



DIGITAL MAPPING PRODUCTS

23 years experience at telecom market

WWW.VISICOMDATA.COM

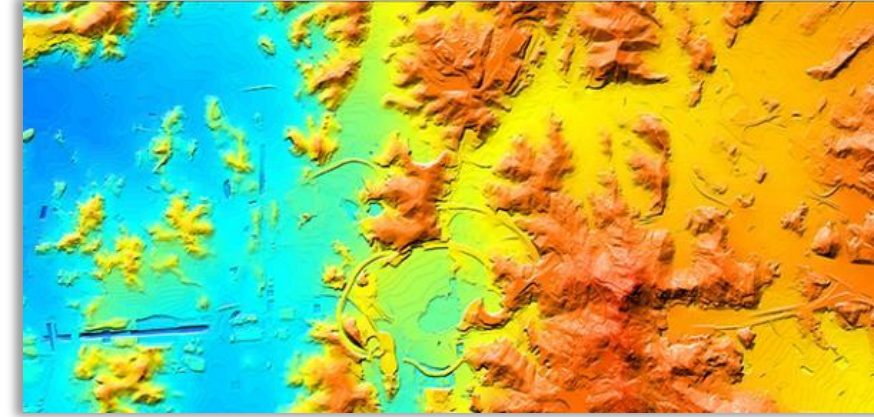


ELEVATION PRODUCTS: DTM, DEM, DSM

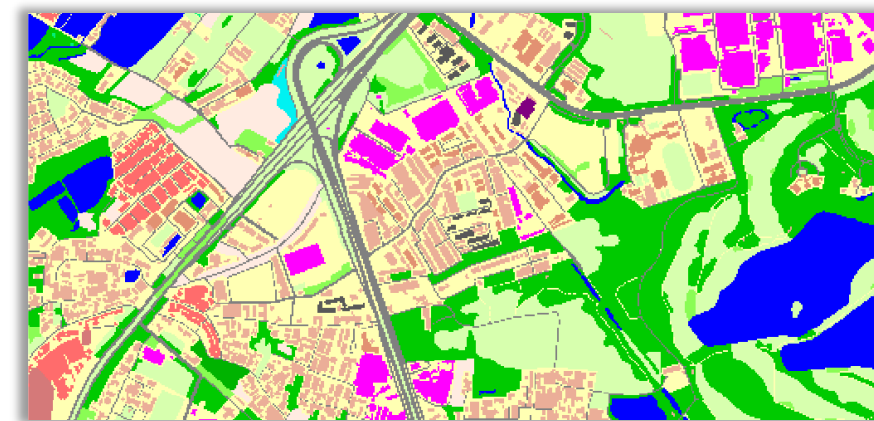
GEODATA FOR 5G/4G/LTE NETWORKS PLANNING



GEOSPATIAL DATA FOR SMART CITIES



LAND USE

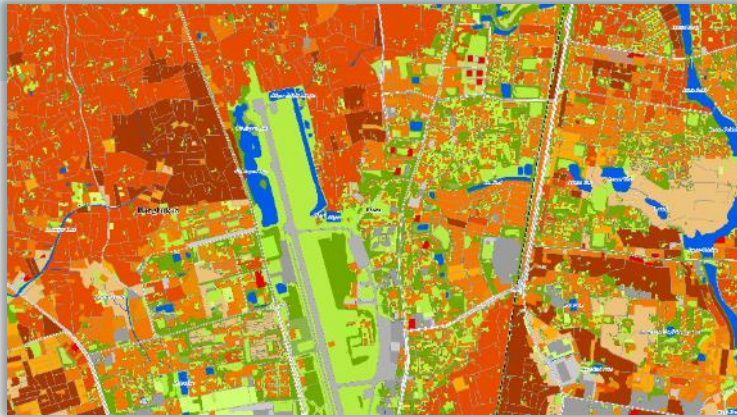




Starting with the implementation of the 2G networks and further deployment 3G, 4G and 5G ones we support our customers by providing them with highly accurate geospatial data.

Tailored for the needs of the telecom market, our geodata products enable you to achieve accurate results along with network planning and optimization. Our long-time relationships with planning tools vendors and the biggest players of the telecom market allow us to meet our customer's requirements whenever they operate.

REGIONAL COUNTRYWIDE 2D MODELS



3D MAPS FOR CITIES AND CONTRYWIDE



OFF-THE-SHELF DATA CATALOGUE

- 2500+ 3D City Models, over 100 000 km²
- 5000+ 2D Urban Models, over 2 000 000 km²
- 85+ Countrywide Models, over 30 000 000 km²

2.5D MAPS FOR CITY/SUBURBS/COUNTRIES



ADVANCED ACCURACY 3D MAPS FOR 5G NETWORKS



VISICOM KEY BENEFITS

- Delivery in any RF/GIS tools formats
- Compatibility with any propagation model
- Support any raytracing models
- Fitted to requirements of mmWave frequencies
- Provide extra-accurate 3D features
- Contain the most up-to-date information

DELIVERED DATA LAYERS FOR 2D/2.5D/3D MODELS

2D Urban 2D Regional models

Digital Terrain Model
Clutter/Land Use Model
Vector Model (Linear Objects)

Optionally:

Population Distribution Model
Orthorectified imagery
POIs

2.5D City 2.5D Urban 2/5D Suburban models

Digital Terrain Model
Clutter/Land Use Model
Vector Model (Linear Objects)
Clutter Heights Model
➢ By buildings
➢ By buildings blocks

Optionally:

Population Distribution Model
Orthorectified imagery
POIs

3D City 3D built-up areas models

Digital Terrain Model
Digital Surface Model
Clutter/Land Use Model
Orthorectified imagery
Vector Model (Linear Objects)
➢ Obstacles Heights Model
➢ Buildings
➢ Vegetation/trees
➢ Engineering constructions

Optionally:

Population Distribution Model
POIs

5G radio-planning processes requires more detailed, accurate and up-to-date maps in comparison with previous networks generations.

Because of the sensitivity of radio waves, it is necessary to have an adequate level of maps details, which tends to grow – 3D buildings with roofs features; 3D vegetation, which also can affect the signal propagation, with crown and trunk features.

For big areas like regions and whole country, more precise data are also very important. They ensure a detailed clutter classification together with Population Distribution models.

