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Titel
Advances in modelling hydrological dynamics in drained and cultivated peatlands

Abstract
Process-modelling of hydrological dynamics in drained and cultivated fen soil profiles is essential for a precise calculation of greenhouse gas emissions. Until now, several estimation procedures exist, basically depending on site-specific conditions like land-use, vegetation, water table and fen soil type. To some extent these approaches are vulnerable to under- and overestimation of local greenhouse gas emissions by neglecting heterogeneous properties along fen soil profiles potentially differing from horizon to horizon. Hydrological modelling of water dynamics in fen soils characterised by progressed moorsh-forming process is restricted due to a lack of valid parameters describing available water retention functions. In the present study, a general applicable parameter set to solve the van Genuchten-Mualem water retention equation for fen soil horizons formed by drainage and cultivation has been developed based on a comprehensive dataset consisting of 520 horizontal data from fen soil profiles sampled at altogether 15 peatland areas in Germany. Different categorizations of the data were proofed to account for various states of peat decomposition and to reduce the range of measured volumetric soil water contents at specific pressure heads. Finally, bulk density was used as a cluster variable to consider the intensity of moorsh-forming process within every horizon category. Subsequent parameter estimation was conducted by the RETC programme and validation of the estimated parameters was realized for in total four monitoring plots varying in land-use type, climate and fen soil profile, by modelling water dynamics using HYDRUS-1d.