**10.20.19 Question Answers**

1. Fix the reciprocal suitability scripts to have the distribution polygon area as the denominator. - DONE and pushed. Updated on the latest version of the draft as well.

Table 3. Reciprocal suitability of arboreal and terrestrial species for each classification scheme.

|  |  |  |
| --- | --- | --- |
| Classification | Arb Poly, Terr ENM | Terr Poly, Arb ENM |
| 6-M | 35.57% | 11.72% |
| 6-L | 33.75% | 12.82% |
| 7-M | 35.39% | 11.75% |
| 7-L | 35.44% | 12.69% |
| 6-McM | 32.17% | 11.74% |
| 6-McL | 18.72% | 76.02% |

2. Could I also ask you to find the right citations to put into this sentence: "ENM is most often used to define a species’ potential range based on observed localities, but many other important applications have been explicated (e.g. CITE, CITE, CITE)."

- These papers use SDM to predict population density

- <https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/j.1365-2664.2012.02138.x>

- <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1472-4642.2012.00892.x>

- This papers use SDM to predict if species is generalist or specialist

- <http://archive.li.suu.edu/docs/ms130/AR/evangelista2.pdf>

- This paper uses SDM to predict the impact of invasive plants

- <https://www.nature.com/articles/s41598-018-25437-1>

3. Clarify the full citations for the following papers

Elith et al. 2006

Elith, J., C. H. Graham, R. P. Anderson, M. Dudík, S. Ferrier, A. Guisan, R. J. Hijmans, F. Huettmann, J. R. Leathwick, A. Lehmann, J. Li, L. G. Lohmann, B. A. Loiselle, G. Manion, C. Moritz, M. Nakamura, Y. Nakazawa, J. McC. M. Overton, A. T. Peterson, S. J. Phillips, K. Richardson, R. Scachetti-Pereira, R. E. Schapire, J. Soberón, S. Williams, M. S. Wisz, and N. E. Zimmermann. 2006. Novel methods improve prediction of species’ distributions from occurrence data. Ecography 29:129-151.

Ortega-Huerta and Peterson 2008

Ortega-Huerta MA, Peterson AT (2008). Modeling ecological niches and

predicting geographic distributions: a test of six presence-only

methods. Revista Mexicana De Biodiversidad 79: 205-216.

Phillips et al 2004

Phillips, S. J. and M. Dudík. 2004. A maximum entropy approach to species distribution modeling. Proceedings of the 21st International Conference on Machine Learning, Baniff, Canada.

Phillips et al 2006

Phillips, S. J., R. P. Anderson, and R. E. Schapire. 2006. Maximum entropy modeling of species geographic distributions. Ecological Modelling 190:231-259.

Rodder and Engler 2011

Rödder D, Engler JO (2011) Quantitative metrics of overlaps in Grinnellian niches: advances and possible drawbacks. Glob Ecol Biogeogr 20: 915–927.

Wisz MS et al. 2008

Wisz, M.S.; Hijmans, R.J.; Li, J.; Peterson, A.T.; Graham, C.H.; Guisan, A. NCEAS Predicting Species Distributions Working Group. Effects of sample size on the performance of species distribution models. Diversity Distrib. 2008, 14, 763–773.

**Nov 20th 2019 Questions**

1. Figure update.

November - Make a couple and upload them into a figure folder. Make 2 clear panels: A as the top map and inset, B as the bottom map and inset. This will add a little space between the top and bottom map. Place the insets covering up a bit of the top right corner of each full map. Fix the percentages to match the appropriate reciprocal suitability tests. Add a label for which suitability map is displayed. Thicken the lines of species distributions. Add the attachment labeled recipsuit.jpeg as panel C – code to change this attached. Make 3 panels stacked vertically

Dec 3 - I like the changes you made for Figure3\_panels.jpg (which has become figure 2 now), and I just have a few more edits and we'll call it a day. 1st, you and I have slightly different values for the reciprocal suitability score, presumably because our computers came up with every so slightly different models when we ran them separately. Not a problem, but as I have these numbers elsewhere in the manuscript, please change the numbers to be 37.21% and 11.25%. 2nd, pull the labels of the panels ("A", "B", and "C") inside the dark outlining box of each panel. 3rd, move the percentage values to sit just above the MAXENT suitability script. Finally, please add back the black boxes on the zoomed out map that show where the insets are zooming into (those were on the original figures but you have since deleted them).

