

riojaPlot: User Guide (Version 1.0-1)

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0.1 1. Introduction

darleq3 is an R package for the assessment of river and lake ecological status using diatom data obtained by light microscopy (LM) or Next Generation Sequencing (NGS). The package contains functions to import diatom and associated environmental data from Excel worksheets, perform simple data validation checks, calculate various water quality metrics, EQRs and Water Framework Directive (WFD) quality classes for samples, and classification uncertainty for sites. The package can calculate Trophic Diatom Index TDI5LM, TDI4 and TDI3 scores for light microscopy river diatom samples, TDI5NGS for NGS river diatom samples, Lake Trophic Diatom Index LTDI2 and LTDI1 scores for light microscopy lake diatom samples, and Diatom Acidification Metric (DAM) scores for lake and river light microscopy samples. Details of the TDI / LTDI metrics, algorithm and derivation of the status class boundaries for rivers are given in Kelly *et al.* (2008) and for lakes in Bennion *et al.* (2014). Details of the DAM acidification metric is described in Juggins *et al.* (2016). Calculation of uncertainty of classification is described in Kelly *et al.* 2009. At the date of publication, formal WFD classification across the UK uses TDI5 LM for rivers and LTDI2 for lakes.

darleq3 can be run in two ways, either as an interactive shiny app, or a series of R functions issued from the R console or an R script. The first method attempts to mimic the old DARLEQ2 software will be the easiest for most users. The second methods will be more convenient for processing multiple data sets, for automating darleq calculations, or including them in a longer chain of analysis.

```
library(rioja)
#> This is rioja 1.0-1
library(dplyr)
#>
#> Attaching package: 'dplyr'
#> The following objects are masked from 'package:stats':
#>
#>     filter, lag
#> The following objects are masked from 'package:base':
#>
#>     intersect, setdiff, setequal, union

data(aber)

spec <- aber$spec
colnames(spec) <- aber$names$Name
depth <- aber$ages$`Depth (cm)`
yvar <- aber$ages[, 1:2]
groups <- aber$types %>% mutate(Group=factor(Group, levels=c("Trees", "Shrubs", "Herbs")))

mx <- apply(spec, 2, max)
selTaxa <- names(mx[mx > 5])
```

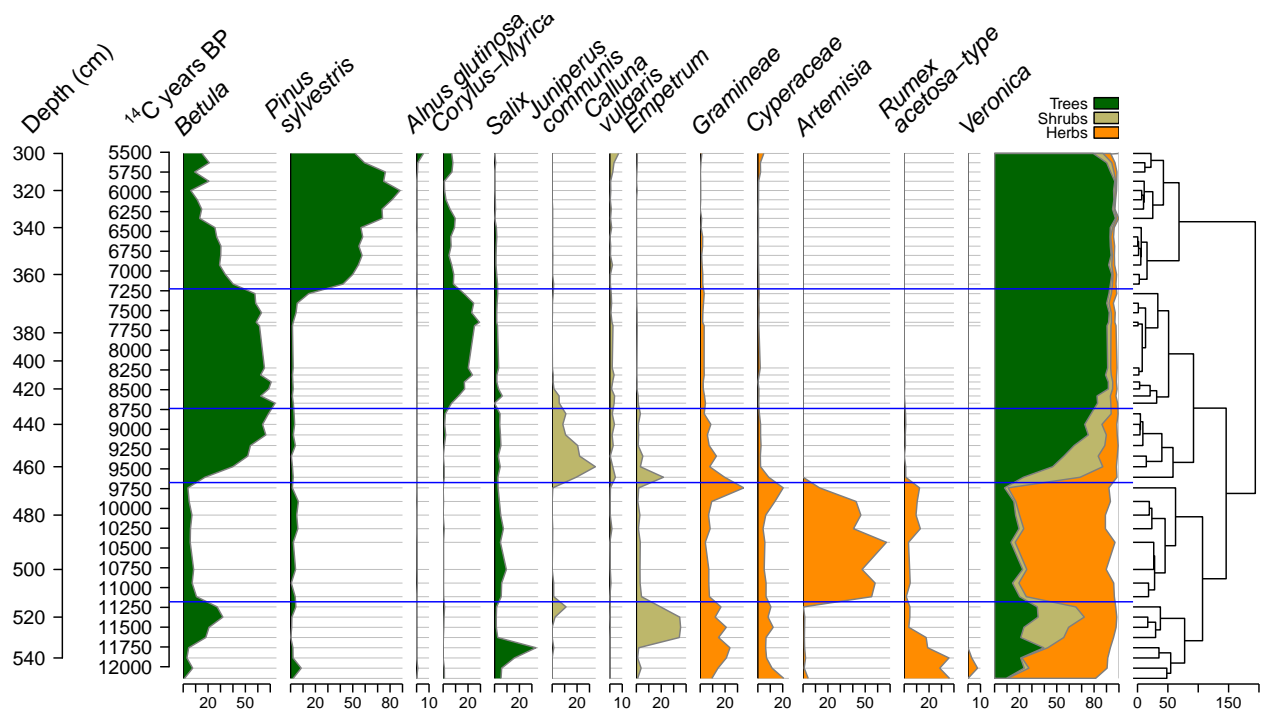
```

tmp <- data.frame(Name=colnames(spec)) %>%
  dplyr::left_join(groups, by="Name")

ylab <- expression("^{14}C~years-BP")

x <- riojaPlot(spec, yvar, selVar=selTaxa, groups=groups,
  secYvarName="Depth (cm)",
  yvarName="Age (14C years BP)",
  yLabel = ylab,
  showSecAxis=TRUE,
  showGroups=T,
  showCumul=TRUE,
  showExag=F,
  exagCol="grey90",
  outlineCol="grey50",
  cumulFontSize=0.7,
  nameAngle=45,
  nameFontSize=1,
  yAxisFontSize=0.8,
  showClust=TRUE, yInterval=250, yMin=5500,
  showBars="full",
  barTop=F,
  nameStylenBreak=15,
  lwdBar=0.5,
  showZones="auto",
  zoneCol="blue")

```



0.2 8. References

Bennion, H., Kelly, M.G., Juggins, S., Yallop, M.L., Burgess, A., Jamieson, J., Krokowski, J., 2014. Assessment of ecological status in UK lakes using benthic diatoms. *Freshwater Science* **33**, 639-654.

Juggins, S., Kelly, M., Allott, T., Kelly-Quinn, M., Monteith, D., 2016. A Water Framework Directive-compatible metric for assessing acidification in UK and Irish rivers using diatoms. *Science of The Total Environment* **568**, 671-678.

Kelly, M., Bennion, H., Burgess, A., Ellis, J., Juggins, S., Guthrie, R., Jamieson, J., Adriaenssens, V., Yallop, M., 2009. Uncertainty in ecological status assessments of lakes and rivers using diatoms. *Hydrobiologia* **633**, 5-15.

Kelly, M., Juggins, S., Guthrie, R., Pritchard, S., Jamieson, J., Rippey, B., Hirst, H., Yallop, M., 2008. Assessment of ecological status in UK rivers using diatoms. *Freshwater Biology* **53**, 403-422.