ADVANCED ACCURACY IS REQUIRED FOR 5G NETWORK PLANNING



1m or 2m resolution maps

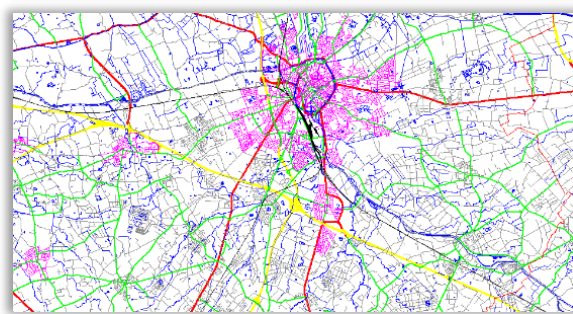
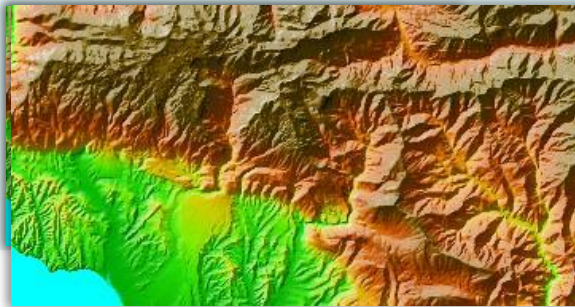
- **3D Buildings** include small roof details
- **3D Trees Model** with separate crowns
- **3D Bridges** displaying precise and detailed engineering constructions



2.5D resolution maps

- Improved clutter classification
- Clutter Heights for obstacles
- Detailed street/road network

DELIVERED DATA LAYERS FOR 3D MODELS



Digital Terrain Model

Digital Surface Model

Clutter/Land Use Model

Orthorectified imagery

Vector Model (Linear Objects)

- Obstacles Heights Model
- Buildings
- Vegetation/trees
- Engineering constructions



PRODUCT FEATURES DEPENDING ON THE PROJECT DEMANDS

- ❑ 1m, 2m or 5m resolution
- ❑ MMU 9-16 sq.m
- ❑ X,Y, Z accuracy \pm 2-4 m
- ❑ Building heights accuracy \pm 1-3 m
- ❑ Represents all buildings structure
- ❑ Allows to process complex architectural solutions, irregular quarter's structure with high buildings density
- ❑ Vegetation is given as detailed foliage including separate trees with individual heights
- ❑ Support any RF tools format like Atoll Forsk, Planet, Aircom Asset, ICS Telecom, CelPlanner, NetPlan, Ranplan Professional, Pathloss etc





- ❑ Vegetation outlines recognition from high-resolution satellite images WorldView 1,2,3 and Pleiades or aerial photos
- ❑ Segmentation of vegetation polygons
- ❑ Vegetation heights defining by Convolutional Neural Network (CNN) model

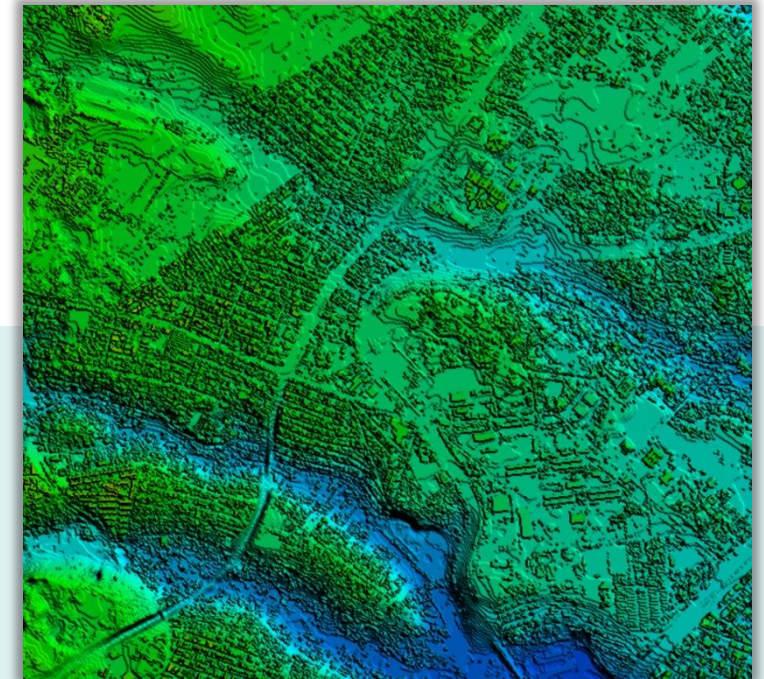
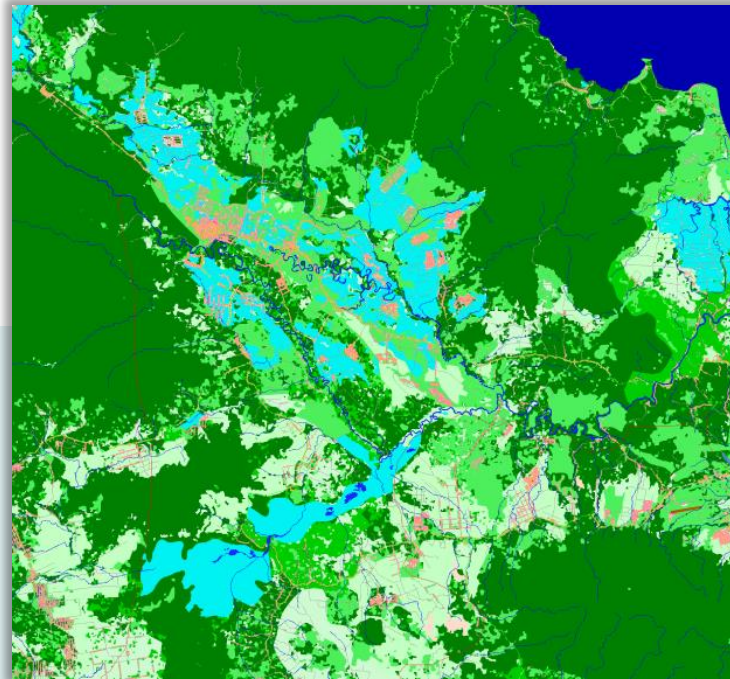
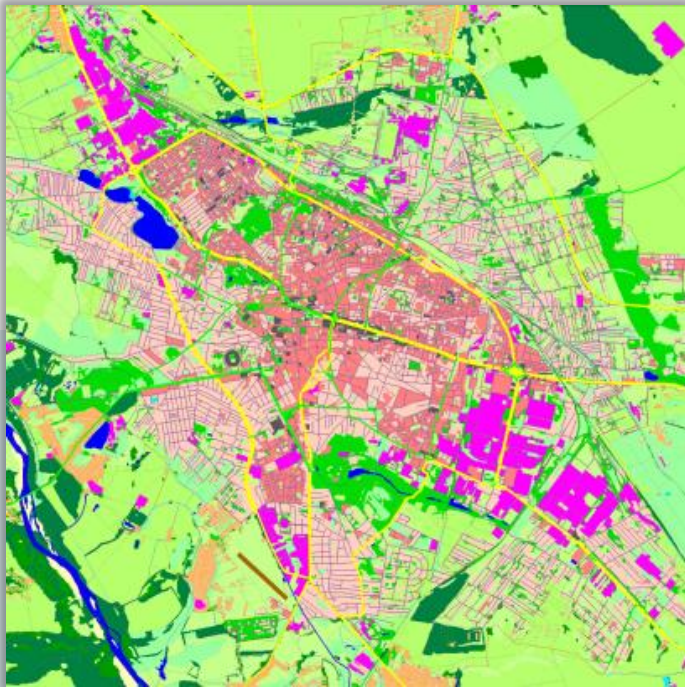
CREATED USING AI TECHNOLOGY OF SATELLITE IMAGES RECOGNITION