Dec 4 - I think we should now just delete the inset and zoom in a bit on the map, cutting out a little more of South America. I've taken a screen shot and boxed in what I think should be the new limits of both maps. Make the whole panel that bit of the map, no inset, and we should be able to see the map details pretty well.

Chapter3/Docs/Figures/Figure2\_panels\_noinset.pdf

2. Cloud cover manipulation clarification

Paper that uses IPCC data (<https://onlinelibrary.wiley.com/doi/full/10.1111/j.1466-8238.2007.00347.x>)

Paper that uses IPCC cloud cover data - <https://www.sciencedirect.com/science/article/pii/S0304380016304665#bib0195>

Cloud cover data download from - <https://www.ipcc-data.org/>

IPCC data manual - <https://www.ipcc-data.org/docs/tyndall_working_papers_wp55.pdf>

Units: The data has units of percent, but you have to convert it to be so. The raw data download when directly uploaded into R will have values from 0-255 which is an artifact of the raster file pixel size. You have to scale the raster to the units intended and as instructed from the manual which is percent so 0-100 or 0-1 for exact percent.

2.a: What are the old values measured in?

Units of percent. When making tif files, the bit depth capacity for raster dataset cells ranges (<http://desktop.arcgis.com/en/arcmap/10.3/manage-data/raster-and-images/bit-depth-capacity-for-raster-dataset-cells.htm>) and they have to pick a bit depth to fit in the 0-100 for percents. The only bit depth good enough is the unsigned 8 bit which goes in 0-255. The 255 is the byte value of this raster file. To actually rescale it to represent 100 percent, we have to manually rescale the raster to make it usable.

2.b. Is this a yearly average of cloud cover taken once every day? Every hour?

It is the 1991-2000 time chunk and it gives us the yearly average so there are 12 files for the 12 months. Time-series were calculated at 0.5 degree resolution (this is indicative of a grid) so for every grid cell across the time series of monthly observations that are derived from daily sun hours (page 10 of the IPCC manual). But basically, they measured the sunshine received (via short-wave flux) and said the total sunshine received should be equal to 100- cloud cover. So a high cloud cover percentage is lower sunshine received and low cloud cover is high sunshine received and this is represented in percentage of cloud cover. They based it off of the sunshine duration data.

Also an exact description of data management is described in this paper (<https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/joc.3711>) and a lot of the technicalities go over my head. All the papers that cite this data do not talk about the details of data acquisition, just the analysis though.

3. Re-label code and update TOC

4. Wisz 2007 or Wisz 2008 paper?

It is the Wisz MS et al. 2008 paper and NOT the 2007 one

Wisz, M.S.; Hijmans, R.J.; Li, J.; Peterson, A.T.; Graham, C.H.; Guisan, A. NCEAS Predicting Species Distributions Working Group. Effects of sample size on the performance of species distribution models. Diversity Distrib. 2008, 14, 763–773.

5. Polygons IUCN or Polygons Lauren (Chap3/Scripts/Polygons/LM+IUCN\_Polys)

- Which species I constructed polygons from scratch where there was no IUCN data - 18

- Which species you added extra parts to the distribution already provided by IUCN - 13

- Lolo findings

UniqueNLMPolys – 293 unique species

AllPolysforanalysis – 311 unique species

AllPolysforanalysis – 310 unique species after collapsing Eurycea longicauda and Eurycea longicauda melanopleura

The polygons cut out from the climate data was 8, so this was then 302 total species cutting out

Hydromantes ambrosii

Hydromantes flavus

Hydromantes genei,

Hydromantes imperialis

Hydromantes italicus

Hydromantes strinati

Hydromantes supramontis

Karsenia koreana

The 18 polygons that I made were brand new species not from IUCN and these species were: found in Chap3/Shapefiles/AllNewLMPolysBinded

