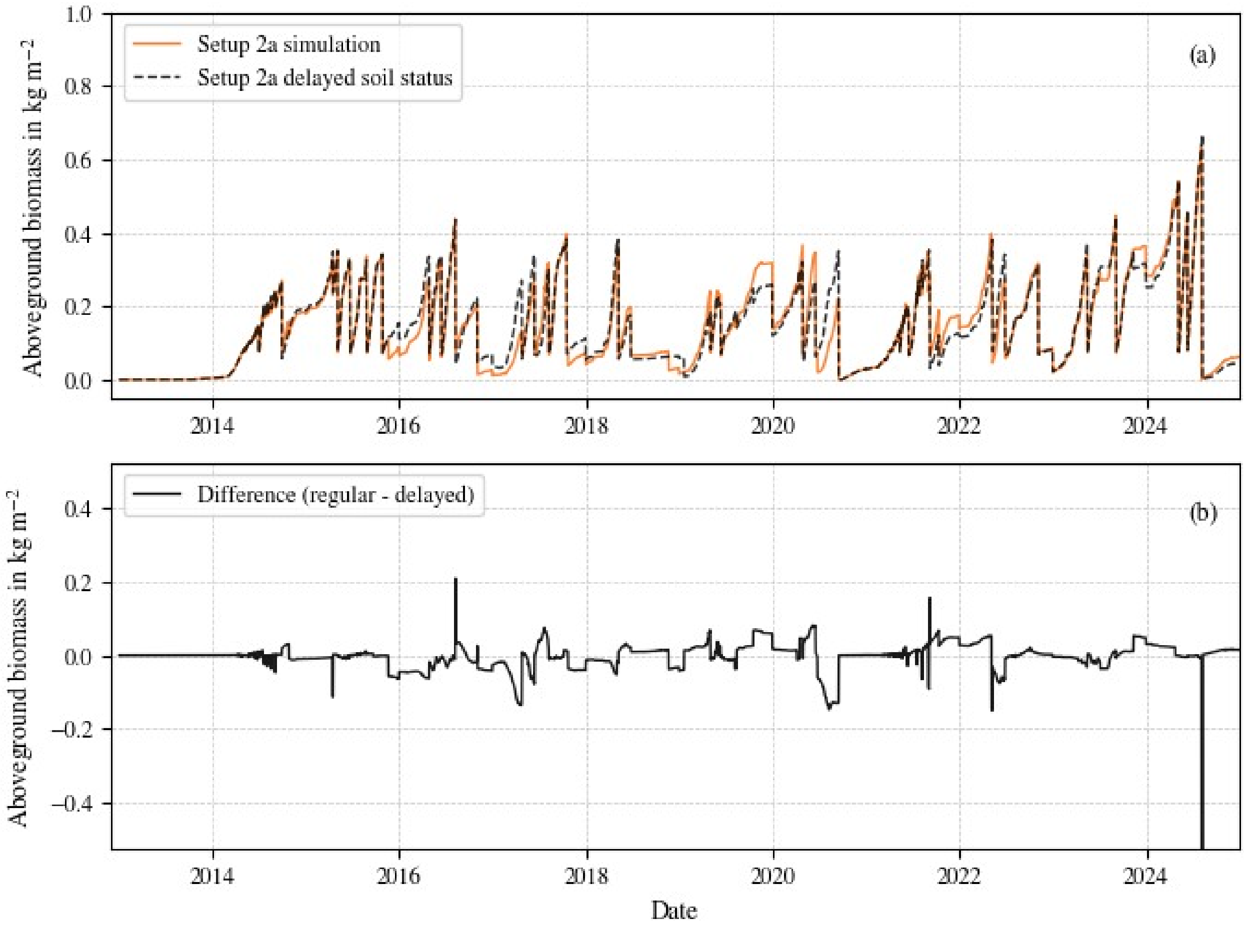

Figure 1: Comparison of single simulation (fixed stochastic seed) between standard setup and setup with delayed soil status (GRASSMIND receives the state of soil water and nitrogen from BODIUM at the end of two days ago instead of the end of the last timestep/day). Panel a) shows simulation results on aboveground biomass and panel b) visualizes the differences between both setups (result of standard run minus result of run with delayed soil status).

