

OpenStreetMap3D

Challenges and Technology of a Virtual Globe Model

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Arne Schilling
GIScience,
Department of Geography,
University of Heidelberg



- Village Labels
- Health
- Terrain
- Enjoyment
- Eating
- Technical Facilities
- City Labels
- Post
- Street Labels
- OSMBase
- default
- Server Styles:**
- osm_wms
- Money
- Building Labels



Search Routing Map Lighting



OpenStreetMap



OpenStreetMap3D

Goals

1. create and visualize a global landscape and city model based on OpenStreetMap.
2. find out how a Web 3D Service (W3DS) can be combined with a virtual globe model

The screenshot shows the homepage of the OpenStreetMap-3D Germany project. At the top, there is a navigation bar with the project logo and language options for German and English. Below the navigation bar, there is a main content area with a title 'OpenStreetMap-3D' and a series of small images showing 3D city models. A sidebar on the left contains links to Home, Map, Start Germany 3D, Information, Screenshots, Videos, OSM Wiki, Contact, Project GD3D, Publications, and Technology. The main text describes the project's goal: to integrate OpenStreetMap data with Digital Elevation Model (DEM) data to create a 3D scene graph. It mentions that the service is available for Germany as a first test and provides a URL: <http://osm-3d.org>.

The screenshot shows the W3DS Web 3D Service website. At the top, there is a navigation bar with the project logo and the text 'W3DS Web 3D Service'. Below the navigation bar, there is a main content area with a title 'OSM-3D Germany W3DS' and a large URL: <http://w3ds.org>. A sidebar on the left contains links to Contents, Main, Scope, Download, Roadmap, Contact, Resources, Links, and References. The main text describes the service: 'This W3DS was set up for the OSM-3D-Germany project. See also <http://www.osm-3d.org>'. It also includes a 'Terms of Use' section and a 'Trace' section showing the current page path: 'main -> resources -> osm-3d_w3ds'. The footer contains contact information for the Research group GIScience, Prof. Zipf, Department of Geography, University of Heidelberg.

The footer of the website contains logos for GDI3D, GIScience, and the University of Heidelberg. It also includes contact information for the Research group GIScience, Prof. Zipf, Department of Geography, University of Heidelberg, located at Berliner Strasse 48, D-69120 Heidelberg, with the website <http://www.geog.uni-heidelberg.de>.