Batrachoseps altasierrae

Batrachoseps bramei

Bolitoglossa nympha

Bolitoglossa robinsoni

Chiropterotriton miquihuanus

Desmognathus conanti

Desmognathus organi

Desmognathus planiceps

Eurycea aquatica

Eurycea chamberlaini

Eurycea longicauda melanopleura

Oedipina nica

Plethodon chattahoochee

Plethodon chlorobryonis

Plethodon grobmani

Plethodon mississippi

Plethodon ocmulgee

Plethodon variolatus

I ended up making additions to the IUCN polygons because we found occurrences on VertNet in locations we knew they were and wanted to add to the IUCN polygon. There were 13 additional polygons for these species

Batrachoseps regius

Batrachoseps relictus

Bolitoglossa dunni

Bolitoglossa odonnelli

Bradytriton silus

Desmognathus fuscus

Eurycea bislineata

Eurycea longicauda

Plethodon aureolus

Plethodon dorsalis

Plethodon jordani

Plethodon richmondi

Plethodon wehrlei

This is where things got tricky. So, to be able to add these to the IUCN polygons I had to do each individually. So, I took the LM made addition polygon and combined it with the IUCN one separately (Chapter3/Shapefiles/AllNewPolyBind)

I had to make an IUCN polygon without these species and their additions (Analysis\_Scripts/Chapter3/Shapefiles/IUCNNNEW)

Then added them back together to create the file we use that combined the 18 new ones (Chap3/Shapefiles/AllNewLMPolysBinded)

IUCN untouched (IUCN poly - lauren additions) = 293-13 = 280

IUCN and additions (Chapter3/Shapefiles/AllNewPolyBind) 13

18+280+13 = 311(Chapter3/Shapefiles/AllPolysforAnalysis)

And then in each Occ\_points script the intro combines the Eurycea sp together

6. Resolution AUC table. In each of the cells below enter the AUC score for the arboreal model and the terrestrial model as indicated below. Have the resolution go low and high enough to show a good variance across the resolutions that ended up being best for each scheme.

6.a: Do you have an old version of that table that has all the AUC scores across resolutions? What has changed since you having to run new tests? Quote from paper “Other classification schemes resulted in similar resolutions, ranging from 0.275 to 0.375”

This is referring to the cutoff of when it hits 0.8 AUC score. I highlighted in here when they switch so the sentence could be adapted to 0.300-0.380 but more precisely the lowest resolution is 0.275 (for 6L) and 0.375 (for 6McL). All of the lenient classifications varied… weird. Also, AUC scores are somewhat of an artifact of the points used. I have an excel doc that documents all the testing I did Chapter3/Docs/CV\_RESOLUTION\_TESTS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Resolution | 6-M | 6-L | 6-McM | 6-McL | 7-M | 7-L |
| 0.200 | 0.912/0.692 | 0.899/0.737 | 0.901/0.693 | 0.688/0.914 | 0.912/0.692 | 0.897/0.740 |
| 0.300 | 0.939/0.771 | 0.916/0.817 | 0.933/0.775 | 0.765/0.946 | 0.942/0.774 | 0.930/0.815 |
| 0.340 | 0.941/0.792 | 0.930/0.836 | 0.935/0.797 | 0.788/0.948 | 0.942/0.793 | 0.931/0.833 |
| 0.360 | 0.946/0.801 | 0.920/0.841 | 0.930/0.801 | 0.792/0.947 | 0.944/0.802 | 0.935/0.842 |
| 0.380 | 0.948/0.811 | 0.933/0.853 | 0.942/0.817 | 0.803/0.954 | 0.946/0.810 | 0.931/0.850 |
| 0.400 | 0.949/0.815 | 0.939/0.856 | 0.940/0.824 | 0.809/0.951 | 0.945/0.817 | 0.939/0.857 |
| 0.500 | 0.943/0.843 | 0.930/0.878 | 0.936/0.848 | 0.837/0.958 | 0.944/0.843 | 0.931/0.879 |