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

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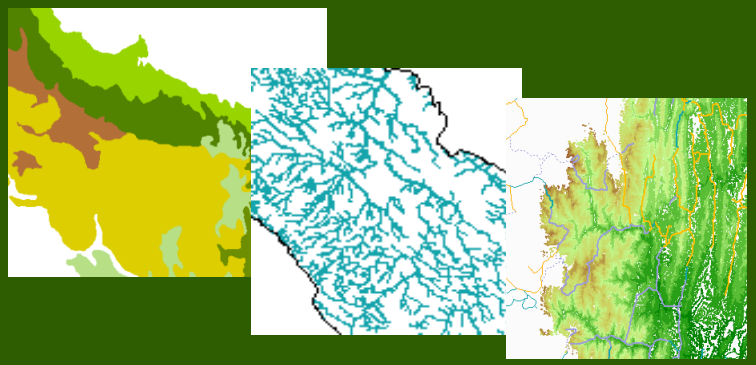
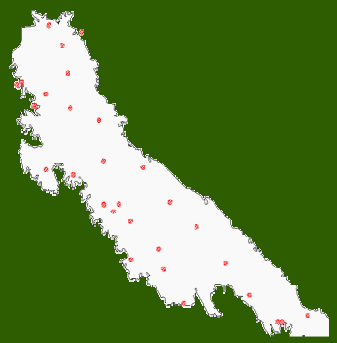
Modelos de distribucion de especies

Informacion espacial + ocurrencia de especies





Re-construccion de requerimientos ecologicos
y/o (potencial) distribucion geografica

Ambiente

Habitat

Nicho

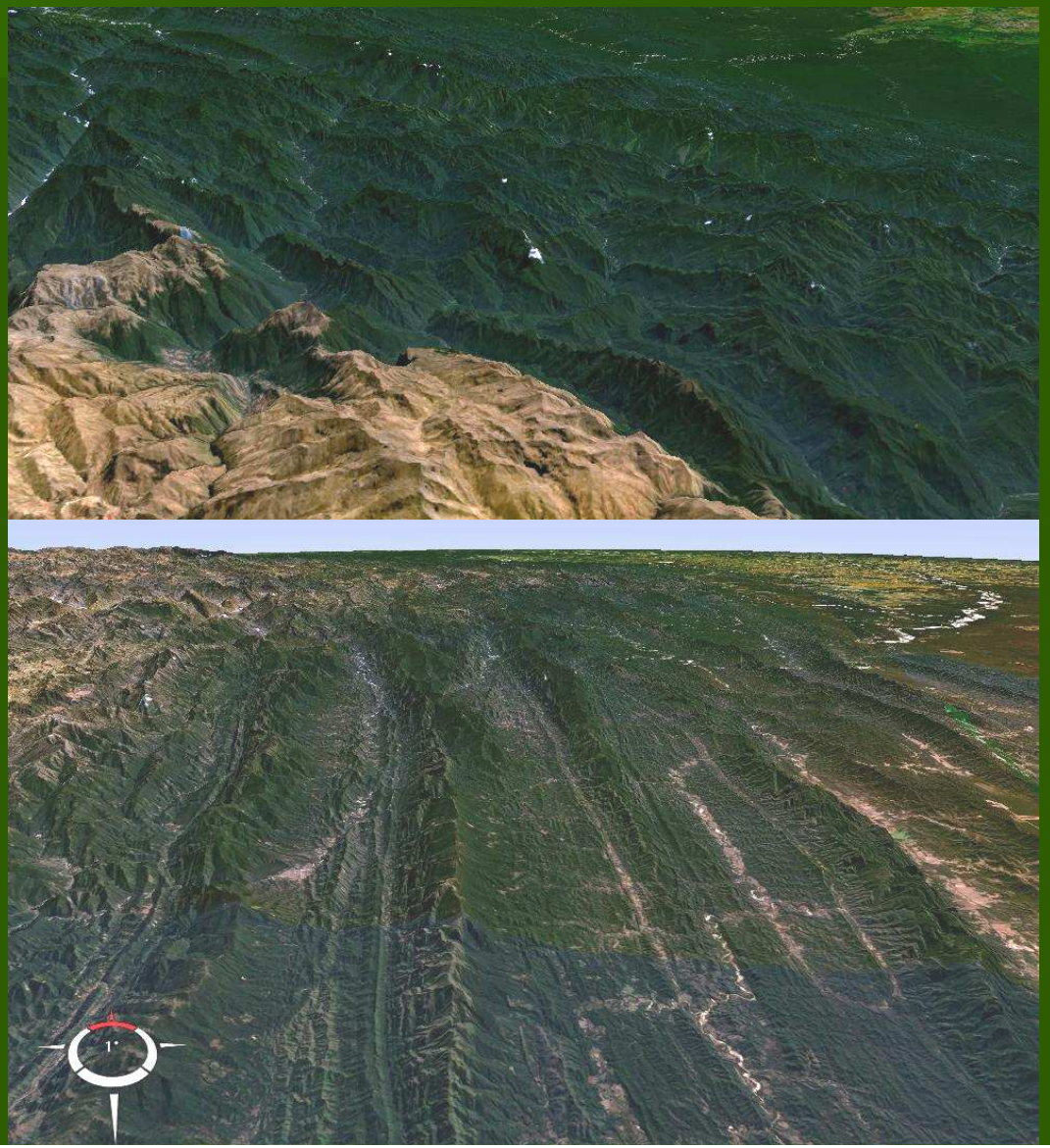
Que estamos modelando?

