

**Transcend Project**  
**Project 3: "Wetting and drying cycles - Effect on transport"**

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**Objectives**

The objective is to analyse and understand the hysteretical behaviour of water vapour sorption isotherms and to predict these desorption-adsorption scanning isotherms. The second objective is to account for wetting and drying cycles in the description and prediction of moisture transport (and transport properties).

**Description of Work**

Sorption properties will be determined (on materials with Supplementary Cementitious Materials SCMs: fly ash, slag, etc.) and the results will be compared to data already available. Analysis of sorption curves will be carried out in particular with regard to pore structure characterization and compared with other methods of assessment. A model will be developed, on the basis of the porosity accessible to water and C-S-H amount and properties, to predict the sorption properties.

The effects of early-age drying on these data will be analysed by means of a macroscopic numerical hydration model coupled with moisture transport. In view of investigating new types of binders (e.g. with high volume of SCMs), the model will be adapted accordingly.

The hysteretical behaviour of water vapour sorption isotherms will be analysed. In particular the temperature effect will be regarded. The primary desorption-adsorption curves, as well as the desorption-adsorption scanning isotherms will be predicted by using e.g. *Mualem's* approaches.

Wetting and drying cycles will be taken into account in the description and the macroscopic modelling (prediction) of moisture transport. Simulated drying/wetting kinetics and moisture profiles will be compared to gamma-ray attenuation measurements. Likewise, their effects on transport properties will be quantified, in particular on liquid permeability and on apparent moisture diffusion coefficient. Results obtained by numerical inverse analysis and by experiments will be compared, and recommendations on the assessment of these properties will be provided.