



PRODUCT DESCRIPTION

Sofia city (Bulgaria)

3D City model 2m resolution sample

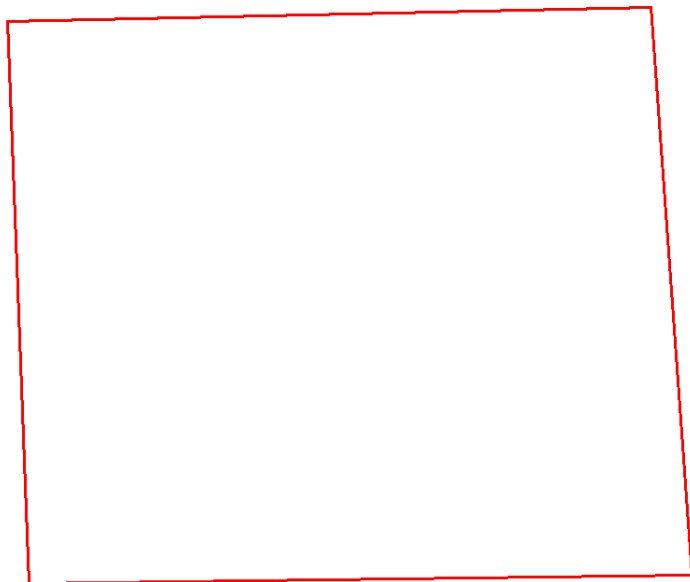
GENERAL INFORMATION

Coverage

This geographic product covers 5,27 sq. km of Sofia city (Bulgaria).

The geographic coordinates of the red bounding rectangle (reference ellipsoid WGS 84) are the following:

E 23,23533996°	E 23,26627296°
N 42,73581771°	N 42,73581771°



E 23,23533996°	E 23,26627296°
N 42,71638383°	N 42,71638383°

Data presented in Atoll format.

Package content in Atoll includes:

- Digital Terrain Model (DTM) (data contains in the **Height** folder);
- Clutter Model (DLU) (data contains in the **Clutter** folder);
- Clutter Heights Model (DHM) (data contains in the **Clutter_Height** folder);
- 3D buildings + 3D vegetation + 3D bridges + 2D Basic vector basic layers (roads, water, coastline) (data contains in the **Vector** folder);
- Orthophoto (data contains in the **Orthoimage** folder)

Language: English

Resolution (cell size): 2m

CARTOGRAPHIC REFERENCE

Data are given in geographic coordinates on ellipsoid WGS 84 with the following references:

