Supplementary Material for "Modelling Herbivory Impacts on Vegetation Structure and Productivity"

Jens Krause[1], Peter Anthoni[1], Mike Harfoot[2], Moritz Kupisch[1], Almut Arneth1,3
1: Karlsruhe Institute of Technology, IMK-IFU, Campus-Alpin, Garmisch-Partenkirchen, Germany
2: Vizzuality UK, Gwydir St, Cambridge CB1 2LJ, United Kingdom
3: Karlsruhe Institute of Technology, IfGG, Karlsruhe,

Correspondence to: Jens Krause (jens.krause@kit.edu)

Trait	Code	BNE	BINE	BNS	IBS	TeNE	TeBS	TeBE	TrBE	TrIBE	TrBR	C3G	C4G	LSE	LSS
Climate Type	**B**oreal, **T**emperate, **Tr**opical	B	B	B	B	Te	Te	Te	Tr	Tr	Tr				
Life Form	**t**ree, **l**ow-**s**hrub, **g**rass	t	t	t	t	t	t	t	t	t	t	g	g	ls	ls
Leaf Physiognomy	**N**eedleleaved, **B**roadleaved	N	N	N	B	N	B	B	B	B	B			N	B
Phenology	**E**vergreen, **S**ummergreen, **R**aingreen	E	E	S	S	E	S	E	E	E	R				
Photosynthesis Pathway		C3	C3	C3	C3	C3	C3	C3	C3	C3	C3	C3	C4	C3	C3
Light Behaviour	**S**hade **T**olerant, **S**hade **I**ntolerant	ST	SI	ST	SI	ST	ST	ST	ST	SI	ST			SI	SI
Photosynthesis Temperature [°C]	Min to Max	-4 to 38			10 to	-2 to 38		15	2 o 55		25 to	-5 to 45	6 to 20	-4 to 10	25
	Optimum Low to High	25				to 25			30			10 to 30	45 to 55	to 38	
Survival Temperature [°C]		-31	-31	no limit	-30	-2	-14	-1	15.5			no limit	15.5	-32.5	-40
Leaf Turnover rate [frac/yr]		0.33	0.33	1	1	0.33	1	0.33	0.5	0.5	1	1		0.33	1
Leaf Longevity [yrs]		3	3	0.5	0.5	3	3	3	2	2	0.5	0.5		3	3
Drought Resistance Coefficient (1 = max sensitivity)		0.0001												0.1	0.1
Fire Resistance		0.3			0.1	0.3	0.1	0.3	0.1	0.1	0.3	0.5		0.12	
Respiration Coefficient		1	1	1	1	1	1	1	0.15	0.15	0.15	1	0.15	1	
Minimum forest floor PAR for grass growth/tree establishment (10^6 J m^{-2} day^{-1})		0.35	2.5	0.35	2.5	0.35	0.35	0.35	0.35	2.5	0.35	1	1	1	1

Table S1: The PFT's basic traits alongside a set of selected parameterisations.

