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Supporting Information for

Tracking Changes in Vegetation Structure Following Fire in the Cerrado Biome using ICESat-2

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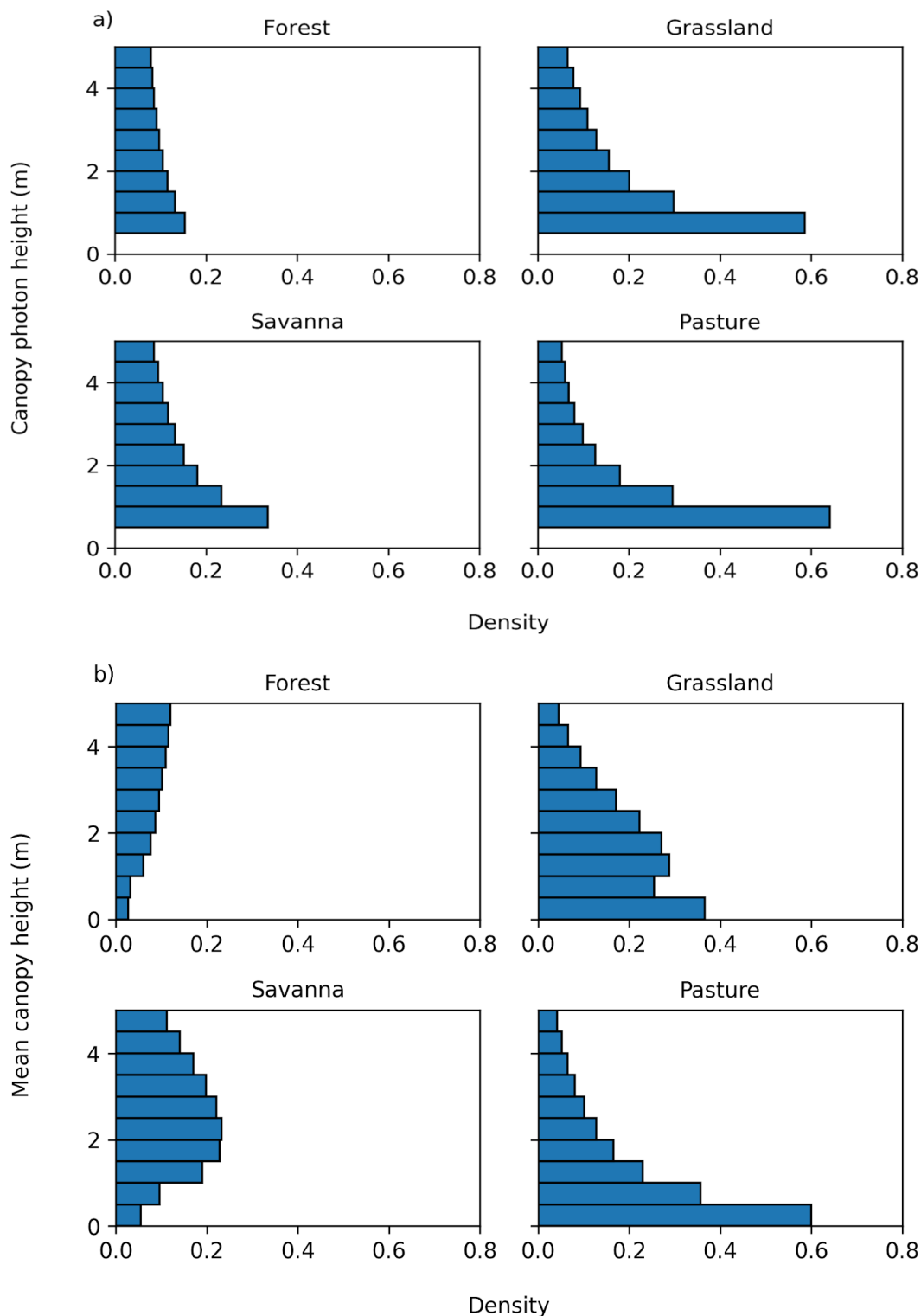


Figure S1: a) Canopy photon heights are greater than 50 cm for all four land cover types, based on the combination of low vegetation with ground returns in each 20m segment. **b)** Mean canopy height distributions for the four land cover classes indicate the proportion of 20m segments with little or no woody cover (<50 cm) and the presence of woody vegetation in open cover types (grasslands, pastures).

