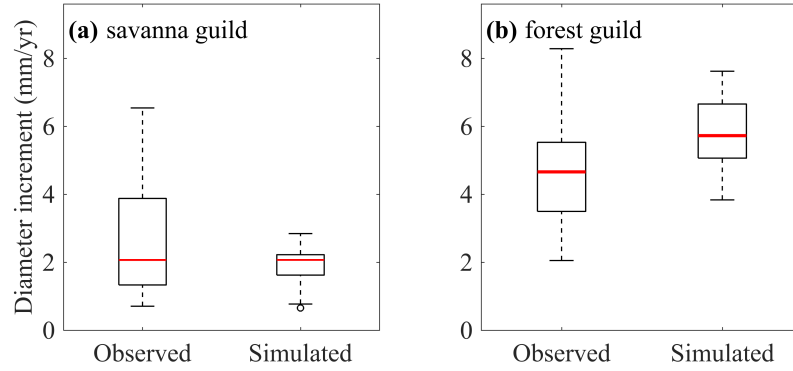
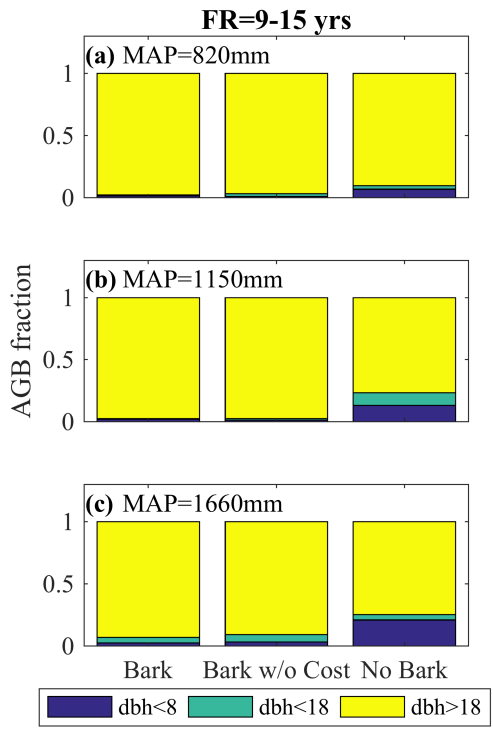


