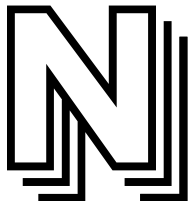


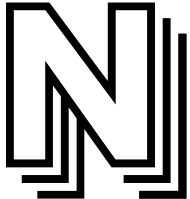
Determination of water content in solid brick masonry walls

Poul Klenz Larsen

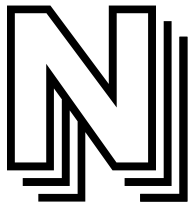
Årsmøde I Nordisk Kalkforum, Helsingør, 2014



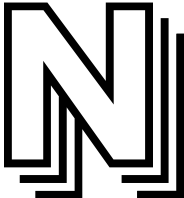
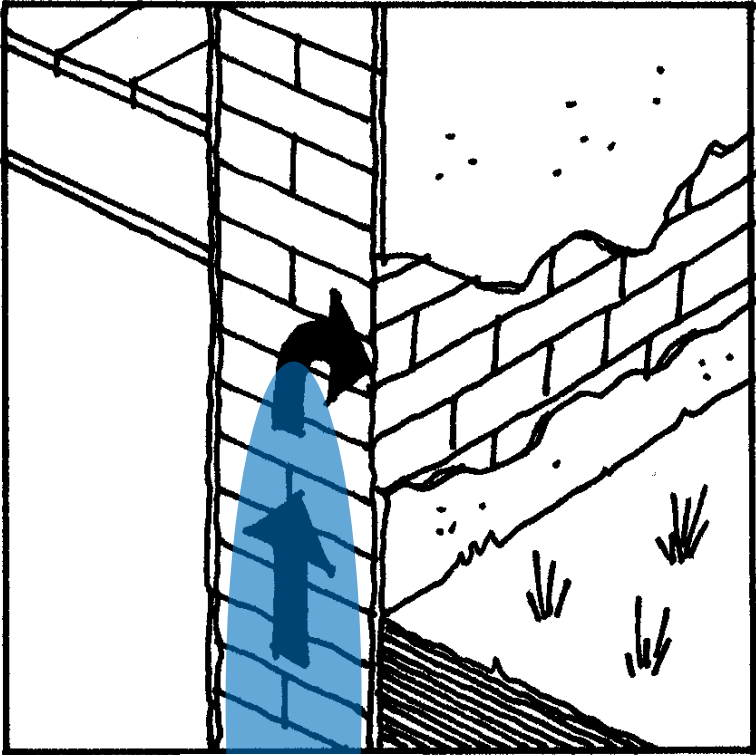
Brumleby, Copenhagen. Salt contaminated masonry. The wall is dry



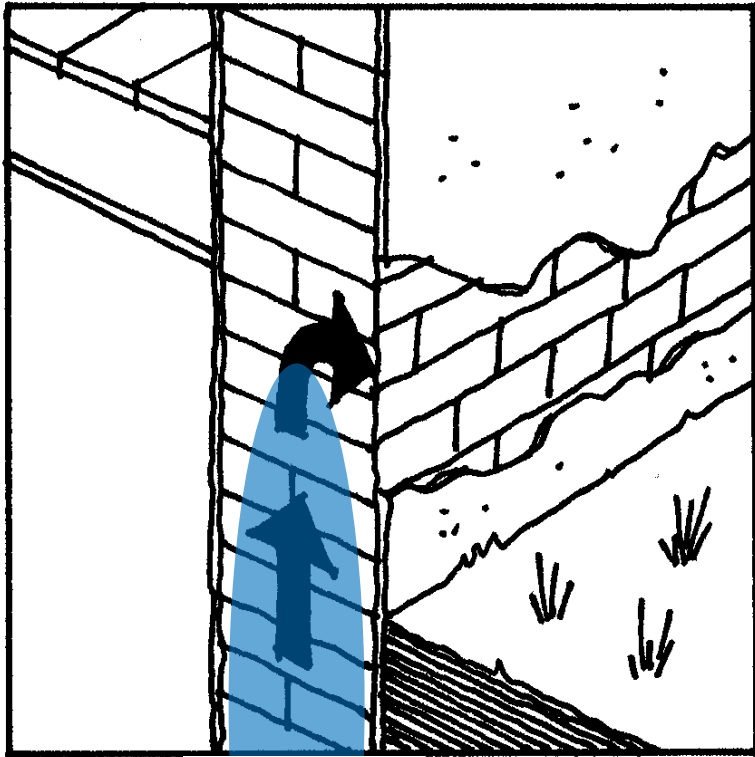
Brumleby, Copenhagen. Salt contaminated masonry. The wall is dry



