R spatial

CSC –Tieteen tietotekniikan keskus
Kylli Ek

R spatial

- Main packages
- Some nice maps for ideas
- Links

Data input and output

- sp the base for many other spatial packages
- rgdal for almost anything: raster and vector
- Some specific formats have their own libraries:
  - ncdf4 and RNetCDF
  - rpostgis and postGIStools
  - rgeos (WKT)
  - wkb
- Some datasets have their own libraries:
  - OpenStreetMap and osmar
  - geonames

Basic tools

- rgeos: for vectors using GEOS: area, intersects, simplify, envelope, buffer, equals..
- raster for rasters: reclassify, zonal, mask, calc, crosstab..

Data analysis

- spatial for kriging and point pattern analysis
- spdep for spatial weights, spatial autocorrelation and spatial regression models
- GWmodel for geographically weighted summary statistics, regression, pca and discriminant analysis
- gstat for variogram modelling, kriging
- mgcv for generalized additive model (GAM) modelling
- gbm for generalized boosted models (GBM) modelling

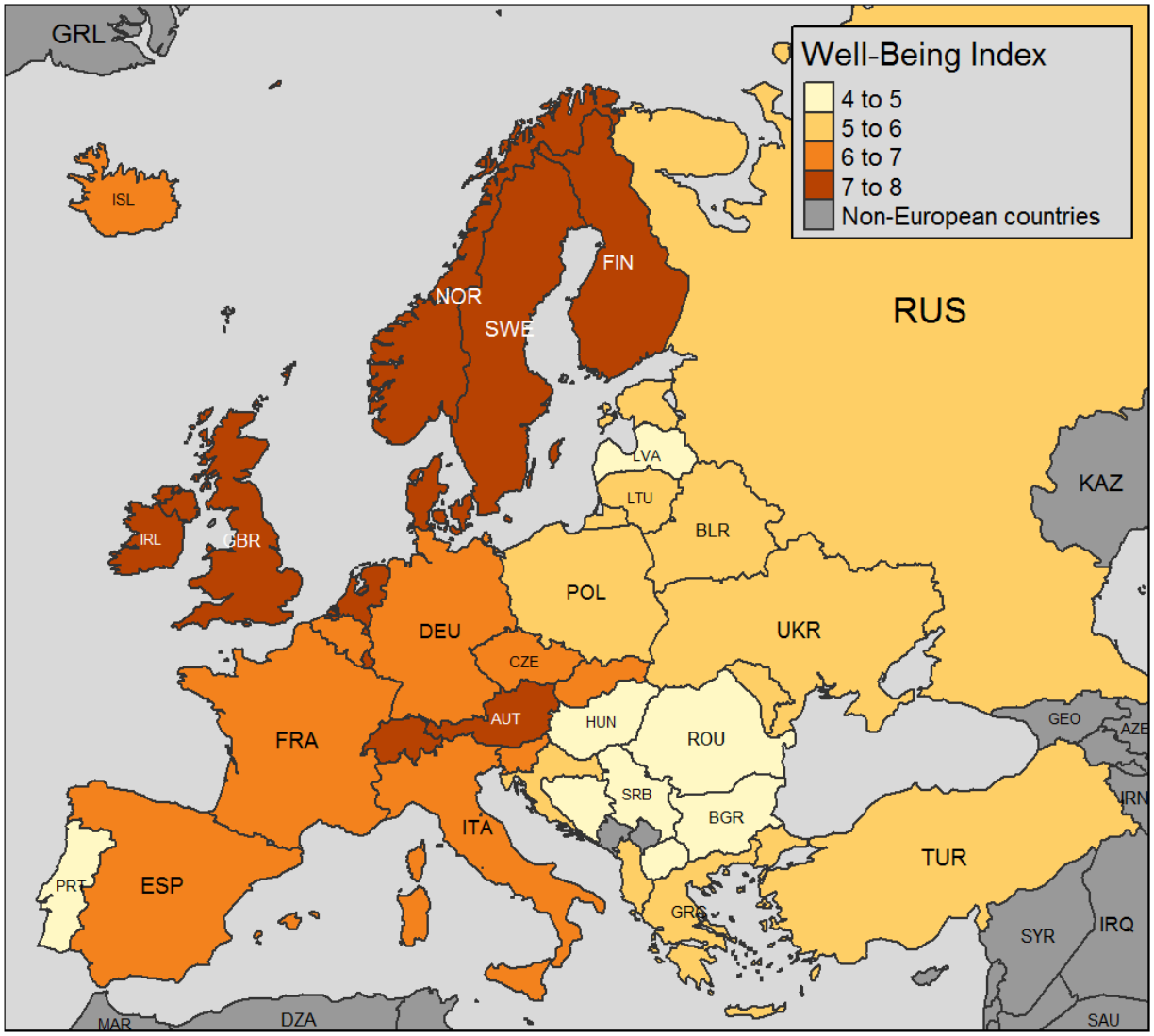
Access to external functionality

- RPyGeo (ArcGIS)
- RQGIS
- gdalUtils (GDAL and OGR utils)
- rgrass7
- rpostgis
- RSAGA

Visualization

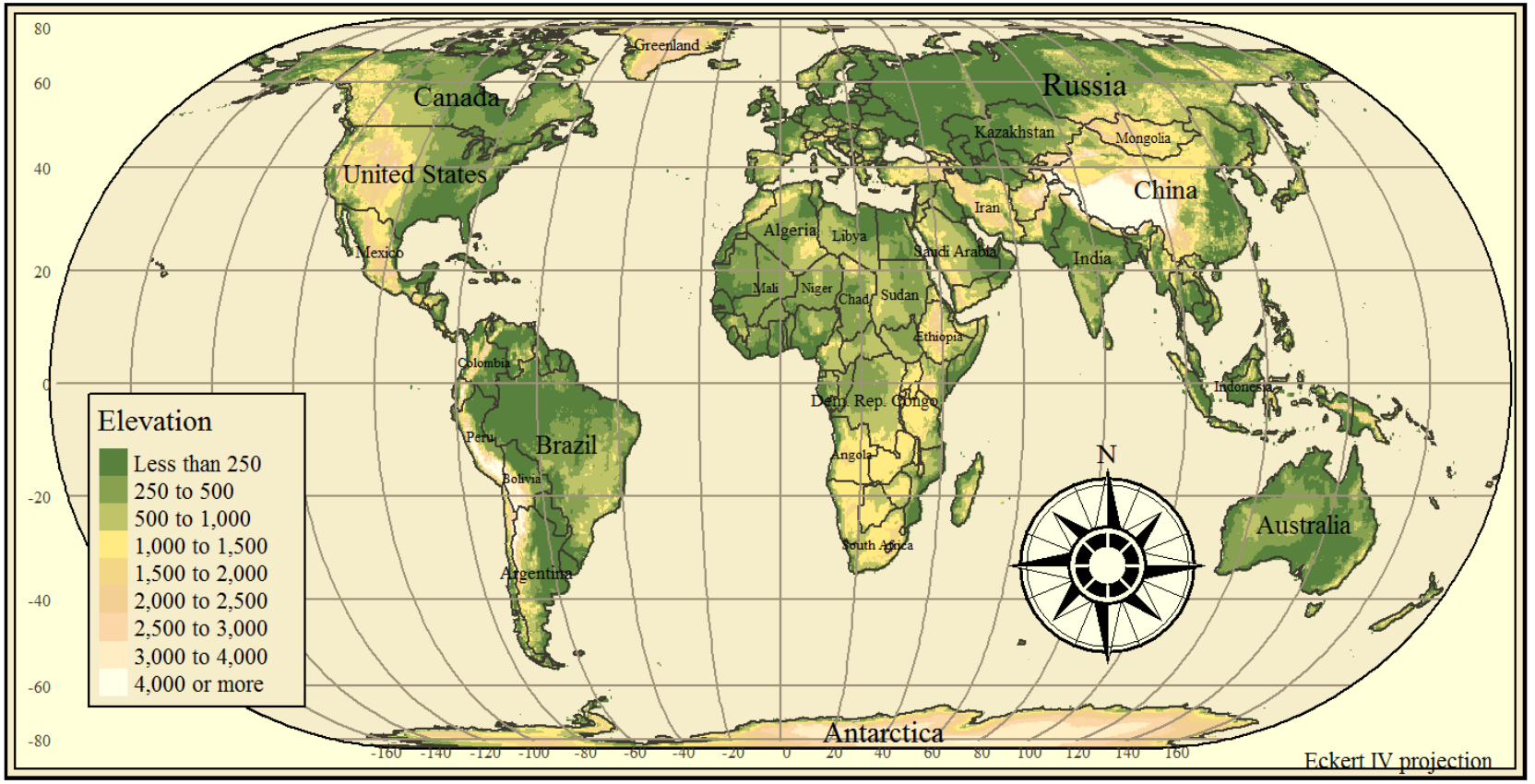
- ggmap
- tmap choropleths and bubble maps
- GISTools choropleth maps with nice legends
- GGally for simple correlation figures

