

Modelizando el habitat y distribucion del oso Andino, aplicando su historia natural

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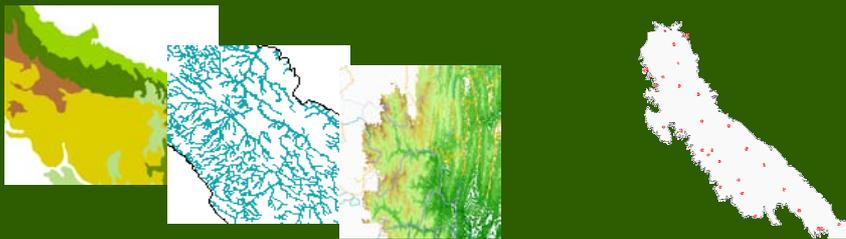
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Modelos de distribución de especies

Información espacial + ocurrencia de especies



Re-construcción de requerimientos ecológicos
y/o (potencial) distribución geográfica

Ambiente

Habitat

Nicho

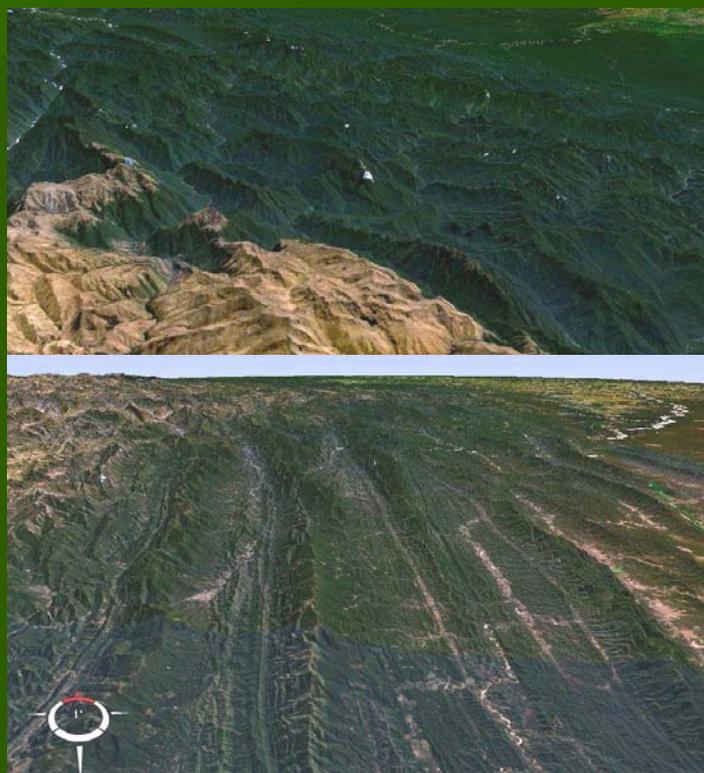
Que estamos modelando?

Habitat

Concepto abajo-arriba para delinear el habitat de un organismo basado en recursos esenciales y/o condiciones asociadas a funciones ecologicas

Los Andes Tropicales de Bolivia

- Area 240 000 km²
- El Norte
 - 300-4000 msnm
 - Picos altos, oeste a este y valles interandinos
 - Bosque de Yunga, Amazonico, pajonales
- El Sur
 - 800-3800 msnm
 - Picos bajos y se encuentran paralelamente norte sur y presentan fragmentacion natural
 - Vegetacion influenciada por cambios hidricos y termales estacionales



Creando el modelo

Maxent

- Datos de solo-presencia
- Distribucion incompleta puede ser aproximada encontrando la probabilidad de maxima entropia o lo mas cercano a la uniformidad
- La distribucion es calculada ajustadando y maximizando la probabilidad media de las localidades de presencia.
- Variables importantes →Jacknife analysis
 - importancia de las variables utilizada individualmente o excluida del set de variables
- El resultado del modelo representa la probabilidad que la especie este presente en un particular pixel, basado en condiciones ambientales.
- La evaluacion del modelo se realiza aplicando el area under the receiver operating characteristic (ROC) curve -> AUC

Variables comunes

■ Tipicas

- Clases vegetacion
- Topografia
- Climatica
- Humana
- Etc. Etc.