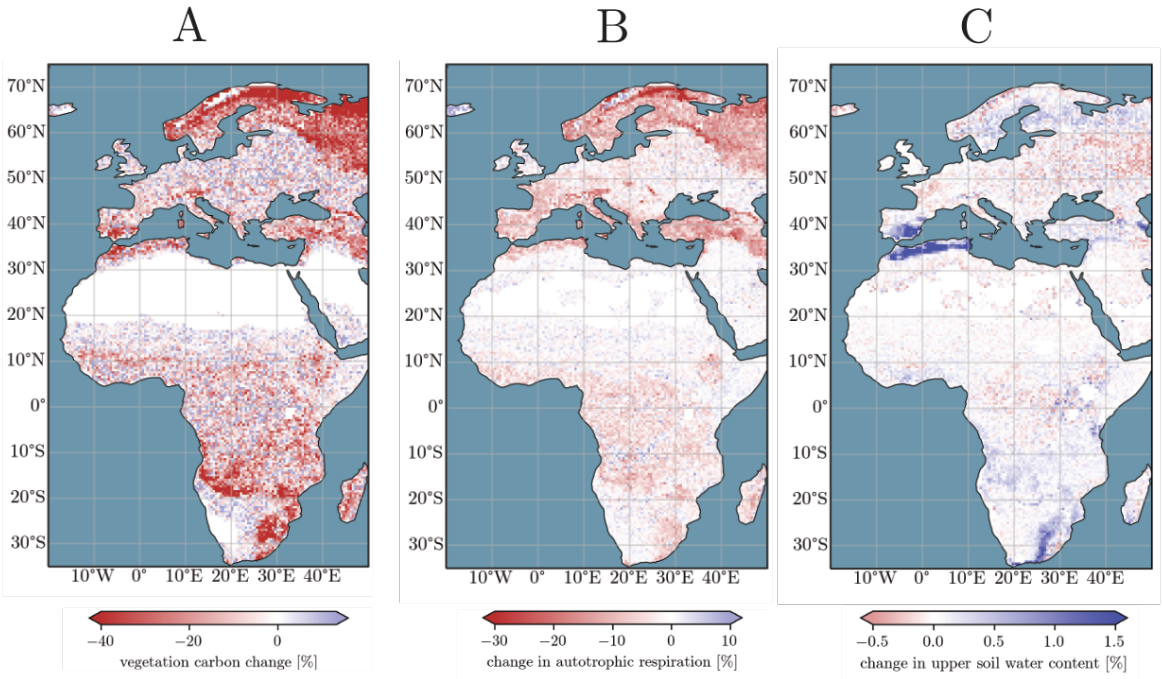
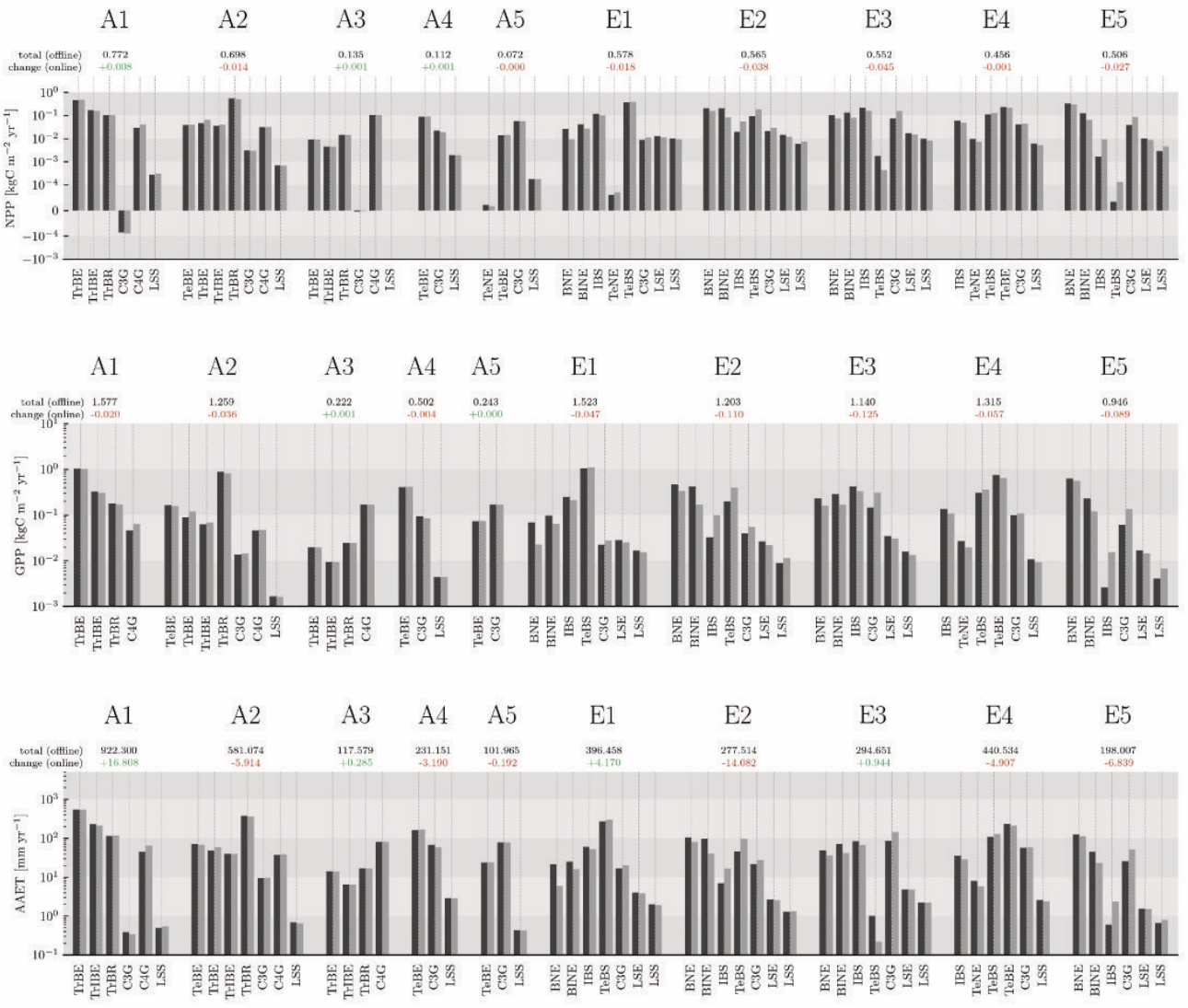


Figure S1: Coupling related changes in A) vegetation carbon, B) autotrophic respiration and C) the upper soil water content. The maps show the percentage difference between simulations with vs without the coupling in place. Positive values indicate a higher value in the simulation with coupling in place. Analysis was carried out between the simulation years 1900 to 2014. The soil from 0-50cm depth is treated as upper soil layer.



