Interpretable ML for biodiversity

An introduction using species distribution models

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MAIN GOALS

1. How do we produce a model?
2. How do we convey that it works?
3. How do we talk about how it makes predictions?
4. How do we use it to guide actions?

THE STEPS

1. Get data about species occurrences
2. Build a classifier and make it as good as we can
3. Measure its performance
4. Explain some predictions
5. Generate counterfactual explanations
6. Briefly discuss ensemble models

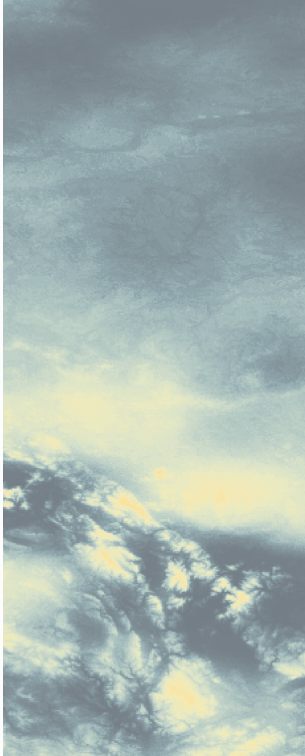
BUT WHY...

... think of SDM as a ML problem? Because they are (and would be better if we accepted this)

... the focus on explainability? We cannot ask people to *trust* - we must *convince*

§ 1

Introduction



GETTING DATA

GETTING A POLYGON

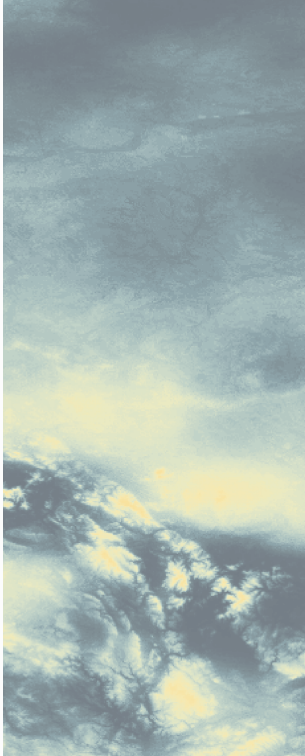
CHELSA2 DATA

TRIMMING POLYGON

DOWNLOAD DATA FROM GBIF

§ 2

Validation



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SDM Layer with 45336 Bool cells
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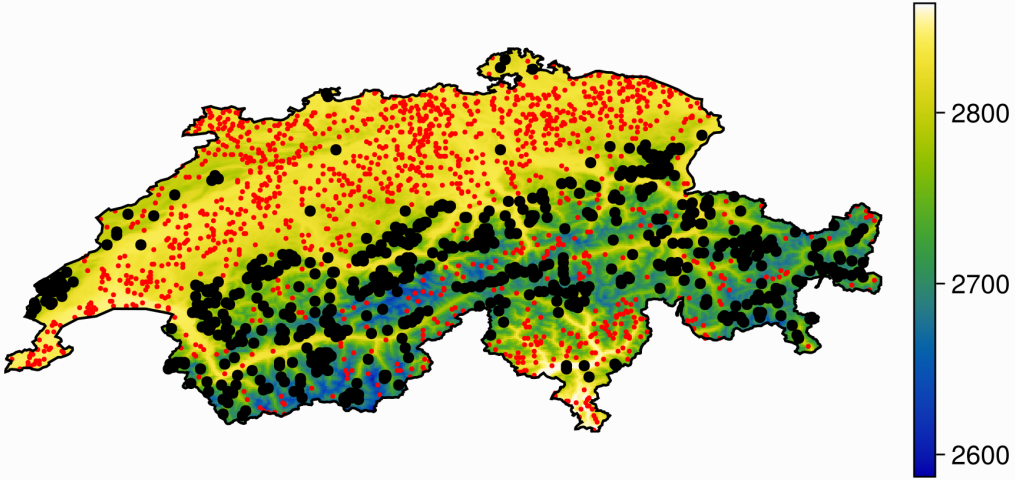
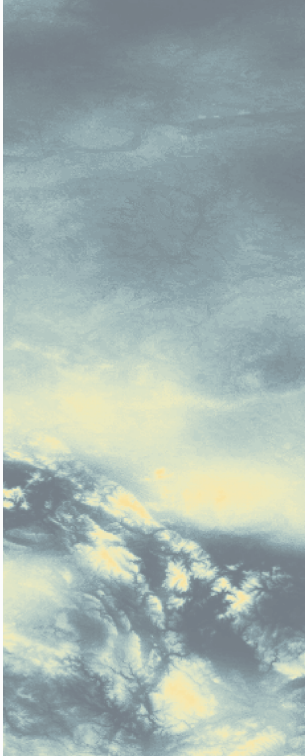
    Grid size: (239, 543)
```


2800
2700
2600

§ 3

Model setup



SETUP

