

# 3D Charts

## Taxonomy and Implementation in a Virtual Globe

Raimund Schnürer, Remo Eichenberger, René Sieber, Lorenz Hurni  
Institute of Cartography and Geoinformation, ETH Zurich

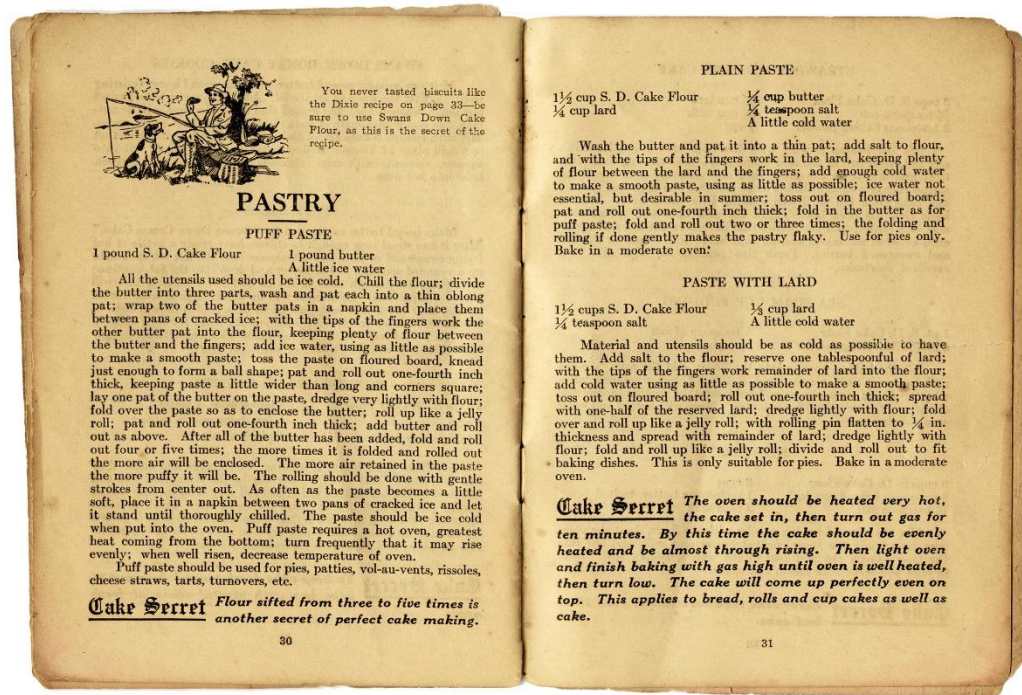
# Today's menu

- Introduction
- Taxonomy
- Implementation
- Examples
- Outlook

**Allergy warning!**  
**This presentation may contain 3D pie charts.**



<http://blog.lueg.de/wp-content/uploads/2014/02/Die-richtige-Pr%C3%A4sentation-z%C3%A4hlt.jpg>

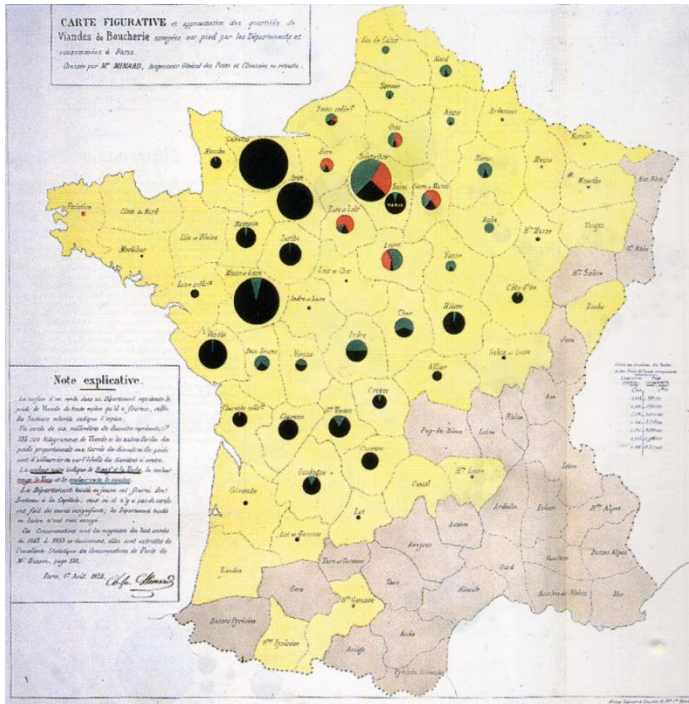


[http://olddesignshop.com/wp-content/uploads/2011/11/OldDesignShop\\_CakeSecretsFree4.jpg](http://olddesignshop.com/wp-content/uploads/2011/11/OldDesignShop_CakeSecretsFree4.jpg)

