

Cross-Scale-Model-Integration-Examples

These scripts are provided to reproduce the examples given in the paper “Cross-scale integration of data and knowledge for predicting species ranges.” All source code is licensed under the GPL3, details are provided in the `LICENSE` file.

For convenience, a makefile is provided to demonstrate how to build the examples and provide an automated way to generate all necessary files. The command `make all` will build both examples, while `make example1` and `make example2` will build each example individually. Note that these will likely take a long time and consume a lot of memory, so plan your usage accordingly.

Dependencies:

- R version 3.x
- JAGS
- Rscript (optional, but recommended. Included with most R installations)

R packages:

- `sp`
- `glm2`
- `fields`
- `rjags`

Running the models:

Both examples are provided as a collection of scripts. Order matters (more so for example 2, but to some extent for example 1 as well). A list of all scripts and the proper order follows. The examples are easiest to run by invoking them with `Rscript` at the command line, as follows:

```
cd path/to/desired/example
Rscript file.r
```

Alternatively, you can run the scripts from the console by using `source()`, or by pasting one line at a time. Just make sure you set your working directory to the appropriate place, either `example_1` or `example_2`.

Example 1:

1. `Rscript ex1_m1.r` – Run the naive model
2. `Rscript ex1_m2.r` – Run the mechanistic submodel
3. `Rscript ex1_mm.r` – Run the metamodel
4. `Rscript ex1_makeSamplingFig.r ex1_Sampling.pdf` – Make figure 2 from the manuscript
5. `Rscript ex1_makePrecipFig.r ex1_precip.pdf` – Make figure 3 from the manuscript
6. `Rscript ex1_makeMapFig.r ex1_map.pdf` – Make figure 4 from the manuscript

Example 2:

1. `Rscript ex2_prepMapleData.r` – Loads data from original sources and formats it for the analysis
2. `Rscript ex2_setUpSDM.r` – Use conventional methods to select the form for the metamodel
3. `Rscript ex2_mcmcSDM.r` – Run the mcmc on the naive model
4. `Rscript ex2_mcmcIntegrated.r` – Run the mcmc for the integrated model
5. `Rscript ex2_processResults.r` – Produce predictions from the posterior parameter distributions
6. `Rscript ex2_makeFigures.r` – Produce figure 5 from the manuscript