



Multi-scale assessment of the random variability of hydric and thermal properties of cob buildings for energy refinement purposes.

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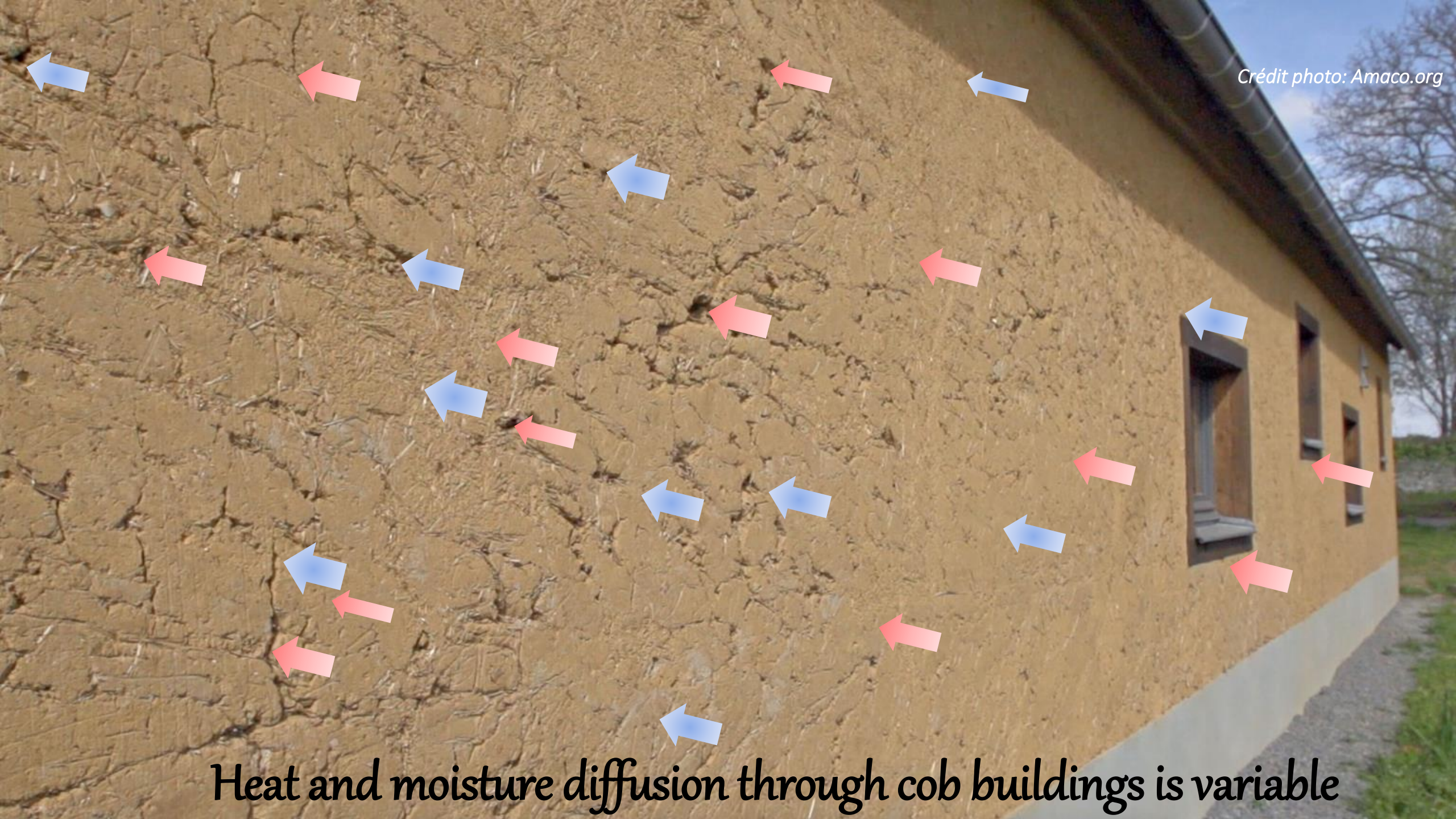
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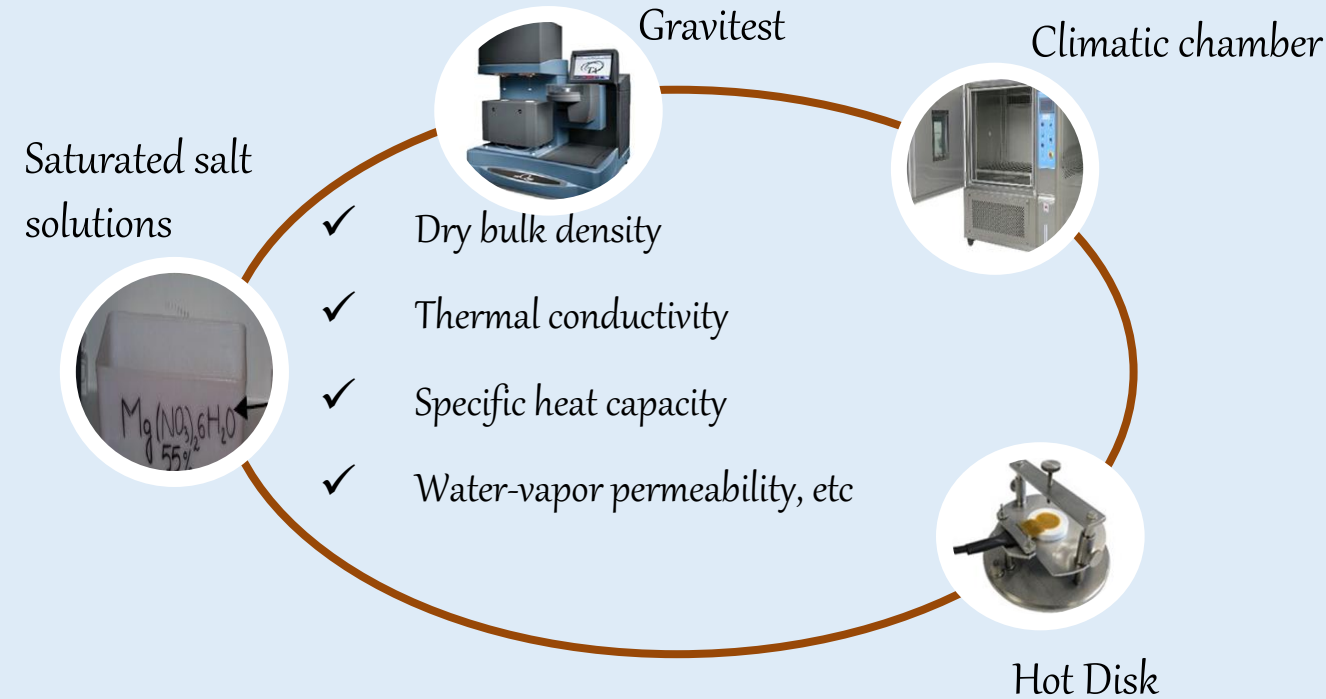
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Heat and moisture diffusion through cob buildings is variable