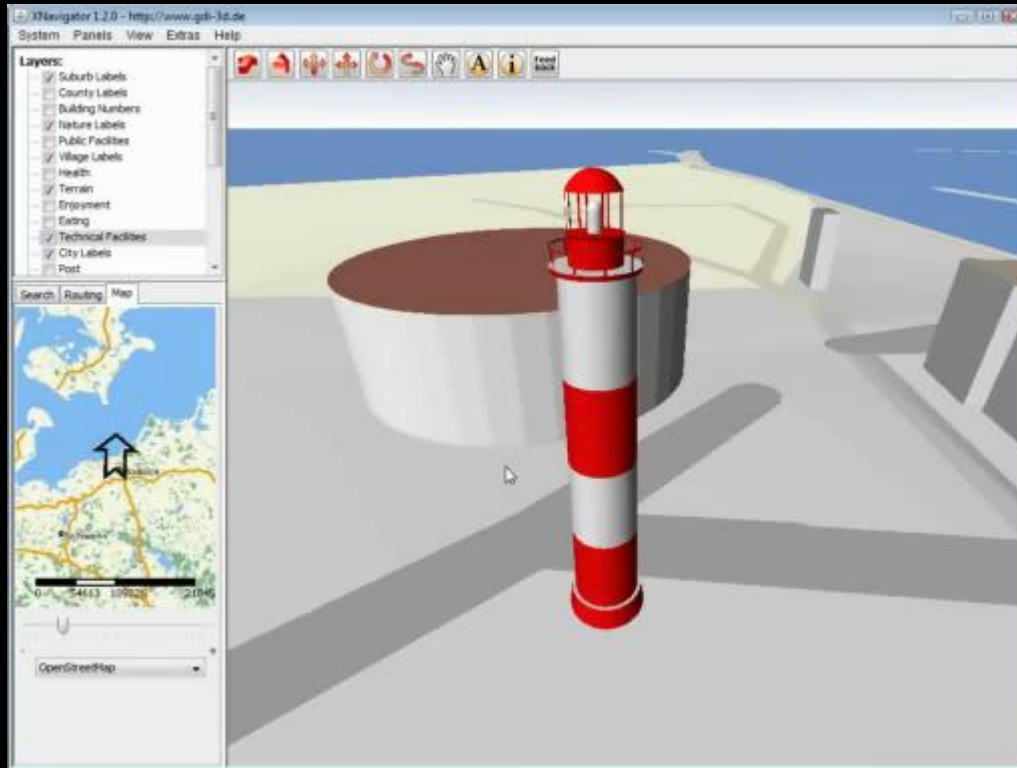
OpenStreetMap3D

Technical issues

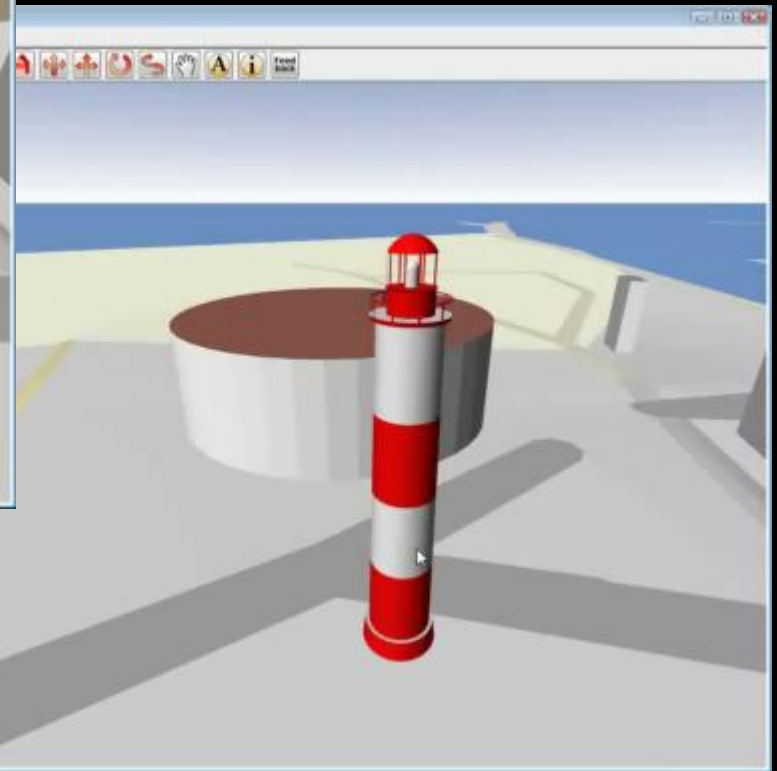
1. Precision problem
2. Scene graph transformations
3. LOD implementation



Precision Problem



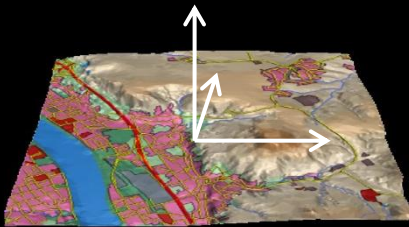
Solved by moving
ModelView calculation to
software