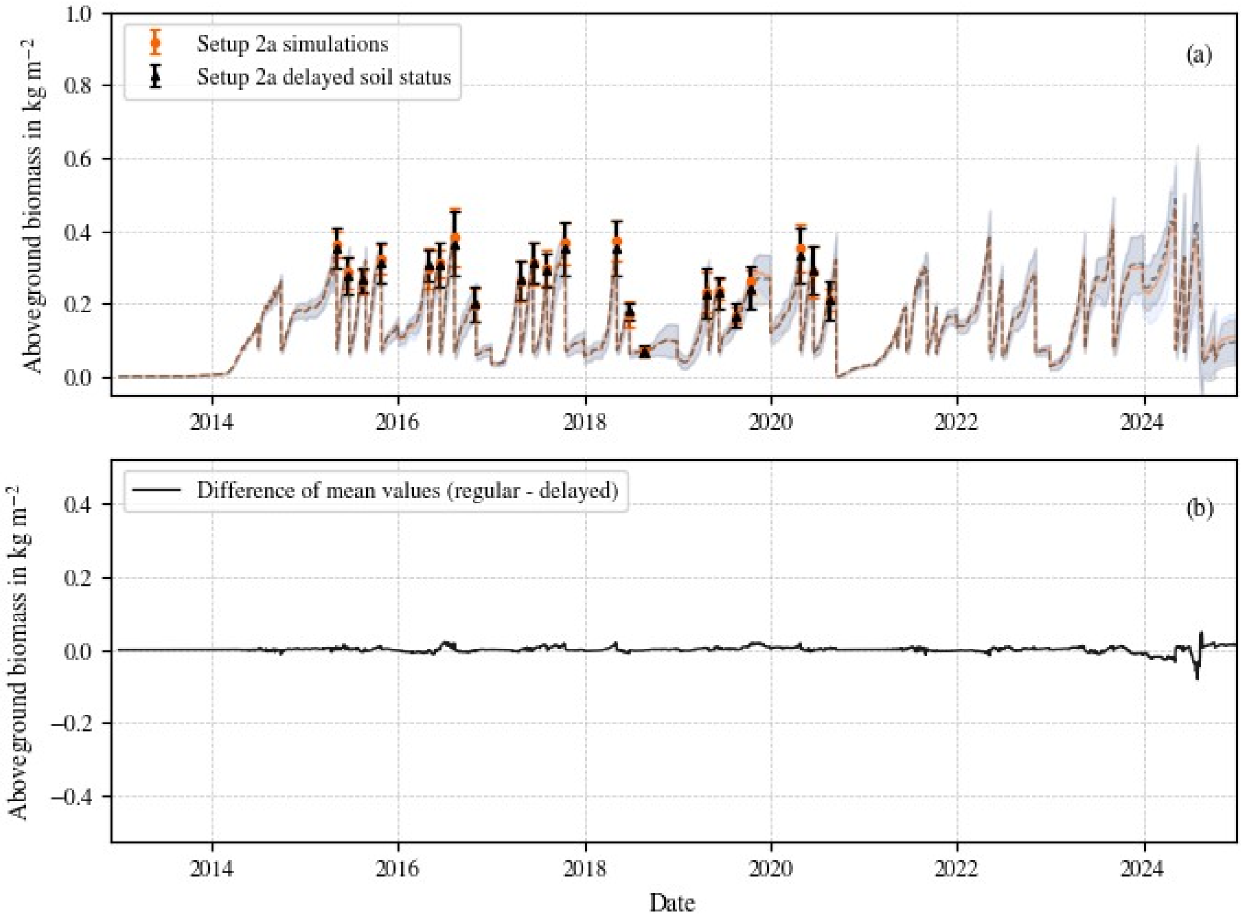

Figure 2: Comparison of mean results from 100 simulation runs between standard setup and setup with delayed soil status (GRASSMIND receives the state of soil water and nitrogen from BODIUM at the end of two days ago instead of the last timestep/day). Panel a) shows the mean simulation results on aboveground biomass and panel b) indicates differences (mean result of standard run minus mean result of run with delayed soil status).

