

EGU2020-4700

<https://doi.org/10.5194/egusphere-egu2020-4700>

EGU General Assembly 2020

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Stratigrapher: making and using lithologs in R

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Stratigrapher is an open-source integrated stratigraphy package. It is available in the free software environment R (<https://CRAN.R-project.org/package=Stratigrapher>) and is designed to generate lithologs in a semi-automated way, to process stratigraphical information, and to visualize any plot along the lithologs in the R environment.

The basic graphical principle behind Stratigrapher is the incremental addition of elements to a drawing: a plot is opened, and graphical elements are successively added. This allows compartmentalisation of the drawing process, as well as the superposition of different plots for comparison. For instance a litholog of a single section can be written as a single function including all the drawing sub-functions, and be integrated in a larger plot, for instance to be correlated to other sections or to show proxy data.

The Stratigrapher package is designed for efficient work, and minimum coding, while still allowing versatility. The lithological information of beds (upper and lower boundary, hardness, lithology, etc.) is converted into polygons. All polygons are drawn together using a single function, and each polygon can have its personalised symbology allowing to distinguish lithologies. A similar workflow can be used for plotting proxies while distinguishing each sample by their lithology. Vector graphics can be imported as SVG files, and precisely drawn with the lithologs to serve as symbols or complex elements. Every type of symbol is plotted by calling one single function which repeats the drawing for each occurrence of the represented feature. This illustrates that the amount of work invested to make lithologs using Stratigrapher is related to their complexity rather than their length: a long but monotonous litholog (e.g. of marl-limestone alternations) only takes a few lines of code to generate.

The Stratigrapher package also provides a set of functions to deal with selected stratigraphic intervals (for instance in the $[0,1[$ form): they allow simplification, merging, inversion and visualisation of intervals, as well as identifying the samples included in the given intervals, and characterising the relation of the intervals with each other (overlap, neighbouring, etc.). Stratigrapher includes PDF and SVG generation of plots, of any dimension. The generated PDF can even store multiple plots in a single file (each plot on a different page) to document data processing comprehensively.

