GEO INFORMATION

Geoinformatic4Viehfinder

Structure

- WP1 – Spatial Optimization
- WP2 – Integration of Sentinel Data
- WP3 – Longtime Tracing

Workpackage 1

WP1 – Spatial Optimization
- Overview -

- Goal: A demonstrator for spatial optimization of antenna positions in a testarea
- Minimize antenna positions based on DEM of area of interest
- Use of Allagash
- Documentation describes functionalities and workflow of the demonstrator

WP1 – Spatial Optimization
- Resulting Product -

- Background Data
- Documentation
  - Guide
  - Workflow
- Projects
  - Schöckelland
  - Upper Mölltal
- Software
  - Solver
  - Example Product
  - Final Product

WP1 – Spatial Optimization
- Documentation -

- How to setup the python environment
- Description of Backend Data and User Input
- How to generate 1m DEM (GIS Styria & GIS Carinthia)
- How to work with the ViehFinder spatial Optimizer
  - Automated Pipeline
  - Manuel Pipeline
  - Rerunning a problem
  - Visualizing a result

WP1 – Spatial Optimization
- Background Data -

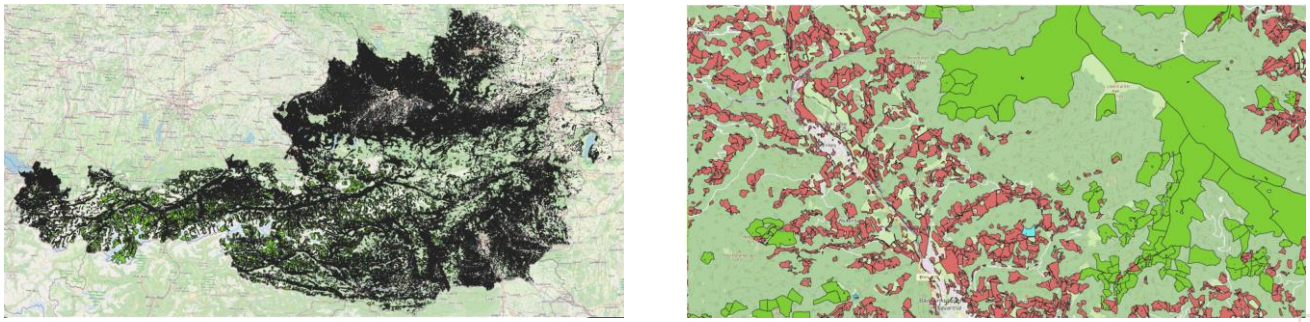

Fig. 1: Alp Cadastre of Austria. The Vector-File contains three different area classes (“Almen” = green, “Grünland” = red, “Gemeinschaftsweiden” = turquoise).

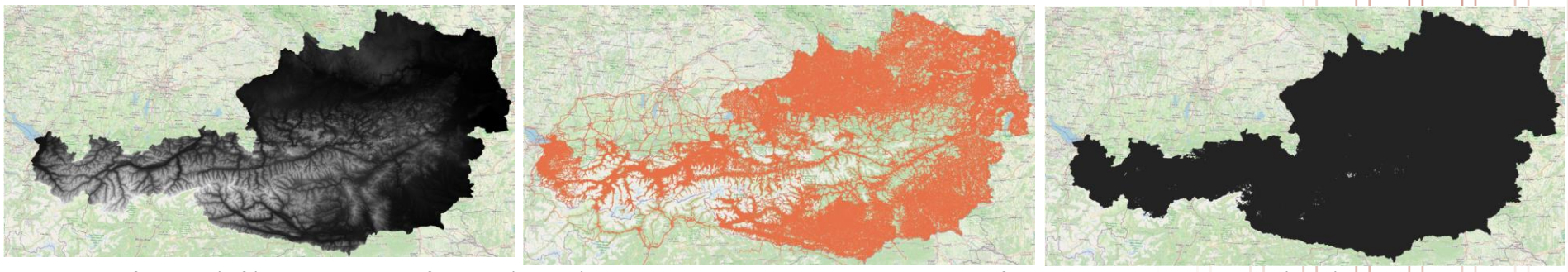

Fig. 2: DEM of Austria (left), Streetnetwork of Austria (Center) and combined mobile reception coverage of the three Austrian providers (right).

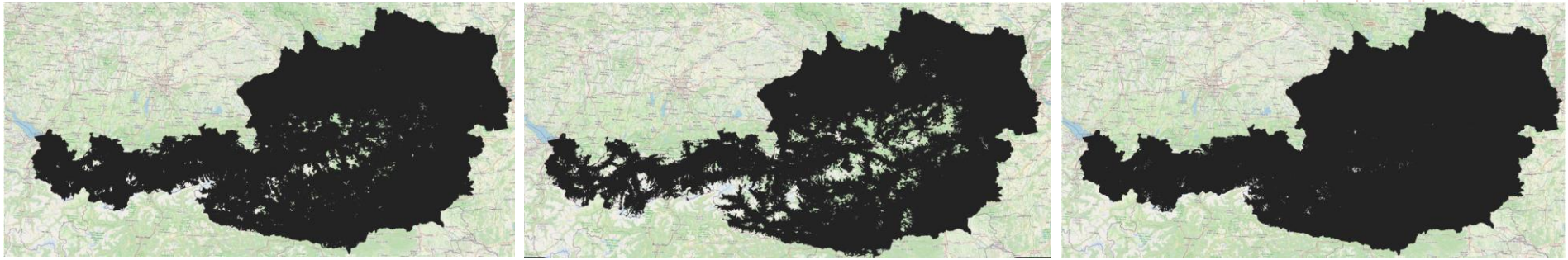

Fig. 3: Mobile reception coverage of the three Austrian providers, Magenta (left), Drei (center) and A1 (left).

