Fine-scale dynamic modelling of water table depths (WTD) in Danish peatlands

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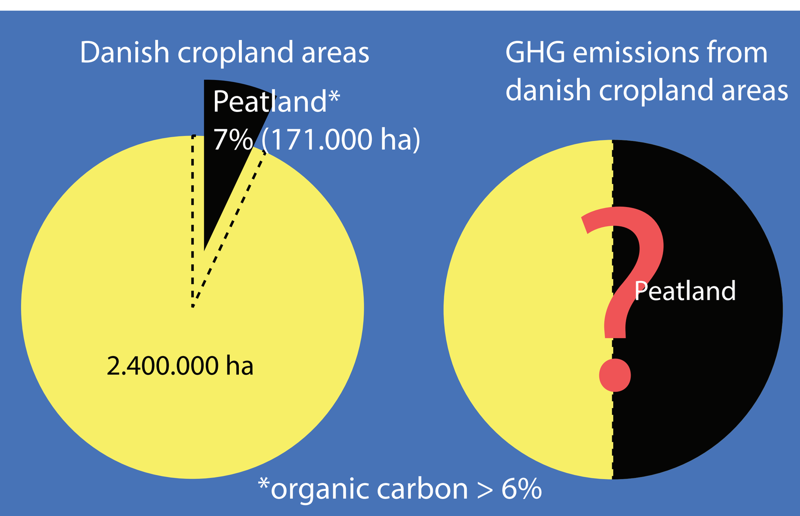
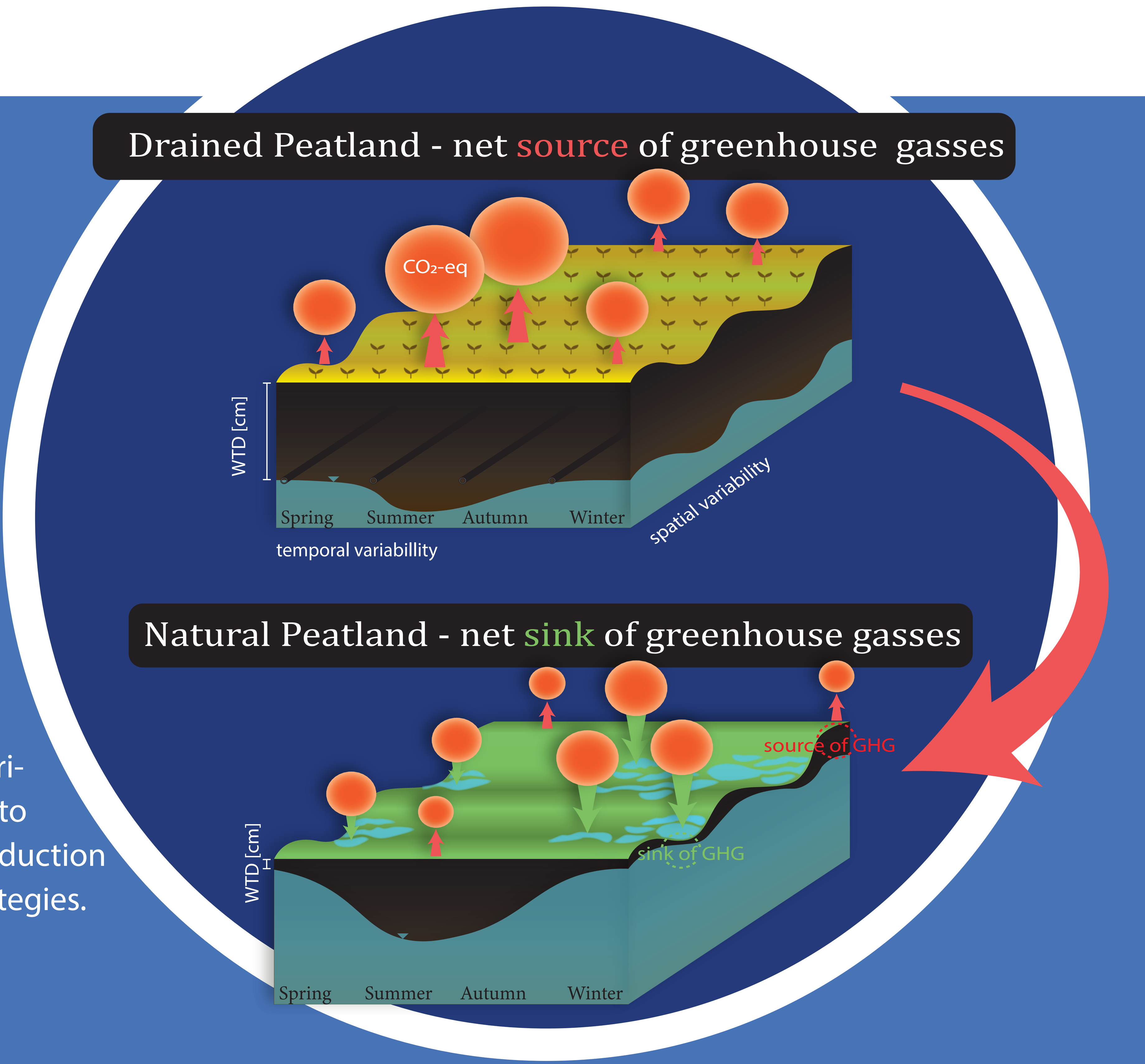
1. Introduction

