



## **PRODUCT DESCRIPTION**

**Pyongyang city (North Korea)  
3D city model**

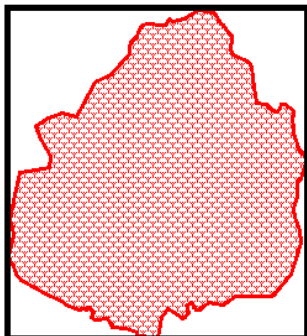


## GENERAL INFORMATION

### Coverage

This geographic product covers 700 sq. km of Pyongyang 3D city model (North Korea).  
The geographic coordinates of the bounding rectangle (reference ellipsoid WGS 84) are the following:

E 125,538121°                      E 125,895545°  
N 39,171339°                      N 39,171339°



E 125,538121°                      E 125,895545°  
N 38,867128°                      N 38,867128°

### Package content

The delivered package includes:

- Digital Terrain Model (data contains in the **Height** folder);
- Digital Surface Model (data contains in the **DSM** folder);
- Land Use Map (Clutter Model) (data contains in the **Clutter** folder);
- Building Heights Model (data contains in **Obstacle** and **Buildings\_Multipatch** folders);
- Vector Data (data contains in the **Vector** folder);
- Text labels (data contains in the **Text** folder);
- Orthoimage (data contains in the **Orthoimage** folder)

### Data format

The delivered data has been converted into the **ESRI GRID / SHP** format.

**Resolution (cell size):** 2 m

**Language:** English

## 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

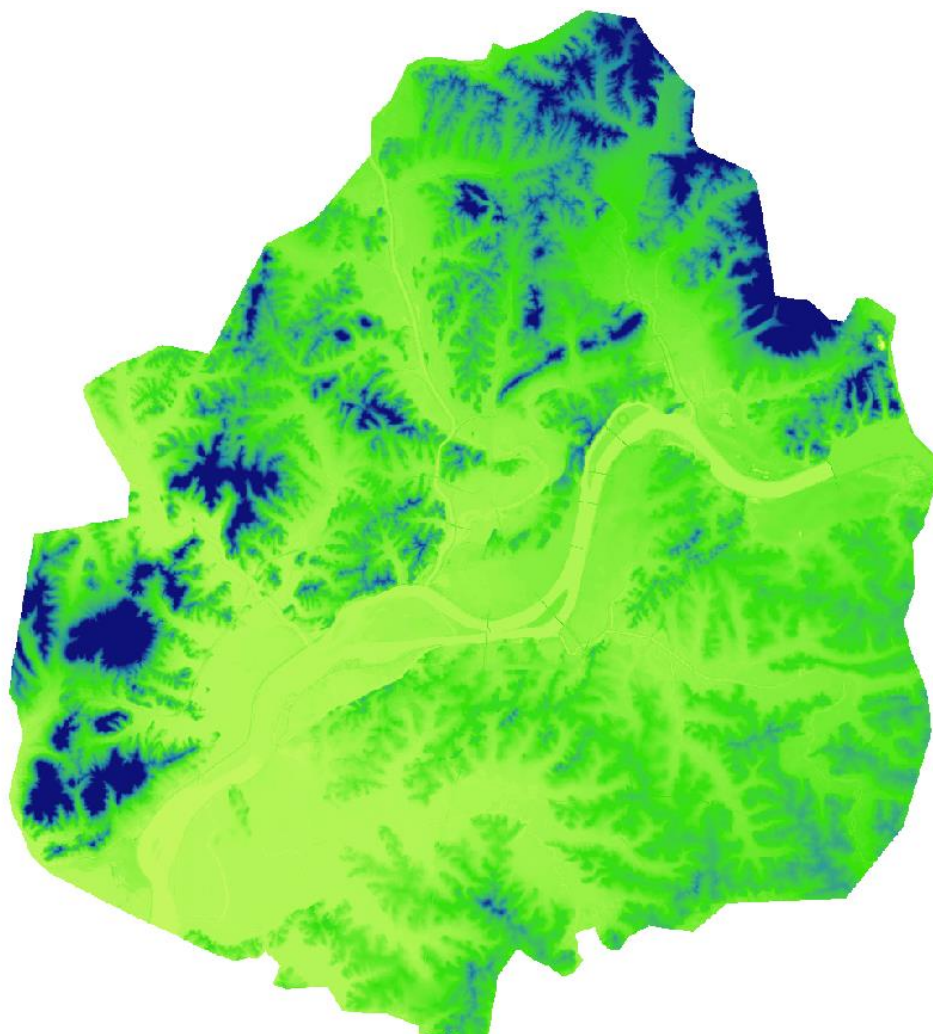
### Projection

- Type : UTM 51N
- Azimuth angle : 0.0 degrees
- Longitude 0 : 123.0 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

### 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 |

In this Digital Terrain Model the altitudes are varied in the range of -10 to 369 meters. Values of heights are submitted in the Baltic system of heights.

