

Predicting spatial and temporal effects of climate change on the South American lizard genus *Teius* (Squamata: Teiidae)

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Abstract. The consequences of past or future climate change have been studied in many physical and biological systems, and their effects could change the ecology and spatial distribution of suitable areas for a wide variety of organisms. We analyzed the environmental and geographic space of the current suitable area projecting these conditions into Mid-Holocene and 2050 RCP8.5 scenarios to quantify whether climate change would affect the distribution and size of environmental and geographic space for lizard species of the genus *Teius*. The potentially suitable geographic area for the Mid-Holocene was found to be smaller than today for *T. oculatus* (-29.55%) and for *T. teyou* (-6.82%), but for *T. suquiensis* it was inferred as a larger suitable area (+26%). For the future scenario all species showed a decrease in the potentially suitable area compared to the present (*T. oculatus* = -9.30%, *T. teyou* = -0.79%, *T. suquiensis* = -37.58%). The PCA axes that in the environmental space showed a higher contribution for PC1-2 in Mid-Holocene and Present were mostly related to temperature and for PC3 with altitude variables, for the 2050 scenario were temperature for PC1, precipitation for PC2 and altitude-temperature for PC3. The current *Teius*' potentially suitable geographic space results versus the other temporal forecasts, showed specific differences in magnitude changes. This work illustrates how ectothermic organisms might have to face major changes in their environmental and geographic space as a consequence of the effect of climate changes.

Keywords: niche modeling, climate, Mid-Holocene, present, 2050 scenario, reptiles

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Supplementary material

Table S1. Museums consulted to verify the specimens' identity and obtain information of presence localities for *Teius*.

Collection acronyms	Museum / Herpetological Collection	Location / Country
CENAI	Coleccion Herpetológica, Instituto Nacional de Microbiología "Gustavo G. Malbrán", after 2010 incorporated to MACN collection	Ciudad Autónoma de Buenos Aires, Argentina
FML	Fundación Miguel Lillo	San Miguel de Tucumán, Tucumán, Argentina
FMNH	Field Museum of Natural History	Chicago, Illinois, USA
IADIZA-CH	Instituto Argentino de Investigación de Zonas Áridas	CCT-Mendoza-CONICET, Mendoza, Argentina
IBA-UNC	Instituto de Biología Animal	Universidad Nacional de Cuyo, Mendoza, Argentina
IMCN-UNSJ	Instituto y Museo de Ciencias Naturales	Universidad Nacional de San Juan, San Juan, Argentina
JMC-DC	José Miguel Cej Diagnostic Collection	Universidad Nacional de San Luis, San Luis, Argentina
KU	Natural History Museum	University of Kansas, Lawrence, USA
LACM	Natural History Museum of Los Angeles County	Los Angeles, California, USA
LJAMM-CNP	Herpetological Collection	IPEEC-CONICET, Puerto Madryn, Argentina
MACN	Museo Argentino de Ciencias Naturales "Bernardino Rivadavia"	Ciudad Autónoma de Buenos Aires, Argentina
MCP	Museu de Ciências e Tecnologia, Pontifícia Universidade Católica do Rio Grande do Sul	Porto Alegre, Brazil
MCZ	Museum of Comparative Zoology, Harvard University	Cambridge, Massachusetts, USA
MHN SR H	Museo de Historia Natural de San Rafael	San Rafael, Mendoza, Argentina
MLP	Museo de La Plata	La Plata, Argentina
MNHNP	Museo Nacional de Historia Natural del Paraguay	San Lorenzo, Paraguay
MVZ	University of California, Museum of Vertebrate Zoology	UC Berkeley, Berkeley, California, USA
MZUT	Museo di Zoologia, Università di Torino	Torino, Italy
RVP	Relevamiento de Vertebrados de La Pampa, Museo Provincial de Historia Natural	Santa Rosa, La Pampa, Argentina
SMF	Senckenberg Forschungsinstitut und Naturmuseum	Frankfurt, Germany

