

ELECTRONIC SUPPLEMENTARY MATERIAL

Modeling the 20th-century distribution changes of *Microgyne trifurcata* a rare plant of southern South American grasslands

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Fig. 1 Single plot of the two datasets of *Microgyne trifurcata* used in the study showing niche overlap of the occurrences for the first (1901-1940) and second (1960-2000) period. (a), (b) Density plots. (c) Kernel density. Occurrences of the first period are plotted in red; occurrences of the second period are plotted in blue

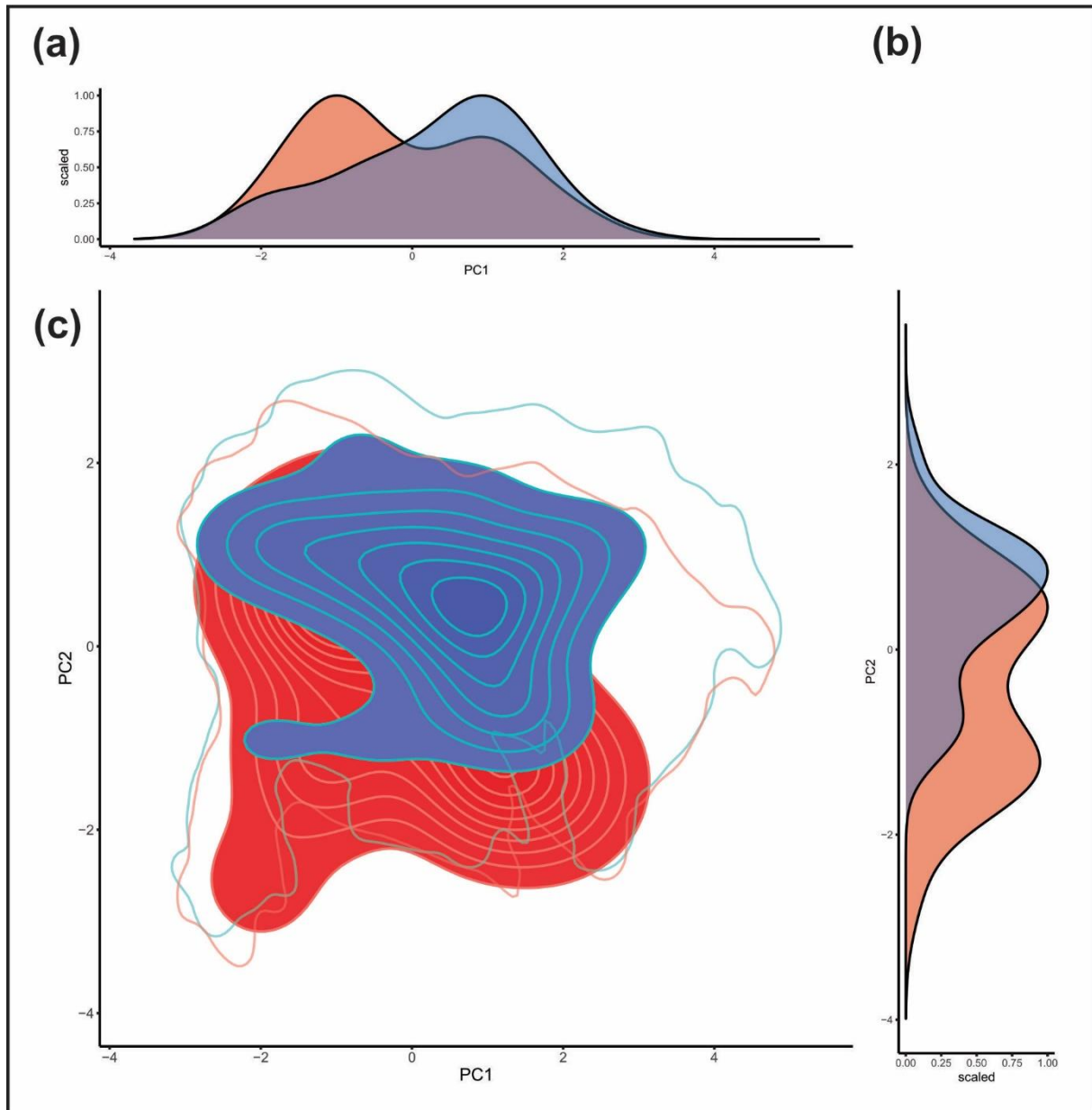


Fig. 2 Environmental differences in the climatic spaces of *Microgyne trifurcata*. (a) climatic space for the first period (1901-1940). (b) climatic space for the second period (1960-2000). (c) differences between the climatic spaces. (d) niche similarity and equivalency analyses.