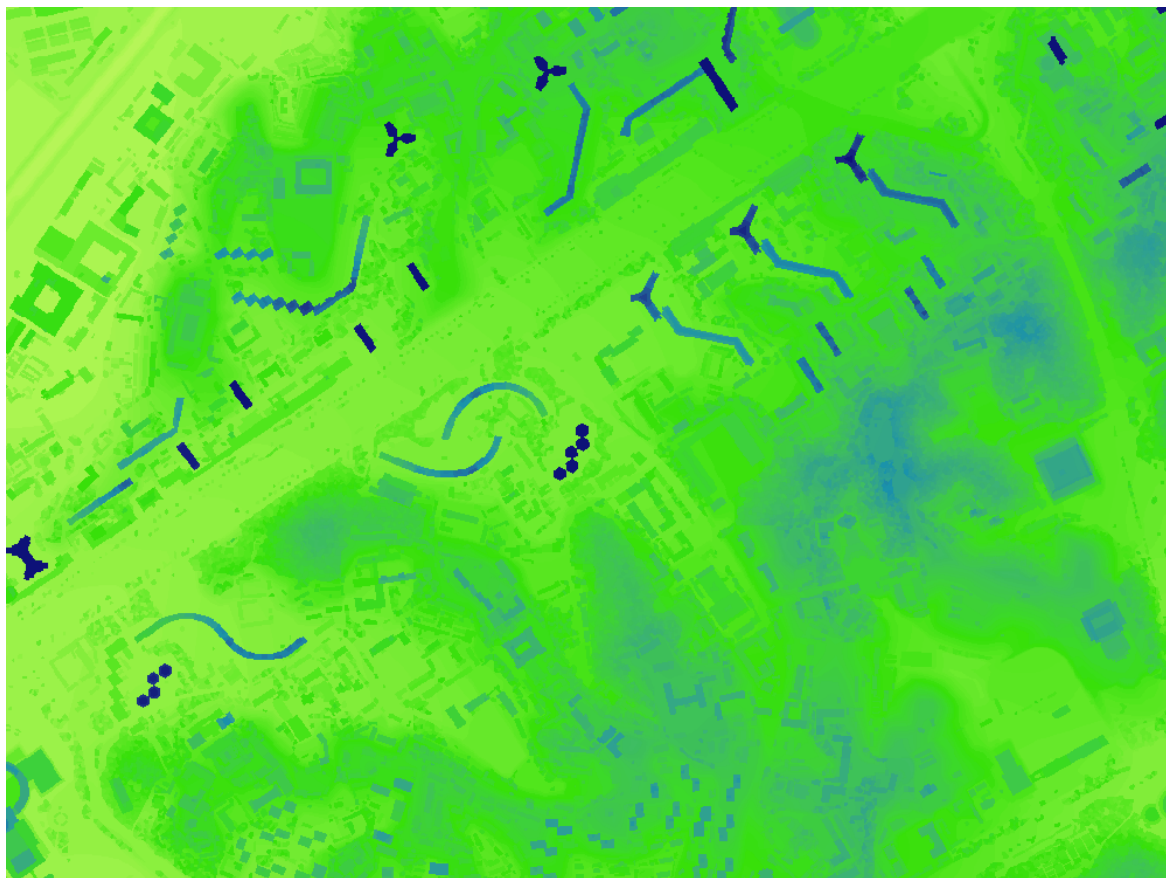
| Parameters of accuracy              |       |
|-------------------------------------|-------|
| Resolution (cell size)              | 2 m   |
| Absolute Planimetric accuracy (x,y) | 3-5 m |
| Absolute Altimetric accuracy (z)    | 2-3 m |

| Sources                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Stereo pairs of Pleiades satellite images with 0.5 m/pixel resolution. Vintage 2019.</li> </ul> |