Choropleth maps



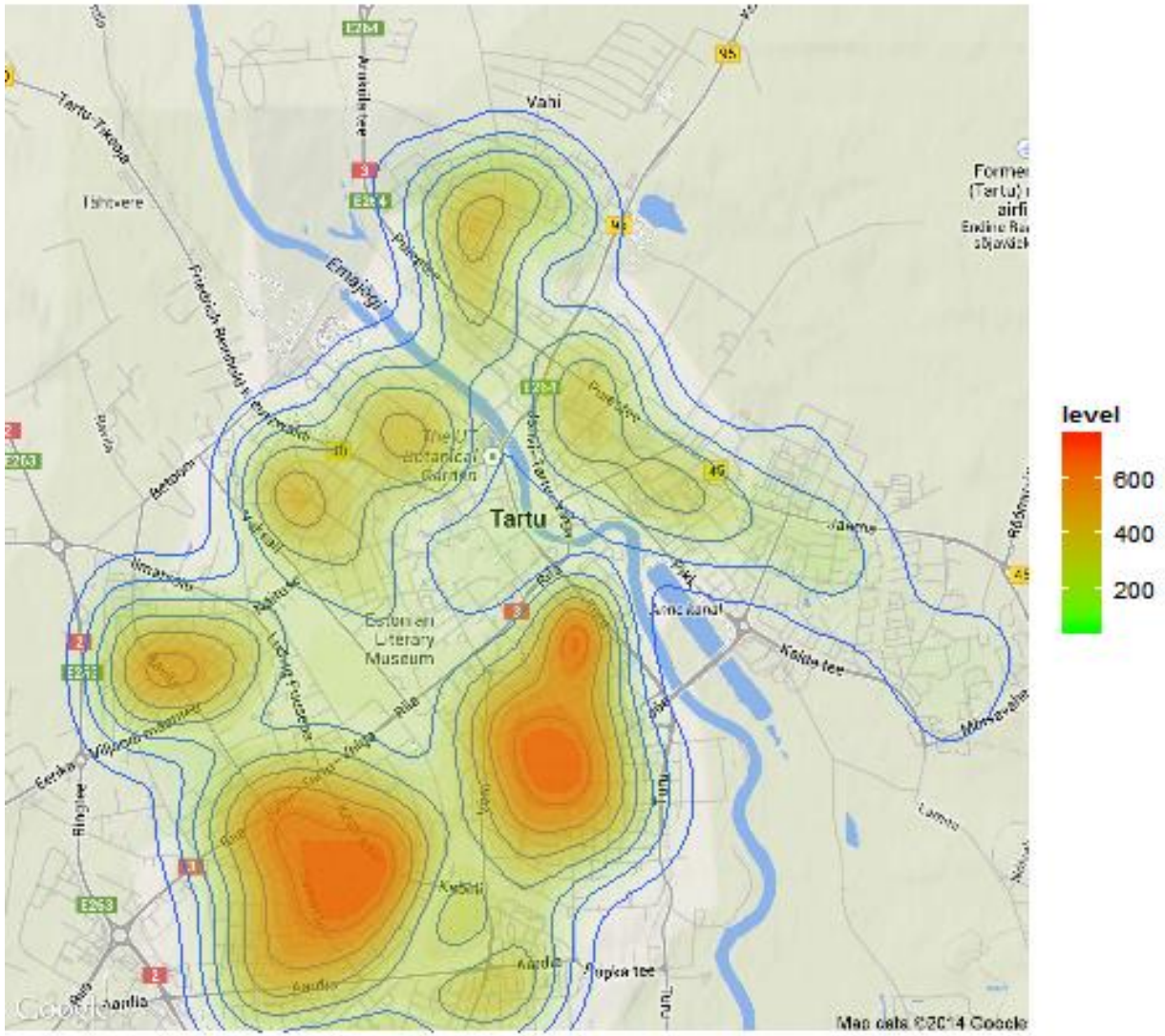
tmap in a nutshell:
https://cran.r-project.org/web/packages/tmap/vignettes/tmap-nutshell.html

