`plotKML`: a framework for visualisation of space-time data

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KML is an OGC (Open Geospatial Consortium), XML-based standard to represent spatial data. Use of KML has been popularised with the development of virtual globes like Google Earth (McGavra et al. 2009), which provide an alternative point of view of spatial data. There is an increasing demand for such tools to visually explore spatio-temporal patterns in a variety of environmental data (Andrienko and Andrienko, 2006).

KML support is already available in R through the GDAL external library, via functions from the `rgdal` package, or directly implemented in R by packages `maptools` and `raster`. However, the support of the KML specifications by those existing options, is only partial. The `plotKML` package provides the user with tools to plot spatial and spatio-temporal objects as described by `sp` and `raster` classes into a KML file, and to propose an easy syntax to make complete use of the KML specification.
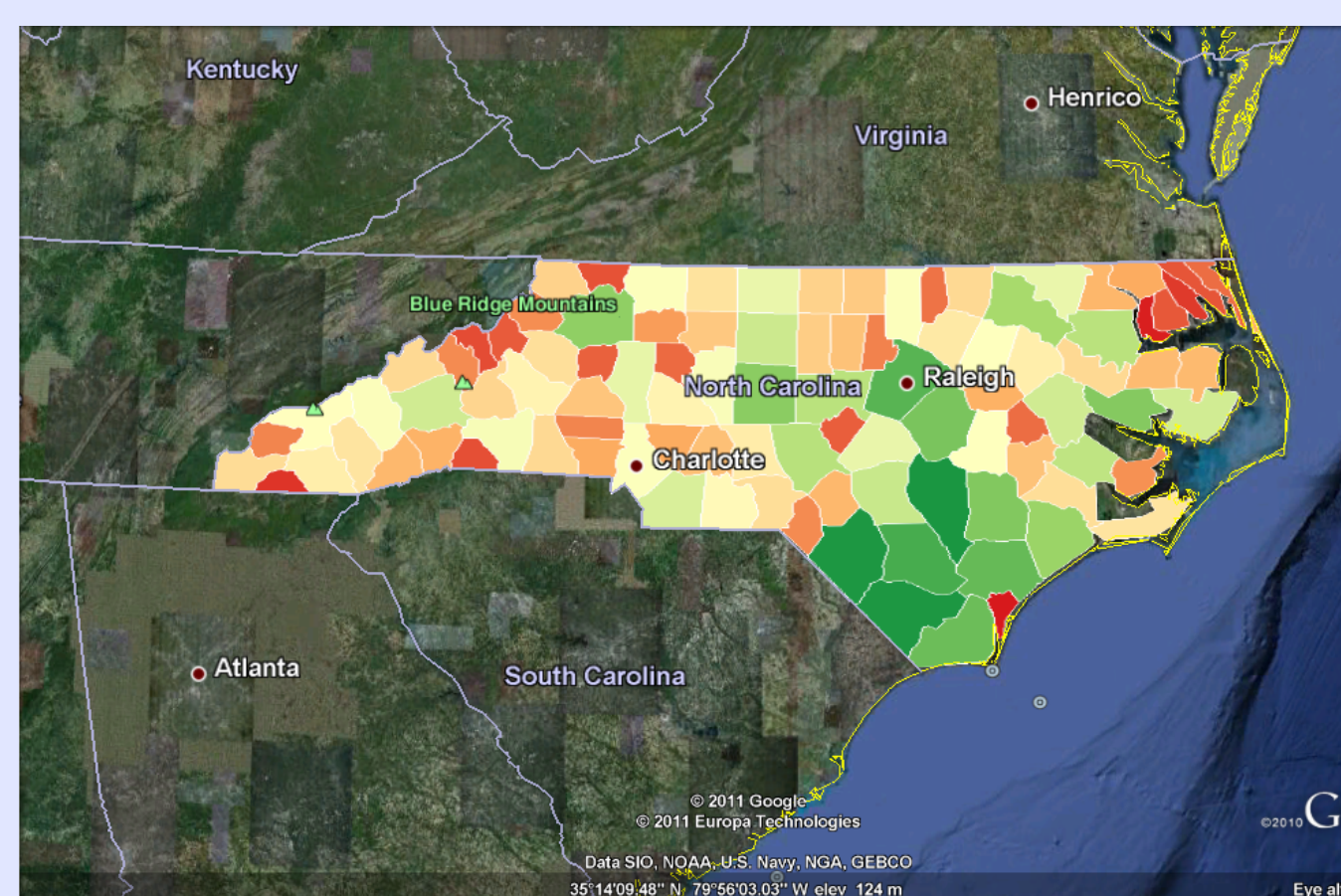
`plotKML` offers three levels of functionality (detailed below). The package is capable of representing a wide variety of spatio-temporal data.

