

# GEOCUBES FINLAND

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Earth Observation Workshop  
May 16, 2022



# GEOCUBES FINLAND

- An integrated and harmonized set of raster geodata resources made available in a cloud computing platform
- Harmonized on
  - Georeferencing
  - Resolution in multiple levels
  - Spatial subdivision
  - Access mechanisms
  - Format
- Developed as part of the oGIIR project,
- Now part of the GeoPortti research infrastructure

# GEOCUBES FINLAND

- Fixed grid, based on ETRS-TM35FIN
- Resolutions: 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 m
- Divided in 60 blocks of 100 km \* 100 km
- Implemented as Cloud-Optimized GeoTIFF (COG) files
- Available through
  - WCS, WMS/WMTS, http GET Range, virtual file (VRT), Custom API
- Web Client, QGIS Plugin

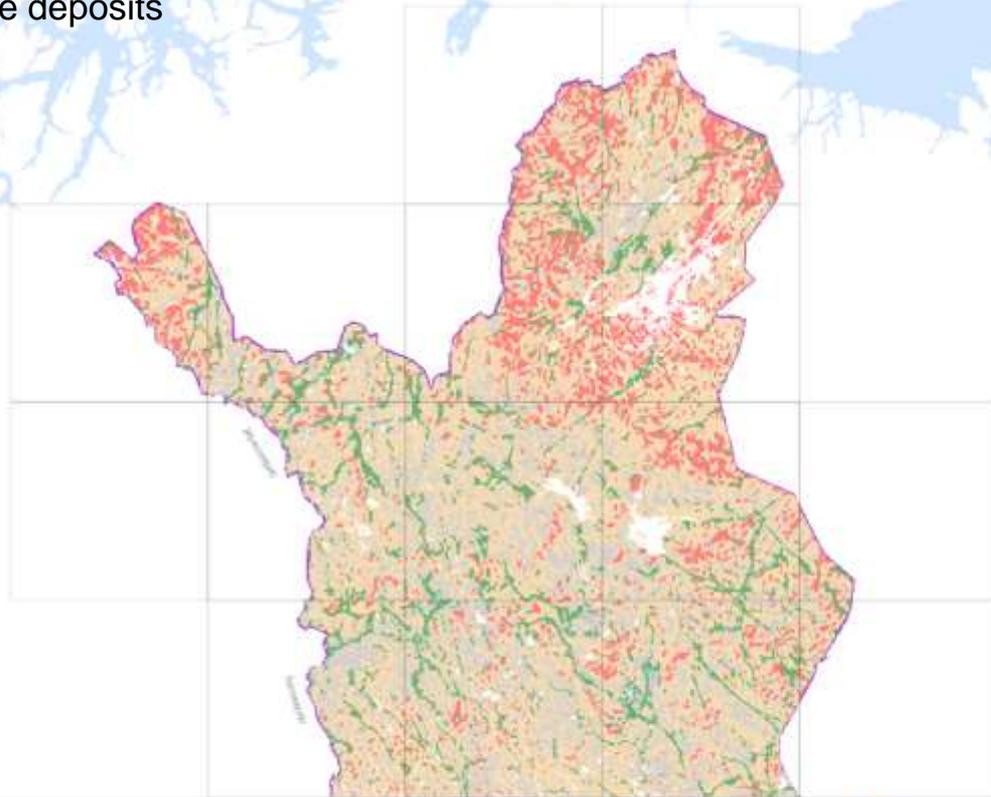


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# GEOCUBES CONTENT

- Surface deposits
  - Sources 1:20000, 1:200000 and 1:1M data sets
- CORINE Land Cover
  - 2000, 2006, 2012, 2018
- Forest inventory
  - Nine attributes; 2009, 2015
- DEM
  - 2 and 10 m source resolution
  - Slope, Aspect
- Sea, Field parcels
- Administrative units
  - Municipalities, counties, regions, country

Surface deposits



1 legend entries removed.