```
SDeMo.MultivariateTransform{MultivariateStats.PCA} → SDeMo.NaiveBayes → P(x) ≥ 0.5
```

```
0.5620979518435002
```

RE-TRAINING

```
SDeMo.MultivariateTransform{MultivariateStats.PCA} → SDeMo.NaiveBayes → P(x
) ≥ 0.281
```

INITIAL PRED

```
SDM Layer with 69967 Float64 cells
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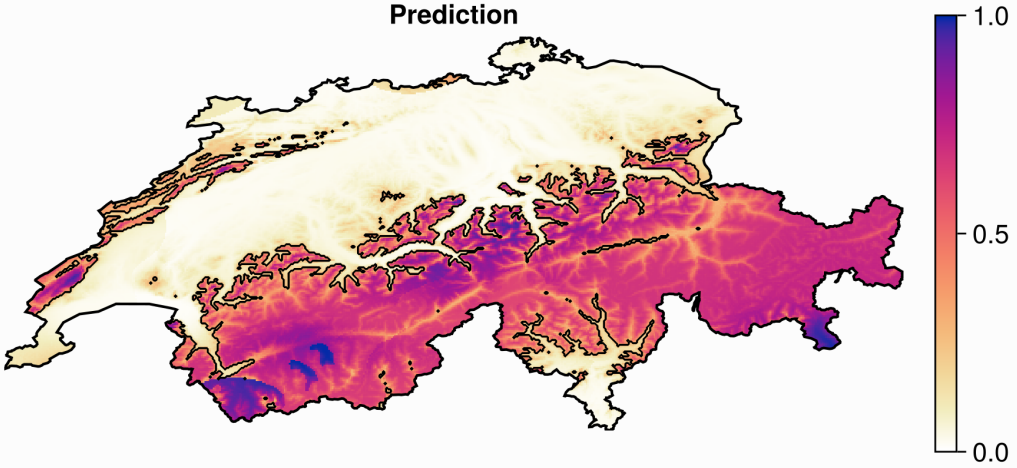
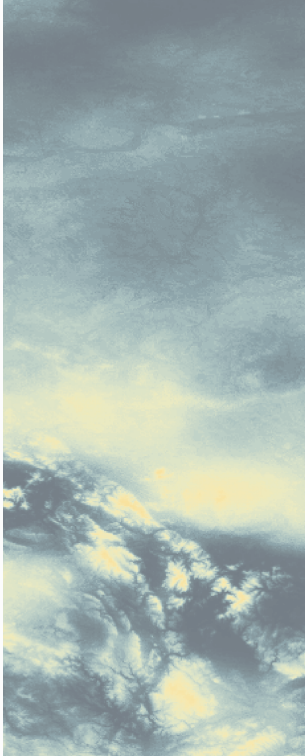

