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Monitoring of water table dynamics in peatlands with OPTRAM: Towards globally applicable algorithms in Google Earth Engine using Landsat and Sentinel-2

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Fluctuations of water table depth (WTD) affect many processes in peatlands, such as vegetation development and emissions of greenhouse gases. Here, we present the OPTical TRapezoid Model (OPTRAM) as a new method for satellite-based monitoring of the temporal variation of WTD in peatlands. OPTRAM is based on the response of short-wave infrared reflectance to the vegetation water status. For five northern peatlands with long-term in-situ WTD records, and with diverse vegetation cover and hydrological regimes, we generate a suite of OPTRAM index time series using (a) different procedures to parametrise OPTRAM (peatland-specific manual vs. globally applicable automatic parametrisation in Google Earth Engine), and (b) different satellite input data (Landsat vs. Sentinel-2). The results based on the manual parametrisation of OPTRAM indicate a high correlation with in-situ WTD time-series for pixels with most suitable vegetation for OPTRAM application (mean Pearson correlation of 0.7 across sites), and we will present the performance differences when moving from a manual to an automatic procedure. Furthermore, for the overlap period of Landsat and Sentinel-2, which have different ranges and widths of short-wave infrared bands used for OPTRAM calculation, the impact of the satellite input data to OPTRAM will be analysed. Eventually, the challenge of merging different satellite missions in the derivation of OPTRAM time series will be explored as an important step towards a global application of OPTRAM for the monitoring of WTD dynamics in northern peatlands.