Ellipsoid

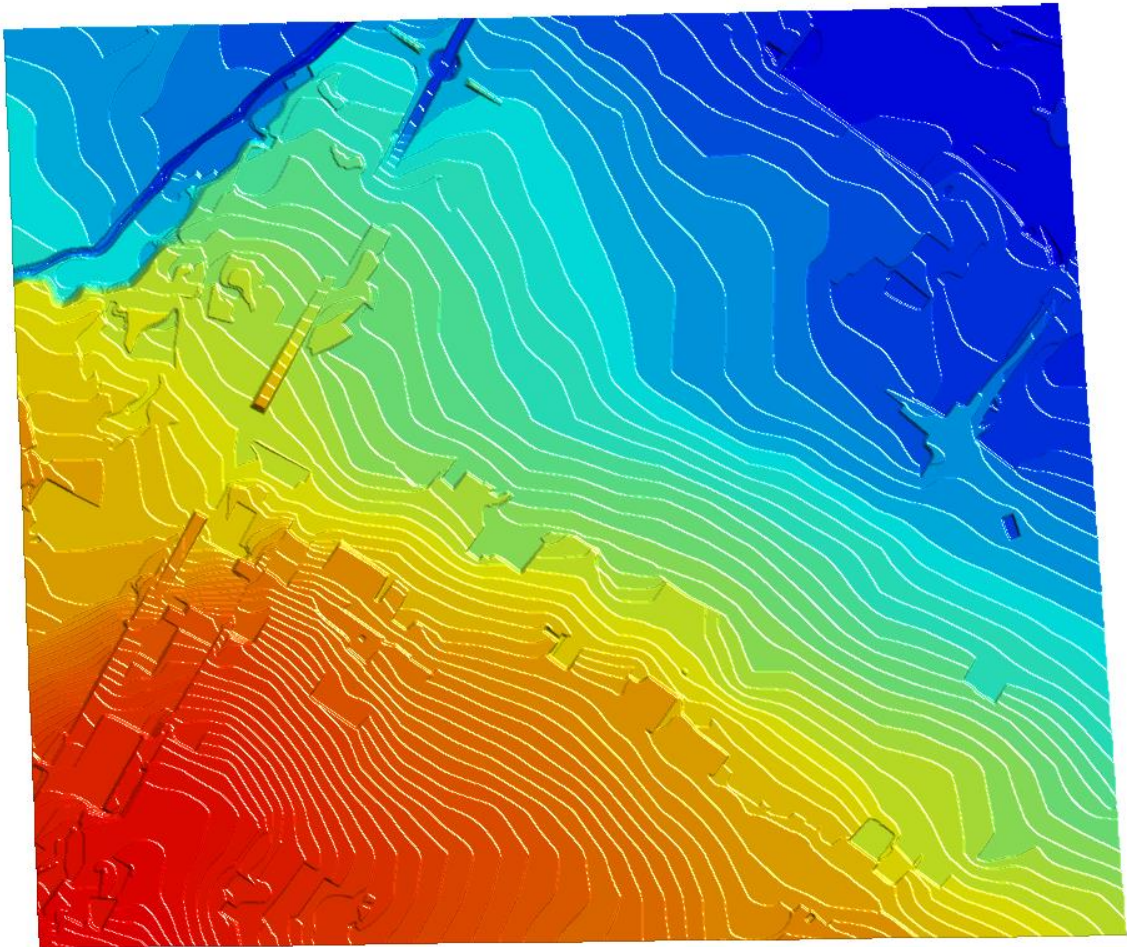
- | | |
|-----------------|------------------|
| - Name: | WGS 84 |
| - Big axis: | 6378137.0 meters |
| - Eccentricity: | 0.081819191 |

Projection

- | | |
|------------------|-----------------|
| - Type: | UTM 34N |
| - Azimuth angle: | 0.0 degrees |
| - Longitude 0: | 21.0 degrees |
| - Latitude 0: | 0.0 degrees |
| - X axis 0: | 500000.0 meters |
| - Y axis 0: | 0.0 meters |
| - Scale factor: | 0.9996 |

DIGITAL TERRAIN MODEL (DTM)

General view



Meanings of pixel values

Each image pixel stores the value of terrain elevation.

The value of elevation above sea level:

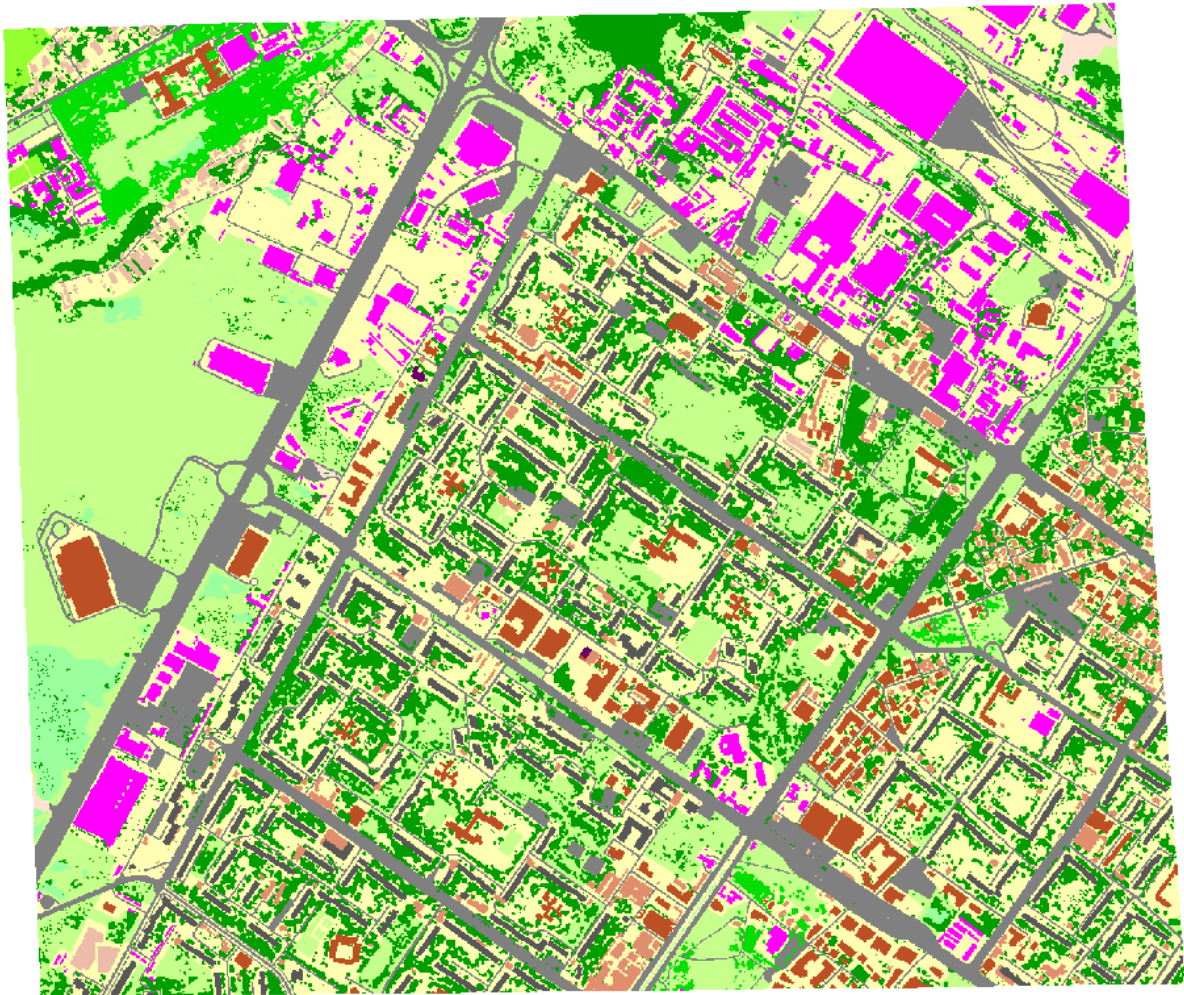
- Height = 0 meters - 0
- Unknown values - - 9999
- Z values unit - meters

Parameters of accuracy	Value
Resolution (cell size)	2 m
Absolute Planimetric accuracy (x, y)	3 m CE95
Absolute Altimetric accuracy (z)	3 m LE95

Sources:
Pleiades 1B stereopairs of satellite images with 0,5 m resolution. Vintage 11.2024

CLUTTER MODEL (DLU)

Partial view



Parameters of accuracy	Value
Resolution (cell size)	2 m
Absolute Planimetric accuracy (x, y)	3 m CE95
Minimal Mapping Unit for buildings and vegetation	9 sq.m

Sources:
Pleiades 1B satellite images with 0,5 m resolution. Vintage 11.2024

Class	Color
open_area	
forest	
sea	
inland_water	
residential	
urban	
dense_urban	
blocks_of_buildings	
industrial_and_commercial	
villages	
open_areas_in_urban	
parks_in_urban	
airport	
wetland	
dense_residential	
sparse_forest	
urban_low	
dense_urban_low	
buildings	
bushes	
grass	
agricultural	
barren	