WP1 – Spatial Optimization
- Workflow -

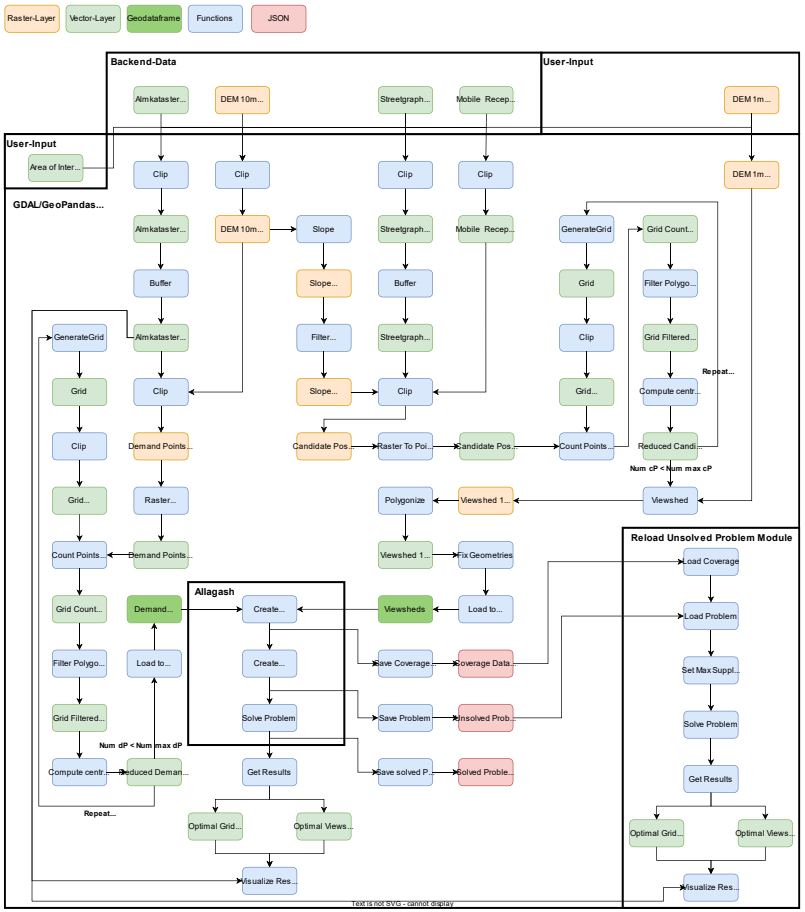

Fig. 4: Flowchart of the Automated ViehFinder-Pipeline.

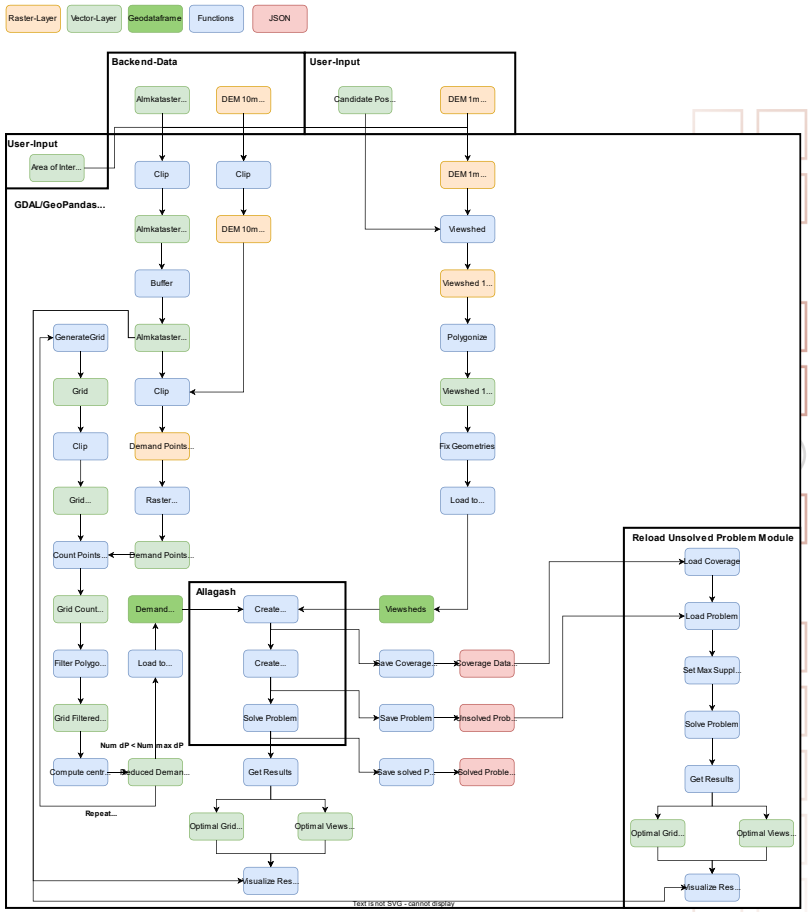

Fig. 5: Flowchart of the Manual ViehFinder-Pipeline.

