

# Multivariate analysis of ecological data with **ade4**

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In many situations, researchers have to deal with multivariate data sets. For instance, in community ecology, assemblages are usually described by species abundances gathered at different sites. Sites can be located in the geographic space and described by the measurements of several environmental variables. Species can be characterized by traits or their common evolution history (i.e. phylogeny). Understanding how and why individuals or different species coexist at a given place require thus to analyze simultaneously different type of data (quantitative or qualitative variables, temporal, spatial or phylogenetic information) collected on different types of units (individuals, sites or species). Multivariate methods offer a common framework to analyze such data. In this workshop, I will present several methods of multivariate analysis to summarize the information contained in one (e.g., principal component analysis, correspondence analysis), two (e.g., redundancy analysis, coinertia analysis) or more tables (e.g. STATIS or RLQ methods). I will show how external constraints (spatial or phylogenetic) can be considered in these analyses. I will adopt a data-driven presentation and illustrate the use of methods with the **ade4** package for R. I will also present the new graphical functionalities available in the package and its graphical interface implemented in the **ade4TkGUI** package.