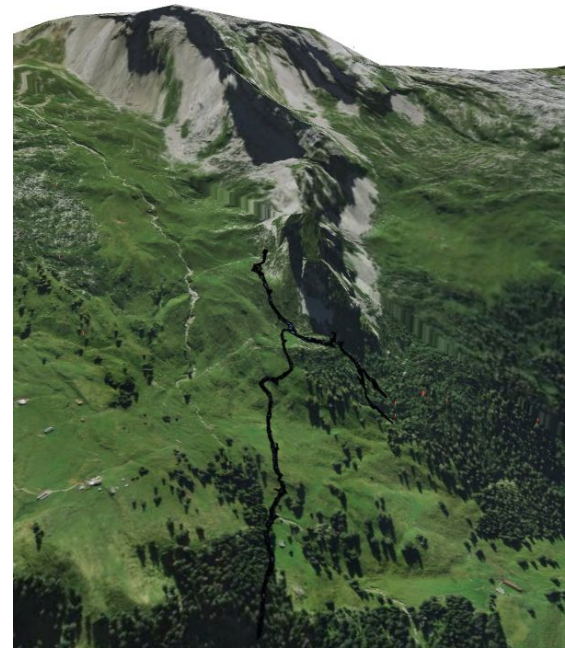# 3D visualization in QGIS

Current State and Future Plans
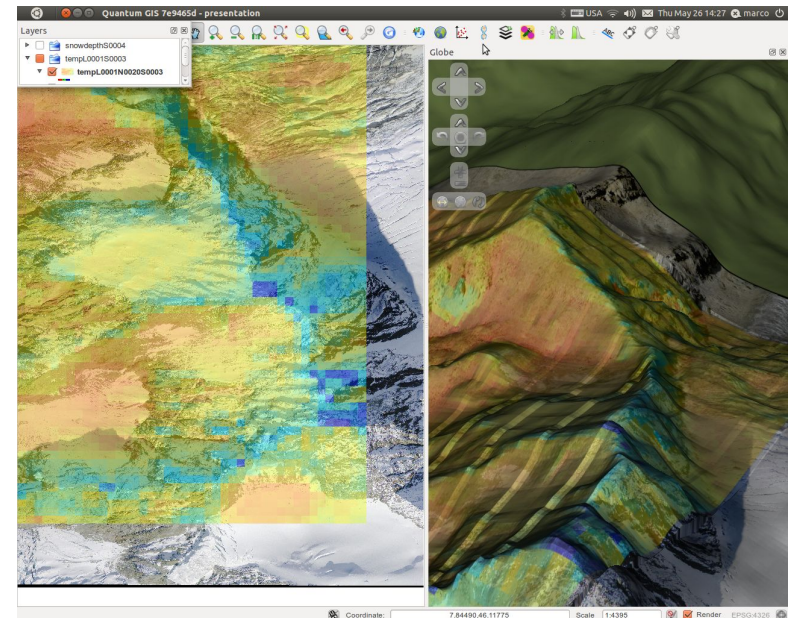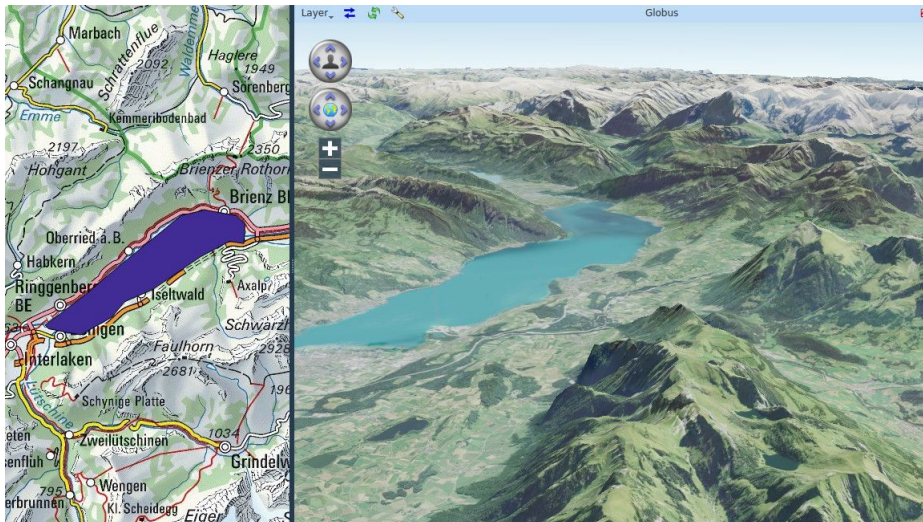
Kanton Zug

