HMSC COURSE AUGUST 15ᵀᴴ – AUGUST 19ᵀᴴ 2022

ORGANIZED AS PART OF JYVÄSKYLÄ SUMMER SCHOOL

Teachers: Otso Ovaskainen, Gleb Tikhonov, Jari Oksanen, Ryan Burner, Jenni Niku, Mirkka Jones and Sara Taskinen.

GENERAL INFORMATION

The course is organized in the hybrid mode: physically at Jyväskylä University, and remotely through zoom.

The zoom link to all sessions is the same:
https://helsinki.zoom.us/j/8066261697?pwd=a0FsZHhpVkorNUN6cjVmbmFENGc2dz09

All plenary sessions will be recorded and made available on YouTube asap after the session:
https://www.youtube.com/channel/UCgSflScNO81Nxw39rTLMZXw

All course material (R-scripts and datafiles) will be placed on the HMSC www-pages:
https://www.helsinki.fi/en/researchgroups/statistical-ecology/software/hmsc

The recommended version of the R-package Hmsc to be used during the course is the version available at CRAN at the beginning of the course. Thus, you are recommended to update your Hmsc package just before starting the computer exercises.

The daily schedule is the same for all days (all times are given in Finnish time which is EEST = Eastern European Summer Time; currently UTC + 3):

9am – 2pm (including lunch break at 12-13): ***Plenary sessions (lectures and R-demonstrations). Both physical (Agora building Ag B103 = Auditorium 3) and on Zoom.***

2pm – 4pm: ***Alternative 1 for computer exercises. Both physical (Ag B112.1 for those without laptop and Ag C231.1 for those with laptop) and on Zoom.*** In the zoom session, there will be multiple teachers. In the main zoom room (which you enter by clicking the zoom link above), you can ask for help with the computer exercise by asking questions either via the chat or by raising your hand and opening your microphone when the teacher indicates that it is your turn to ask a question. Questions that do not relate to the given exercise will be answered in separate break-out rooms to which you can move from the main zoom room. The teacher will let you know in which break-out room your question will be discussed.

7pm – 9pm (11am – 1pm US Central time): ***Alternative 2 for computer exercises*** (targeted especially for American time zones). ***Zoom only, with one teacher available to answer questions.***

10pm – 12pm (2pm – 4pm US Central time): ***Alternative 3 for computer exercises*** (targeted especially for American time zones). ***Zoom only, with one teacher available to answer questions.***

the next morning 6am – 8am (1pm – 3pm Sydney time): ***Alternative 4 for computer exercises*** (targeted especially for Australian time zones). ***Zoom only, with one teacher available to answer questions.***

By default, you are expected join only one of these three break-out groups daily. You don't need to register beforehand, just join the session that fits you the best. However, you are welcome to visit a second group if you have any further questions after your initial session has ended.

DAILY PROGRAMME

Monday 15th August 2022

Plenary sessions

- Lecture (by Otso Ovaskainen). Welcome & introduction to the course.
- Lecture (by Otso Ovaskainen). Overview of HMSC.
- R demonstration (by Otso Ovaskainen). What is the Hmsc pipeline and how to apply it? Setting up a model, fitting it, and producing standard output.
- Lecture (by Otso Ovaskainen). Introduction to the case study to be used in the break-out groups.

Break-out groups

Exercise 1. Apply the Hmsc pipeline to the provided case study data. Define a simplified Hmsc model (no traits, no phylogeny, no random effects), and follow the Hmsc pipeline to generate basic output on parameter estimates. Participants are encouraged to work independently, the teacher is there mainly to help if questions arise.

Tuesday 16th August 2022

Plenary sessions

- R demonstration (by Otso Ovaskainen). Recap of Exercise 1.
- Lecture (by Otso Ovaskainen). The fixed and random effect components of HMSC and their links to ecological theory.
- Lecture (by Otso Ovaskainen). Measuring explanatory and predictive power by different cross-validation strategies.
- R demonstration (by Otso Ovaskainen). Checking MCMC convergence and examining model fit.
- Lecture (by Sara Taskinen): Using variational approximation for fast estimation of joint species distribution models with various response distributions (note: this lecture is not related to HMSC but to joint species distribution modelling more generally).

Break-out groups

Exercise 2. Continue from Exercise 1 by defining a full HMSC model (with traits, phylogeny, and random effects) and apply the Hmsc pipeline to produce some basic model outputs.

Wednesday 17th August 2022

Plenary sessions

- R demonstration (by Otso Ovaskainen). Recap of Exercise 2.
- Lecture (by Gleb Tikhonov). How is Hmsc fitted to data? Overview on prior distributions and posterior sampling.
- R demonstration (by Gleb Tikhonov). How to modify the prior distributions and make choices related to posterior sampling.
- R demonstration (by Otso Ovaskainen). Making predictions over environmental gradients.
- R demonstration (by Otso Ovaskainen). Setting up different response distributions.

Break-out groups

Exercise 3. Continue from Exercise 2 by checking MCMC convergence, examining model fit, and making predictions over environmental gradients.

Thursday 18th August 2022

Plenary sessions

- R demonstration (by Otso Ovaskainen). Recap of Exercise 3.
- R demonstration (by Otso Ovaskainen). How to set up different types of random levels in Hmsc: hierarchical, spatial and temporal.
- R demonstration (by Otso Ovaskainen). Making predictions over spatial gradients.
- R demonstration (by Otso Ovaskainen). Variable selection, reduced rank regression, and other methods to deal with cases with many potential covariates.

Break-out groups

- Exercise 4. Continue from Exercise 3 by trying out different models and selecting among them.

Friday 19th August 2022

Plenary sessions

- R demonstration (by Otso Ovaskainen). Recap of Exercise 4.
- Discussion session (lead by Otso Ovaskainen, Gleb Tikhonov and Jari Oksanen). Recent and future development needs of HMSC: Overview of recently implemented and ongoing developments, and discussion on what users would like to see implemented.
- Discussion session. Based, e.g., on questions that came up during lectures and/or break-out groups that could not have been addressed there.

Break-out groups

In the break-out groups, discussions on topics suggested by the participants, including guidance on working with their own data.

6 pm. Workshop dinner for participants physically present in Jyväskylä