Styled raster maps



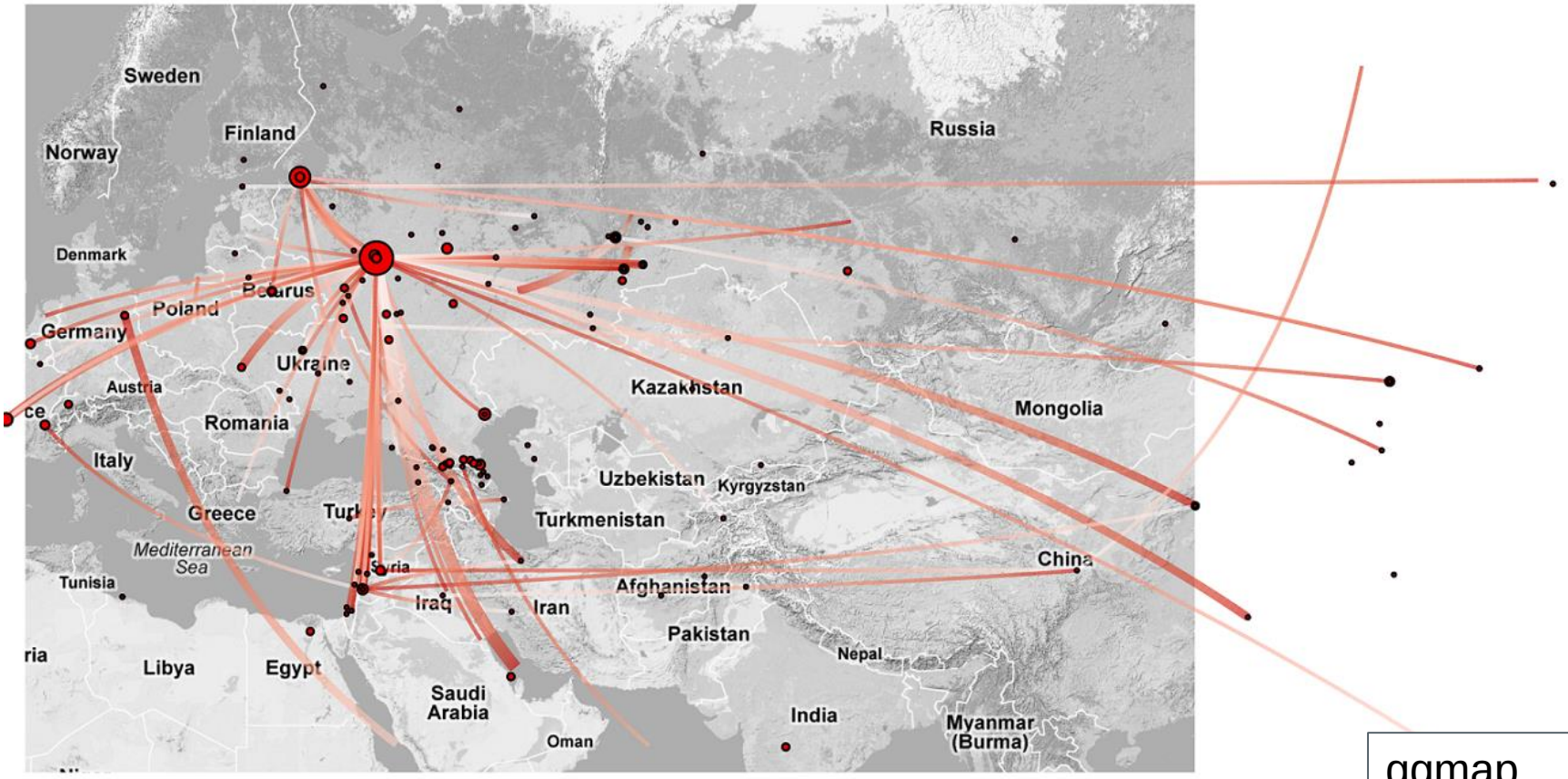
tmap in a nutshell:
https://cran.r-project.org/web/packages/tmap/vignettes/tmap-nutshell.html