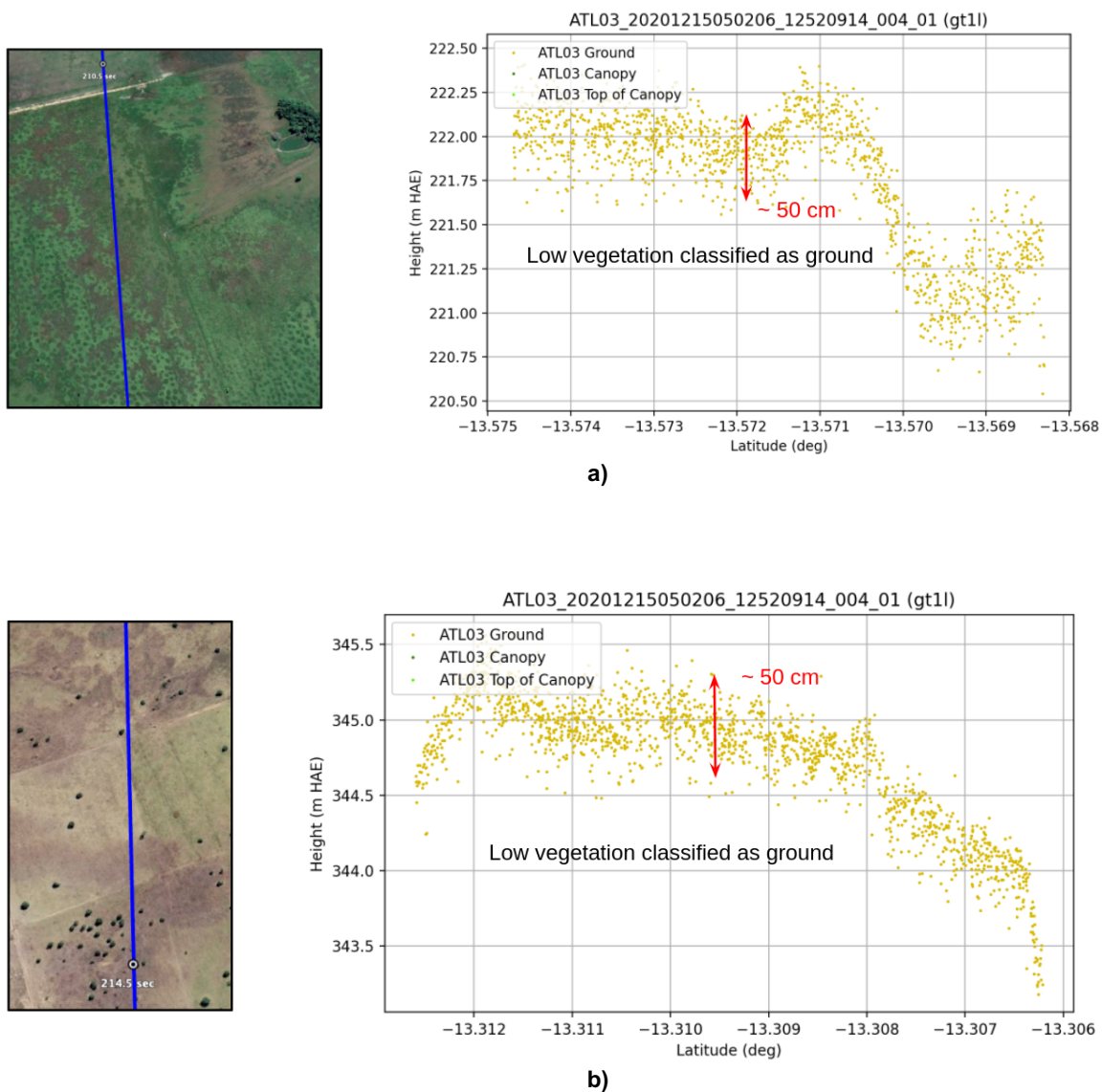


Figure S2: The ATL08 algorithm is unable to distinguish low vegetation (< 50 cm) from ground returns in pasture areas, as shown in examples **a)** and **b)**. Pictures on the left show the ICESat-2 flight tracks and plots on the right show the photon classification (ground vs canopy) and photon heights along the transect.

