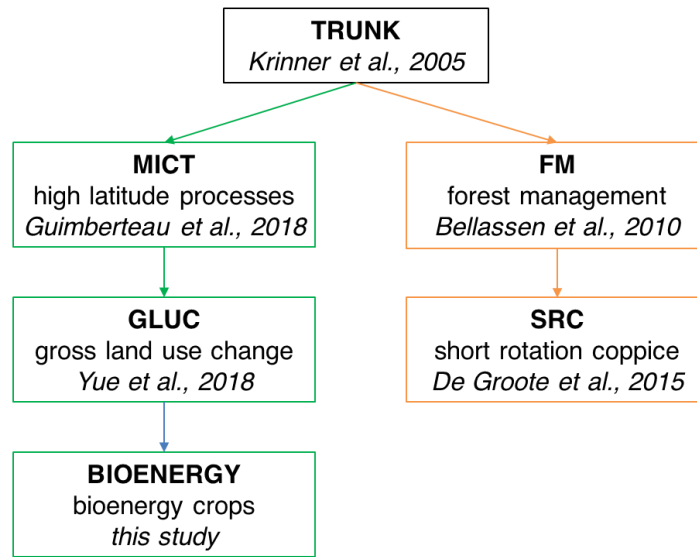


*Supplement of*

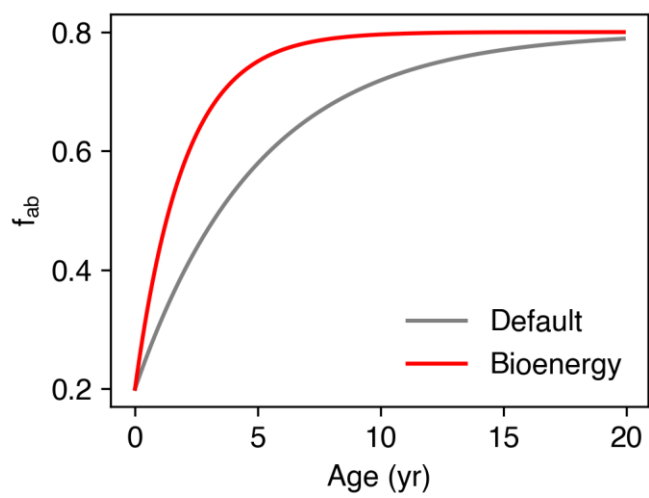
**ORCHIDEE-MICT-BIOENERGY: an attempt to  
represent the production of lignocellulosic crops for  
5 bioenergy in a global vegetation model**

**Wei Li et al.**

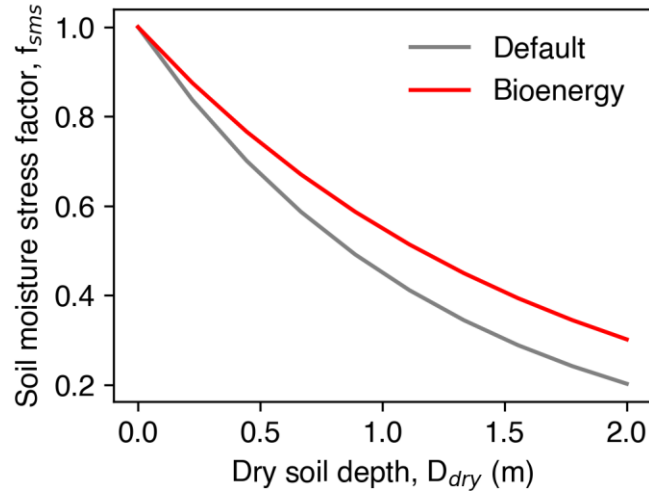
*Correspondence to:* Wei Li (wei.li@lsce.ipsl.fr)