PRODUCTS FEATURES

- 10m resolution
- Accurate land use classification
- Last available administrative division
- Imagery source: Sentinel-2, 10m resolution images
- Easy to use due to supporting of all major RF-tools formats

DATA FORMATS

Atoll Forsk, Mentum Planet,
Aircom Asset, ESRI shp, MapInfo,
ICS Telecom, CelPlanner,
NetPlan, Ranplan Professional,
Pathloss and any other



OUR PROJECTS REALISED in 2023 FOR 2.5D AND 2D REGIONAL MODELS

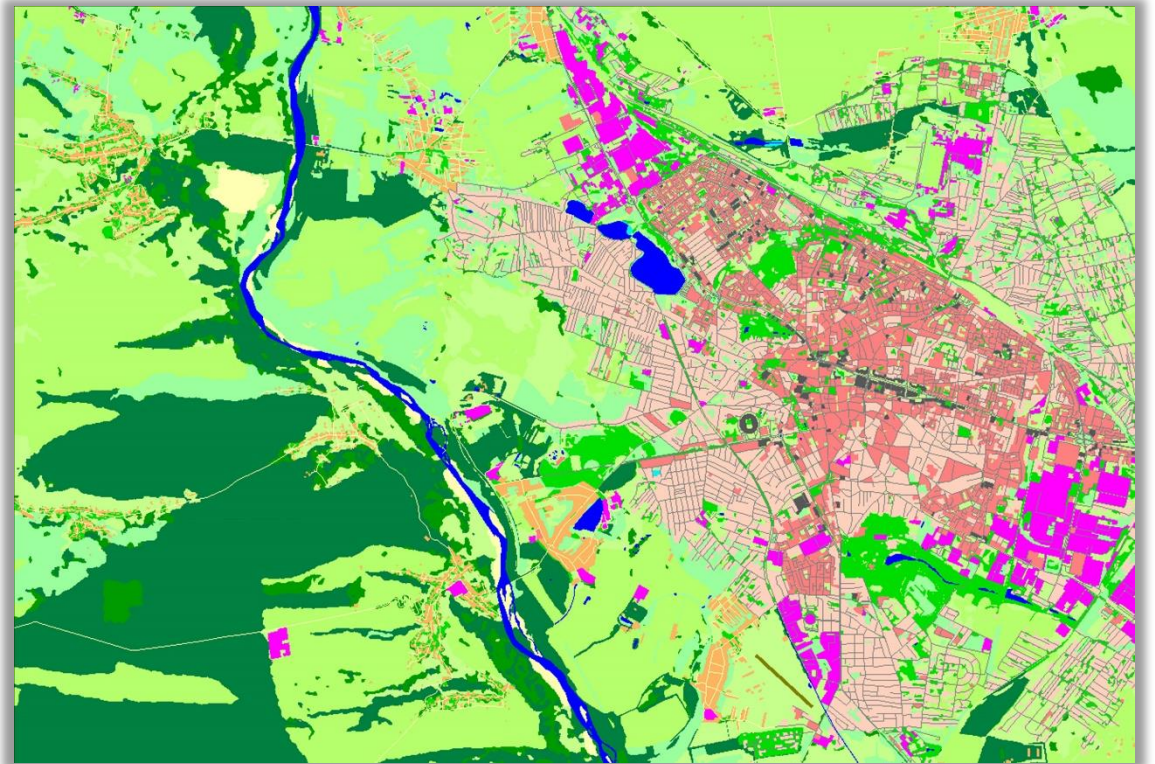
- Poland
- Czech Republic
- United Kingdom
- Belgium
- Georgia
- Romania
- Malaysia
- Philippines
- Cambodia
- Bangladesh
- Sri Lanka
- Vietnam
- Myanmar
- Thailand
- Jordan
- Singapore
- South Korea
- Pakistan