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A. H. Hirzel and R. Arlettaz

Table 1. Ecogeographical variables included in analyses

Variable category	Variable	
Topographical	Average elevation in a 200 m radius Average slope in a 200 m radius SD of elevation in a 200 m radius Average northness in a 200 m radius Average eastness in a 200 m radius	
Geolo	Geological variables, their units, code and scale	
	Variable Unit Code	
Distance urban edge	meters	URBAN distance of edge
Mean road length	meters	ROAD total length of road
Water course length	meters	WCOURSE length of primary water course
Riparian vegetation area	ha	RIPRIAN area of riparian vegetation
Open water area	ha	GAME area of game reserve
Shannon-Wiener diversity index	-	SHANNON index of habitat diversity
Open habitat	ha	OPEN area of open habitat
Scrubland area	ha	SCRUB area of scrubland
Forest area	ha	FOREST area of forest
Open woodland area	ha	OLIVE area of olive orchards
Regulated stream	ha	REG area of regulated stream
Water surface area	ha	WATER area of water surface
Number of open habitat patches	-	OPEN number of open habitat patches
Number of scrubland patches	-	SCRUB number of scrubland patches
Number of forest patches	-	FOREST number of forest patches
Number of regulated stream patches	-	REG number of regulated stream patches
Number of water surface patches	-	WATER number of water surface patches
Moran slope	degrees	SLOPE Moran slope in the study area

Table 1 - List of land use types adapted from EUNIS typology

Type	Land use
Aquatic habitats	Permanent oligotrophic ponds Hydrographical network
Shrub-covered habitats	Scrub Densely shrub-covered area Sparsely shrub-covered area
Outflooded habitats	Amble land (1) Recently unmanaged amble land (1.5)
Forested habitats	Broad-leaved deciduous woodland Mixed woodlands Coniferous woodland Low-stem tree orchards
Grazed/mowed habitats	Permanent extensive mesotrophic pastures (2) (containing patches of ungrazed and diversified vegetation) Permanent intensive mesotrophic pastures (1) (where but quite diversified and heterogeneous vegetation) Permanent very intensive mesotrophic pastures (0.5) (overgrazed and homogeneous vegetation) Hay meadows (3) After-math grassed meadows (2.5)
(Temporarily) unimproved habitats	Wet grasslands Dry grasslands Grassy fallow Wet fallow Dry heath Dry heath with scattered trees Dry heath with numerous bushes Wet heath Wet heath with numerous bushes
Anthropogenic habitats	Rail network Road network (if secondary roads or paths only) Agricultural constructions Buildings of cities, towns and villages Domestic gardens of villages and urban peripheries Artificial and sterile habitats

Variables: nuestra propuesta

■ Alimento



■ Refugio

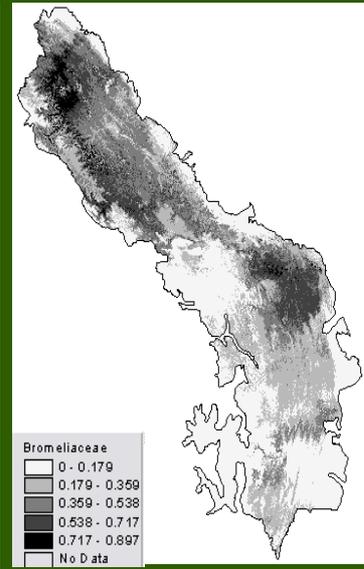
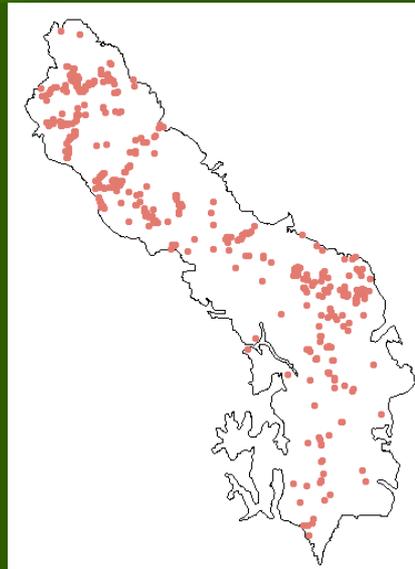