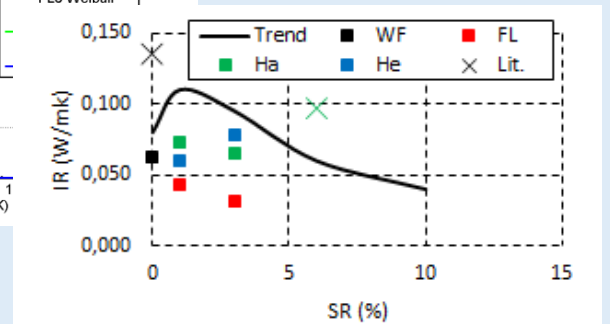
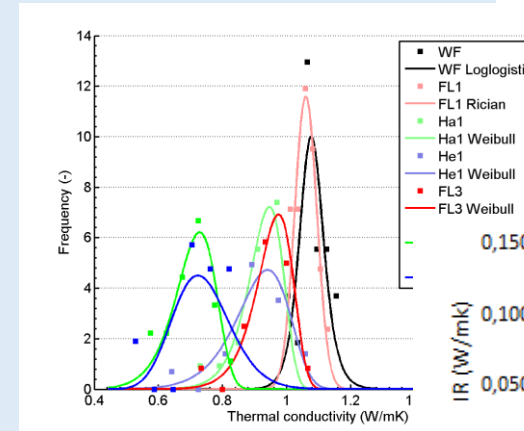
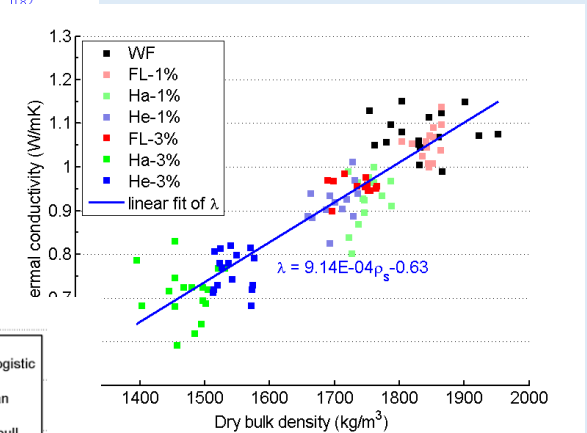
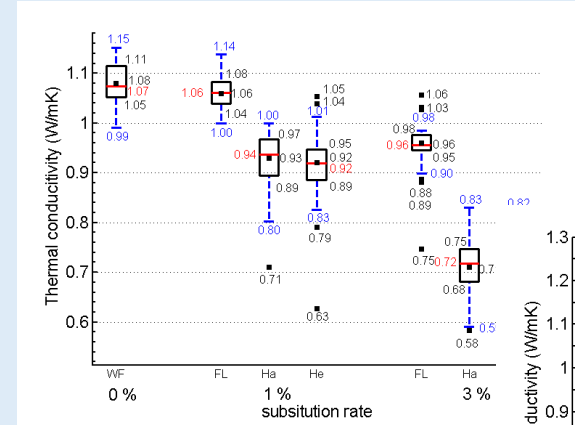
Experimental study