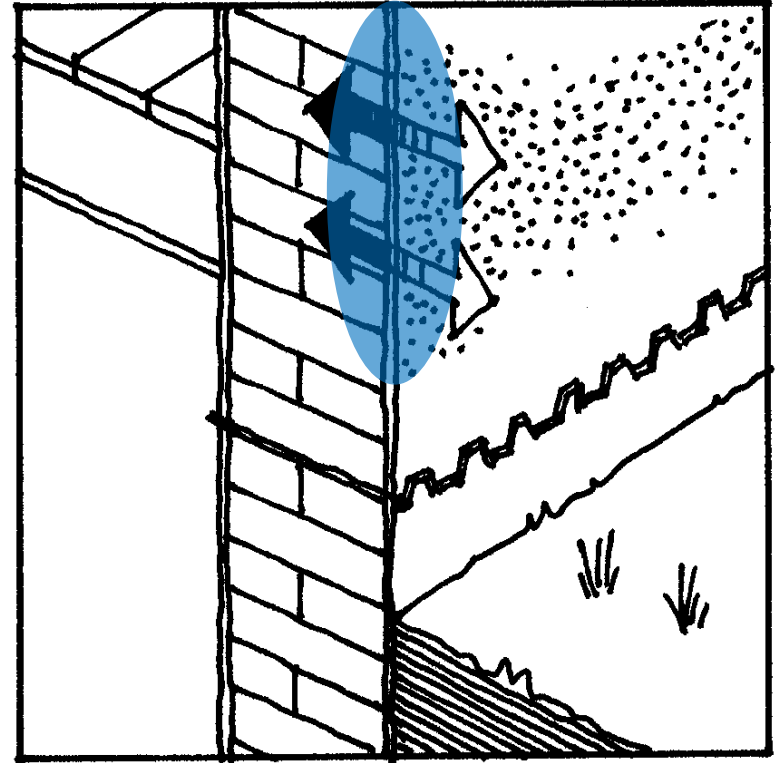
Rising damp is not visible



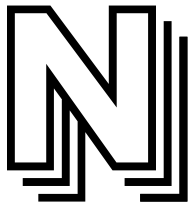
Rising damp is not visible



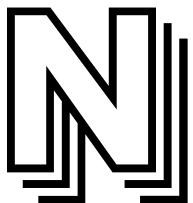
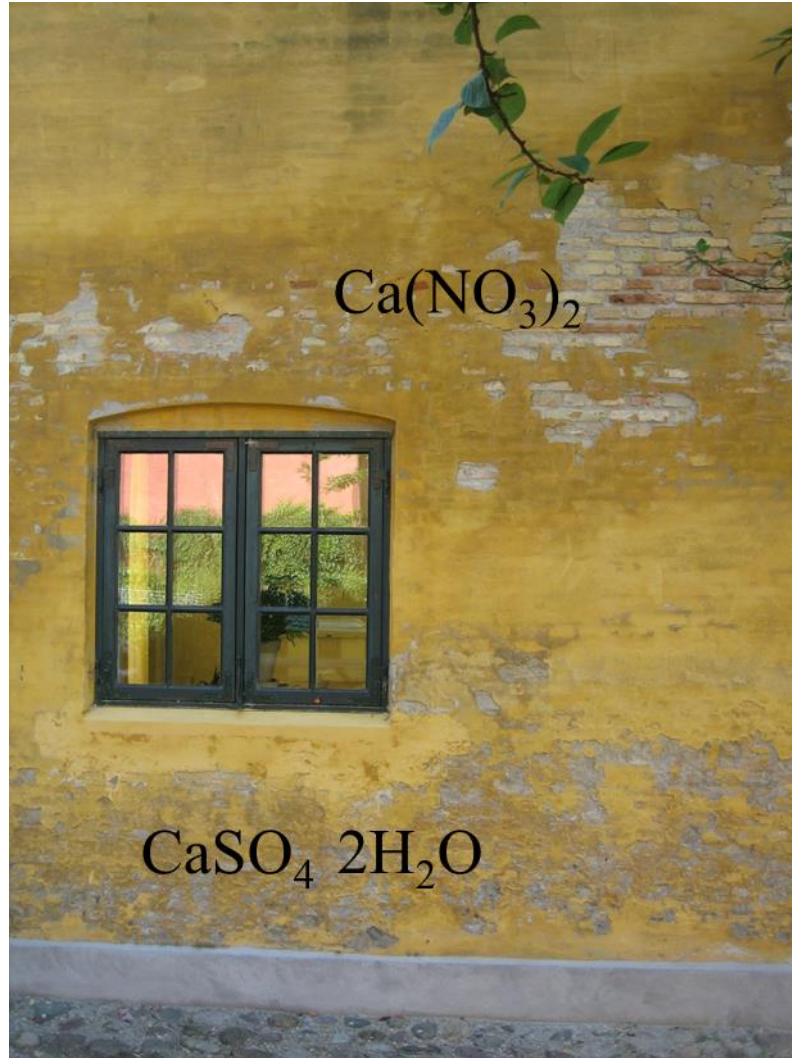
Hygroscopic moisture is visible



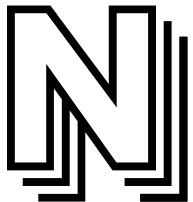
House in Black Horse district, Vesterbro, Copenhagen. Rising damp?



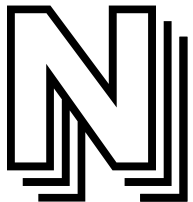
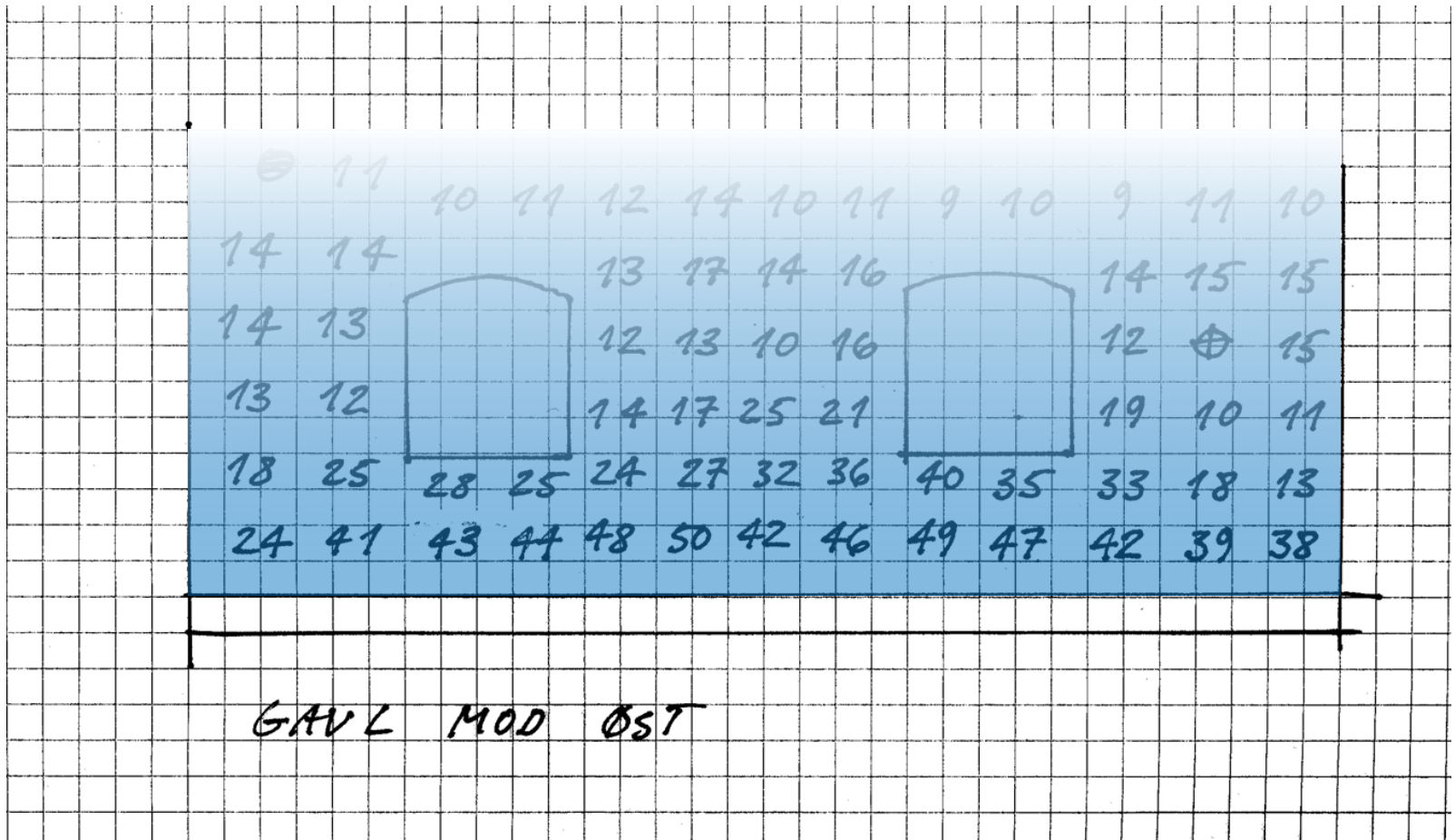
Different salts due to different solubility



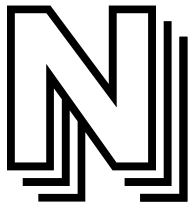
A neutron gauge does not detect the salt, only the water (hydrogen molecules)