# Introduction

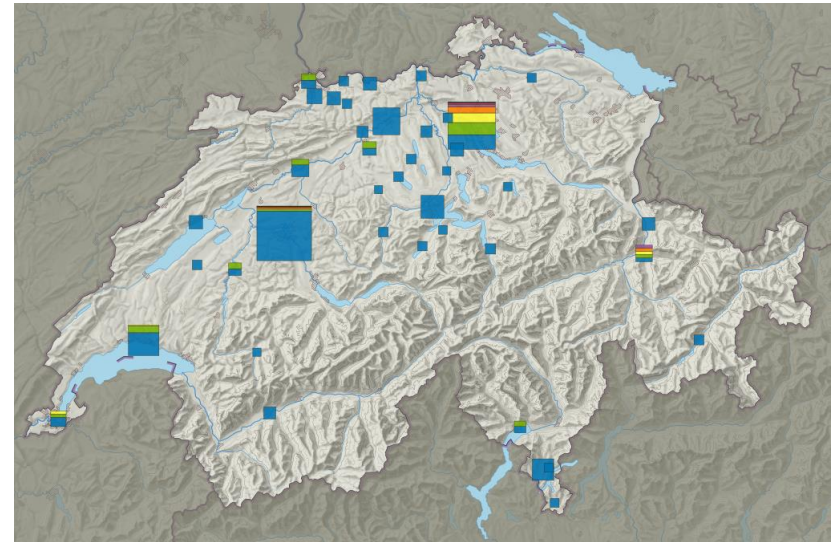


# 2D charts



Minard 1858

Printed map



Atlas of Switzerland 2010

Digital map

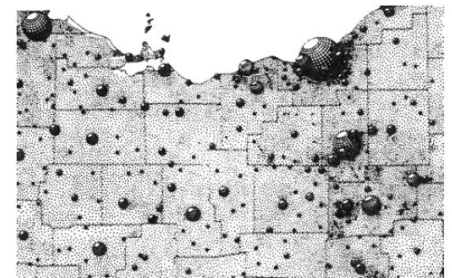
# 3D charts



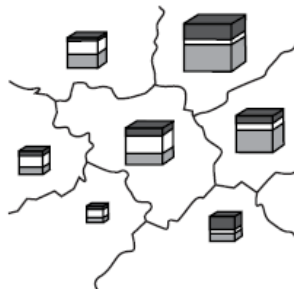
Divided Repeated Cubes



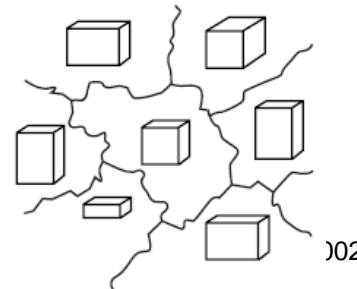
Side-by-side Volume Chart



Proportional Sphere



Divided Volume Chart



Cuboid Chart

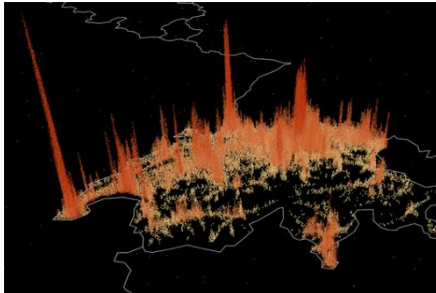
Schnabel 2007



[http://s3images.coroflot.com/user\\_files/individual\\_files/original\\_428061\\_jeqm4vSzdVpMBWZ\\_pFmX9nww.jpg](http://s3images.coroflot.com/user_files/individual_files/original_428061_jeqm4vSzdVpMBWZ_pFmX9nww.jpg)