Andreas Neumann (Kanton Zug)

3D in QGIS - what has been done in the past: QGIS Globe

- **Approx available since 2008?**
- **C++ 3D Plugin based on osgEarth.**
- **Useful: but a lot of dependencies, not so easy to compile. Sometimes multi-threading issues.**
- **Contributors: Pirmin Kalberer, Matthias Walker, Sandro Mani, Marco Bernasocchi, Matthias Kuhn**

3D in QGIS - what has been done in the past? Plugin qgis2threejs

- **Approx available since 2013**
- **Plugin for export to web using HTML/JS/WebGL/ThreeJS**
- **After export it works without QGIS and can be deployed to modern, WebGL-capable Webbrowsers**
- **Interactivity: toggling of layers, moveable plane, navigation controls, querying feature attributes**
- **Useful: but limitations with larger scenes.**
- **Example Mt. Aso Japan**
- **Contributors: Minoru Akagi, Olivier Dalang, Luca Casagrande, Stefano Cudini, Josef K, Célian**
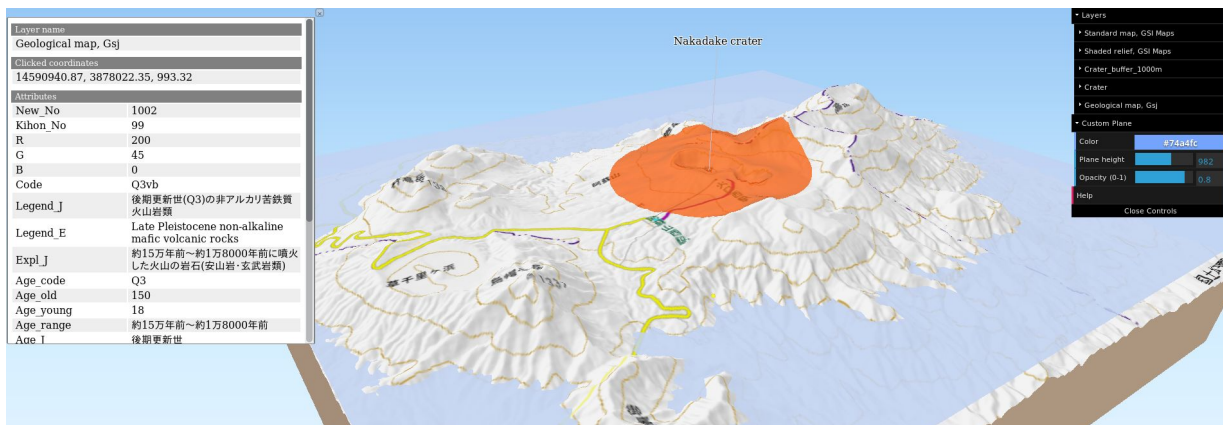
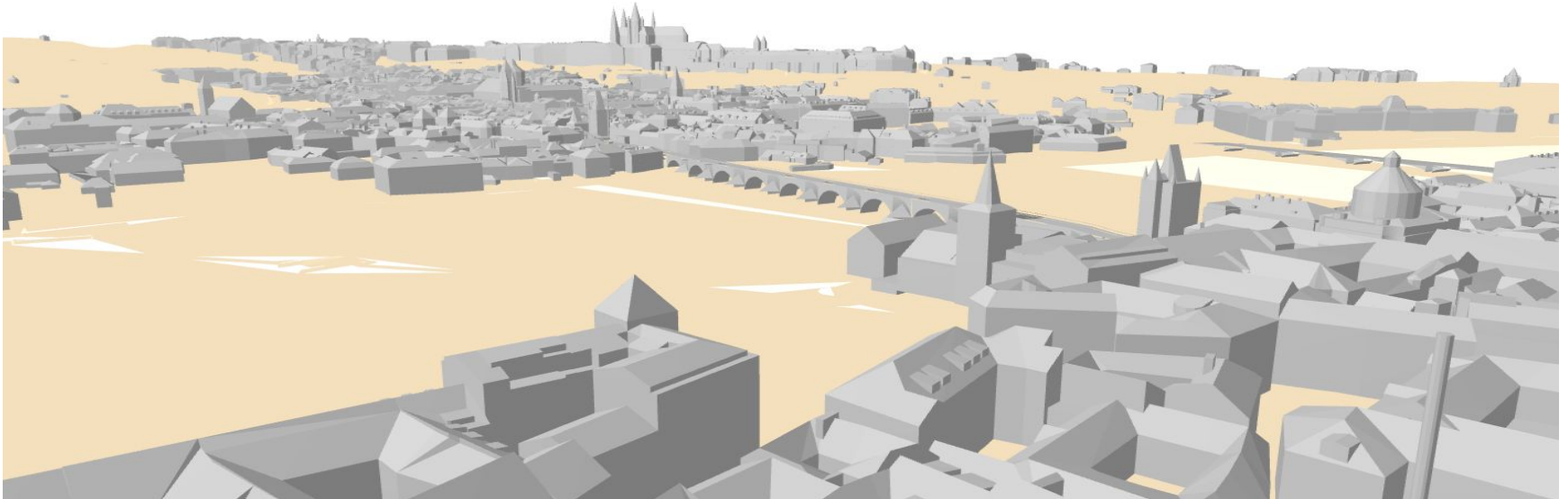# 3D natively in QGIS since version 3