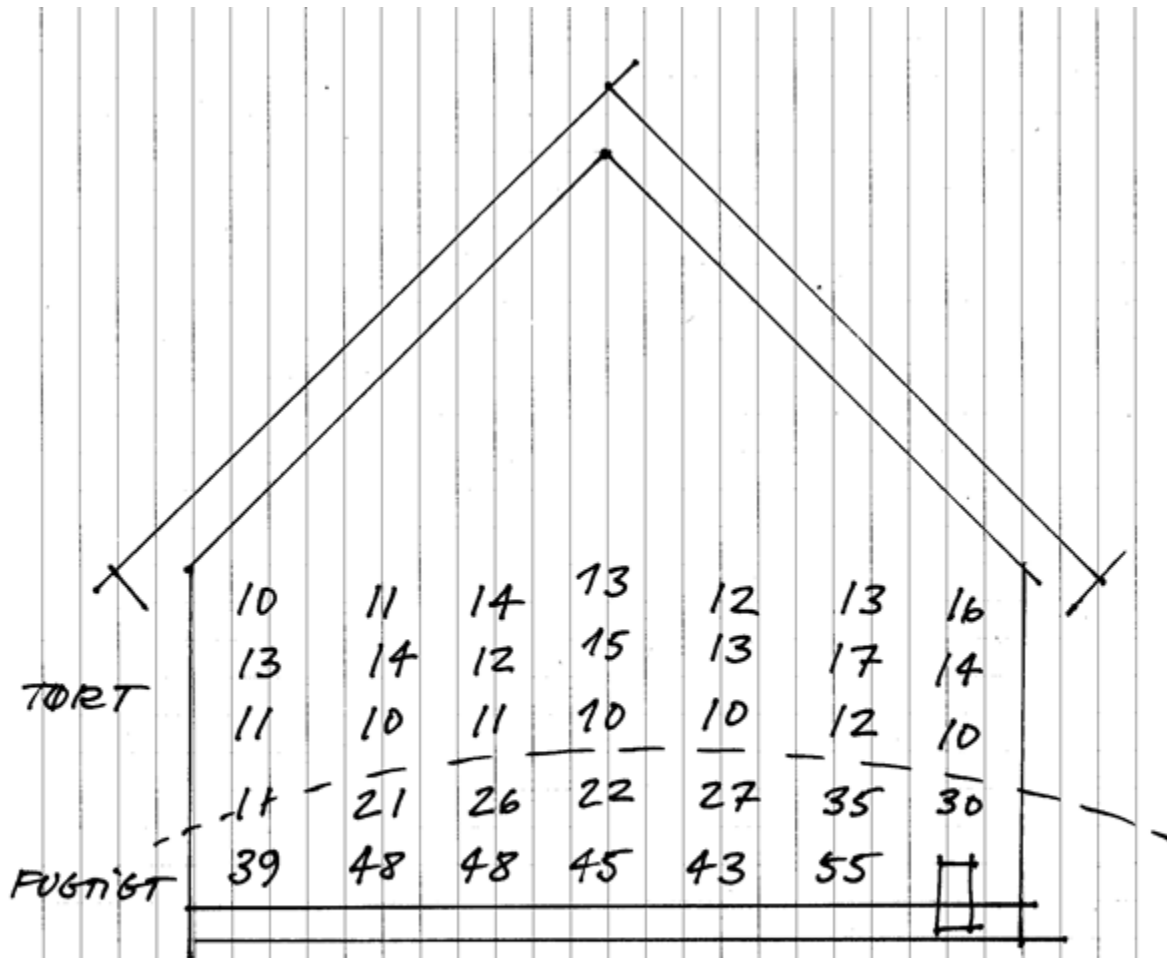


The visible moisture is not measured. The measured moisture is not visible



Is this wall damp ?

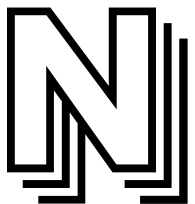




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What about heavy masonry walls ?



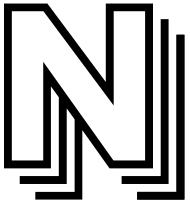
Historic warehouse in Copenhagen, transformed to an apartment block

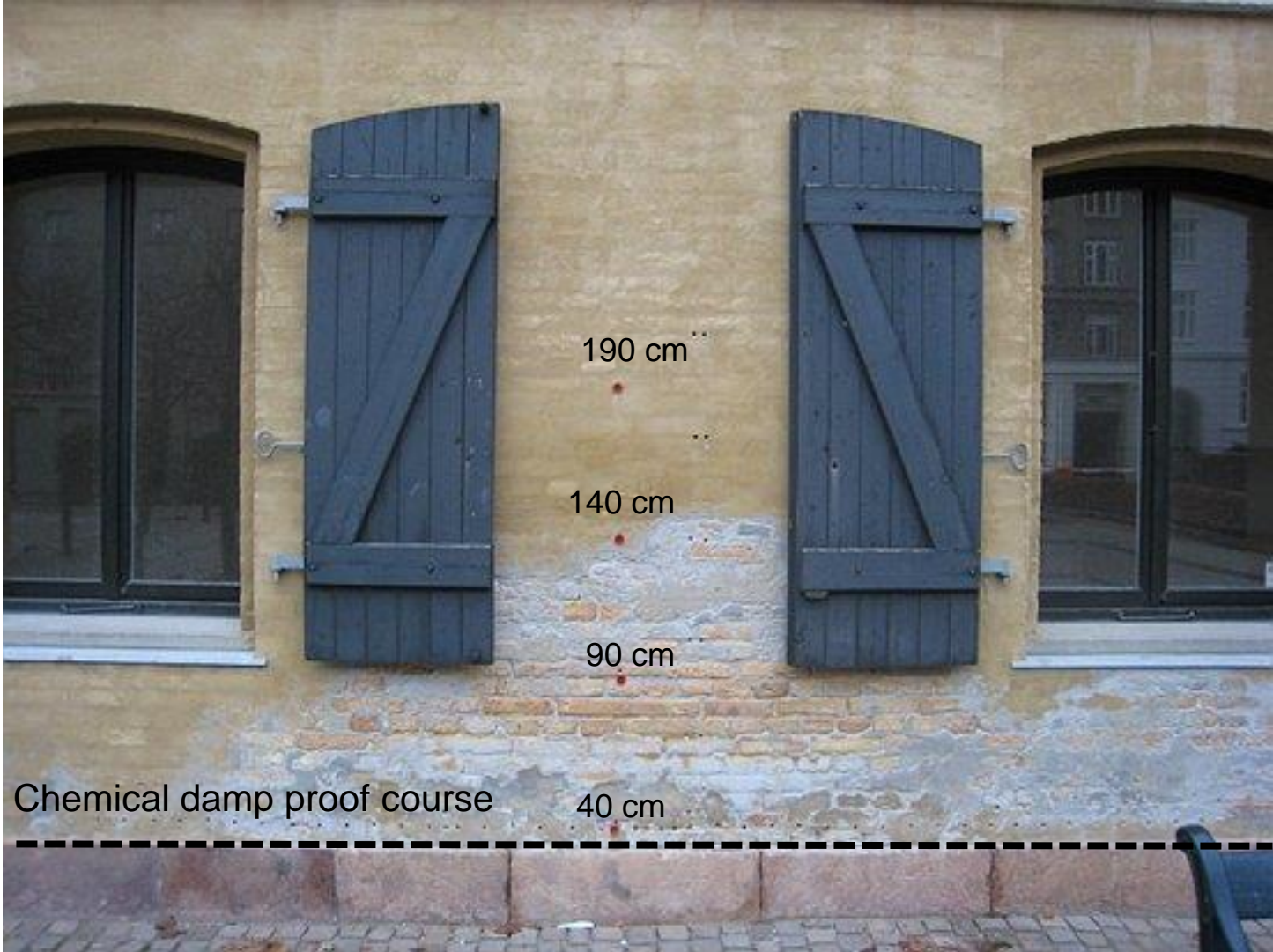




Rising damp ??