Automate Workflow.svg

Manual Workflow.svg

WP1 – Spatial Optimization
- Results Schöckelland -

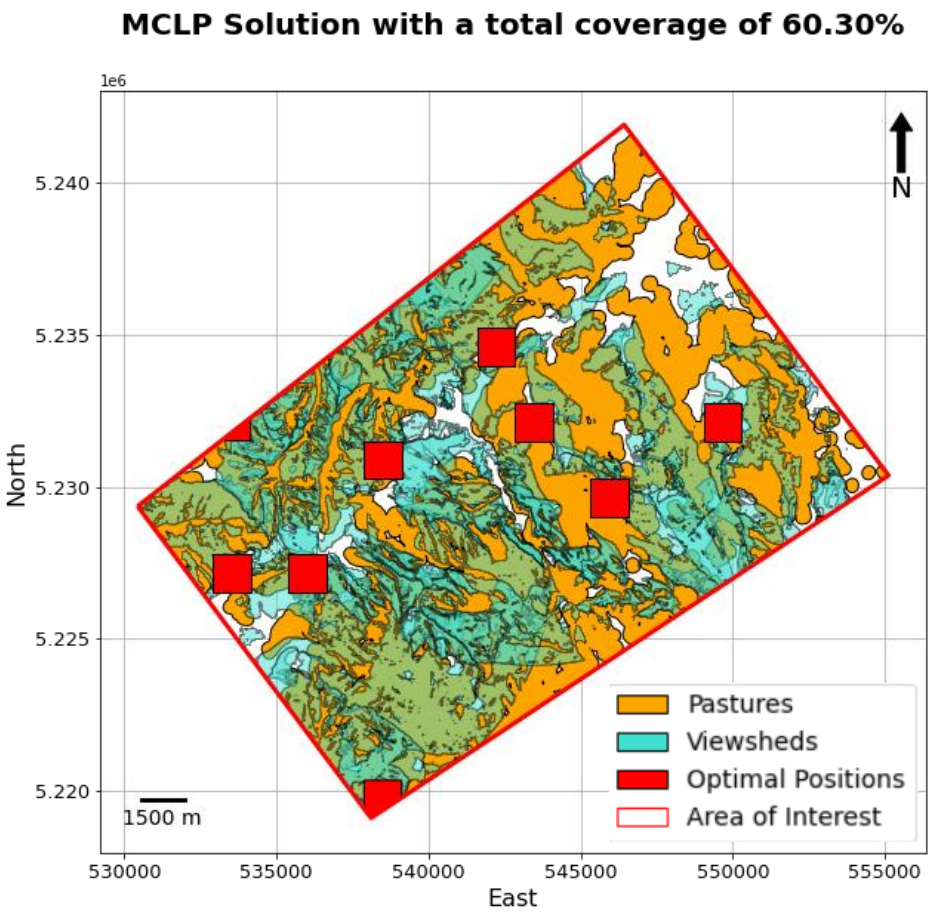

Fig. 6: Optimal Solution for a maximum number of 10 antenna positions using the automated pipeline, with 198 potential antenna positions and 92,691 demand points. The size of the resulting position quadrants is 1,240 meters.