Heatmaps



Anto Aasa, Creating heatmaps in R with ggmap
http://www.geo.ut.ee/aasa/LOOM02331/heatmap_in_R.html

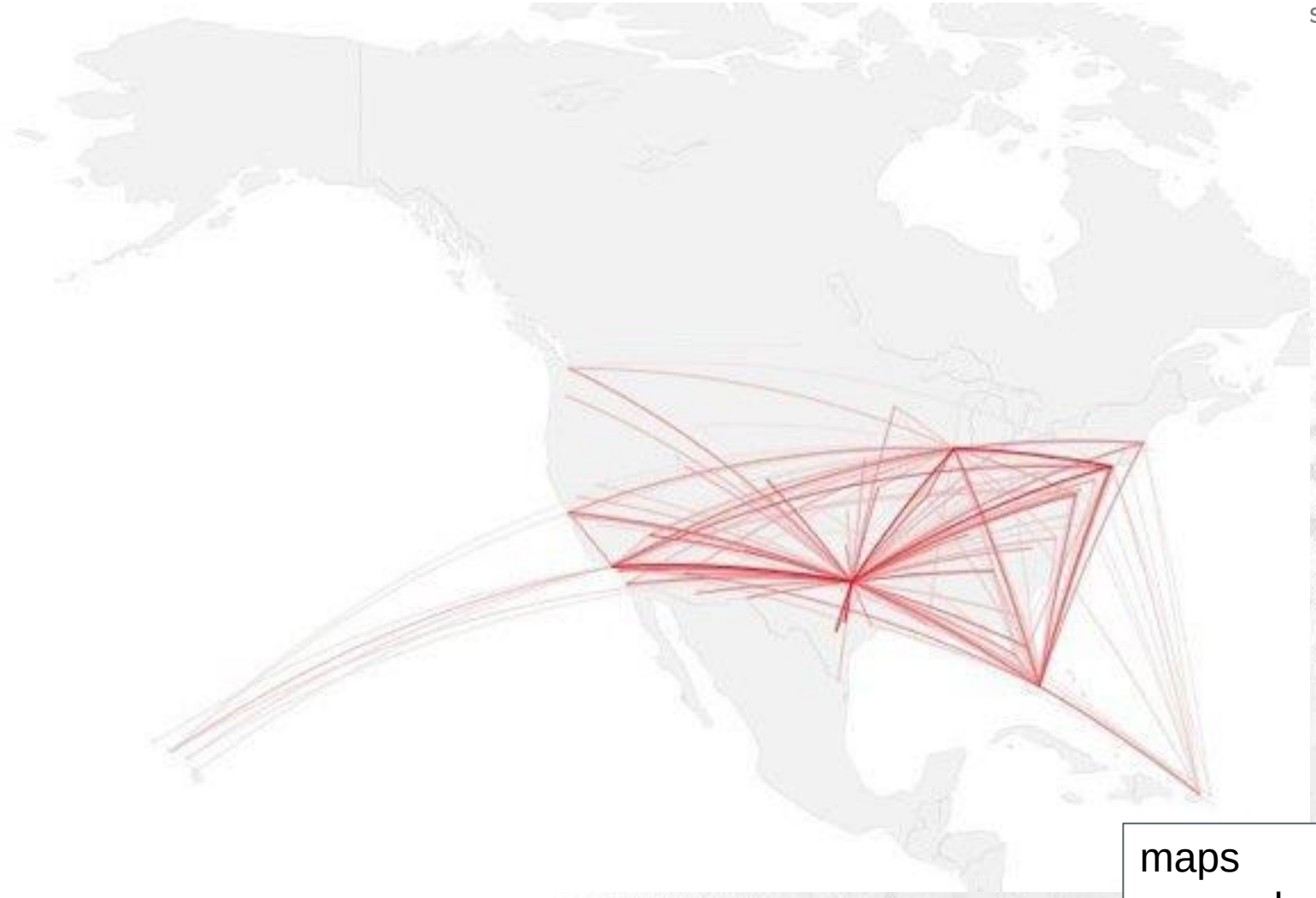
Flow charts



ggmap
sna
Hmisc

Rolf Fredheim, Mapping the GDELT data in R,
http://blog.rolffredheim.com/2013/04/mapping-gdelt-data-in-r-and-some.html

