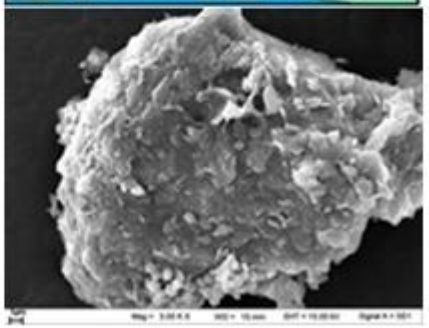




Stress-strain and strength characteristics of Bangkok Clay

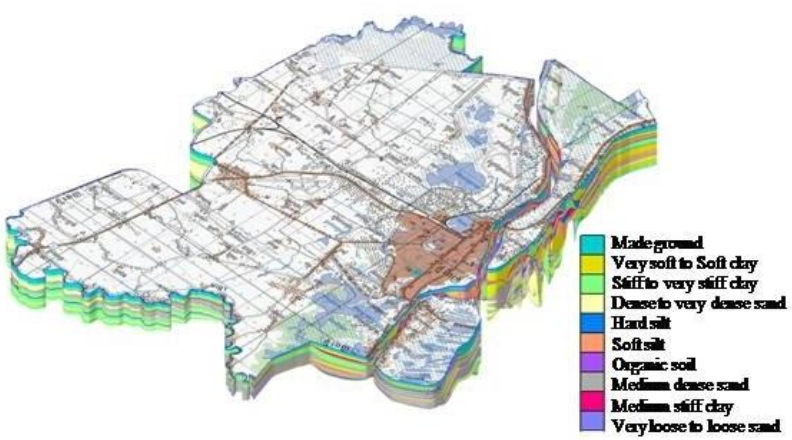


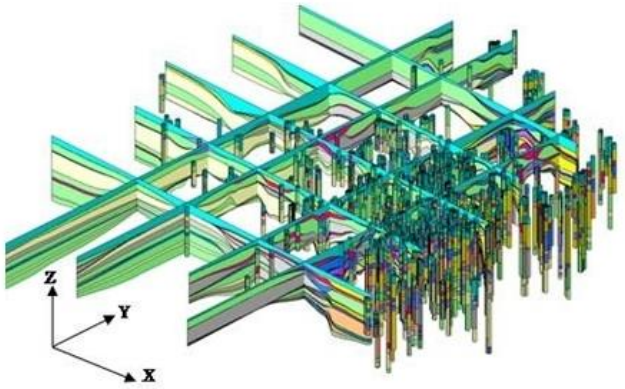


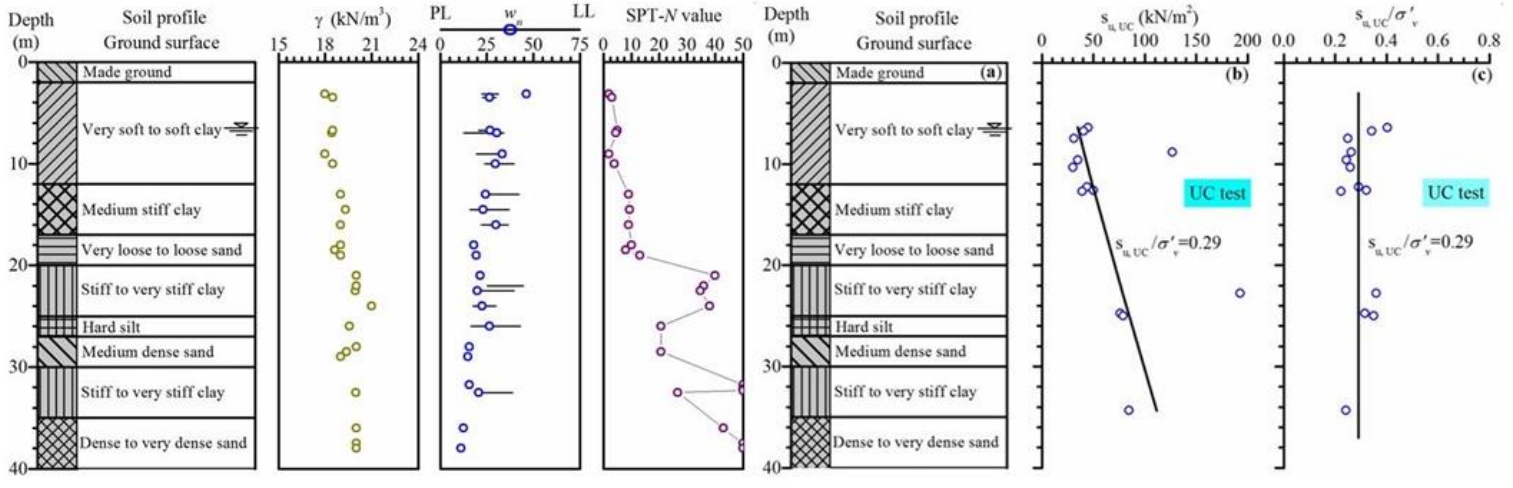


CHE-AUN/Seed-Net Ph.D. Sandwich Program + Hokkaido University (2008 – 2011)