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 km^2
- 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



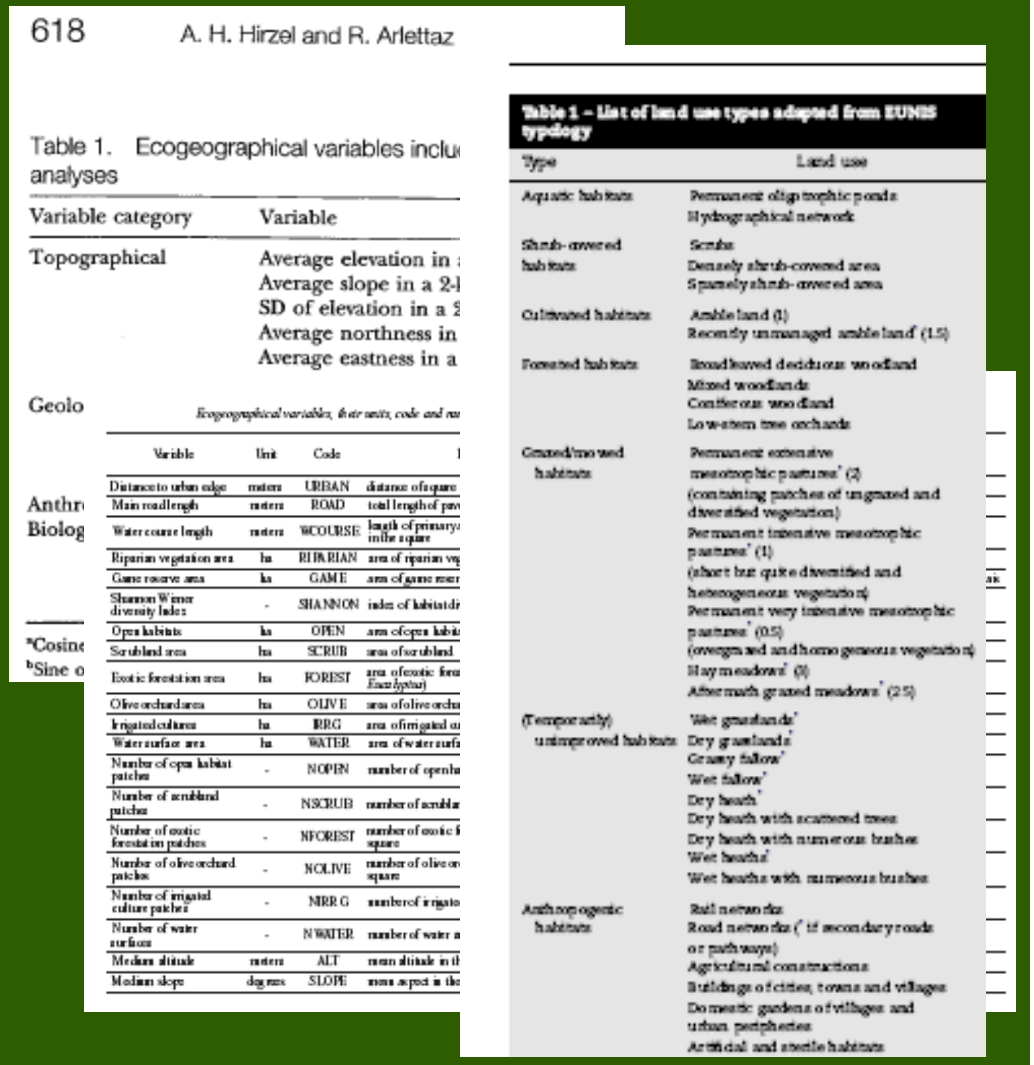
Creando el modelo

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.



618 A. H. Hirzel and R. Arlettaz

Table 1. Ecogeographical variables inclu
analyses

Variable category	Variable
Topographical	Average elevation in Average slope in a 2- SD of elevation in a Average northness in Average eastness in a
Geolo	
Anthr Biolog	

*Cosine
bSine o

Ecogeographical variables, their units, code and ra

Variable	Unit	Code	
Distance to urban edge	meters	URBAN	distance of square
Main road length	meters	ROAD	total length of pav
Water course length	meters	WCOURSE	length of primary in the square
Riparian vegetation area	ha	RIPARIAN	area of riparian ve
Game reserve area	ha	GAME	area of game reser
Shannon Wiener diversity index	-	SHANNON	index of habitat di
Open habitats	ha	OPEN	area of open habit
Scrubland area	ha	SCRUB	area of scrubland
Exotic forestation area	ha	FOREST	area of exotic fore *Eucalyptus*
Olive orchard area	ha	OLIVE	area of olive orcha
Irrigated cultures	ha	IRRG	area of irrigated cu
Water surface area	ha	WATER	area of water surfa
Number of open habitat patches	-	NOPEN	number of open ha
Number of scrubland patches	-	NSCRUB	number of scrubla
Number of exotic forestation patches	-	NFOREST	number of exotic f square
Number of olive orchard patches	-	NOLIVE	number of olive or square
Number of irrigated culture patches	-	NIRRG	number of irrigate
Number of water surfaces	-	NWATER	number of water a
Median altitude	meters	ALT	mean altitude in th
Median slope	degrees	SLOPE	mean aspect in the

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

Type	Land use
Aquatic habitats	Permanent oligotrophic ponds Hydrographical network
Shrub-covered habitats	Scrubs Densely shrub-covered area Sparsely shrub-covered area
Cultivated habitats	Arable land (1) Recently unmanaged arable land' (1.5)
Forested habitats	Broadleaved deciduous woodland Mixed woodlands Coniferous woodland Low-stem tree orchards
Grassed/mowed habitats	Permanent extensive mesotrophic pastures' (2) (containing patches of ungrazed and diversified vegetation) Permanent intensive mesotrophic pastures' (1) (short but quite diversified and heterogeneous vegetation) Permanent very intensive mesotrophic pastures' (0.5) (overgrazed and homogeneous vegetation) Hay meadows' (0) Aftermath grazed 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 heaths' Wet heaths with numerous bushes
Anthropogenic habitats	Rail networks Road networks (' tf secondary roads or pathways) Agricultural constructions Buildings of cities, towns and villages Domestic gardens of villages and urban peripheries Artificial and sterile habitats