- **QGIS grant from 2017**
- **Based on qt5-3d and OpenGL**
- **Separate 3D view next to 2D view**
- **Per project configuration and per layer configuration**
- **Developer: Martin Dobias (Lutra Consulting)**

Examples

- **City model with bridges (3d polygons or multipatch) and terrain (DTM raster or TIN (3d polygon)) from Prague**
- **Sources:**
  - **Buildings:** http://www.geoportalpraha.cz/cs/opendata/44EE8B0A-641A-45E8-8DC9-CF209ED00897#.Wyjp74SLTmE
  - **Terrain:** http://www.geoportalpraha.cz/cs/opendata/6F72EDDF-CAA4-4243-8776-7006CB0B2521
  - **Bridges:** http://www.geoportalpraha.cz/cs/opendata/C9B6B3BD-217E-4819-B58F-5F574DC6FC78

Examples

- **Cave entrances and cave galleries projected on ground surface and rendered in real 3d (below surface)**
- **Data not publically available**
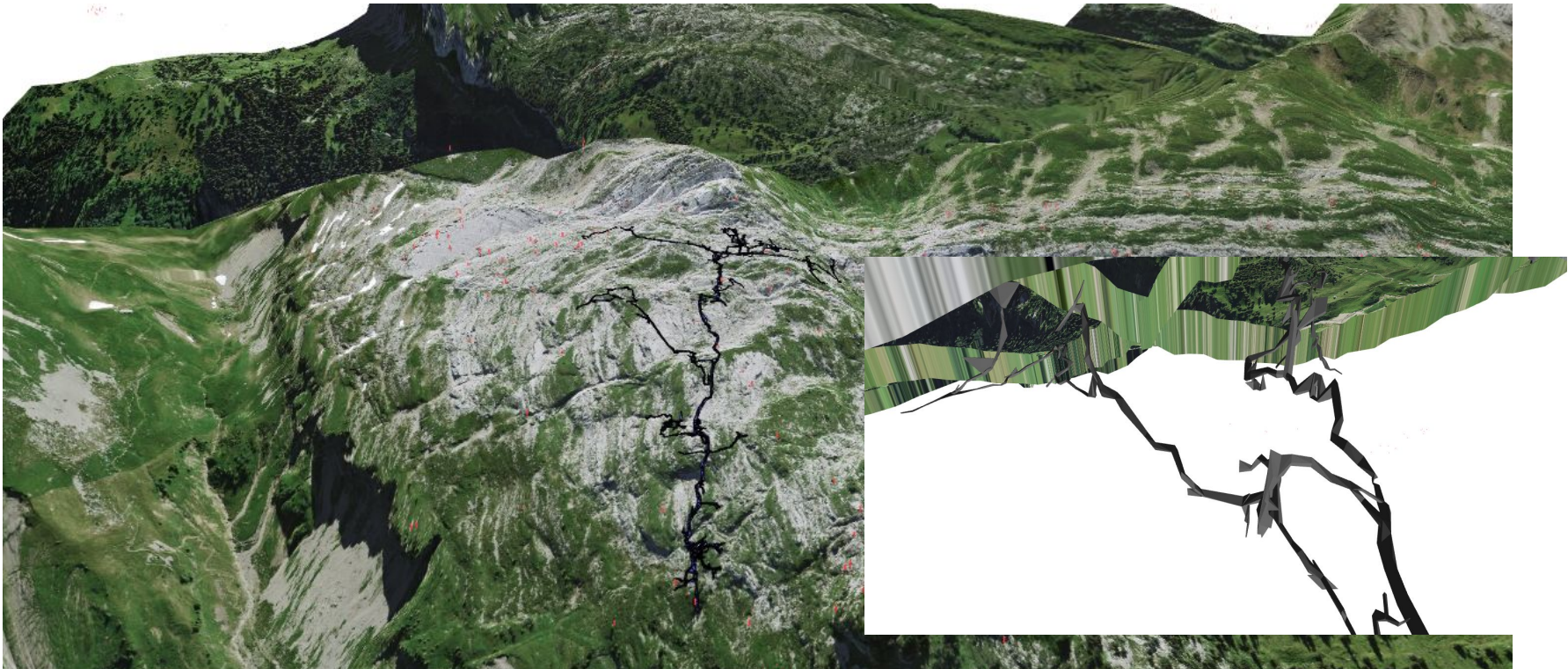
Examples

- **Kanton Zug: Swissbuildings (multipatch), SwissTLM3D and Cadastral data (Amtliche Vermessung)**
- **Data not publically available**

What works?

- **Separate Window for 3D display and navigation**

- **Display Terrain models from raster files (triangulated in multi-resolution tiles on the fly)**

- **2D symbology overlays on top of terrain model**

- **Extrusions of Polygons and lines from 2D data**

- **Display of 3D polygons (e.g. models of buildings or bridges)**