TCWC	Biodiversity Research and Teaching Collections	Texas, USA
TNHC	Texas Natural History Collections, University of Texas at Austin	Austin, Texas, USA
UCS	University of Connecticut, Biodiversity Research Collections	Storrs, Connecticut, USA
UMMZ	University of Michigan Museum of Zoology	Ann Arbor, Michigan, USA
UNNEC	Colección Herpetológica de la Universidad Nacional del Nordeste	Corrientes, Argentina
UNRC-ZV	Colección Herpetológica de Zoología Vertebrados, Universidad Nacional de Río Cuarto	Córdoba, now deposited at FML, Argentina
USNM	National Museum of Natural History, Smithsonian Institution	Washington DC, USA

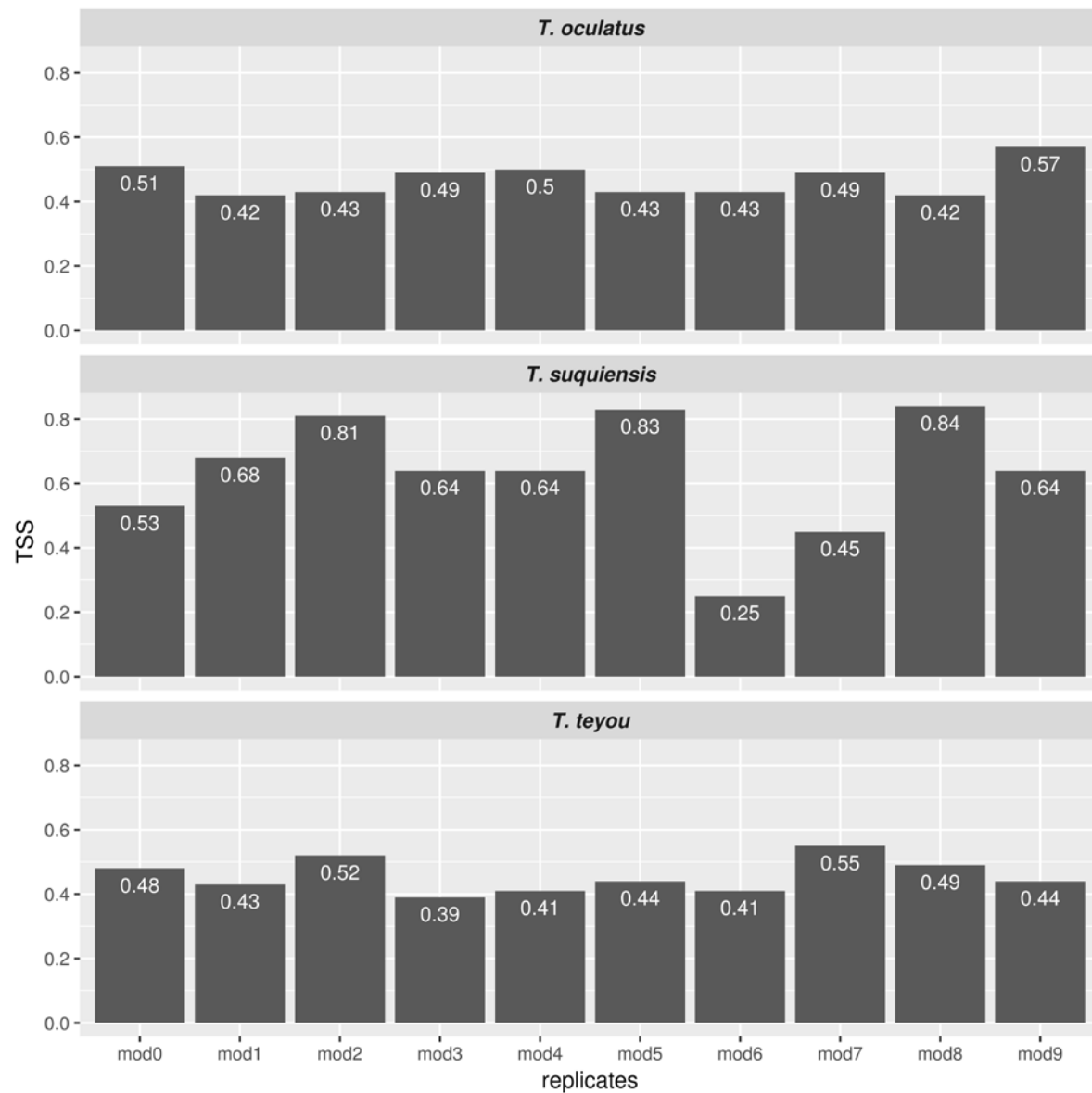


Figure S1. True skill statistic (TSS) performed on the replicates for each species. References: mod, number of model replicate; values close to 1 indicates perfect agreement, values near zero indicates a performance no better than random.