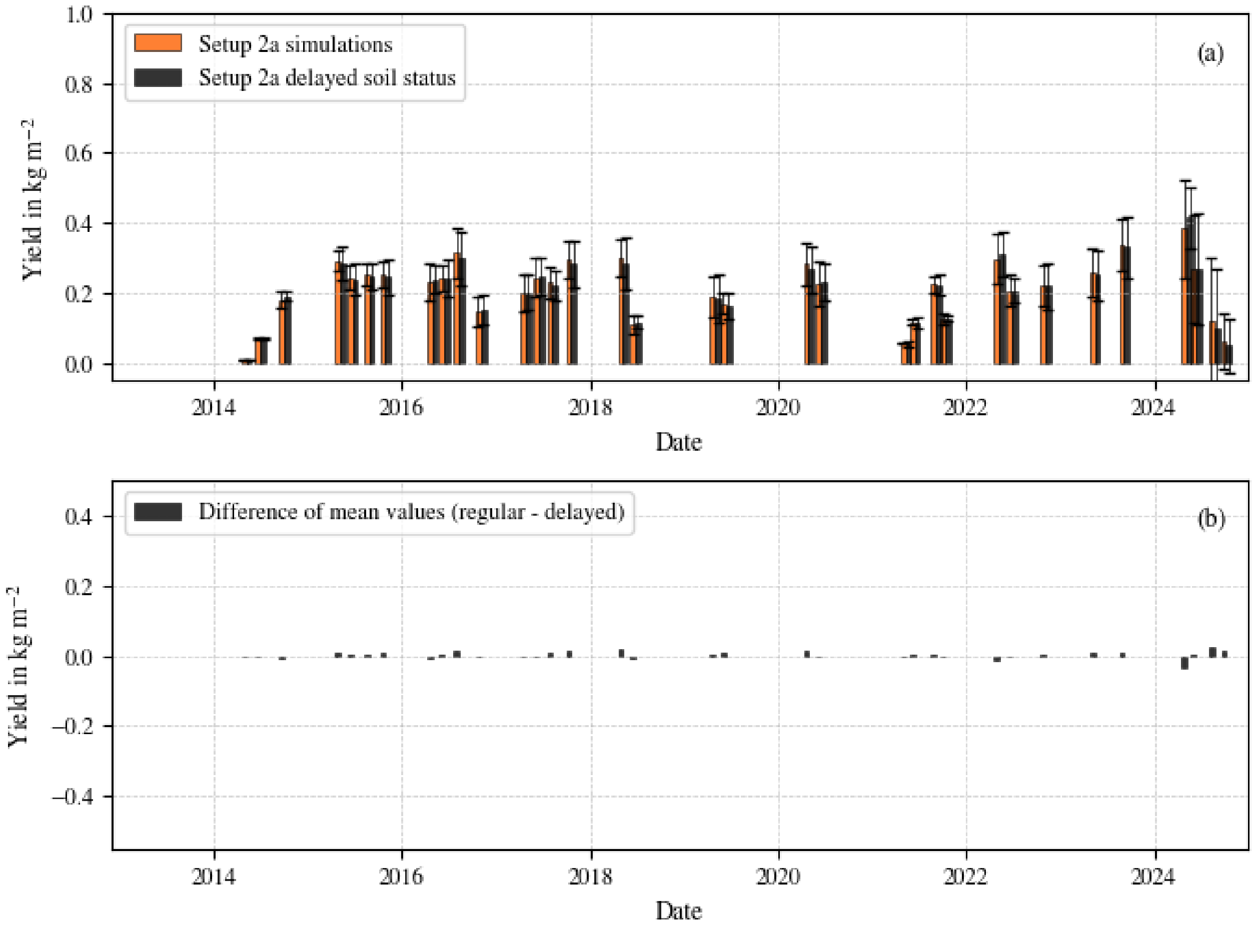

Figure 3: Comparison of mean results from 100 simulation runs between standard setup and setup with delayed soil status (GRASSMIND receives the state of soil water and nitrogen from BODIUM at the end of two days ago instead of the last timestep/day). Panel a) shows the mean simulation results on yield and panel b) indicates differences (mean result of standard run minus mean result of run with delayed soil status).

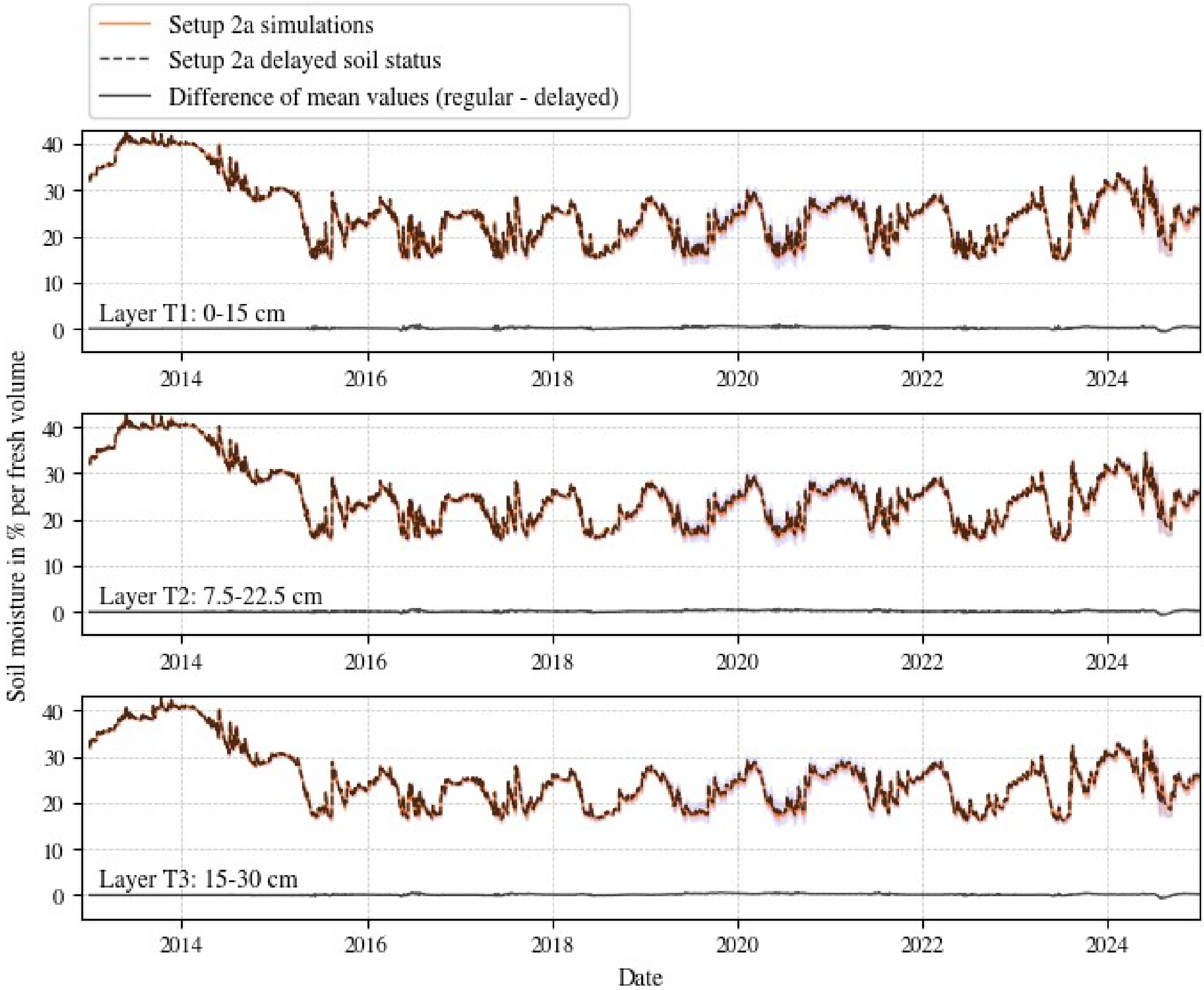

Figure 4: Comparison of mean results from 100 simulation runs between standard setup and setup with delayed soil status (GRASSMIND receives the state of soil water and nitrogen from BODIUM at the end of two days ago instead of the last timestep/day). Shown are the mean simulation results on soil moisture and their differences (mean result of standard run minus mean result of run with delayed soil status).