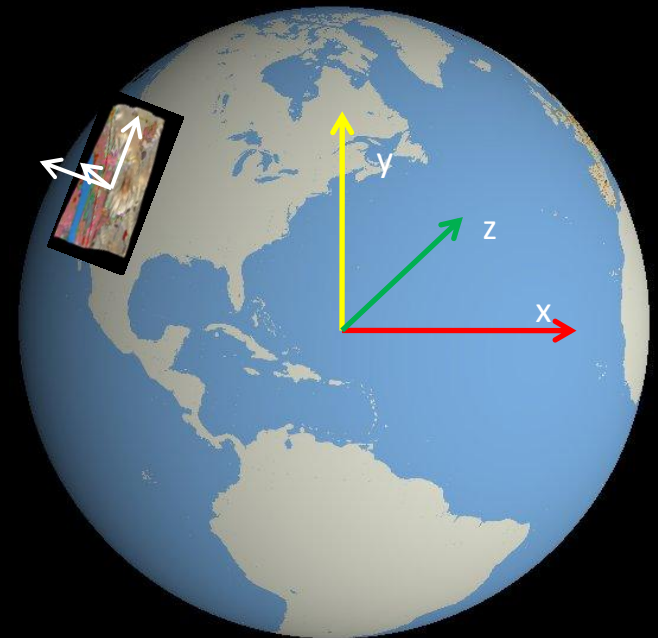
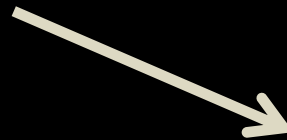
Single precision matrix
calculations may cause jitter



Scenegraph Transformations

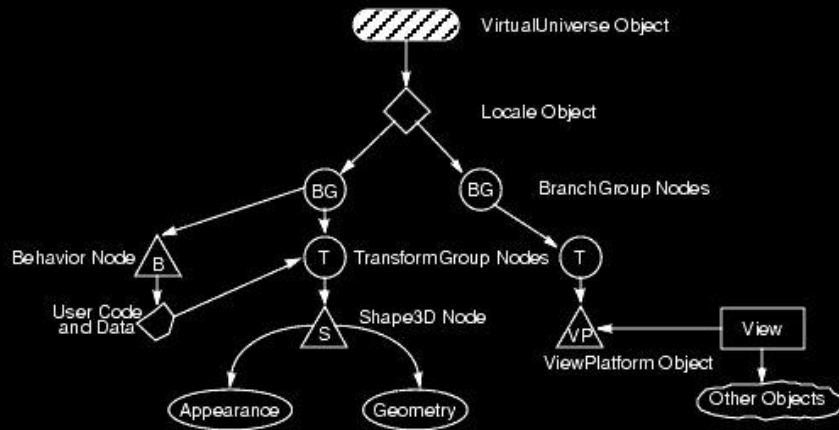


Data as received from W3DS
in Map Projection CRS
(Spherical Mercator)