Coordinate 95403.7753229

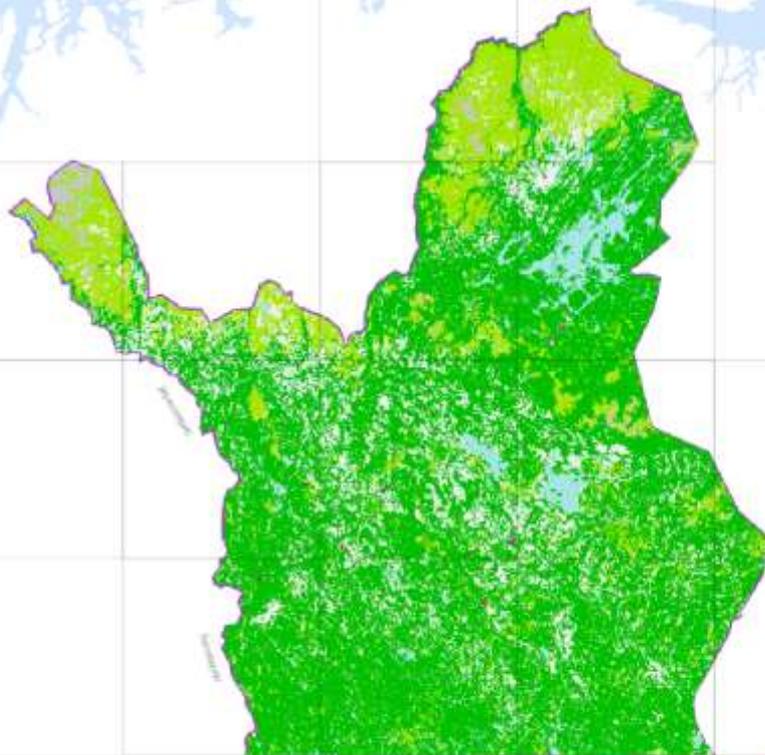
Scale 1:1 233 471

Magifier 100%

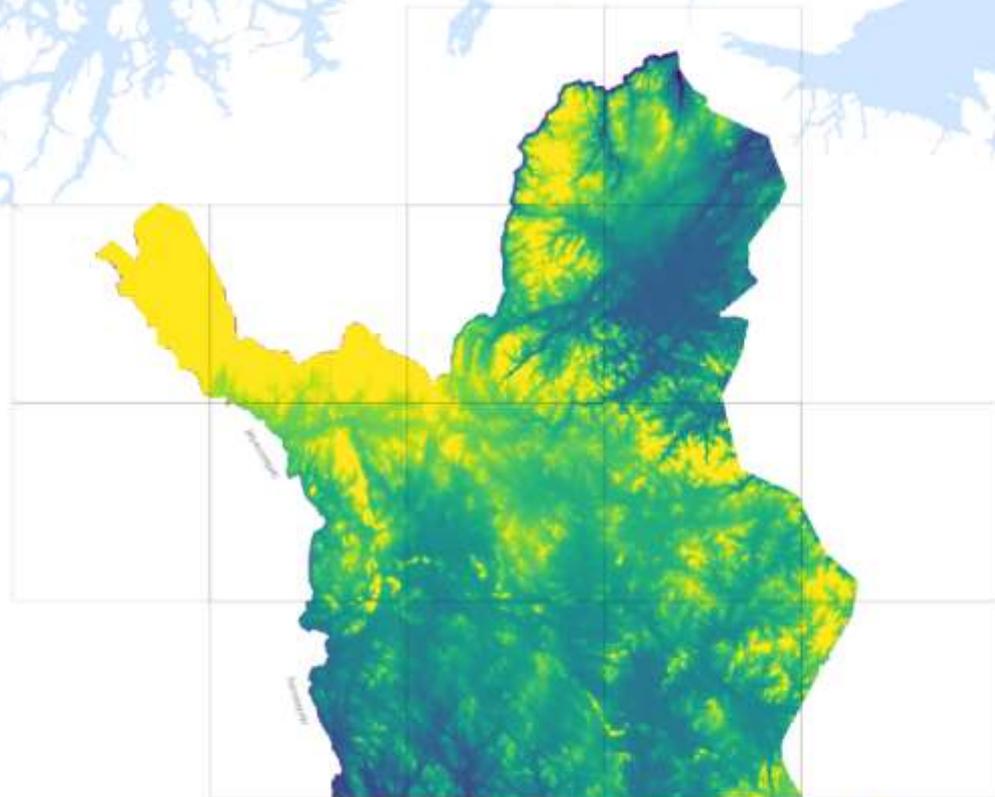
Rotation 0.0

Render EPSG:3057 (ITRF)

Land cover



DEM