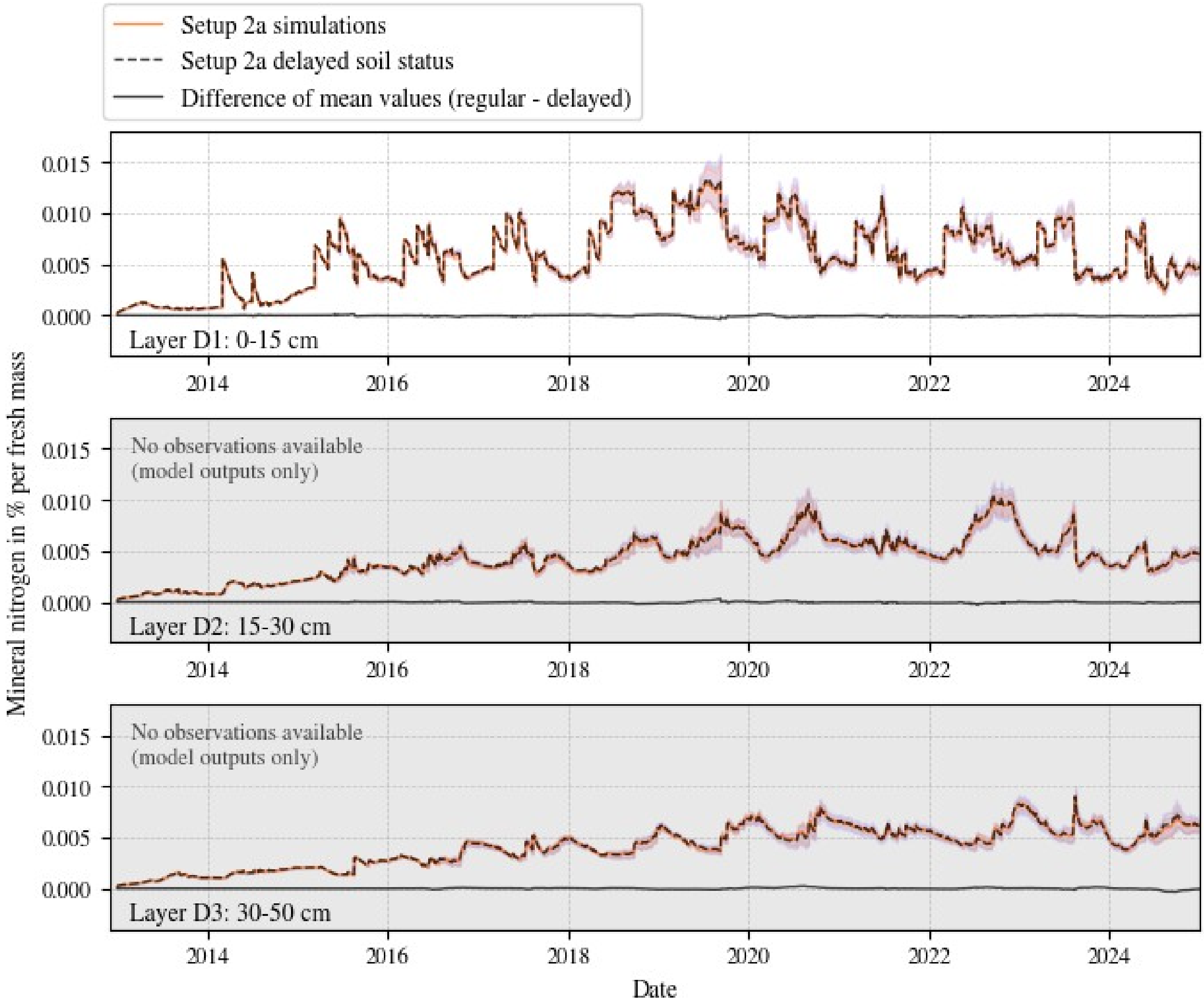

Figure 5: Comparison of mean results from 100 simulation runs between standard setup and setup with delayed soil status (GRASSMIND receives the state of soil water and nitrogen from BODIUM at the end of two days ago instead of the last timestep/day). Shown are the mean simulation results on mineral soil nitrogen and their differences (mean result of standard run minus mean result of run with delayed soil status).