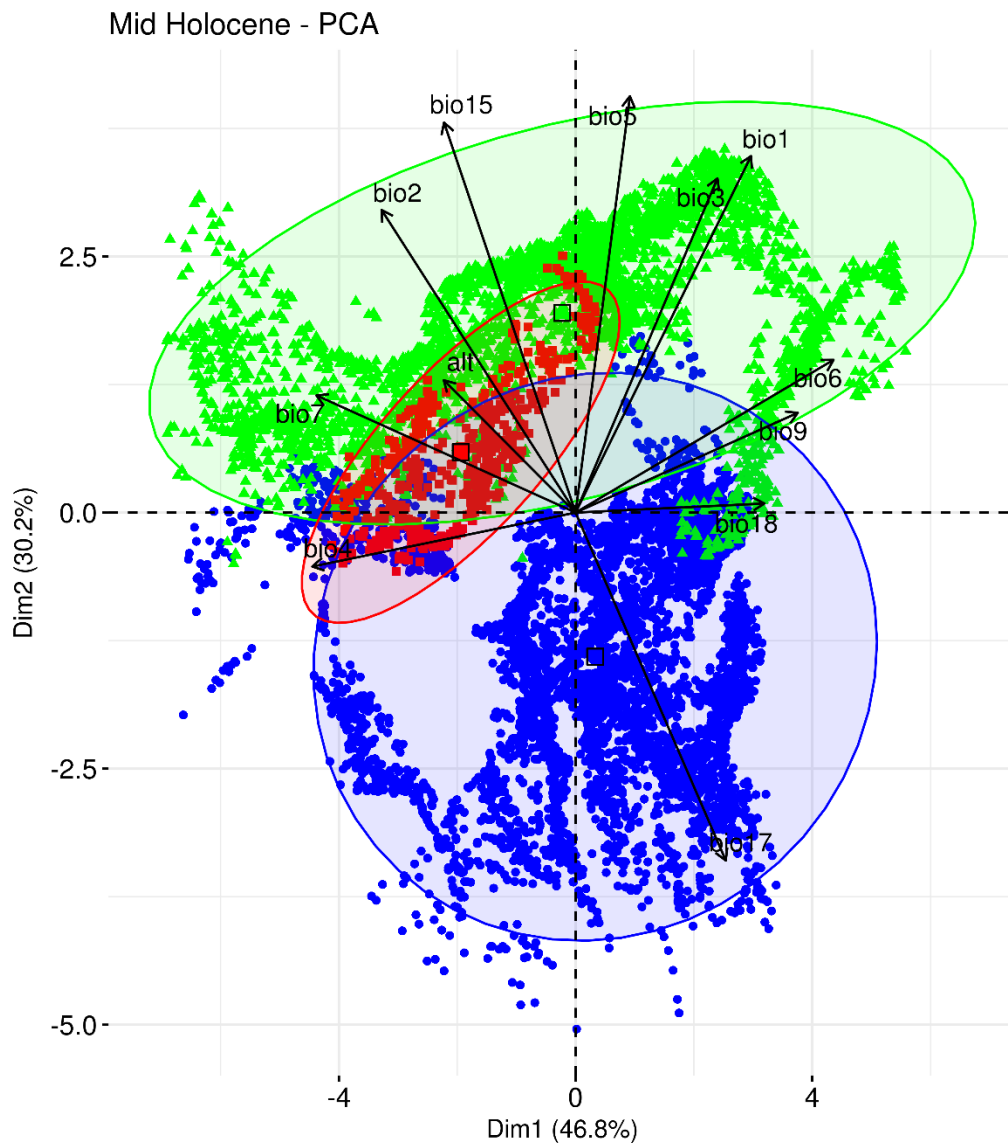


Figure S2. PCA biplot of environmental space for Holocene scenario. References: barycentre for each factor level: square; blue: *T. oculatus*; green: *T. teyou* and red: *T. suquiensis*.

