

Challenge

Climate-driven seawater intrusion, rising saline groundwater, and widespread de-icing practices are accelerating soil salinisation.

The concerns:

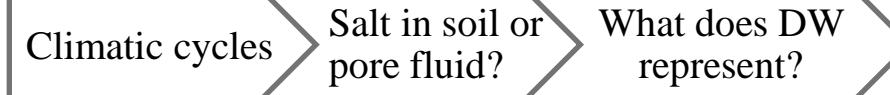
→ Are geotechnical test standards valid for saline soils?

Associated uncertainties and their effects:

→ Do the current tests represent in situ conditions?

Testing the pore fluid effects:

→ Consistency limit tests, with DW, and NaCl as a saline solution.



Methodology

Investigating the effect of soil salinity using LL and PL tests, along with its electrical conductivity measurements.

Soil Selection:

Glacial Till

Brine, NaCl:

(0 → 223) ‰

Mixing:

Soil + Brine

Testing:

LL, PL, EC

Results

Soil Behaviour and Findings

Investigating the effect of soil salinity using LL and PL tests, along with its electrical conductivity measurements.

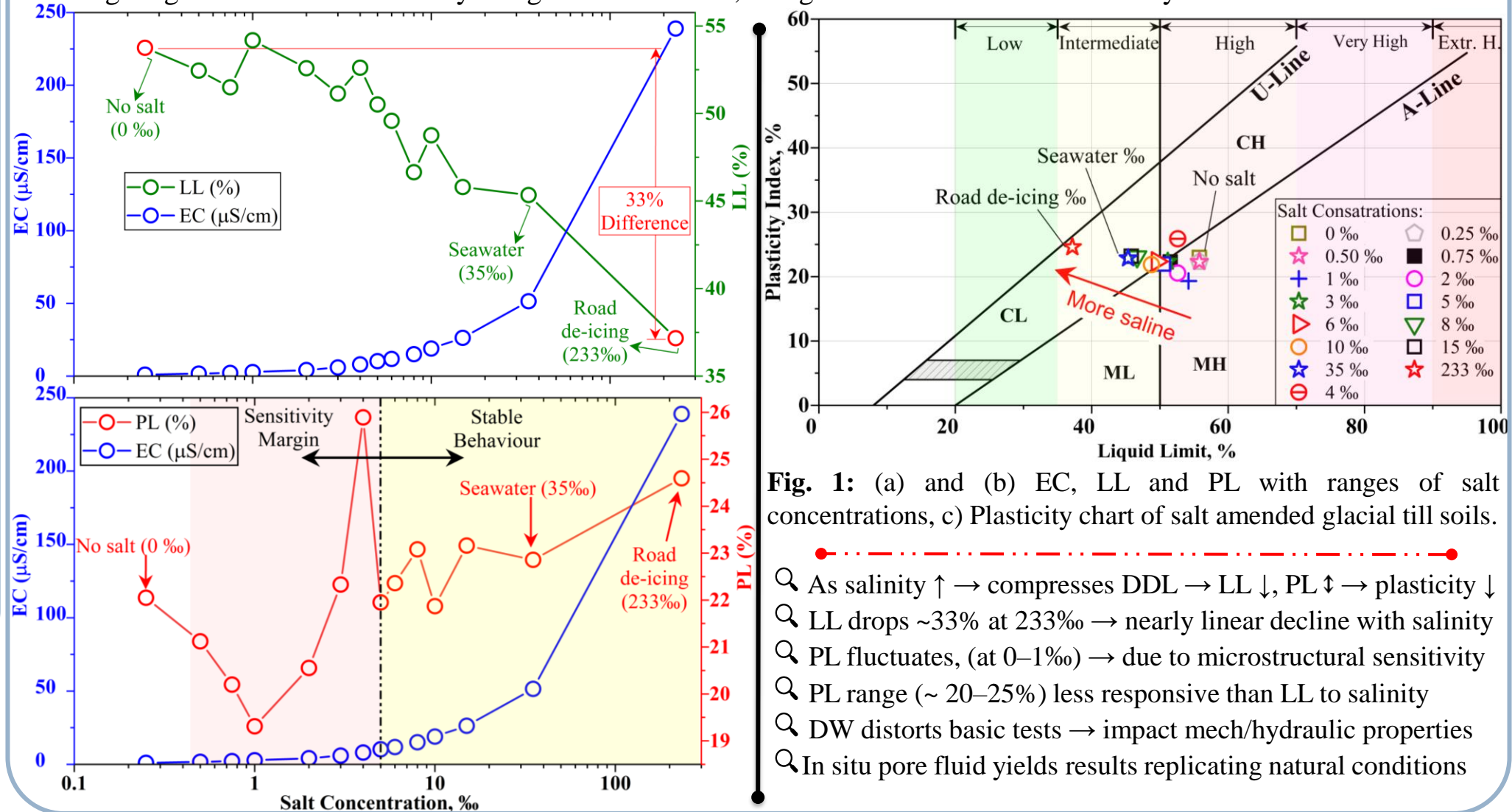


Fig. 1: (a) and (b) EC, LL and PL with ranges of salt concentrations, (c) Plasticity chart of salt amended glacial till soils.

- As salinity ↑ → compresses DDL → LL ↓, PL ↓ → plasticity ↓
- LL drops ~33% at 233‰ → nearly linear decline with salinity
- PL fluctuates, (at 0–1‰) → due to microstructural sensitivity
- PL range (~ 20–25%) less responsive than LL to salinity
- DW distorts basic tests → impact mech/hydraulic properties
- In situ pore fluid yields results replicating natural conditions

Acknowledgments

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References

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[2] JAYATHILAKA, P., INDRARATNA, B. & HEITOR, A. 2019. Influence that Osmotic Suction and Tree Roots has on the Stability of Coastal Soils.