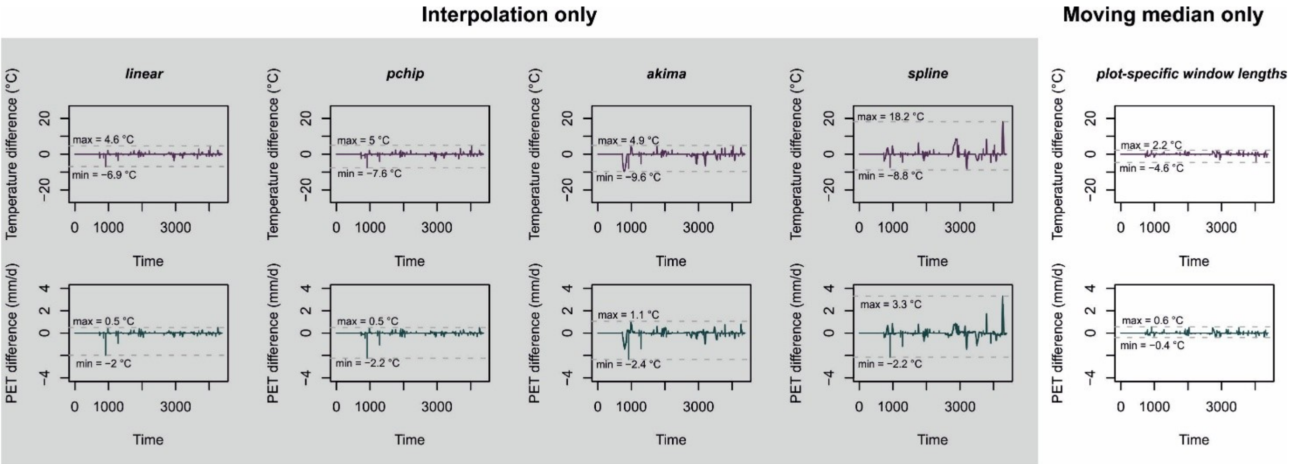

Figure 6: Testing modifications of our gap-filling approach. Deviations to the weather data of the current gap-filling approach.

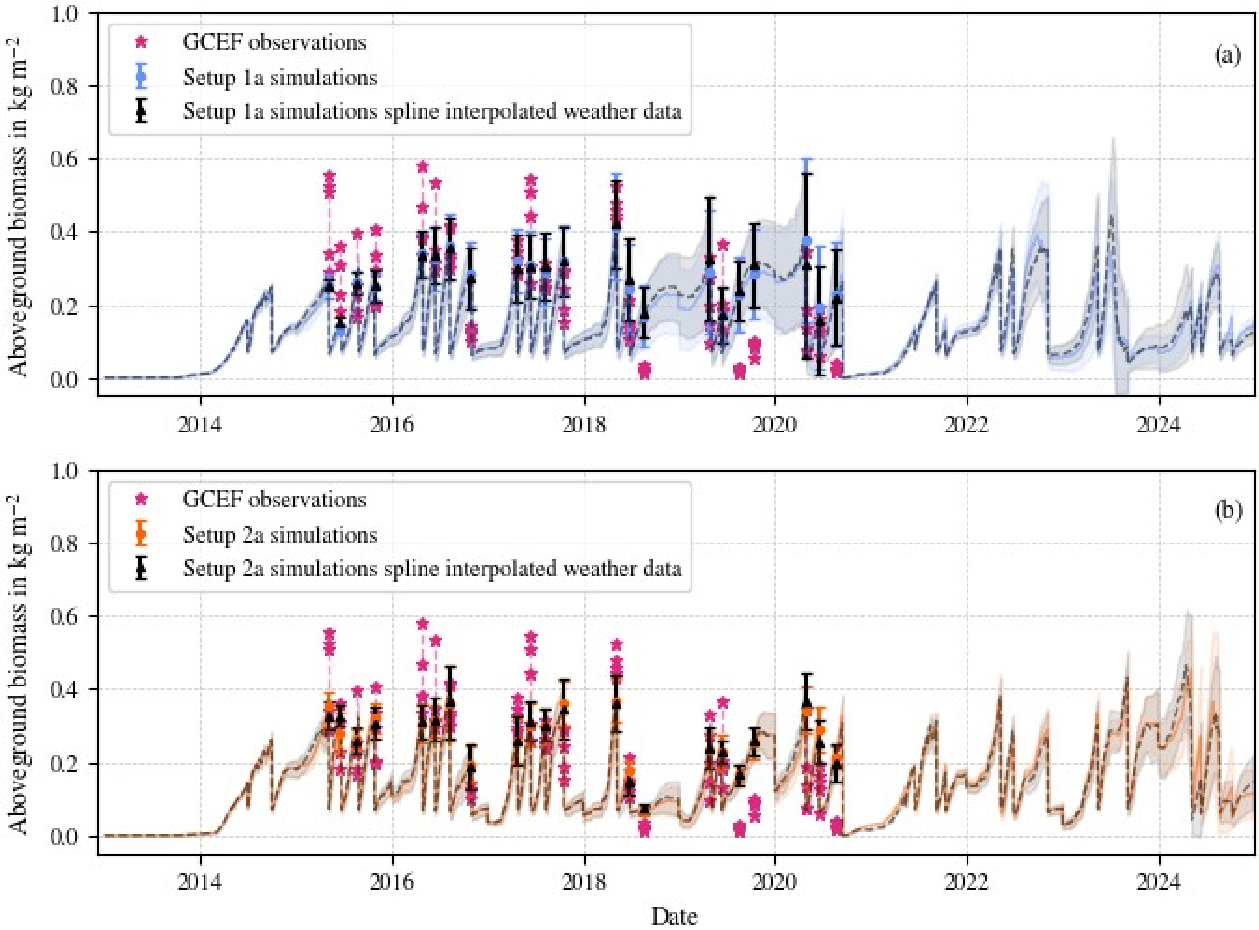

Figure 7: Comparison of mean results from 100 simulation runs between standard setup and setup with modified gap-filling approach for weather data (using spline interpolation). Shown are the mean simulation results on aboveground biomass together with the GCEF observations. Panel a) shows simulation results of GRASSMIND (standalone) and panel b) simulation results of GRASSMIND-BODIUM.