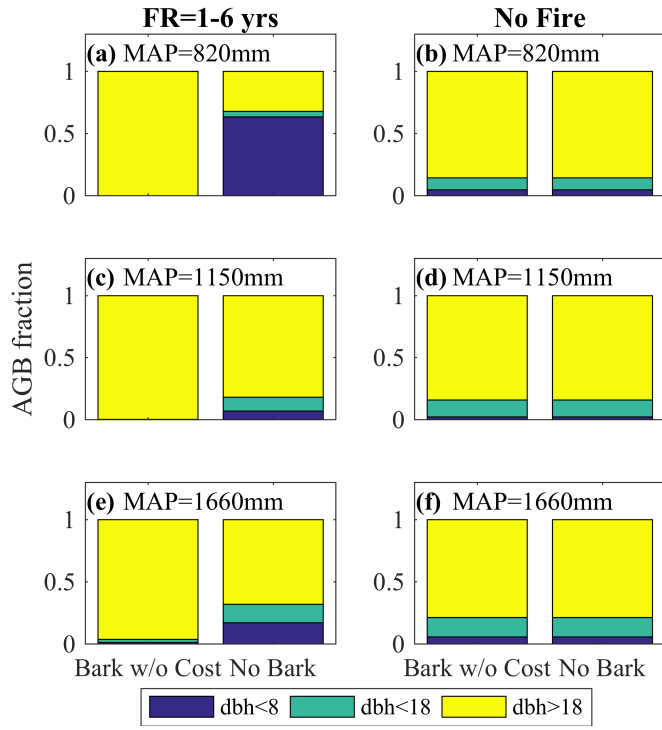
## Supplementary Figures



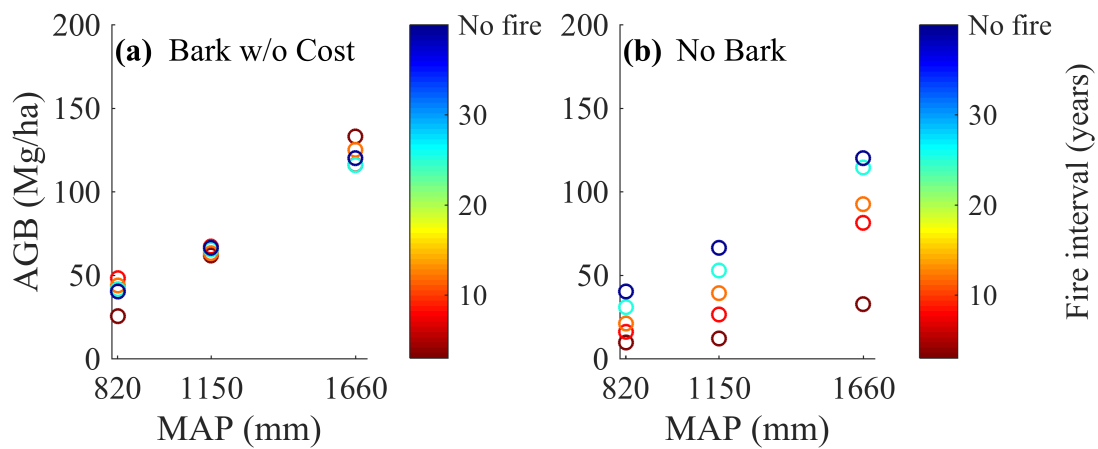
**Figure S1:** Observed and model-simulated annual diameter growth increment for twelve species of the savanna guild compared to the savanna plant functional type (PFT) in the model with bark **(a)** and twelve species of the forest guild compared to the tropical forest PFT **(b)**. Variation in the observed growth rates is due to interspecies variation in growth rates (Rossatto *et al.*, 2009a). Variation in the simulated growth rates is due to interannual variability in growth as a result of climate. The red line denotes the median diameter increment, the black box denotes the interquartile range, and the dotted error bars denote  $\pm 2.7$  standard deviations.



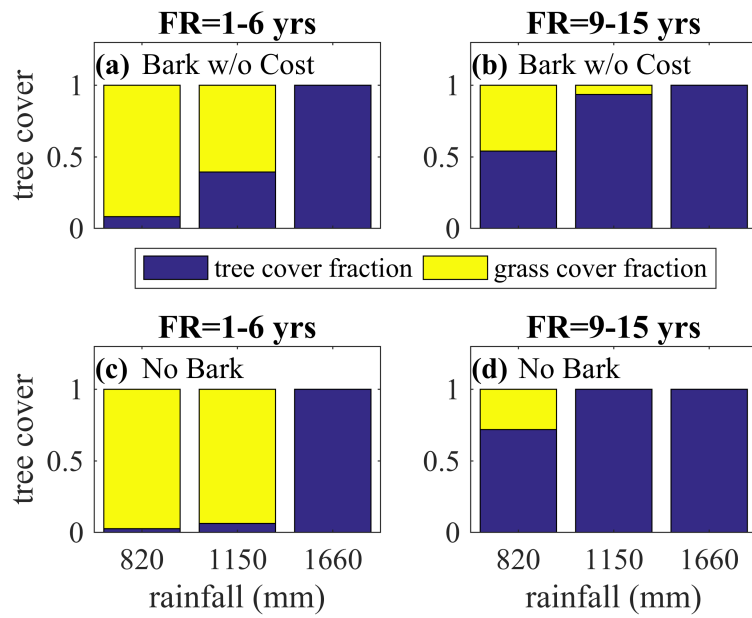
**Figure S2.** Model-simulated fraction of aboveground woody biomass (AGB) present in different tree diameter at breast height (dbh in cm) size classes at low **(a)**, intermediate **(b)**, and high **(c)** MAP for an intermediate frequency (FR) fire regime. Simulations were initialized with tropical tree and C4 grass plant functional types and included a 100-year model spin up from seedlings. The subsequent 20-year average AGB fraction by tree size class is shown for the following models: bark, bark with no allometric carbon cost, and no bark. See Figs. 4,S3 for size class distributions associated with high fire frequency and no fire disturbance.



**Figure S3.** Model-simulated fraction of aboveground woody biomass (AGB) present in different tree diameter at breast height (dbh in cm) size classes at low (a-b), intermediate (c-d), and high (e-f) MAP for a high frequency (FR) fire regime (a,c,e), and a no fire disturbance (b,d,f). Simulations were initialized with tropical tree and C<sub>4</sub> grass plant functional types and included a 100-year model spin up from seedlings. The subsequent 20-year average AGB fraction by tree size class is shown for the model with bark but no allometric carbon cost and the model without bark. See Fig. S2 for size class distributions associated with intermediate fire frequency.



**Figure S4.** Model-simulated total aboveground woody carbon (AGB) at different MAP and forced fire regimes for the model with bark but no allometric carbon cost **(a)** and the model without bark **(b)**. Simulations were initialized with tropical tree and C<sub>4</sub> grass plant functional types and included a 100-year model spin up from seedlings. The subsequent 20-year average AGB for each disturbance and precipitation regime is shown.



**Figure S5.** Model-simulated tree cover fraction present at different levels of mean annual precipitation (in mm) for the model with bark but no allometric carbon cost **(a-b)** and the model without bark **(c-d)** for fire frequencies (FR) of 1-6 years **(a,c)** and 9-15 years **(b,d)**. Simulations were initialized with tropical tree and C<sub>4</sub> grass plant functional types and included a 100-year model spin up from seedlings. The subsequent 20-year average tree cover fraction is shown.