MDPI Land

Supporting Information for

Land use increases the correlation between tree cover and biomass carbon stocks in the global tropics

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Introduction

This document contains the supporting tables and graphics for the main text of the study. Individual information about the tree cover (TC) and biomass carbon stocks (CS) datasets are presented in Tables S1 and S2. Table S1 describes briefly the actual TC and CS datasets used in the study. Table S2 describes briefly the potential TC and CS datasets used. Figures S1-S2 display figures which supplement the figures and analysis presented in the main text.

Table S1: Actual tree cover and biomass carbon stocks datasets used in the study. *All maps were based on the year 2000. They were aggregated to the common spatial resolution of 5 arc-minutes and constrained to match the tropical extent* (~23.4°N to 23.4°S).

	Source	Original Spatial Resolution	Temporal Resolution	Notes
Actual Tree Cover (TC)	Hansen et al. (2013)	30m	2000	Landsat-derived tree cover estimates
	Song et al. (2018)	0.05° (approx. 5km at the equator)	2000	Tree cover derived from harmonization of multiple sensors
Actual Carbon Stocks	Erb et al. (2018) FAO Forest Resource Assessment-based	5 arc minutes (approx. 10kms at the equator)	2000	Biomass carbon stocks maps were made available from a study of global biomass stocks, developed using different sources [1], and used directly. In order: Forest Resource Assessment (2000), Pan et al. (2011), Saatchi et al. (2011),
	Erb et al. (2018) Pan-based	5 arc minutes (approx. 10kms at the equator)	2000	
	Erb et al. (2018) Saatchi-based	5 arc minutes (approx. 10kms at the equator)	2000	
	Erb et al. (2018) Baccini-based	5 arc minutes (approx. 10kms at the equator)	2000	
	Erb et al. (2018) IPCC-based	5 arc minutes (approx. 10kms at the equator)	2000	

				Baccini et al. (2012) and Ruesch & Gibbs (2008)

Table S2: Potential tree cover and biomass carbon stocks datasets used in the study. *They were aggregated to the common spatial resolution of 5 arc-minutes and constrained to match the tropical extent* (~23.4°N to 23.4°S). *Note that an available potential forest restoration map* [2] *was not used as it only contains cardinal-scale information on potential tree cover (three classes: 10-25%, 25-45%, >45%) and no continuous data.*

Attribute	Input Datasets	Original Spatial Resolution	Notes
Potential Tree Cover	Bastin et al. (2019)	30 arc seconds	Potential tree cover map developed from the analysis of very high resolution imagery and the extrapolation of tree cover in protected areas
Potential Carbon Stocks	Erb et al. (2018) remote sensing-based map	5 arc minutes	Biomass carbon stocks maps were made available from a study of global biomass stocks, developed using different sources [1], and used directly. In order: harmonized estimates from Saatchi et al. (2011) and Baccini et al. (2012), Forest Resource Assessment (2000), Pan et al. (2011) and West et al. (2010)
	Erb et al. (2018) landscape-averaged map consistent with the FAO Forest Resource Assessment	5 arc minutes	
	Erb et al. (2018) landscape-averaged map consistent with Pan et al.	5 arc minutes	
	West et al. (2010), available in Erb et al. (2018)	5 arc minutes	
	Searchinger et al. (2018)	0.5°/30 arc minutes	Potential vegetation estimates developed using modelling simulations with reference carbon stock values [3].

