

Electronic Supplementary Material

Spatiotemporal ecological niche modelling of multigenerational insect migrations

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Supplementary Table S2: Classification of land cover categories in GlobCover.

Value	Layer	open	closed	bareland
11	Post-flooding or irrigated croplands (or aquatic)	X		
14	Rainfed croplands	X		
20	Mosaic cropland (50-70%) / vegetation (grassland/shrubland/forest) (20-50%)	X		
30	Mosaic vegetation (grassland/shrubland/forest) (50- 70%) / cropland (20-50%)	X		
40	Closed to open (>15%) broadleaved evergreen or semi- deciduous forest (>5m)		X	
50	Closed (>40%) broadleaved deciduous forest (>5m)		X	
60	Open (15-40%) broadleaved deciduous forest/woodland (>5m)	X		
70	Closed (>40%) needleleaved evergreen forest (>5m)		X	
90	Open (15-40%) needleleaved deciduous or evergreen forest (>5m)	X		
100	Closed to open (>15%) mixed broadleaved and needleleaved forest (>5m)		X	
110	Mosaic forest or shrubland (50-70%) / grassland (20- 50%)	X		
120	Mosaic grassland (50-70%) / forest or shrubland (20- 50%)	X		
130	Closed to open (>15%) (broadleaved or needleleaved, evergreen or deciduous) shrubland (<5m)	X		
140	Closed to open (>15%) herbaceous vegetation (grassland, savannas or lichens/mosses)	X		
150	Sparse (<15%) vegetation	X		
160	Closed to open (>15%) broadleaved forest regularly flooded (semi-permanently or temporarily) - Fresh or brackish water		X	

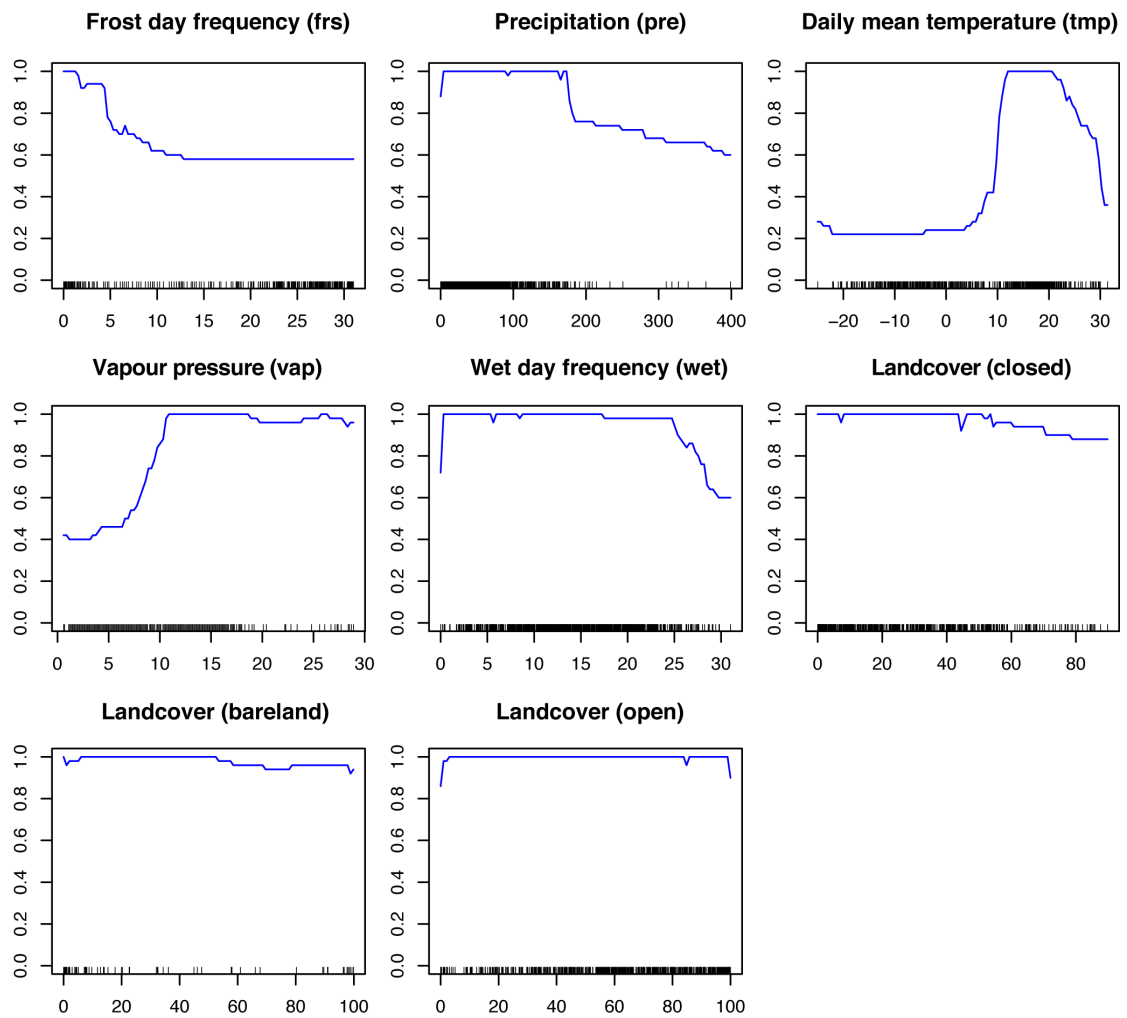
170	Closed (>40%) broadleaved forest or shrubland permanently flooded - Saline or brackish water		X	
180	Closed to open (>15%) grassland or woody vegetation on regularly flooded or waterlogged soil - Fresh, brackish or saline water	X		
190	Artificial surfaces and associated areas (Urban areas >50%)	X		
200	Bare areas			X

Supplementary Table S3. Mean ROC and TSS evaluation scores (10 runs) for all models used in biomod2.