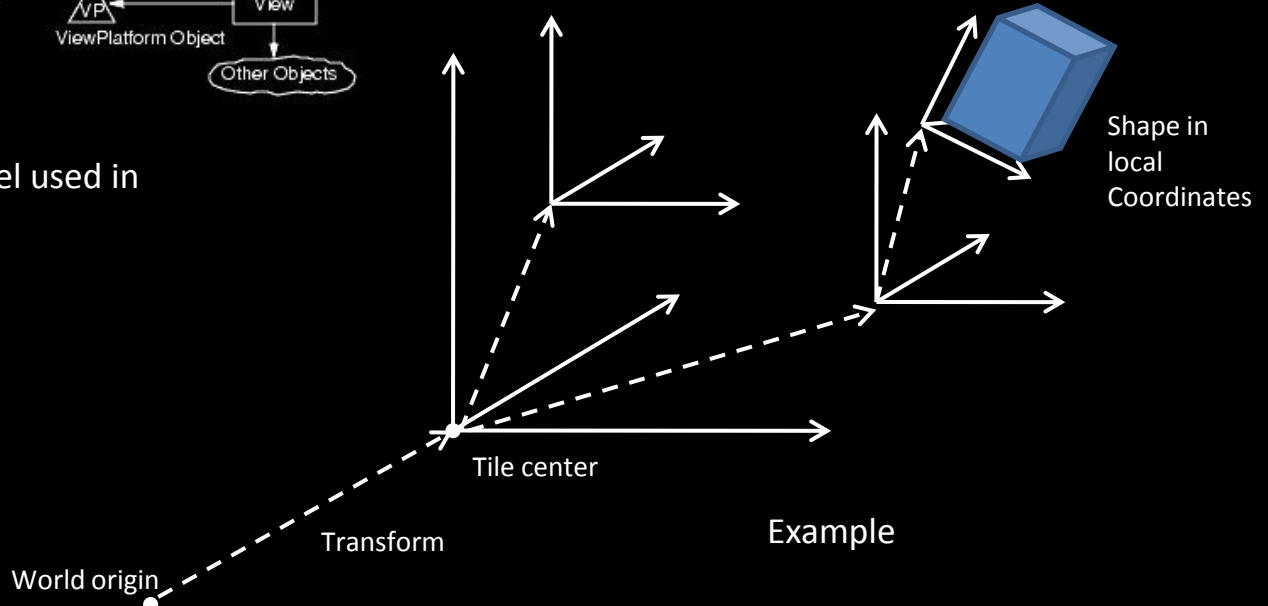


Data as displayed in the final
application in Cartesian
Coordinates

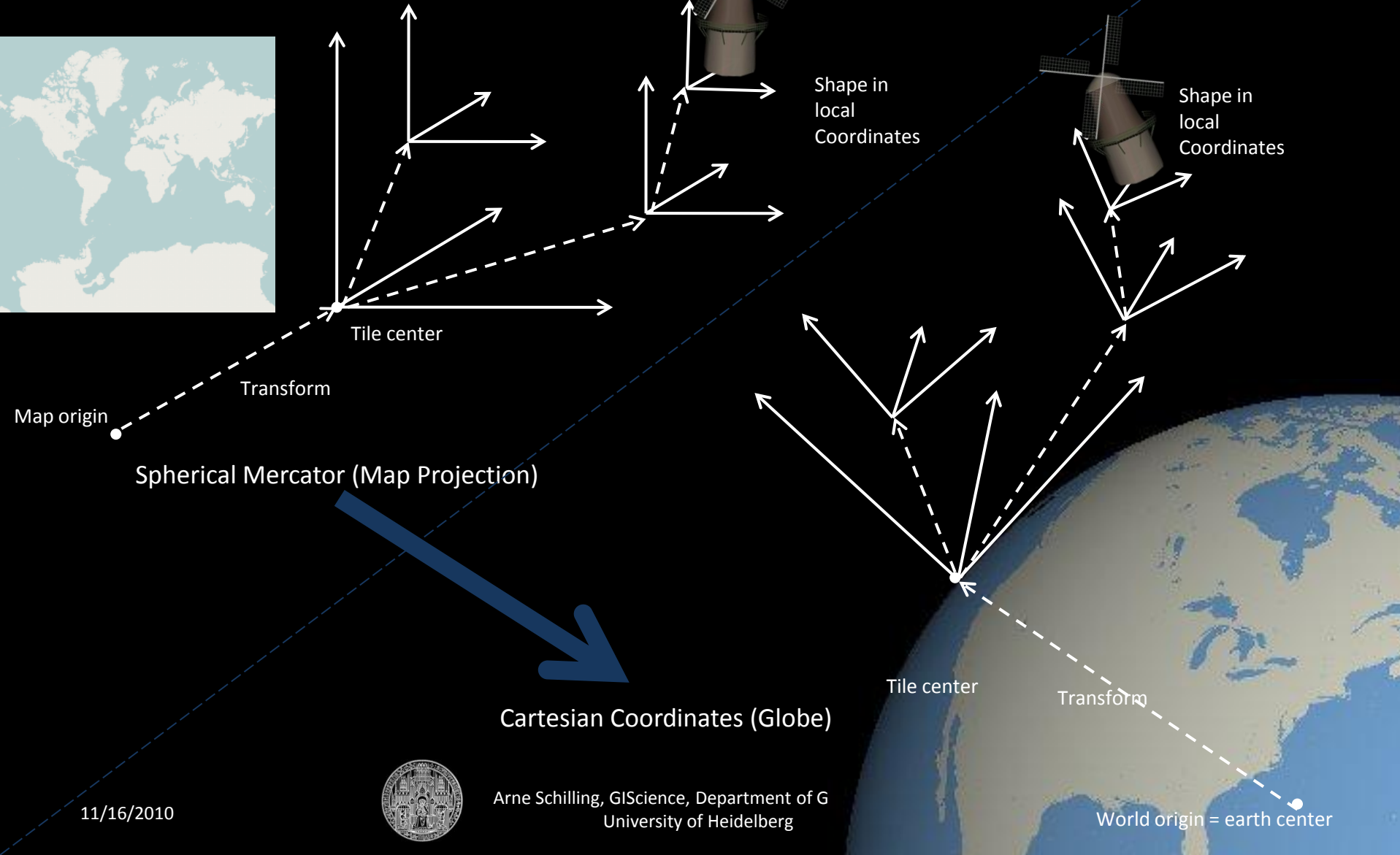
Scenegraph Transformations



Scene Graph Model used in X3D - Concept



Scenegraph Transformations