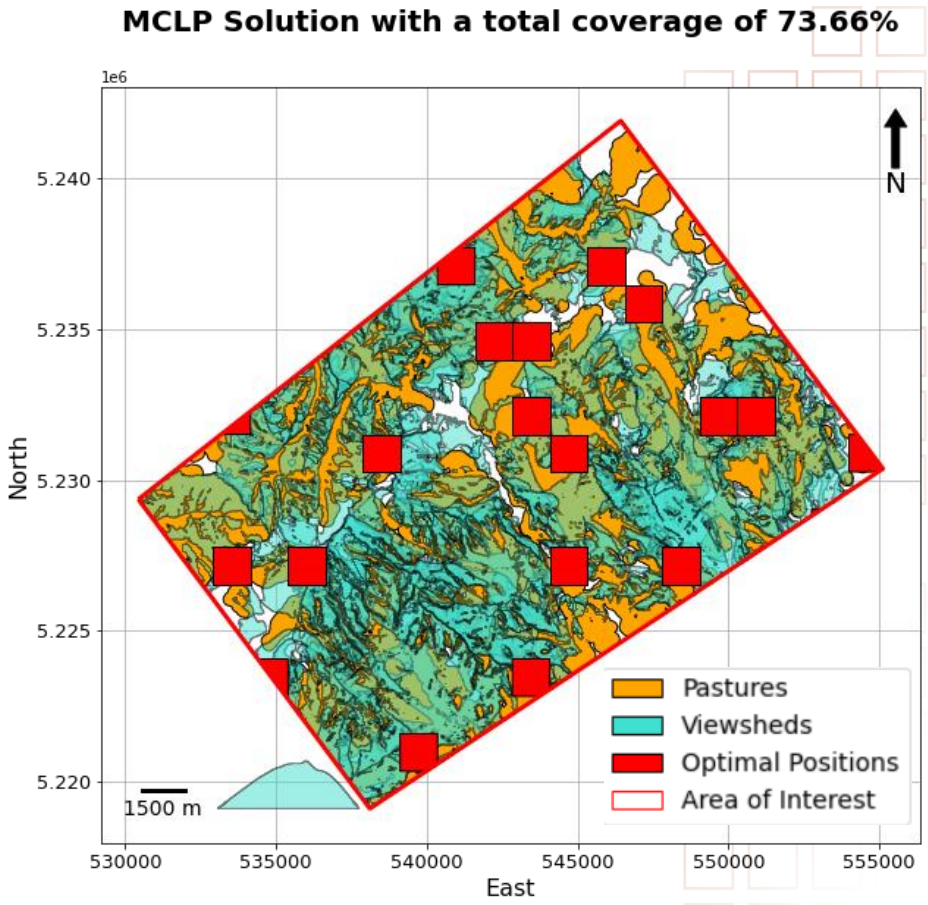

Fig. 7: Optimal Solution for a maximum number of 20 antenna positions using the automated pipeline, with 198 potential antenna positions and 92,691 demand points. The size of the resulting position quadrants is 1,240 meters.

WP1 – Spatial Optimization
- Results Schöckelland -

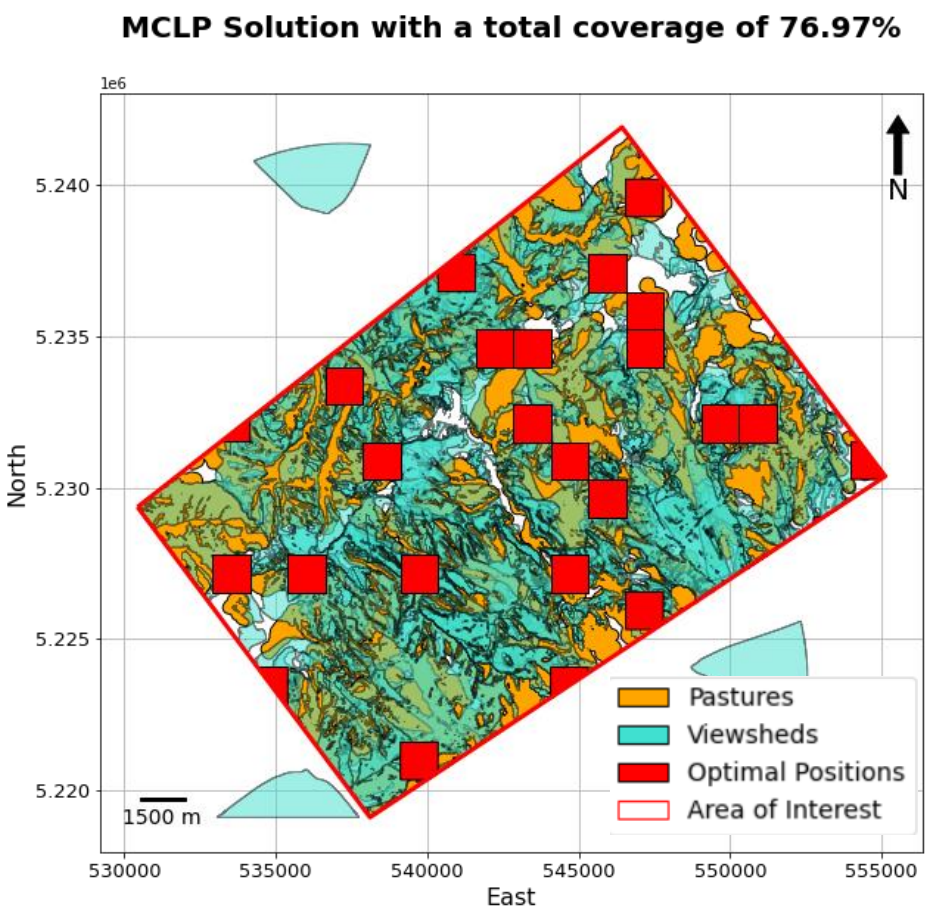

Fig. 8: Optimal Solution for a maximum number of 25 antenna positions using the automated pipeline, with 198 potential antenna positions and 92,691 demand points. The size of the resulting position quadrants is 1,240 meters.