Variables: nuestra propuesta

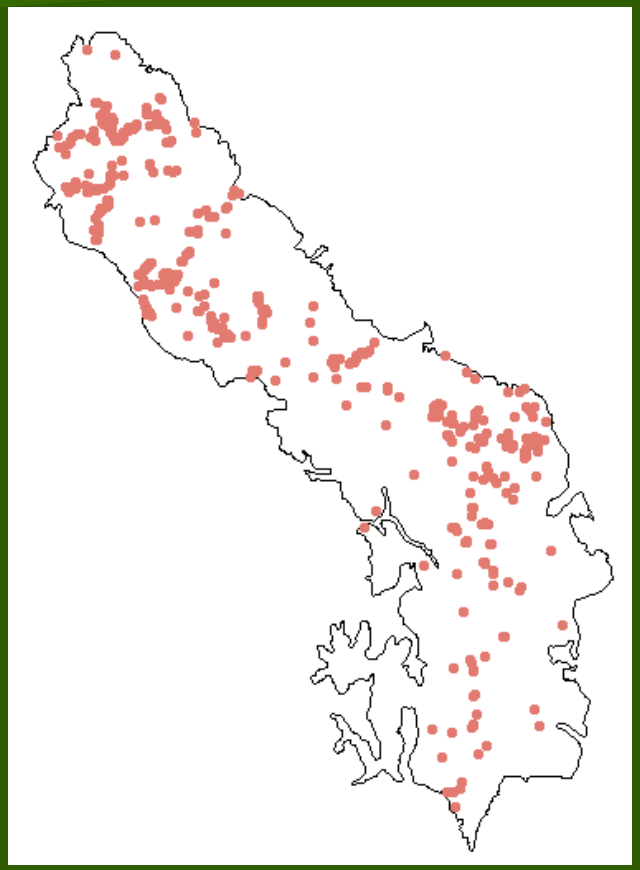
- Alimento

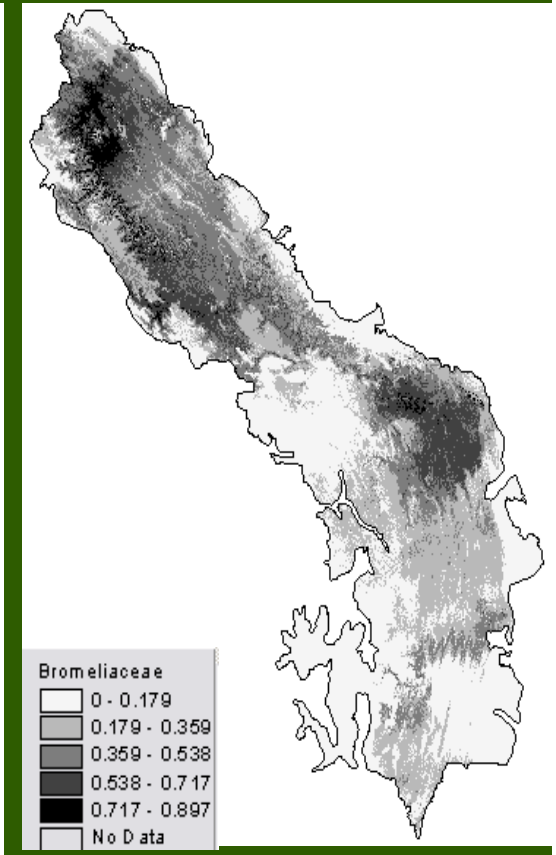
- Refugio

- Agua

Alimento

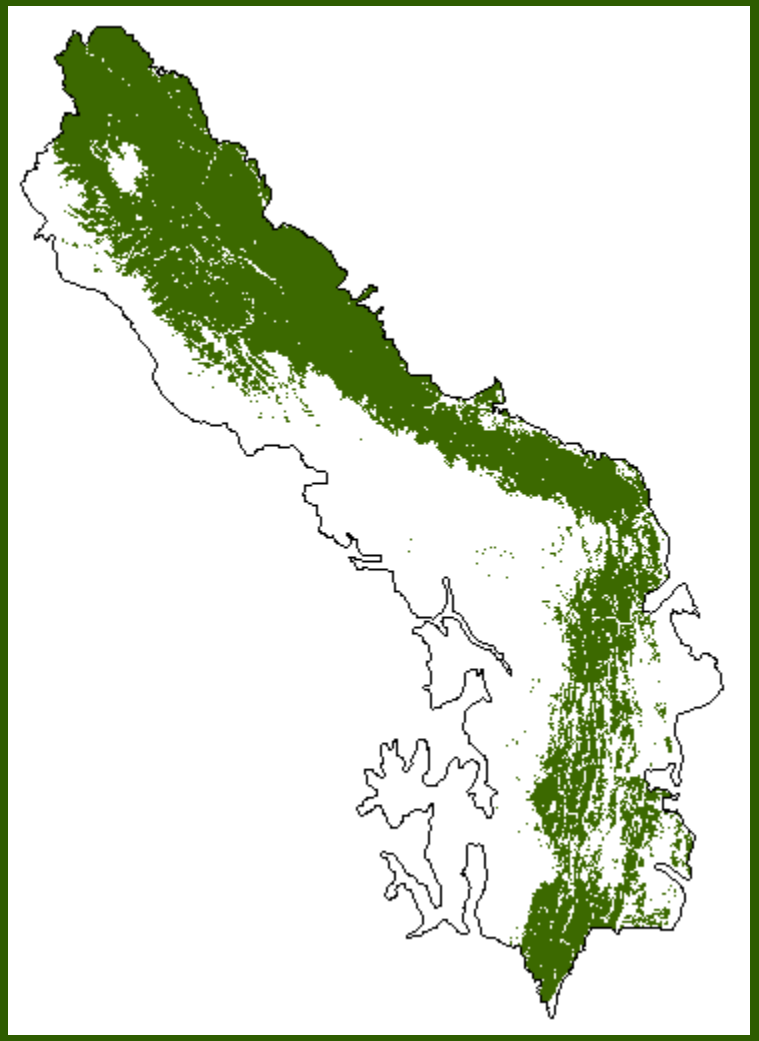
- Bromeliaceae
- Ericaceae
- Lauraceae
- Rosaceae
- Poaceae