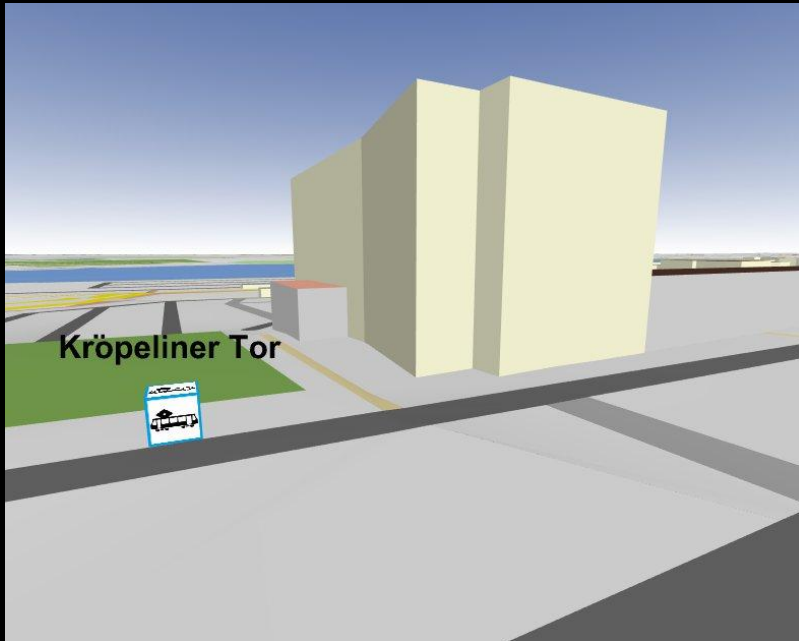
Scenegraph Transformations

Procedure

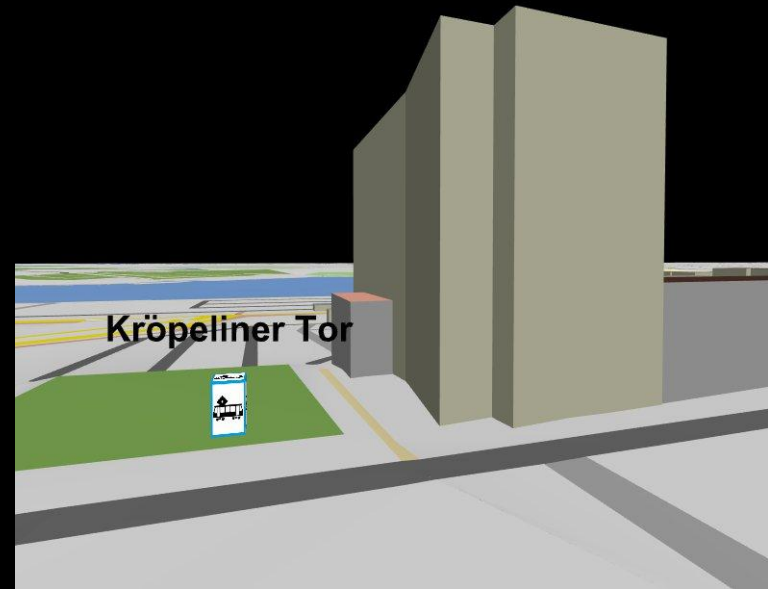
1. Local to world transform matrix
2. Apply actual coordinate reference transformation
3. Reconstruct the original structure



