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UN Vector Tile Toolkit development and its application

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The United Nations Vector Tile Toolkit

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UN Vector Tile Toolkit

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Combining efforts with UN.

- UNVT is a collection of Open Source Software (OSS) to produce, host, style and optimize vector tiles for web mapping. It also shares technical know-how.
- UNVT is an effort under **the UN Open GIS Initiatives**. It was initiated by Mr. Hidenori Fujimura in 2018
- UNVT first aims to achieve automatic continuous update of the basemap vector tiles for UN operations. It also aims to facilitate the use of the vector tile technology among partners.

Meet him in Florence!
Founder of UNVT.

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Some example of our tool

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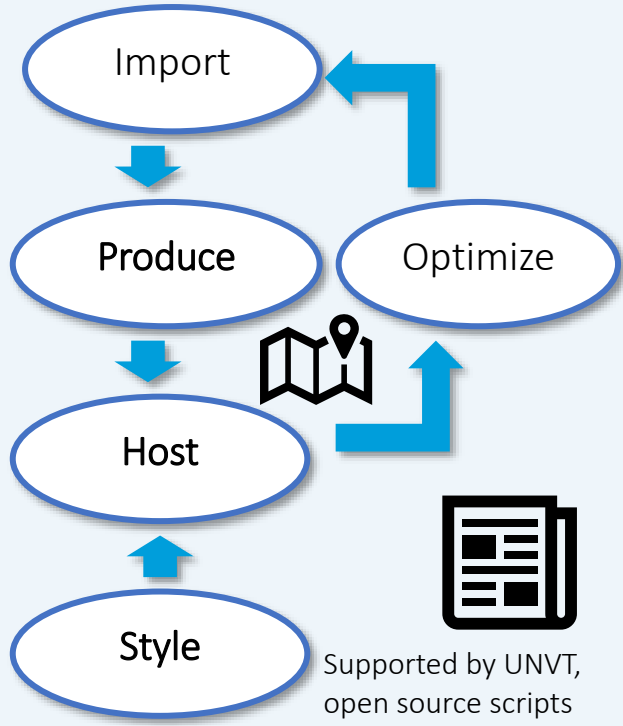
Our tools and activities cover various phases of vector tile development/application.
Tools listed here are some example of UNVT for general use. We often customize our tool for specific purpose.

Tool name	Main developer	Area of use	Overview
kata	GSI	Produce, optimize	“Filter" function to add layer name, maxZ, etc to each source file and output them to JSON sequence to be inserted in Tippecanoe
itoma	GSI	Host	It displays vector tile map in three map libraries (mapbox, MapLibre and ArcGIS), and returns ArcGIS REST API response to preview the vector tile map in ArcGIS Online.
charites	Geolonia	Style	Edits map style with easy to handle YAML format. A live preview is also available. (Donated by Geolonia Inc.)
tell	hfu	Application	For making an easy story telling map (introduced in the workshop)
nanban	hfu	(general)	Ubuntu/intel based UNVT docker files.
equinox	hfu	(general)	UNVT tool installer for Raspberry Pi

UNVT workflow of developing **vector tile** for base map



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Recent development topics: Some selected tools/repositories

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- I would like to introduce some of our tools.

- If you think it is interested in, please try to use them from our Github repository. (Or, join us, UNVT, at anytime.)

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Some example of our tools

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Some example of our tools

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Vector Tile Styling tool – unvt/charites
- make styling work easy and fun

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Efficient Styling– Use of YAML files

- **JSON file** based on Mapbox style specification (or MapLibre style specification)
- Wise use of YAML files increases efficiency
- We use UNVT/charites

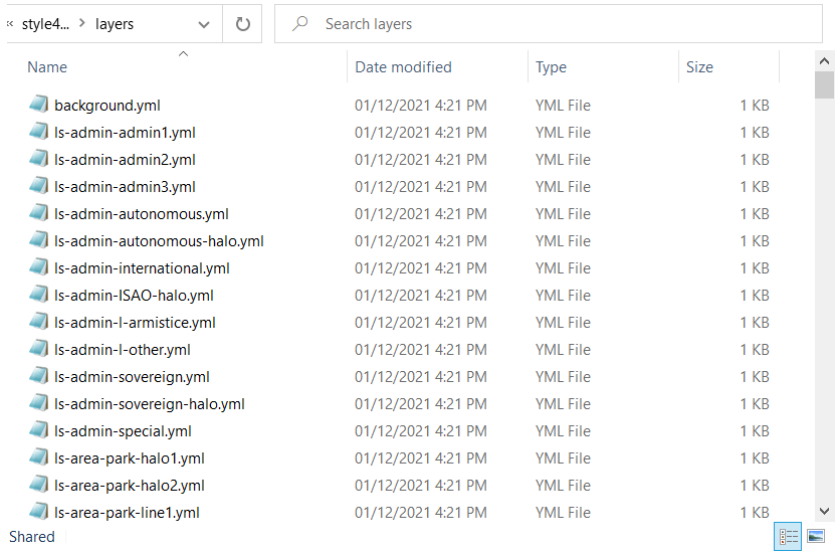
Style files (mapbox/maplibre/arcgis)

