CORRELATION BETWEEN COMPRESSION INDEX AND INDEX PARAMETERS FOR HIGH PLASTICITY PALAEOGENE CLAYS

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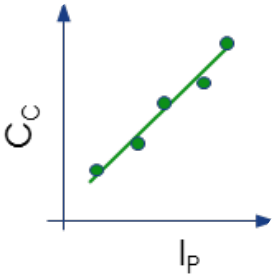
GEO
SUBSURFACE EXPERTISE

Aim of study

- Simple correlation between the compression index and relevant geotechnical index parameters
- High Plasticity Palaeogene clays

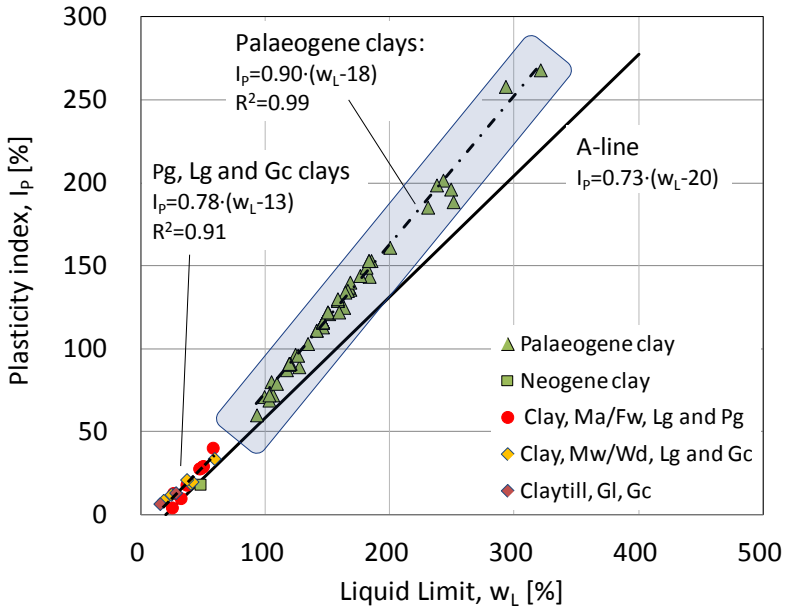


Application

- Rough estimate
- Assessment of preconsolidation pressure
- Simulation of geological loading history

Test details and classification of tested clays

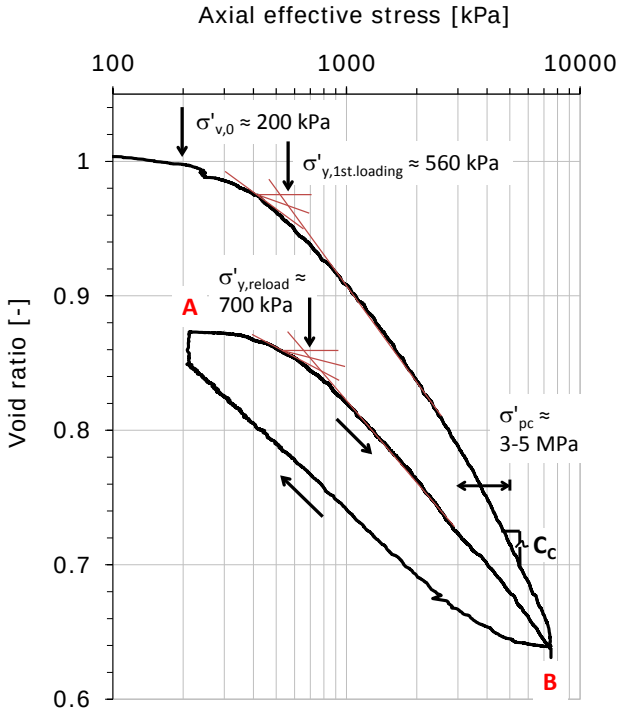
- Very high to extremely high plasticity w_L > 90%
- Heavily overconsolidated (OCR typically > 10)
- Database of 62 1D comp. tests
- Undisturbed natural samples



