

Spatial data sources for species distribution modeling

Environmental data

WorldClim - Global Climate Data

Free climate data for ecological modeling and GIS

- The 19 bioclimatic variables from the Worldclim database are the more widely used! But **not** the only available dataset!

BIO1 = Annual Mean Temperature

BIO2 = Mean Diurnal Range (Mean of monthly (max temp - min temp))

BIO3 = Isothermality (BIO2/BIO7) (* 100)

BIO4 = Temperature Seasonality (standard deviation *100)

BIO5 = Max Temperature of Warmest Month

BIO6 = Min Temperature of Coldest Month

BIO7 = Temperature Annual Range (BIO5-BIO6)

BIO8 = Mean Temperature of Wettest Quarter

BIO9 = Mean Temperature of Driest Quarter

BIO10 = Mean Temperature of Warmest Quarter

BIO11 = Mean Temperature of Coldest Quarter

BIO12 = Annual Precipitation

BIO13 = Precipitation of Wettest Month

BIO14 = Precipitation of Driest Month

BIO15 = Precipitation Seasonality (Coefficient of Variation)

BIO16 = Precipitation of Wettest Quarter

BIO17 = Precipitation of Driest Quarter

BIO18 = Precipitation of Warmest Quarter

BIO19 = Precipitation of Coldest Quarter

Some other databases



19 Bioclimatic variables
Monthly Temperature and Precipitation
~1km

Global Ecology and Biogeography, (Global Ecol. Biogeogr.) (2016)



**Remotely sensed temperature and
precipitation data improve species
distribution modelling in the tropics**

V. Deblauwe^{1,2,3*}, V. Drossart^{2,3,4,5}, R. Bose^{1,6}, B. Sonké³, A. Blach-Overgaard⁷,
J.-C. Svensson⁷, J. J. Wieringa⁸, B. R. Ramesh⁶, T. Stévart^{2,5} and
T. L. P. Couvreur^{1,3,8}

19 Bioclimatic variables
from MODIS and Chirps
~1km

ENVIREM

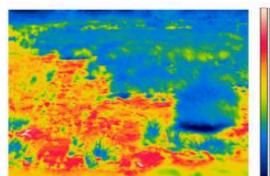
ENVIRONMENTAL RASTERS FOR ECOLOGICAL MODELING

