Supplementary figure captions:

Figure S1. Comparison between tower and simulated GPP (gC m-2 d-1) 1) including soil moisture stress (with SMs) and 2) excluding soil moisture stress (without SMs). The experiment is performed during dry period of August (Agu) and September (Sep) months of the year 2018.

Figure S2. Comparison between tower and simulated GPP (gC m-2 d-1) using different alternative approaches (i.e., Liebig law approach (Li) and Multiplicative approach (mul)) when estimating overall stress term (Epsilon). The experiment is performed during dry period of August (Agu) and September (Sep) months of the year 2018.

FigureS3. Distribution of total-order Sobol' indices for GPP (a) and LAI (b) outputs at DE-HoH where soil moisture information was used in GPP-LAI simulations. Note that the PWP and betta parameters (parameters related to soil moisture stress) have been identified as informative parameters. The vertical dotted red line corresponds to the threshold of 1%.

Figure S4. Time series of tower derived - simulated GPP (a) and simulated LAI (b) at different investigated sites during the entire study periods. The vertical dash line marked the calibration – verification periods. The black dots indicate the tower derived GPP. The light grey shed corresponds to the ensemble sets of simulated GPP and LAI outputs at each time step corresponding to DK-Sor, CA-Oas, and DE-Hai. The dark grey line refers to the median of model ensembles.

Figure S5 **(continued).** Caption shown on Figure S4. Simulations are corresponding to FR-Fon, US-Ha1, and IT-Ro1.

Figure S6 **(continued).** Caption shown on Figure S4. Simulations are corresponding to US-Oho and US-MMS.