



Integrating R with GIS for innovative geocomputing – the examples of RQGIS and RSAGA

Jannes Muenchow (1), Patrick Schratz (1), Donovan Bangs (2), and Alexander Brenning (1)

(1) Department of Geography, Friedrich Schiller University Jena, Löbdergraben 32, 07743 Jena (jannes.muenchow@uni-jena.de), (2) Department of Geography and Environmental Management, University of Waterloo, 200 University Avenue West, Waterloo, Ontario N2L 3G1, Canada

While Geographical information systems (GIS) are good at efficiently manipulating and processing large amounts of geospatial data, the programming language R excels in (geo-)statistical analyses. Thus, bringing GIS algorithms to the R console combines the best of the two worlds, and paves the way for innovative geocomputing. To promote this approach, we will contrast the new RQGIS package with the established RSAGA package in terms of architecture, functionality and ease-of-use. Both packages use already existing Application Programming Interfaces (API), namely the QGIS Python API and SAGA API, to access GIS functionality from within R. Overall, RQGIS has the advantage of providing a unified interface to several GIS toolboxes (GRASS, SAGA, GDAL, etc.) bringing more than 1000 geocomputing algorithms to the R console (though only a subset of the full functionality of a specific third-party provider might be available). To further support the unified interface, QGIS automatically converts the input data into the formats supported by the respective third-party module. Moreover, RQGIS is easier to use than RSAGA due to special convenience functions (`open_help`, `get_args_man`, `run_qgis`). Nevertheless, the experienced SAGA user will most likely prefer the RSAGA package since it lets the user access all SAGA algorithms for a wide range of SAGA versions (currently 2.0.4 - 2.2.3). Additionally, RSAGA includes numerous user-friendly wrapper functions with arguments and meaningful default values (e.g., `rsaga.slope`). What is more, RSAGA provides the user with special geocomputing R functions, i.e. functions which solely run in R without using SAGA in the background (e.g., `pick.from.ascii.grid`, `grid.predict` and `multi.local.function`). To demonstrate the advantages of each package, we will derive terrain attributes from digital elevation models to model species richness and landslide susceptibility using non-linear generalized linear or generalized additive models. In the end, the choice of RQGIS or RSAGA depends on the user's preferences, expertise and tasks at hand. But both packages will benefit anyone working with large spatio-temporal data in R.