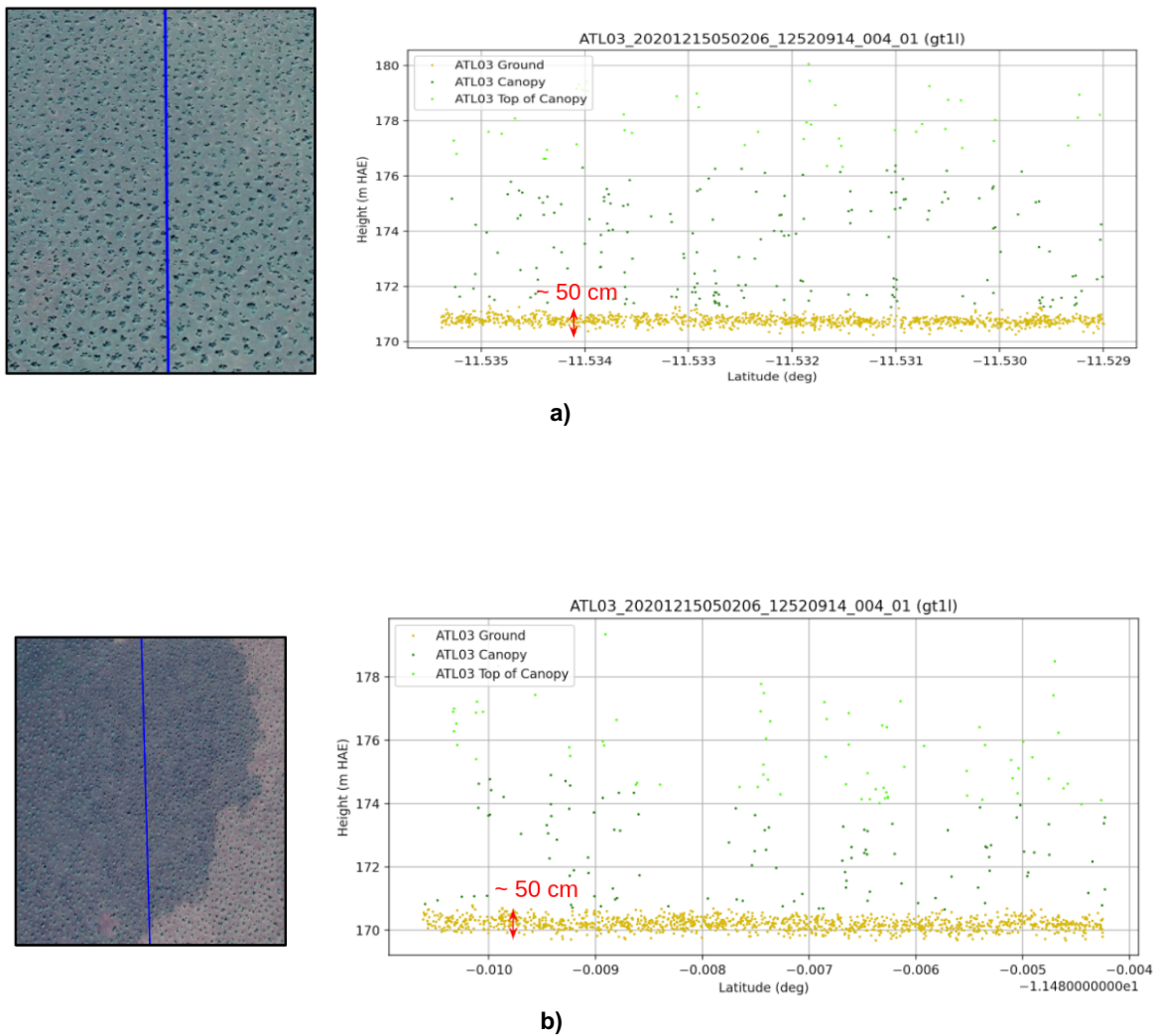


Figure S3: Some of the areas classified as grassland in the MapBiomass land cover product have substantial tree/shrub cover, as shown in examples **a)** and **b)**, which could partially explain the higher-than-expected mean canopy heights in Figure 2, in addition to the exclusion of low vegetation returns <50 cm shown in Figure S2. Pictures on the left show the ICESat-2 flight tracks and plots on the right show the photon classification (ground, canopy or top-of-canopy) and photon heights along the transect.