15 **Figure S2: Ecosystem Net and Gross Primary Production and Evapotranspiration. The Black bars show the offline run, grey bars the online run.**

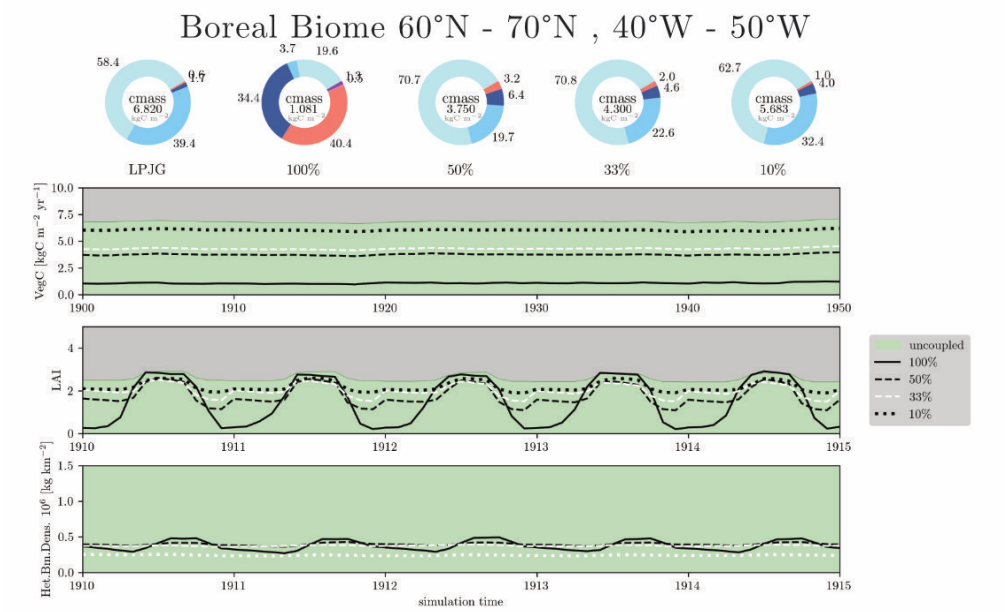


Figure S3: Sensitivity of the model system to the percentage of the evergreen vegetation stock being passed to Madingley. The example is for a boreal ecosystem. The pie charts show the carbon mass distribution withing the analysis domain. PFT colours are similar to the colours in Fig. 2. For Vegetation Carbon and LAI, the green uncoupled background refers to the uncoupled LPJ-GUESS simulation. For Heterotroph Biomass Density, the green background refers to an uncoupled Madingley simulation. 100% labels a simulation, where 100% of the evergreen stock is passed to Madingley, 50% labels a simulation where 50% is passed to Madingley, etc.

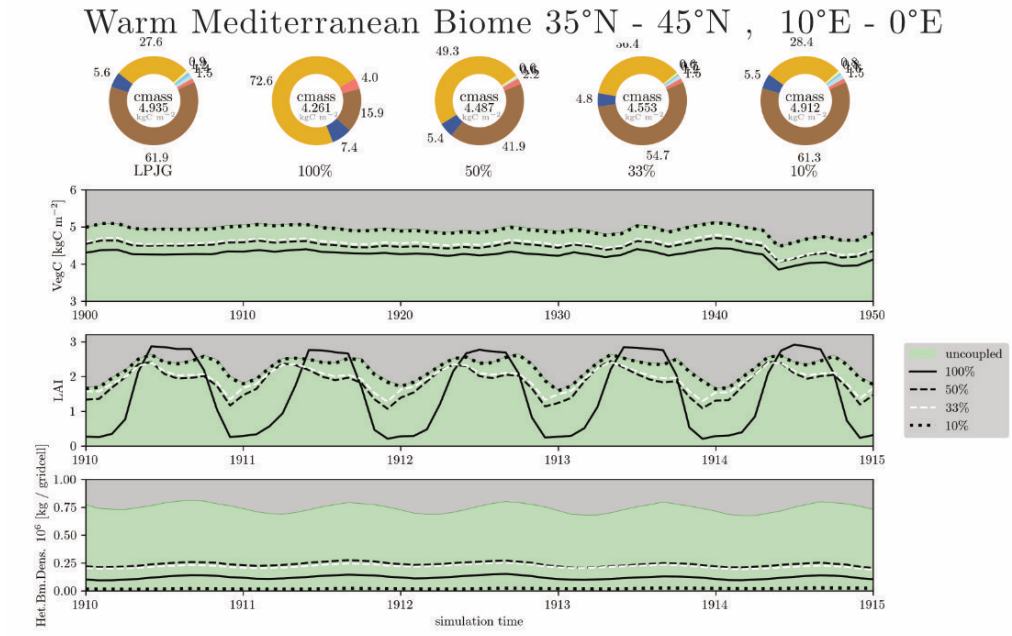


Figure S4: Sensitivity of the model to the percentage of evergreen vegetation stock being passed to Madingley. Carried out in a warm temperate/Mediterranean ecosystem in Europe. Colours and labelling as in Appendix IV.