■ Agua

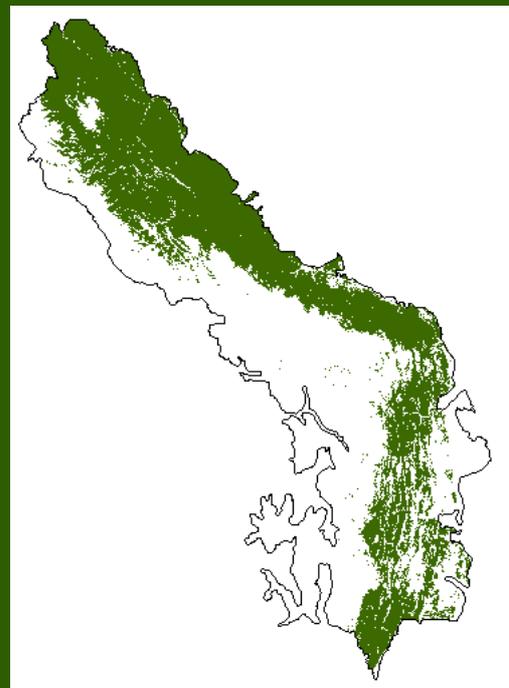


Alimento

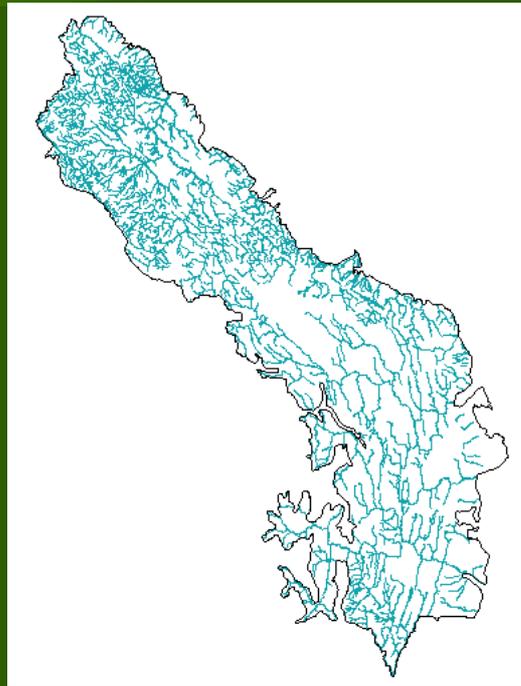
- Bromeliaceae
- Ericaceae
- Lauraceae
- Rosaceae
- Poaceae