Deicing salt ??





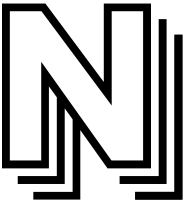
Chemical damp proof course

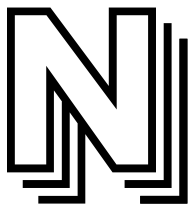
190 cm

140 cm

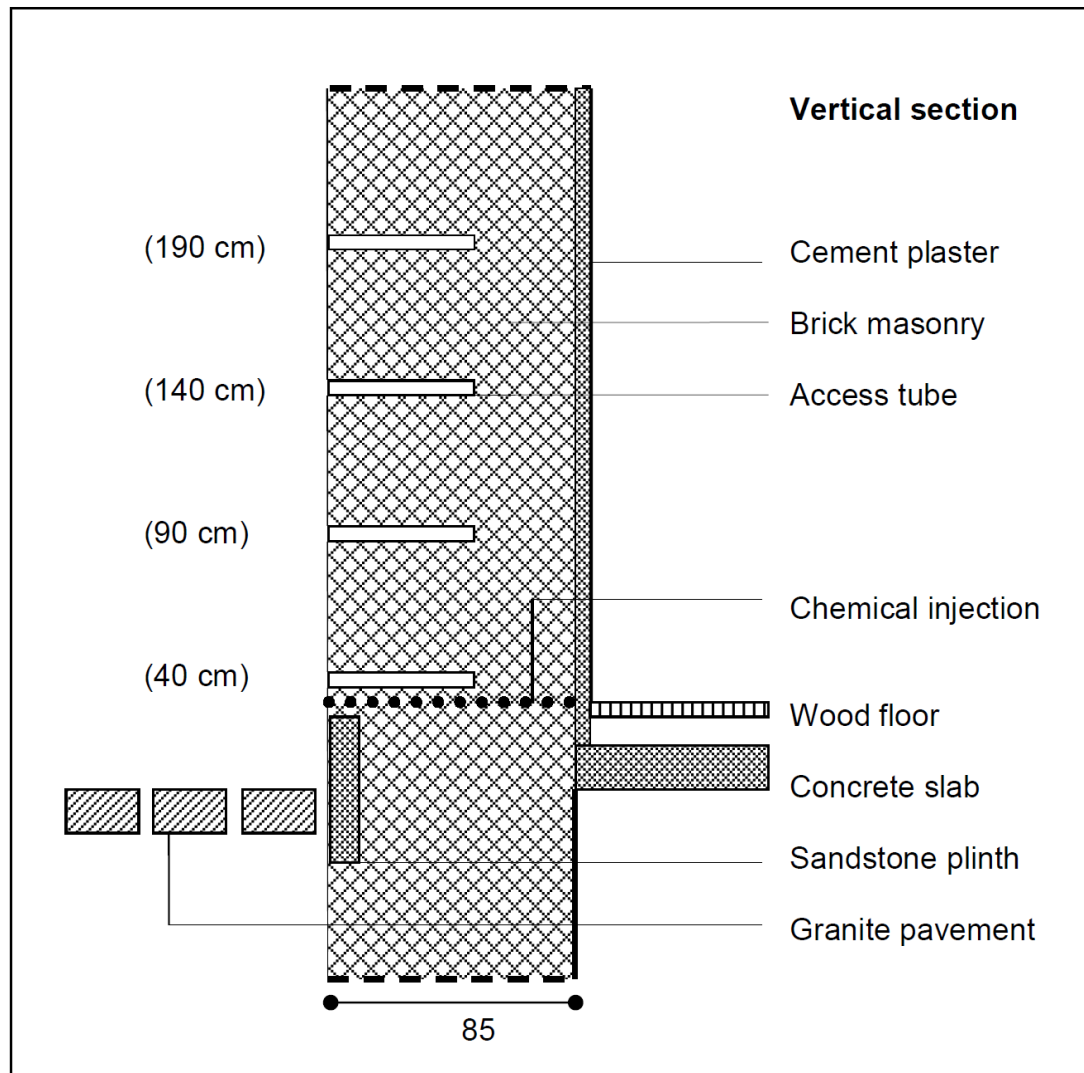
90 cm