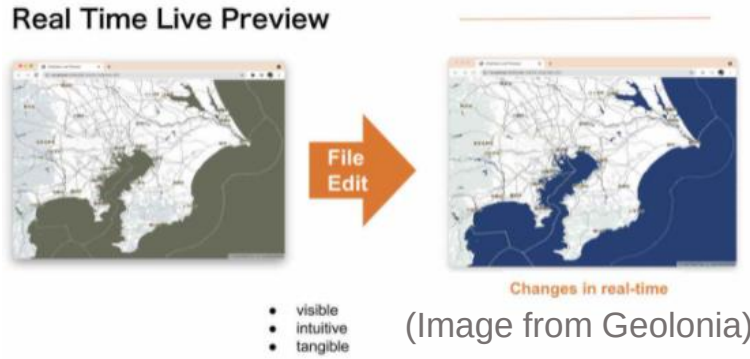
- **JSON format**
  - Many lines (thousands)
  - In a single file
  - Hard to read/edit

Our tool **Charites**

Let's edit with

- **YAML format**
  - Human readable
  - Structured files
  - Re-usable
  - Stored in the series of config files





(Image from Geolonia)

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A story about the tool development

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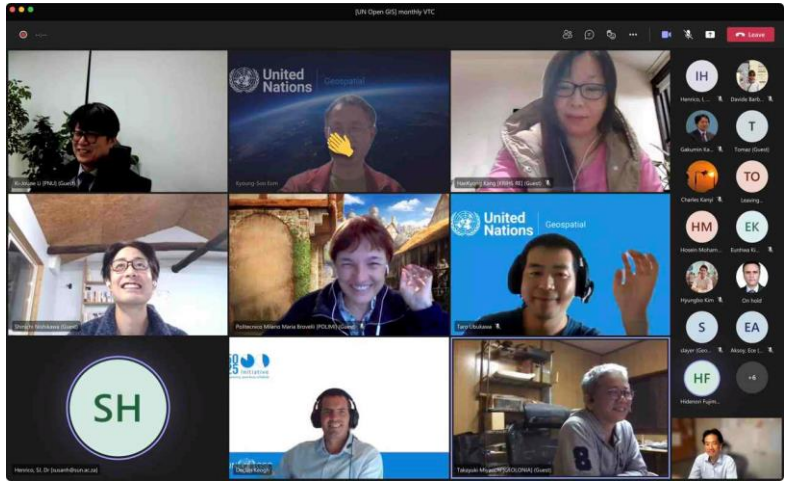
テキストと操作画面

- Originally, we used HOCON parser to edit the style. These work was reported at UNVT workshop in May 2021

- Our partner, Geolonia, supported the shared idea, and contributed to develop a tool with YAML files. They contributed their tool at the UN Open GIS monthly meeting in October 2021.



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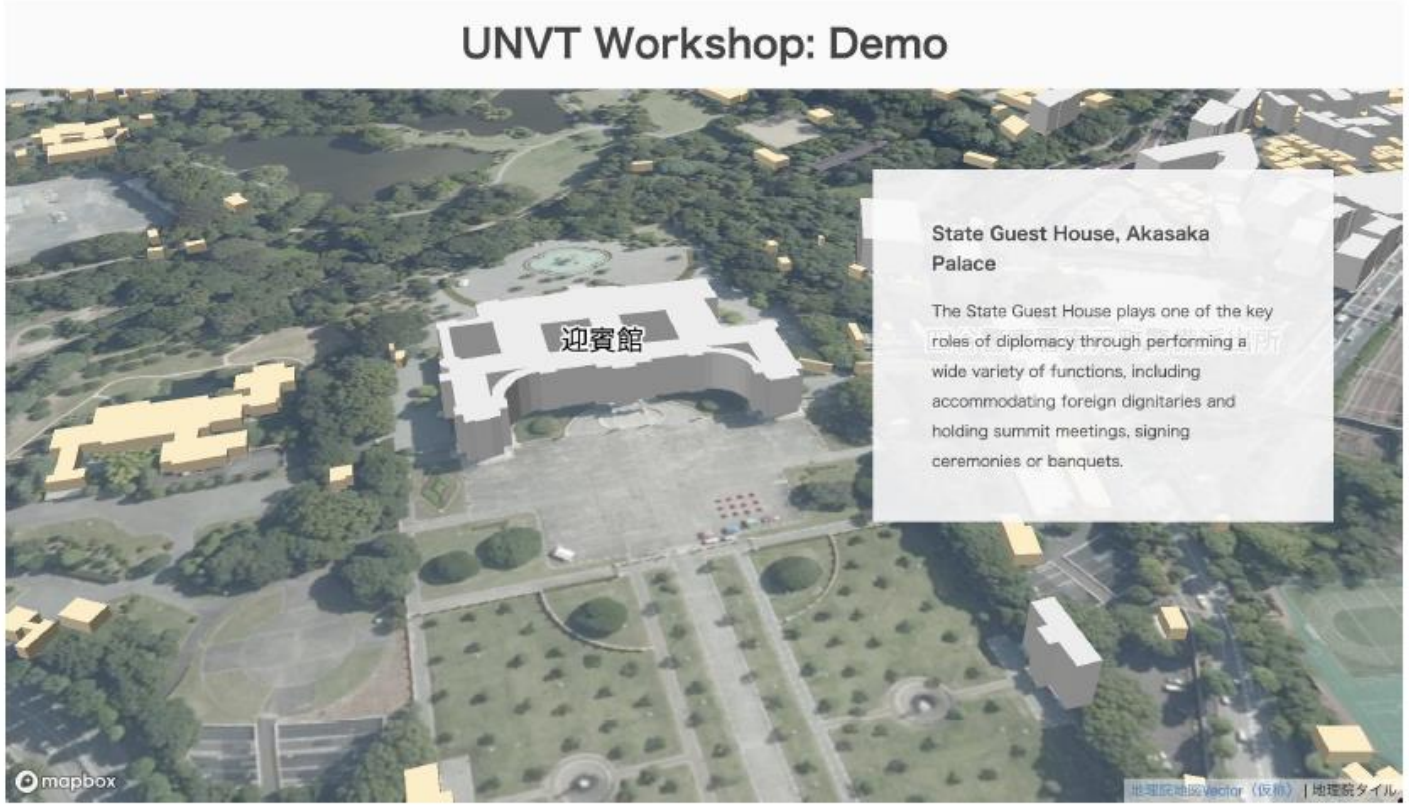
Storytelling

