The Power of 3D Real-Time Visualization in Atlases

Concepts, Techniques and Implementation

René Sieber
Raimund Schnürer
Remo Eichenberger
Lorenz Hurni

Institute of Cartography and Geoinformation
ETH Zurich
Atlas of Switzerland

New version: 2014/15

- Virtual Globe
- Web-based
- Reduced complexity
- Open standards
- 3D Cartography
Advantages of 3D cartography

- Eye-catching
- Equals our natural perception
- Allows displaying features in the air or in the ground
- Third dimension can be used as visual variable for temporal and thematic data

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**Techniques**
- Space-time-cube
  - [Chrisman 2002]
- Direct flights from Zurich airport
  - [Gruber 2012]
- Population density
  - [ReadyMap SDK]
Fusion of 2D and 3D maps
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**Fusion of 2D and 3D maps**

Wood-fired heating systems in Swiss cantons
## Mapping Space

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Techniques for creating 3D maps

Abstraction
Generalization
Translation
Rotation
Scaling

Extrusion
Anchoring
Arrangement
Surface properties
Projection
Example: Multi-layered choropleth map

Employment in the Primary, Secondary and Tertiary sector
Demo: Point cloud map

Population density in Switzerland
osgEarth

- Virtual Globe toolkit (OpenSource)
- Implemented in C++, based on OpenSceneGraph (OSG)

Features:
- Real-time map rendering and navigation
- Custom digital elevation models
- Image overlays / Vector data / 3D objects
- Support of various GIS formats and services
- Annotations / Labeling
Data processing for creating 3D maps

- Data originates from the Atlas of Switzerland 3

- Geometries were preprocessed by Python scripts including ArcGIS and PostGIS functions (e.g. ST_Translate)

- Styling took place in osgEarth configuration files
Wrap up

• Advantages of 3D cartography for atlases
• Concepts: Map Fusion, Mapping Space
• Ten techniques for creating 3D maps
• osgEarth as a powerful Virtual Globe engine with 3D real-time visualization capabilities
• Exemplary 3D maps throughout the presentation
Thank you for your attention

Raimund Schnürer
schnuerer@karto.baug.ethz.ch

Institute of Cartography and Geoinformation, ETH Zurich