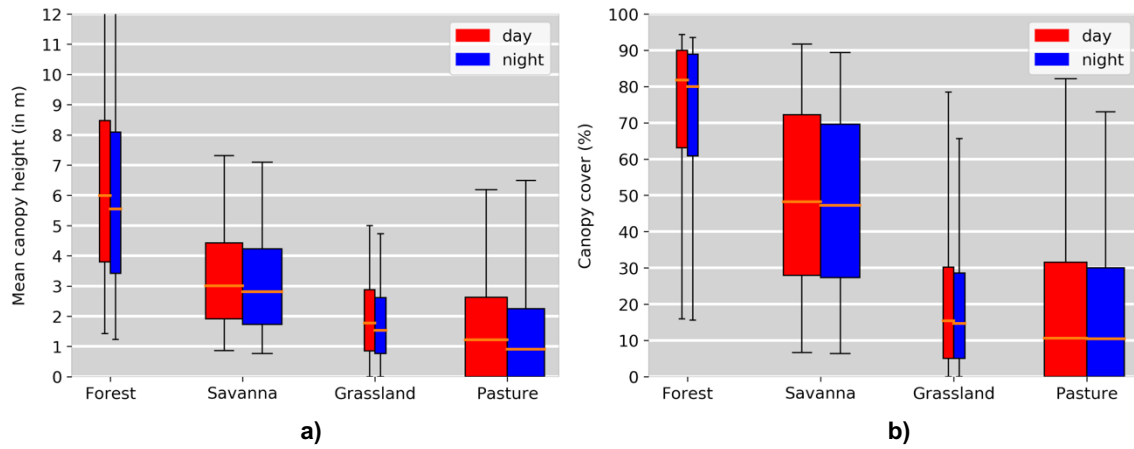


Figure S4: Impact of daytime and nighttime acquisition on **a)** canopy heights (in m) and **b)** canopy cover (%) during dry season months (May-September) for the major Cerrado vegetation types. Lidar-derived estimates of fractional canopy cover were consistent between day and night acquisitions. By contrast, estimates of mean canopy height from daytime lidar acquisitions were greater in all cover types, likely due to the influence of residual solar background photons.