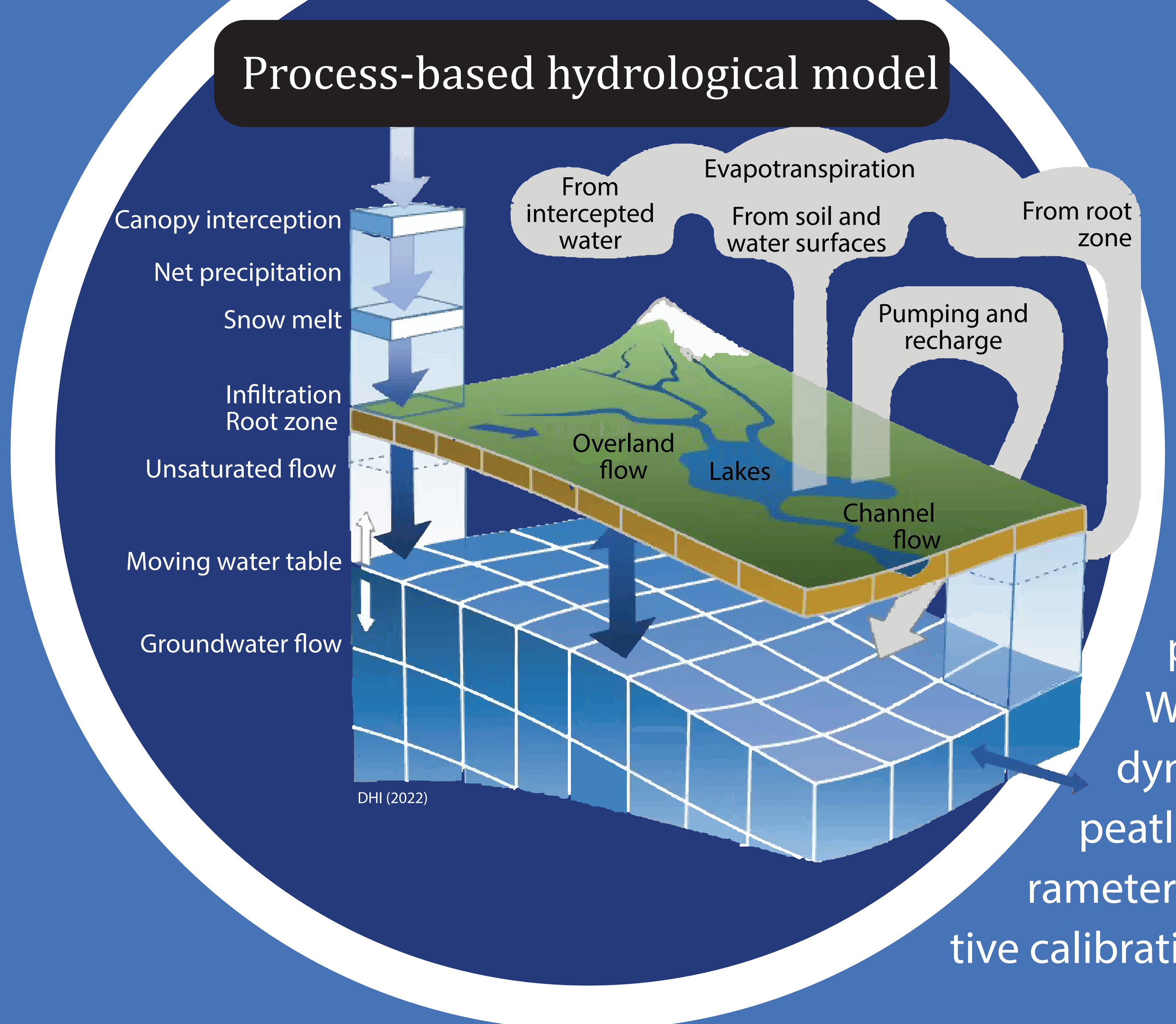
Re-wetting of drained peatland is considered an effective measure for reduction of agricultural greenhouse gas (GHG) emissions, due to the well-established relationship between water table depth (WTD) and GHG emissions. Returning peatlands to their natural hydrological state has become central in environmental policies.