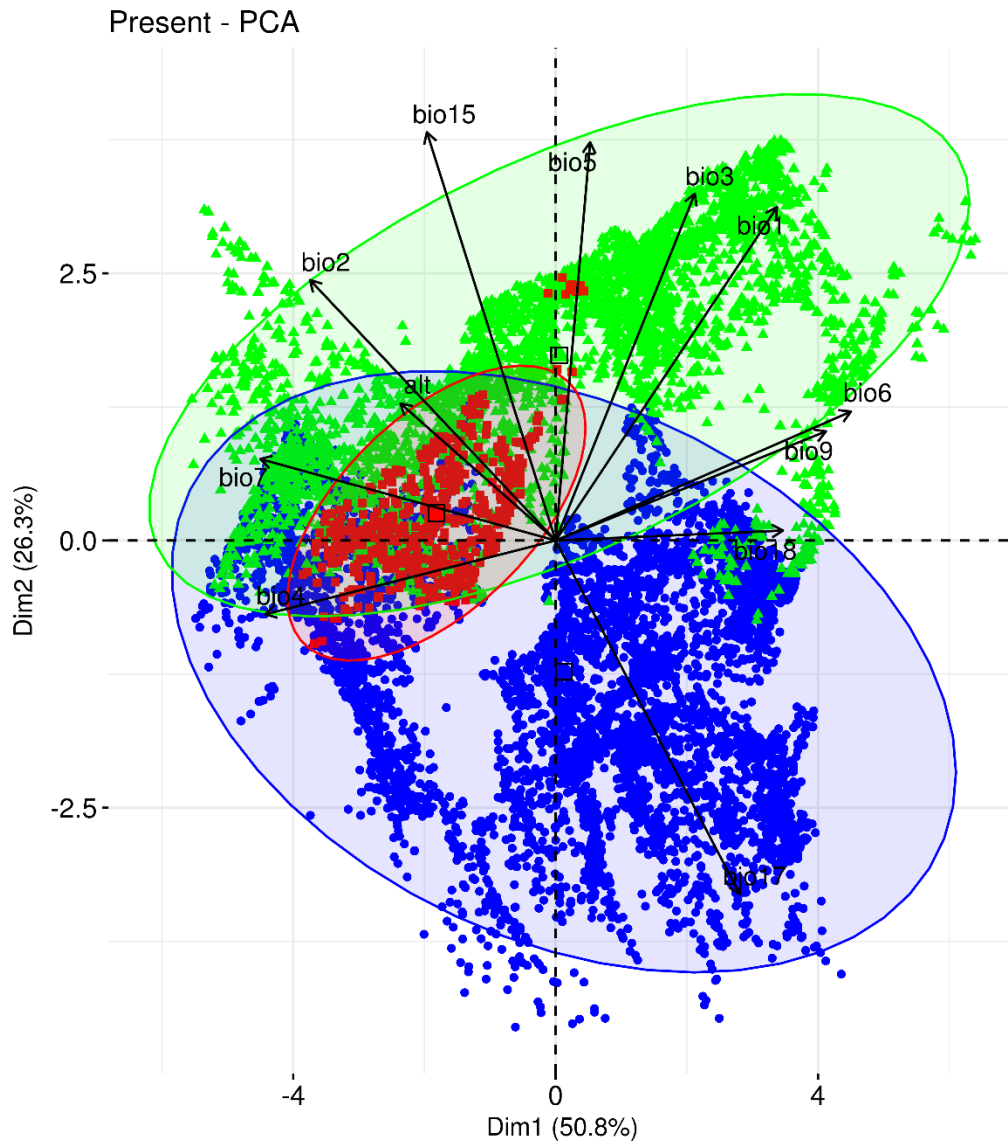


Figure S3. PCA biplot of environmental space for Present scenario. References: barycentre for each factor level: square; blue: *T. oculatus*; green: *T. teyou* and red: *T. suquiensis*.