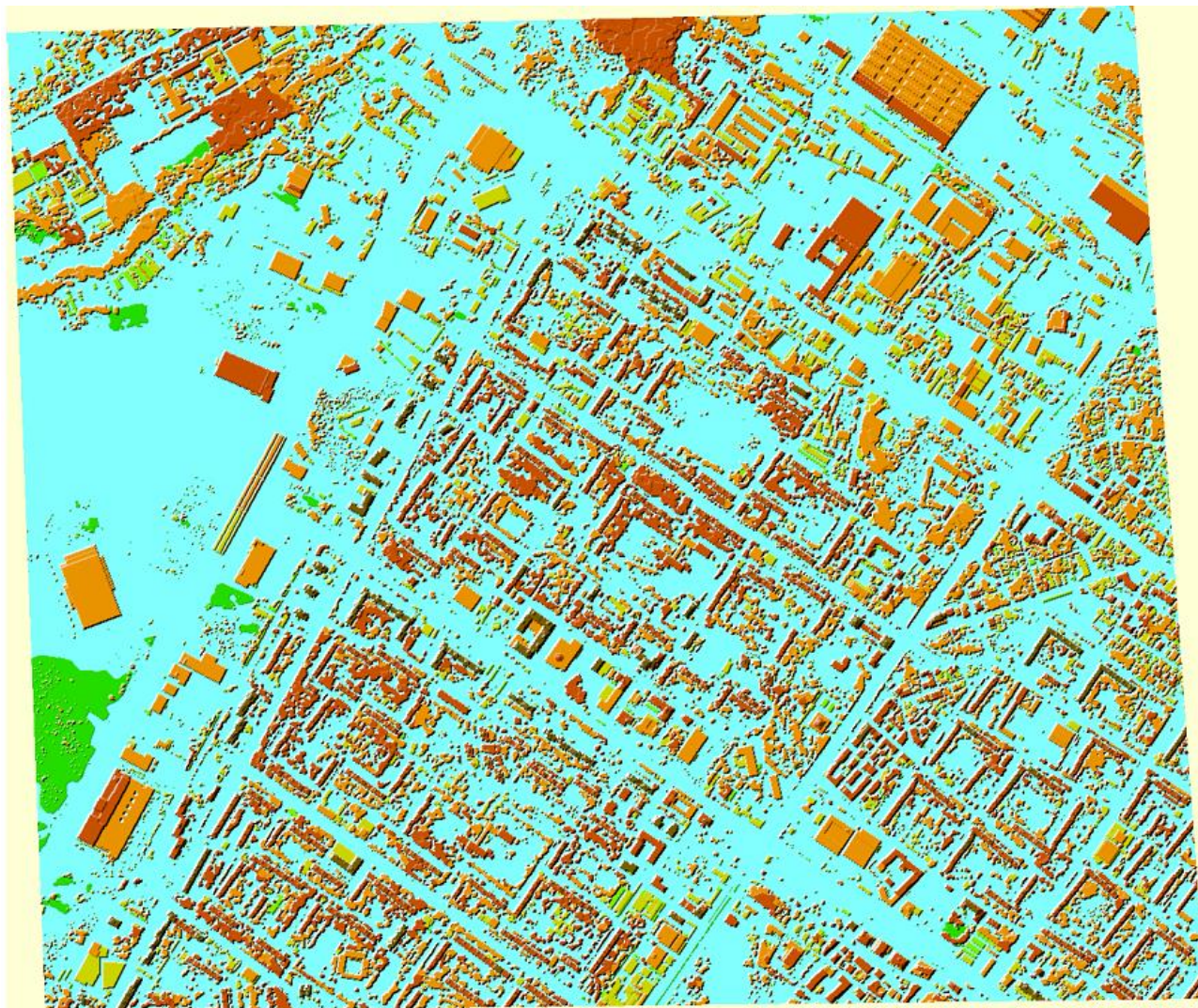
Meanings of pixel values

The values that are stored with each pixel of the image correspond to the code that represents land type (clutter class). The table of correspondences between codes and clutter class names (23 clutter classes) is presented below:

