# **Data Manipulation & Statistical Analysis in Palaeoecology: A Masterclass In R**

# **Draft Schedule**

# **Tuesday 25th – Friday 28th May 2021**

The overall aim of this workshop is to showcase the variety of ways in which R can be used to conduct ecological analyses on palaeo-data through the presentation and discussion of research covering critical themes in palaeoecological and ecological research.

R courses often focus on introductory level skills or on the nitty-gritty details of using specific packages and are rarely focused on palaeoecological data. This workshop is designed to do something different – it aims to support intermediate users by showcasing a range of possible approaches for problem-solving in data analysis using R, including considering workflows and how existing tools in R packages can be adapted to work with palaeoecological data. This workshop will be particularly useful to ECRs or those relatively new to R but keen to advance their skills and/or those who have been trained in traditional palaeoecological approaches but want to do more.

Format:

The workshop will run across 4 days, 3 days working on specific R related exercises and a seminar which will showcase research which heavily relies on analysis in R.

The workshop will include discussion and Q & A sessions to help participants apply workflows to their own data and support community learning. This will include large group discussions and breakout sessions.

# **Day 1: Data management & Replicability**

# **Tuesday 25th May 2021**

Day 1 will focus on data management and utilising R packages to enable efficient and organised data storage and analysis.

Professor Steve Juggins talk through the ‘tidyverse’ package and work through some typical palaeoecological data analysis (plotting diagrams and ordination?) using the tidyverse system

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| **DATE AND TIME** | **Session title** | **Description** | **Session format** |
| 10:00–10:30 | Welcome & Opening Remarks | | |
| **Session 1: Data Management & Replicability** | | | |
| Zoom technical support: DS, NS | | | |
| 10:30 – 10:50 | Tidyverse: overview | Overview of the Tidyverse package | Talk |
| 10.50 – 11.10 | Tidyverse: data organisation | Adding data to the tidyverse | Exercise |
| 11.10 – 11.30 | Tidyverse: data visualisation | How to plot typical palaeoecological diagrams | Talk |
| 11:30 – 11.50 | Tidyverse: plotting data | Coding | Exercise |
| 11:50 – 12.10 | Tidyverse: data exploration |  | Talk |
| 12:10 – 12.30 | Tidyverse: ordination | Plotting | Exercise |
| 12:30–13:30 | Lunch | | |
| **Session 2: Open working session** | | | |
| Zoom technical support: DS, NS | | | |
| 13.30 – 15.30 | Sorting your own data | Small group working format to allow participants to help one another to work through their own data | Breakout groups |
| 15:30 – 16.00 | Day 1 concluding remarks | | |

# **Day 2: Recovering ecology**

# **Wednesday 26th May 2021**

Day 2 will take us away from the more traditional analysis method utilised in the palaeoecological realm and look more closely at techniques common in ecology.

Dr Gavin Simpson will discuss how (and how far) we can interpret our data and models and understand the parameters within which these models sit. Gavin will also discuss compensatory dynamics using palaeoecological data to provide examples.

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| **DATE AND TIME** | **Session title** | **Description** | **Session format** |
| 9.45 – 10:00 | Log in | | |
| **Session 1: Ecological analysis of palaeoecological data** | | | |
| Zoom technical support: DS, NS | | | |
| 10:00 – 10:30 | Interpreting models and understanding estimated parameters | Discussion around palaeoecological model interpretation | Talk |
| 10.30 – 11:00 | Exploring models and parameters | Plotting data and discussing outputs? | Exercise |
| 11:00 – 11:30 | Coffee break | | |
| 11:30 – 12:00 | Compensatory dynamics: overview | An overview discussion of method | Talk |
| 12:00 – 12.30 | Compensatory dynamics: plotting and analysing data | Plotting data and discussing outputs | Exercise |
| 12:30–13:30 | Lunch | | |
| **Session 2: Open working session** | | | |
| Zoom technical support: DS, NS | | | |
| 13.30 – 15.30 | Sorting your own data or working through the mornings exercises in detail | Small group working format for participants to help one another to work through their own data | Breakout groups |
| 15:30 – 16.00 | Day 2 concluding remarks | | |

# **Day 3: Seminar Day**

# **Thursday, 27th May 2021**

This event will feature a wide variety of current researchers who will be presenting how they use R to answer their own ecological questions (schedule TBA).