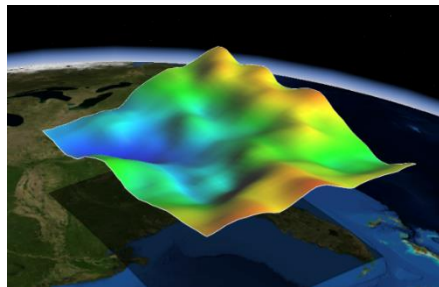
# Taxonomy

# A taxonomy for 3D charts



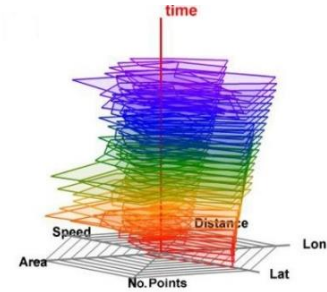
Sieber et al. 2013

3D Point charts



NASA Worldwind 2010

3D Surface charts



Peters 2014

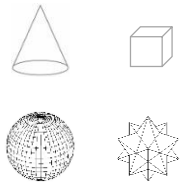
3D Line charts



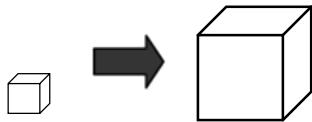
Lang & Gutiérrez Corea 2010

3D Solid charts

# 3D Solid charts - Properties



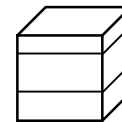
Shape



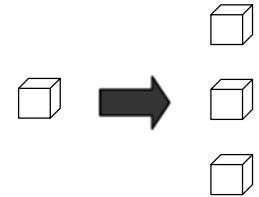
Scale



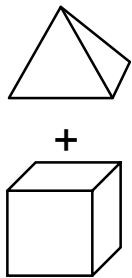
Rotation



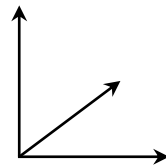
Segmentation



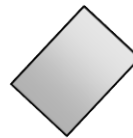
Repetition



Composition



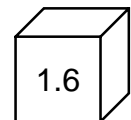
Alignment



Surface properties



Outline properties



Visual aids

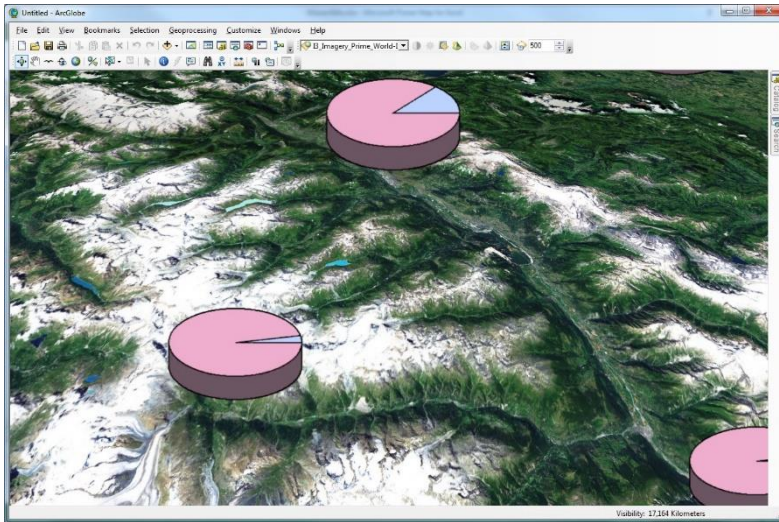




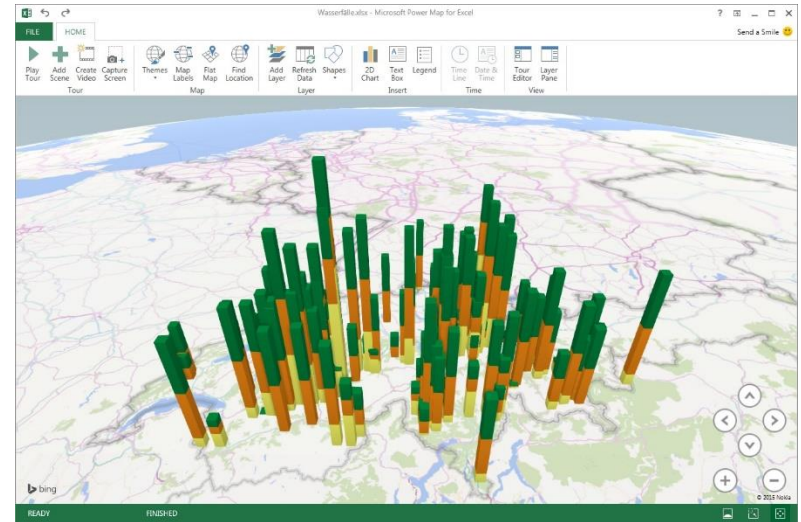
<http://ecx.images-amazon.com/images/I/71RvXmjHZIL. SL1329 .jpg>