40 cm

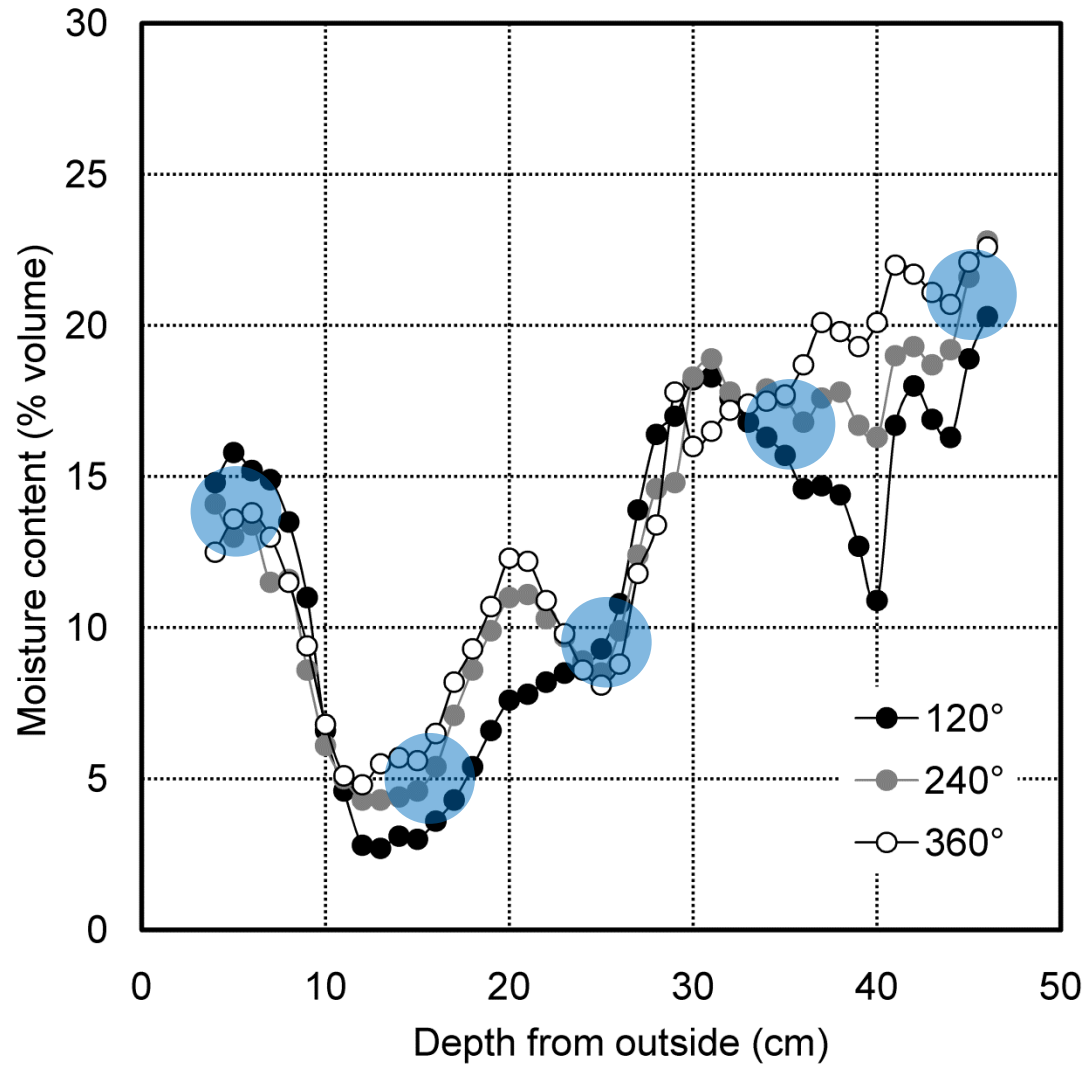




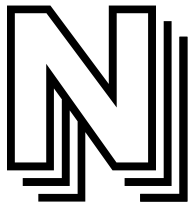
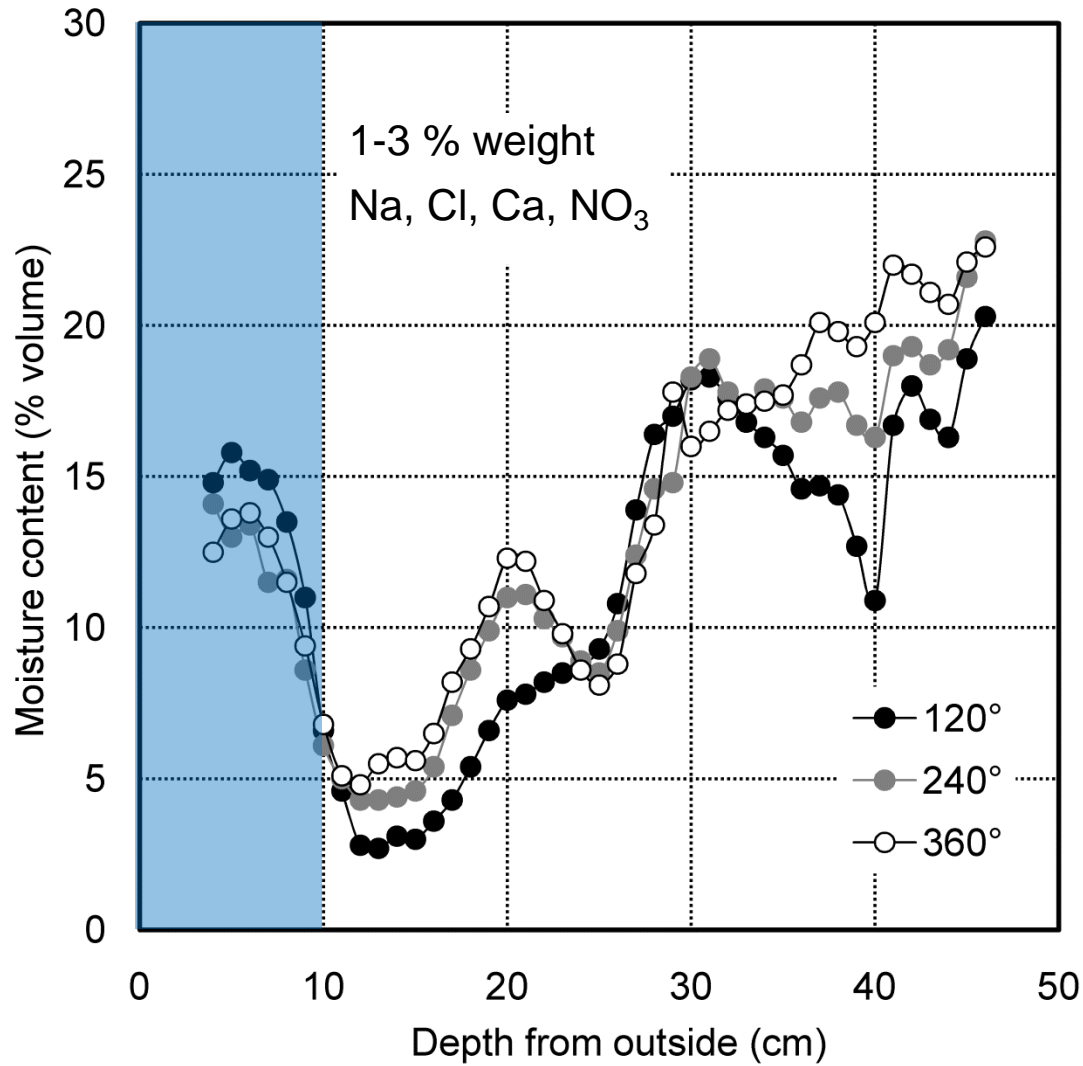
Cross section of wall with moisture monitoring positions