2. Objective

Prevailing WTD-dependent GHG upscaling methods for peatlands are based on long-term average WTD estimates. There is limited understanding of the impact of WTD variability, extremes and how those effect rewetting strategies. We aim to increase the knowledge on peatland WTD variability in space and time in high resolution to enable better estimation of the emission reduction potential and to support the rewetting strategies.

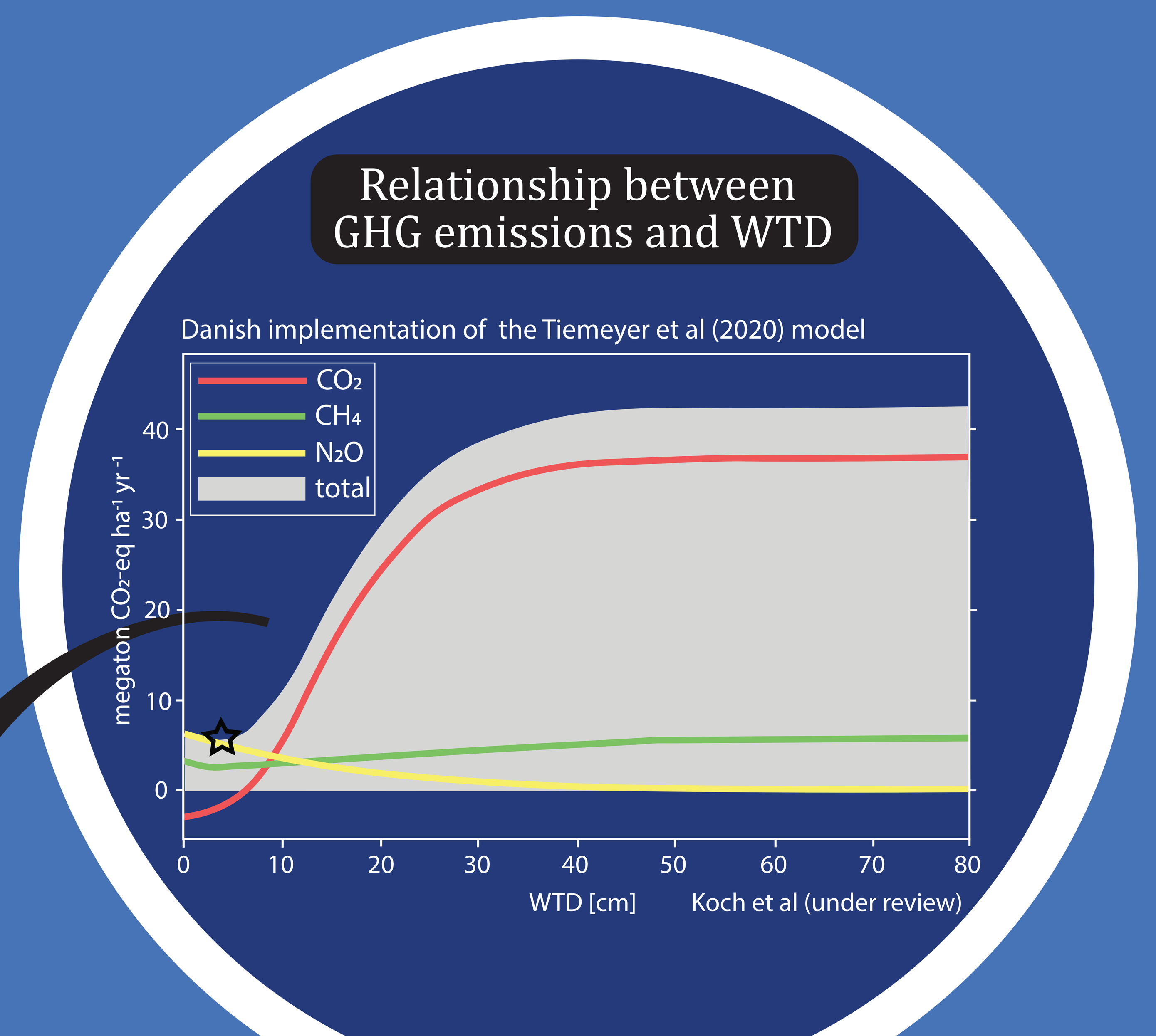




Understanding the spatio-temporal hydrological patterns in peatlands contribute to climate change mitigation by prioritizing rewetting of peatland areas with the largest greenhouse gas reduction potential.

