

The mapmisc package

Patrick Brown

April 15, 2024

This document will be incomplete if `rgdal` is unavailable or there is no internet connection when this document is compiled. The full document is at <http://diseasemapping.r-forge.r-project.org/>.

1 Introduction

This package provides a few utilities for making nice maps in R, with an emphasis on enabling maps in short tidy code chunks which are suitable for Sweave and knitr documents. The package duplicates the capabilities of packages such as `classInt`, `geonames`, and `OpenStreetMap`, and the price of having tidier code is much of the flexibility from these other packages has been lost here.

The meuse data

```
R> data('netherlands')
R> meuse = unwrap(meuse)
R> nldElev = unwrap(nldElev)
```

```
R> meuseLL = project(meuse, crsLL)
```

The elevation data is a Raster.

```
R> class(nldElev)
## [1] "SpatRaster"
## attr(,"package")
## [1] "terra"
R> nldElev = crop(nldElev, extend(ext(meuse), 1000))
```

2 Downloading background maps and city locations

Get a background map covering the extent of the meuse data

```
R> nldTiles = openmap(meuse)
```

`nldTiles` is a Raster with the same projection as `meuse`

```
R> class(nldTiles)
## [1] "SpatRaster"
## attr(,"package")
## [1] "terra"
R> crs(nldTiles, proj=TRUE)
## [1] "+proj=sterea +lat_0=52.1561605555556 +lon_0=5.38763888888889 +k=0.9999079 +x_0=1
R> crs(meuse, proj=TRUE)
## [1] "+proj=sterea +lat_0=52.1561605555556 +lon_0=5.38763888888889 +k=0.9999079 +x_0=1
```

Maps which can be downloaded are shown at <http://diseasemapping.r-forge.r-project.org/openmap/>

A list of cities, included in the `netherlands` data.

```
R> nldCities = unwrap(nldCities)
```

Or download using `GNcities`, a wrapper for the function of the same name in the `geonames` package.

```
R> options(geonamesUsername="myusernamehere")
R> if(file.exists("~/geonamesUsername.R")) source("~/geonamesUsername.R")
R> nldCities = GNcities(meuse, maxRows=6)
```

A `SpatVector`, with same map projection.

```
R> class(nldCities)
## [1] "SpatVector"
## attr(,"package")
## [1] "terra"
R> names(nldCities)
## [1] "lng"          "geonameId"    "countrycode" "name"         "fclName"
## [6] "toponymName" "fcodeName"   "wikipedia"    "lat"          "fcl"
## [11] "population"  "fcode"
R> crs(nldCities, proj=TRUE)
## [1] "+proj=sterea +lat_0=52.1561605555556 +lon_0=5.38763888888889 +k=0.9999079 +x_0=1
```

3 Making maps

The `map.new` function sets up a map in the current plot window with the correct limits and aspect ratio for the object supplied, and without margins or white space. `scaleBar` adds a scale and north arrow. It uses the map projection of the argument supplied to calculate distances and find north.