Topographic indexes
Aridity
Evapotranspiration
~1km

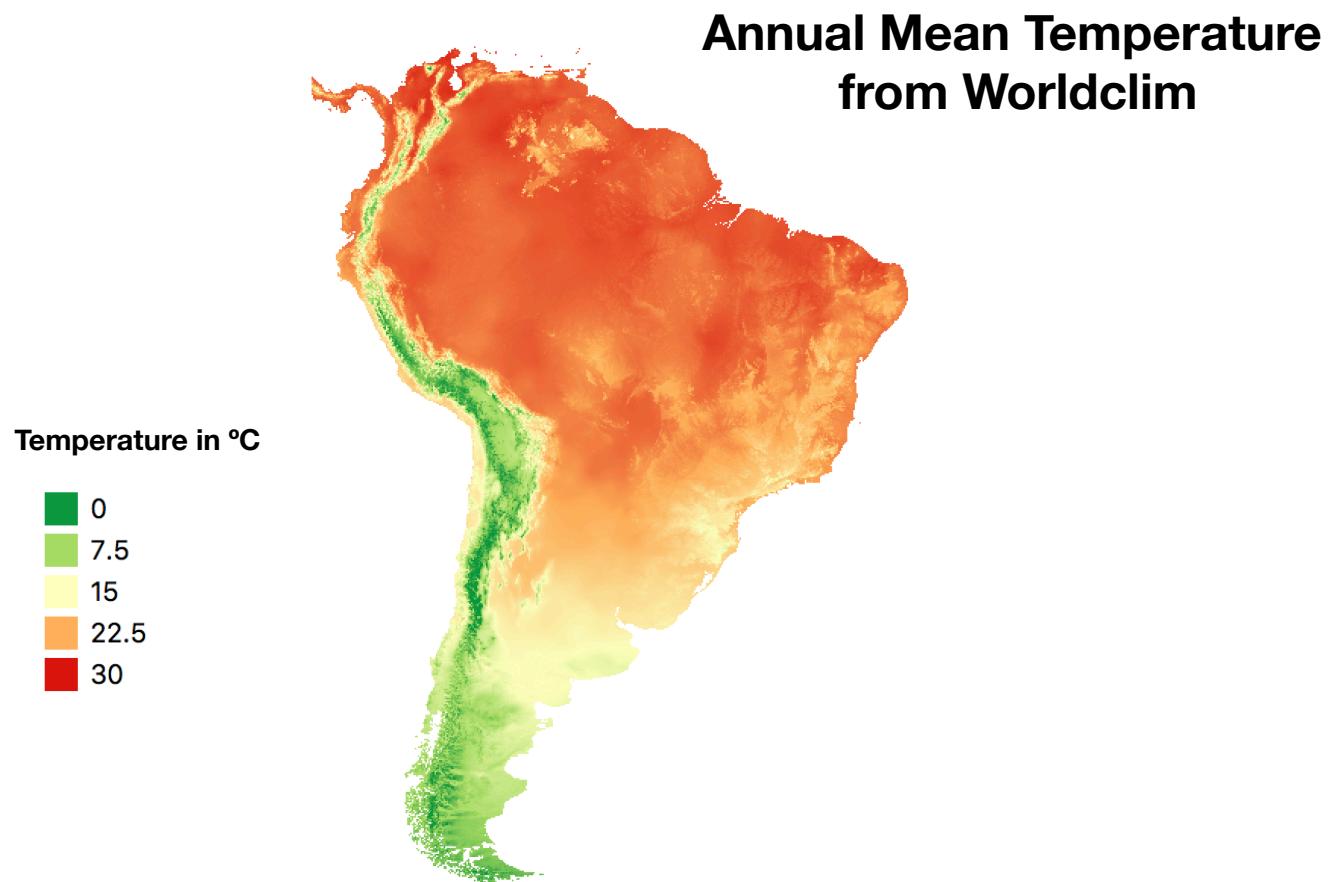
EarthEnv

Cloud cover
Habitat heterogeneity
Freshwater
~1km

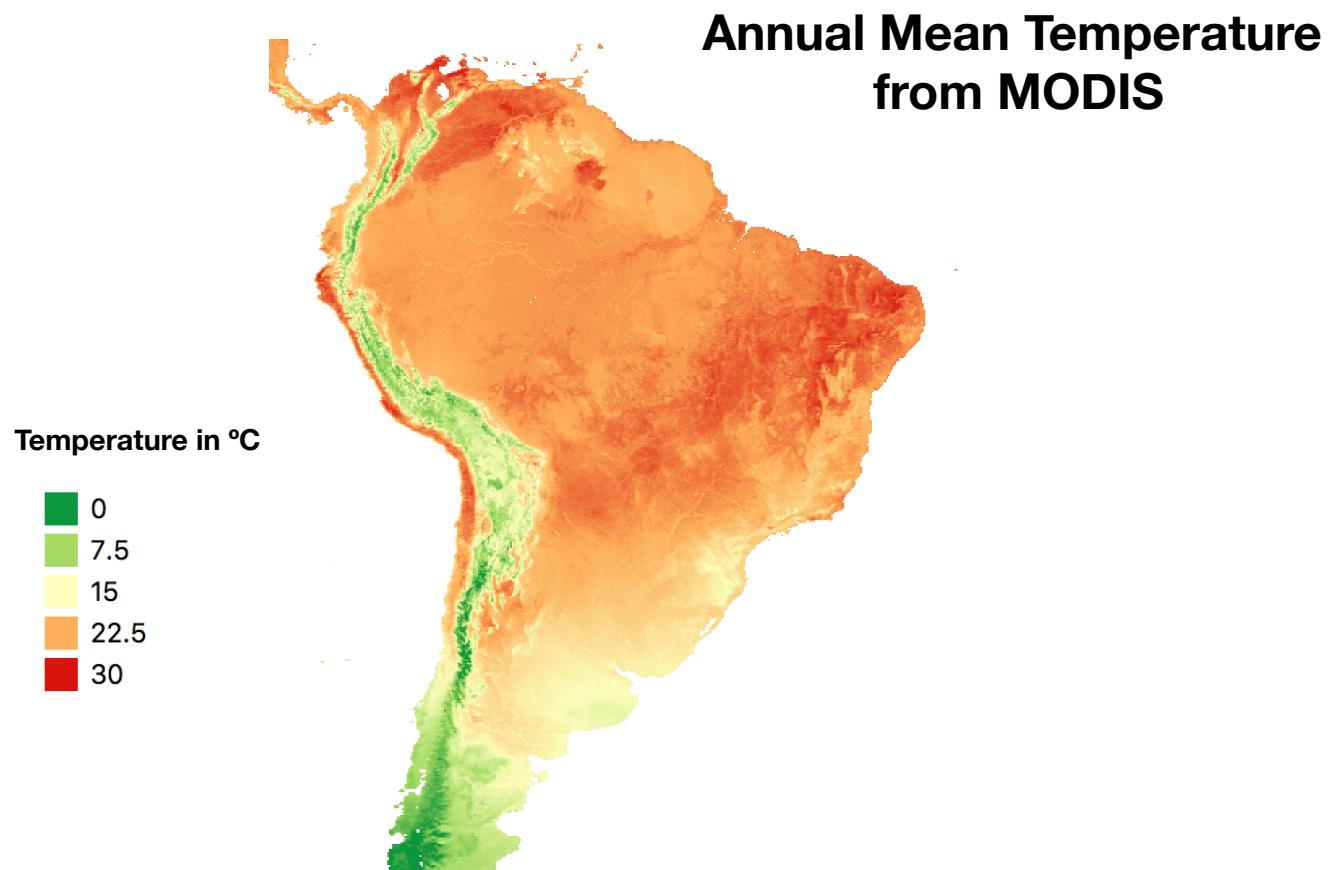
microclim – a global microclimate data set