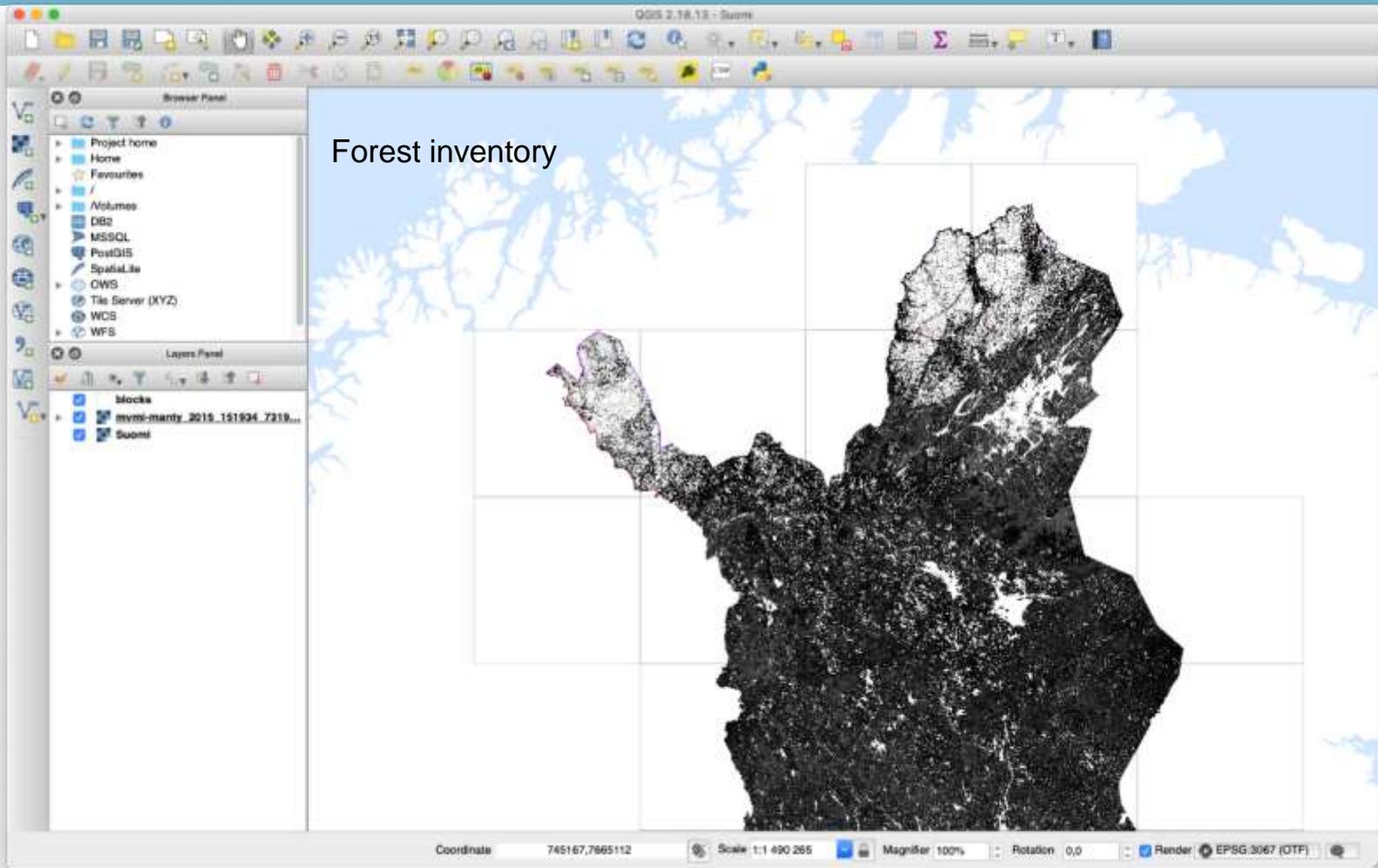
Project Panel

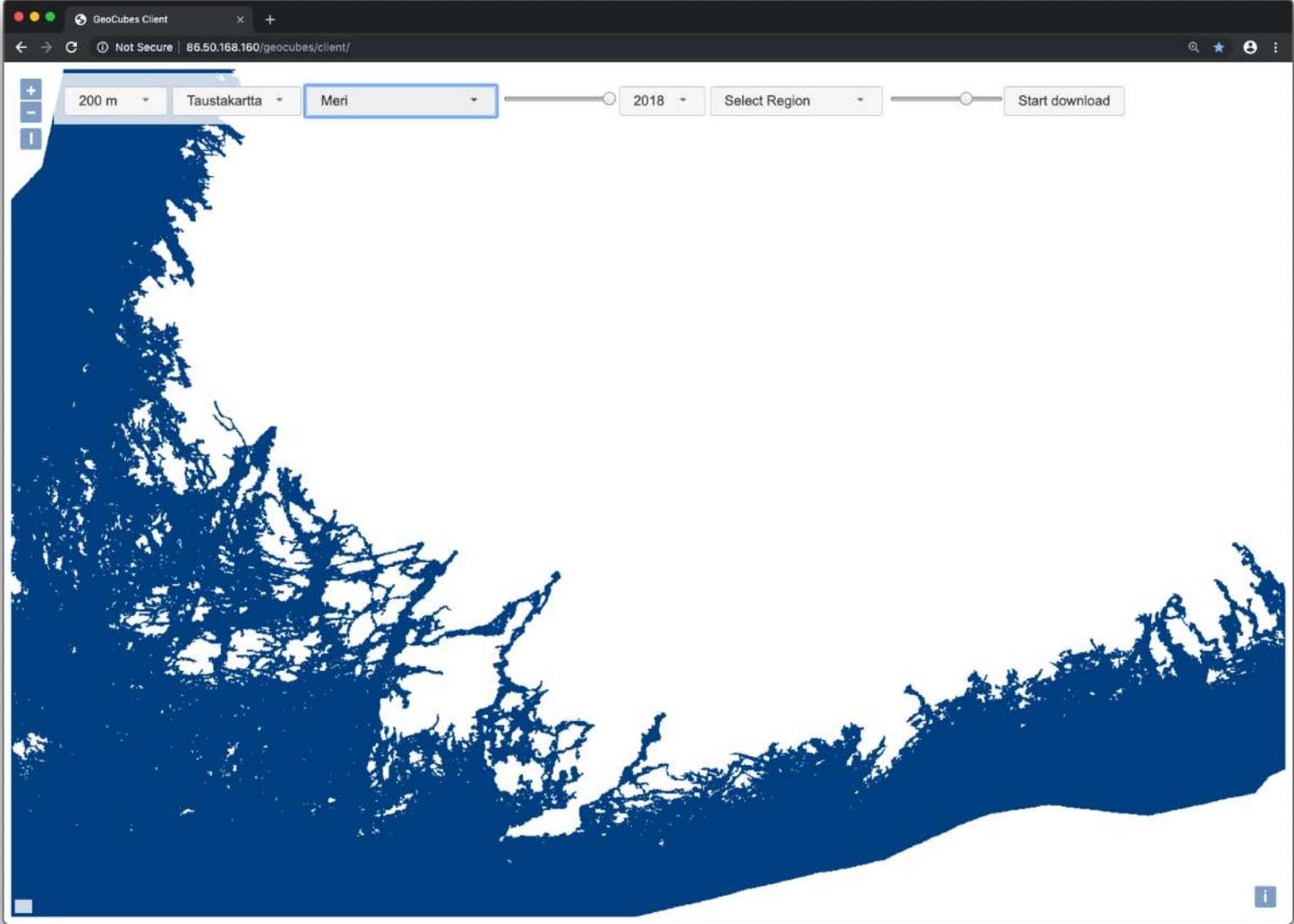
- Project home
- Home
- Favourites
- 7
- Volumes
- DB2
- MSSQL
- PostGIS
- Spashtite
- OWS
- The Server (XYZ)
- WCS
- WFS
- WMS