# Implementation

# Commercial software

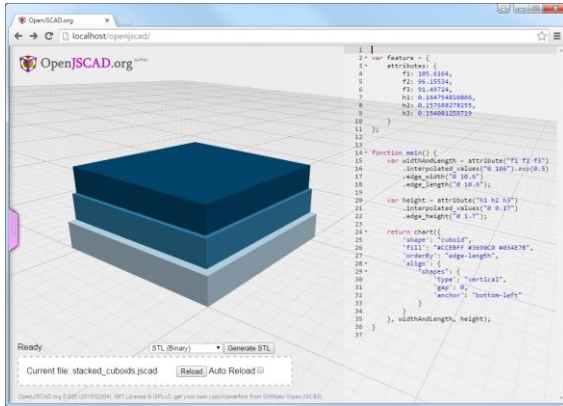


ESRI's ArcGlobe

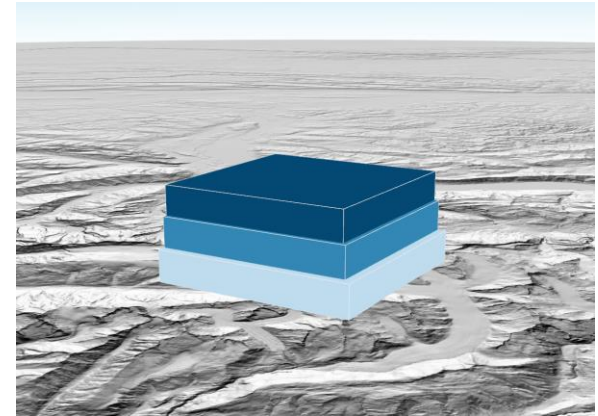


Microsoft's Power Map for Excel

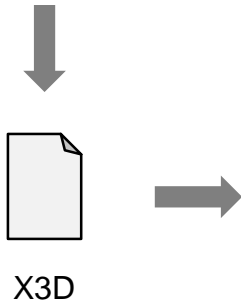
# Open-Source workflow



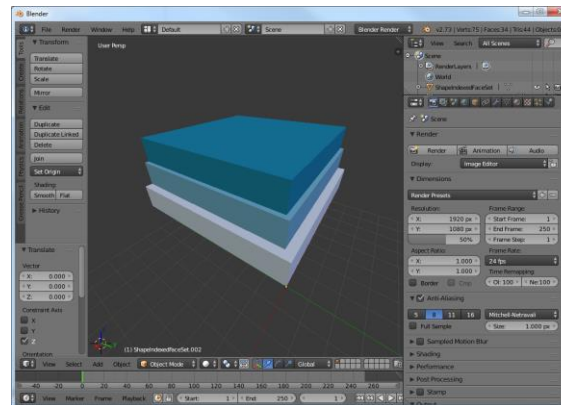