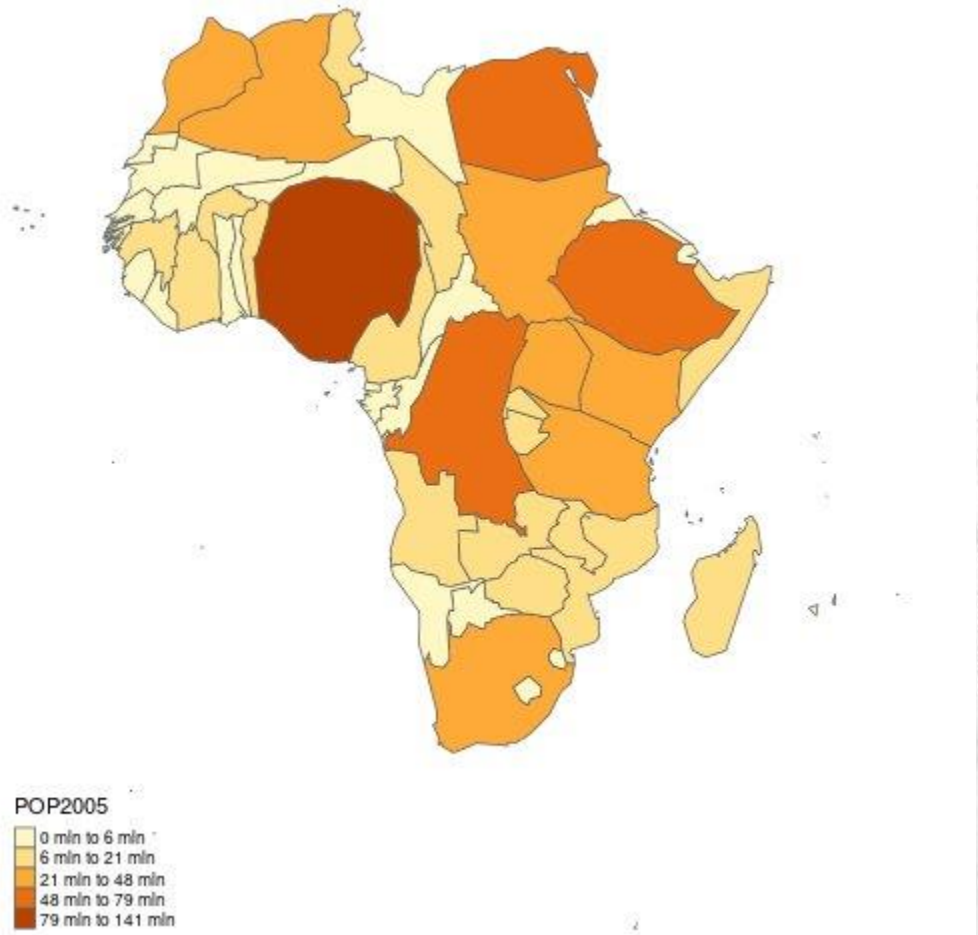
Map with great circles



maps
geospehere

Nathan Yau, How to map connections with great circles,
http://flowingdata.com/2011/05/11/how-to-map-connections-with-great-circles/

