



## APPLIED METHODS IN BIOGEOGRAPHY

**Lecturers:** Paulo A. V. Borges (Azorean Biodiversity Group, Ce3C) & Pedro Cardoso (Finnish Museum of Natural History, University of Helsinki; Azorean Biodiversity Group, Ce3C)

**Calendar:** February 16-21<sup>st</sup> 2015

**Duration:** 36 hours

**Schedule:** 9h30-12h30 and 14h00-17h00.

**Objectives:** This is a mostly practical course offering an overview on different biogeography and macroecological methods and software. These will include all steps of a research project, from the optimal sampling of communities to process inference from large-scale patterns of taxon, phylogenetic and functional diversity. Specific topics will be: (1) alpha, beta and gamma diversity; (2) taxon, phylogenetic and functional diversity; (3) sampling biodiversity in all dimensions; (4) building optimal sampling protocols; (5) estimating diversity from incomplete sampling; (6) partitioning beta diversity; (7) local-regional processes (8) interspecific abundance-occupancy relationship; ; (9) species-abundance distributions; (10) species-area relationships; and (11) inferring processes using null models. Finally, students will be asked to present own data and case studies.

### General Plan:

1. Partitioning diversity into independent alpha, beta and gamma components - basic concepts and software (Species Diversity & Richness IV).
2. Taxon, phylogenetic and functional diversity - concepts and measures (R).
3. Strategies for sampling biodiversity in all dimensions with standardized protocols – description of projects, sampling methods and database construction (projects BALA, COBRA, NETBIOME)
4. Building optimal sampling protocols - principles and software (R, COBRA).

5. Estimating diversity from incomplete sampling - algorithms and applications (EstimateS, R).
6. Partitioning beta diversity - multiplicative vs. additive measures of beta diversity and replacement vs richness differences components. Applications in PARTITION and R.
7. Relationship between local and regional species richness – Some applications.
8. The abundance-distribution relationship - The unitary model of rarity (Taylor's power law and abundance-occupancy models)
9. Species Abundance Distribution Models (SADs) with new applications in R.
10. Species-area relationships and Island Biogeography (Practical applications).
11. Null models in process inference - a brief overview and applications (R).
12. Student's case studies.

**This course can have a recognition of 6 ECTs for FCUL PhD students enrolling in it as part of their first doctoral year. For students only requiring 5 ECTs recognized in their specific PhD programmes the last 6 hours of the course are not mandatory and the certificate will be on 'Topics in Applied methods in Biogeography'.**

**Location:** Departamento de Biologia Animal (FCUL) or Universidade dos Açores (Angra do Heroísmo) depending of the edition. In 2014 the course will be held in Lisbon.

**Nº (min, max) students:** 10 – 15

**Directed to:** PhD or MSc students in Ecology, Geography or related areas, and postdocs working in related topics

**Requirements:** (very) basic knowledge of R

**Fee:** free for 1st year PhD students in the Doctoral programme in Biology (FCUL), Biodiversity, Genetics and Evolution (UL; UP) and Biology and Ecology of Global Changes (UL, UA); 20 € for PhD students from institutions of the PEERS network (Ce3C, CFE); 100 € for FCUL Master students and unemployed; 150 € for BTI, BI and other PhD students; 200 € for Professional and postdocs.

**Deadline for applications:** December 31<sup>st</sup>, 2014

Candidates should send a short CV and motivation letter explaining why they are interested in the course, including a brief description of their research projects. Send all information and requests to Paulo A. V. Borges ([pborges@uac.pt](mailto:pborges@uac.pt)).