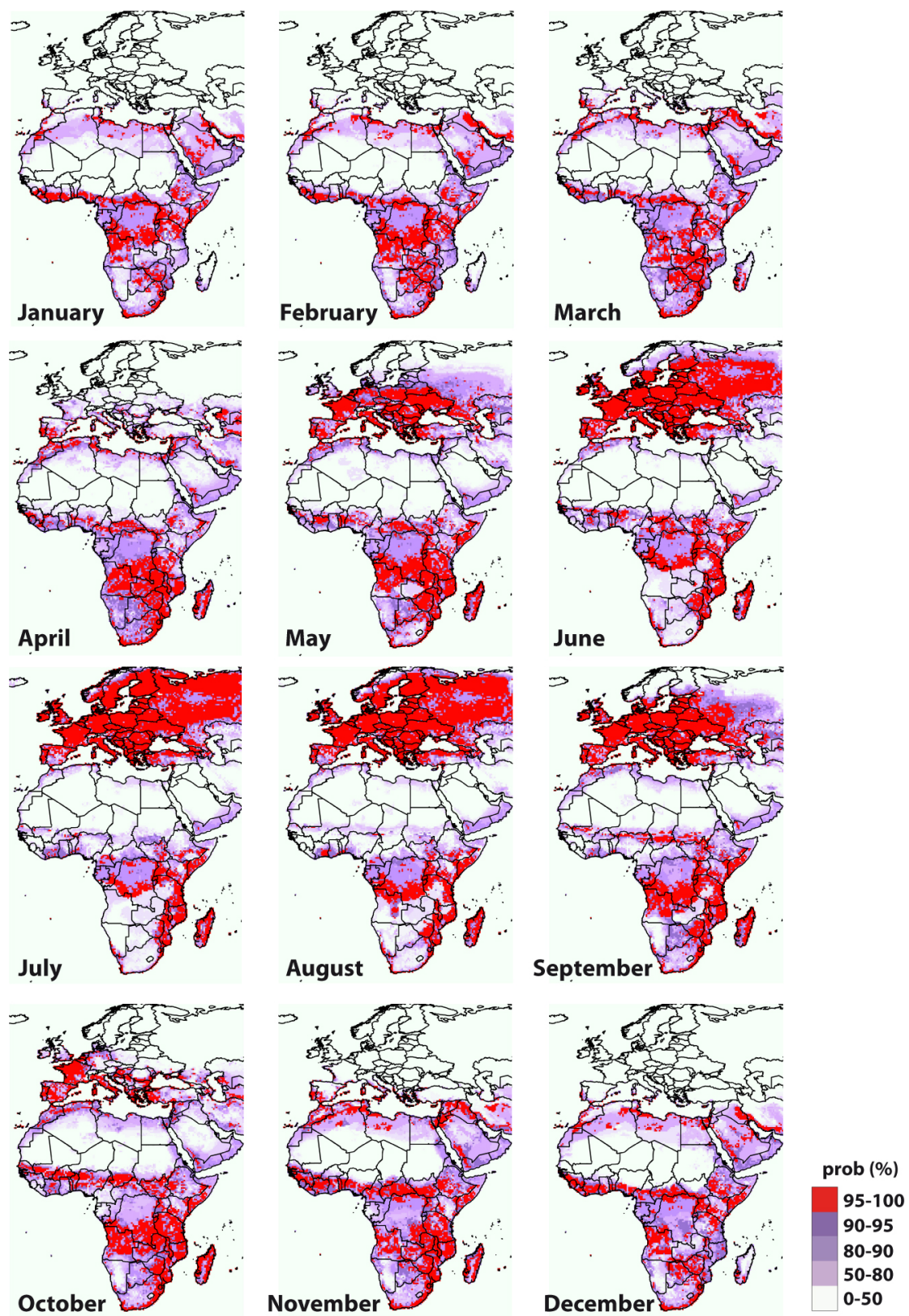
	TSS	ROC
RF	0.9905	0.9972
MARS	0.9572	0.9815
GLM	0.9437	0.972
GAM	0.9773	0.9894
GBM	0.9766	0.9934

Supplementary Table S4. Mean variable importance scores for each model, converted into percentages. The three most important variables in the final EMca model are shown in bold.

	frs	pre	tmp	vap	wet	closed	bareland	open
RF	22.46	1.38	37.66	1.76	5.34	1.84	11	2.74
MARS	50.51	1.70	5.72	7.22	2.22	0	32.63	0
GLM	15.95	2.97	29.83	25.65	12.18	0.90	4.92	7.60
GAM	15.32	8.35	25.27	17.92	13.65	1.44	6.92	11.12
GBM	0.73	5.11	83.72	5.92	0.39	0.14	2.49	1.50
EMca	20.41	4.75	30.06	17.38	9.41	0.96	10.38	6.64



Supplementary Figure S1. Response curves of the selected variables used for modelling.



Supplementary Figure S2. Monthly projections of the ensembled SDM models, where models were built based on data from the northern hemisphere and projections extended to the southern hemisphere. Colour denotes probabilities from 0 (white) to 100 (red).