OpenJSCAD



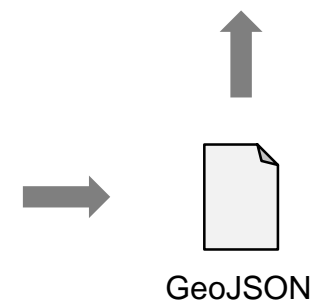
osgEarth



X3D

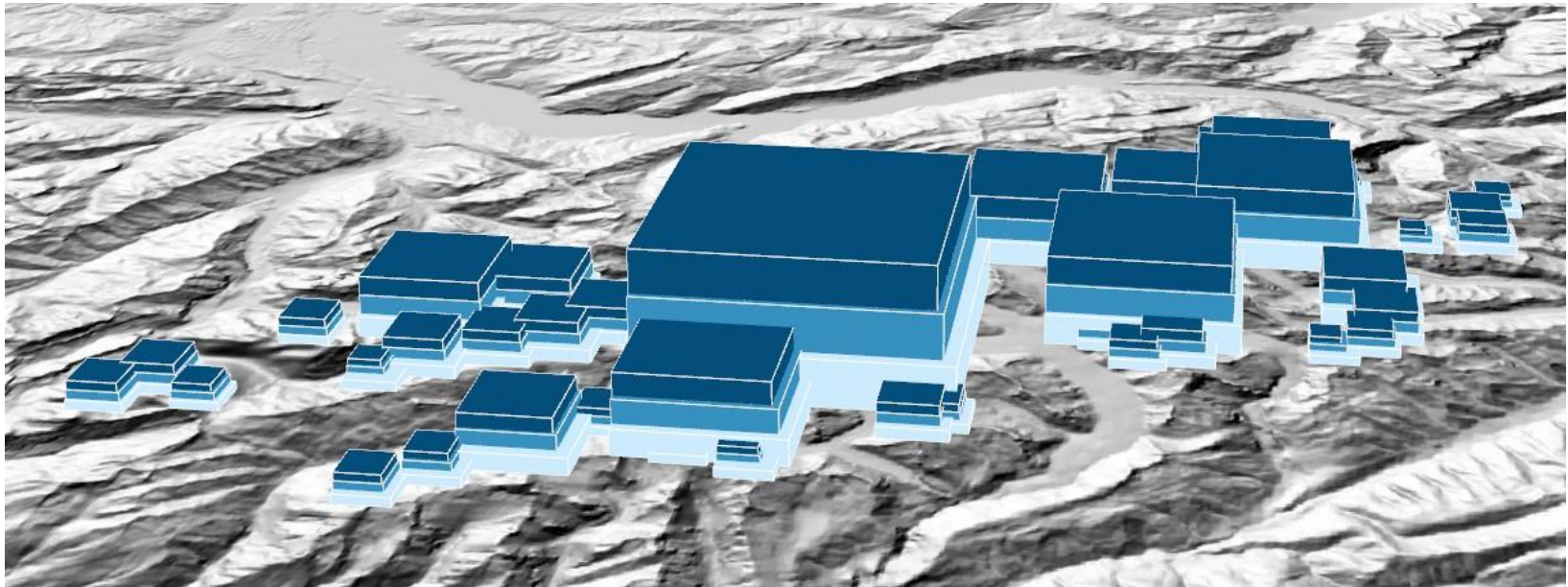


Blender



GeoJSON

# Stacked cuboids



Volumes of glaciers measured in years  
1850, 1978, and 1998 (from bottom to top)