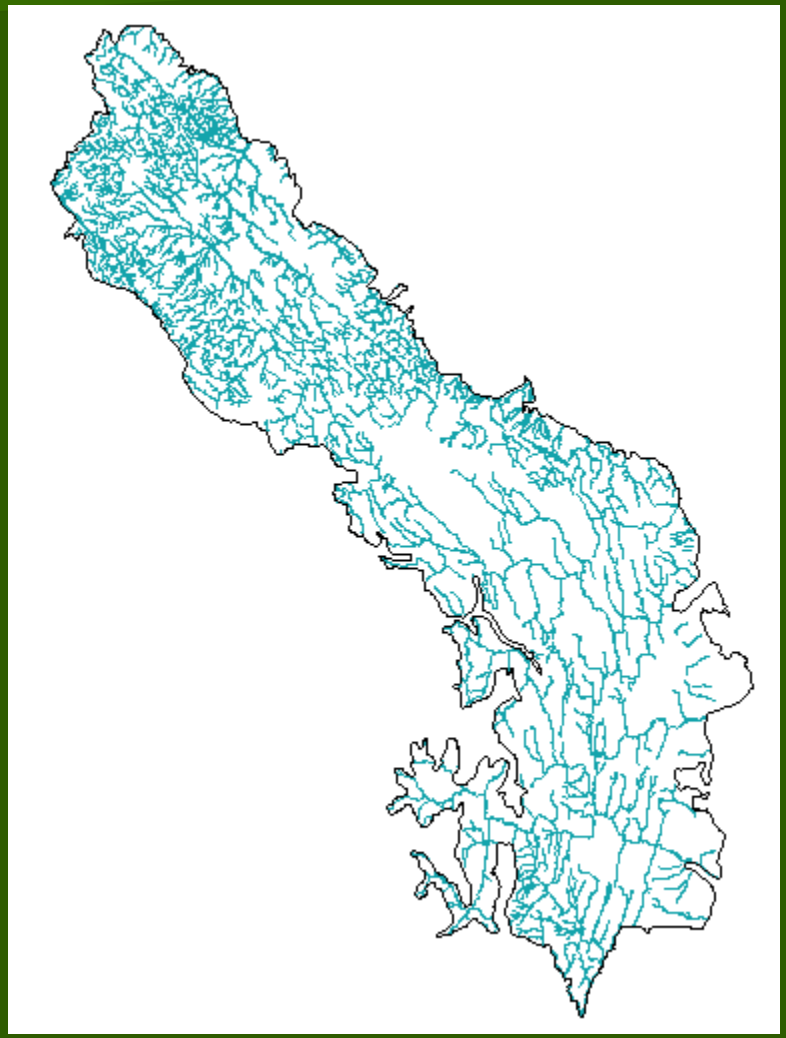


Refugio

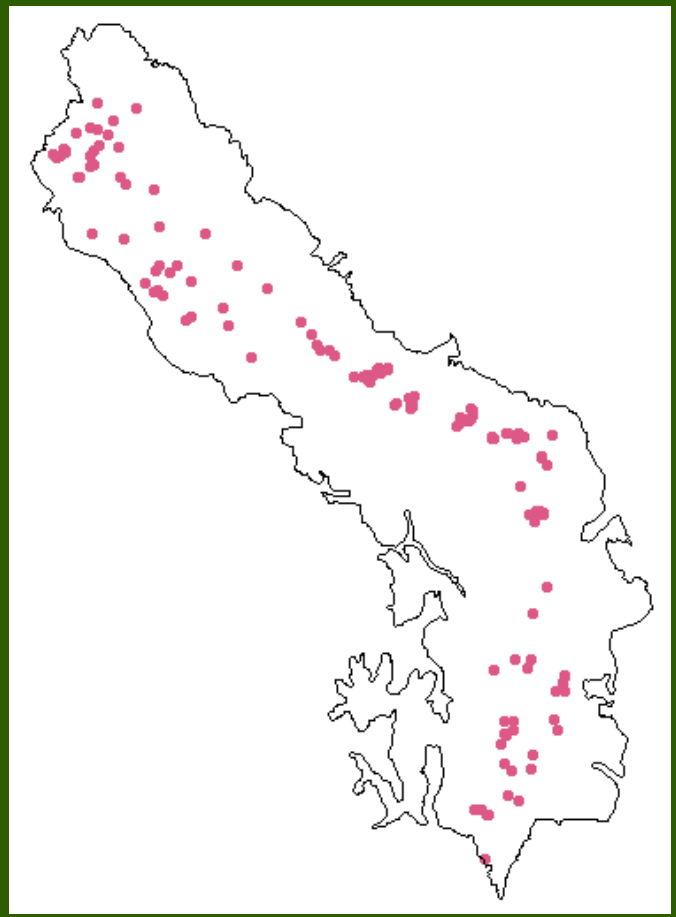

Jan 1, 2000
Rondônia
La Paz
Bolivia
Santa Cruz
714 km
© 2008 LeadDog Consulting
© 2008 Europa Technologies
© 2008 DMapas
©2008 MapLink/Tele Atlas



