Submitted Abstract

ID IMC22-FSAbstr- 723

First Author First Name Last Name	 Livio Bätscher
Submitting Author First Name Last Name	 Livio Bätscher
Correspondence	livio.baetscher@unibas.ch
Co-Authors **>> E-Mails will be not listed**	De Vos, Jurriaan
Organisations	University of Basel, Switzerland
Country	Switzerland
Region	Western Europe
Title	Improving Macroevolutionary Studies Of Alpine Plant Groups By Accurately Assigning Species To Biomes Based On Imperfect Data.
Keywords	Biome Shift, Biogeography, Ancestral Range Reconstruction, Phylogenomics, Classification
Type	List Of Focus Session
Focus Session ID	05

Abstract

Macroevolutionary studies to understand niche evolution in plants usually rely on classifying species as belonging to particular biomes, even though occurrence data is typically noisy and boundaries of biomes may be poorly defined both spatially and climatically. For diverse plant clades (e.g., all species of a genus) that have broad geographic distributions, such assignment need to consider imperfect, rasterized global climatic data. Moreover, spatial datasets of millions of point-localities require a fully automized approach. Accurately assigning species to biomes then becomes a challenging task that is often not fully addressed but may bias downstream evolutionary inference.

Here we present an approach to automatically classify species to thermal belts (e.g. alpine or non-alpine) using the climatic proxies for the treeline and the ruggedness of the terrain. We account for poorly geo-referenced point-localies and bias due to rasterized data in topographically highly heterogeneous mountainous areas. Specifically, to classify a record, we combine digital elevation models and climatic data to model the elevation of a local treeline and use it to adjust a "raw" classification of a record. To reconstruct the evolution of biome shifts, we then use phylogeny-explicit methods and well-sampled phylogenies of species-rich genera that contain species in all thermal belts.

We demonstrate that accurately defining biomes positively impacts the accuracy of reconstructed biome shifts, underlining the importance of our approach. Furthermore, this study is among the few that considers the local differences of the treeline, through by the mass elevation effect (causing the isotherms to move upslope in larger mountain systems) and latitude.