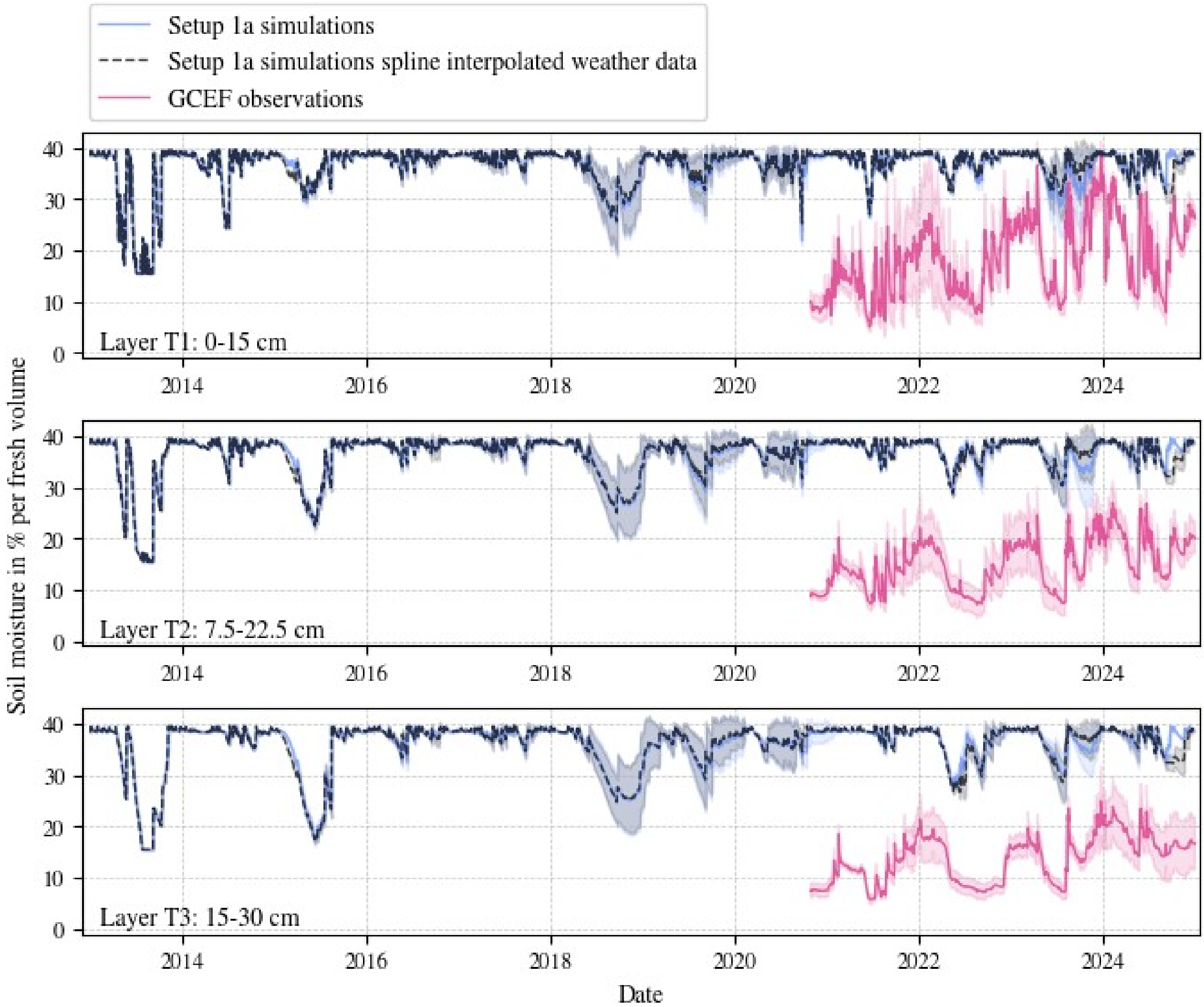

Figure 8: Comparison of mean results from 100 simulation runs between standard setup and setup with modified gap-filling approach for weather data (using spline interpolation). Shown are the mean simulation results of GRASSMIND (standalone) on soil moisture together with the sensor data from GCEF.