Agua

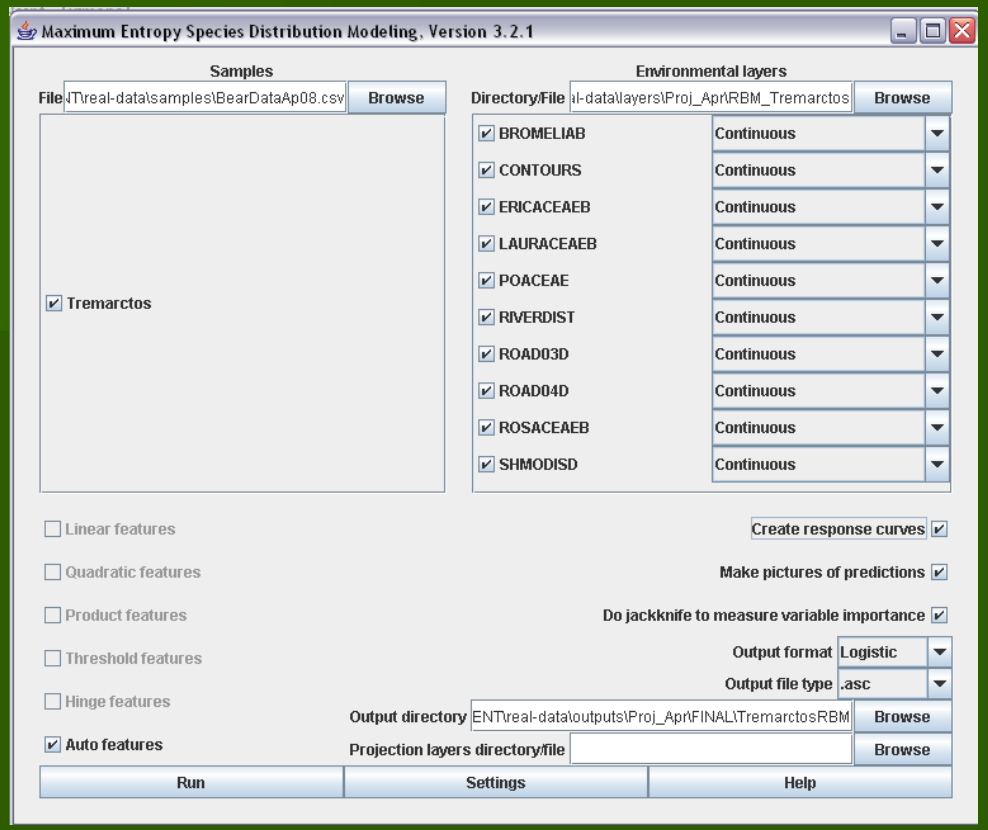


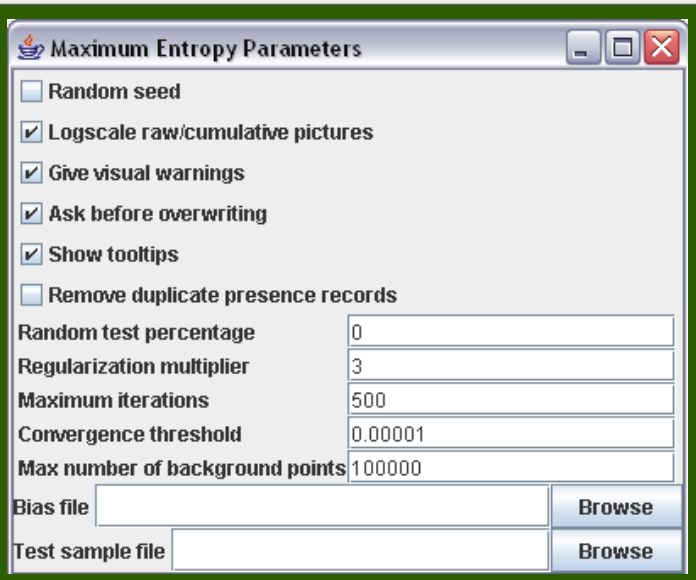
Datos solo-presencia



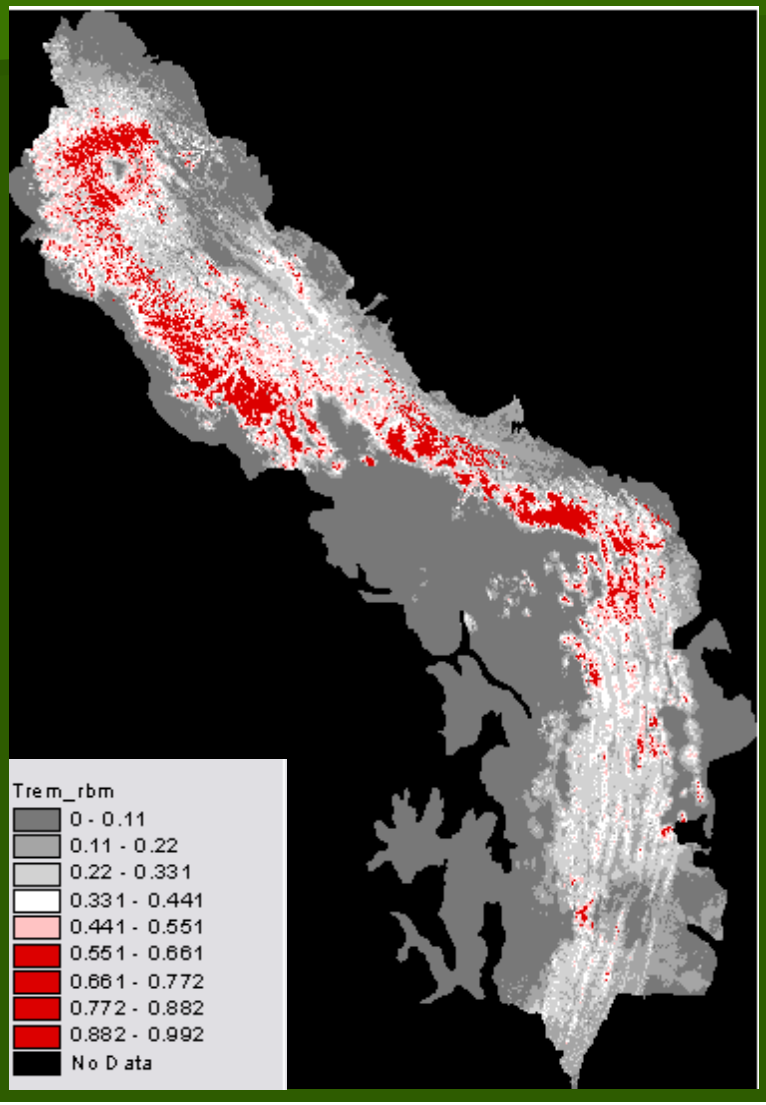
Maxent parametros

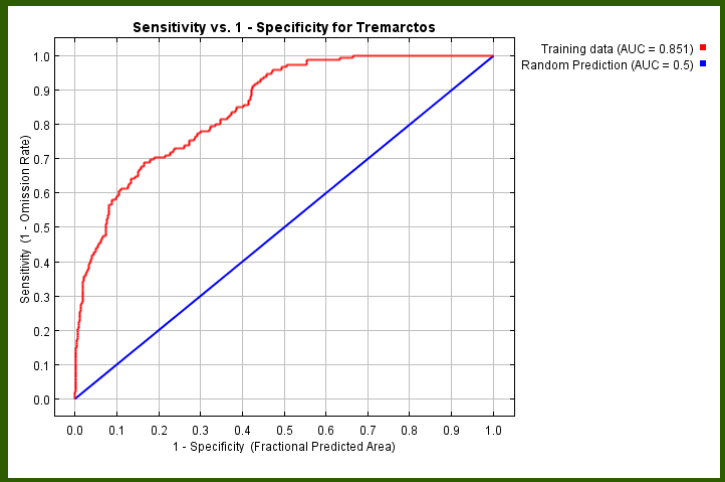
- Resolucion 30 arcsec o approx 1km^2
- Variables continuo raster ASCII
- 100 000 background points → area gran numero de pixels (+300 000)
- Regularization multiplier de 3 para reducir over–fitting en los datos.
- La seleccion de features (derivados de variables ambientales) automatico