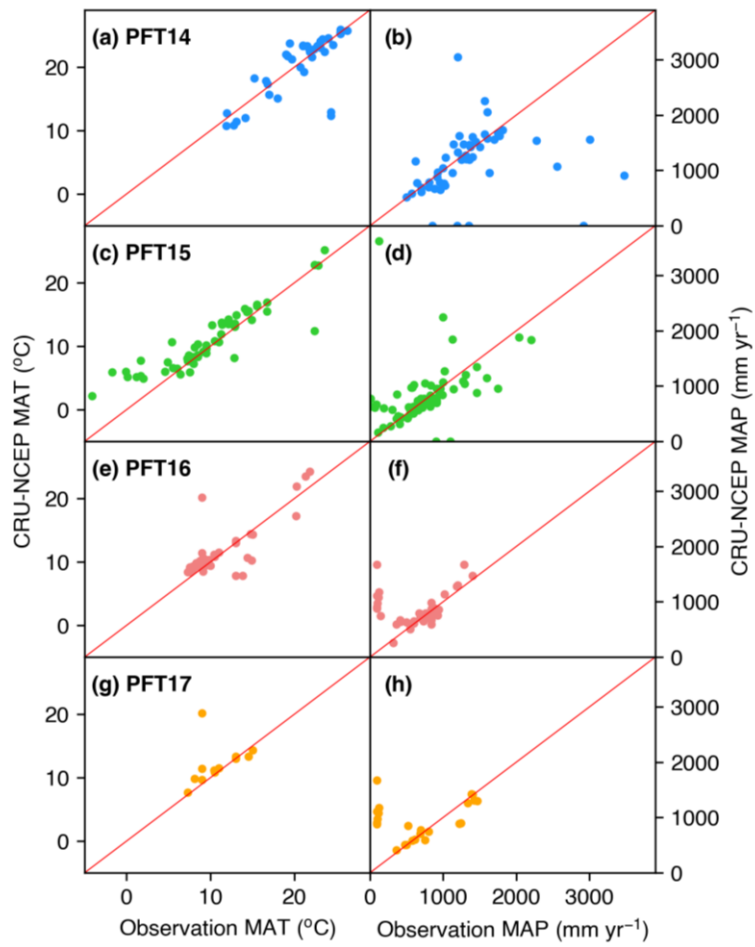
**Fig. S1** The origin of ORCHIDEE-BIOENERGY version and ORCHIDEE-SRC version.



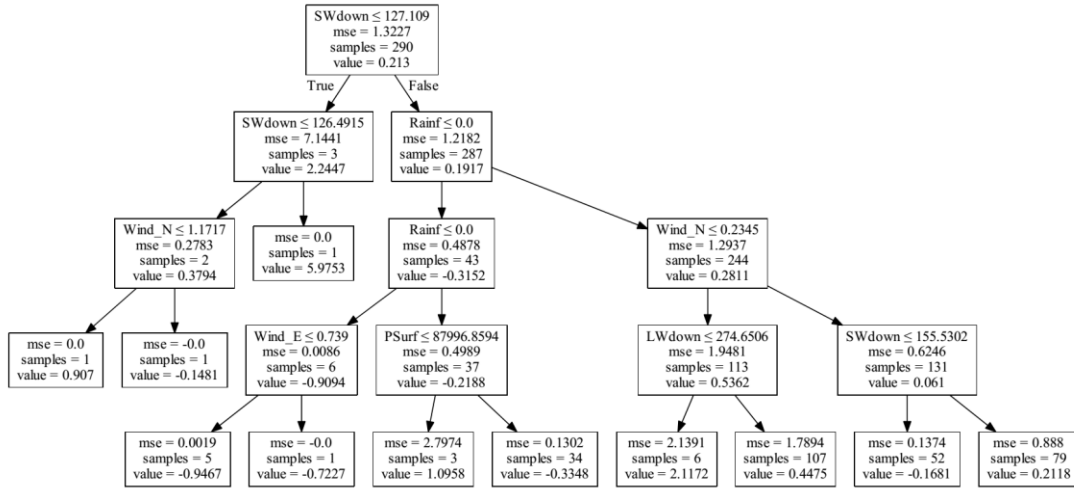
**Fig. S2 Fraction of sapwood biomass allocated to aboveground ( $f_{ab}$ ) as a function of forest age.**



**Fig. S3** Soil moisture stress factor ( $f_{sms}$ ) as an exponential function of dry soil depth ( $D_{dry}$ ):  $f_{sms} = e^{\beta D_{dry}}$ . A higher value of  $f_{sms}$  indicates a lower soil moisture stress. We changed  $\beta$  from the default value of 0.8 to 0.6 for bioenergy trees (Table 2), and thus an increase in  $f_{sms}$  at the same  $D_{dry}$ .



**Fig. S4 Mean annual temperature (MAT) and mean annual precipitation (MAP) during 1990-2000 from CRU-NCEP used for the simulations in comparison with those reported in our collected dataset. Note that only a few studies reported MAT and MAP. PFT 14 is tropical bioenergy tree, eucalypt; PFT15 is temperate bioenergy tree, poplar and willow; PFT16 is C4 bioenergy grass, *Miscanthus*; PFT17 is C4 bioenergy grass, switchgrass. The red line indicates the 1:1 ratio line.**



**Fig. S5 Regression tree derived from the model-observation difference against the PFT types and nine climate forcing variables (see variable names and units in Table S3). “mse” and “value” represent mean square error and the relative difference between model and observation (i.e. (model - observation) / observation) respectively. “Scikit-learn” in Python (Pedregosa et al., 2011) was used to perform the tree regressions. The maximum depth of regression tree was set to be 4.**