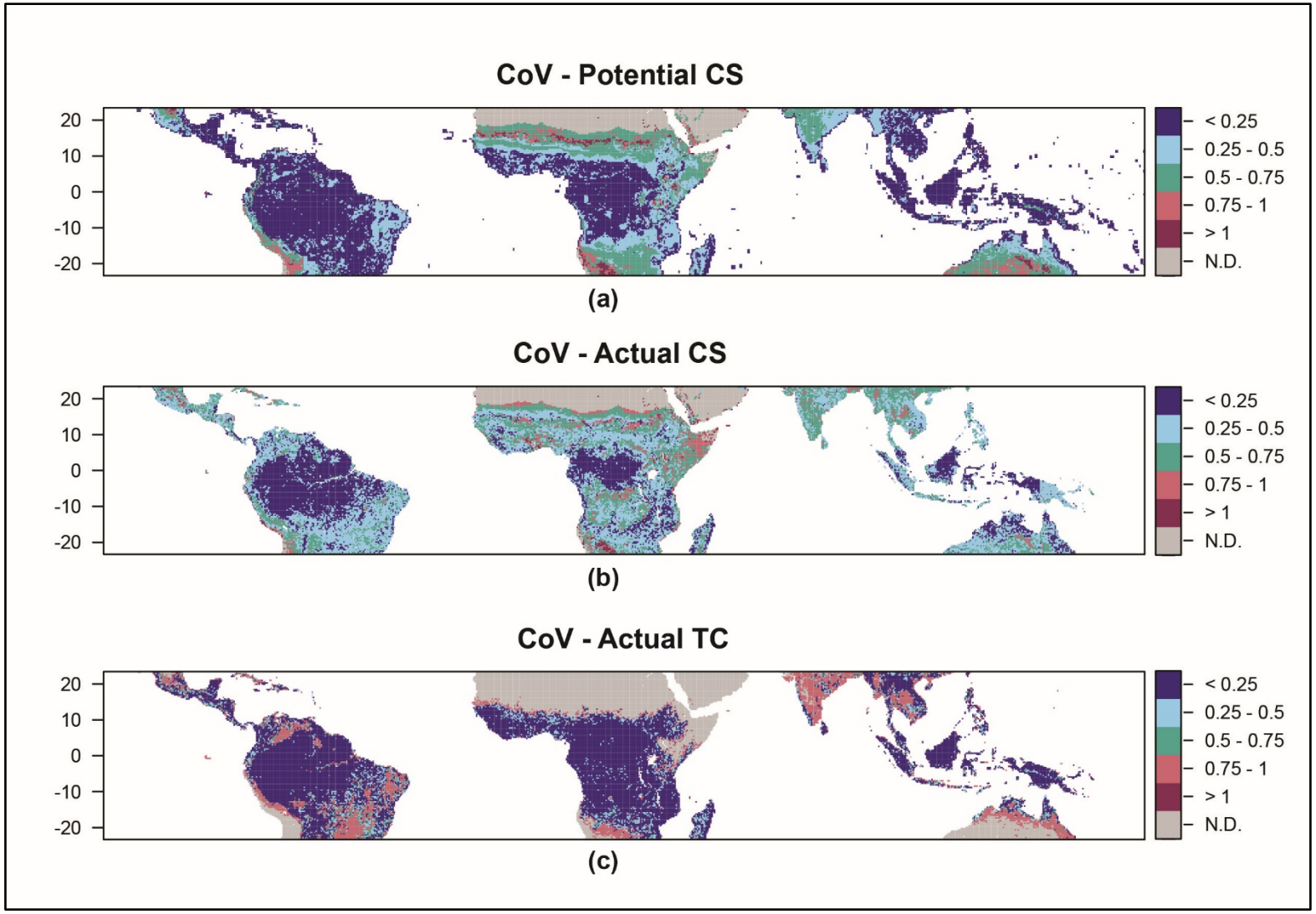

Figure S1: Uncertainty of (a) potential CS, (b) actual CS and (c) actual TC, expressed as the coefficient of variation (CoV). *Note that only one potential TC map exists and was analysed using a different approach (see Main Text).*