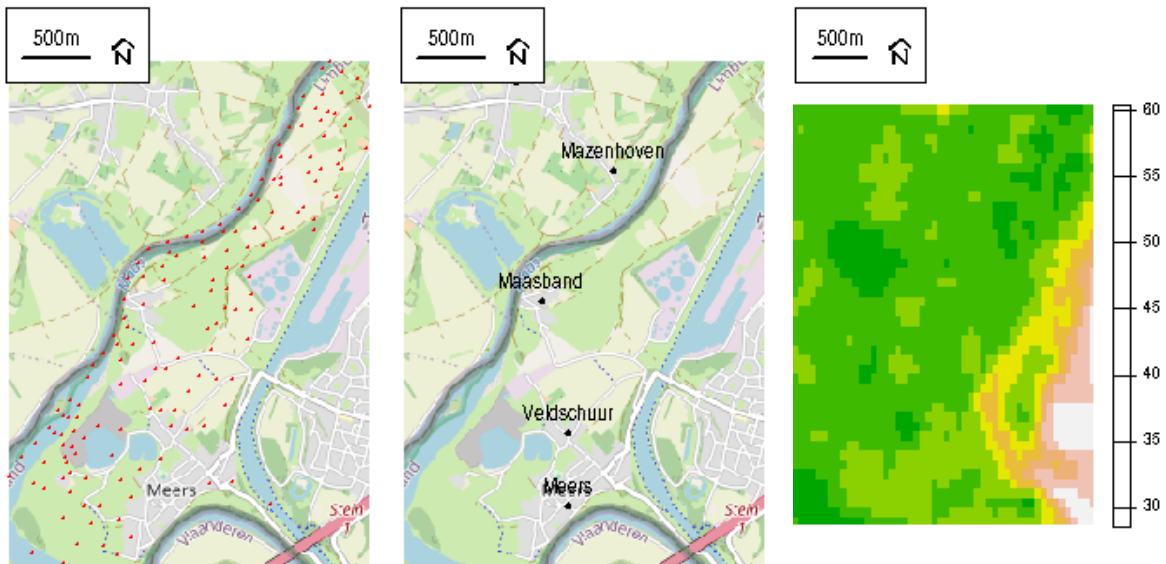
```

R> # plot the data locations
R> map.new(meuse)
R> plot(nldTiles, add=TRUE)
R> points(meuse,col="red", cex=0.3)
R> scaleBar(meuse,pos="topleft", bg="white")
R>
R> # plot city names
R> map.new(meuse)
R> plot(nldTiles, add=TRUE)
R> points(nldCities)
R> text(nldCities, labels=nldCities$name, pos=3)
R> scaleBar(meuse,pos="topleft", bg="white")
R>
R> # plot elevation
R> map.new(meuse, legendRight=TRUE)
R> plot(nldTiles, add=TRUE)
R> plot(nldElev,add=TRUE,col=terrain.colors(8),alpha=0.6,legend.mar=2, legend.line=0)

## Warning in graphics::rect(e$xmin, Y[-(nc + 1)], e$xmax, Y[-1], col = rev(cols),
: semi-transparency is not supported on this device: reported only once per
page

R> scaleBar(meuse,pos="topleft",bg="white")

```



(a) data locations

(b) cities

(c) elevation

Figure 1: simple map

4 Legends

Create a colour scale for plotting copper concentrations

```
R> cuScale = colourScale(meuse$copper, breaks=5, style='equal',
+   opacity=0.8, dec=-1, firstBreak=0)
```

and elevation, with transparency decreasing as elevation increases.

```
R> elevScale = colourScale(nldElev, style='equal',
+   breaks=6, col=terrain.colors,
+   firstBreak=0, dec=-1,opacity=c(0.2, 0.9))
```

Soil type is a categorical variable, create a factor and create a colour scale of unique values

```
R> soilScale = colourScale(meuse$soil, col="Set2")
```

```
R> map.new(meuse)
R> plot(nldTiles, add=TRUE)
R> plot(meuse, col=cuScale$plot,add=TRUE,pch=16)

## Warning in graphics::plot.xy(list(x = g[, 3], y = g[, 4]), type = "p", pch
= pch, : semi-transparency is not supported on this device: reported only once
per page

R> legendBreaks("bottomright", breaks=cuScale,
+   title="gals/firkin")
R>
R>
R> map.new(meuse)
R> plot(nldTiles, add=TRUE)
R> plot(meuse, col=soilScale$plot,add=TRUE,pch=16)
R> legendBreaks("bottomright", breaks=soilScale,
+   title="soil type", cex=0.7,bg="white")
R>
R> map.new(meuse)
R> plot(nldTiles, add=TRUE)
R> plot(nldElev, breaks=elevScale$breaks, col=elevScale$colOpacity,
+   legend=FALSE,add=TRUE)
R> legendBreaks("left", breaks=elevScale, title='Metres',bg="white")
```