Classification chart for tested Palaeogene clays

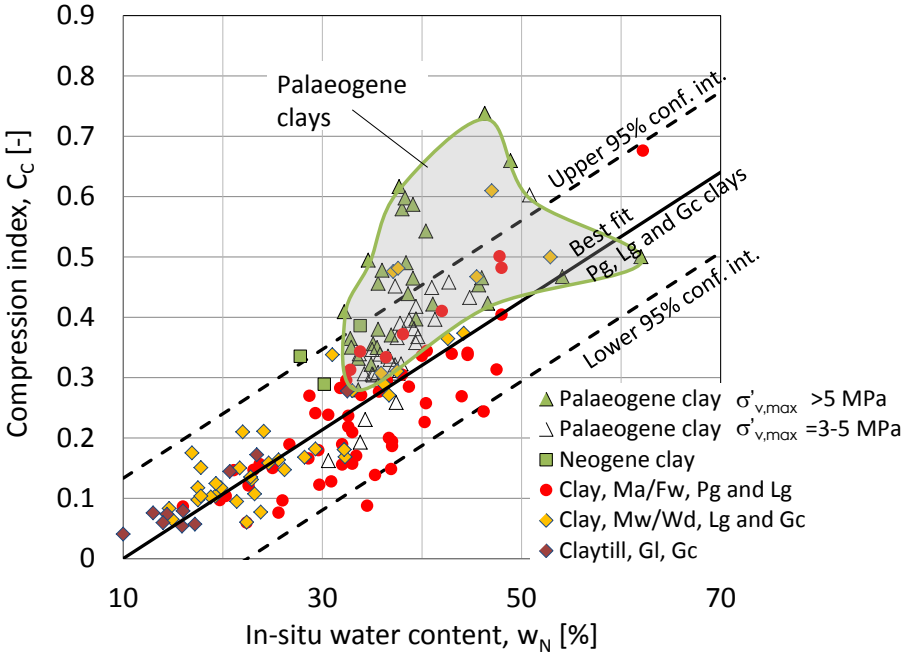
1D compression behaviour

- High compressibility and swelling potential.
- Fully reversible unloading-reloading curve.
- Gradual yield, σ'_{pc} is not easily identified.
- The compression behaviour post yield is influenced by inherent properties and structure.



Typical CRS compression curve - extremely high plasticity Palaeogene clay (I_P > 150 %)

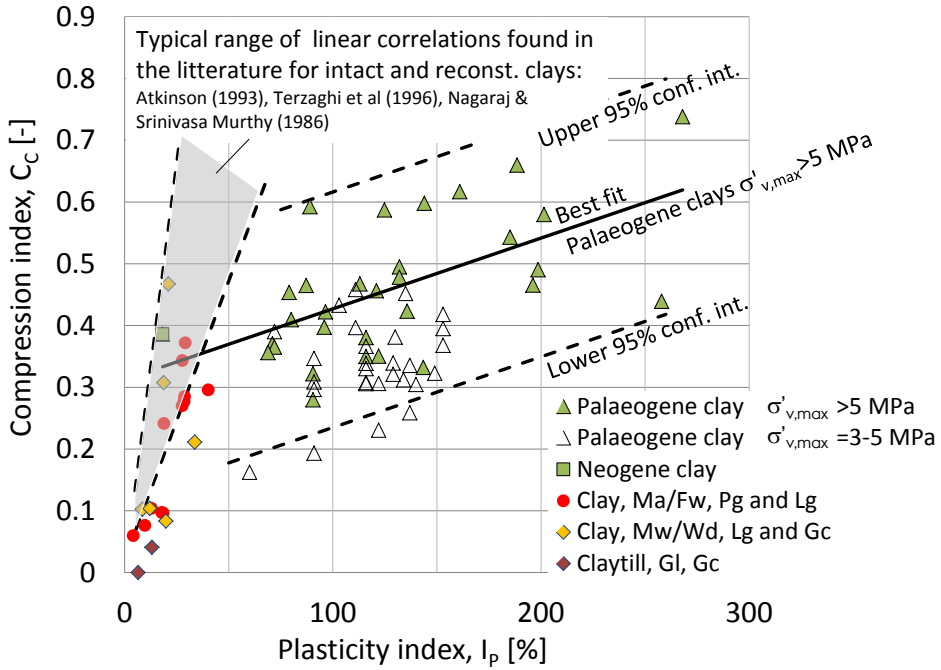
Compression index C_c vs. natural water content, w_N