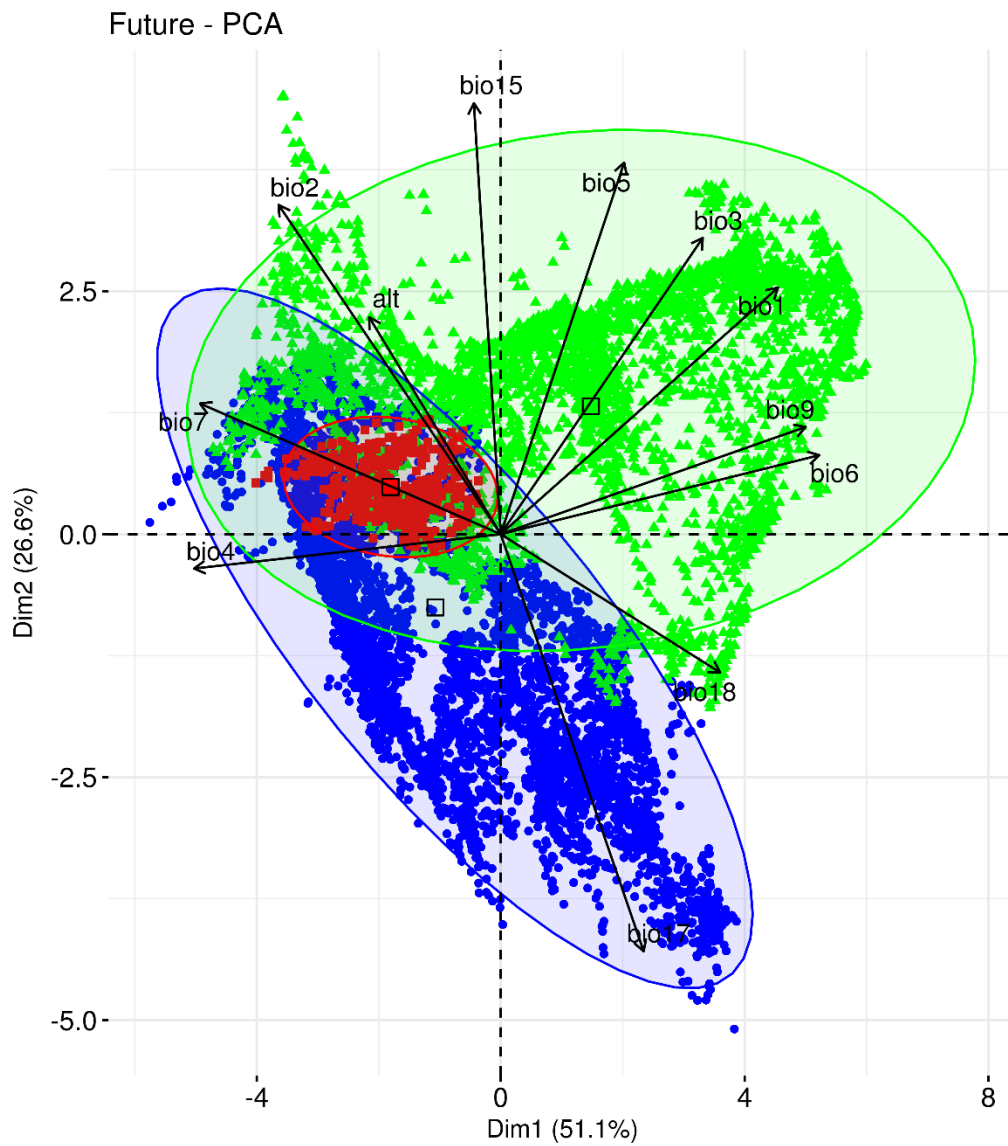


Figure S4. PCA biplot of environmental space for Future scenario. References: barycentre for each factor level: square; blue: *T. oculatus*; green: *T. teyou* and red: *T. suquiensis*.