VISICOM REGIONAL MAPS LINE

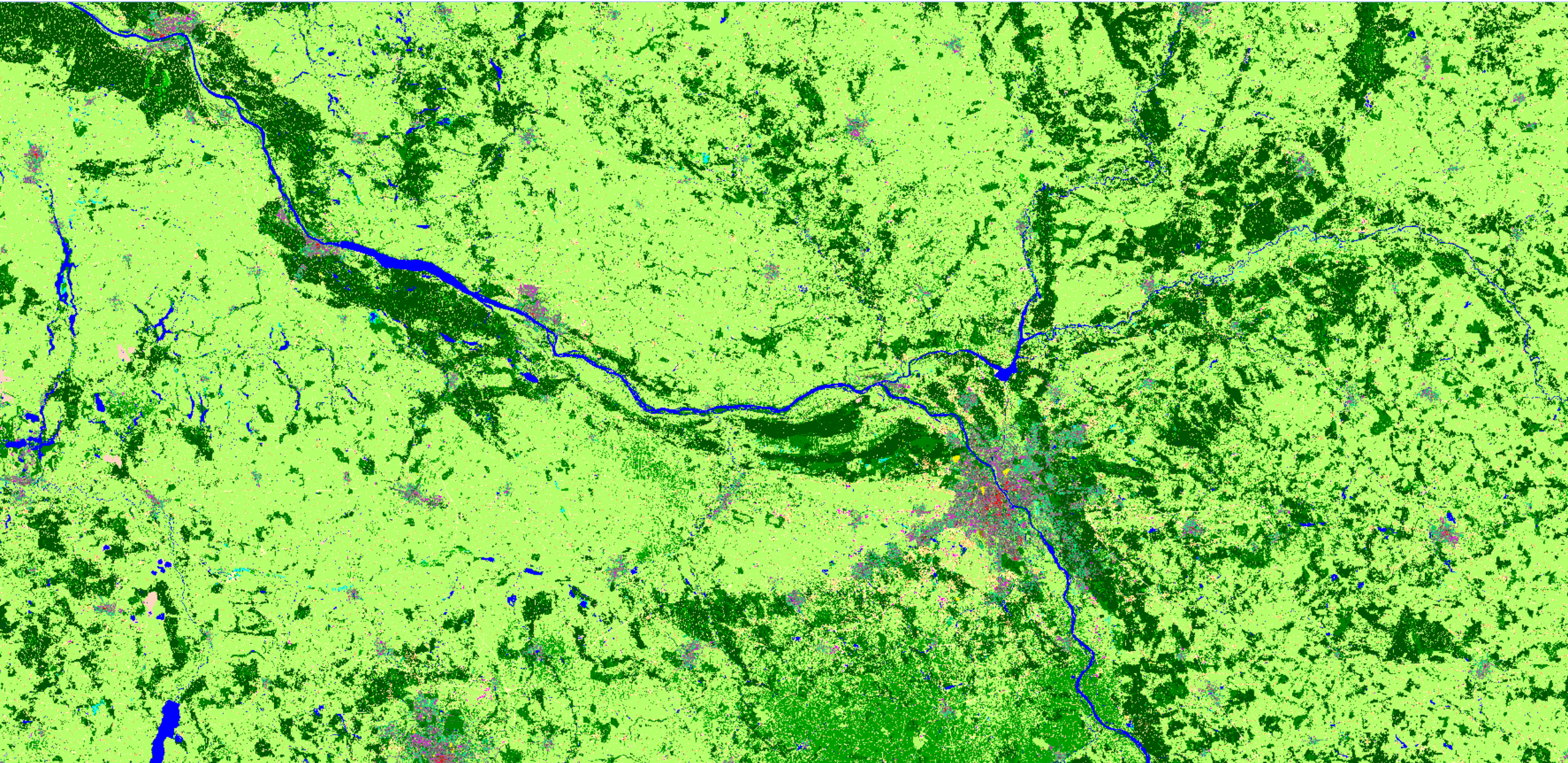
The best choice for 5G rollout in large regions is 10 m resolution Regional model with an extended set of clutter classes, more detailed buildings structure classification and type of vegetation layers, and 5m vertical accuracy in DTM

2D map provides valuable information about the surrounding environment, which helps predict radio wave propagation, interference patterns, and signal strength in regions

2.5D maps allow wireless planners to improve predictions of signal attenuation and assist in finding the optimal location of network base stations and other wireless system transmitters within a country

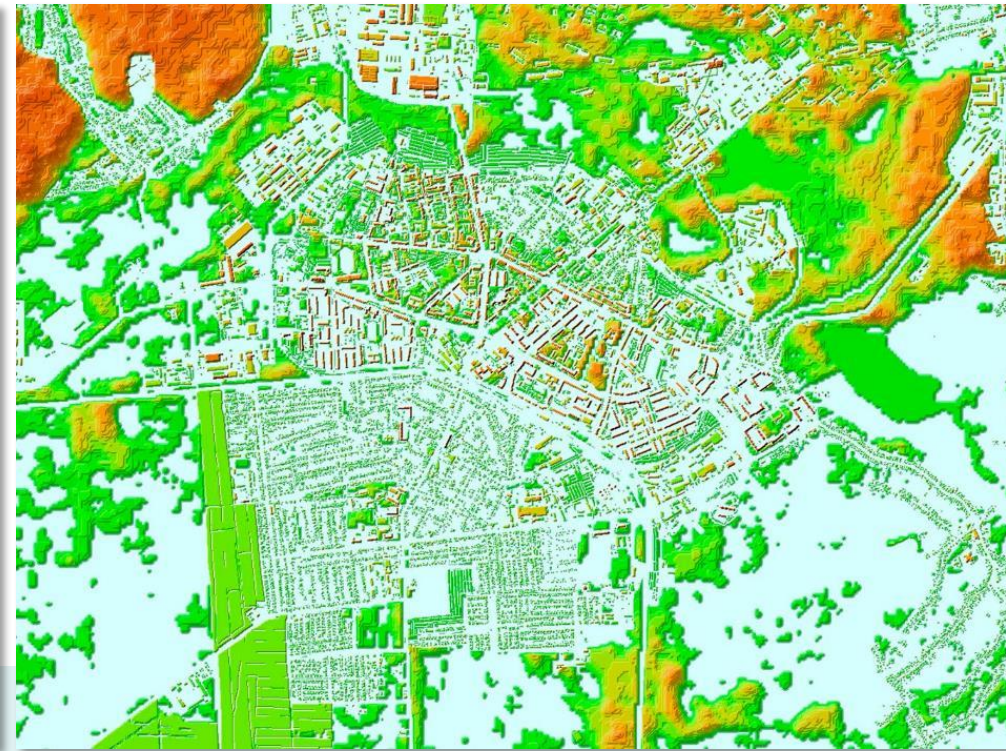
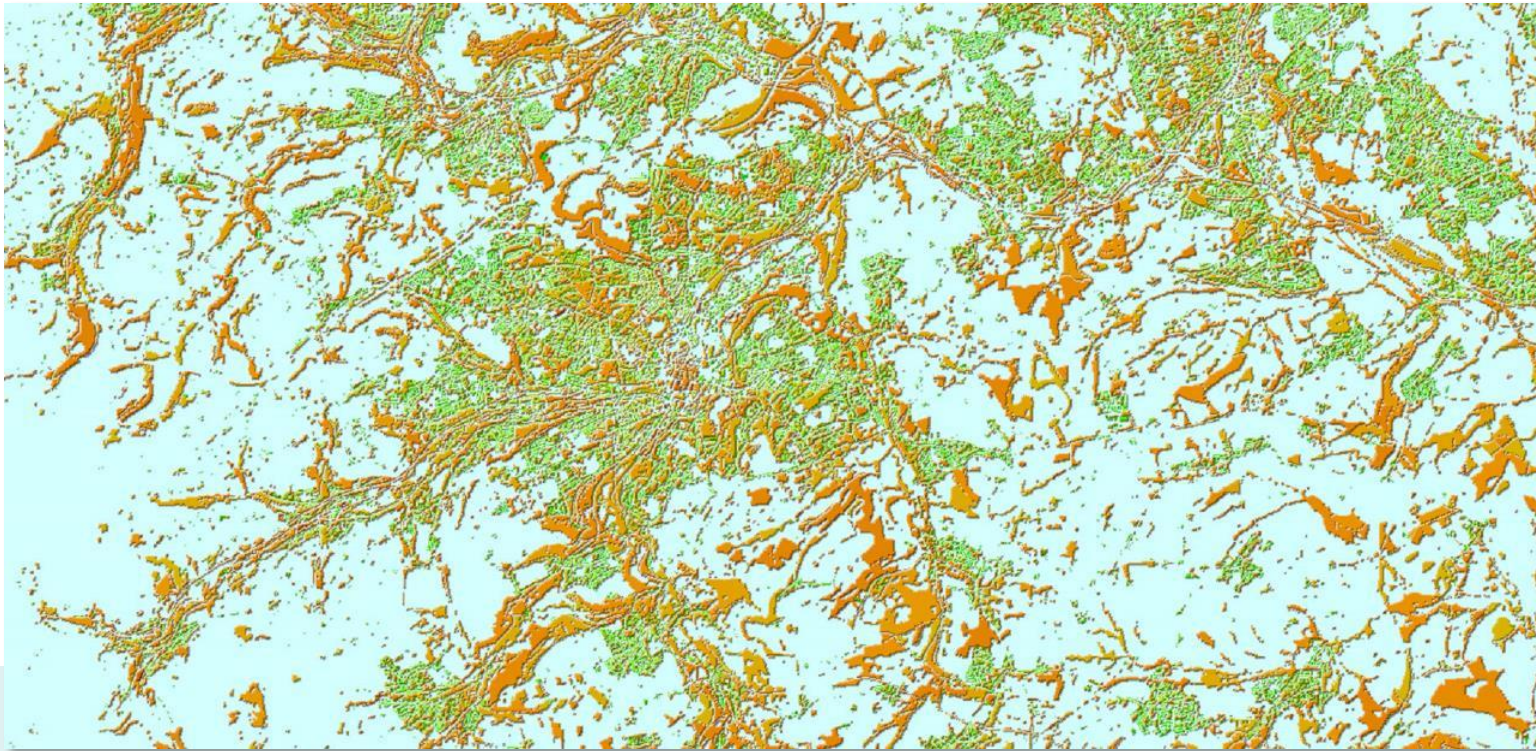