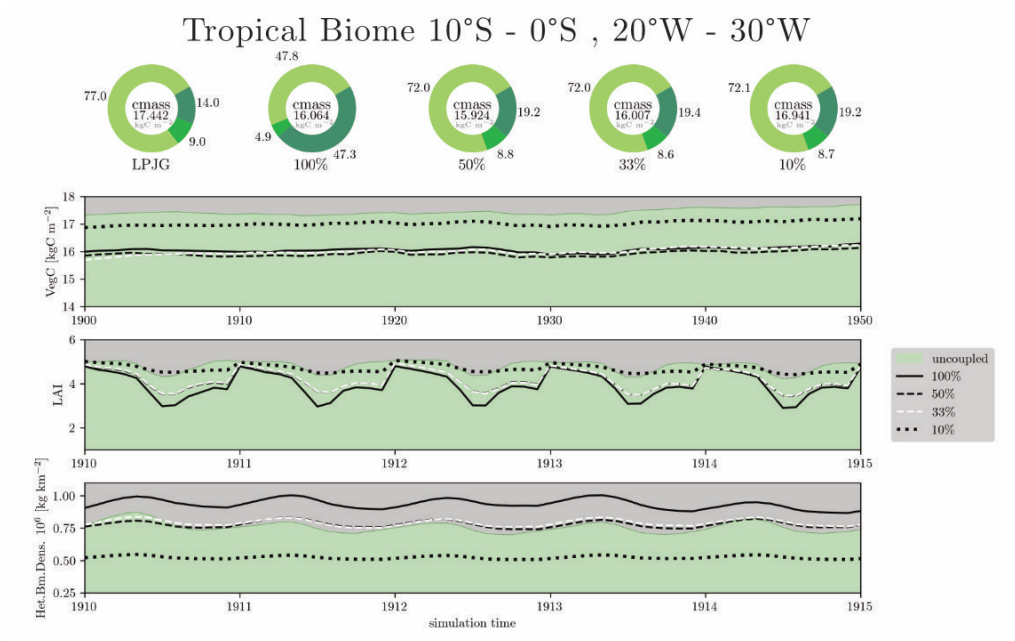


Figure S5: Sensitivity of the model to the percentage of evergreen vegetation stock being passed to Madingley for an example tropical forest. Colours and labelling as in Appendix IV.

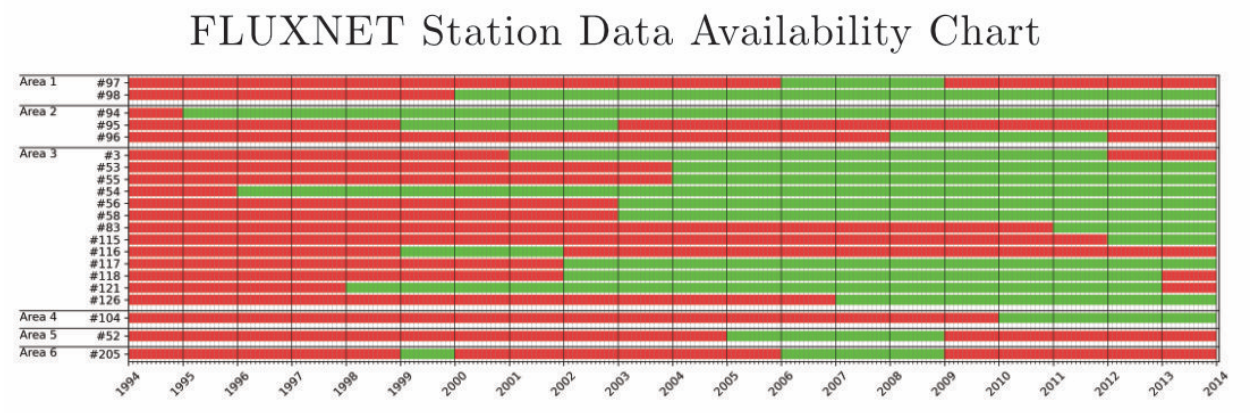


Figure S6: Timeline of available data from FLUXNET stations, which were selected for Fehler! Verweisquelle konnte nicht gefunden werden..