3D geological modelling of Phnom Penh City

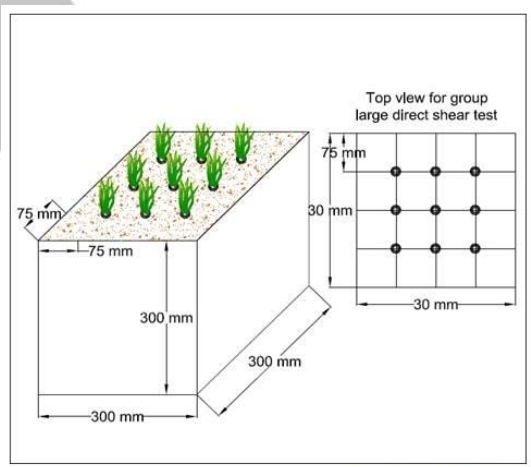


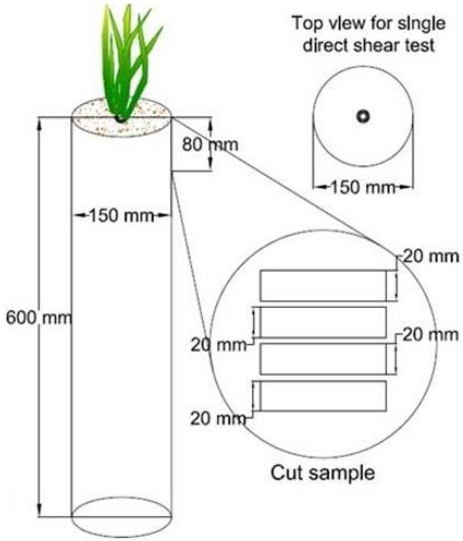


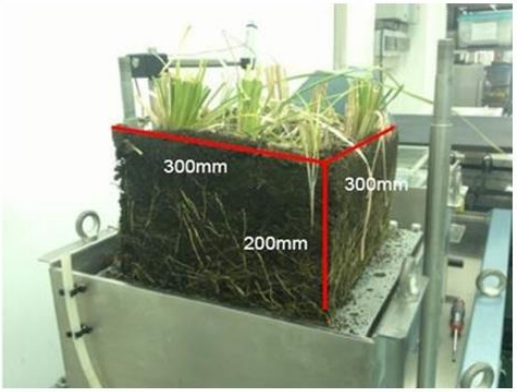


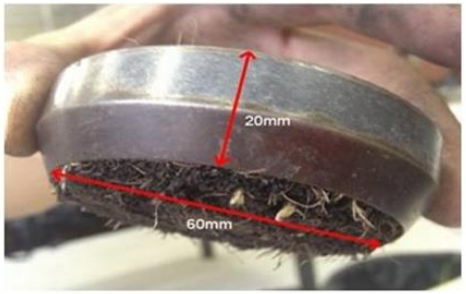
AUN/Seed-Net Master Program + Tokyo Institute of Technology (2011 – 2012)