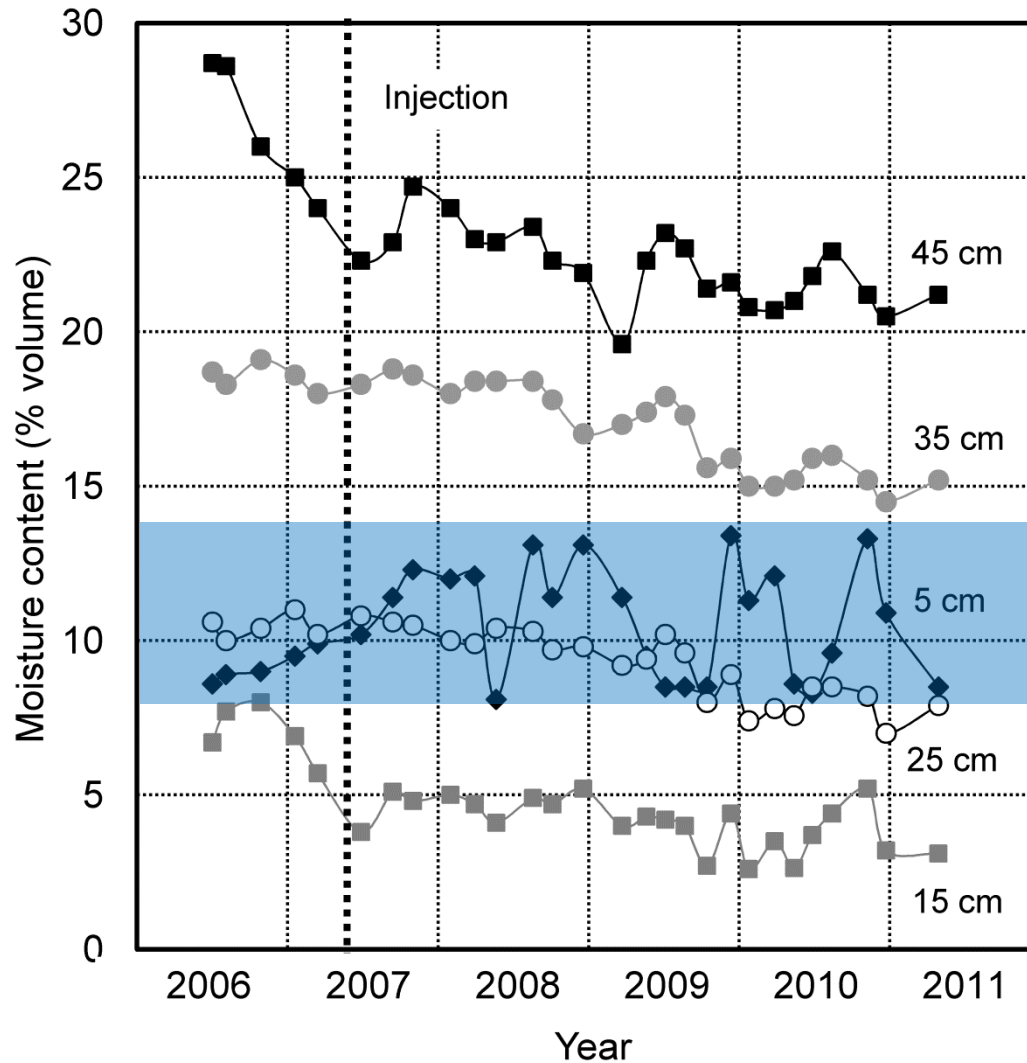
Moisture profile 140 cm above ground



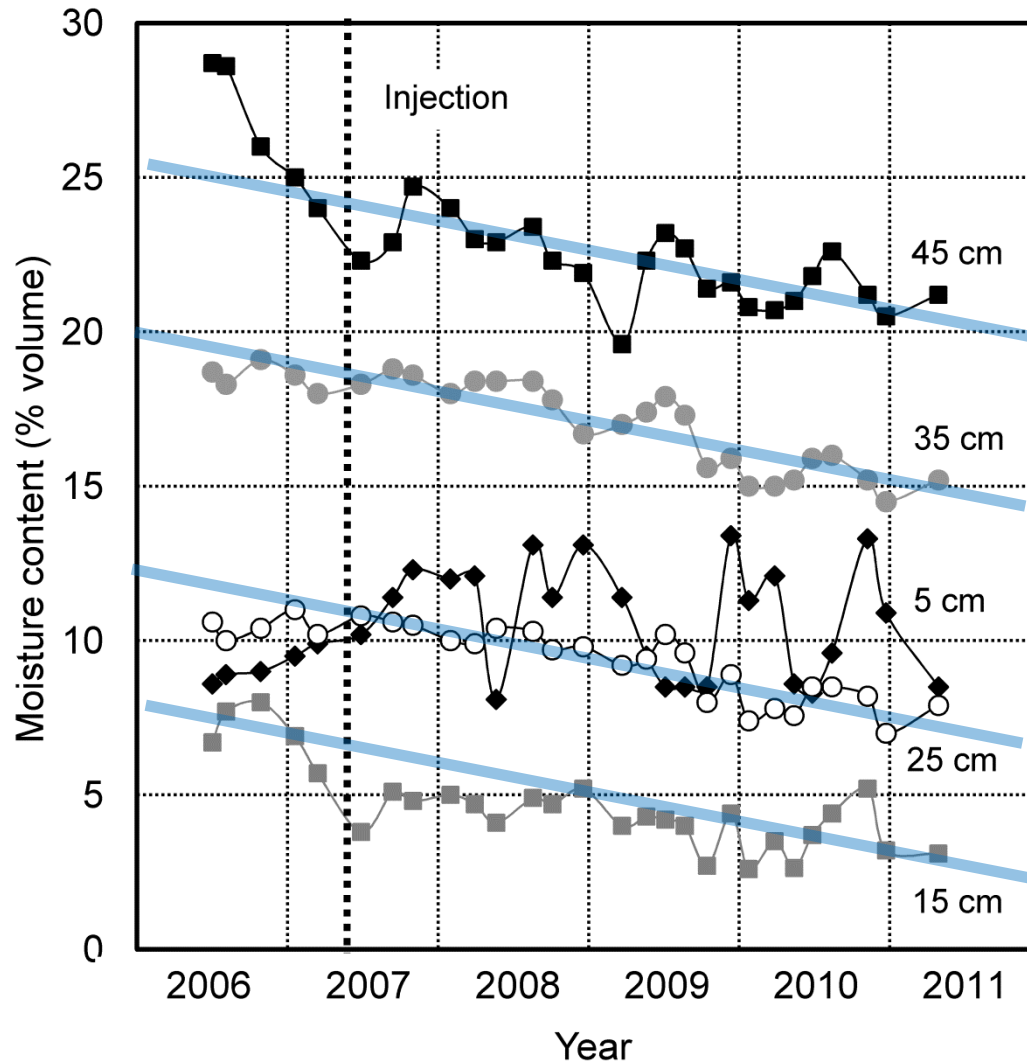
Moisture profile 140 cm above ground



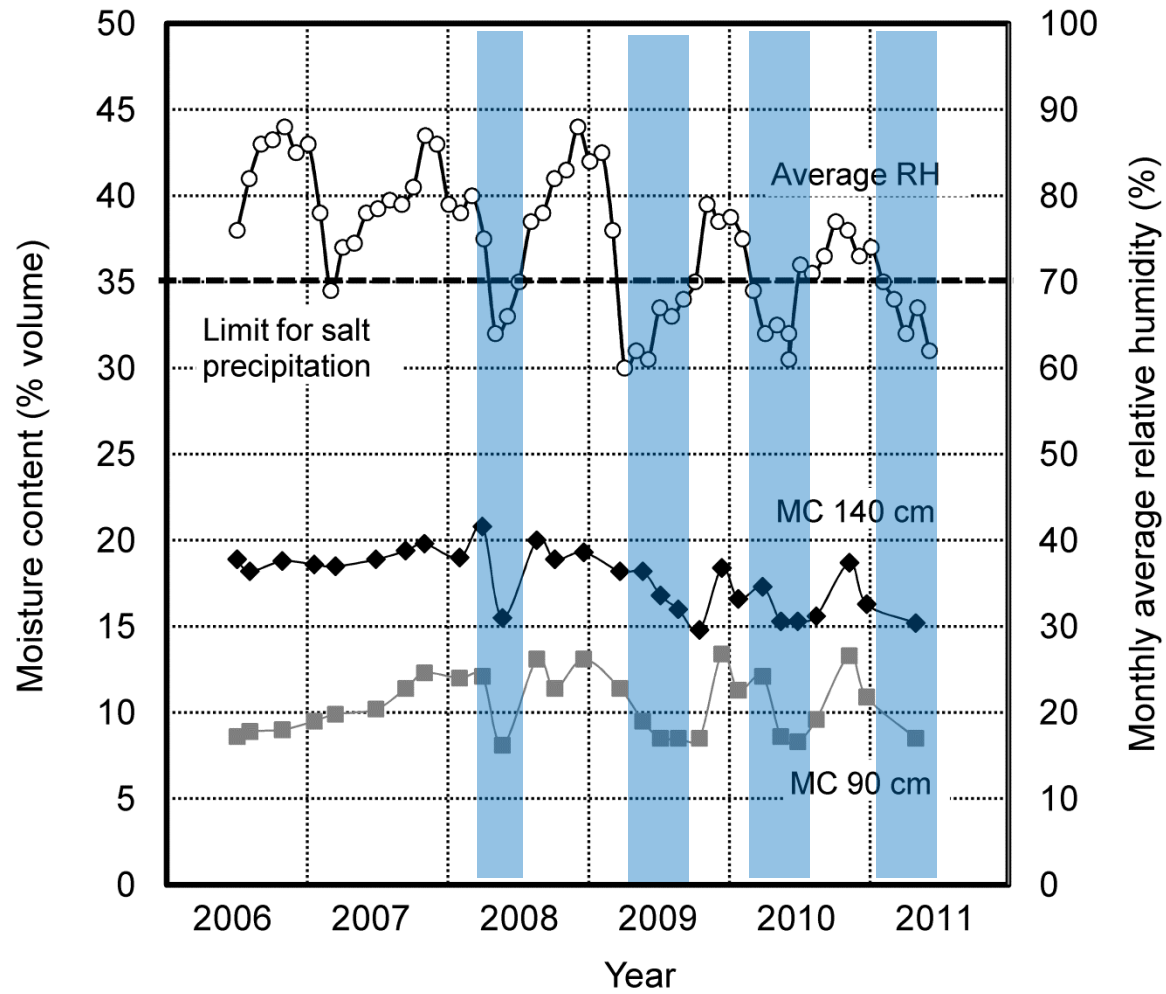
Moisture content 140 cm above ground



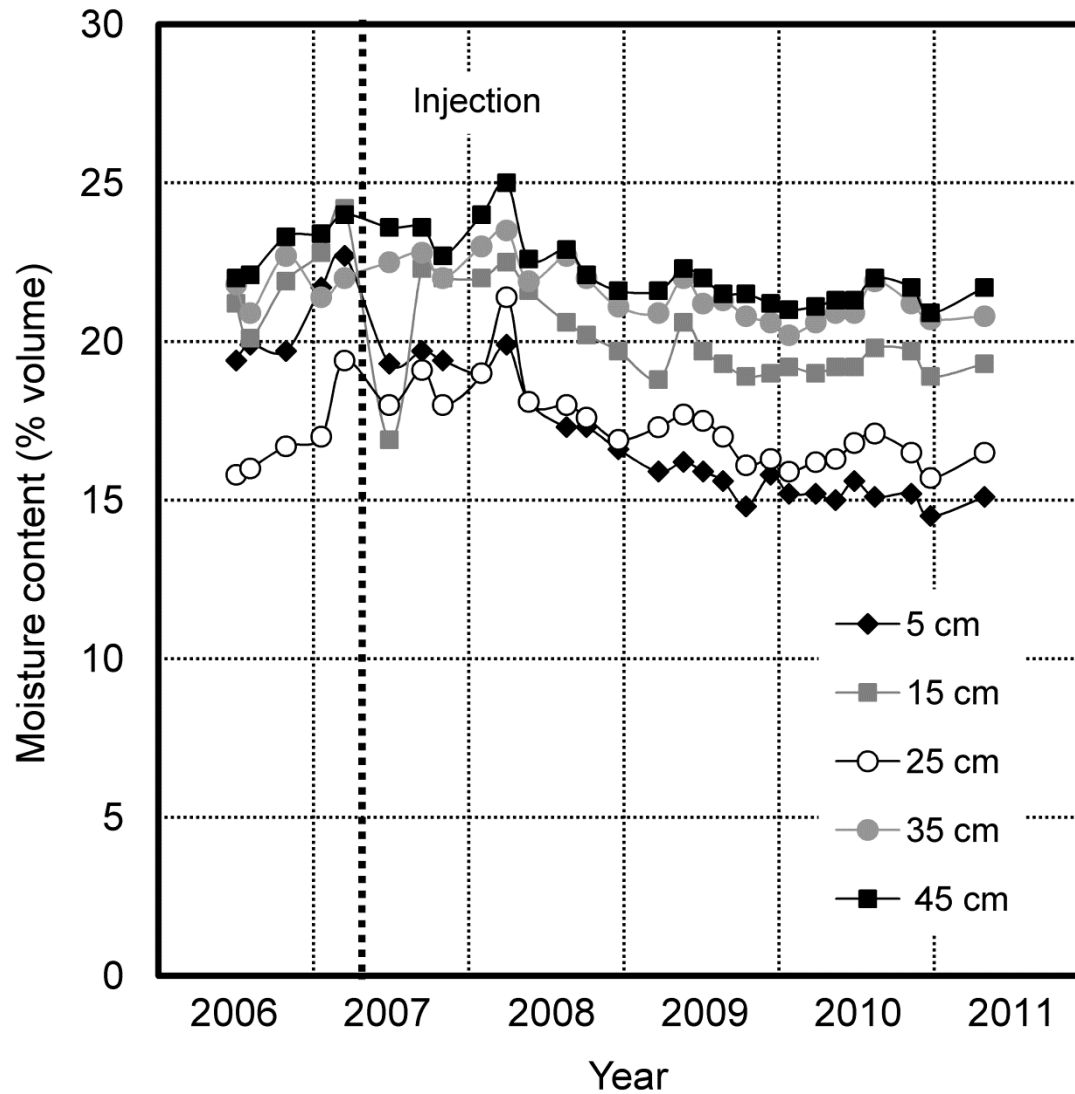
Moisture content 140 cm above ground



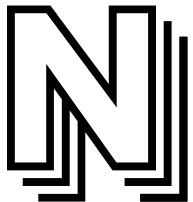
Hygroscopic response at wall surface



Moisture content 40 cm above ground



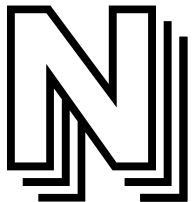