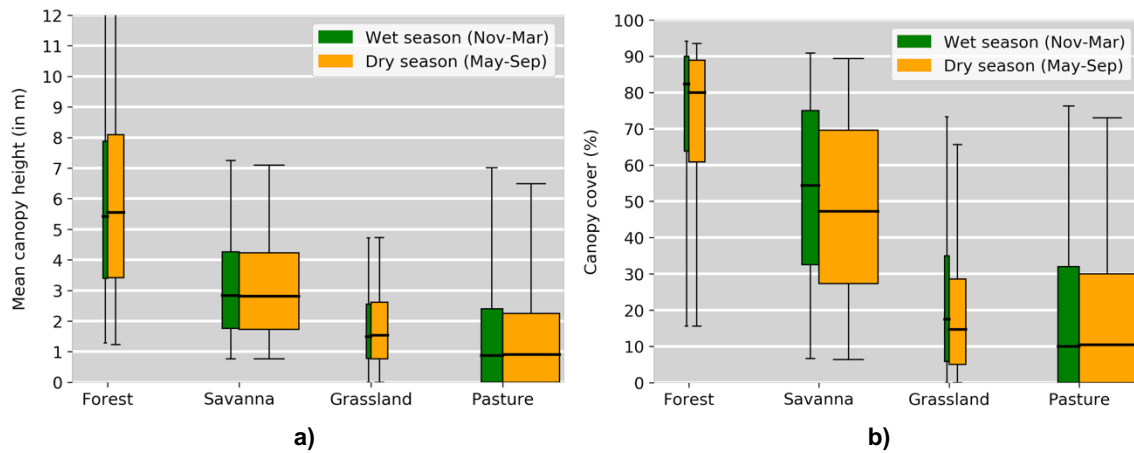
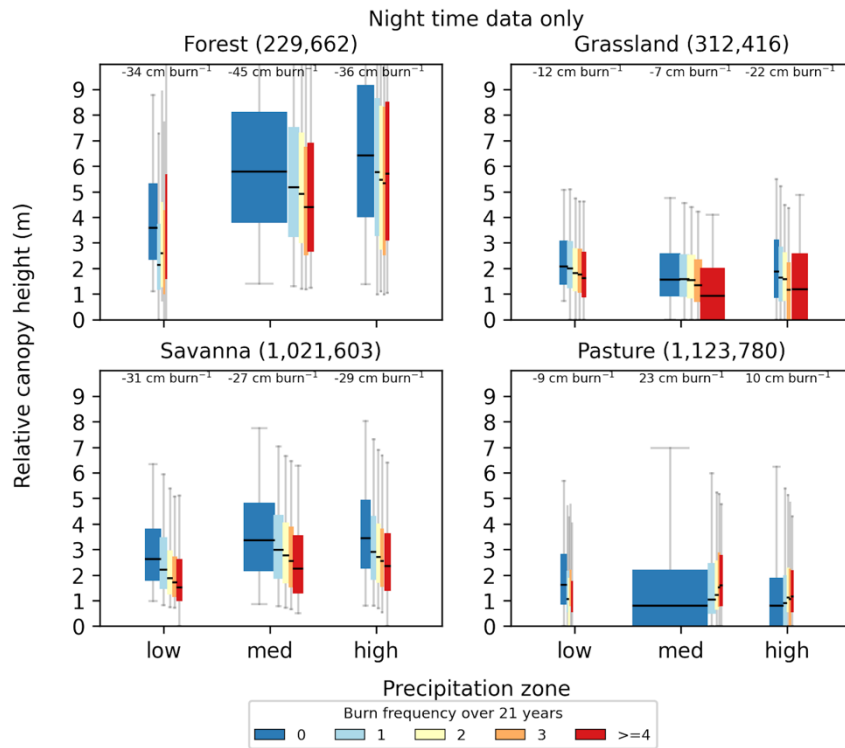


Figure S5: Impact of dry and wet seasons on **a)** canopy heights (in m) and **b)** canopy cover (%) for the major Cerrado vegetation types (using only nighttime data). While the canopy height values remain mostly the same between dry and wet seasons, canopy cover during the wet season was found to be consistently greater than that during dry season, especially for the Savanna class, likely due to higher leaf area during wet season months.

a)



b)