Scenegraph Transformations

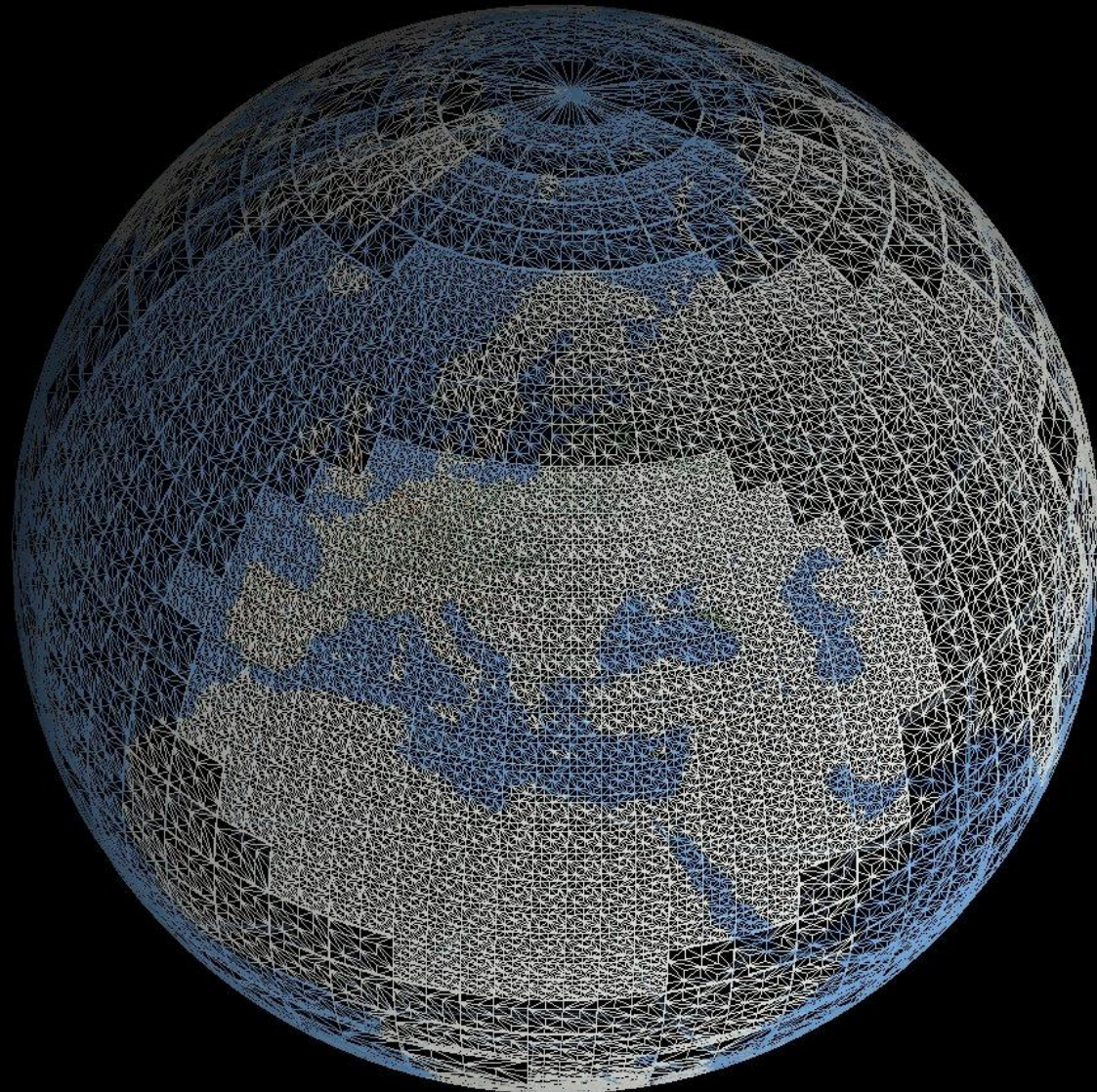


Distortions due to map projection



No projection

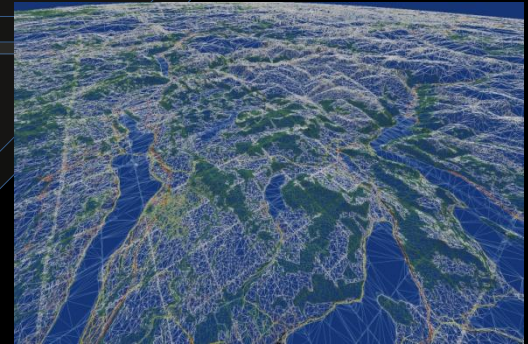