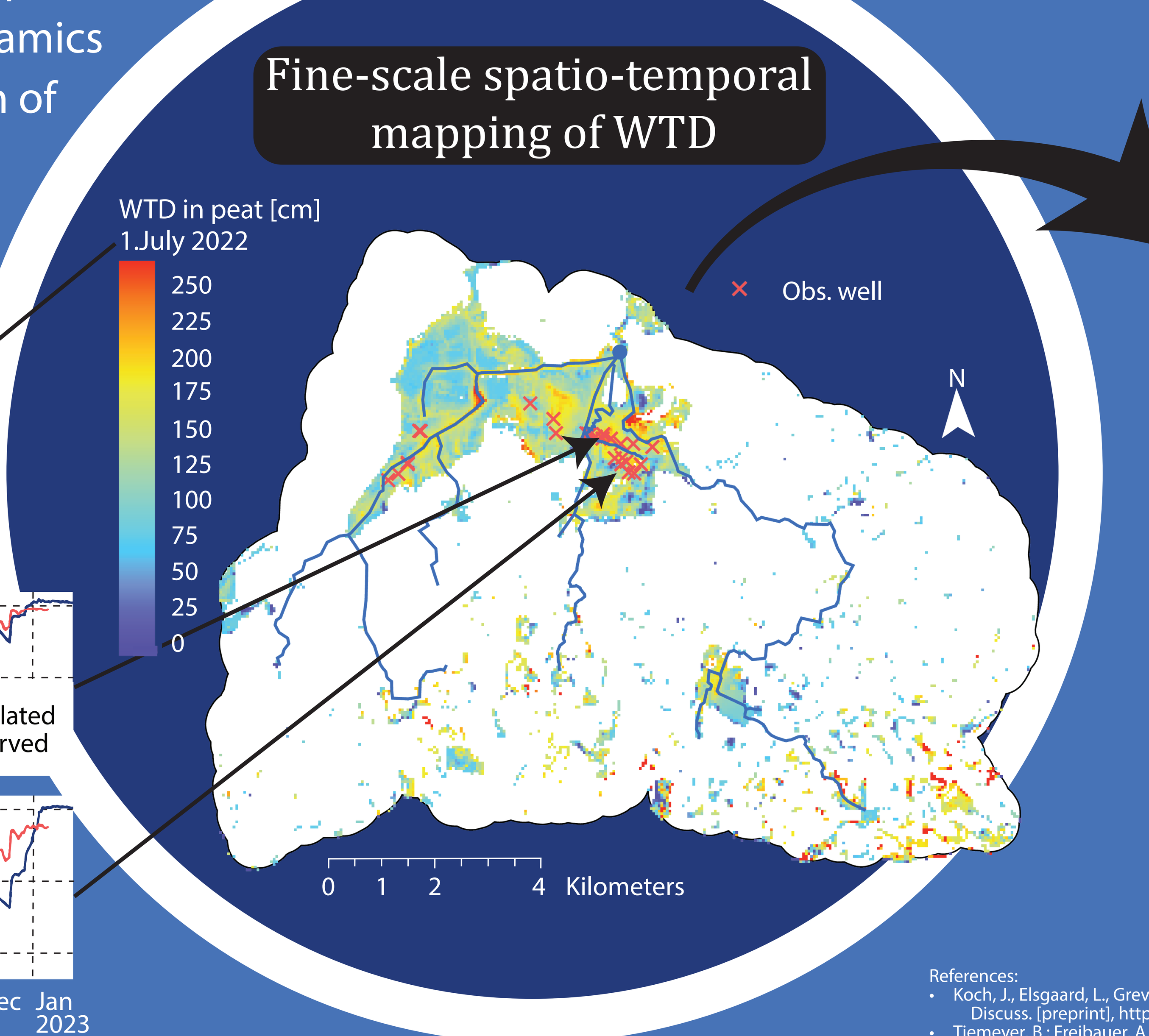
3. Method

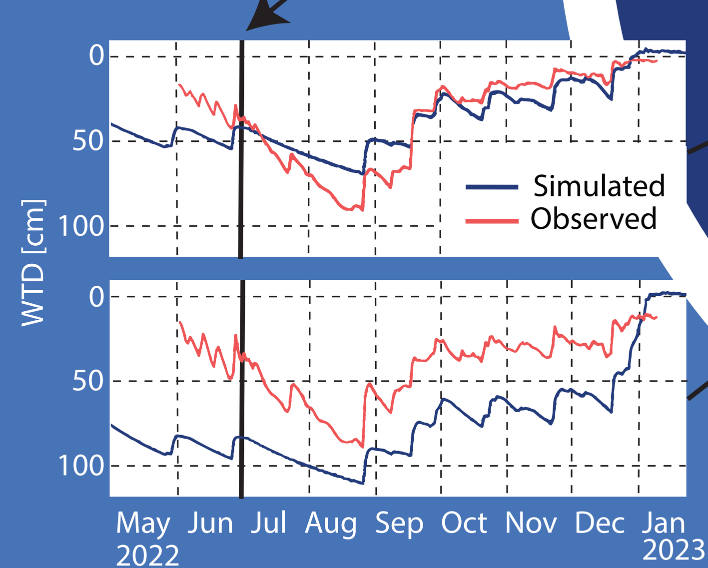
We do detailed estimation of WTD by use of a fine-scale distributed process-based hydrological model. We get local-scale insights on WTD dynamics from a highly instrumented peatland, and optmize the model parameters in a spatial oriented multi-objective calibration approach.



4. Results

We are going to identify the processes that govern water table dynamics in peat, including estimation of model parameters corresponding to those processes. Thereby we get a better understanding of the drivers of the hydrological dynamics in peat in both space and time.





5. Perspectives

Through scenario simulations we are going to analyze the effects of climate variability and change, and especially how extreme events (e.g. droughts) impact GHG emissions controlled by WTD.

Those achievements enhance simulation of peatland processes, and the understanding of the climate response to the changes in WTD. This research will thereby support the Danish rewetting strategies and enables better upscaling of GHG emissions for national inventories.

References:

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