A tool for data consumption.
Making a simple story-telling map with easy preparation. (Just prepare text with YAML fortmat.)

- https://github.com/unvt/tell
- https://www.youtube.com/watch?v=CVajhAUDLMs



Workshop was recorded and released from YouTube

UNVT Storytelling Workshop 2021-10-22

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Making a story map by editing simple text (YAML)

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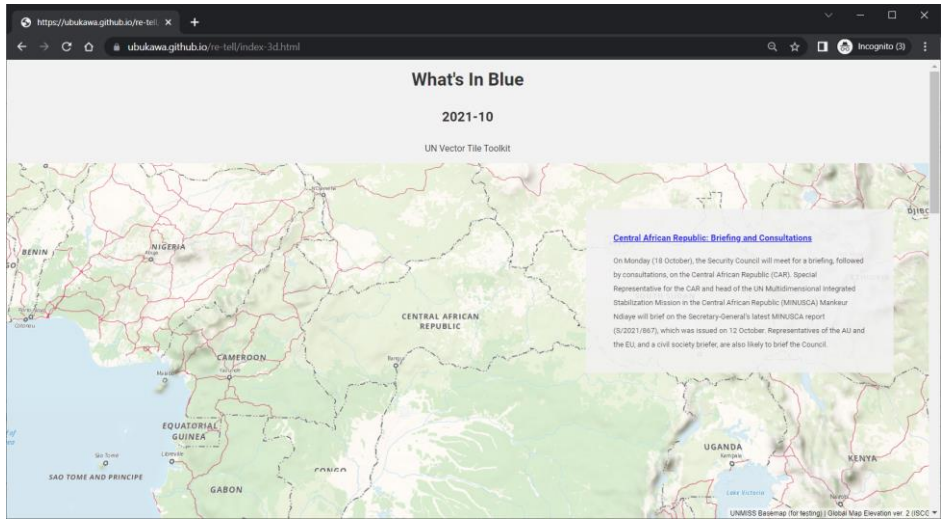
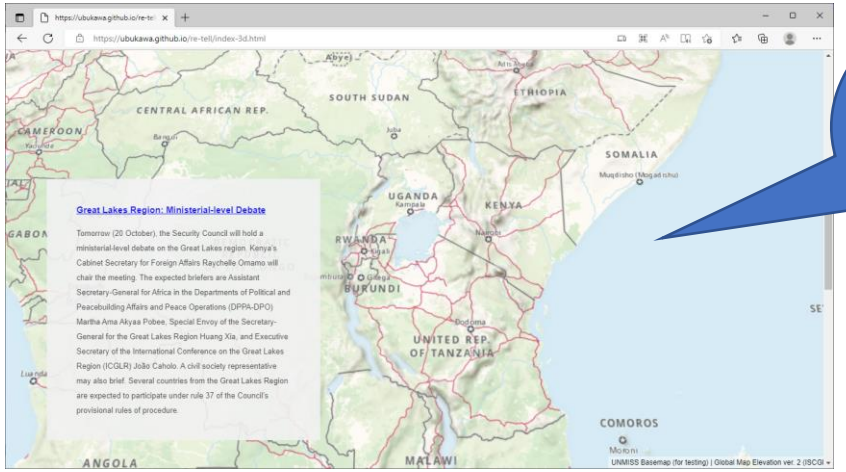
story.yml - Notepad