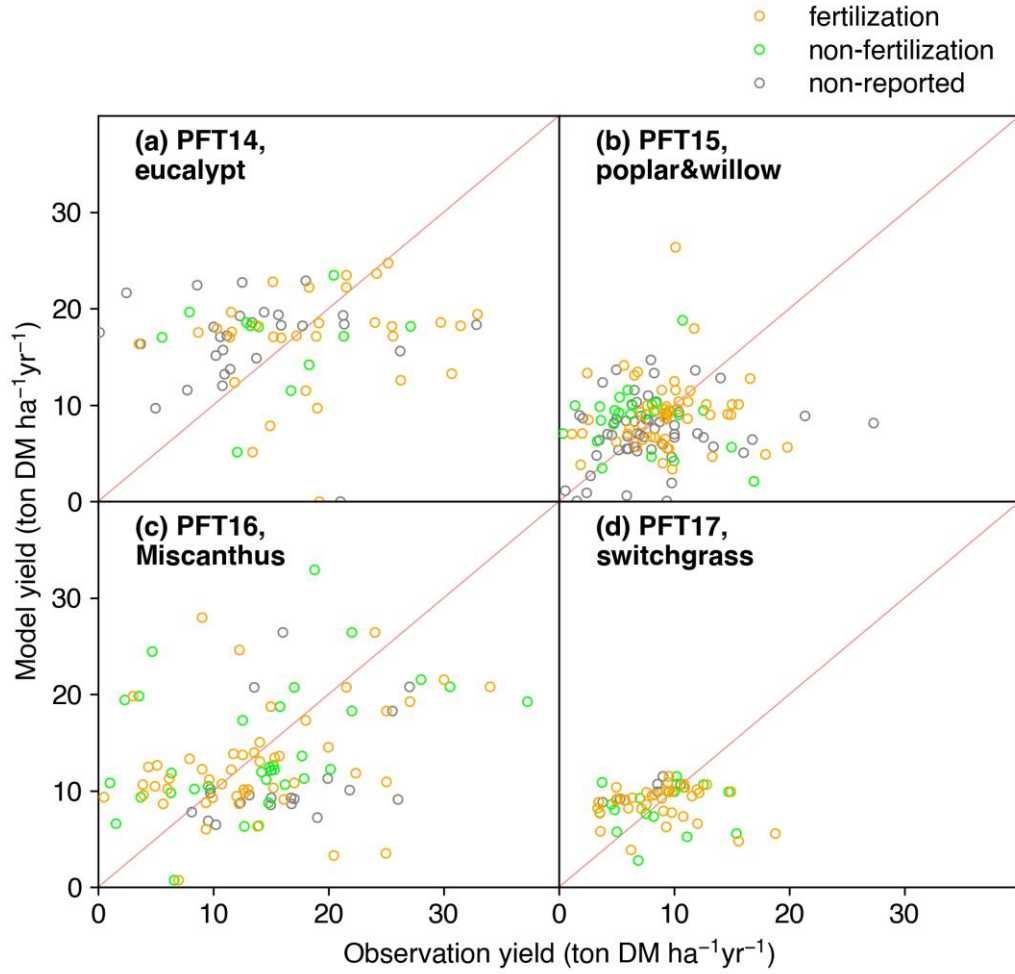


Fig. S6 Comparison of biomass yields simulated by ORCHIDEE-MICT-BIOENERGY and observations with or without fertilization. Orange, green and gray colors represent the median values of observations with fertilization, without fertilization or non-reported information, respectively in each grid cell. The red line indicates the 1:1 ratio line.