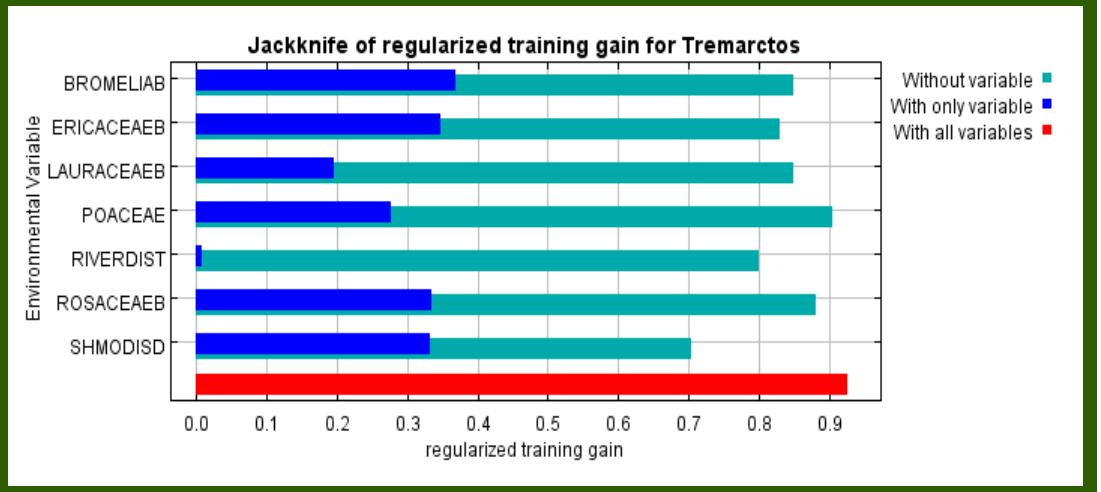




El resultado





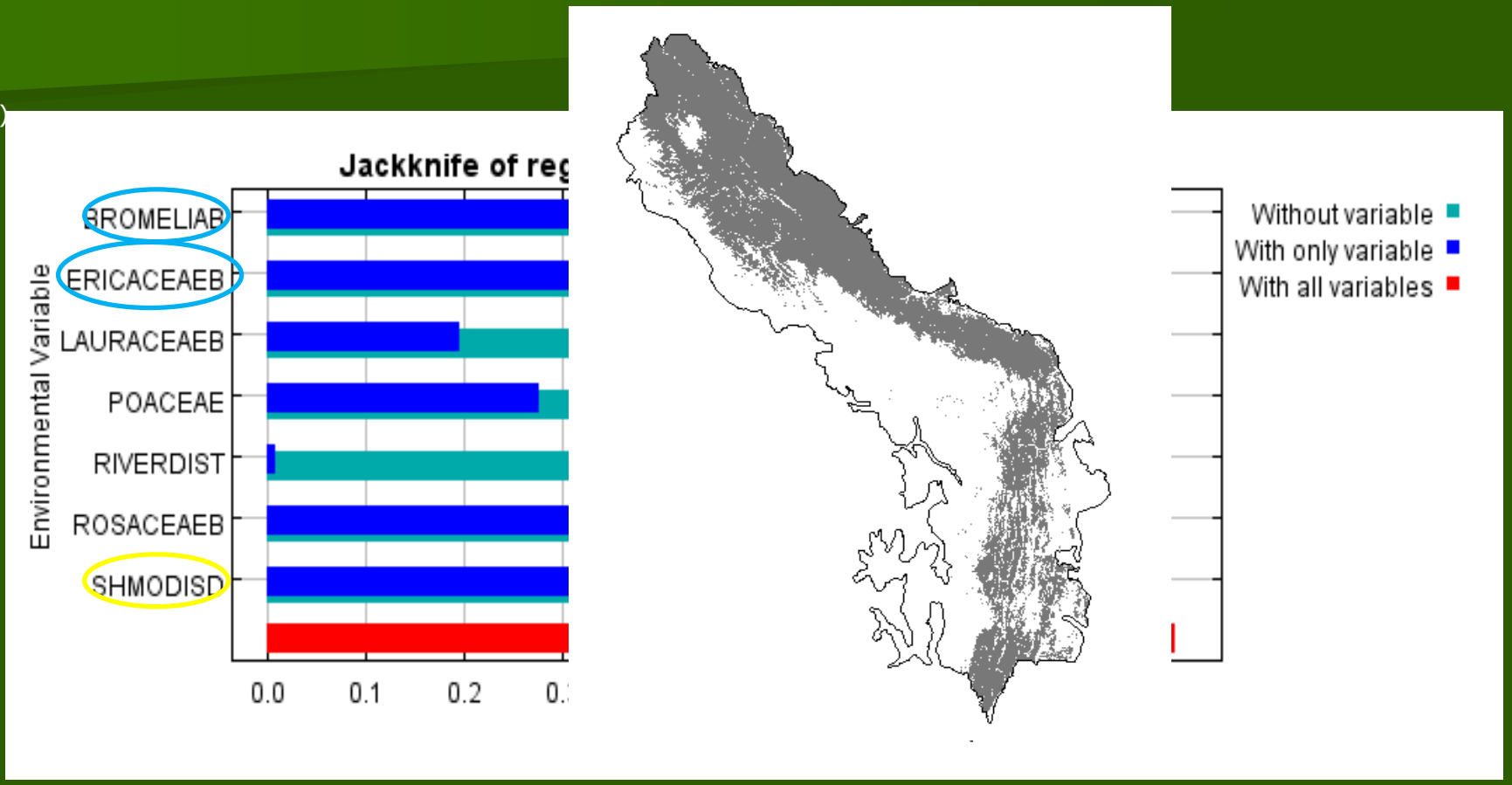


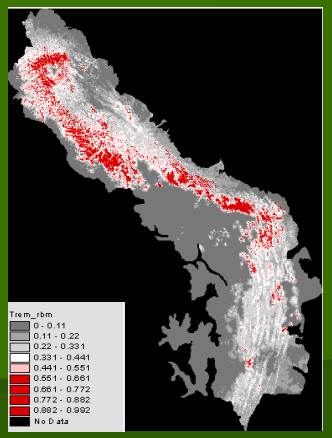
Importancia de las variables

(b)

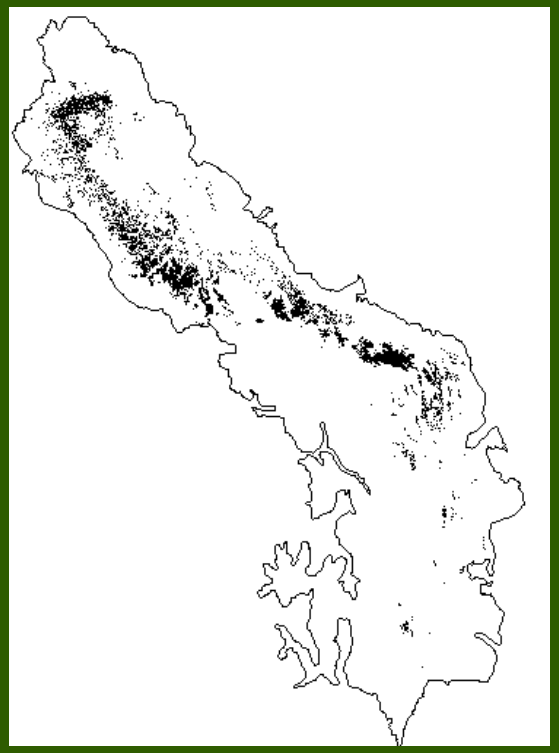
(c)