File Edit Format View Help

```
style: ./style.json
title: What's In Blue
subtitle: 2021-10
byline: UN Vector Tile Toolkit
theme: light
footer: This is the end of the story. The source of this story is <a href='https
view:
# you can pick the location information from https://optgeo.github.io/relief
  car:
    center: [21.91, 7.71]
    zoom: 4.84
  lakes:
    center: [33.9, -3.15]
    zoom: 4.84
  haiti:
    center: [-73.73, 19.25]
    zoom: 5.34
chapters:
  - id: c1
    alignment: right
    url: https://www.securitycouncilreport.org/whatsinblue/2021/10/central-afric
    title: Central African Republic: Briefing and Consultations
    description: >
      On Monday (18 October), the Security Council will meet for a briefing, fo
    location: car
  - id: c2
    alignment: left
    url: https://www.securitycouncilreport.org/whatsinblue/2021/10/great-lakes-r
```

Ln 3, Col 18 130% Unix (LF) UTF-8





Map moves with the story

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3D expression (1)

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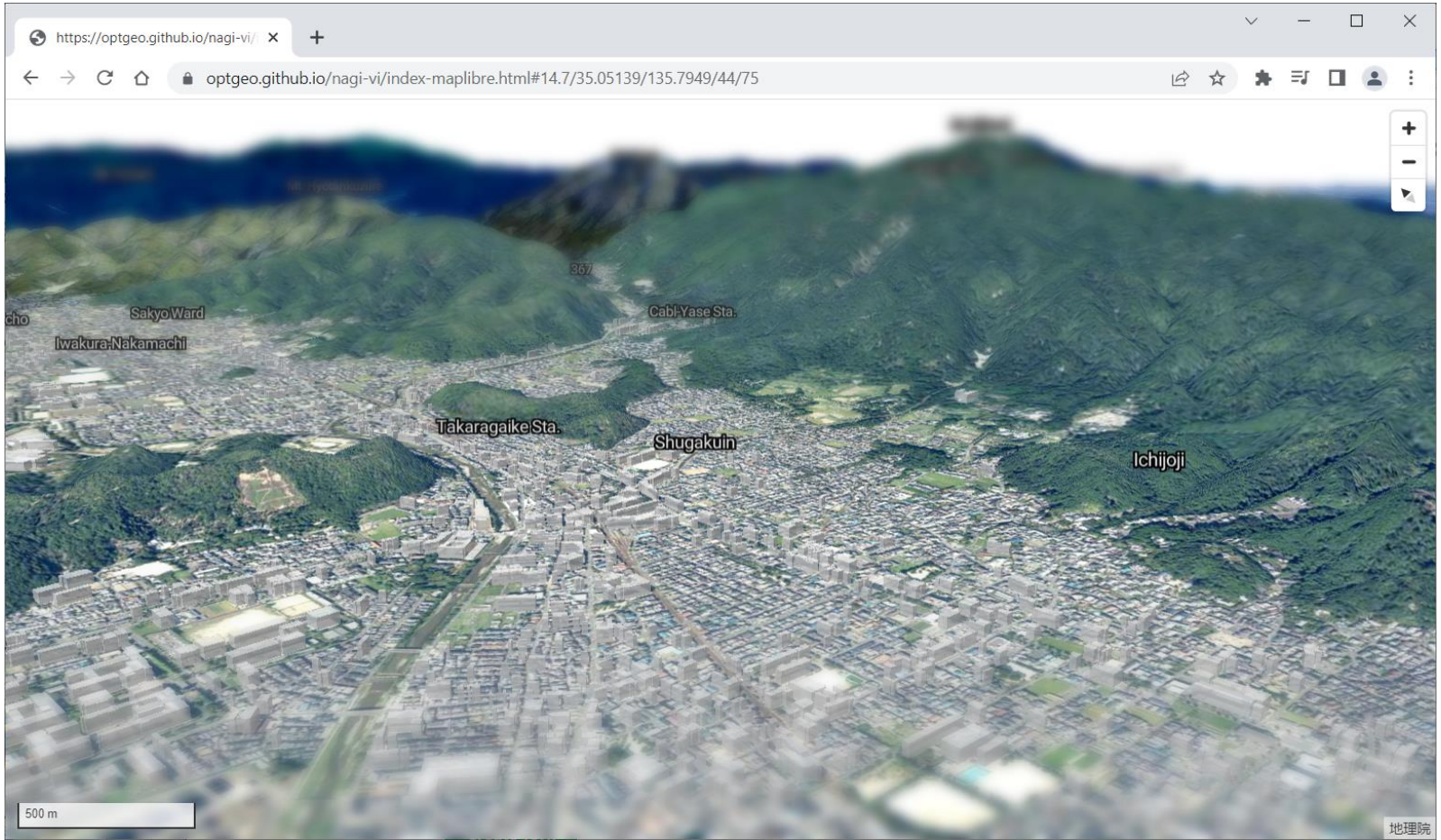
- 3D terrain with **Mapbox GL JS and MapLibre GL JS**: https://github.com/optgeo/nagi-vi
- Vector Tiles + Terrain Tiles + Orthophotos (focus on center)



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3D expression (2)

