

DISCOVER the Landcover – R based tools for quantitative vegetation reconstruction

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Quantitative methods have gained increasing attention in the field of vegetation reconstruction over the past decade. The DISCOVER package implements key tools in the R programming environment for statistical computing. This implementation has three main goals:

- 1) Provide a user-friendly, transparent, and open implementation of the methods
- 2) Provide full flexibility in all parameters (including the underlying pollen dispersal model)
- 3) Provide a sandbox for testing the sensitivity of the methods.

We illustrate the possibilities of the package with tests of the REVEALS model and of the extended downscaling approach (EDA). REVEALS (Sugita 2007) is designed to translate pollen data from large lakes into regional vegetation composition. We applied REVEALSinR on pollen data from Lake Tiefer See (NE-Germany) and validated the results with historic landcover data. The results clearly show that REVEALS is sensitive to the underlying pollen dispersal model; REVEALS performs best when applied with the state of the art Lagrangian stochastic dispersal model. REVEALS applications with the conventional Gauss model can produce realistic results, but only if unrealistic pollen productivity estimates are used.

The EDA (Theuerkauf et al. 2014) employs pollen data from many sites across a landscape to explore whether species distributions in the past were related to known stable patterns in the landscape, e.g. the distribution of soil types. The approach had so far only been implemented in simple settings with few taxa. Tests with EDASinR show that it produces sharp results in complex settings with many taxa as well.

The DISCOVER package is open source software, available from discover.uni-greifswald.de. This website can be used as a platform to discuss and improve quantitative methods in vegetation reconstruction. To introduce the tool we plan a short course in autumn of this year.

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