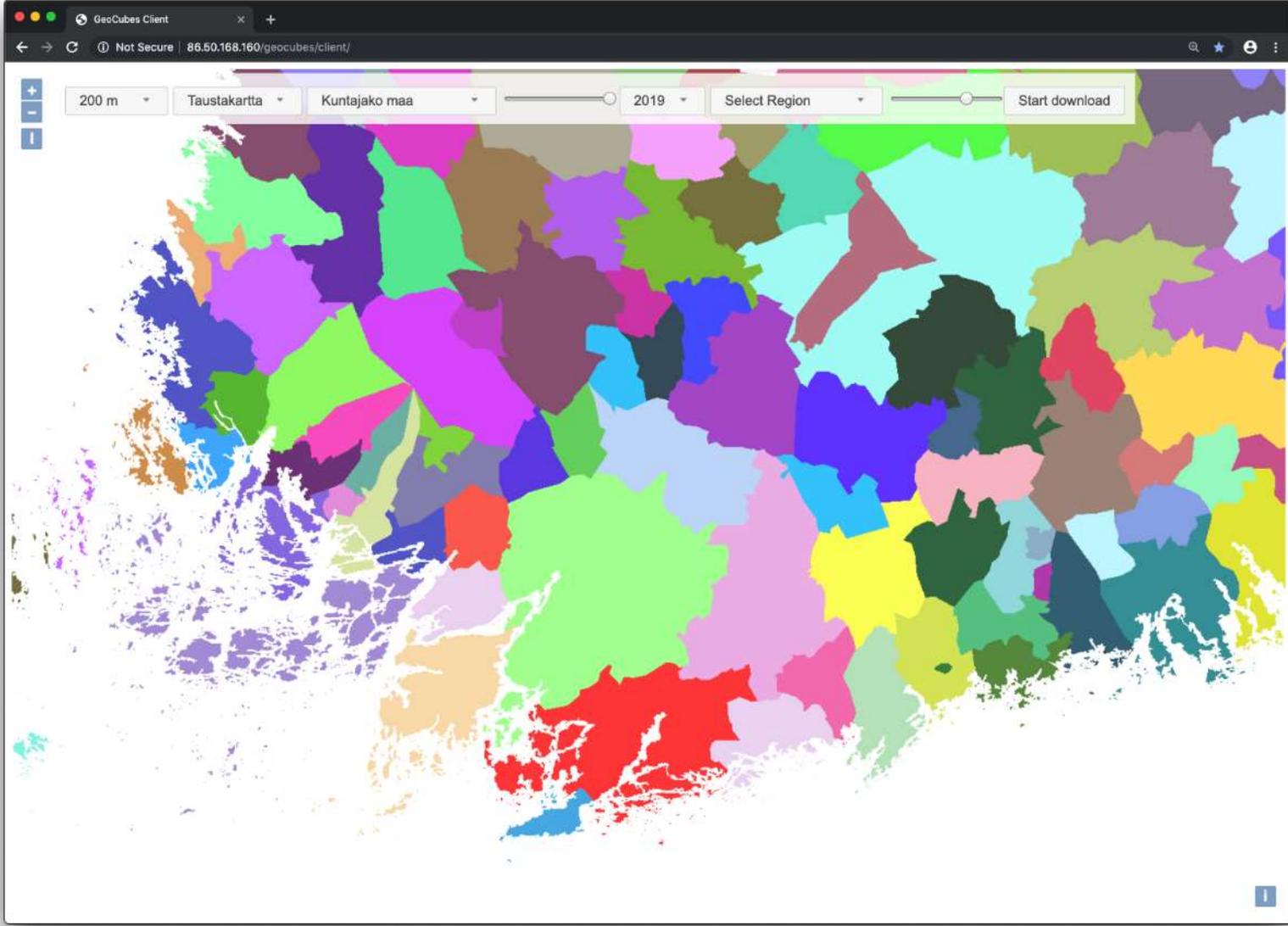
Layers Panel

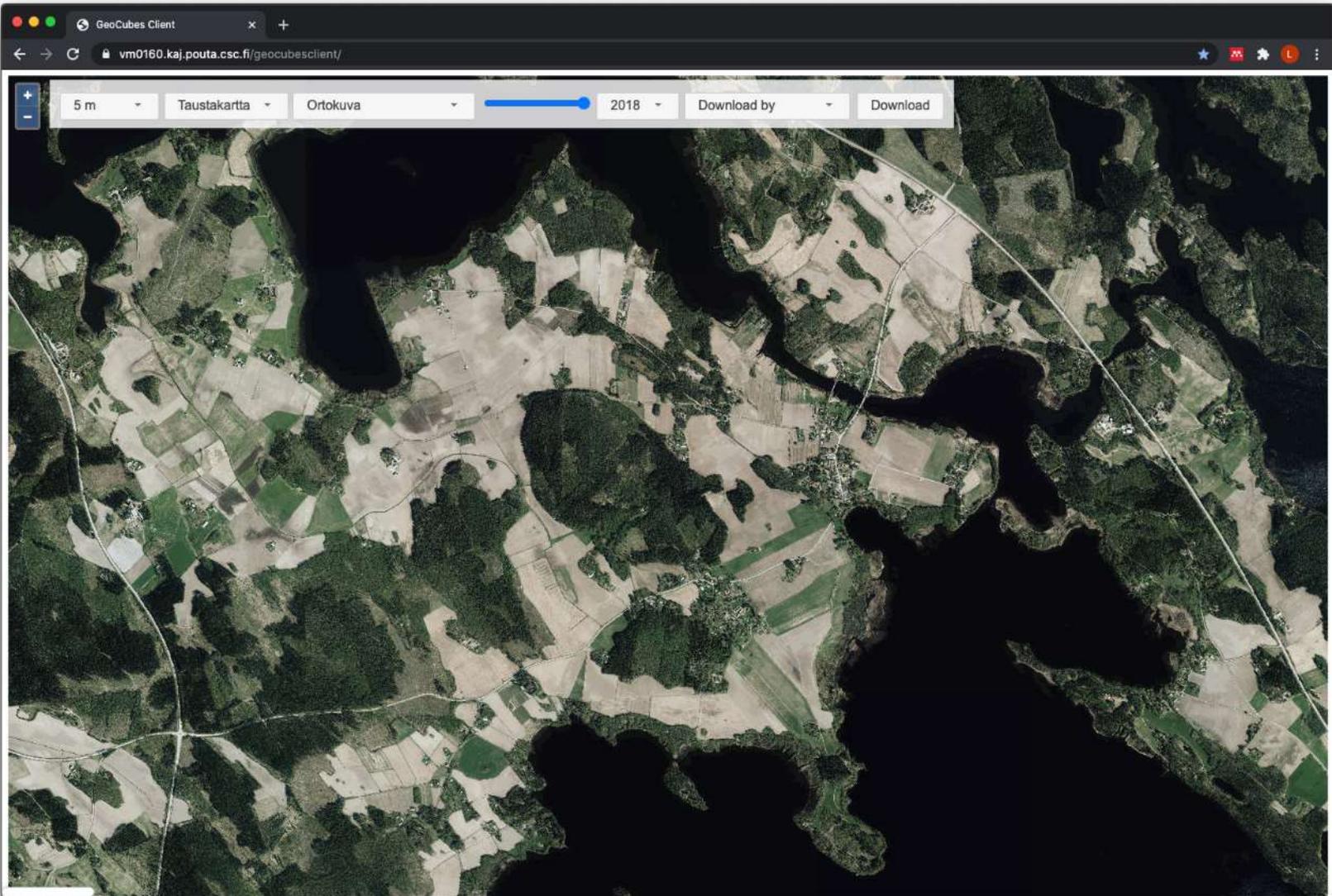
- Layers
- DEM
- contour2012
- map
- clu2006\_10m
- clu2012\_50m
- kurte
- ortho
- Suomi