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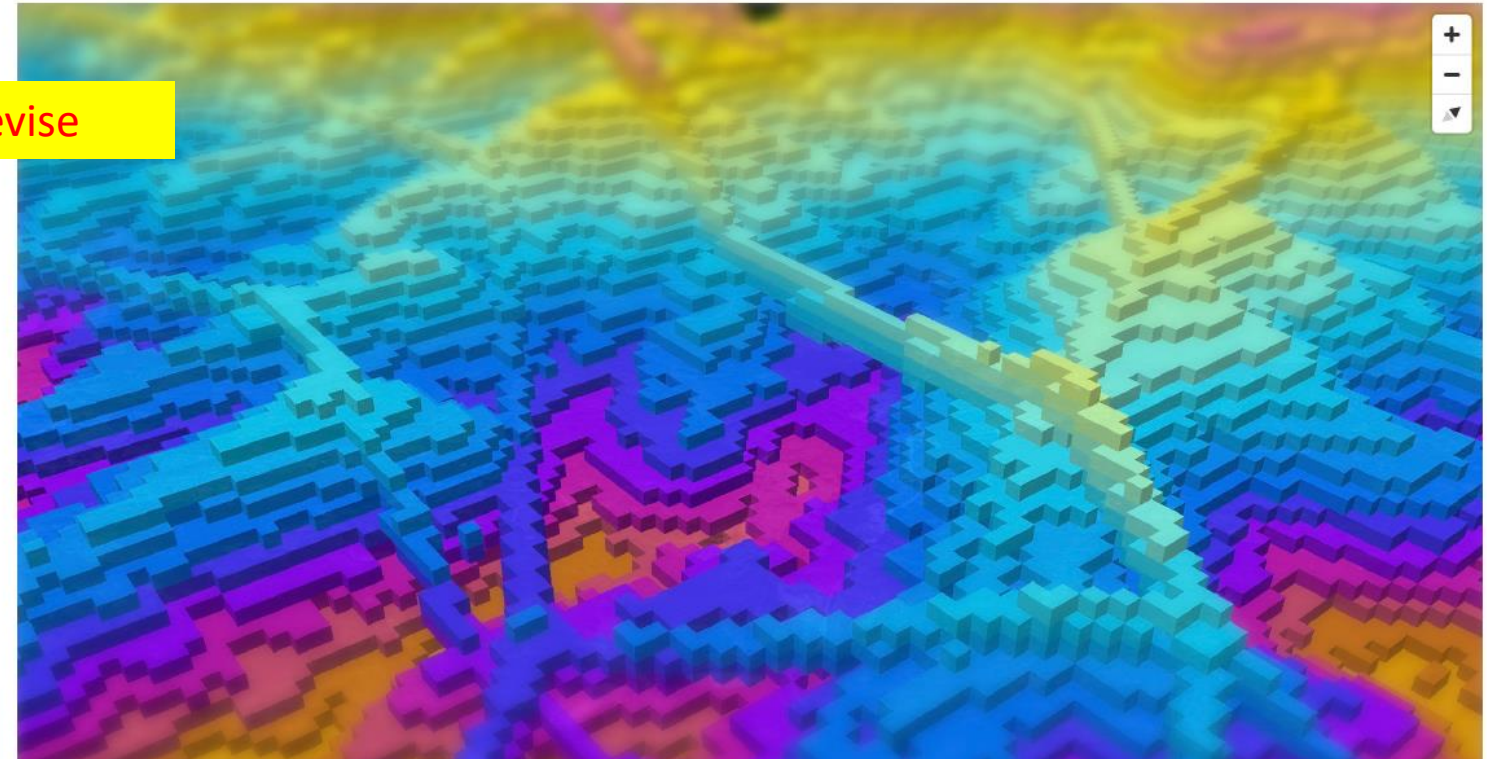
- A lot of work on voxel tiles:
  - Lightweight abstraction of lidar data

Voxel Tiles: https://optgeo.github.io/togari
Lightweight abstraction of lidar data

Will revise



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3D expression (3)

Let's develop Free and Open RGB Elevation tiles from the source DEM

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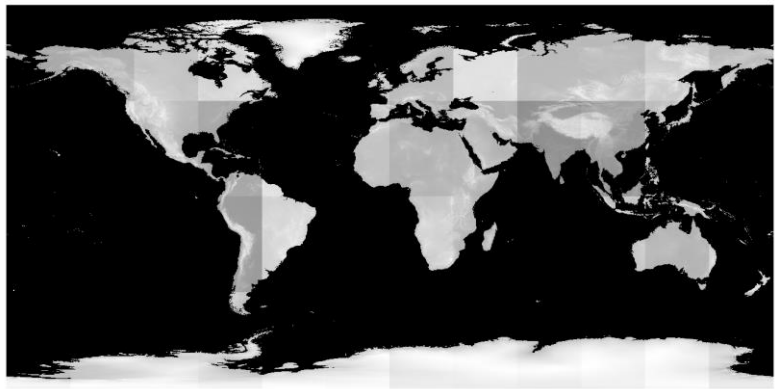
- We have a tool to easily create RGB elevation tile
  - https://github.com/unvt/rgbify -- A docker file based on osgeo/gdal:ubuntu. It has mapbox/rio-rgbify in it.
- Development of RGB elevation tiles from SRTM data and others.
  - from SRTM: ZL 6-11 https://github.com/unvt/rgbify-srtm (About 180GB)
  - from Global Map: ZL 2-8 https://github.com/ubukawa/globalmap-el (About 2 GB)

SRTM has some void area. Need for further improvement.