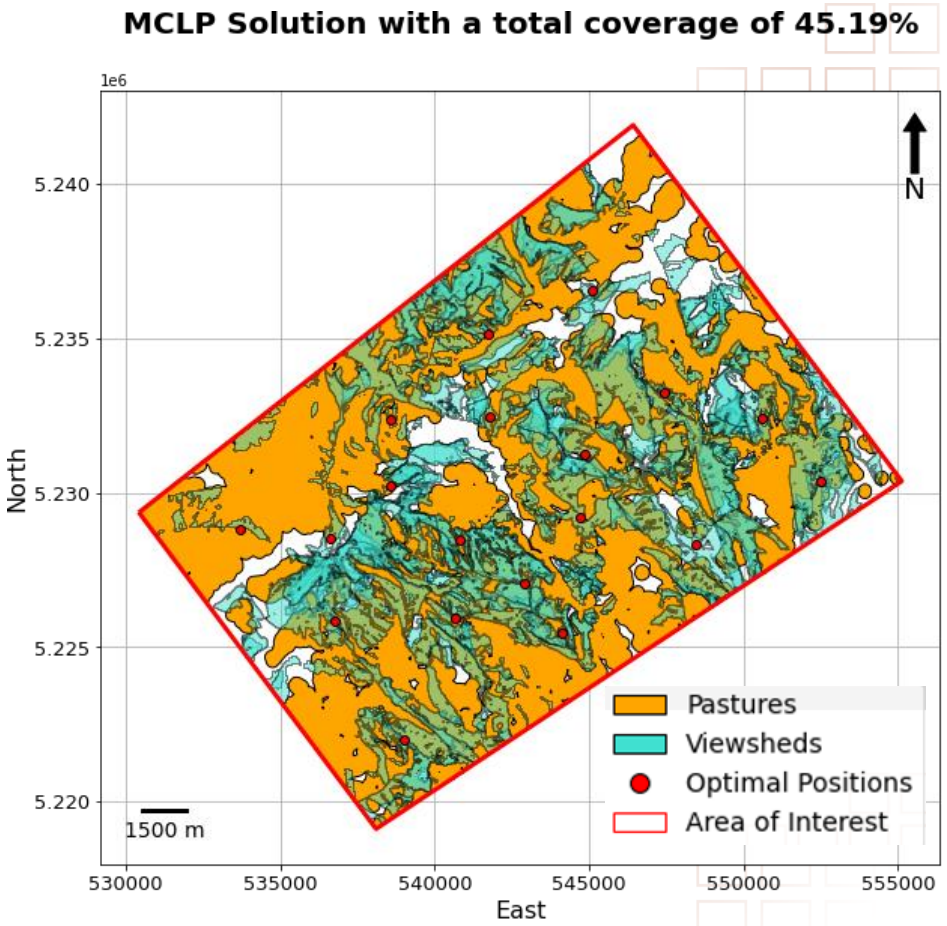

Fig. 9: Optimal Solution for a maximum number of 20 antenna positions using the manual pipeline, with 21 potential antenna positions and 143,687 demand points.

WP1 – Spatial Optimization
- Results upper Mölltal -

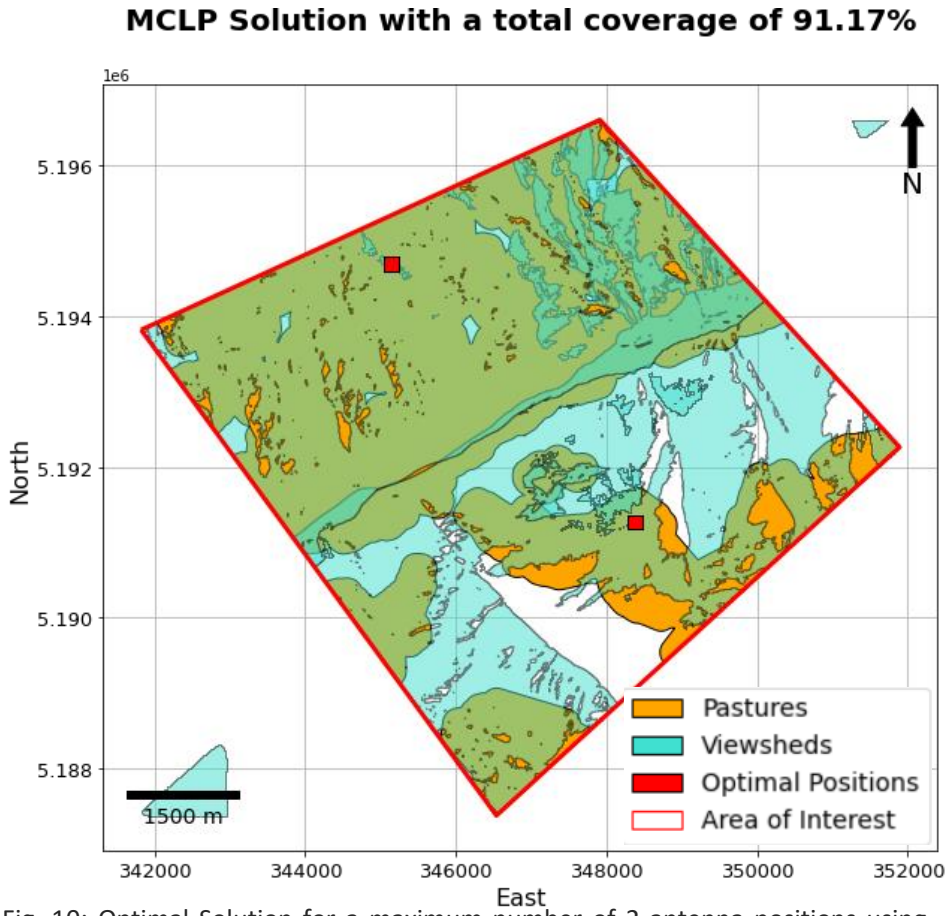

Fig. 10: Optimal Solution for a maximum number of 2 antenna positions using the automated pipeline, with 931 potential antenna positions and 85,277 demand points. The size of the resulting position quadrants is 190 meters.