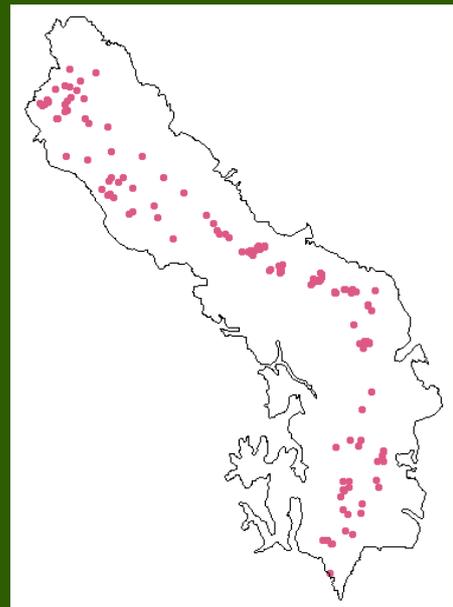
Refugio



Agua

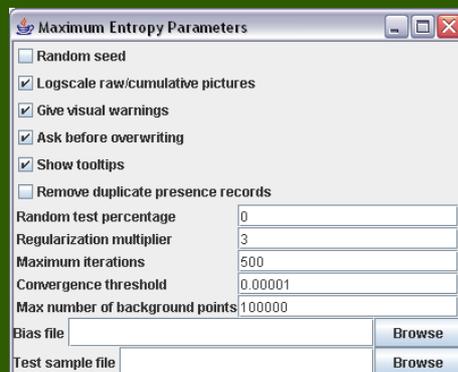
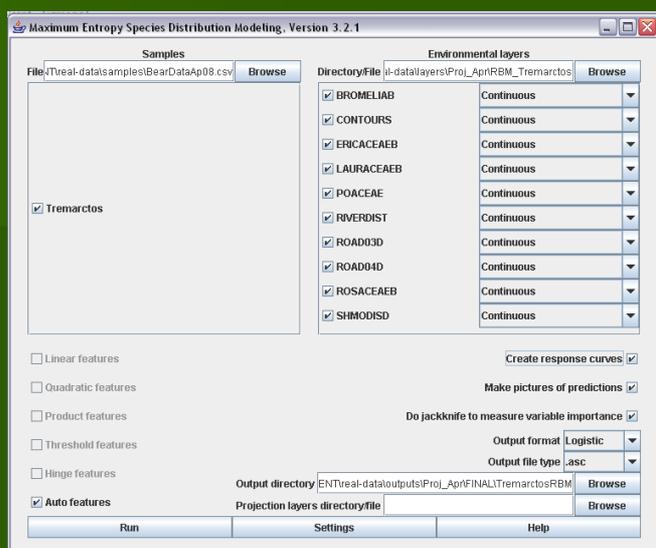


Datos solo-presencia

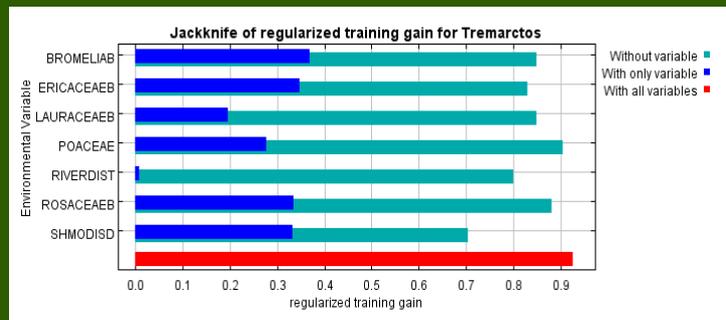
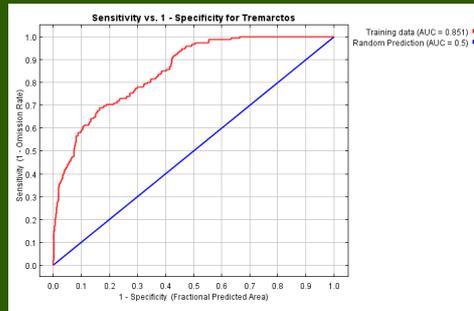
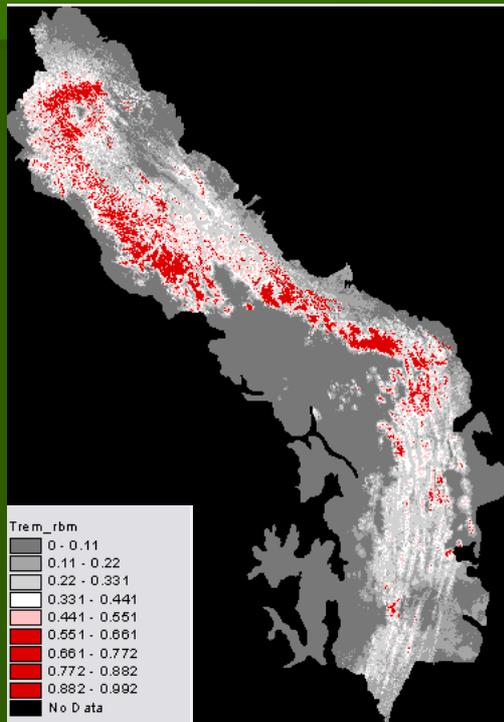