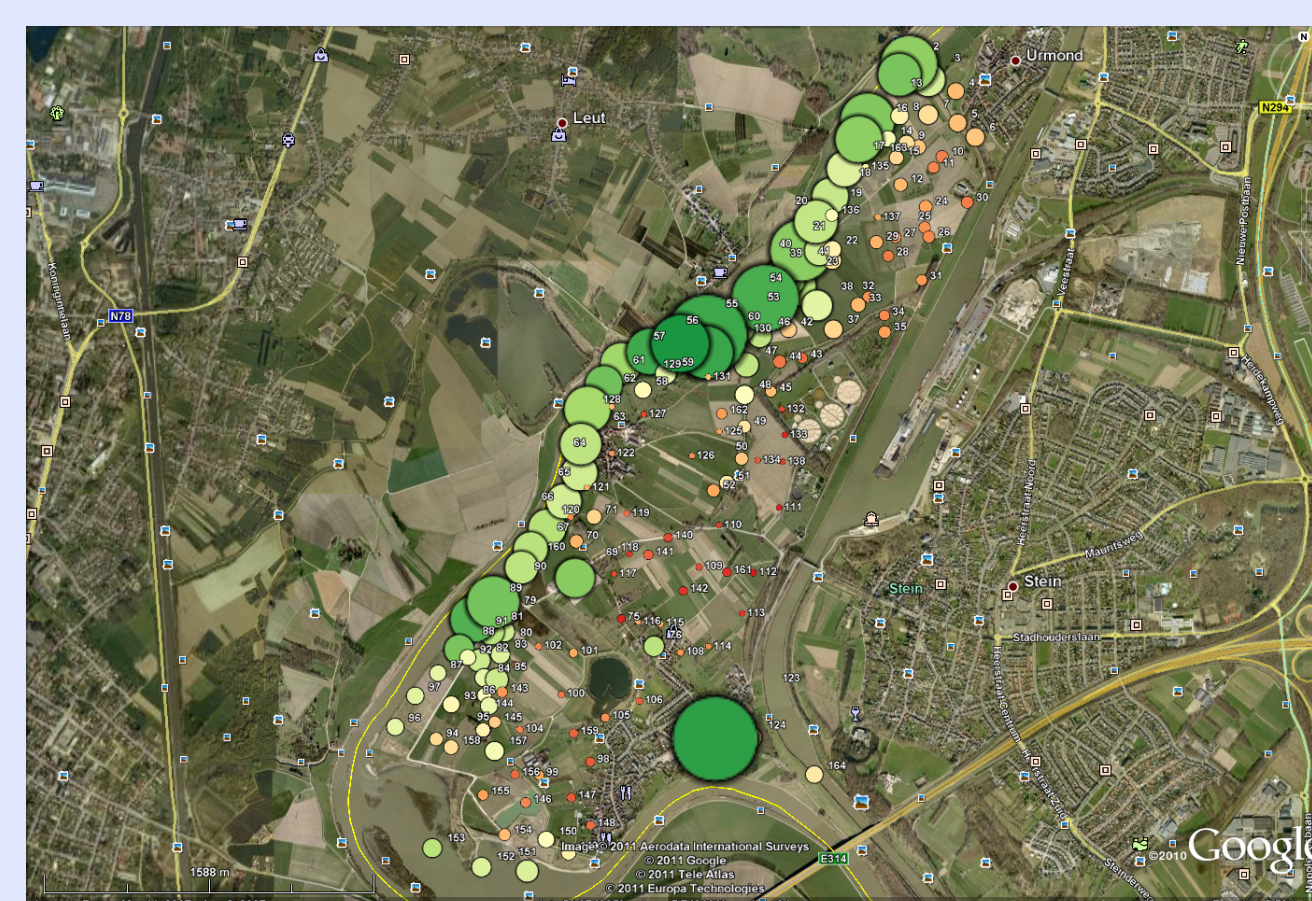## Plot any spatial data with a single function

`kml()` is a single method to plot most spatial or space-time objects available in R.