- Large scatter.
- Tendency of increasing C_C with increasing w_N.
- C_c correlate well with w_N for Quaternary clays (ref. Andersen 2012)
- C_C for Palaeogene clays appears to be influenced by OCR

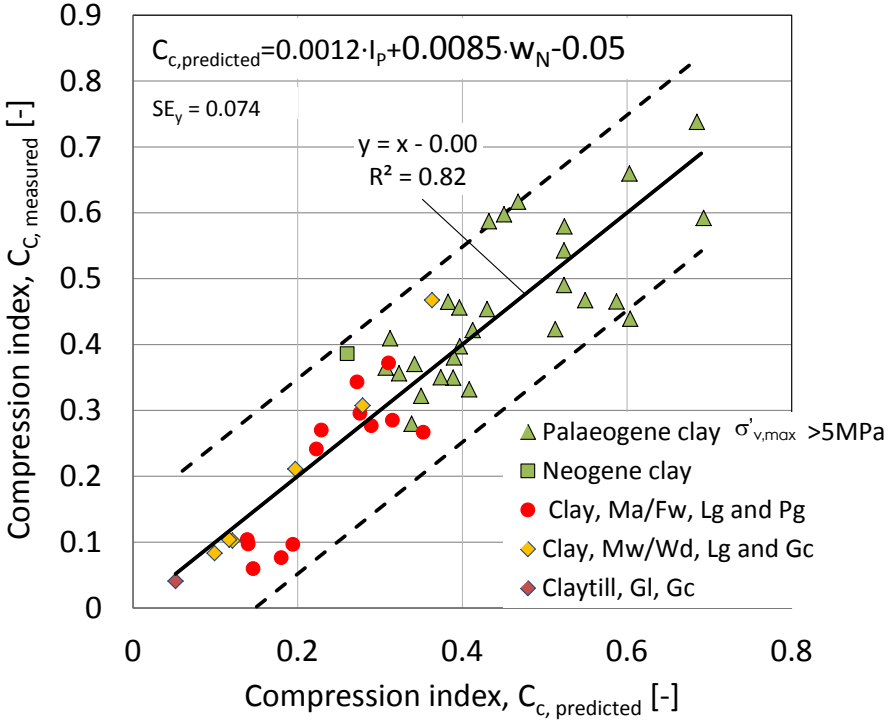
Compression index C_c vs. Plasticity index, I_P

- C_C seen to increase with increasing I_P.
- Large scatter.
- Extremely high plasticity clays show deviating behaviour
- Correlations found in the literature are generally not applicable for I_P>70%!
- Virgin state may not have been reached in some cases ($\sigma'_{v,max}$<5 MPa)



A “unified” correlation is propose

- Compression index a linear function of both natural water content and plasticity index (or liquid limit)
- Applicable to both Palaeogene clays and Quarternary clays - reasonable fit
- However, still large scatter!



Measured vs. predicted compression index

Considerations

- Further improvements may be possible!
  - Specific soil types
  - Index parameters from test specimen
  - Combinations of other variables

- Correlations based on w_L (cf. paper) may be preferred over I_P

- A unique correlation does not exist!
  - Influence of structure, mineralogy, clay size fraction, state, pore water chemistry etc.

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