The seminar will be useful to those without previous R experience and to those who cannot attend all four days of the workshop. If you have purchased tickets for the 4-day workshop (or are planning to), entry for the seminar is included.

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| **DATE AND TIME** | **PRESENTER** | **AFFILIATION** | **TALK TITLE** |
| 10:00–10:15 | Welcome & Opening Remarks | | |
| **Session 1: Data Management & Replicability** | | | |
| Chair: | | | |
| 10:15–10:30 | Maarten Blaauw | Queen’s University Belfast | Version Control etc. |
| 10:30–10:45 | Tom Bishop | University of Manchester (UK) | ITRAX |
| 10:45–11:00 | Alistair Seddon | University of Bergen (Norway) | Assessing the response of UV-B absorbing compounds in pollen grains: Reproducible code and manuscripts |
| 11:00–11:15 | Q & A Session | | |
| 11:15–11:30 | Coffee Break | | |
| **Session 2: Recovering Ecology and Knowing Its Limits** | | | |
| Chair: |  | | |
| 11:30–11:45 | Dewey Dunnington | Dalhousie University (Canada) | Stratigraphic Diagrams in R |
| 11:45–12:00 | Suzette Flaunta | University of Bergen (Norway) | Processing fossil pollen data: what to think about before data analyses |
| 12:00–12:15 | Ralph Fyfe | University of Plymouth | REVEALS |
| 12:15–12:30 | Q & A Session | | |
| 12:30 – 13.30 | Lunch Break | | |

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| **Session 3: Modelling More Complex Scenarios** | | | |
| Chair: | | | |
| 13.30–14:00 | Ondrej Mottl | University of Bergen (Norway) | Rate-of change analyses in paleoecological sequences and the new RRatepol package |
| 14:00–14:15 | Kristen Beck | University of Lincoln | Variance and Rate-of-Change as Early Warning Signals for a Critical Transition in an Aquatic Ecosystem State: A Test Case from Tasmania, Australia |
| 14:15–14:30 | Q & A Session | | |
| 14:30–15:00 | Coffee Break | | |
| **Session 4: Expanding Horizons with R** | | | |
| Chair: |  | | |
| 1 5:00–15:15 | Graciela Gil-Romero | Instituto Pirenaico de Ecología-CSIC Avda (Spain) | Long-term fire resilience of the Ericaceous Belt, Bale Mountains, Ethiopia |
| 15:15–15:30 | Triin Reitalu | Tallinn University of Technology (Estonia) |  |
| 15:30–15:45 | Lizzie Jones | Royal Holloway, University of London |  |
| 15:45–16:00 | Q & A Session | | |
| 16:00–16:30 | Concluding Remarks | | |

# **Day 4: Applying complex models**

# **Wednesday 26th May 2021**

Day 2 will take us away from the more traditional analysis method utilised in the palaeoecological realm and look more closely at techniques common in ecology.

Dr Gavin Simpson will discuss how (and how far) we can interpret our data and models and understand the parameters within which these models sit. Gavin will also discuss compensatory dynamics using palaeoecological data to provide examples.

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| **DATE AND TIME** | **Session title** | **Description** | **Session format** |
| 9.45 – 10:00 | Log in | | |
| **Session 1: Generalised Additive Models** | | | |
| Zoom technical support: DS, NS | | | |
| 10:00 – 10:30 | Generalised additive models: overview | Discussion around palaeoecological model interpretation | Talk |
| 10.30 – 11:00 | GAMs: data inputs | Data | Exercise |
| 11:00 – 11:30 | Coffee break | | |
| 11:30 – 12:00 | GAMs: model set up | An overview discussion of method | Talk |
| 12:00 – 12.30 | GAMs: generating | Plotting data and discussing outputs | Exercise |
| 12:30–13:30 | Lunch | | |
| **Session 2: Open working session** | | | |
| Zoom technical support: DS, NS | | | |
| 13.30 – 15.30 | Sorting your own data or working through the mornings exercises in detail | Small group working format for participants to help one another to work through their own data | Breakout groups |
| 15:30 – 16.00 | Day 4 concluding remarks and workshop round up | | |

**Additional support**

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| **DATE AND TIME** | **Session title** | **Description** | **Session format** |
| 11:30 – 12:00 | Follow up | address any common or recurring queries that arise as a result of the workshop |  |