Maxent parametros

- Resolución 30 arcsec o approx 1km²
- Variables continuo raster ASCII
- 100 000 background points → area gran numero de pixels (+300 000)
- Regularization multiplier de 3 para reducir over-fitting en los datos.
- La seleccion de features (derivados de variables ambientales) automatico

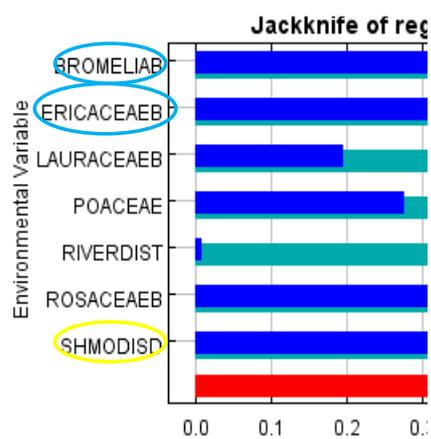


El resultado

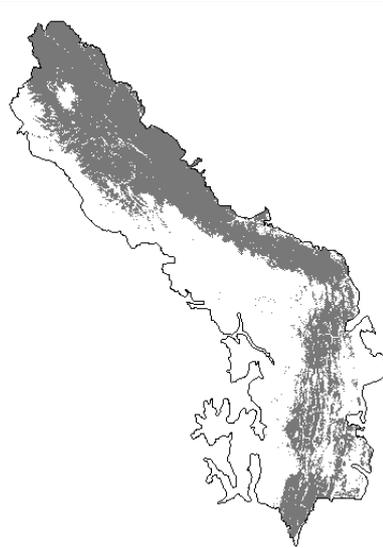


Importancia de las variables

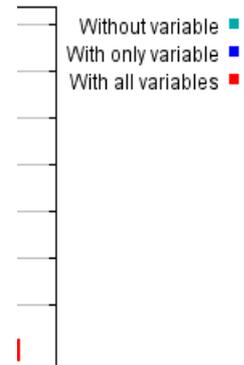
(b)



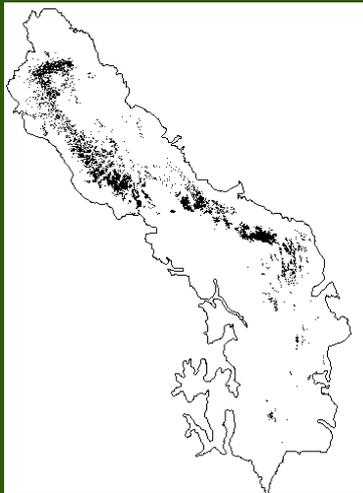
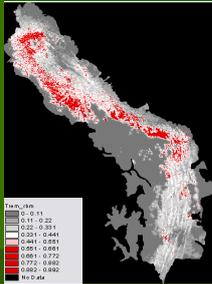
(c)



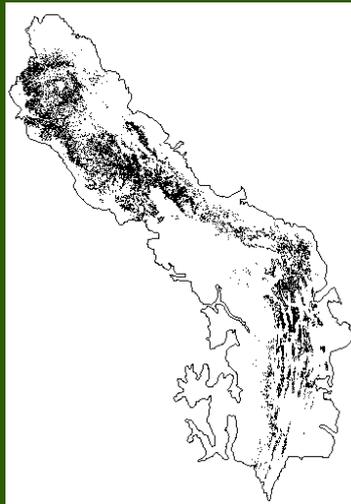
(d)