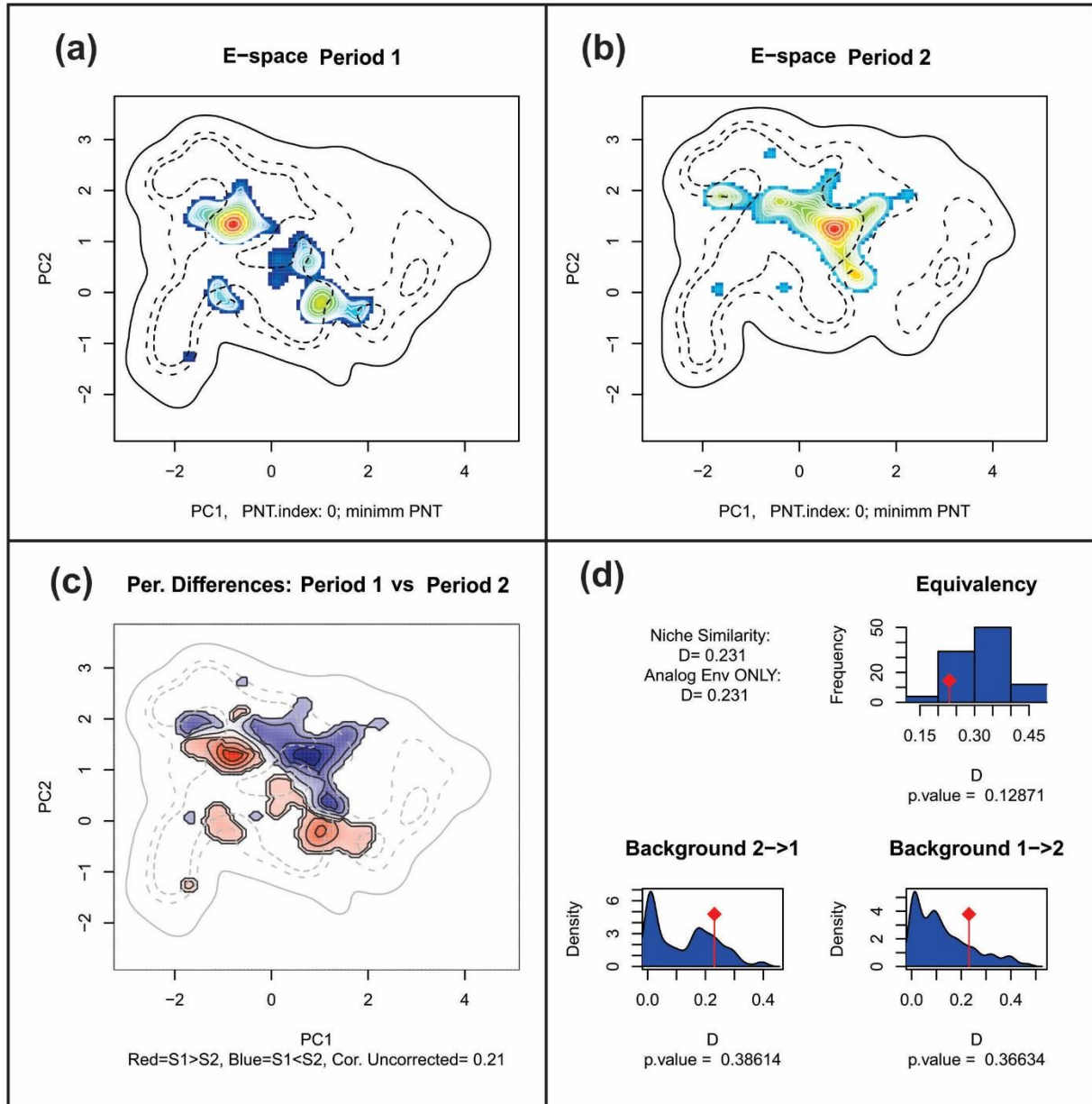


Fig. 3 Changes of climatic variables across the study area during the 20th Century. (a) Mean temperature of wettest quarter (Bio8). (b) Precipitation of wettest quarter (Bio16). (c) Precipitation of the driest quarter (Bio17). (d) Potential evapotranspiration (ET). Estimates of variable changes are based on differences of mean values of the first (1901–1940) and the second (1960–2000) period. Mm/m: millimeters per month. Mm/d: millimeters per day.