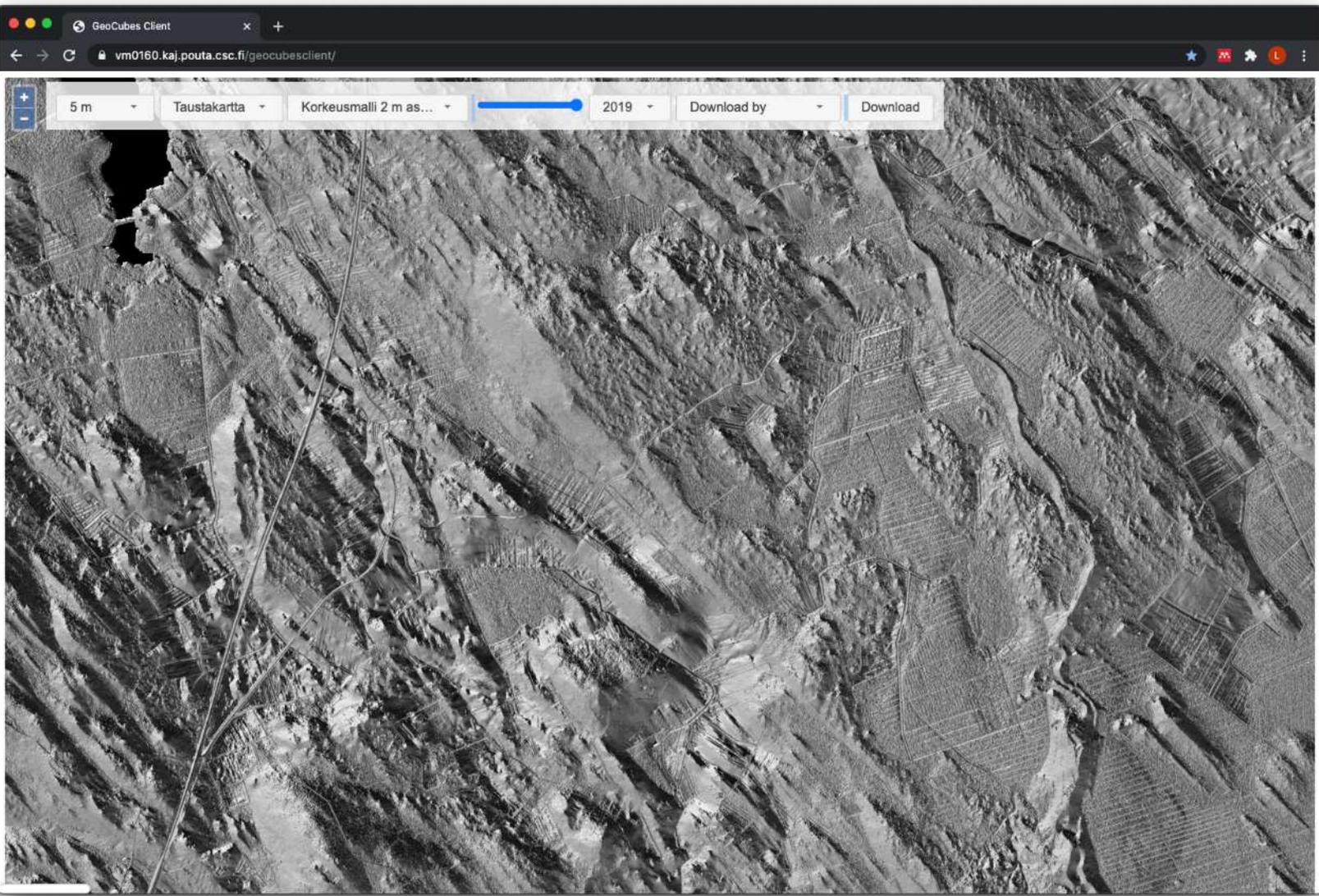
# Forest inventory

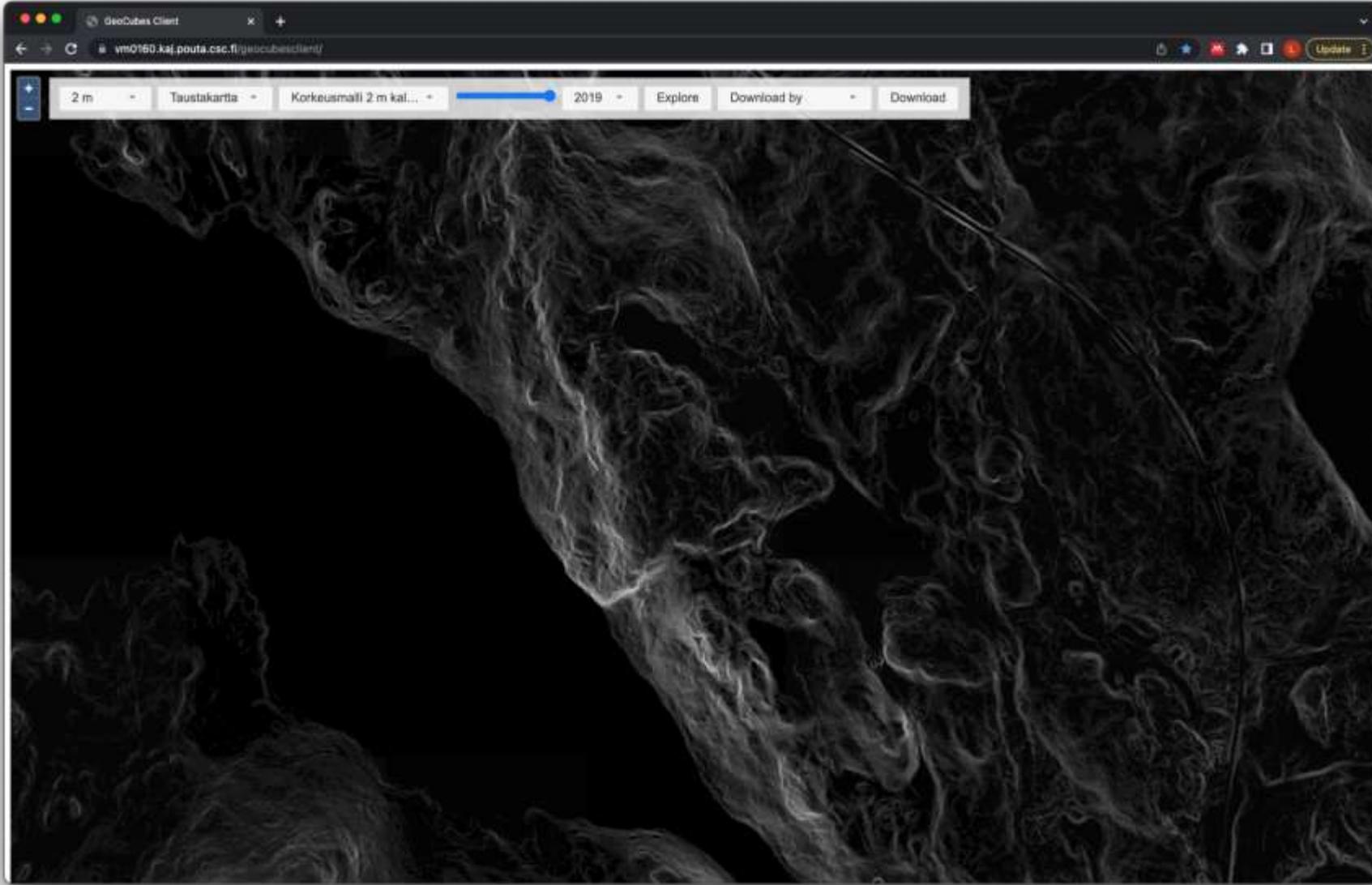


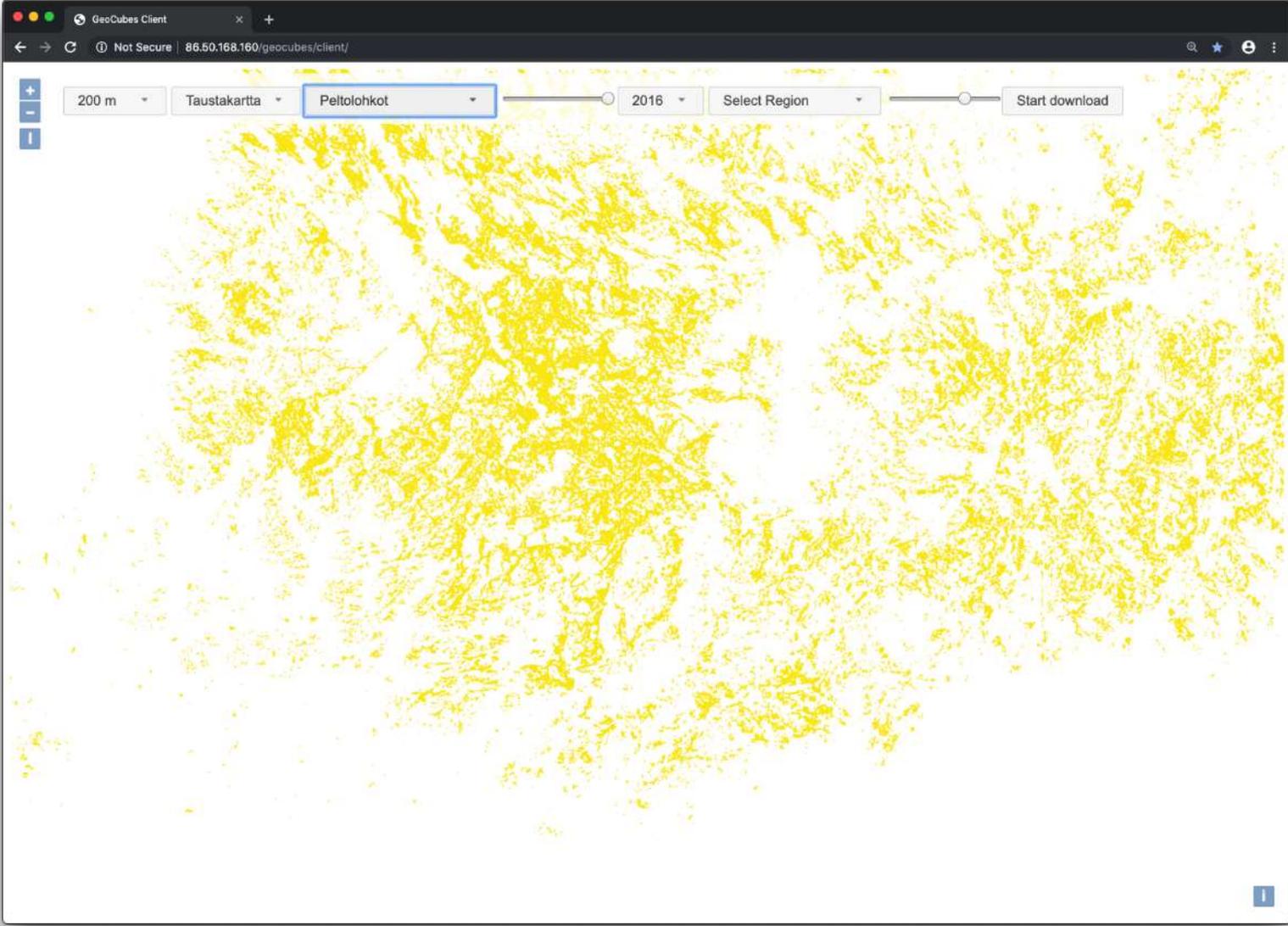


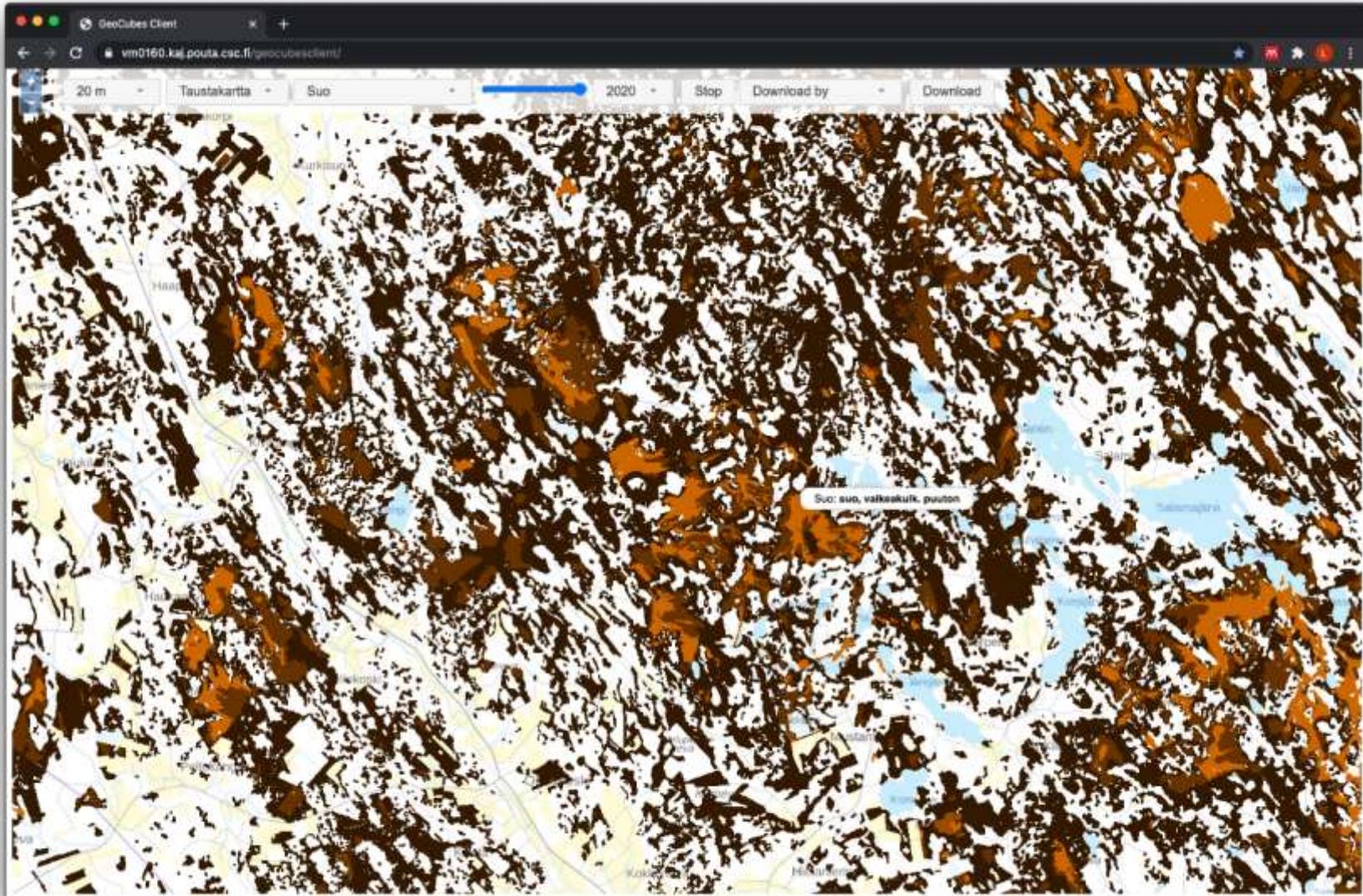