Rainstorm over Copenhagen in July 2011



Mortar joints appeared wet still after two days



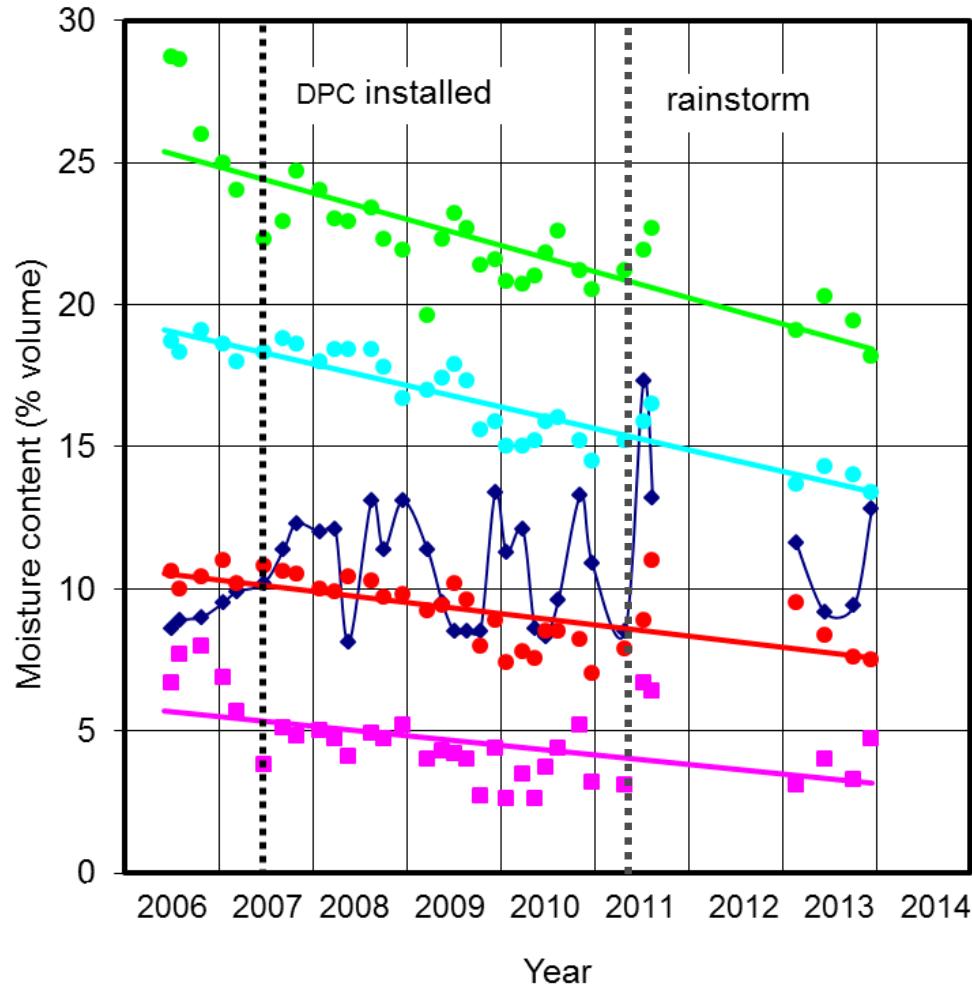
Gravel below pavement washed away by the water



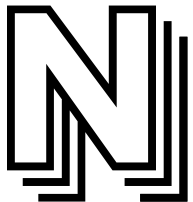
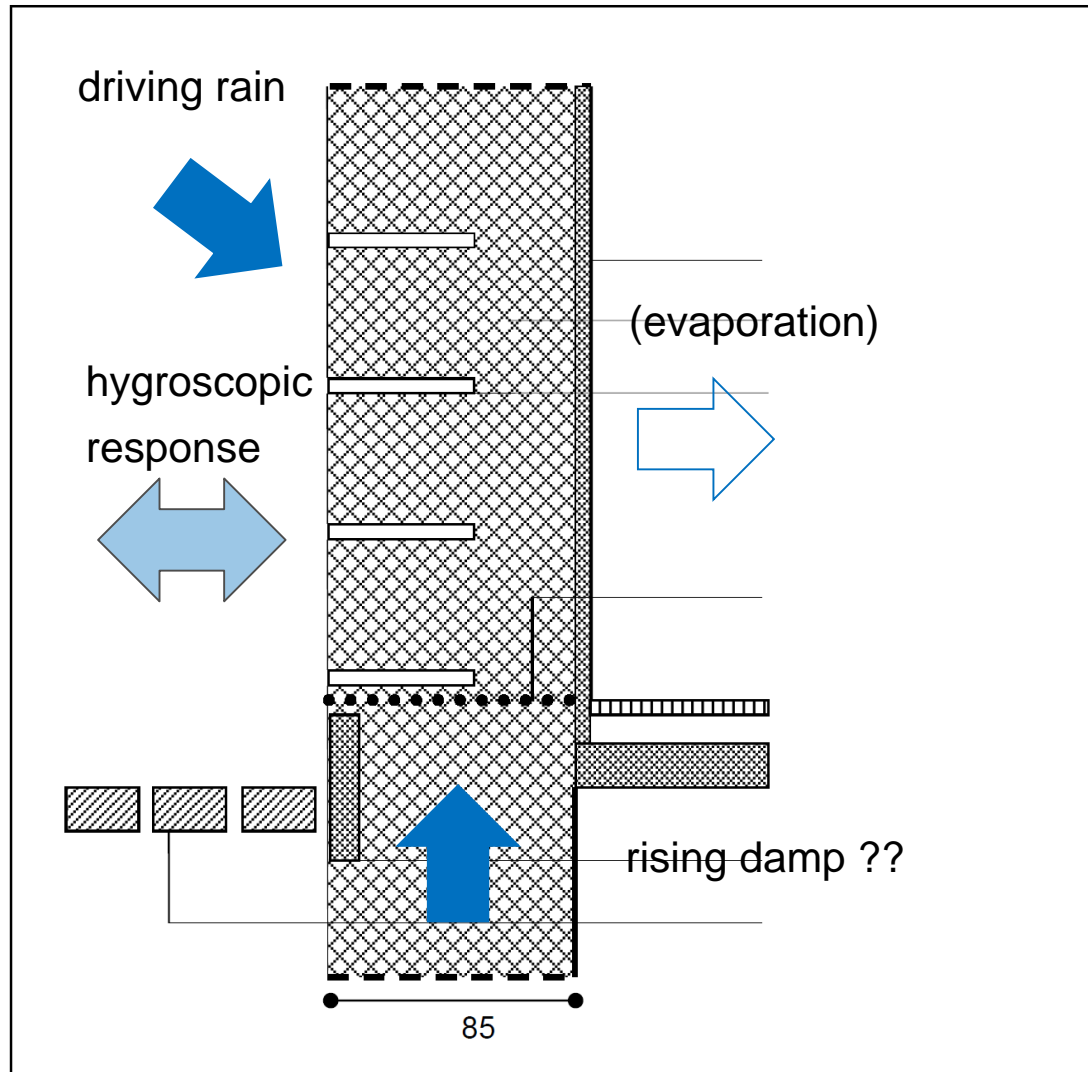
Water in access tubes due to driving rain



Moisture content 140 cm above ground

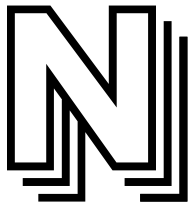


Model for moisture equilibrium in masonry wall



Conclusions

- Dielectric probe for vertical soil moisture measurements is suited for horizontal use in brick masonry
- Detailed information about the moisture distribution over the cross section of a wall was obtained, and the change of water content over time was assessed
- Drying of masonry after installation of chemical DPC was slow, possibly due to driving rain or the influence of hygroscopic salts?
- Does a chemical DPC work?



LEGO houses don't have rising damp ☺