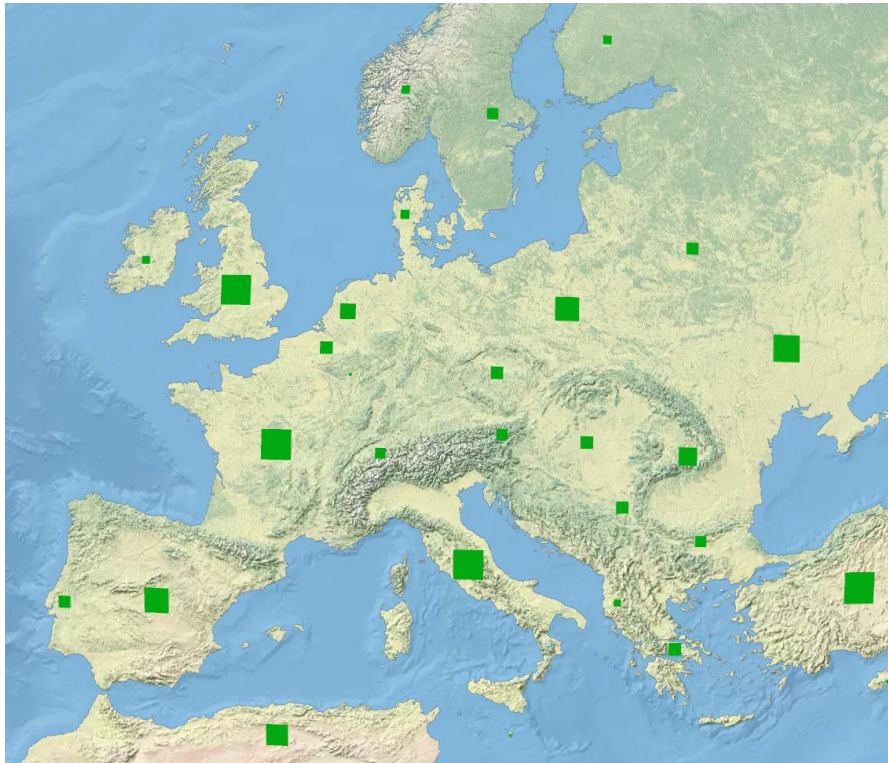




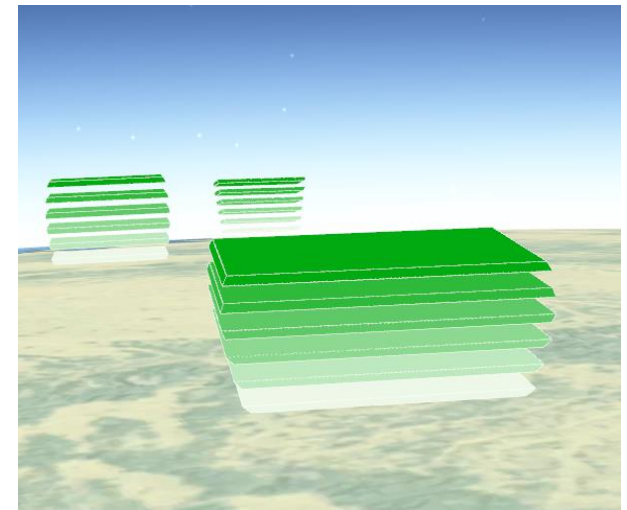
<http://www.restaurantchezfrancois.com/wp-content/uploads/2012/08/canmore-three-course-menu.jpg>