(d)

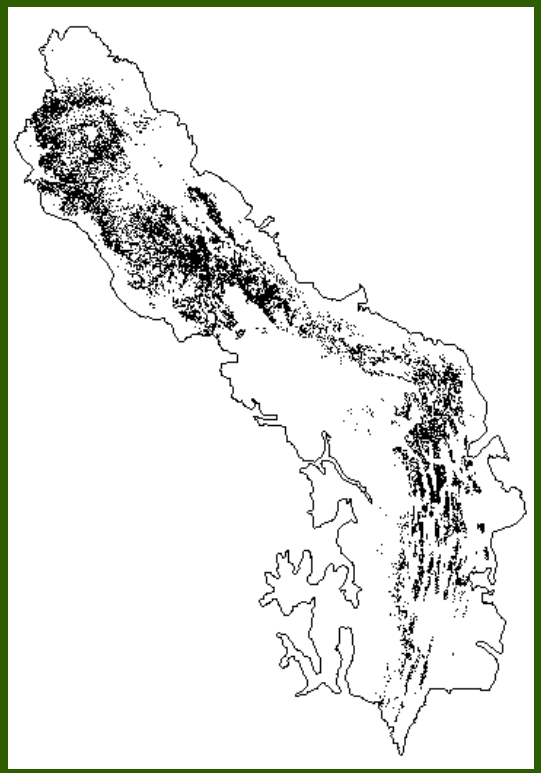




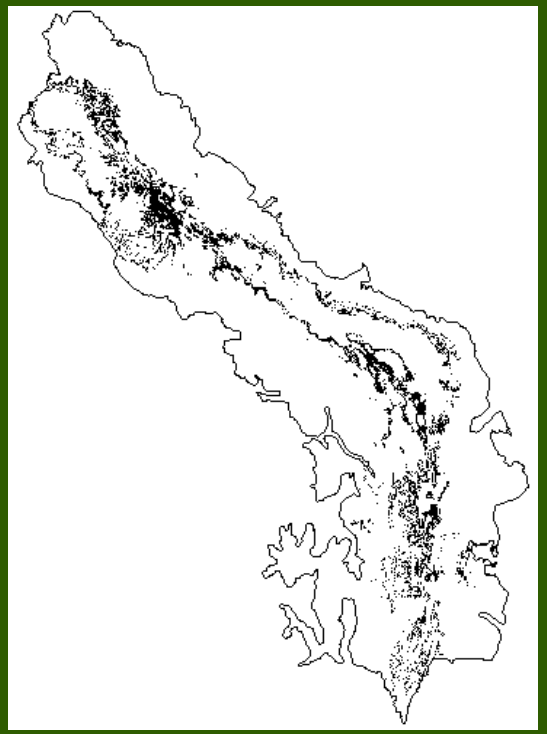
El modelo con diferentes probabilidades de presencia