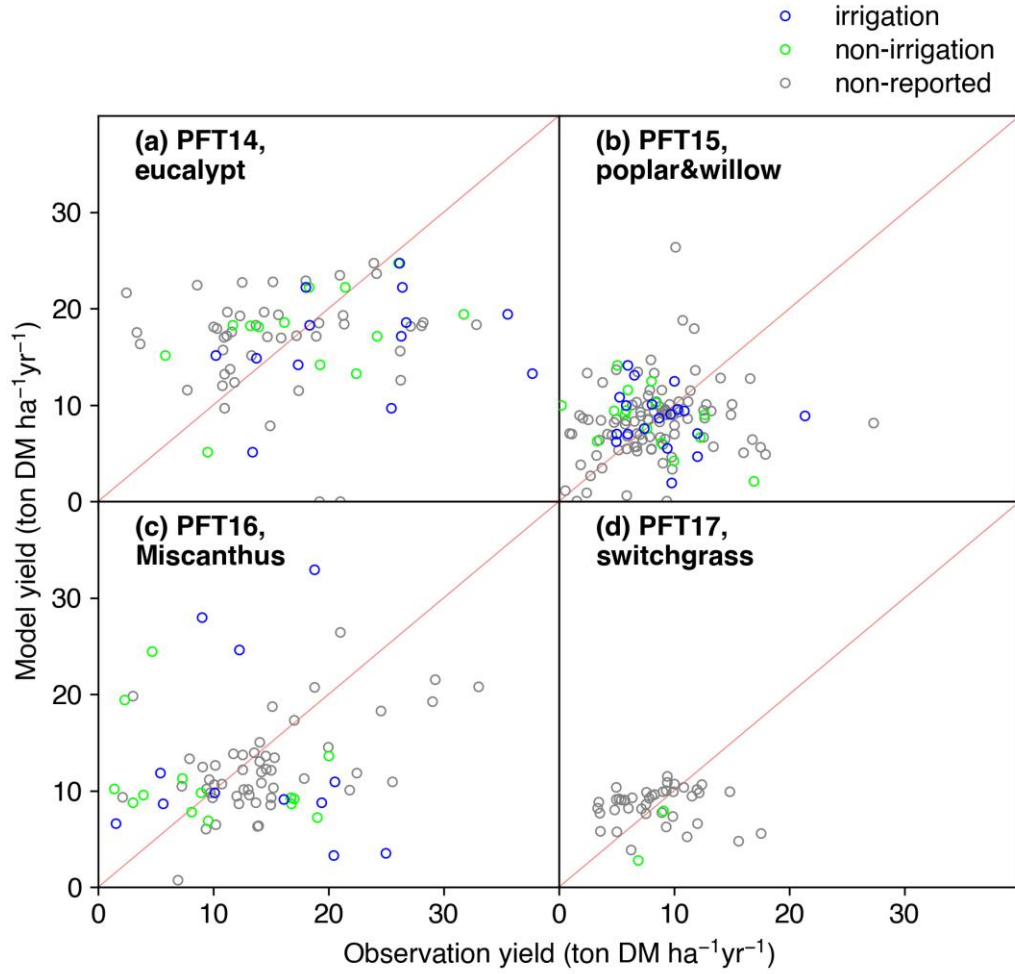
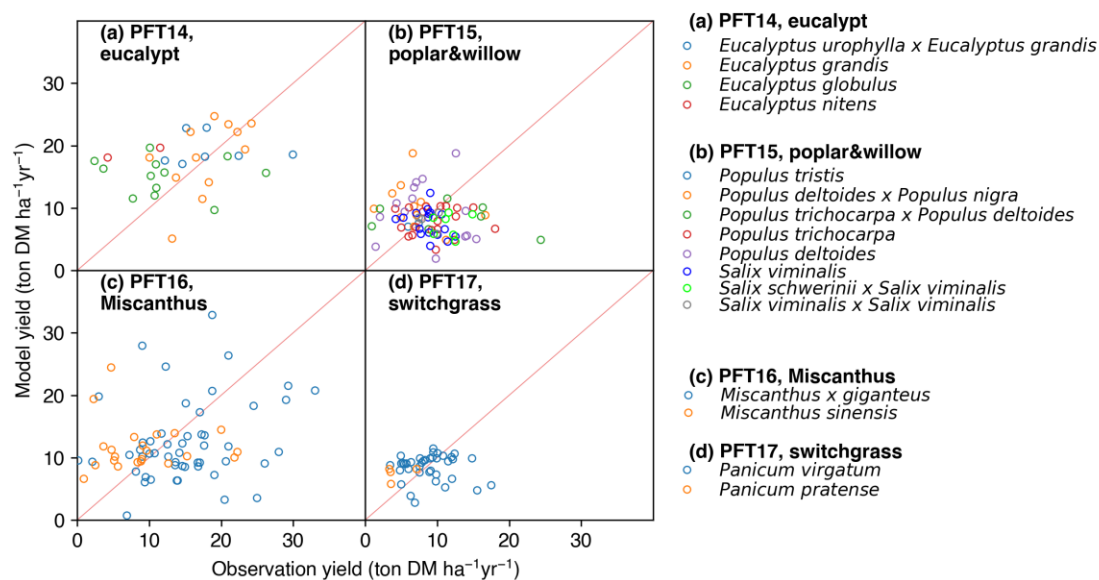


Fig. S7 Comparison of biomass yields simulated by ORCHIDEE-MICT-BIOENERGY and observations with or without irrigation. Blue, green and gray colors represent the median values of observations with irrigation, without irrigation or non-reported information, respectively in each grid cell. The red line indicates the 1:1 ratio line.



**Fig. S8 Comparison of biomass yields simulated by ORCHIDEE-MICT-BIOENERGY and observations for the main species of bioenergy crops. Different colors represent the median values of observations for different species in each grid cell. The red line indicates the 1:1 ratio line.**