Prediction
1.0
0.5
0.0

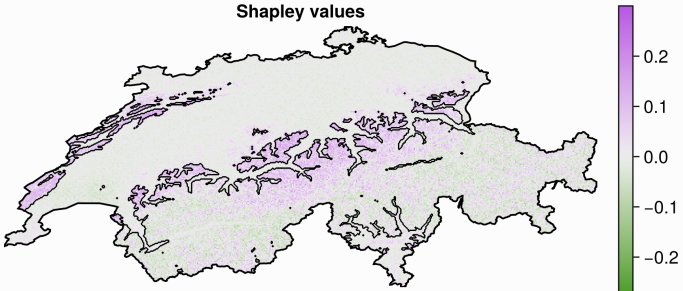
§ 4

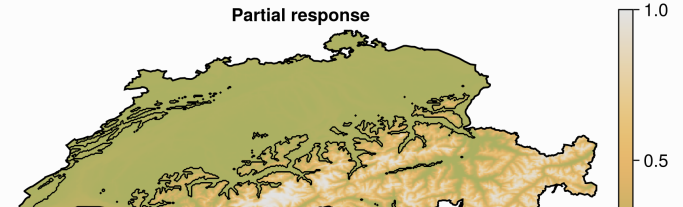
Why?



CODE

VISU





```
SDM Layer with 69967 Int64 cells
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    Grid size: (239, 543)
```
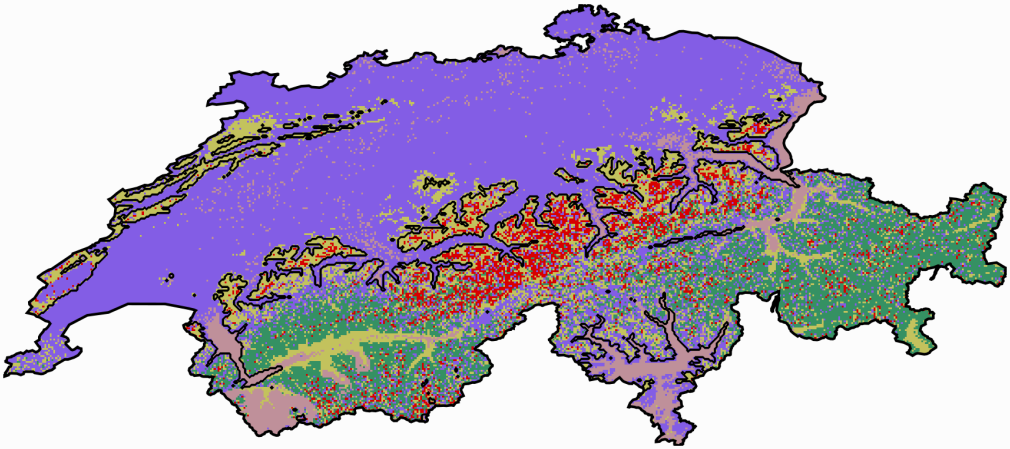
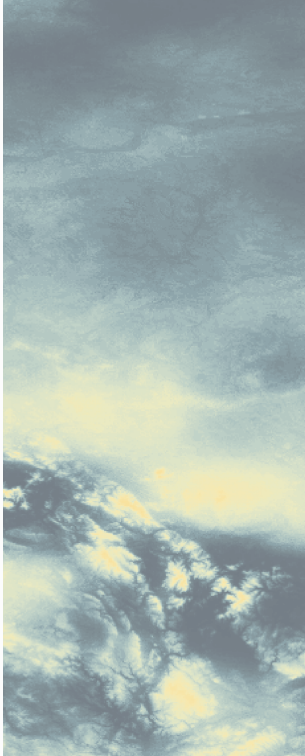

