



Biodiversity Data Cubes for Monitoring and Modelling



Attend 4 online lectures:

Wednesday 9, 16, 23 & 30 September 2026

streamed from the NITheCS Seminar Room, Stellenbosch University



14h00-15h00 SAST

This four-lecture Mini-school will equip researchers, students and practitioners to biodiversity informatics and ecological modelling using data cubes. Participants will gain practical expertise in applying data cubes to biodiversity monitoring and ecological analysis, while supporting collaboration and open science. The Mini-school will be presented by Dr Sandra MacFadyen and Maarten Trekels from the Ecological Complexity & Biodiversity work-package within the NITheCS research focus area [Complexity in Biological Systems \(E5\)](#).

LECTURE 1

9 September

'Introduction to Data Cubes: Fundamentals and Applications'

Sandra MacFadyen

Gain a foundational understanding of data cubes, including their structure and applications in biodiversity monitoring. This lecture will provide practical guidance on constructing data cubes using data from the Global Biodiversity Information Facility ([GBIF.org](#)), and demonstrate how they can support effective biodiversity monitoring and the sustainable use of ecosystems.

LECTURE 3

23 September

'Occurrence Cubes for Species Distribution Modelling'

Sandra MacFadyen

Participants will use occurrence and environmental data to build and interpret species distribution models, with examples in both R and Python. The lecture will show how occurrence data cubes can be linked with environmental predictors to examine species-environment relationships, map habitat suitability, and explore biodiversity responses to environmental change.

LECTURE 2

16 September

'Occurrence Cubes for Biological Invasions with b3alien'

Maarten Trekels

This lecture will provide a practical introduction to b3alien, which estimates rate of new introductions while accounting for detection delays. The lecture will demonstrate how these estimates can support monitoring of Target 6 of the Kunming-Montreal Global Biodiversity Framework (KM-GBF).

LECTURE 4

30 September

'Open Science: Sharing and Disseminating Results from Data Cubes'

Maarten Trekels

The final lecture will introduce principles and practices of open science, including effective dissemination of data and research outputs, and their role in supporting collaboration and sustainable development.

SPEAKER BIOGRAPHIES



Dr Sandra MacFadyen is a Research Fellow with the Mathematical Biosciences Lab at Stellenbosch University. She is a core member of the EU-funded [B-Cubed](#) programme, a NITheCS Associate and lead for the Ecological Complexity & Biodiversity work-package within the NITheCS *E5* research focus area. She specialises in ecosystem dynamics, spatial statistics and mathematical modelling for biodiversity conservation.



Maarten Trekels is a Biodiversity Data Scientist and Project Coordinator at [Meise Botanic Garden](#) in Belgium. He coordinates the implementation of the DiSSCo research infrastructure in Flanders and contributes to FAIR data strategies and cross-domain interoperability. He is also a work-package leader in the EU-funded [B-Cubed](#) programme and a PhD candidate in community ecology at Stellenbosch University.

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