>0.5

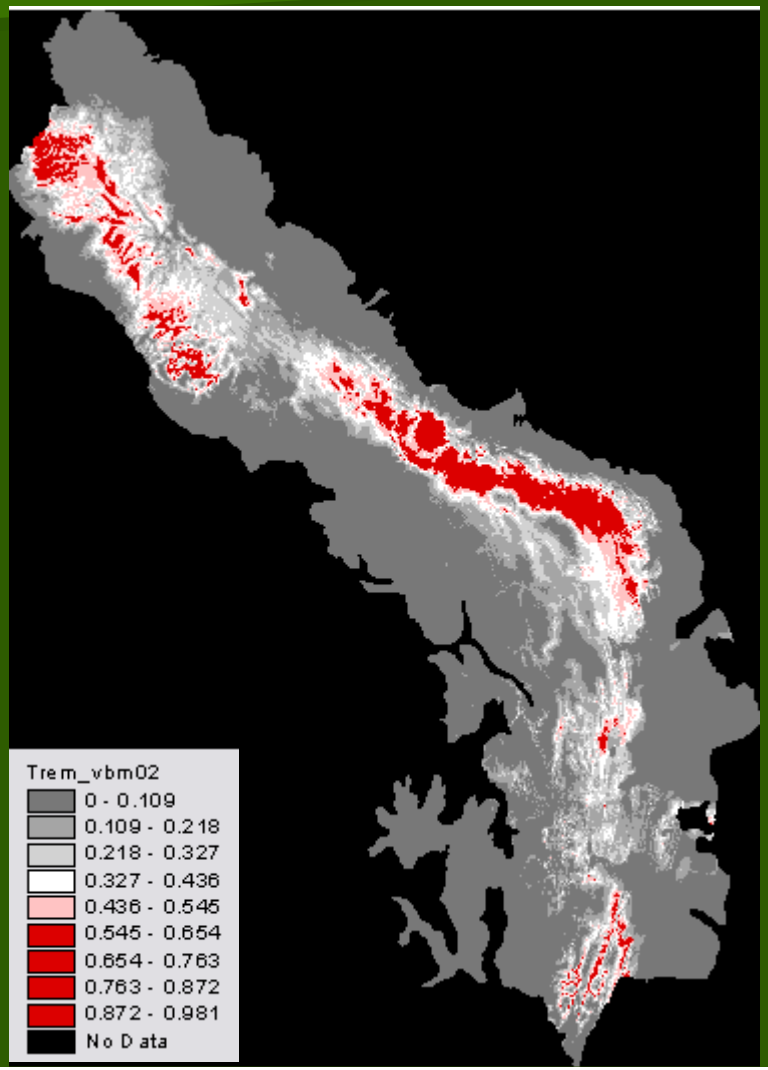


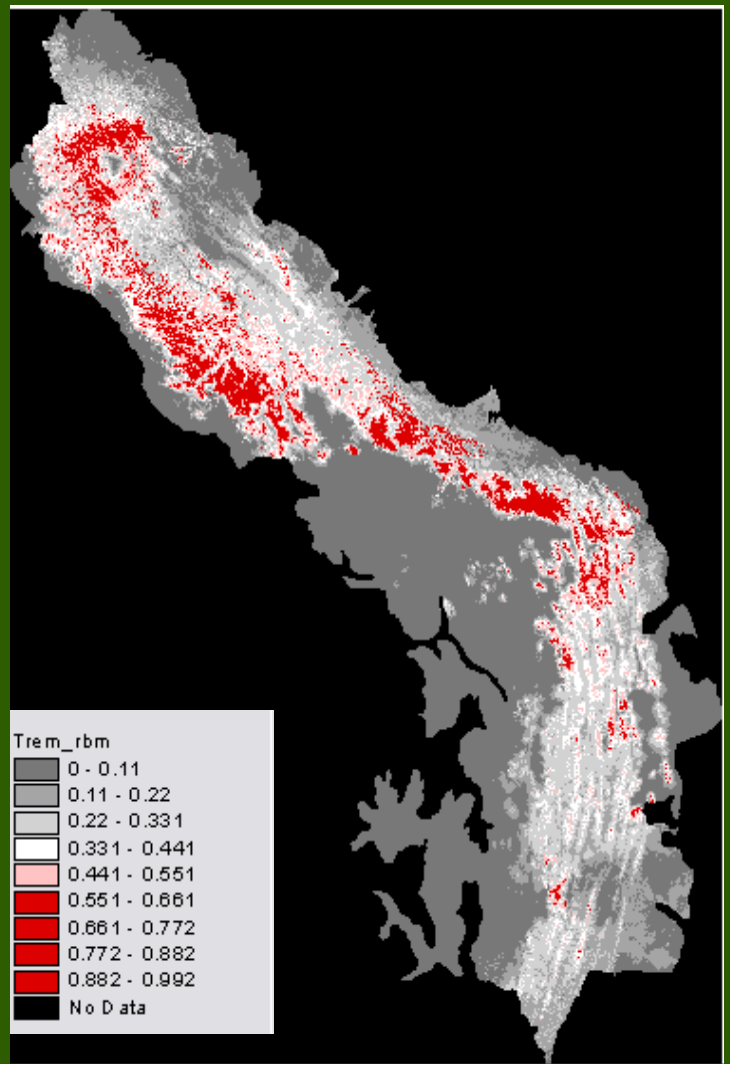
0.3–0.5

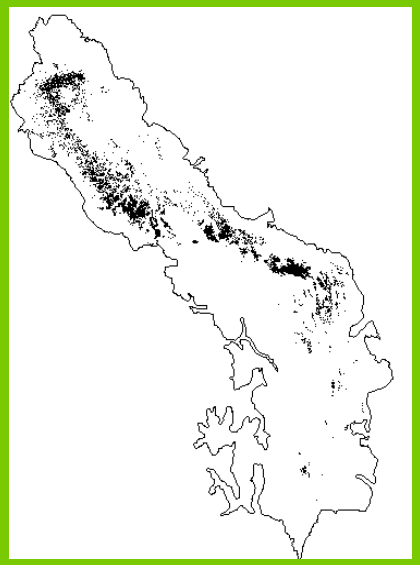


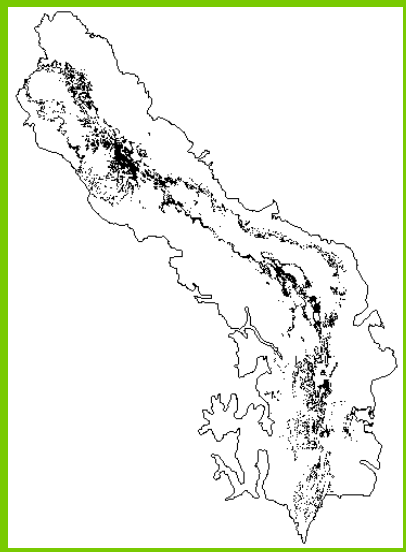
0.2–0.3

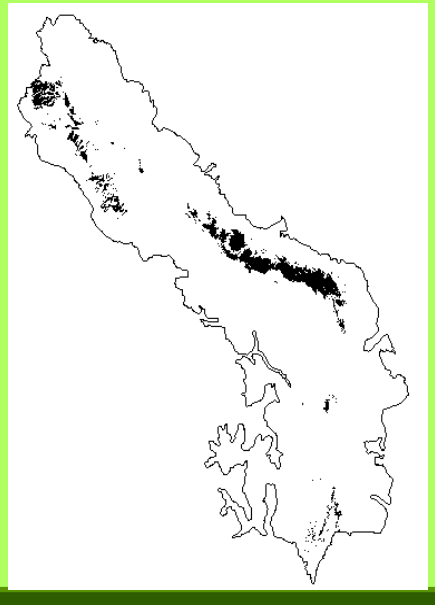
Y los modelos construidos con variables "tradicionales"?

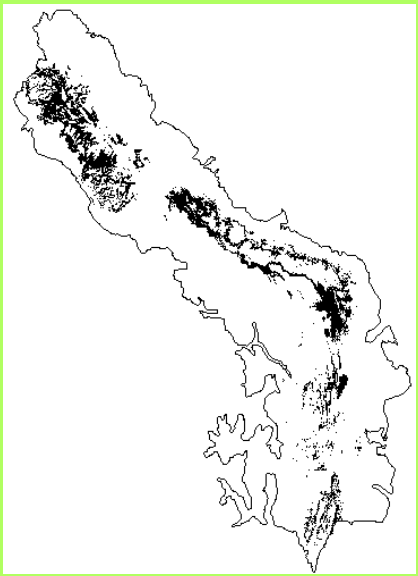


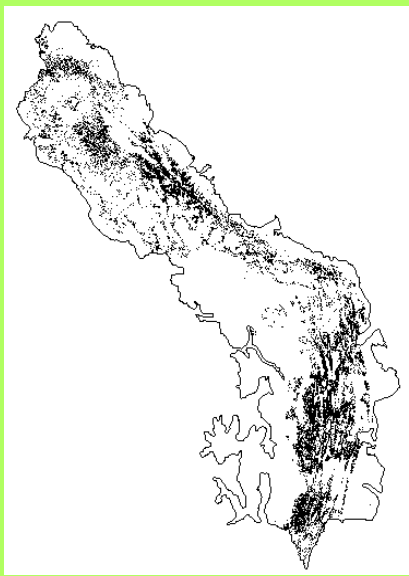












Conclusion

- 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 conocimento de la especie por sobre todo fancy modelo estadistico