LOD Implementation



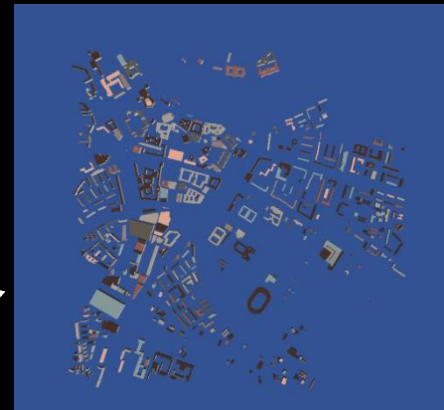
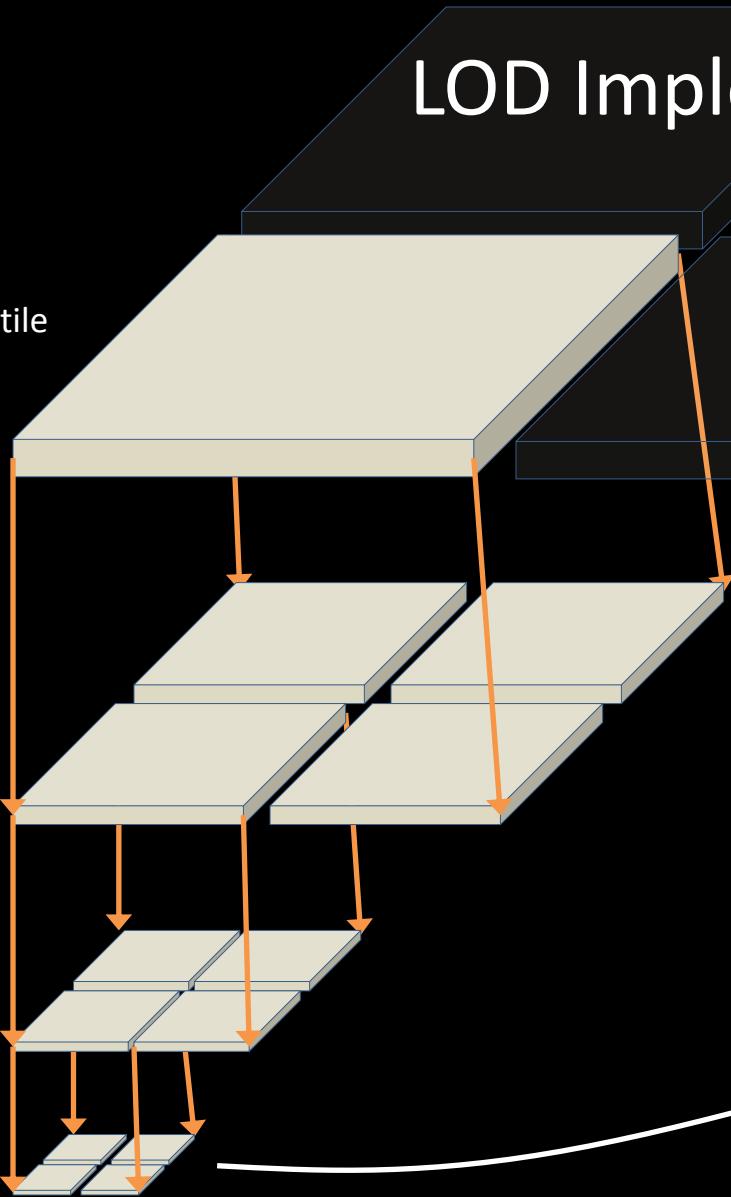
Tiles loaded into client