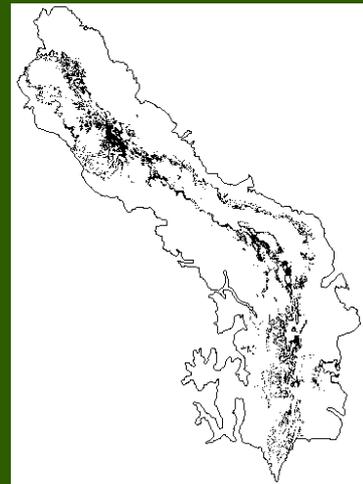
El modelo con diferentes probabilidades de presencia



>0.5

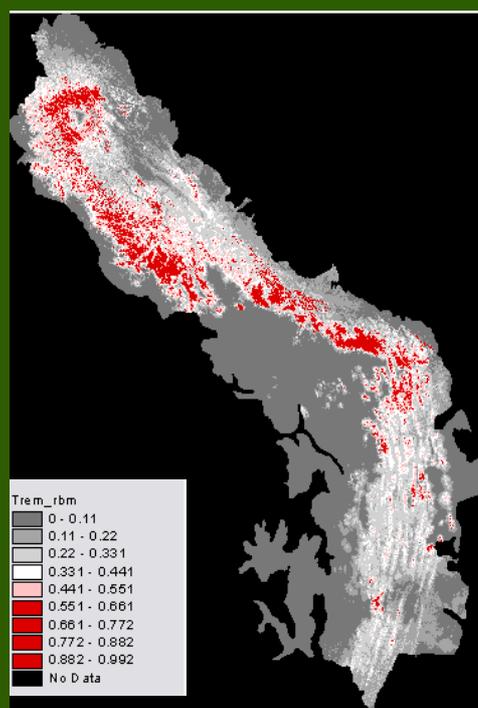
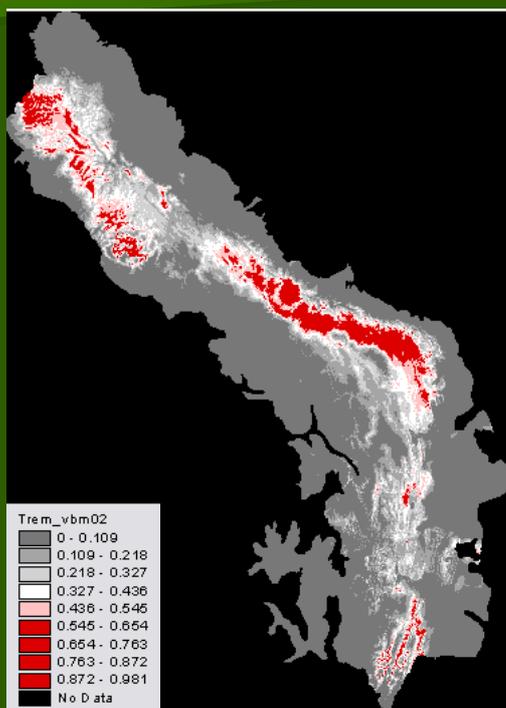


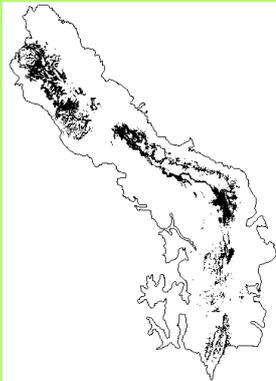
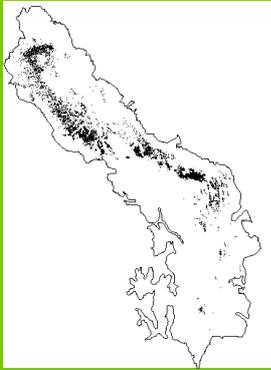
0.3-0.5



0.2-0.3

Y los modelos construidos con variables "tradicionales"?





Conclusion

- Modeladores → A ponerse los zapatos del animal!!!!
 - Incorporacion de la historia natural de la especie
- No modeladores → Apretar el boton "run" es PELIGROSO
 - Los modelos son herramientas extremadamente manipulables y faciles de utilizar. Por lo tanto, sobreponer el conocimiento de la especie por sobre todo fancy modelo estadistico