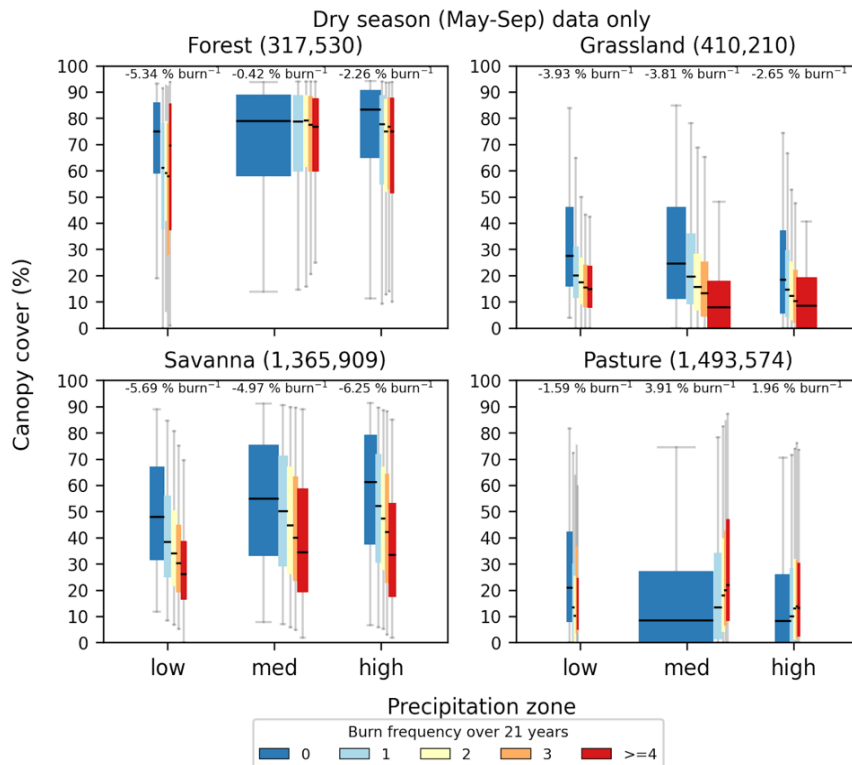


Figure S6: a) Canopy height and **b)** fractional cover response to increasing fire frequency is robust to differences in solar background noise during daytime observations and seasonal changes in leaf area.