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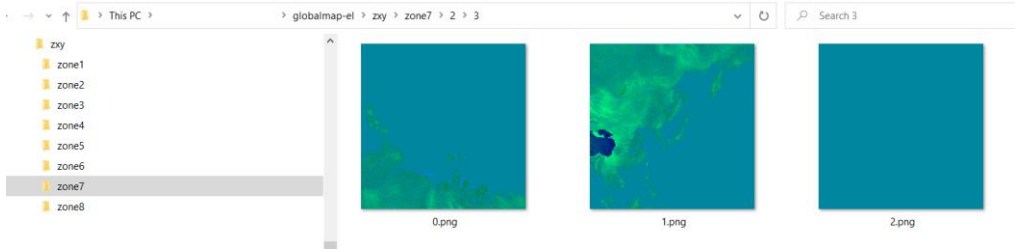
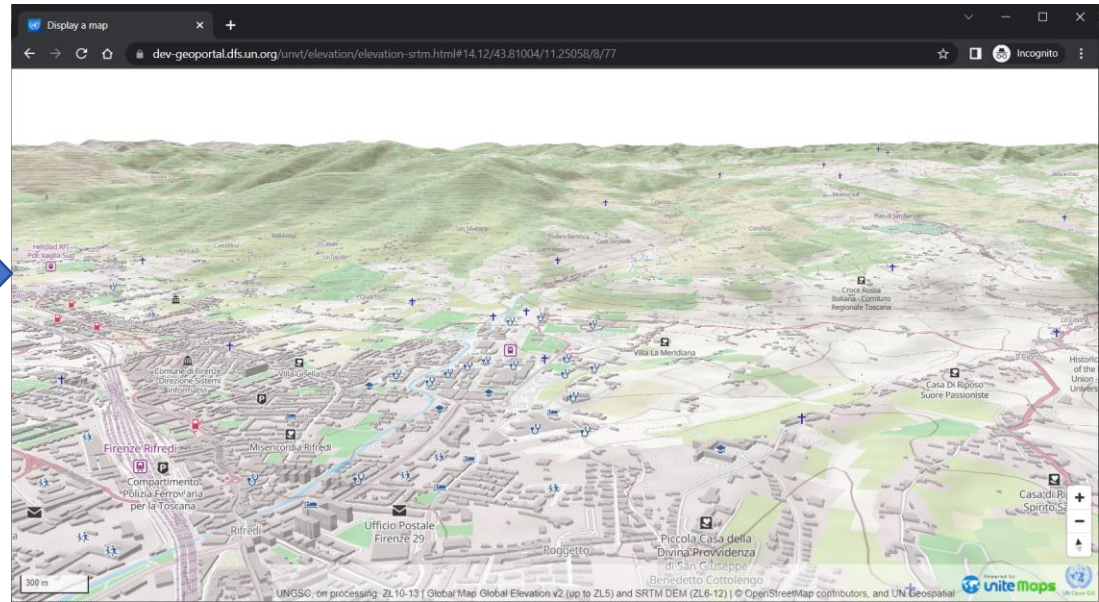
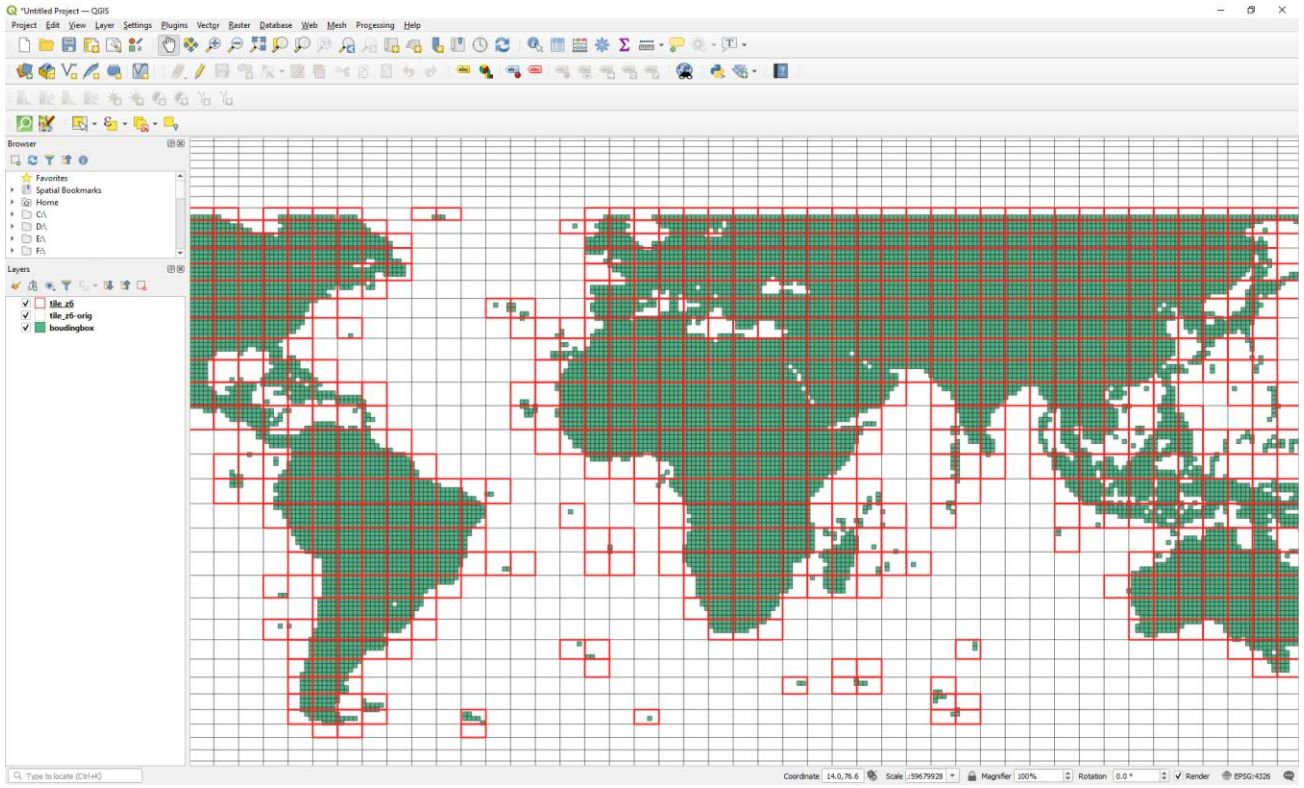




