EMILIO BERTI

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SUMMARY

I am a theoretical ecologist with a passion for math and computing. I have a strong quantitative background, with expertise in mathematical and statistical modelling of complex systems using big databases at large spatio-temporal scales. I have worked in many different fields of biology, from molecular muscle physiology to macroecology and biogeography. I am very open minded to other cultures and societies: I am Italian, my wife is Bulgarian, we met in Denmark, and we live in Germany. I am an avid reader of ancient history and I love sumo.

PROFESSIONAL EXPERIENCE

PostDoctoral researcher *October 2020 – Present*
Theory in Biodiversity Science, German Centre for Integrative Biodiversity Research (iDiv), Leipzig, Germany.

Scientific consultant *May 2020 – July 2020*
Department of Bioscience, Aarhus University, Aarhus, Denmark.

Teaching assistant *February 2017 – April 2020*
Department of Biology, Aarhus University, Aarhus, Denmark.

EDUCATION

PhD *February 2017 – June 2020*
Section of Ecoinformatics and Biodiversity, Department of Biology, Aarhus University, Aarhus, Denmark.

Visiting PhD student *Fall 2018*
Department of Ecology and Evolution, University of Chicago, Chicago, IL.

MSc in Biology *2013 – 2016*
Department of Ecology and Evolution, University of Florence, Florence, Italy.

BSc in Biology *2009 – 2012*
Department of Physiology, University of Florence, Florence, Italy.

GRANTS

2024 U. S. National Science Foundation (NSF). Understanding impacts of climatic variability on distributions of species. 800,000$ awarded to Prof. Daniel Reuman (PI), Emilio Berti (co-PI), Townsend Peterson (co-PI), and Jorge L. Soberon (co-PI).

RELEVANT SKILLS

I have developed an outstanding set of quantitative skills and successfully applied it to investigate macroecological and biogeographical drivers of biodiversity.

Programming languages – R, python, bash, C/C++, Stan, javascript (mostly for Google Earth Engine), SQL (PostGres flavor).
Software – Linux/GNU, Anaconda, RShiny, Google Earth Engine, QGIS, High-performance computing (HPC, Slurm flavor), Tidyverse, Git, GitHub, Jupyter Notebooks, LaTeX.
Methods – Mathematical modeling, Geographic information systems (GIS), Geoinformatics, Geomatics, Remote sensing, Biostatistics, Data science, Climate analyses, Species distribution modeling,

Environmental niche modeling, Machine learning, Bayesian statistics, Ordination and classification, Network theory, Community assembly, Optimization, Automation.
Languages – Italian (native), English (fluent), German (A1 → A2.1).

SOFTWARE

GHCNr: Download and process daily weather data from the Global Historical Climatology Network (GHCN) database. Author, maintainer. https://cran.r-project.org/packages=GHCNr.
enerscape: Compute Energy Landscapes (CRAN). Author, maintainer. https://cran.r-project.org/package=enerscape.
ATNr: Run Allometric Trophic Networks Models (CRAN). Author. https://cran.r-project.org/package=ATNr.
squirrygis: Fast C++ routines to process climate layers (GitHub). Author, maintainer. https://github.com/emilio-berti/squirrygis. assembly: Simulate community assembly (GitHub). Author, maintainer. https://github.com/emilio-berti/assembly.

SELECTED PUBLICATIONS

A full list of my publications can be found at Google Scholar.