Layers: Digital Terrain Model (DTM), Clutter/Clutter Height Model and Basic Vectors. Population distribution model delivered together with the usual layers provides a better representation of land use and density ratios of urban classes



DATA PREVIEW

Balance Cost and Accuracy With 2.5D Nationwide Coverage



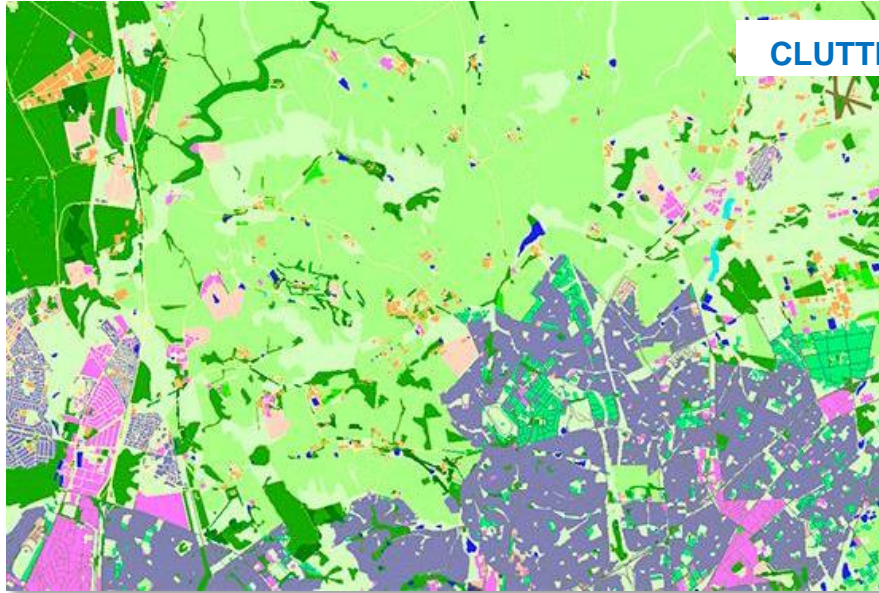
2.5D map provides valuable information about the surrounding environment, which helps predict radio wave propagation, interference patterns, and signal strength in regions

The Clutter Height layer or Digital Heights Model (DHM) is an essential part of 2.5D maps that represents the elevation differences in the terrain, providing detailed data on the height of the surface at specific points. Clutter height data helps to determine the best locations for communication towers and antennas.