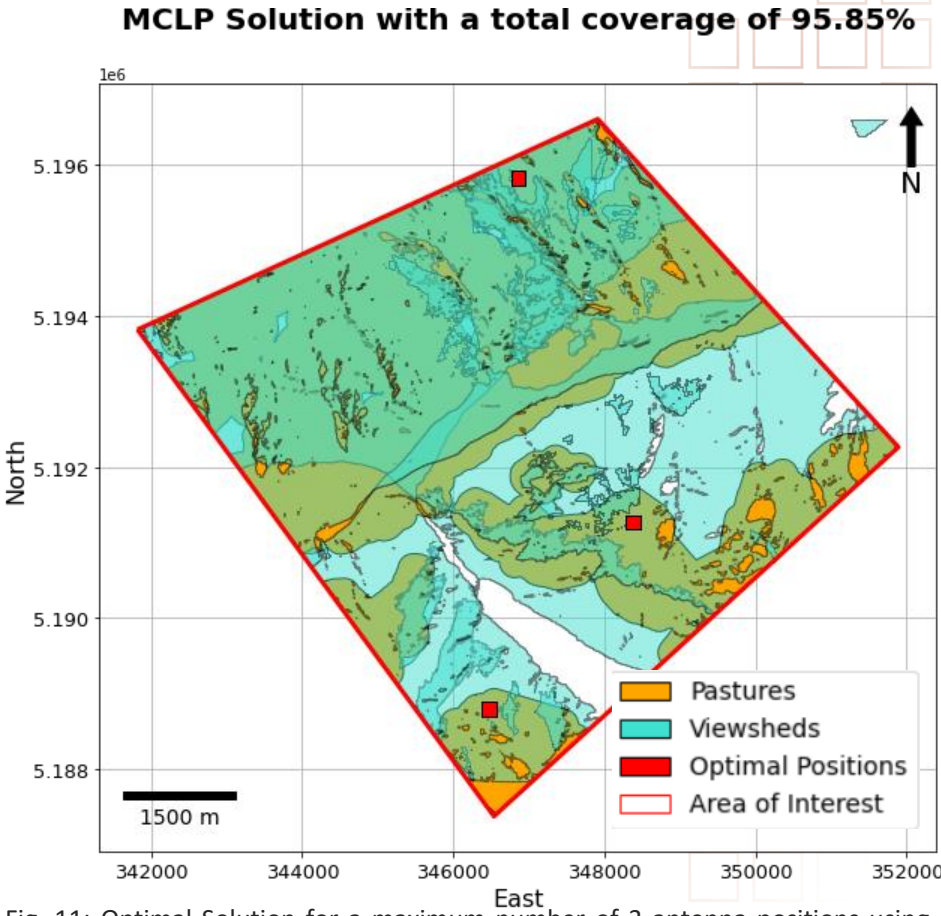

Fig. 11: Optimal Solution for a maximum number of 3 antenna positions using the automated pipeline, with 931 potential antenna positions and 85,277 demand points. The size of the resulting position quadrants is 190 meters.