## Examples

# Stacked pyramid frustums



Bird's eye view

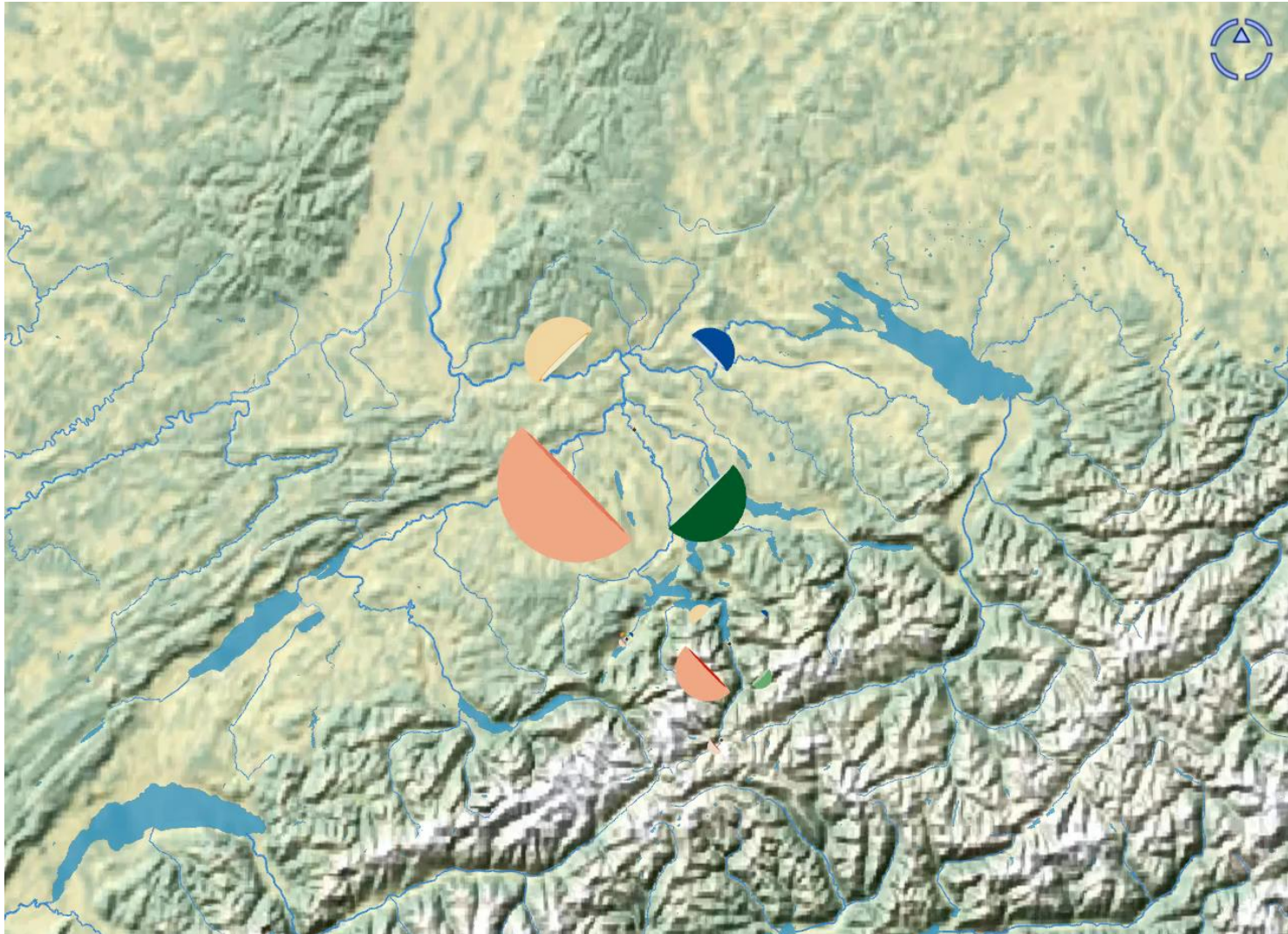


Tilted view

Resident population from 1960 to 2010  
in steps of 10 years (from bottom to top)