1. **Berti, E.**, Rosenbaum, B., & Vollrath Fritz. (2025). Energy landscapes direct the movement preferences of elephants. *Journal of Animal Ecology* (Accepted).
2. Li, J., Brose, U., Rosenbaum, B., Ryser, R., & **Berti, E**. (2024). Decoding Information Flow and Sensory Pollution: A Systematic Framework for Understanding Species Interactions. *Ecology Letters*. DOI: 10.1111/ele.14522.
3. Antunes, A. C., **Berti, E.**, . . . , & Gauzens, B. (2024). Linking biodiversity, ecosystem function, and Nature's contributions to people: a macroecological energy flux perspective. *Trends in Ecology & Evolution*. DOI: 10.1016/j.tree.2024.01.004.
4. Gauzens, B., Brose, U., Delmas, E., & **Berti, E**. (2023). ATNr: Allometric Trophic Network models in R. Methods in Ecology and Evolution.
5. Bauer, B., **Berti, E.**, ... & Brose, U. (2022). Biotic filtering by species' interactions constrains food-web variability across spatial and abiotic gradients. *Ecology letters*. DOI: 10.1111/ele.13995. (`Shared first authorship`).
6. Grenié, M, **Berti, E.**, ... & Marten, W. (2022). Harmonizing taxon names in biodiversity data: a review of tools, databases, and best practices. *Methods in Ecology and Evolution*. DOI: 10.1111/2041-210X.13802.
7. **Berti, E.**, Davoli, M., ... & Vollrath, F. (2021). The r package enerscape: A general energy landscape framework for terrestrial movement ecology. *Methods in Ecology and Evolution*. DOI: 10.1111/2041-210X.13734.
8. **Berti, E.**, Monsarrat, S., Munk, M., Jarvie, S. & Svenning, J.C. (2020). Body size is a good proxy for vertebrate charisma. *Biological Conservation*. DOI: 10.1016/j.biocon.2020.108790.
9. **Berti, E.** & Svenning, J.C. (2020). Megafauna extinctions have reduced biotic connectivity worldwide. *Global Ecology and Biogeography*. DOI: 10.1111/geb.13182.

CONFERENCE TALKS AS PRESENTER

1. **Berti, E.**, Rosenbaum, B., Brose, U., & Vollrath, F. (2023). Energy landscapes direct the movement preferences of elephants. *British Ecological Society annual meeting, Belfast, UK /*
2. Bauer, B., **Berti, E.**, . . . , & Brose, U. (2022). From regional to local scale: biotic interactions shape multilayer food-webs. *SFE-GFO-EEF biannual meeting, Metz, France* (invited talk).
3. **Berti, E.**, & Svenning, J.C. (2022). State-space models show that functional replacements of extinct megafauna have distinct habitat preference in a European rewilding area. *SFE-GFO-EEF biannual meeting, Metz, France*.

4. Grenié, M., **Berti, E.**, Carvajal-Quintero, J., Winter, M., & Sagouis (2021). Matching Species Names Across Biodiversity Databases: Sources, tools, pitfalls and best practices for taxonomic harmonization. *TDWG annual meeting, online.*
5. **Berti, E.** & Svenning, J.C. (2019). Megalinkers extinction and the decrease of ecosystem connectivity. *ESA annual meeting, Louisville, KY.*
6. **Berti, E.**, Jarvie, S. W., & Svenning, J.C. (2018). Rewiring food webs via trophic rewilding. *BES annual meeting, Belfast, UK.*

SUPERVISION, MENTORING, AND TEACHING

During my four years at iDiv (Leipzig), I have co-supervised several students and provideed theoretical, computational, and statistical advice to several members of my host institution. I have also been teaching and organizing workshop since the start of my PhD, particularly on reproducible research and open data principles.

- Meta-analyses for Biodiversity (2024 & 2021) – Teaching assistant (MSc course).
- Theoretical Population Ecology (2023) – Teaching assistant (MSc course).
- Introduction to scientific programming and tidyverse (2022) (slides) – Lecturer (PhD course).
- Introduction to git and GitHub for a fool-proof programming (2022) (course) – Lecturer (PhD course).
- Statistical and Geospatial Modelling (2019) – Teaching assistant (MSc course).
- Behavioural Biology (2018, 2019) – Teaching assistant (BSc course).
- Geographic Information System (2017) – Lab assistant (BSc course).
- Cleaning online repository data for use in biogeography and macroecology (2019) – Co-organizer (workshop).
- Running a species distribution model in R (2019) – Co-organizer (workshop).
- A (very) gentle introduction to Linux (2019) – Organizer (workshop).