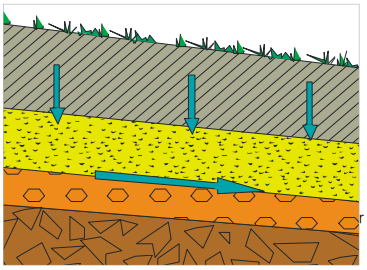
TECHNISCHE UNIVERSITÄT DRESDEN

Faculty of Environmental Sciences, Department of Hydro Sciences

PCSiWaPro® - Application
Water Balance of Landfills Covering Systems

Water balance in surface sealing systems

Surface sealing during construction



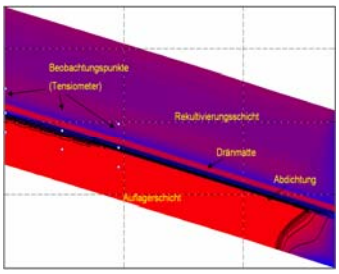
Recultivation layer and capillary barrier

Modeling of tilting channel

Application: - water balance modeling of capillary barriers in tilting channels
- proof of suitability of materials/ optimization

Objective: - optimization of experiments – reduction of intake steps
→ prognosis of maximum drainage capacity
- determination of hydraulic parameters of alternative building materials
- optimization of testing area and monitoring program

Tilting channel

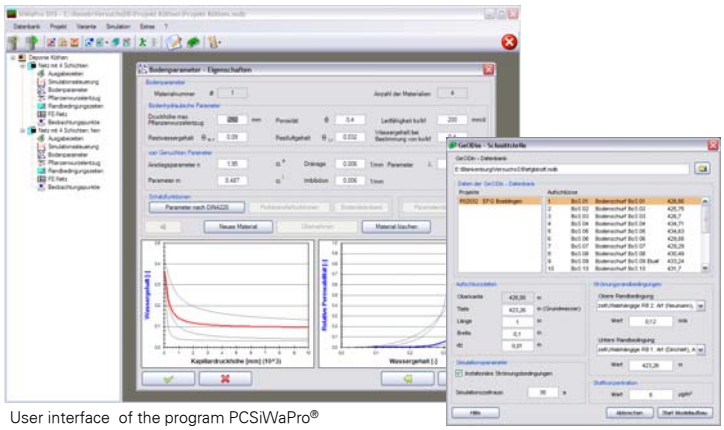


Graphic output of simulation

Modeling of surface sealing

Application: - water balance modeling of surface sealing of landfill
- simulation of water content in the sealing layer

Objective: - construction of a model for the water flux in the area of draining mats and sealing layer
- optimization of water balance, protection from drying up



User interface of the program PCSiWaPro®

Advantages of the simulation software PCSiWaPro®

- easy to handle Windows Software
- GUI that is adapted to several languages (German, English, Spanish, French, Polish, Japanese, Vietnamese, Arabic)
- easy presentation of the results due to several interfaces to graphical software
- flexible choice of boundary conditions
- consideration of atmospheric boundary conditions, root water uptake and soil evaporation
- interface for GeODin-databases
- consideration of hysteretic processes within the unsaturated zone
- implemented algorithm for parameter identification
- integrated weather generator for arbitrary time series in high resolution
- automatic discretization with finite element – mesh generator
- soil databases DIN 4022, DIN 4220, pedotransfer functions

Application for PCSiWaPro®

Application for

- risk assessment
- design of plants and experiments
- analysis of efficiency for facility optimization

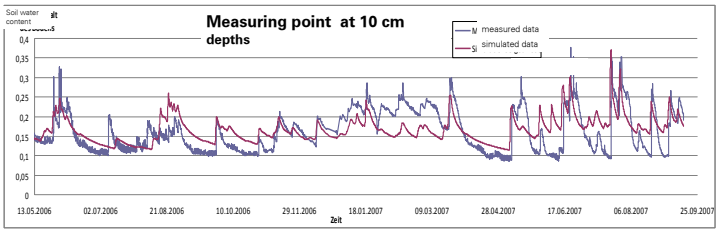
Areas of application

- remediation of contaminated sites and landfills(seepage flow prediction)
- sealing of landfills/capillary barriers/ recultivation layers
- mining
- agriculture
- dam seepage flow

Water balance modeling of recultivation layer

Application: - transient water balance modeling

Objective: - calibration of PCSiWaPro® with the measured data from 16 month of test field monitoring
- parameter identification of recultivation layer
→ checking of subsidence formation and compaction
- statements of general validity
→ optimization of water balance layers



Comparison of measured values and simulated values

Problem of water balance values

The estimation of solute influx requires knowledge of input values for the soil water balance. These are linked closely to the atmospheric conditions of a site (which is characterized by slope, exposition, vegetation) by the water balance equation. In practice average values are often used for the water balance values due to lack of detailed information.

This can lead to considerable miscalculations!

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Funded by Bundesministerium für Bildung und Forschung