Code	Class Name	Class Description
1	Open area	Area with little or no vegetation
2	Forest	Forested lands with closed tree canopy. No distinction is made between deciduous and coniferous
3	Sea	Ocean, sea
4	Inland water	Lakes, rivers or channels
5	Residential	Houses in suburban environment. Suburban density typically involves laid out street patterns in which streets are visible. Lots may be as small as 30m by 30m, but are typically larger and include vegetation cover. Individual houses are frequently visible. Average height is below 15m
6	Urban	Areas within urban perimeter. The mean urban should have mean street density with no pattern, the major streets are visible, the built-up features appear distinct from each other. Some small vegetation could be included. Average height is below 25m
7	Dense urban	Areas within urban perimeter. This includes dense urban areas with dense development where built-up features do not appear distinct from each other. It also includes built-up features of the downtown district with heights below 30m.
8	Blocks of buildings	Groups of buildings, either parallel or not, that may be separated by large green space.
9	Industrial and commercial areas	Areas including buildings with large footprints separated by streets (factories, shopping malls, storehouses etc.)
10	Villages	Small built-up area in rural areas out of cities frames
11	Open in urban	Small open land area with no vegetation surrounded by mean urban, dense urban or residential
12	Parks in urban	Any vegetation land in urban environment. Golf courses, municipal parks, extensive cemeteries or recreational lands
13	Airport	Airports
14	Wetland	Marshes, swamp
15	Dense residential	Groups of houses or collective residential buildings in suburban environment. Suburban density typically involves laid out street patterns in which streets are visible. There is no open space between constructions. Average height is below 15m
16	Sparse forest	Sparse growth of trees, woodland area
17	Urban low	Areas within urban perimeter. The mean urban should have mean street density with no pattern, the major streets are visible, the built-up features appear distinct from each other. Some small vegetation could be included. Average height is below 15m
18	Dense urban low	Areas within urban perimeter. This includes dense urban areas with dense development where built-up features do not appear distinct from each other. It also includes built-up features of the downtown district with heights below 15m.
19	Buildings	Isolated cluster of high towers or skyscrapers higher than 40m.
20	Bushes	Areas with low scrub vegetation
21	Grass	Area with low vegetation like grass of inside buildings block, agricultural fields
22	Agricultural	Agricultural areas
23	Barren	Barren and stone lands

CLUTTER HEIGHTS MODEL (DHM)

Partial view



Obstacles Heights Model includes – buildings and vegetated areas.

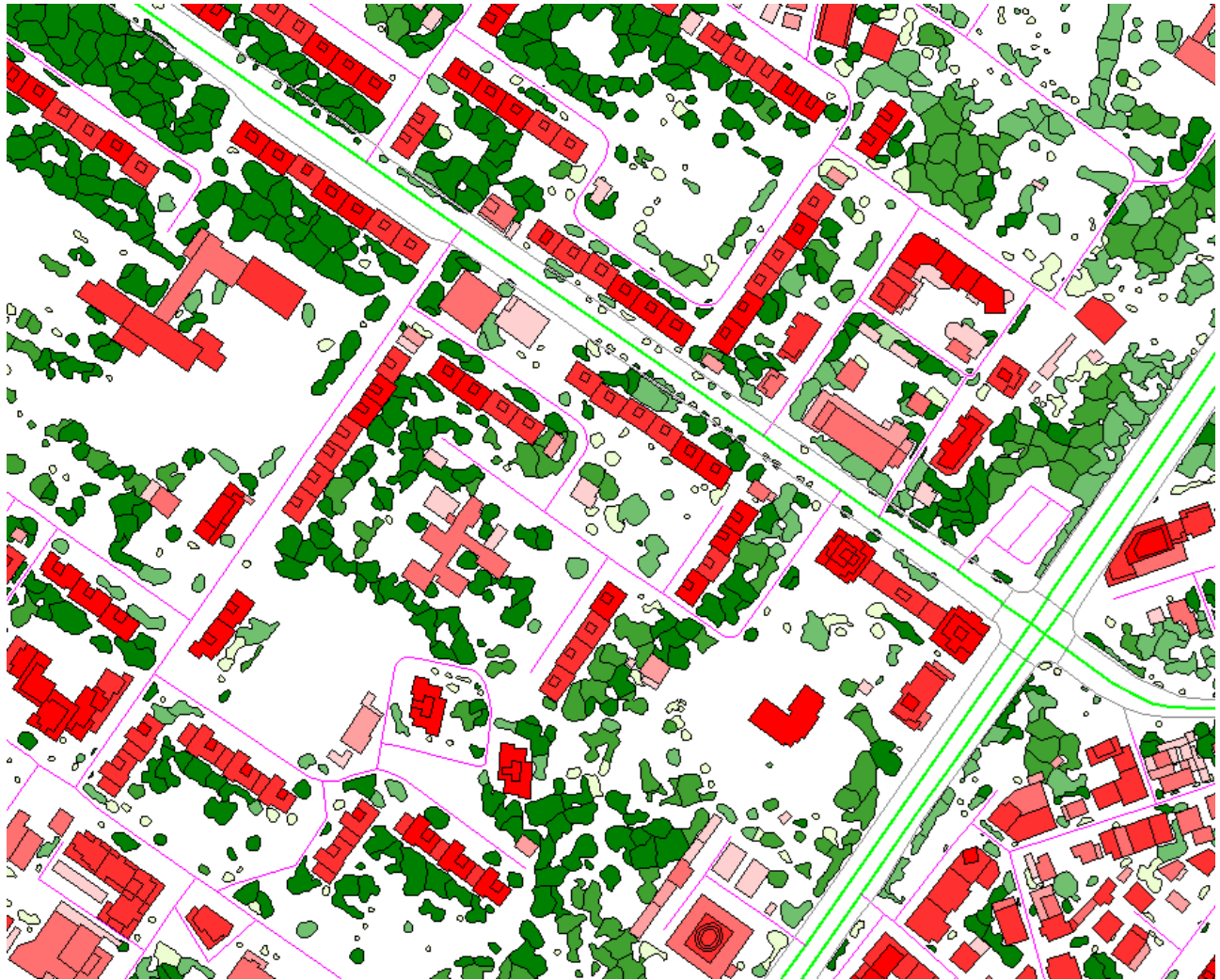
Parameters of accuracy	Value
Resolution (cell size)	2 m
Absolute Planimetric accuracy (x, y)	3 m CE95
Accuracy of Buildings Heights (bh)	3 m LE95
Accuracy of Vegetation Heights (vh)	3 m LE95
Minimal Mapping Unit for Buildings	9 sq.m
Minimal Recognizable Building Height	3 m
Minimal Mapping Unit for Vegetation	9 sq.m

