

Supplementary file S1

Supplementary material for the following publications:

- **Niemi et al. (2026):** *Enhanced multi-objective decision support in peatland forestry using Peatland simulator SUSI*. *Silva Fennica* 60(2), article id 25025.
- **Saari et al. (2025):** *Impacts of reduced ditch network maintenance and ditch shallowing on ecosystem services of peatland forests in Finland*. *Silva Fennica* 59(3), article id 25032.

Weather data processing

The weather data of these studies were aggregated from the Finnish Meteorological Institute (FMI) open database (<https://en.ilmatieteenlaitos.fi/open-data>) to obtain daily minimum, average and maximum temperature (°C), precipitation (mm), solar radiation (kJ/m²), and water vapor pressure (kPa). The data were acquired from four weather observation stations representing different study areas (Table 1). Access to the FMI Python library by following command: `from fmiopendata.wfs import download_stored_query`. The processed weather data are available in Zenodo repository: <https://doi.org/10.5281/zenodo.17130513>

Table 1. Locations and coordinates of the weather observation stations representing different study regions, and mean annual temperature sum and precipitation between 2004–2023.

Region	Weather data location	Longitude	Latitude	Mean annual temperature sum (dd)	Mean annual precipitation (mm)
Southern Finland	Hämeenlinna	25.04°E	61.05°N	1412	635
Central Finland	Alajärvi	24.26°E	63.09°N	1214	640
North Ostrobothnia and Kainuu	Vaala	26.47°E	64.49°N	1156	649
Lapland	Rovaniemi	26.01°E	66.58°N	1035	552

Temperature and precipitation

Daily minimum, average and maximum temperature (°C) and precipitation (mm) are available at daily time steps for all operating FMI weather observation stations.

Water vapor pressure

Water vapor pressure (P, kPa) was calculated from mean temperature (T) and relative humidity (RH, %), which is available at daily time steps for all FMI weather stations presented in Table 1. Water vapor pressure was calculated using the following equations of Buck (1981):

$$P = RH * 6.1121 * e^{\left(18.678 - \frac{T}{234.5}\right)\left(\frac{T}{257.14 + T}\right)}, \text{ if } T \geq 0 \text{ } ^\circ\text{C}$$

$$P = RH * 6.1115 * e^{\left(23.036 - \frac{T}{333.7}\right)\left(\frac{T}{279.82 + T}\right)}, \text{ if } T < 0 \text{ } ^\circ\text{C}$$

Solar radiation

Time series of daily solar radiation observations are available for seven FMI weather stations in mainland Finland: Helsinki Kumpula, Helsinki-Vantaa airport, Jokioinen Ilmala, Jyväskylä airport, Sotkamo Kuolaniemi, Sodankylä Tähtelä, and Utsjoki Kevo. Solar irradiance (W/m^2) was obtained from all those stations at 10-minute intervals, and the average hourly irradiance (W/m^2) was calculated from these observations. Then, we integrated the irradiance over time from hourly radiations (Wh/m^2) to the daily total solar energy (kJ/m^2). (1 Wh = 3600 J)

We interpolated the station-specific solar energy to our study regions using latitude information and inverse distance weighting. For example, the daily solar energy for the North Ostrobothnia–Kainuu region was calculated as a weighted average of the observations from Sotkamo Kuolaniemi station (weight 81%) and Sodankylä Tähtelä station (weight 19%).

References:

Buck AL (1981) New equations for computing vapor pressure and enhancement factor. *J Appl Meteorol* (1962-1982) 20(12): 1527–1532. <https://www.jstor.org/stable/26180379>