- **Display of Simple Shapes (circles, cylinders, boxes) at point positions**

- **Display of 3D models at point positions**

Supported formats

- **For terrain surfaces: TIFF or any other QGIS supported raster**

- **For 2D overlays and extruded overlays: any QGIS supported layer**

- **For real 3D data: 3D Shape (3D Polygon and Multipatch), Geopackage, Postgis**

- **For 3d model files (e.g. rendered at point positions): all formats supporte by Assimp-library - https://github.com/assimp/assimp**

What doesn't work?

- **Navigation still not intuitive (often too fast, no undo, no "elevator mode", no "look-around" mode)**

- **Can't navigate below terrain**

- **No picking (querying of attributes) in 3D**

- **No link between 2D and 3D
e.g. camera position seen in 3d**

- **No brushing (highlighting in 2d doesn't highlight corresponding object in 3d)**

- **No caching of terrain triangulations**

- **Grosse Szenen laden lange oder crashen ...**

Future Plans

- **Crowd-funding: to be released with QGIS 3.4 in autumn → see https://www.lutraconsulting.co.uk/crowdfunding/more-qgis-3d/**

- **Mesh-Verbesserungen: https://github.com/qgis/QGIS-Enhancement-Proposals/issues/119**

Credits / Thanks to

- Martin Dobias (Lutra Consulting)
- QGIS Community for financing QGIS 3D grant
- Earlier 3D developers (QGIS globe and qgis2threejs)