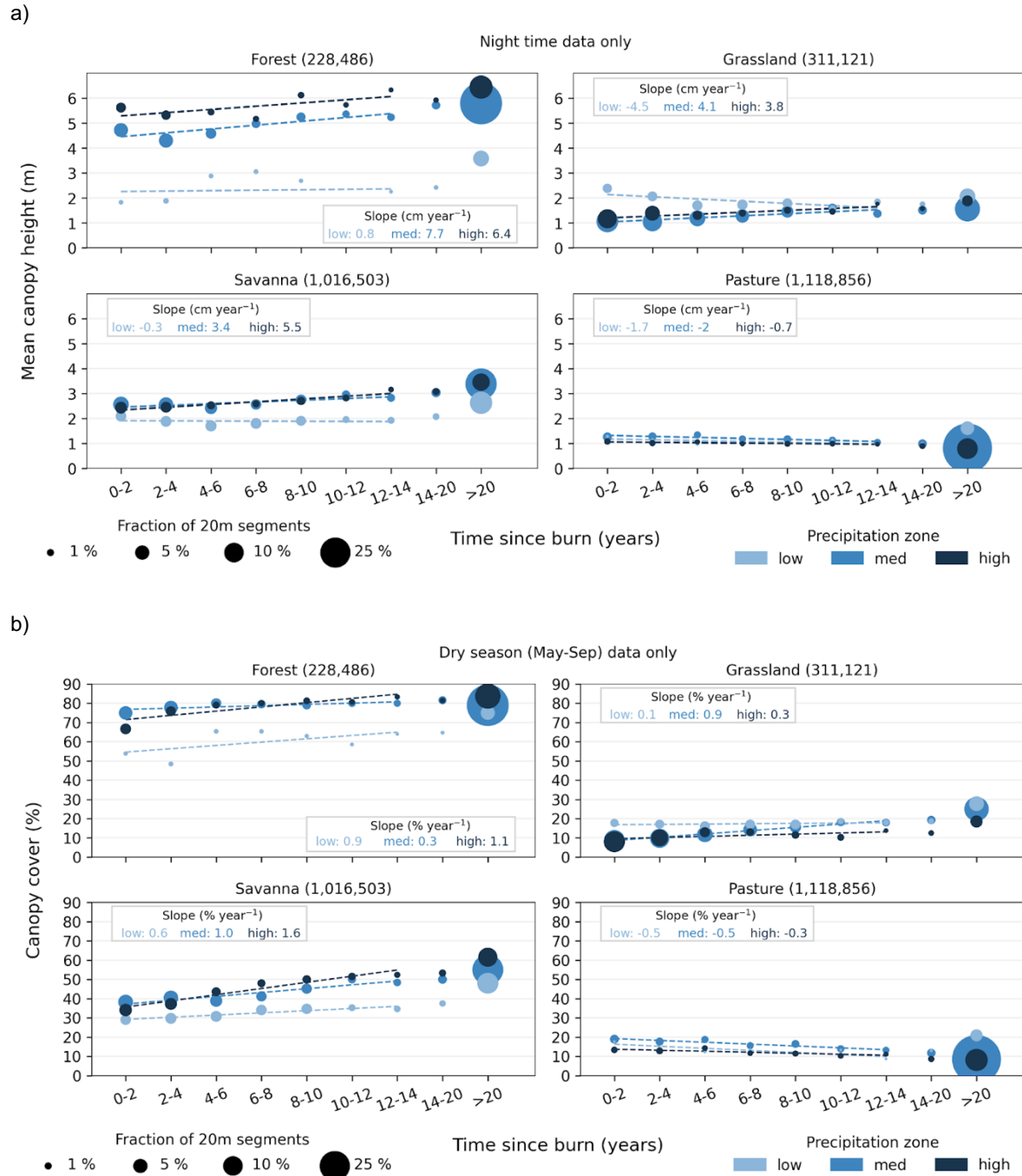


Figure S7: Post fire recovery of **a)** canopy heights and **b)** fractional cover as a function of time since fire is robust to differences in solar background noise during daytime observations and seasonal changes in leaf area, respectively.

Table S1: Breakdown of number of 20 m segments, mean canopy height (m) and percent canopy cover by land cover type, day/night and dry/wet seasons. To maintain consistency, only dry season data were considered when comparing day and nighttime (indicated by *) and only nighttime data were used when comparing dry and wet season data (indicated by +).

Parameter	Property	Forest	Savanna	Grassland	Pasture
# 20 m segments	Day*	158,748	658,037	196,518	786,632
	Night*	158,782	707,872	213,692	706,942
	Dry ⁺	158,782	707,872	213,692	706,942
	Wet ⁺	47,622	207,365	62,010	282,589
	All	494,055	2,083,678	640,903	2,519,019
Median value of mean canopy height (m)	Day*	5.83	2.92	1.74	1.17
	Night*	5.45	2.75	1.48	0.88
	Dry ⁺	5.45	2.75	1.48	0.88
	Wet ⁺	5.31	2.77	1.45	0.83
	All	5.64	2.86	1.62	1.02
Median value of percent canopy cover	Day*	79.94	45.70	14.89	9.68
	Night*	78.37	45.45	13.95	9.68
	Dry ⁺	78.37	45.45	13.95	9.68
	Wet ⁺	81.25	52.27	16.67	9.30
	All	80.00	48.00	15.38	10.00