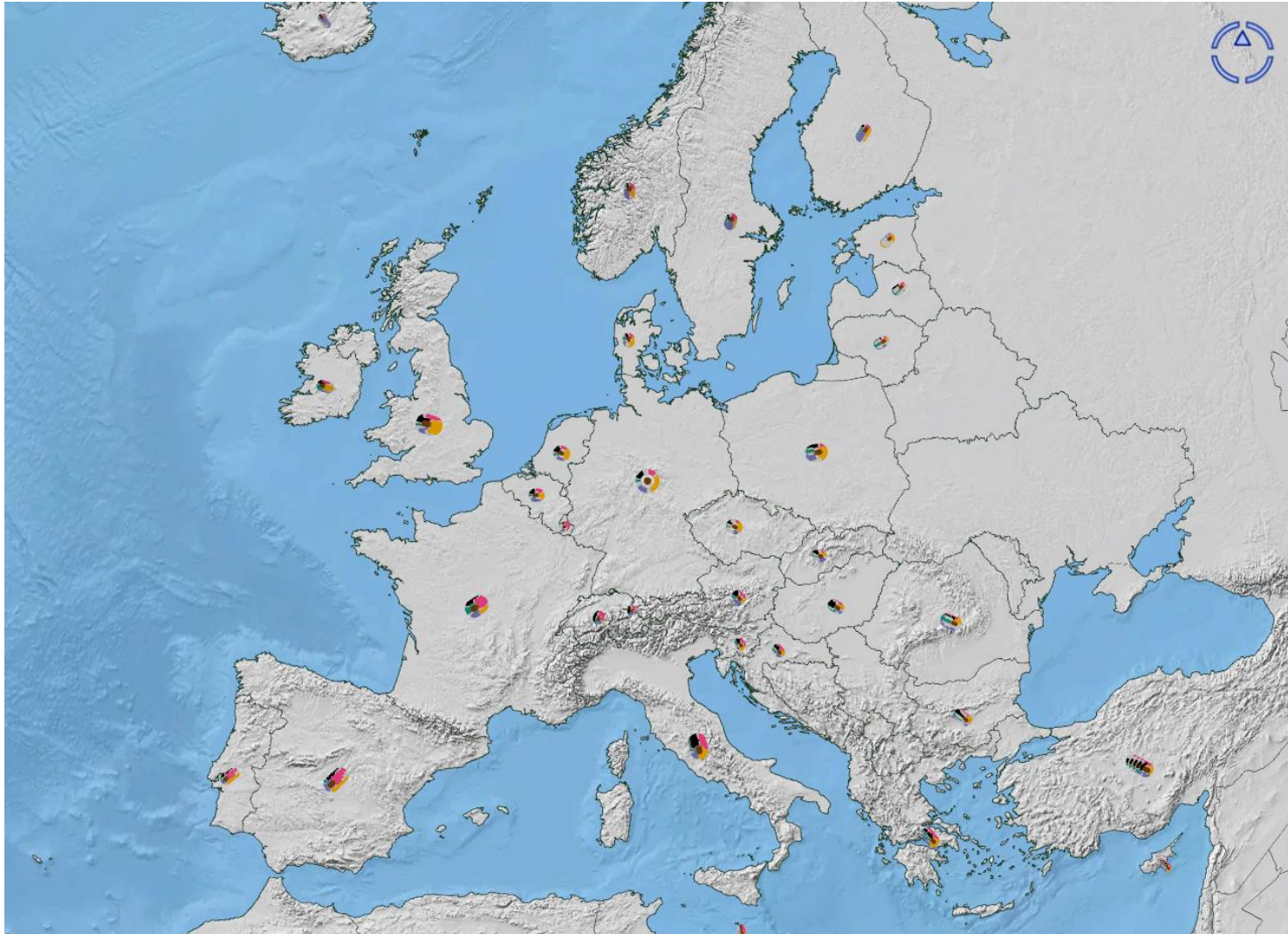


# Nested hemispheres



Average seasonal runoffs in 20-year periods in the 20<sup>th</sup> century

# Abacus charts



CO<sub>2</sub> emissions per sector and in total from 1990 to 2010 in steps of five years (from bottom to top)



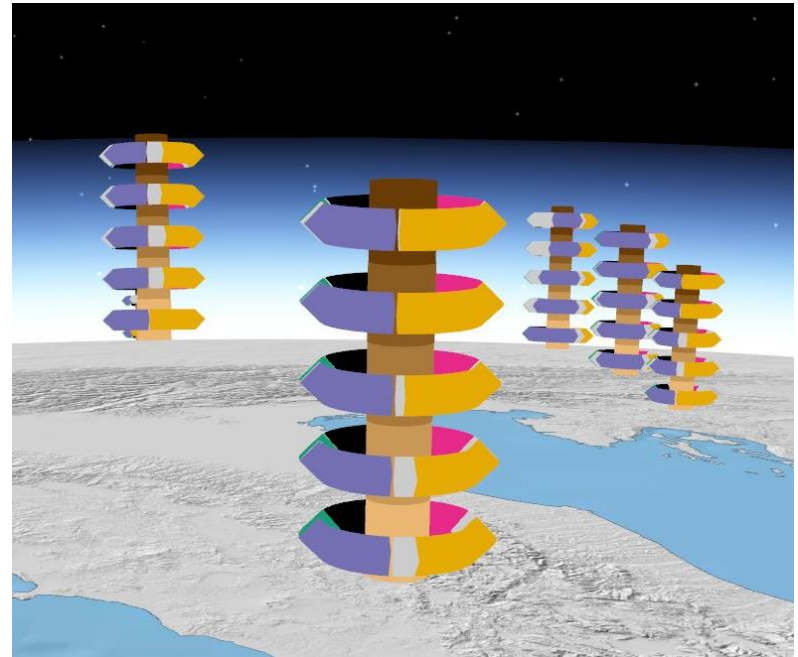


<http://www.thegreenhead.com/imgs/kalorik-interchangeable-salt-pepper-grinder-set-1.jpg>

# Outlook

# Future work

- Client-side rendering
- Outline rendering
- Lighting
- Interactions
- Animations
- Usability testing



# Thank you for your attention!