LOD Implementation

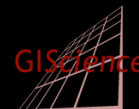
Top level tile



Terrain model has multiple levels



Objects are loaded at the base levels

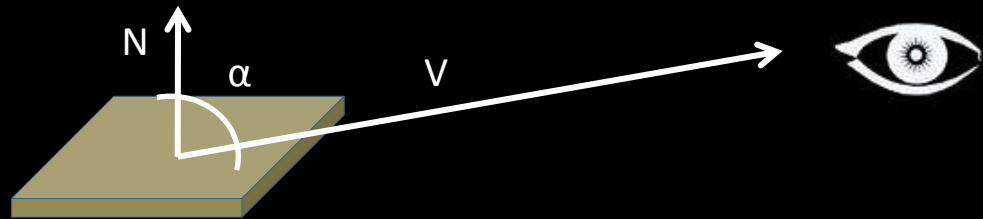


LOD Implementation

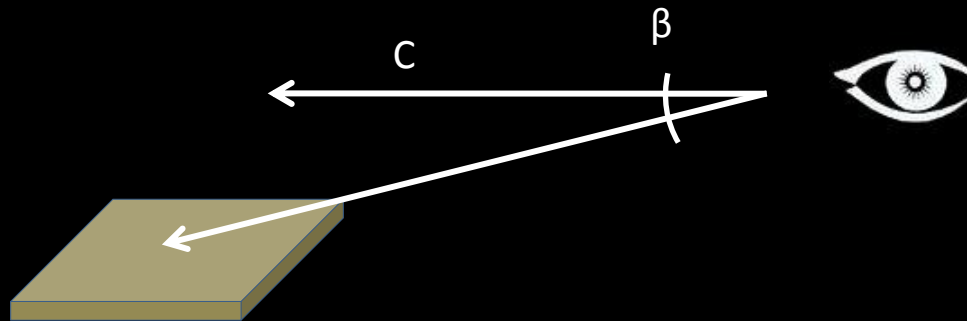
1. Distance to Tile



2. Normal to viewpoint angle



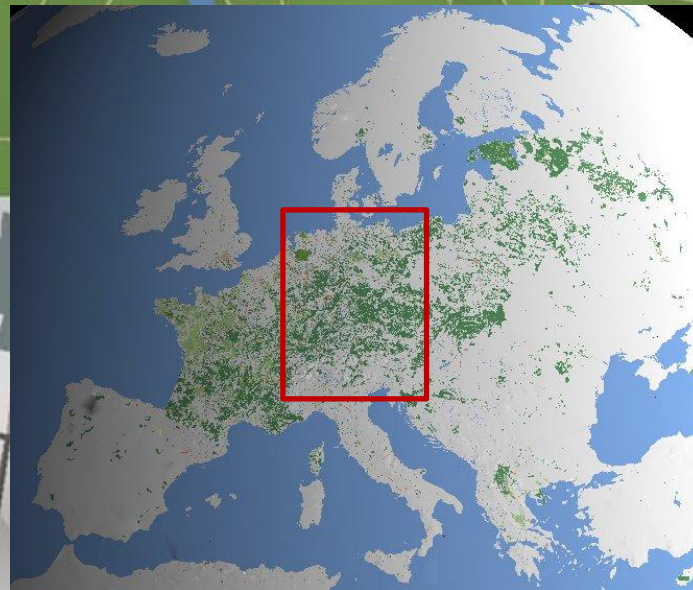
3. View direction to object angle



Database

2.4 million buildings
5.6 million point objects
150 GB in total

Work on Europe 3D in progress
Will be > 1 TB in size



Map Functions



Routing



POI Search

The End

Thank You



Any Questions?

