R4Rchaeologists: Advanced visualisation exercises

Exercise A: Cartography

R has extensive support for vector and raster spatial data (using `sf` and `raster` respectively). `ggplot2` and its extensions allow you to use this data to produce maps and other spatial visualisations. Cartography in R differs from a GIS in that you need to do it programmatically, but this opens up the possibility of generating multiple data-driven maps in a way that can be difficult to replicate in point-and-click GIS software.

Your objectives for this exercise are to:

1. Read vector spatial data into R
2. Plot the data using ggplot2
3. Use categorical data to produce a faceted map
4. Add suitable base maps and cartographic elements (e.g. scale, legend)

Data

- `cartography_data/tavo-a27.tsv` (from https://github.com/joeroe/tavo-a27): a table of archaeological sites with coordinates, periods, and species occurrence data
- https://naturalearthdata.com for generic base map data

R packages and functions

The following packages will be useful for this exercise:

- `ggplot2`
- `dplyr`
- `ggspatial`
- `tidyr`
- `stringr`

* These packages are not on CRAN. You will need to install them with `devtools::install_github()`

Remember that you can open the documentation for any function with `?function_name()`. Google is also your friend – most packages have websites or GitHub repositories with extended documentation. There are also many tutorials and StackOverflow questions about common problems in R.

Hints

- You can facet the map with either the period or occurrence columns, but both will require some transformation:
  - For occurrences, see `?tidyr::pivot_longer`
  - For periods, see `?stringr::str_split` and `?tidyr::pivot_longer`
- Apart from Natural Earth data, there are R packages that provide base maps directly (e.g. `maptools`, `ggmap`)