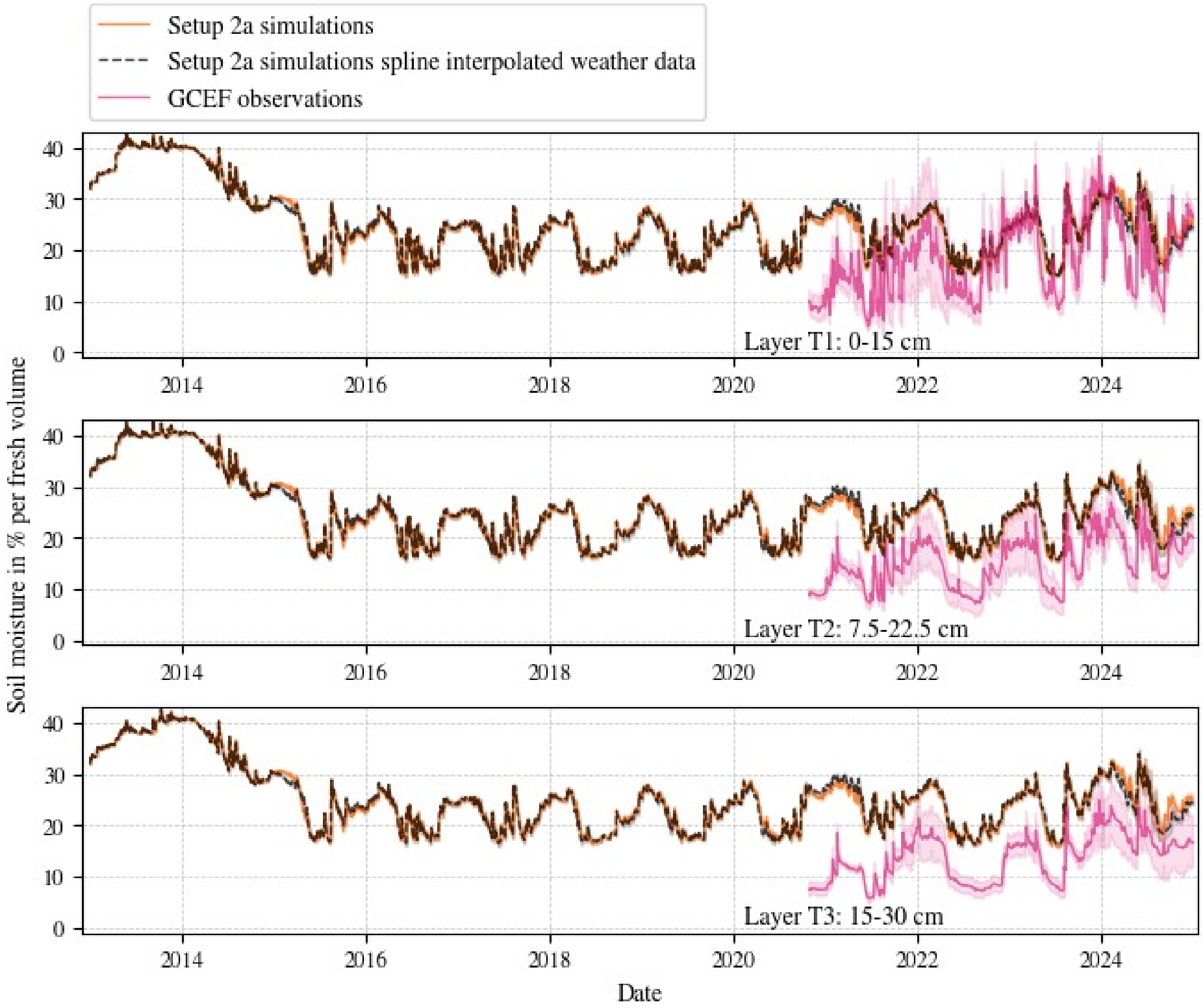

Figure 9: Comparison of mean results from 100 simulation runs between standard setup and setup with modified gap-filling approach for weather data (using spline interpolation). Shown are the mean simulation results of GRASSMIND-BODIUM on soil moisture together with the sensor data from GCEF.