Various ways to represent information are supported (colour, size, transparency, etc.), through a synthax similar to `ggplot2` (Wickham, 2009).
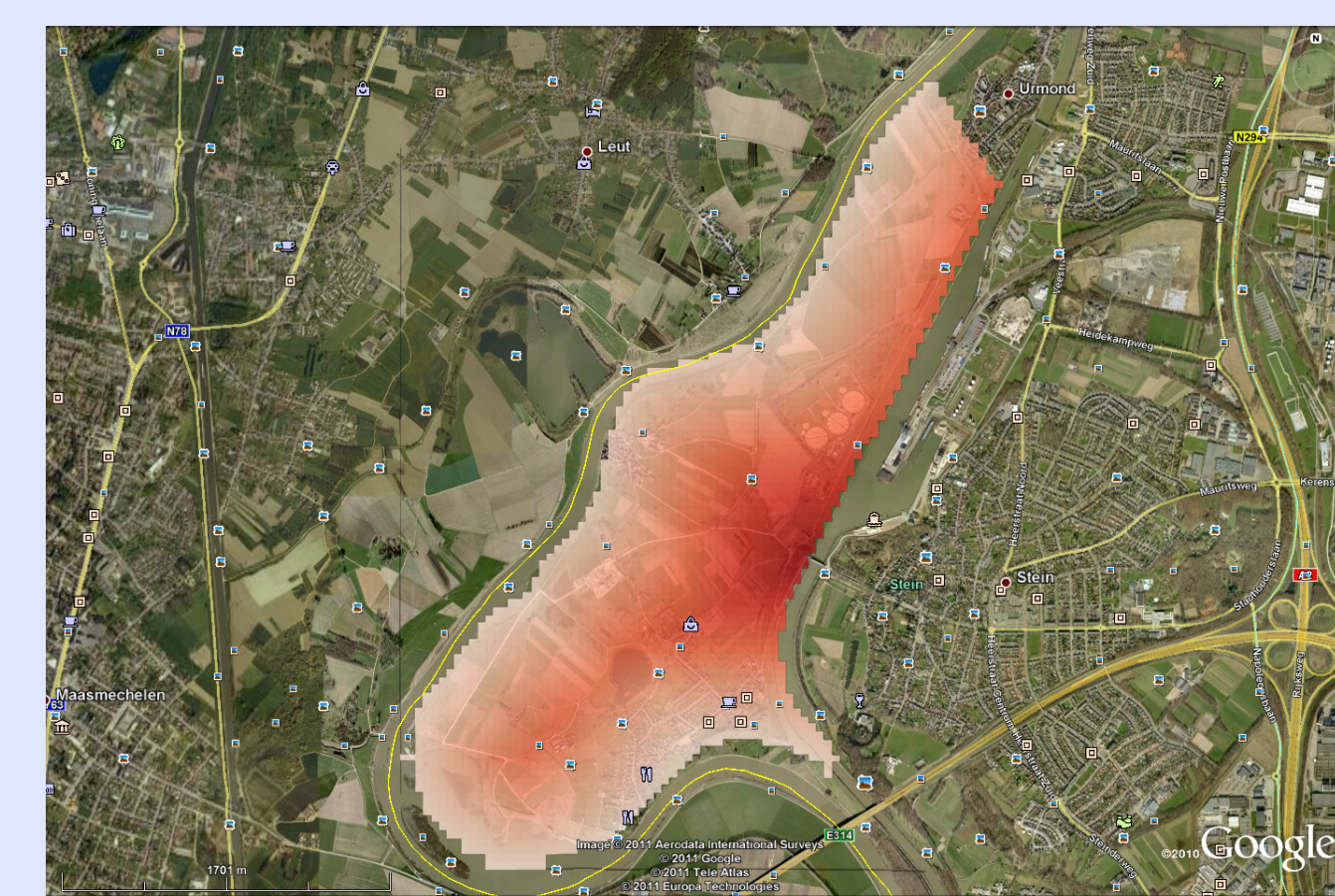
The reprojection of the data into a suitable coordinate system is handled automatically through the `reproject()` method.