DATA PREVIEW

2.5D Regional Model, 10 m resolution with Clutter Heights

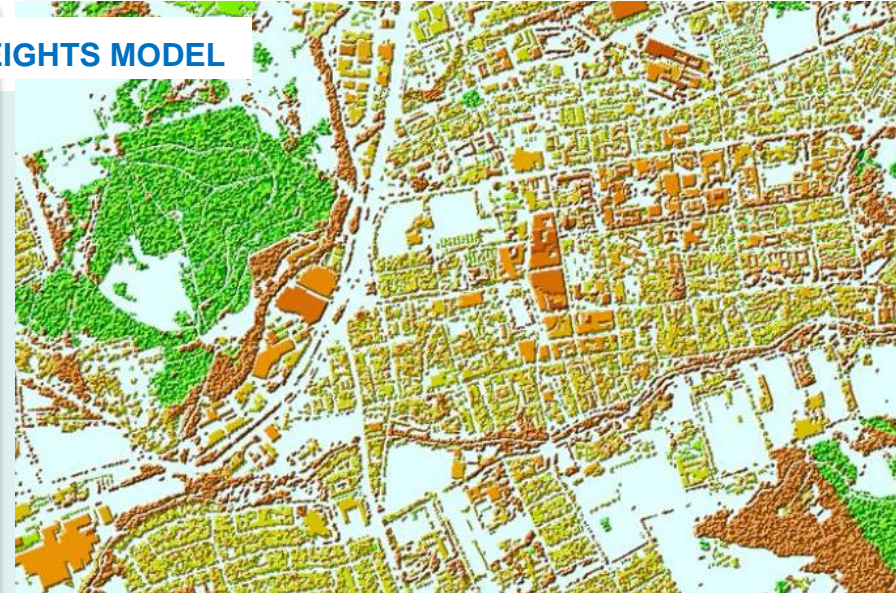
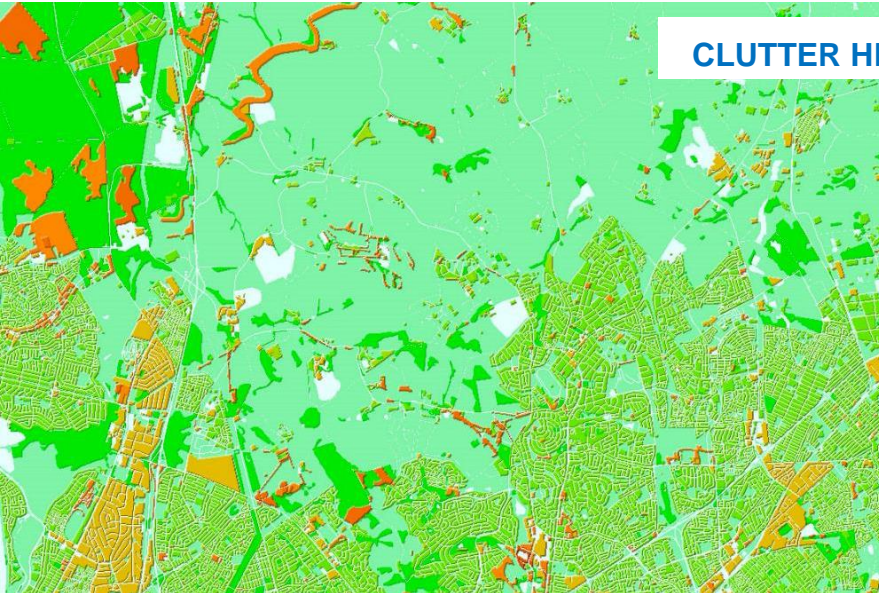
RURAL AREA