Cartogram



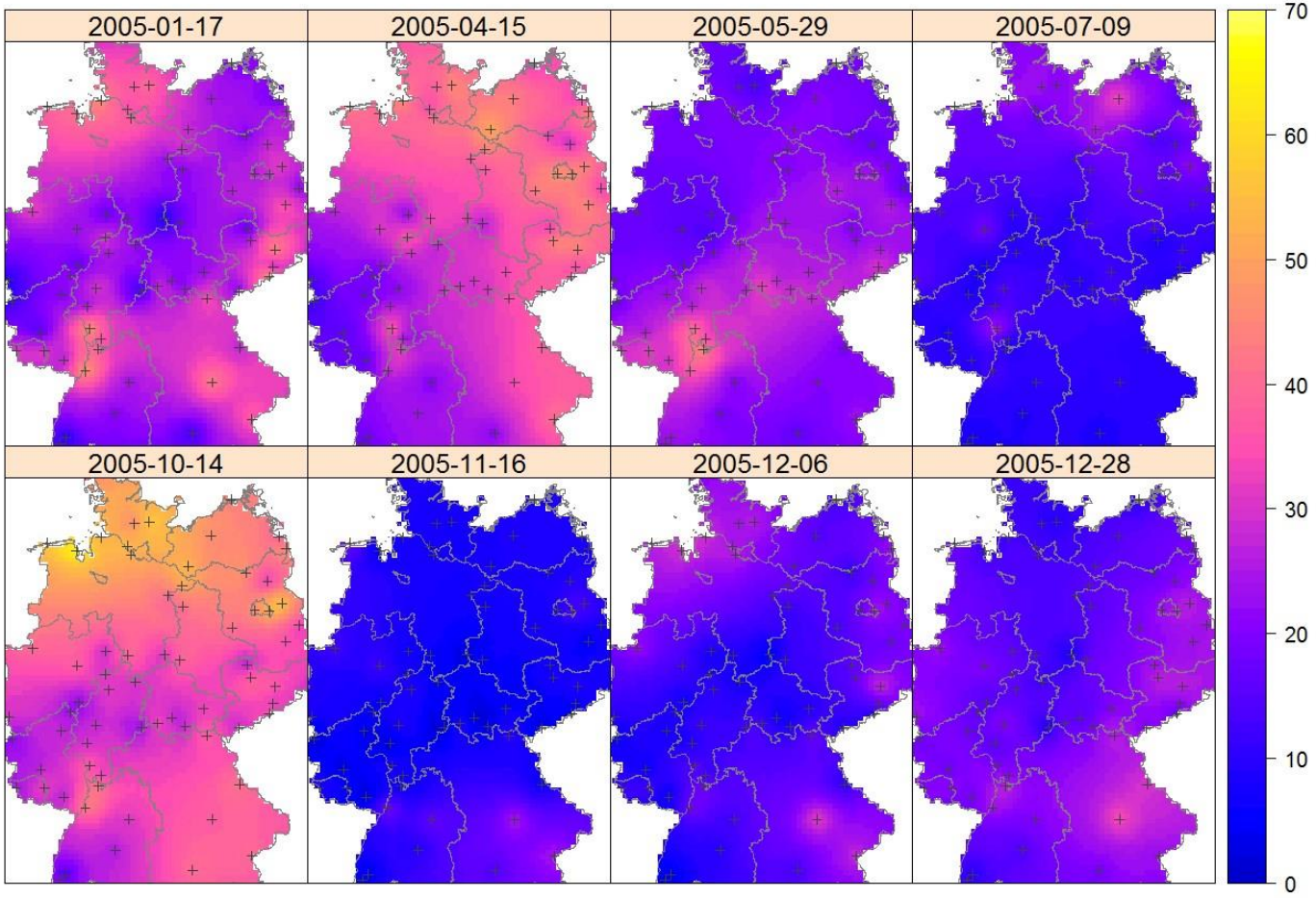
Create Cartograms with R
https://github.com/sjewo/cartogram