```
kml(nc, file = "nc.kml",
    colour = AREA)
```



```
kml(meuse, file = "meuse.kml",
    colour = log(zinc)),
    size = cadmium)
```
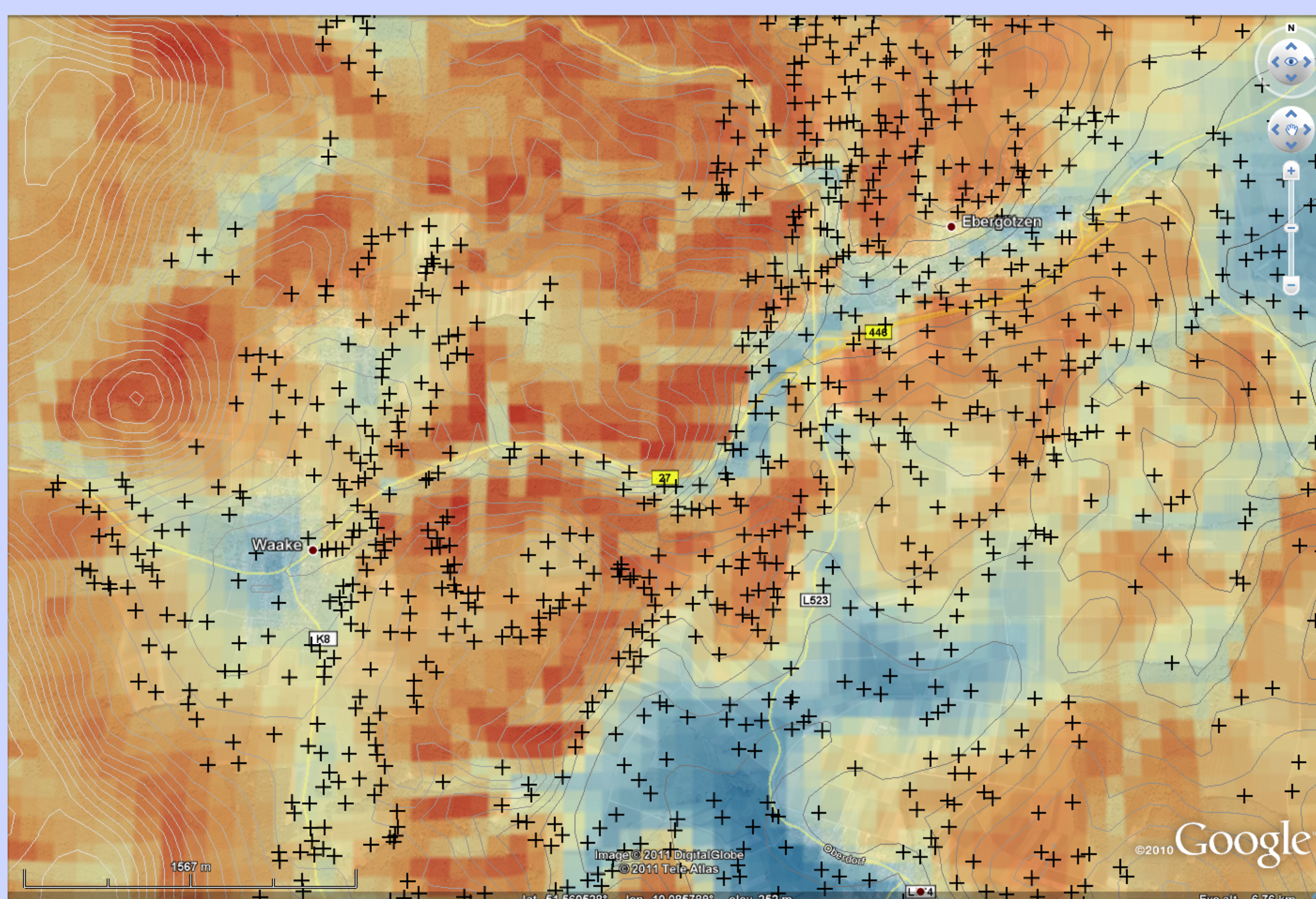


```
kml(meuse.grid, file = "meuse.kml",
    colour = dist,
    alpha = 0.75,
    colour_scale = brewer.pal(5,"Reds"))
```