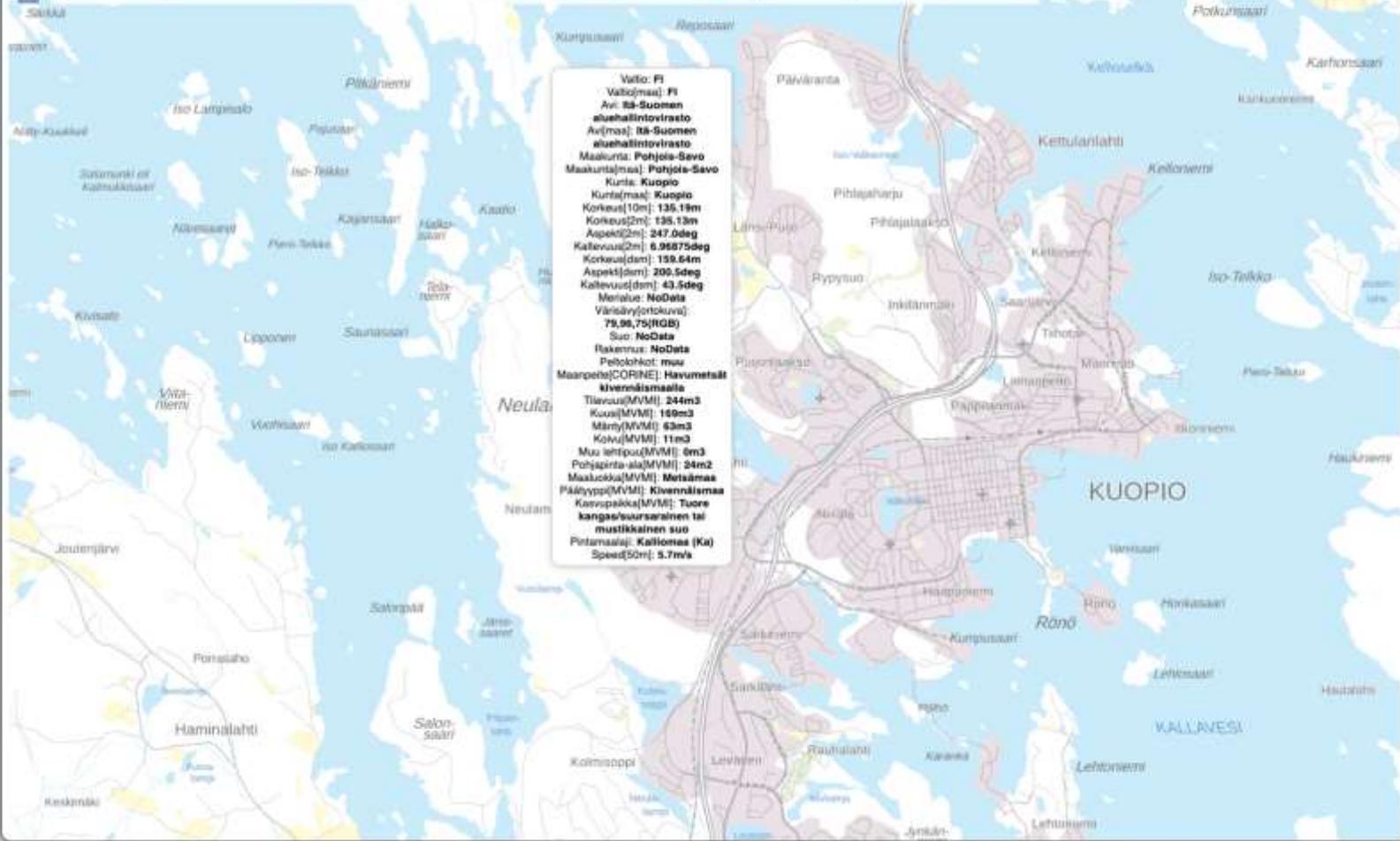


# GEOCUBES API

- **what to do /**
  - **on which resolution level /**
  - **with which content layer /**
  - **where /**
  - **when /**
  - **how**
- 
- **`/legend/1/all/389445,6759833/2016`**