Sources:

Pleiades 1B stereopairs of satellite images with 0,5 m resolution. Vintage 11.2024

VECTOR LAYERS – 3D BUILDINGS, 3D VEGETATION, 3D BRIDGES + BASIC 2D VECTORS

Partial view



Parameters of accuracy	Value
Absolute Planimetric accuracy (x, y)	3 m CE95
Accuracy of Buildings Heights (bh)	3 m LE95
Accuracy of Vegetation Heights (vh)	3 m LE95
Minimal Mapping Unit for Buildings and Vegetation	9 sq.m
Minimal Recognizable Building and Vegetation Height	3 m
3D Vectors of vegetation	MMU 9 sq.m, separated crowns Vegetation heights are calculated from terrain to treetop
3D Vectors of buildings delivered with the following attributes	<ul style="list-style-type: none"> • AGL: height of a building from terrain, in meters • Object ID
3D Vectors of buildings LoD	LoD 1.3
3D Vectors of bridges (polygon footprint with attribute "AGL" height)	<ul style="list-style-type: none"> • The attributes of "AGL" of bridge traffic path: bridge height calculated from the terrain • Object ID

Sources:

Pleiades 1B stereo-pairs of satellite images with 0,5 m resolution. Vintage 11.2024

There are 12 vector classes in 3D Dataset:

Nº	Class name	Class description
1.	Inland Water	Hydrographic objects (rivers, lakes, channels) less than 10m width
2.	Coastline	Coastline of see
3.	Highways	International motor roads
4.	Major Roads	Regional motor roads
5.	Secondary Roads	Other roads
6.	Streets	Town street axial lines
7.	Railways	Railways
8.	Roads in tunnels	Roads in tunnels
9.	Runways	Airport Runways
10.	Buildings	Building footprints with heights
11.	Vegetation	Vegetation footprints with heights
12.	Bridges	Bridges footprints with heights and thickness

ORTHOPHOTO

General view



Parameters of accuracy	Value
Image sensor	Pleiades 1B (Airbus, France)
Orthoimage resolution	0.5m
Spectral level	Multicolor
Vintage	11.2024