Create custom multi-layer visualisations

The second level of `plotKML` functions offers a more flexible syntax for the creation of user-defined, multi-layered KML files:

- `kml_open()` creates a KML file
- `kml_layer()` writes a spatial layer
- `kml_close()` closes the KML file
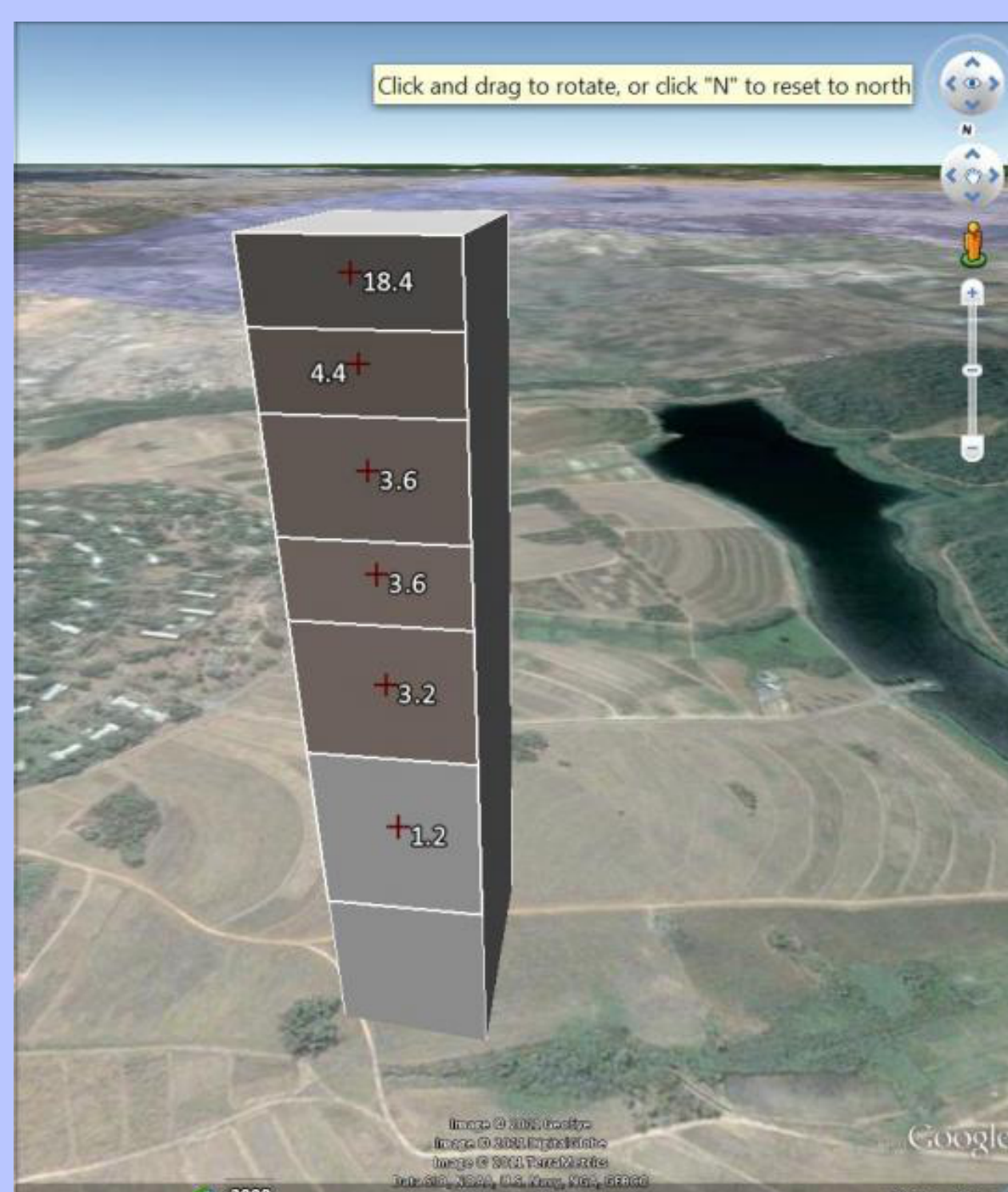- `kml_compress()` compresses the KML file to a KMZ file


```
# Creation of the KML file
kml_open(file = "eberg.kml")
# Printing spatial layers in the file
kml_layer(eberg_grid,
    colour = TWI,
    colour_scale = brewer.pal(5, "RdYlBu"),
    alpha = 0.75)
kml_layer(eberg_contours,
    colour = elevation,
    colour_scale = gray.colors(10))
kml_layer(eberg,
    labels = "",
    shape = "http://plotkml.r-forge.r-
project.org/cross.png",
    size = 0.5)
# Closing the file
kml_close()
```

Extend `plotKML` to render complex objects

It is possible to extend `plotKML` functionalities using templated views.

Using this mode - still under development - it will be possible to plot more complex R objects in a KML file.

Templates can be contributed to the package to extend its core possibilities, or be developed independently.

References

Andrienko, N. and Andrienko, G. 2006. *Exploratory analysis of spatial and temporal data: a systematic approach.* ISBN 9783540259947, Springer.
McGavra, G., Morris, S., and Janée, G. 2009. *Technology Watch Report: Preserving Geospatial Data.* DPC Technology Watch Series Report 09-01. Digital Preservation Coalition, York, UK.
Wickham, H. 2009. *ggplot2: elegant graphics for data analysis.* ISBN 978-0-387-98140-6, Springer.

http://plotkml.r-forge.r-project.org/