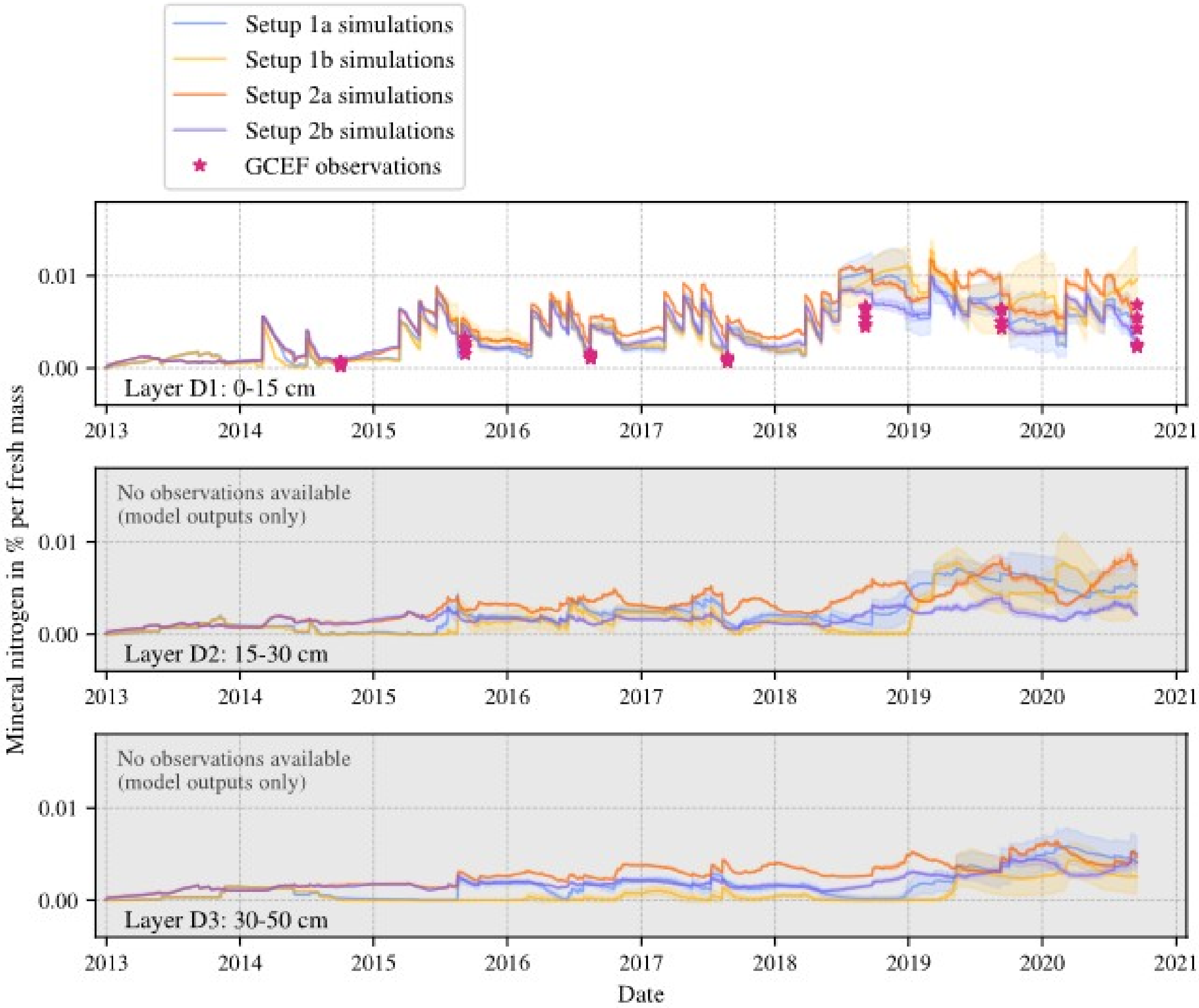

Figure 10: Updated Figure 6 of the manuscript with better indication of model output only results.

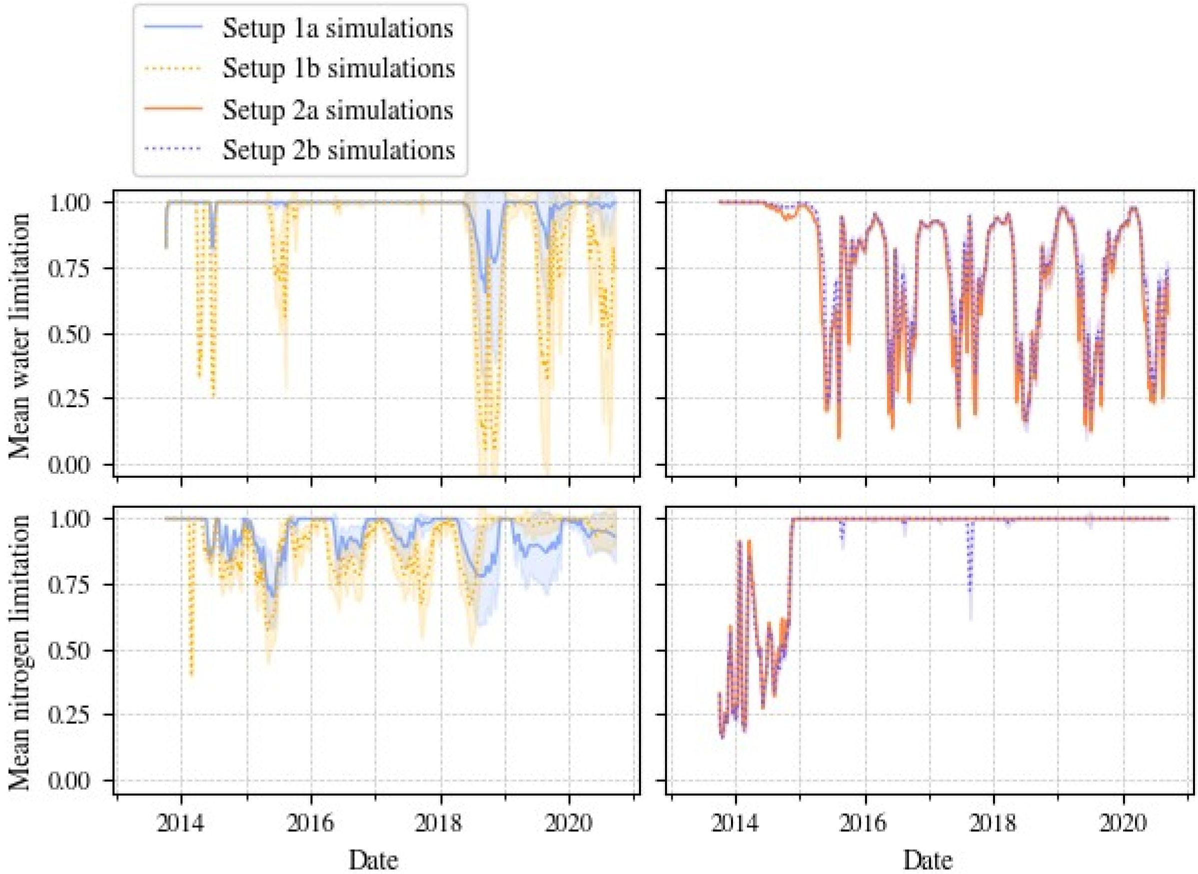

Figure 11: Updated Figure 7 of the manuscript with better readability.