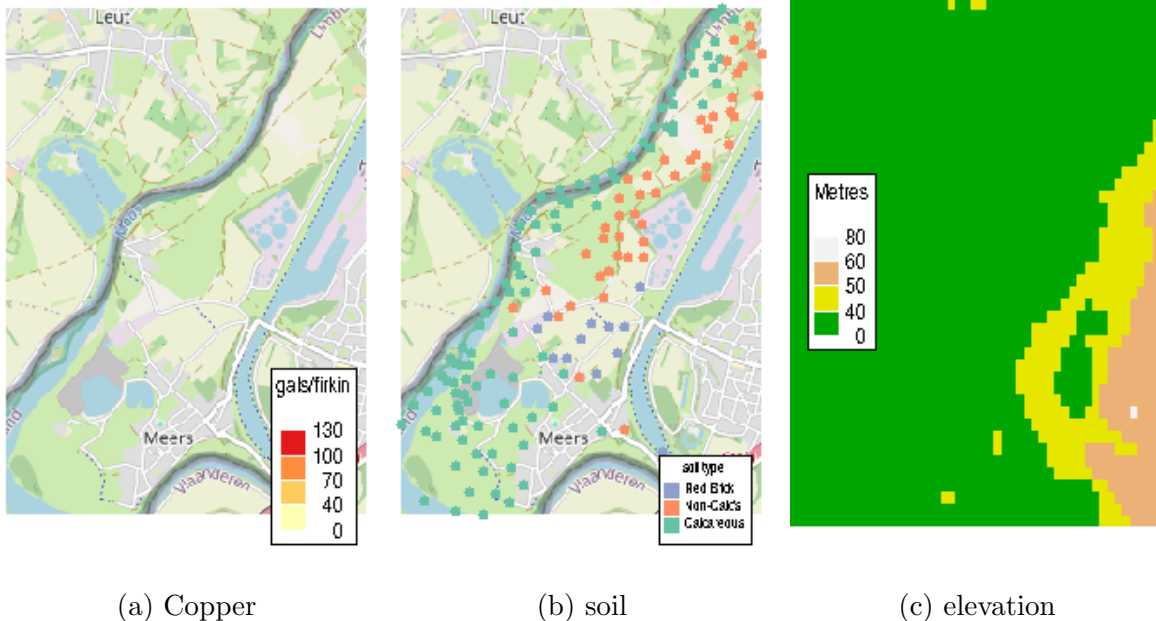


Figure 2: Meuse data again

5 More plots

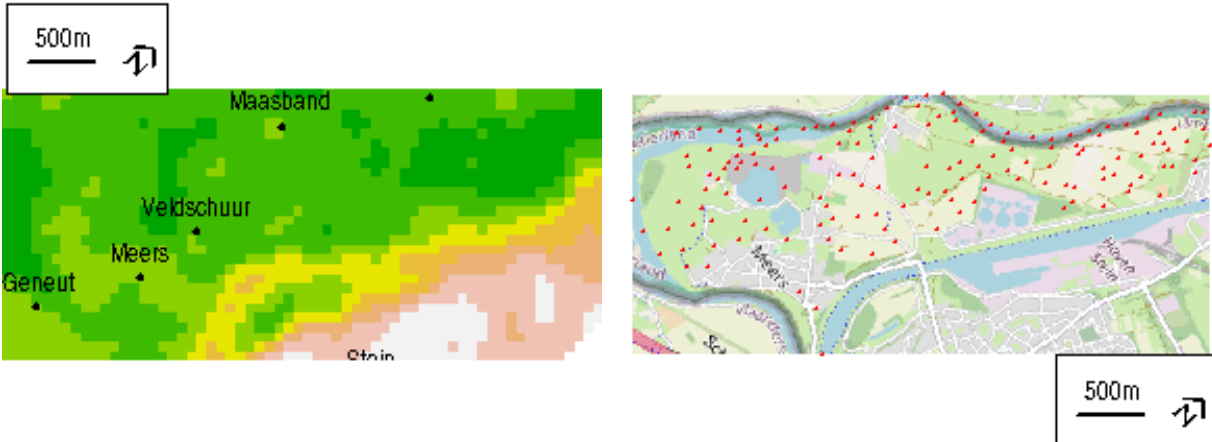
Rotate the data 50 degrees clockwise with an oblique mercator projection.

```
R> meuseRot = project(meuse, omerc(meuse, -50))
R> tilesRot = openmap(meuseRot, fact=2)
R> elevRot = project(nldElev, crs(meuseRot))
R> nldCitiesRot = project(nldCities, crs(meuseRot))
```