WP1 – Spatial Optimization
- Results upper Mölltal -

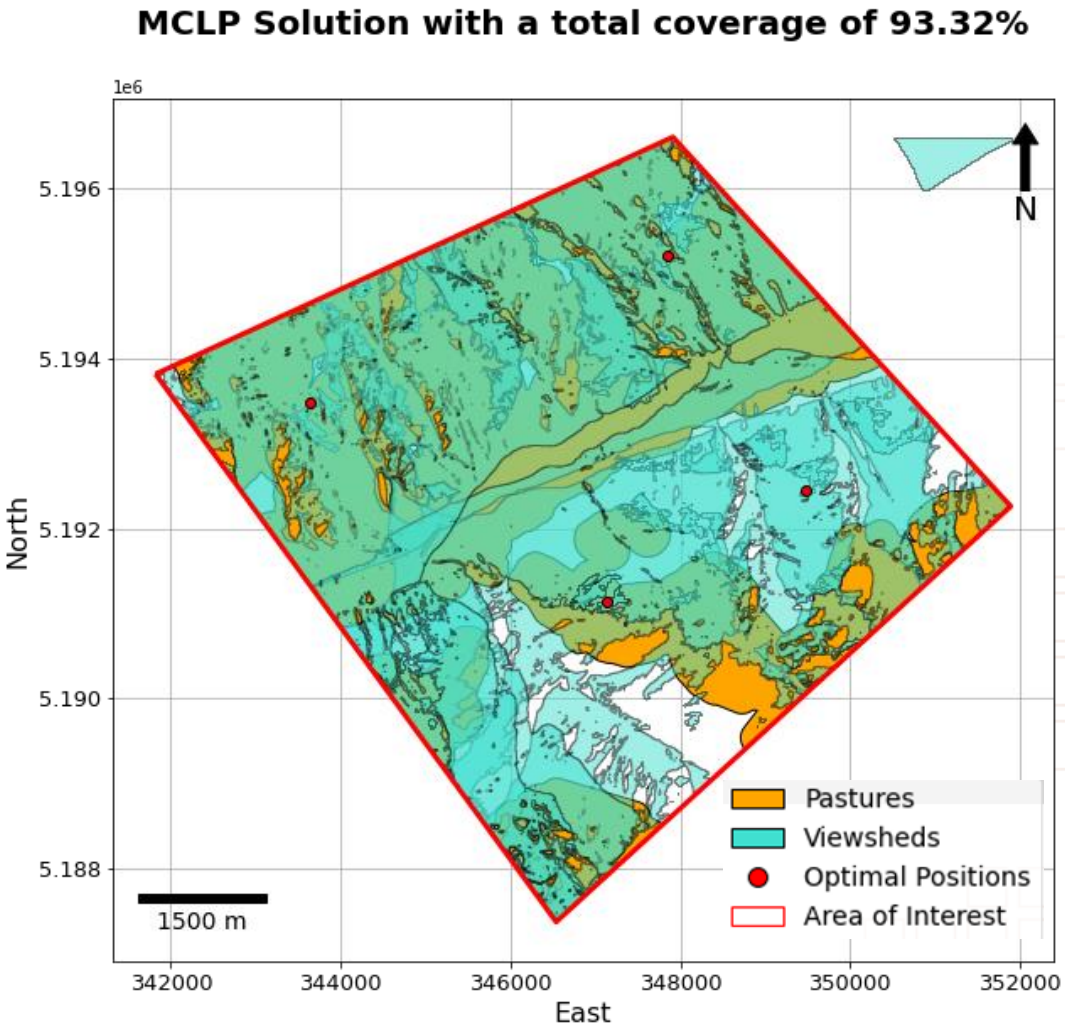

Fig. 12: Optimal Solution for a maximum number of 5 antenna positions using the manual pipeline, with 13 potential antenna positions and 85,277 demand points.

Workpackage 2

WP2 – Integration of Sentinel data
- Overview -

- Sentinel images as WMS layer
- Sentinel-Hub account (https://www.sentinel-hub.com)
  - To create configurations and layers
- WMS properties or imagery request
  - E.g., with python module owslib -> WebMapService from owslib.wms
- Visualization in web map
  - E.g., with python module folium WmsTileLayerfrom folium.raster_layers
- Example to create web app with python module flask

WP2 – Integration of Sentinel data
- Result -

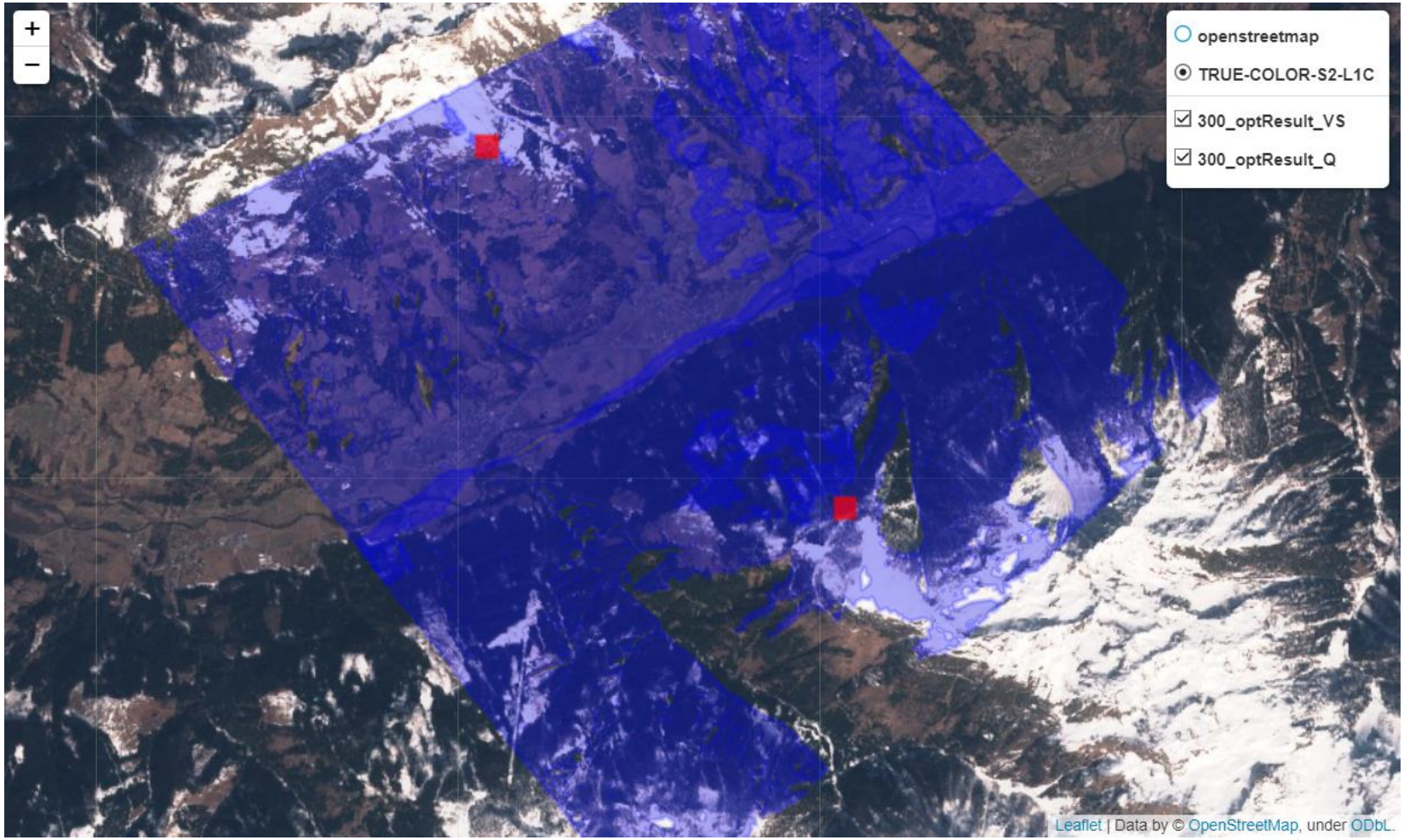

Fig. 13: WMS tile layer with folium.