10 m Tauskarta Select Overlay 2020 Stop Download by Download

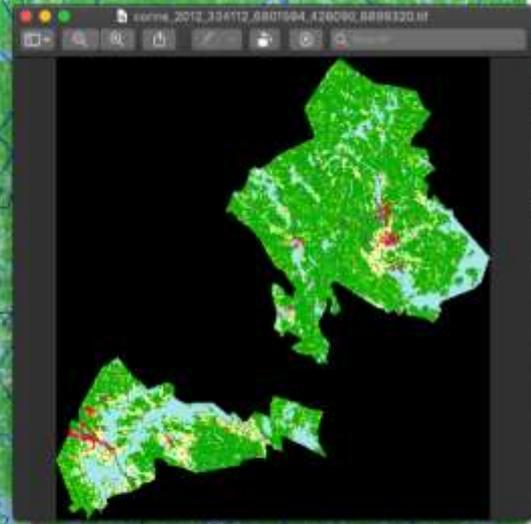
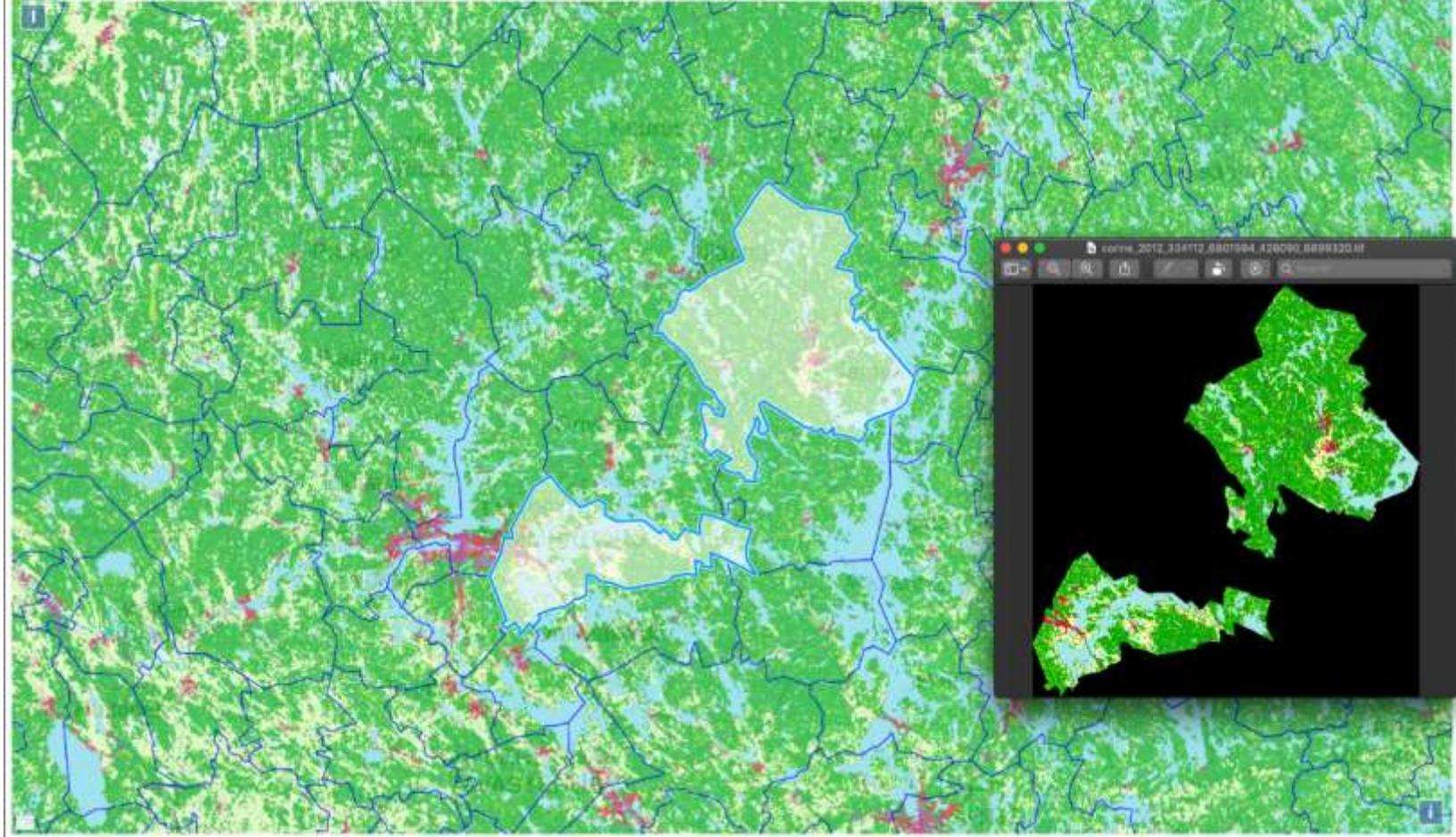
**Valtio:** FI  
**Valtio(maa):** FI  
**Av:** 88-Suomen  
**aluehallintovirasto**  
**Av(maa):** 88-Suomen  
**aluehallintovirasto**  
**Maakunta:** Pohjois-Savo  
**Maakunta(maa):** Pohjois-Savo  
**Kunta:** Kuopio  
**Kunta(maa):** Kuopio  
**Korkeus(10m):** 135.19m  
**Korkeus(2m):** 135.13m  
**Aspekti(2m):** 247.0deg  
**Kalleuus(2m):** 8.96875deg  
**Korkeus(dm):** 135.64m  
**Aspekti(dm):** 205.5deg  
**Kalleuus(dm):** 43.5deg  
**Meriläis:** NoData  
**Värsävyörytokuva:** 79,96,75(RGB)  
**Suo:** NoData  
**Rakennus:** NoData  
**Peltohöhtö:** muu  
**Maarpohe(CORINE):** Havumetsät  
**Kivensalmassa**  
**Tilavuus(MVM):** 24m3  
**Kuus(MVM):** 140m3  
**Mäny(MVM):** 63m3  
**Koku(MVM):** 11m3  
**Muu lehtipu(MVM):** 0m3  
**Pohjapinta-ala(MVM):** 24m2  
**Maaluckka(MVM):** Metsämaa  
**Päätyppi(MVM):** Kivensalmassa  
**Kaavopakka(MVM):** Tuore  
**kangas/oursarainen tai**  
**muistilainen suo**  
**Pintamaaila:** Kalliomaa (Ka)  
**Speed(50m):** 5.7m/s



# GEOCUBES API, EXAMPLES

- `/info/getDatasets`
- `/legend/listLabels/corine`
- `/clip/200/corine/kuntajako:734,761,834,433,224,444,927/2012`
- `/clip/200/maapera/bbox:203300,6653400,494700,6784600/2009/vrt`
- `/clip/20/km10/blocks:300000,6900000,300000,6800000/2018/vrt:mr`
- `/clip/50/mvmi-koivu/ polygon:386349,6900916,414254,6844794,497663,6848714,521186,6904055,509403,6963231,452358,6964027,405703,6960192,386349,6900916/2009`