BUILT-UP AREA



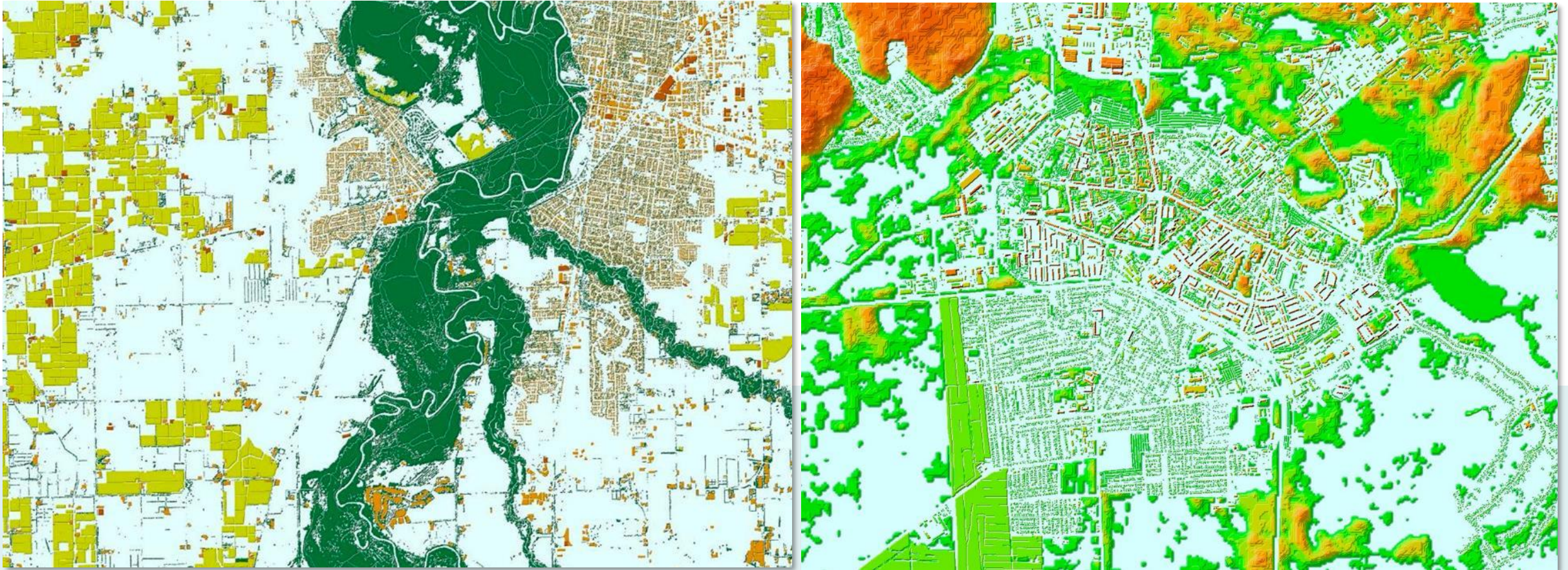
CLUTTER HEIGHTS MODEL



DATA PREVIEW

2.5D GEODATA FOR SUBURB AND RURAL AREAS

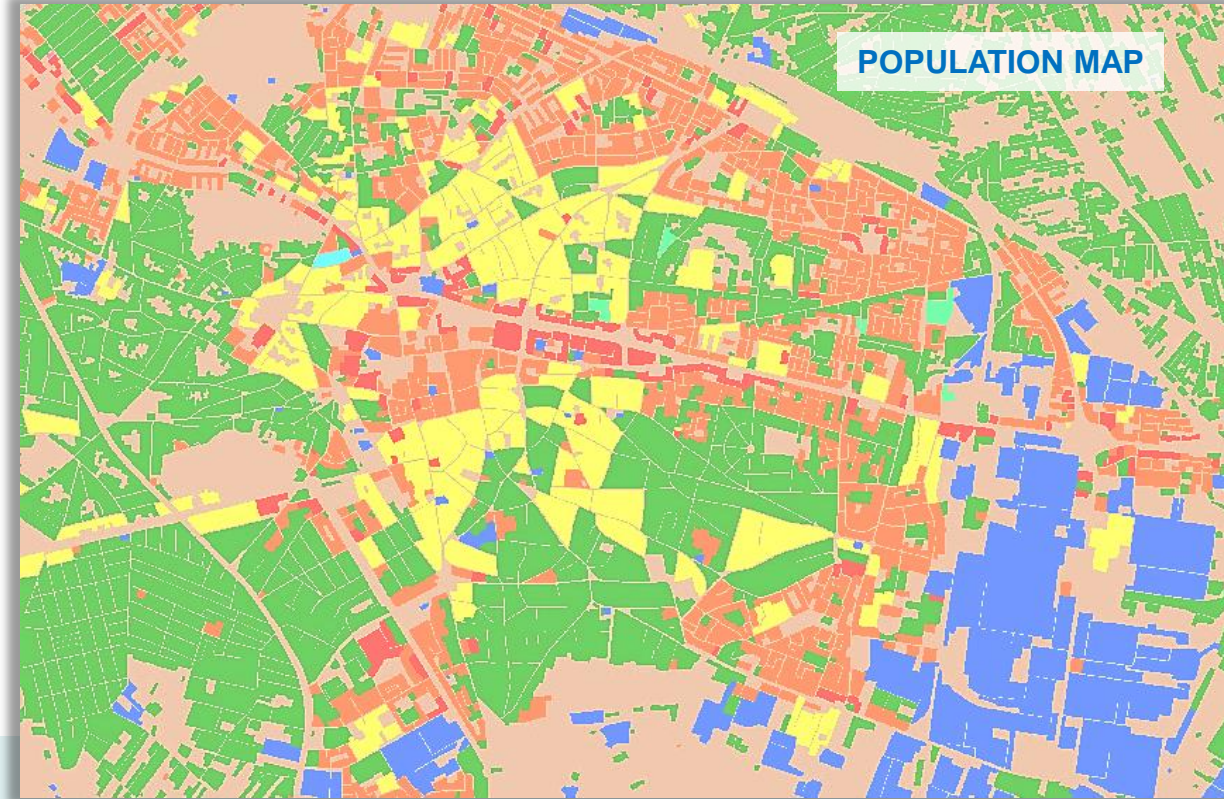
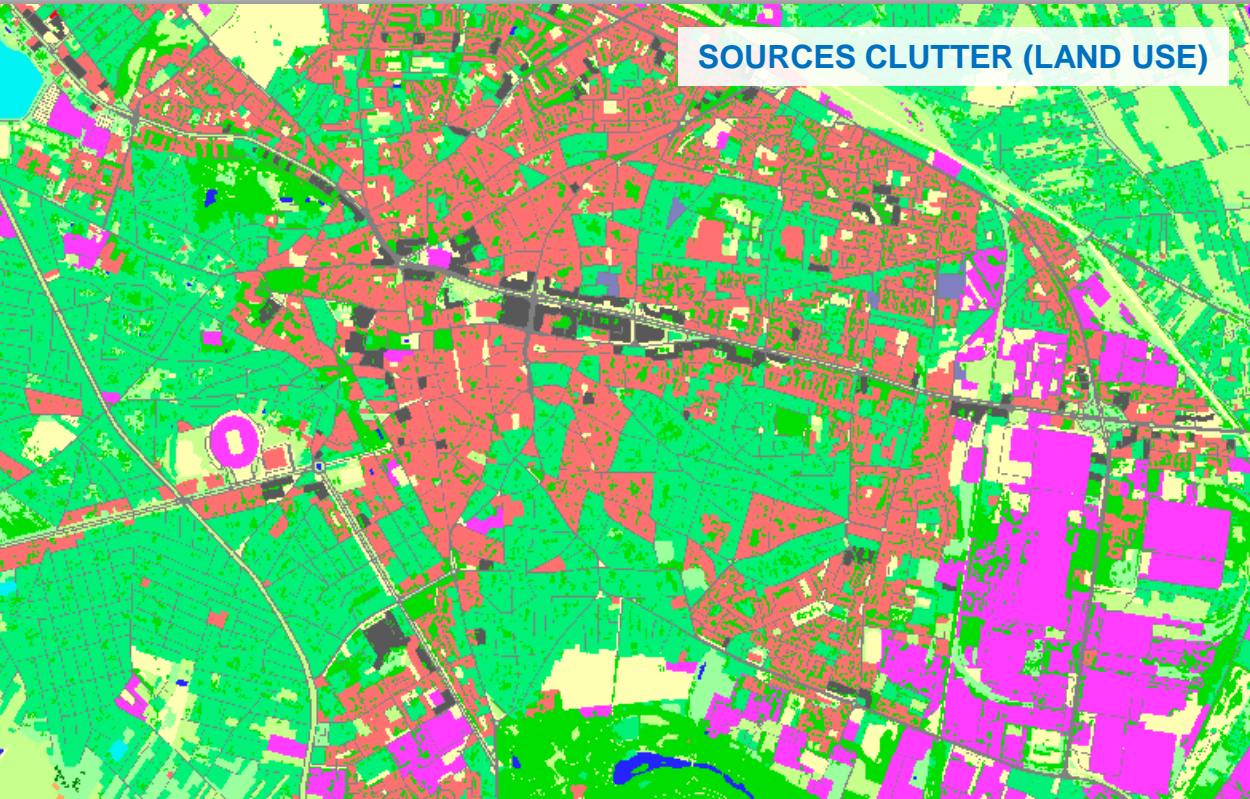
5 M RESOLUTION MODEL



Clutter Heights model is a matrix with height attribute that is defined for each pixel of clutter matrix separately as an individual value

SOURCES CLUTTER (LAND USE)

POPULATION MAP



Population Maps based on:

- Clutter Model: 1/2/5 m resolution for cities, 5/10/20 m resolution
- Minimum mapping unit for population maps corresponds to the accuracy of the clutter model used for production
- Detailed administrative boundaries from the official national sources (National Centers for Statistics etc)
- Boundaries and related population of built-up areas that cover major cities and suburbs
- Last available Official Census population figures and official population forecast for the present yea.

Main attributes presented in Population map:

In raster representation:

- Population density per each cell of the raster grid
- Population quantity per each cell of the raster grid

In vector representation:

- Population density per each built-up block
- Population quantity per each built-up block

Administrative division is delivered together with Population map as vector

Day Population Map (Dynamic Model)

provides the density ratios between the urban classes taking into account a mean average of activity in urban, commercial, and industrial areas.

Day Population Map considers people's movement within an average business day.

The day population distribution matrix represents the maximum expected overall population density by a cell in the daytime, assuming all people are present in their assigned workplaces or other locations and the rest remains at home.