Workpackage 3

WP3 – Longtime Tracing
- Overview -

- Trajectory analysis with python modules geopandas and movingpandas
- Data preparation
  - Clipping to area of interest
  - Filtering by speed
- Data visualization
  - Movement profiles
  - Boundary intersection
  - Heatmaps over time

WP3 – Longtime Tracing
- Result -

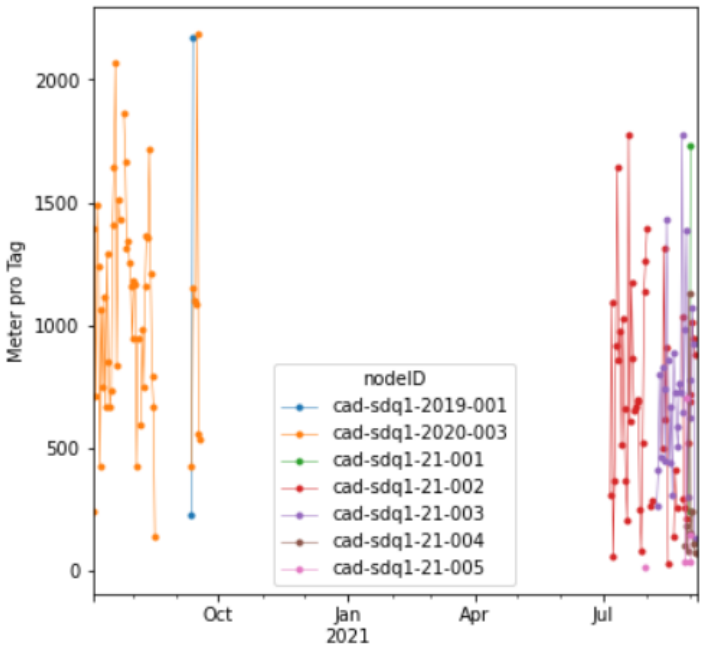

Fig. 14: Movement profiles.

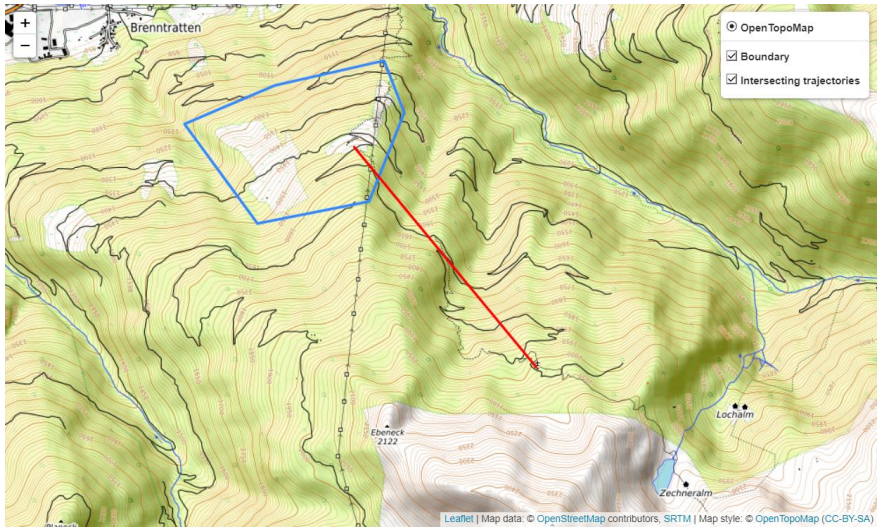

Fig. 15: Boundary intersection.

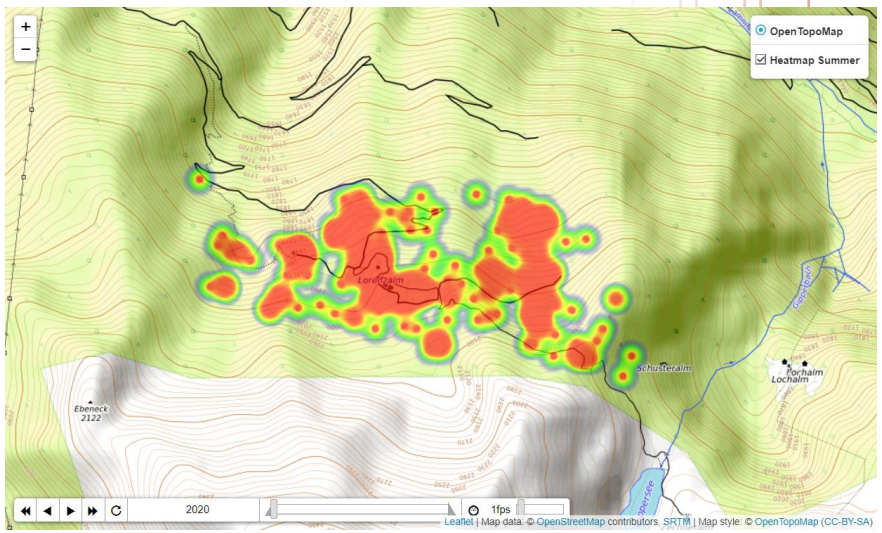

Fig. 16: Heatmaps over time.

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