Are they the same?



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Are they the same?

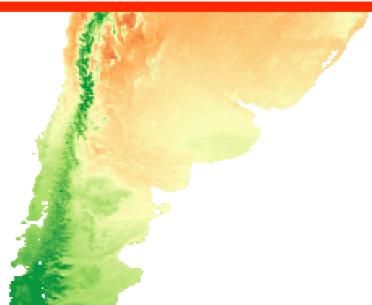
Annual Mean Temperature
from MODIS



Make sure your variables make
sense for your study organism and
area

Temperature

0
7.5
15
22.5
30

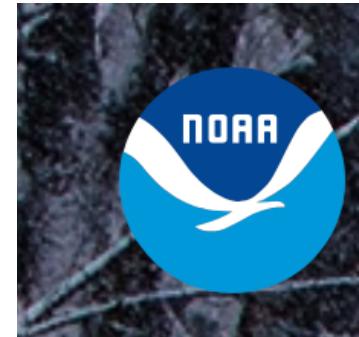


For marine data



~10km

Layer	Unit
Temperature	°C
Salinity	PSS
Currents velocity	m-1
Ice thickness	m
Sea ice concentration	Fraction
Nitrate	mol.m-3
Phosphate	mol.m-3
Silicate	mol.m-3
Dissolved molecular oxygen	mol.m-3
Iron	umol.m-3
Chlorophyll	mg.m-3
Phytoplankton	umol.m-3
Primary productivity	g.m-3.day-1
Calcite	mol.m-3
pH	-
Photosynt. Avail. Radiation	E.m-2.day-1
Diffuse attenuation	m-1
Cloud cover	%



What about time projections?

- To be able to project in time you have to use equivalent layers for model building and projection
- Past and future projections are available for the bioclimatic variables in both Worldclim and Chelsa portals

Georeferenced presence data

- Your own collections
- Primary literature
- Museums
- GBIF, VertNet etc.



Is data always ready?

Is data always ready?

- Can lack coordinates but have locality description
- Can have errors (e.g. wrongly assigned coordinates)

One example

A South American tree frog

Hypsiboas crepitans

DOWNLOAD | 25 OCTOBER 2018

3,361 occurrences downloaded

40% with coordinates



Checking data before modeling