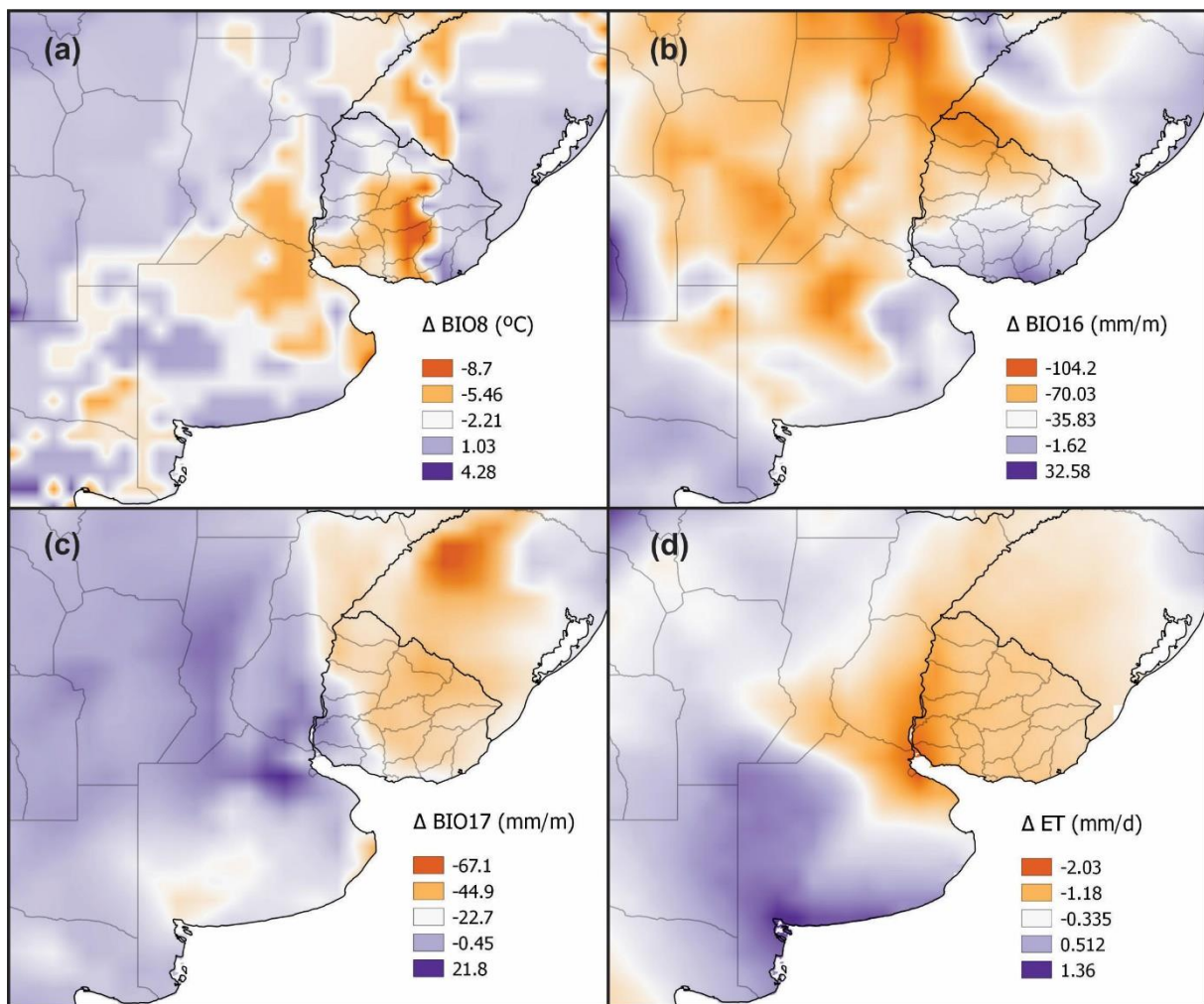


Fig. 4 Changes of land-use variables across the study area during the 20th Century. (a) C3 annuals crops. (b) Pasture. (c) Rangeland. Estimates of variable changes are based on differences of mean values of the first (1901–1940) and the second (1960–2000) period. Units correspond to fractions of grid cell occupied by each variable.