200 m | CORINE | 2012 | Kuntajako | Start download

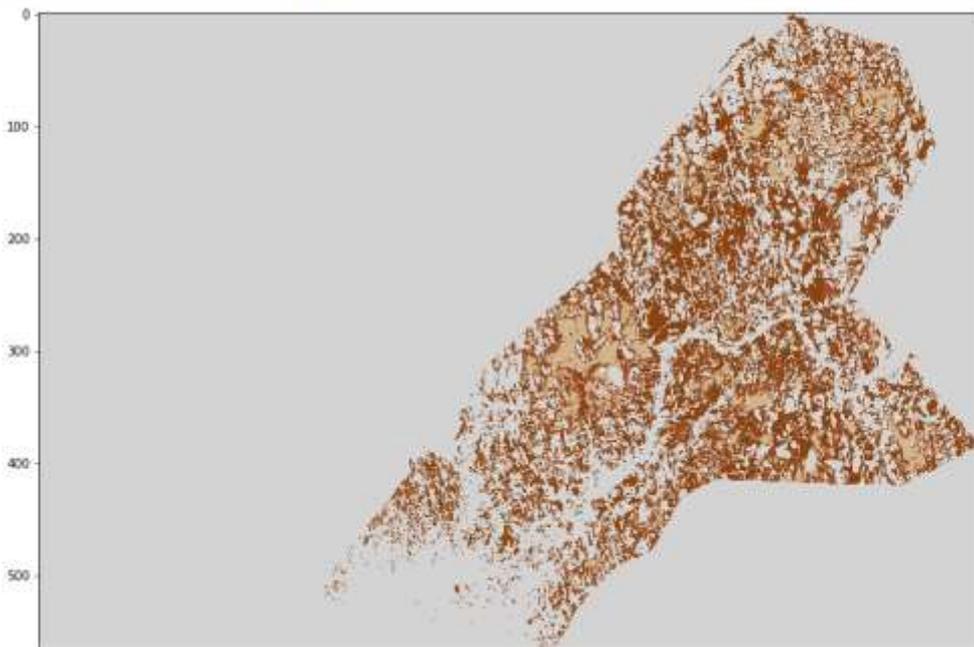


```
In [61]: from rasterio.io import MemoryFile
from urllib.request import urlopen
import numpy as np
import matplotlib.pyplot as plt
from matplotlib.colors import ListedColormap
```

```
In [63]: with urlopen("https://vm0160.kaj.pouta.csc.fi/geocubes" \
"/clip/100/suo/kuntajako:5imo/2020") as response_suo:
content_suo = response_suo.read()
with MemoryFile(content_suo) as memfile_suo:
with memfile_suo.open() as dataset_suo:
data_suo = dataset_suo.read(1)
```

```
In [64]: cmap1 = ListedColormap(['white', 'lightgrey'])
cmap2 = ListedColormap(['lightgrey', 'saddlebrown', 'sienna', 'peru', 'tan'])
```

```
In [65]: fig, ax = plt.subplots(figsize=(15,15))
plot = ax.imshow(data_suo, cmap=cmap2)
```

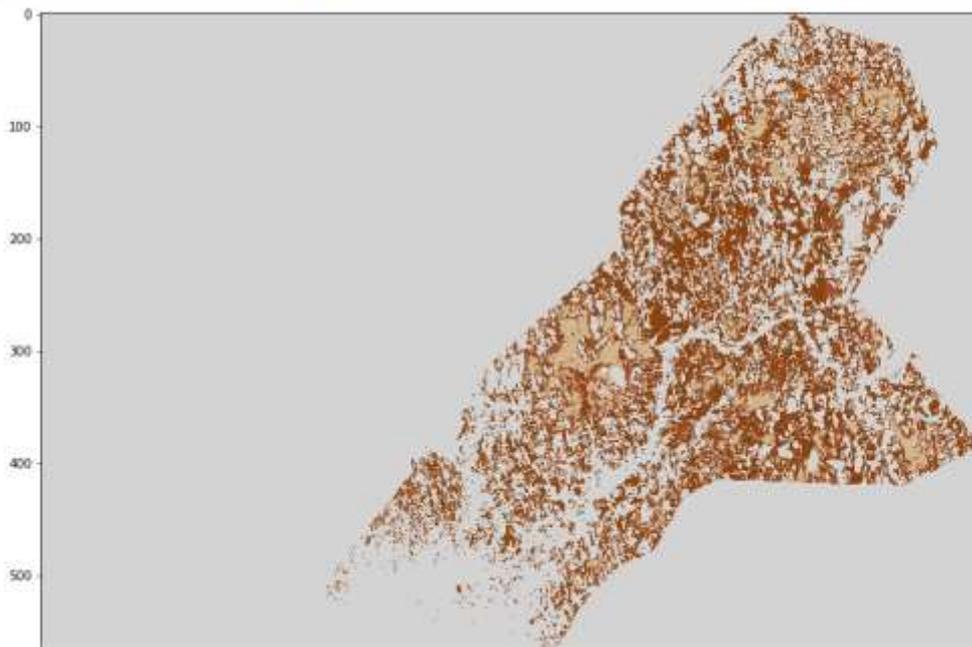


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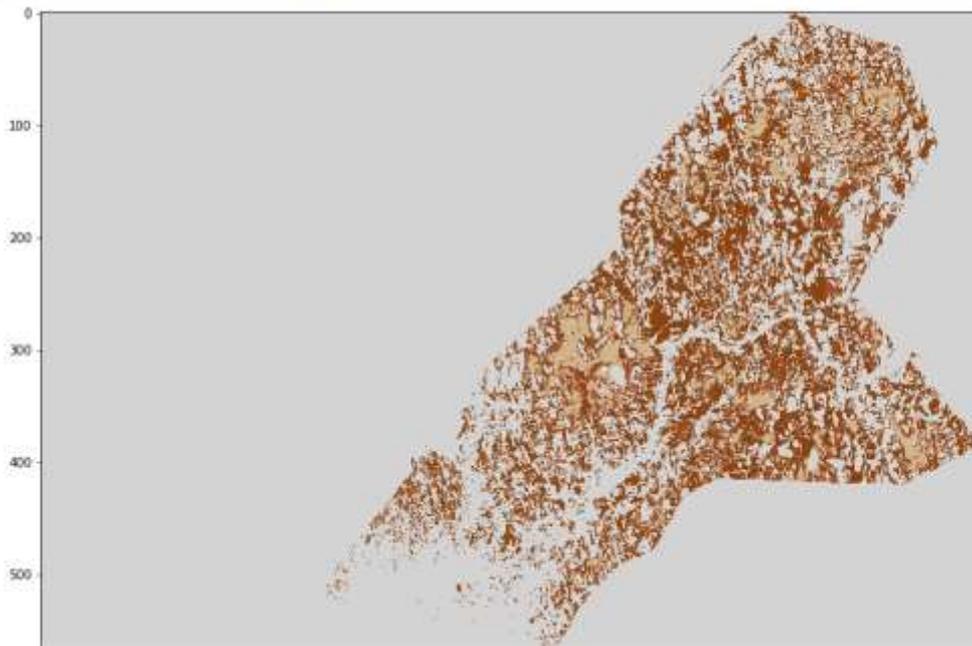
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```

```
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            "/clip/100/suo/kuntajako:Simo/2020") as response_suo:
```

```
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# CONCLUSIONS

- Easy-to-use harmonised multi-layer, multi-resolution raster data storage, aimed at research community
- Several standardized access mechanisms
- Custom API for flexible access and exploration
- Future work involves
  - Importing more content layers
  - Expansion to European context
  - New access mechanisms (OGC API Coverages)

# HOW TO FIND

- <https://vm0160.kaj.pouta.csc.fi/geocubes>
- GeoPortti.fi → Data → Find & Get Data → GeoCubes

# THANK YOU!

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