How did we do?

- Working at once for global coverage is too hard.
- We worked for each boxes of ZL6 tiles. (932 out of 4096 have data.)
  - Merged the source for each extent.
  - Conducted RGBifying for each extent.

You can use Gdal tools and rasterio rgbify command in our Docker container or raspberry pi work environment even if you do not have a Linux env.



This type of “spatial module” is often used for our data development.
It is a good tactic.

With nodejs scripts, we can also use “better-queue” to work with concurrent process.

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Raspberry Pi

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Any other (if any)

- ほかに紹介したいツールやレポジトリがあれば追加

Some ongoing projects

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I also would like to introduce some our our related projects

- Vector Tile deployment in UN
- UNVT Portable (?)
- GSI(?)
- ???

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Vector Tile Development in UN

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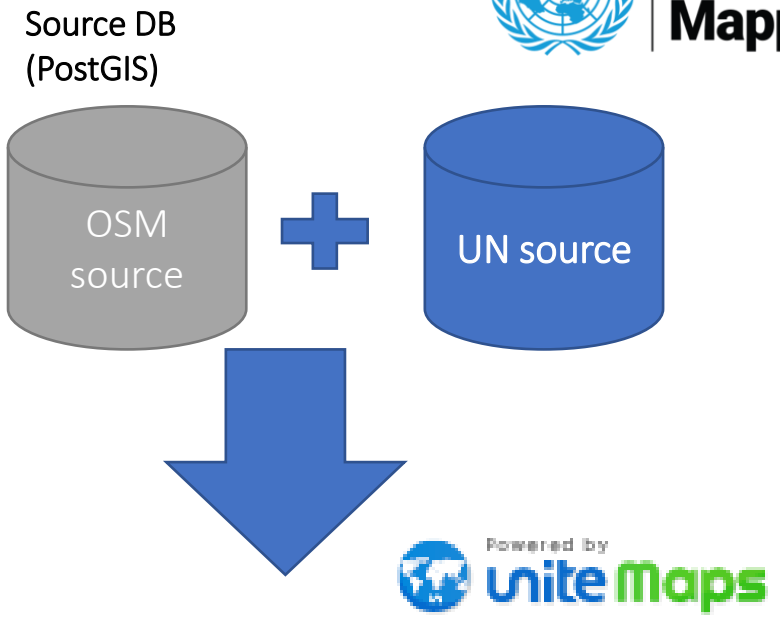
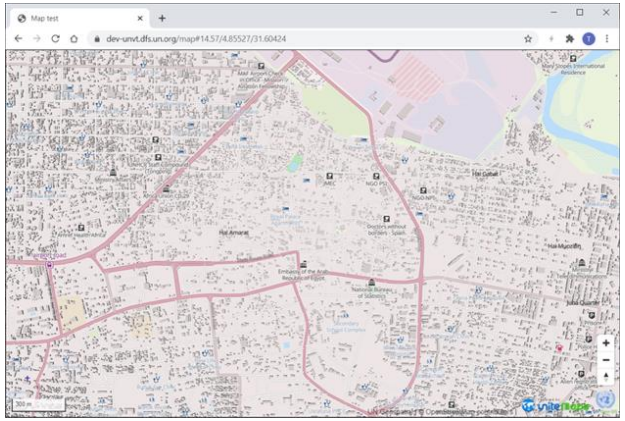
- Vector tile from PostGIS database
  - Use of nodejs scripts and tippecanoe
  - 841 mbitles (140 GB)
- Automatic update of the whole data base.
  - Regular update as scheduled task.
  - (35 hours for global data update)
- Style is prepared
- Hosting web map
  - Vector Tiles for Esri Arcgis Online.
  - Web Map APP with MapLibre

UN Mappers



Powered by unite Maps



Users
- Web APP
- GeoPortal
- Etc.