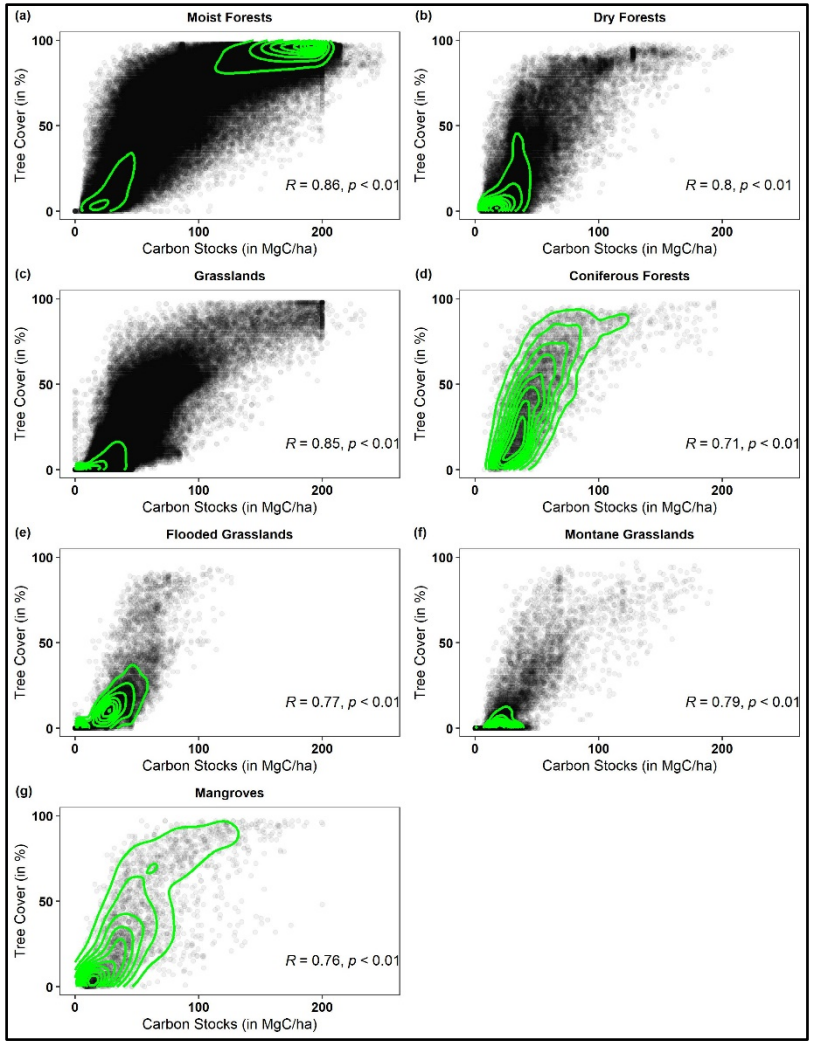

Figure S2: Tree cover (TC) – biomass carbon stocks (CS) correlations at the individual pixel level across tropical biomes for actual vegetation (a-g). *Contours in green represent regions with high frequency of observations, based on kernel density estimations. Note that for the potential vegetation, the original resolution of the input maps does not allow for a grid-level analysis.*

References

1. Erb, K.-H.; Kastner, T.; Plutzar, C.; Bais, A.L.S.; Carvalhais, N.; Fetzel, T.; Gingrich, S.; Haberl, H.; Lauk, C.; Niedertscheider, M.; et al. Unexpectedly Large Impact of Forest Management and Grazing on Global Vegetation Biomass. *Nature* **2018**, *553*, 73–76, doi:10.1038/nature25138.
2. Laestadius, L.; Maginnis, S.; Minnemeyer, S.; Potapov, P.; Saint-Laurent, C.; Sizer, N. Mapping Opportunities for Forest Landscape Restoration. *Unasylva* **2011**, *62*, 47–48.
3. Searchinger, T.D.; Wirsenius, S.; Beringer, T.; Dumas, P. Assessing the Efficiency of Changes in Land Use for Mitigating Climate Change. *Nature* **2018**, *564*, 249–253, doi:10.1038/s41586-018-0757-z.