The socio-economic and demographic factors, classifications of buildings, and built-up areas that are taken into account for Day Population Map production are the following:

- Industrial zones: factories, plants, and ports
- Big office complexes and buildings
- Universities and colleges etc.
- Villages far from towns, cities, and industrial zones
- Suburb zones of large cities
- Roads, weighted by distance from major roads
- Traffic flow

Probability coefficients are assigned to each value of each input factor, and a composite probability coefficient is calculated for each item of the **Day Population Map**.

Night Population Map (Static Model)

provides density ratios between the urban classes based on the places people have identified as inhabiting (residential areas) in the census information.

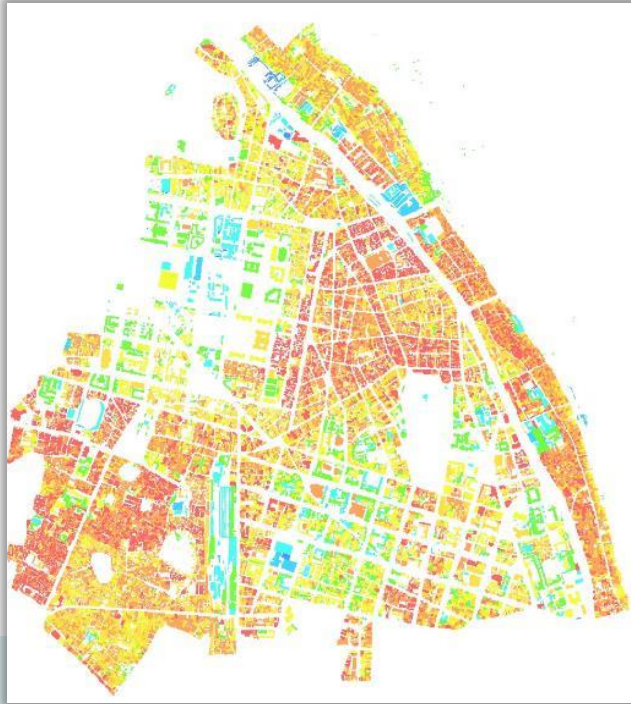
For calculating the matrix **Population Distribution Model**, two input layers are applied: clutter or land use model (only classes related to the populated areas) and experimentally obtained coefficients that assign proportions of population density for different clutter classes.

With the application of these coefficients in conjunction with vector boundaries of administrative units and the populated clusters, the calculation is being conducted individually for each administrative unit.

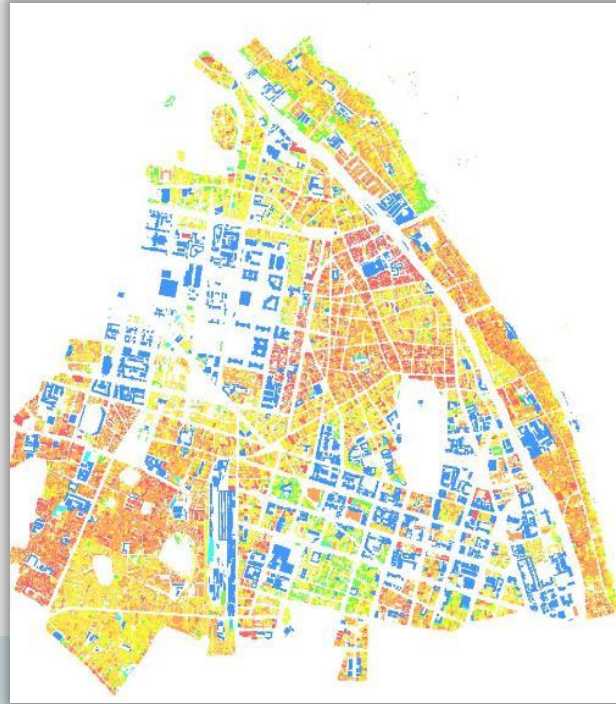
The resulting values are given as a matrix model with preassigned cell size. **Population density value** is assigned with each cell of the matrix.

For the calculation of the **Regional Population Map** are used clutter class type, percentage of built-up block area within each cell (pixel), and also the population density coefficient that was calculated individually and varied for each administrative unit.

Day Population Map



Night Population Map



MATRIX

Population map in matrix representation provides:

- Population density per each cell of the raster grid
- Population quantity per each cell of the raster grid

VECTOR

Vector Population map provides the attributes of polygons in built-up areas:

- Id – unique identifier of each built-up block
- Population – calculated population for each built-up block
- Density – calculated density per each block of built-up area (inhabitants/sq.km)

Regional planning

Country	Area, km ²	Map Type, Resolution
Belgium	30 688	2D 10m + Popmap
United Kingdom	209 331	2D 20m
Hungary	93 030	2D 10m
Kazakhstan	2 725 000	2D 10m + Popmap
Malaysia	330 000	2D 10m + Popmap
Pakistan	881 193	2D 10m + Popmap
Thailand	513 120	2D 10m + Popmap
Algeria	150 000	2D 10m
Bangladesh	148 460	2D 10m + Popmap
Ghana	238 533	2D 10m
Jordan	89 342	2D 10m
Philippines	300 000	2D 10m + Popmap
Poland	322 575	2D 10m
UAE	83 600	2D 10m

3D models

Country	City
Hungary	40 biggest cities
Kazakhstan	55 biggest cities
Malaysia	Johor, Penang and Georgetown
Thailand	3D countrywide coverage
Jordan	5 biggest cities
Turkey	100 biggest cities
Greece	3D countrywide coverage
Czech Republic	3D countrywide coverage
Croatia	3D countrywide coverage
Mexico	3D countrywide coverage
Austria	3D countrywide coverage
Slovakia	3D countrywide coverage
Bahrain	3D countrywide coverage



PROJECTS WORLDWIDE
8500+

2500+

3D City Models



High quality
and accuracy

5500+

2D Urban Models



Highly competitive
and flexible prices

85+

Countrywide model



Support of all RF
planning tools



Worldwide
delivery



Two years
warranty

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OUR PROFESSIONAL AND CUSTOM-ORIENTED TEAM WORKS FOR YOU TO FIT YOUR PROJECT GOALS AND BUDGET



VERTICAL MARKETS WE SUPPORT

- SMART CITIES AND IoT
- SOLAR ENERGY
- ENVIRONMENTAL MANAGEMENT
- ARCHITECTURE
- TRANSPORTATION

OUR CLIENTS:

- MOBILE OPERATORS
- RF PLANING TOOLS PROVIDERS
- TELECOM COMPANIES



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