Specimen scale: Effect of plants add-ons



- ✓ Dry bulk density
- ✓ Thermal conductivity
- ✓ Specific heat capacity
- ✓ Water-vapor permeability, etc

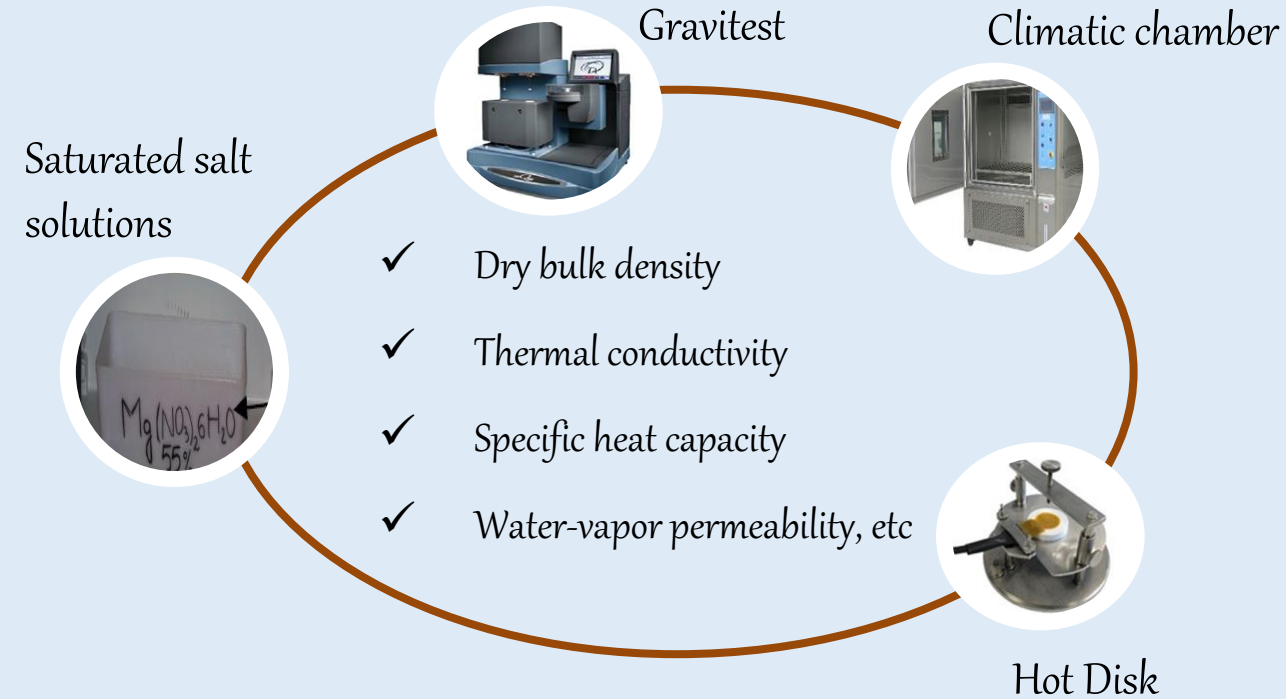
- Repeatability tests
- Reproducibility tests