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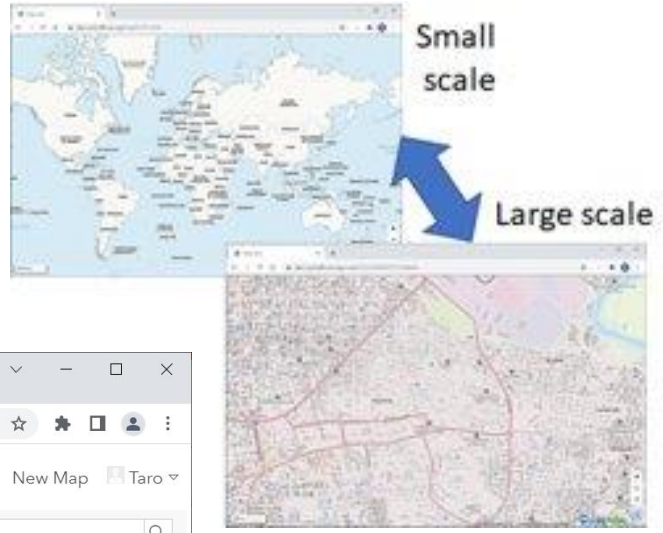
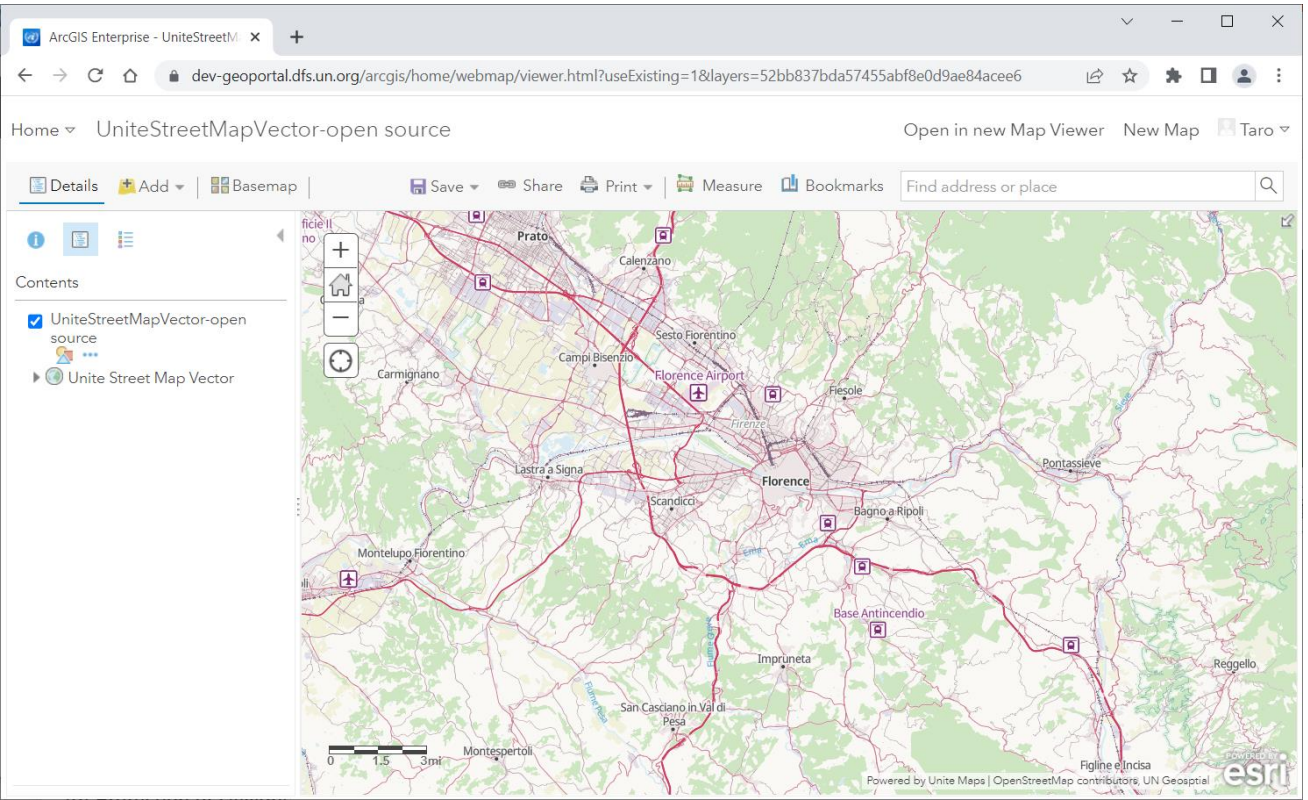
Vector Tile in ArcGIS Online



We needed adjustments for vector tile consumption in ArcGIS online. We struggled and have a lot of lessons.



- ArcGIS REST API
  - Style
  - Index
  - Tilemap (for OverZoom)
- Azure AD authentication
- CORS setting

UNVT Portable

- スライド1～2枚程度で説明

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Any other (if any)

- ほかに紹介したい取り組みがあれば追加

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How we share our experiences?

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- Conduct workshops
- Documentations
- At GitHub

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Workshops

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Hackathon with students

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Way Forward

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Summary

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