And create new plots

```
R> # first elevation
R> map.new(meuseRot)
R> plot(tilesRot, add=TRUE)
R> plot(elevRot, add=TRUE, alpha=0.5, col=terrain.colors(8), legend=FALSE)
R> points(nldCitiesRot)
R> text(nldCitiesRot, labels=nldCitiesRot$name, pos=3)
R>
R> scaleBar(meuseRot, pos="topleft", bg="white")
R>
R>
R> # then data locations
R> map.new(meuseRot)
R> plot(tilesRot, add=TRUE)
```

```
R> points(meuseRot,col="red", cex=0.3)
R>
R> scaleBar(meuseRot, bg="white")
```



(a) elevation

(b) data

Figure 3: Rotated map

6 Inset maps

```
R> world = openmap(
+   rast(ext(-10,30,40,60),crs=crsLL),
+   crs=crsMerc,
+   path="osm")
```

```
R> # not rotated
R> map.new(meuse,legendRight=TRUE)
R> plot(nldTiles, add=TRUE)
R> points(meuse)
R>
R>   scaleBar(meuse,pos="bottomright", bg="white")
R>   insetMap(crs=meuse, pos="topright",map=world)

## Warning in graphics::polygon(xsp, col = col, border = substr(col, 1, 7), :
## semi-transparency is not supported on this device:  reported only once per page

R> # rotated
R> map.new(meuseRot)
```

```
R> plot(tilesRot, add=TRUE)
R> points(meuseRot,col="red", cex=0.3)
R>
R>
R> scaleBar(meuseRot, bg="white")
R> insetMap(meuseRot, "bottomleft",map=world)

## Warning in graphics::polygon(xsp, col = col, border = substr(col, 1, 7), :
## semi-transparency is not supported on this device: reported only once per page
```

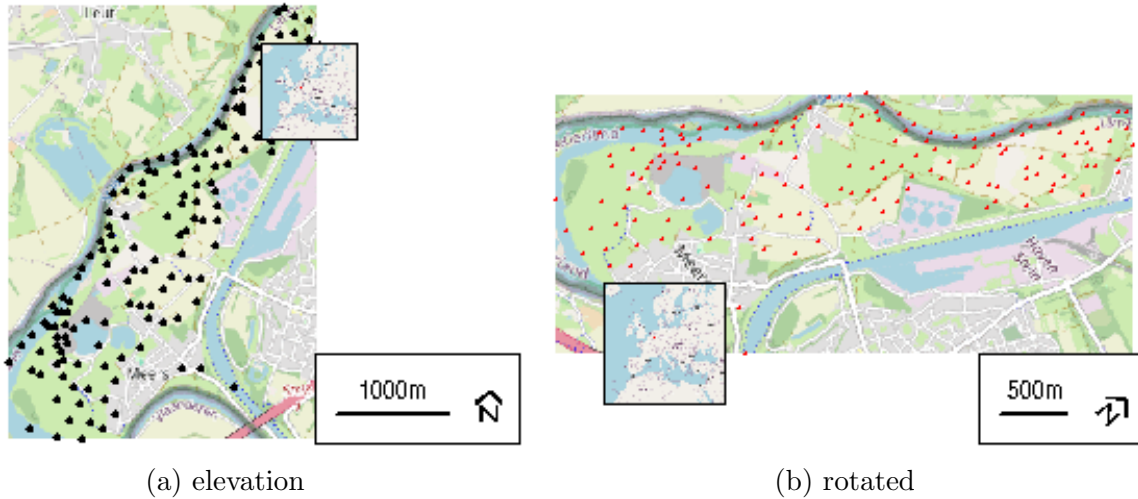


Figure 4: Inset map