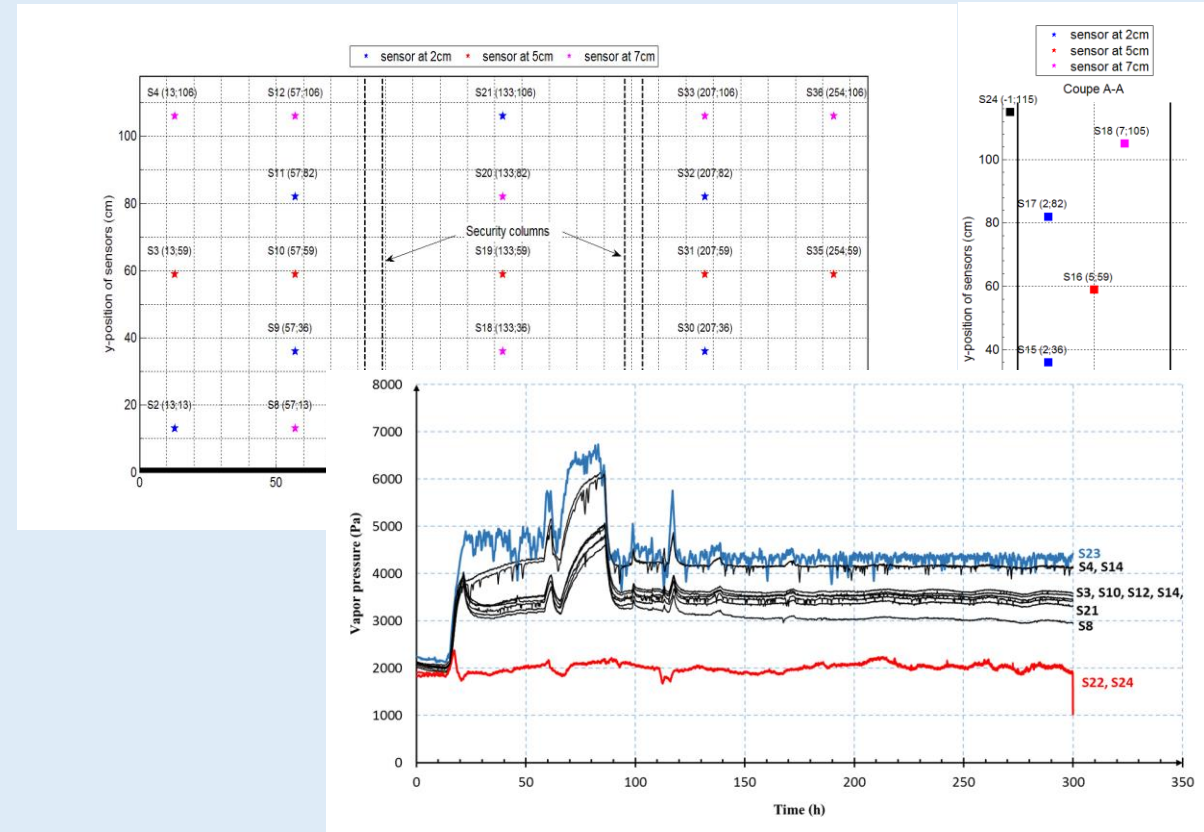
Experimental study

Specimen scale: Effect of plants add-ons

Wall scale



- Repeatability tests
- Reproducibility tests



- Variability of a cob wall response
- Spatial variability of cob material properties

Numerical simulations

Model validation: Wall scale

- Deterministic study:
 - ✓ Constant model inputs
- Probabilistic study:
 - ✓ Effect of random variables got from experimental distributions
 - ✓ Simulation of random fields of inputs in accordance to experimental variograms and inclusion into coupled hygrothermal model



Buiding scale

- Assessment energy consumption and identify the suitable approach for earthen buildings