Faceted map

ggplot2

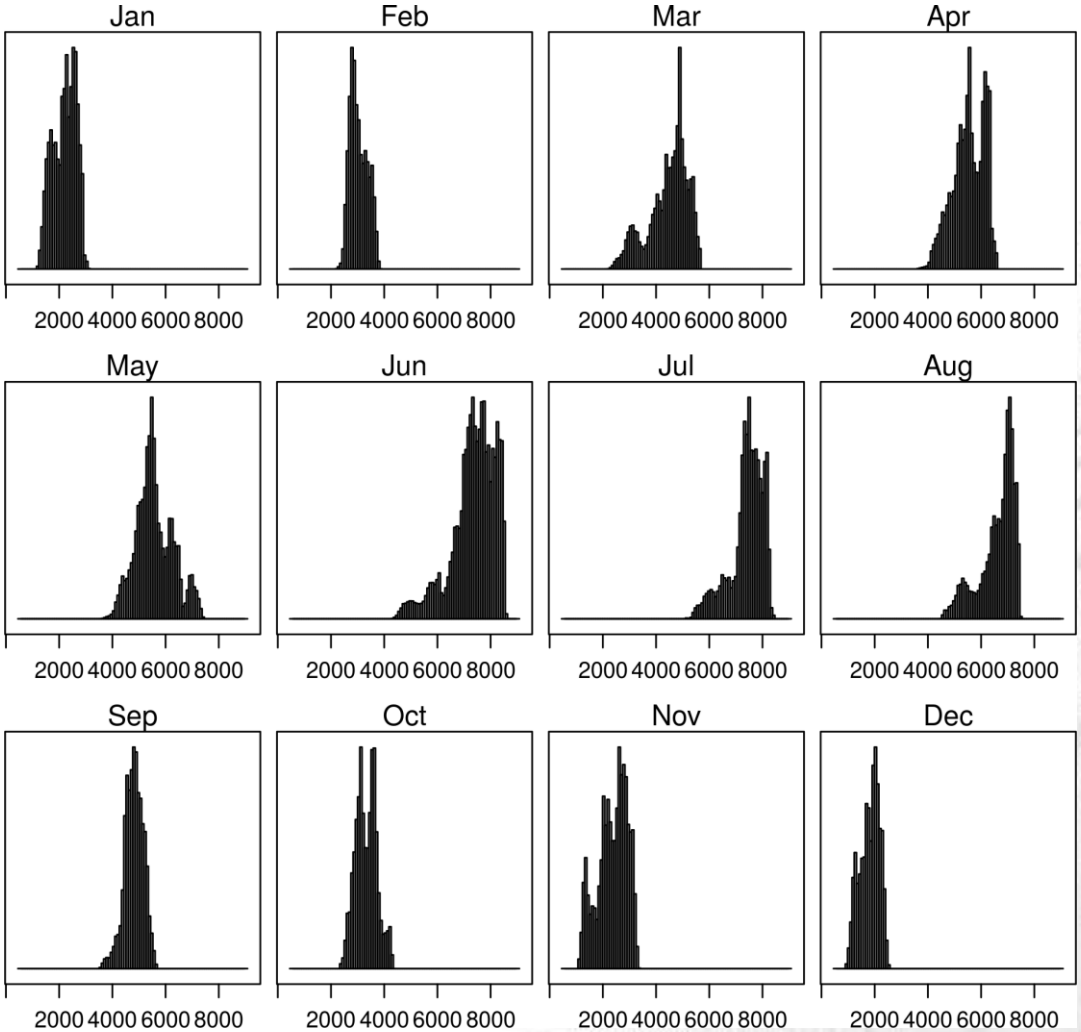
Robin Lovelace, Creating maps in R
https://github.com/Robinlovelace/Creating-maps-in-R

Kriging from point observations + time series



Benedikt Graler, Edzer Pebesma and Gerard Heuvelink, Spatio-Temporal Interpolation using gstat, https://cran.r-project.org/web/packages/gstat/vignettes/spatio-temporal-kriging.pdf

Histograms



Oscar Perpiñán, rasterVis
https://oscarperpinan.github.io/rastervis/

Geocoding, routing

- Geocoding via APIs:
  http://gis.stackexchange.com/questions/158328/batch-geocoding-in-r
- Routing with OpenStreetMap:
  https://journal.r-project.org/archive/2013-1/eugster-schlesinger.pdf

Conclusion

- R strong sides
  - Statistical analysis
  - Raster analysis
  - Time-series analysis
  - Faceted maps
  - Repeating workflows
  - Usage of external functions
- R weak sides
  - Routing
  - 3D vector models
  - Point clouds
  - Interactiv map usage
  - Data editing
  - Steep learning curve

Links

- CRAN spatial view
- Cheshire, Lovelace, Manipulating and visualizing spatial data with R
- Rodriguez-Sanchez, Spatial data in R: Using R as a GIS
- Bearman, Introduction to using R for Spatial Analysis
- Anssi Lensu (JYU), Paikkatiedon käsittely- ja analysointiominaisuudet R-tilasto-ohjelmassa