VISU



§ 5

About ensemble models



UNCERTAINTY

0.6537641876644507

ADD PRED

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SDM Layer with 69967 Float64 cells
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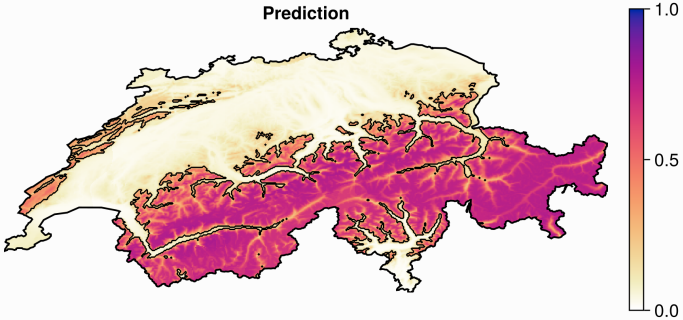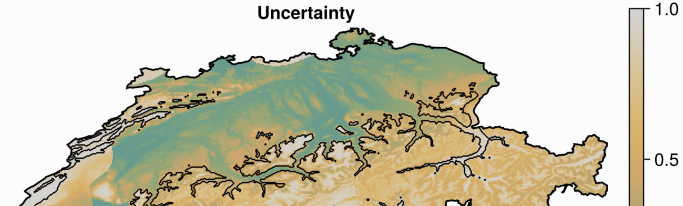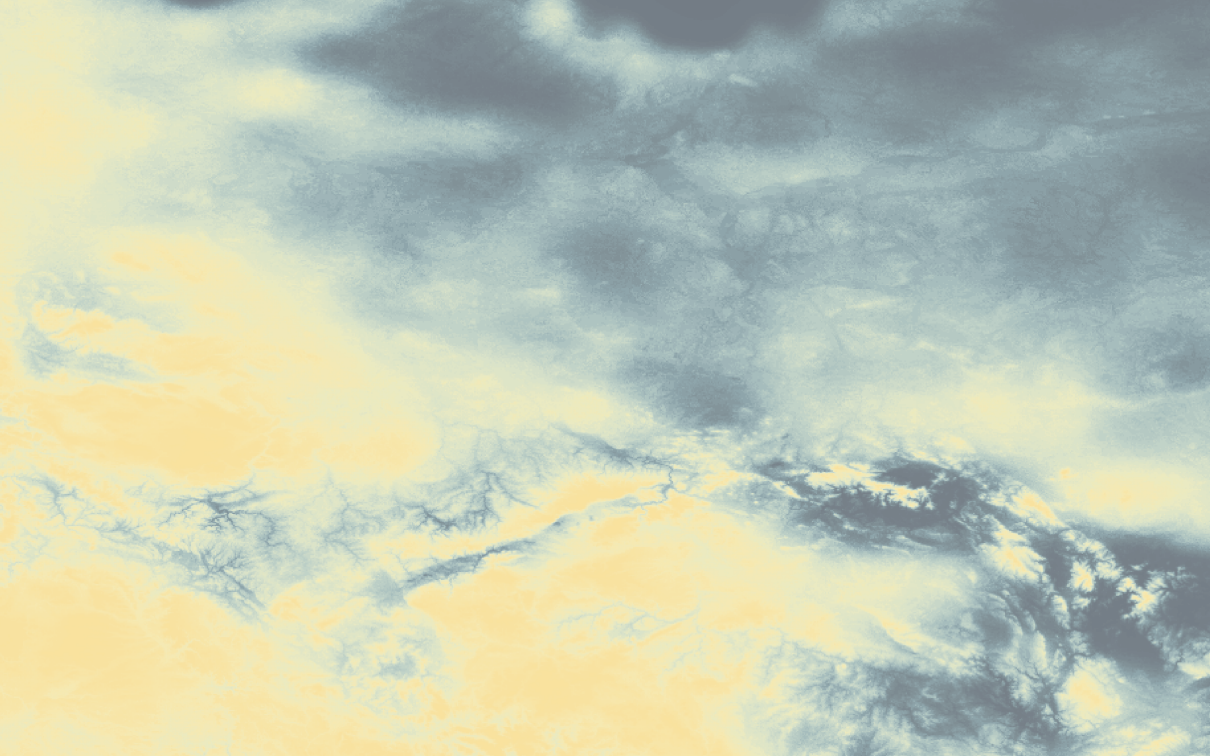
VISU 2