Root reinforcement for slope stabilisation

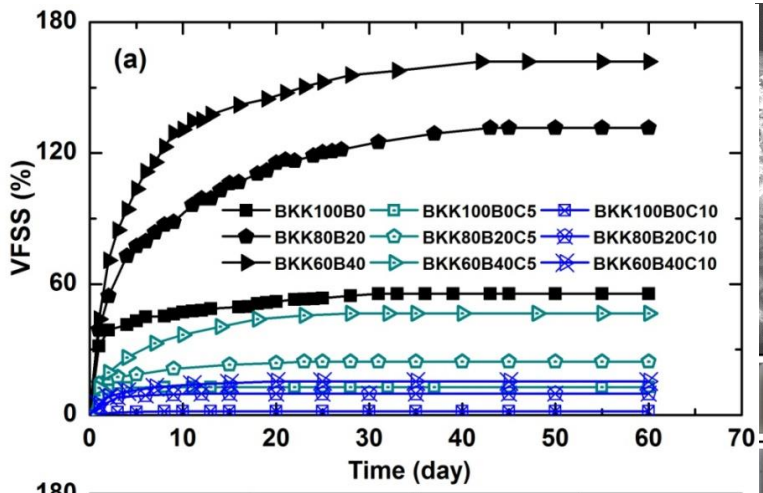


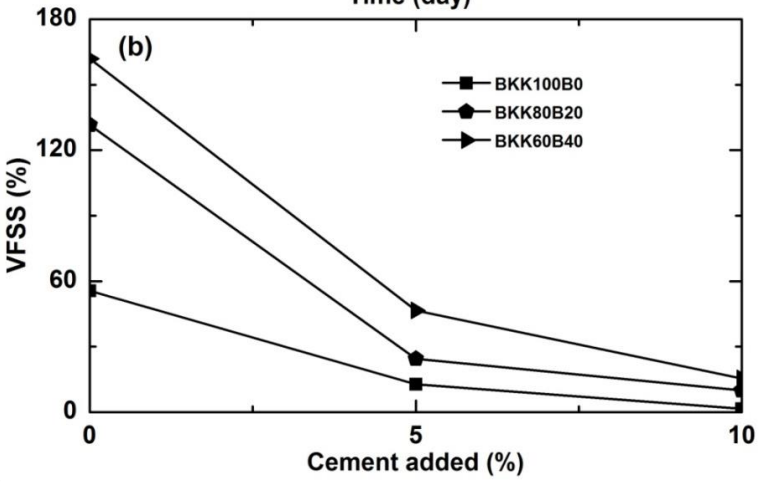


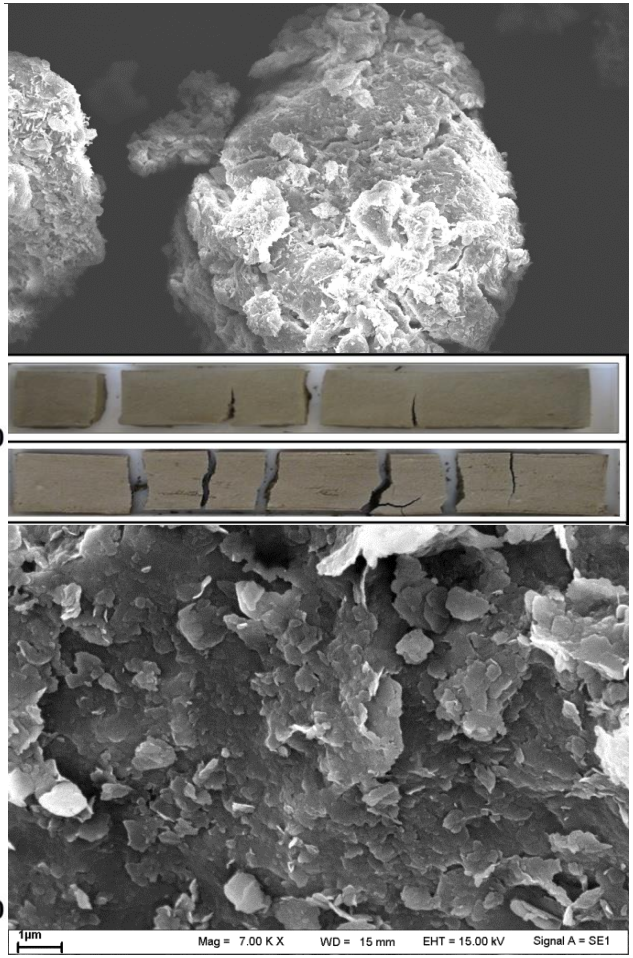




Cement + Fly ash stabilised swelling soil







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Thank You Very Much For The Attentions