

Water and heat balance in urban soils around underground electricity cables

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Abstract:

Along underground electricity cable lines a tremendous amount of lost heat is emitted, which must be transferred to the soil. Otherwise, cables can overheat and burn which results in electrical shortcuts and problems with the security of energy supplies. It is of interest, how fast and to which extent the soil around the cable dries, as this results in a decreasing heat conductivity.

For great temperature gradients, water vapour transport is a relevant process transporting both water and energy. This leads to a drying in the vicinity of the cable. To study the processes, we measured the thermal and hydraulic characteristics of soils around underground cables. With a numerical model we simulated the water and energy transport. Additionally, two field sites were instrumented to measure directly the balance terms of energy and water cycles. Therefore, we can validate the model and derive strategies for managing the energy transport in under-ground cables.

Keywords: underground cables, heat transport, water vapour transport, security of energy supplies

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