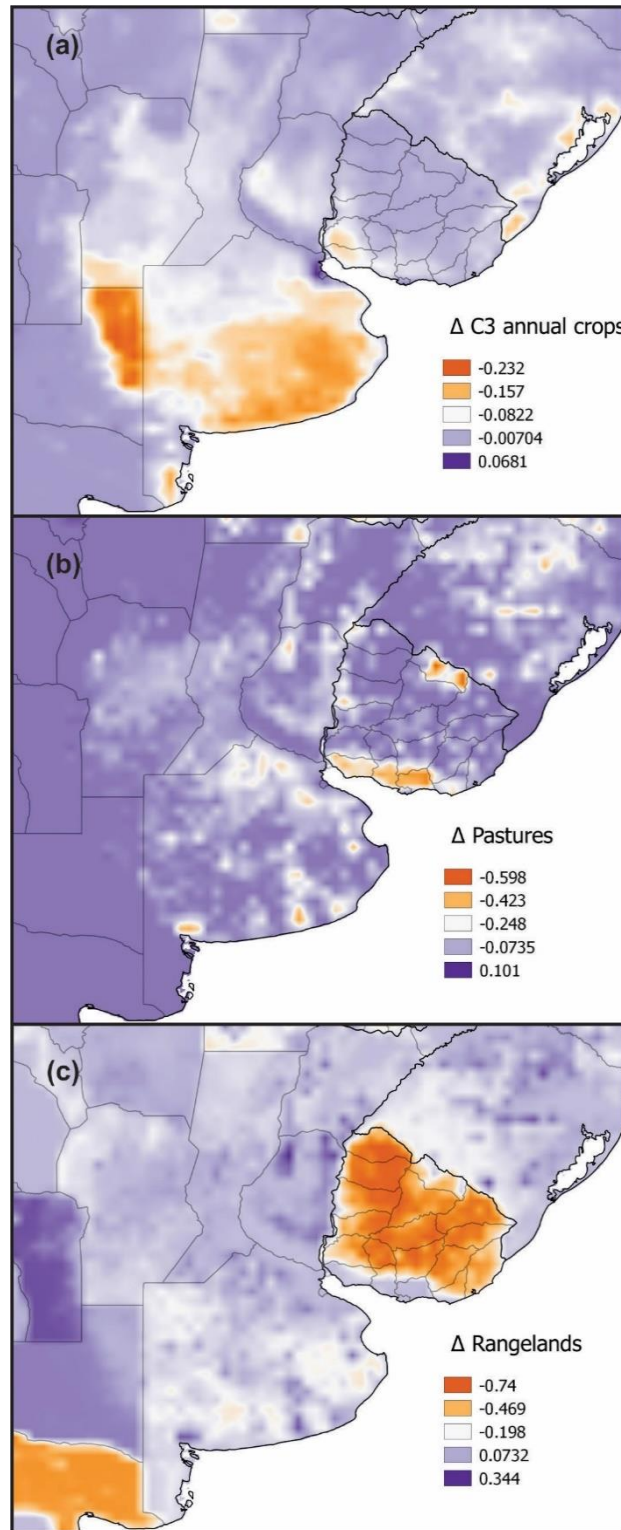


Table 1 Summary statistics (mean, minimum, and maximum) of change in four climate variables and three land-use variables based on mean differences of the first (1901–1940) and second (1960–2000) period (see Online Fig. 3, 4) in the study area. Mm/m: millimeters per month. Mm/d: millimeters per day. * Units correspond to fractions of grid cell occupied by each variable.

Variable	Mean change	Minimum change	Maximum change
Mean temperature of wettest quarter (Bio8) (°C)	-1.51	-8.70	4.28
Precipitation of wettest quarter (Bio16) (mm/m)	-42.72	-104.24	32.58
Precipitation of the driest quarter (Bio17)(mm/m)	-12.77	-67.1	21.76
Potential evapotranspiration (ET) (mm/d)	-0.22	-2.03	1.36
C3 annuals crops *	-0.04	-0.23	0.07
Pastures *	-0.05	-0.67	0.10
Rangelands *	-0.08	-0.74	0.34