## DIGITAL SURFACE MODEL

### Partial 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 |

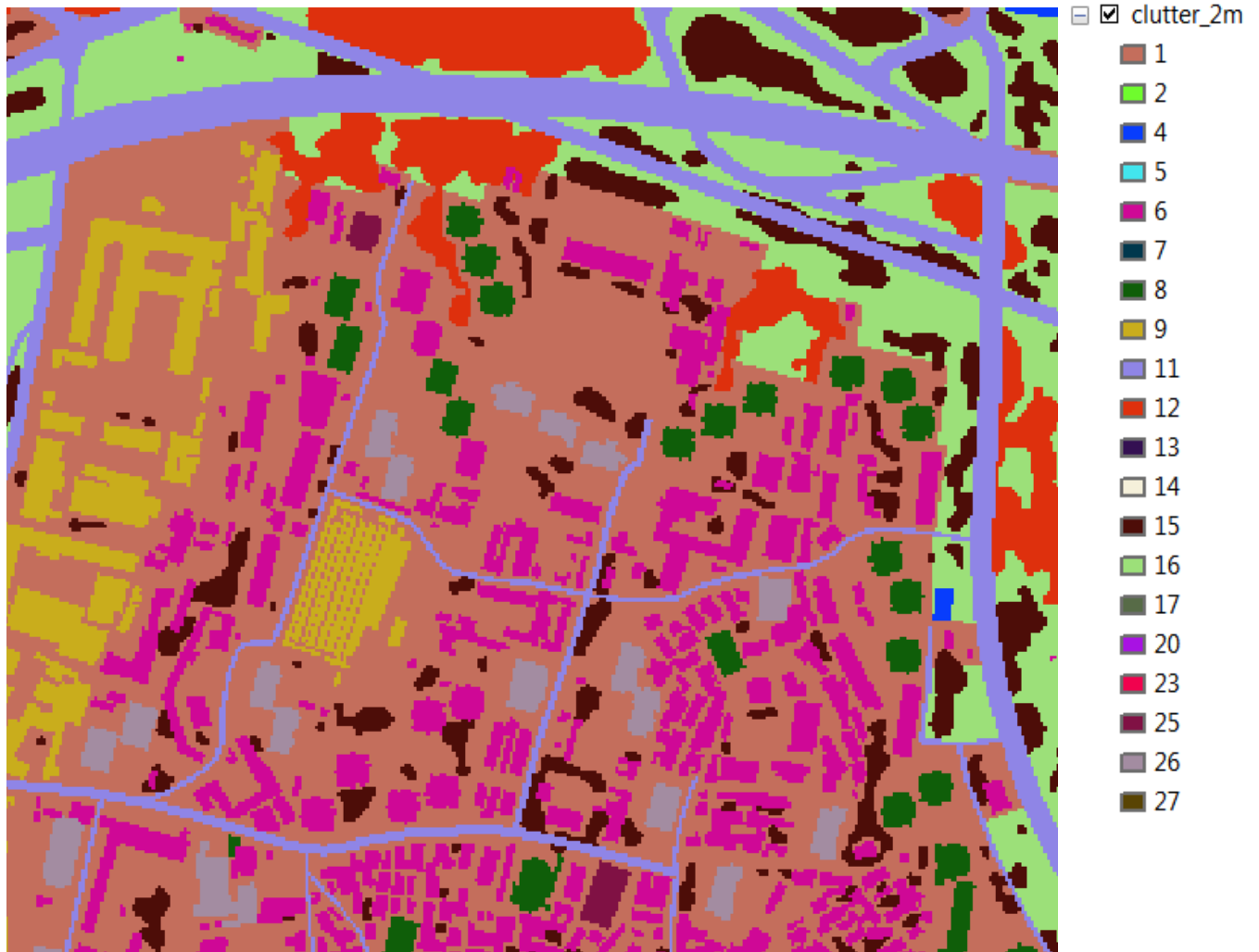
In this Digital Surface Model the altitudes are varied in the range of -10 to 379 meters.  
Values of heights are submitted in the Baltic system of heights.

| Parameters of accuracy                                                                 |       |
|----------------------------------------------------------------------------------------|-------|
| Resolution (cell size)                                                                 | 2 m   |
| Absolute Planimetric accuracy (x,y)                                                    | 3-5 m |
| Absolute Altimetric accuracy (z)                                                       | 2-3 m |
| Absolute Altimetric accuracy of buildings (h)                                          | 2-3 m |
| Sources                                                                                |       |
| • Stereo pairs of Pleiades satellite images with 0.5 m/pixel resolution. Vintage 2019. |       |



## LAND USE MAP (CLUTTER MODEL)

### Partial view



### Parameters of accuracy

|                                     |       |
|-------------------------------------|-------|
| Resolution (cell size)              | 2 m   |
| Absolute Planimetric accuracy (x,y) | 3-5 m |

### Sources

- Pleiades satellite images with 0.5 m/pixel resolution. Vintage 2019.



## Meanings of pixel values

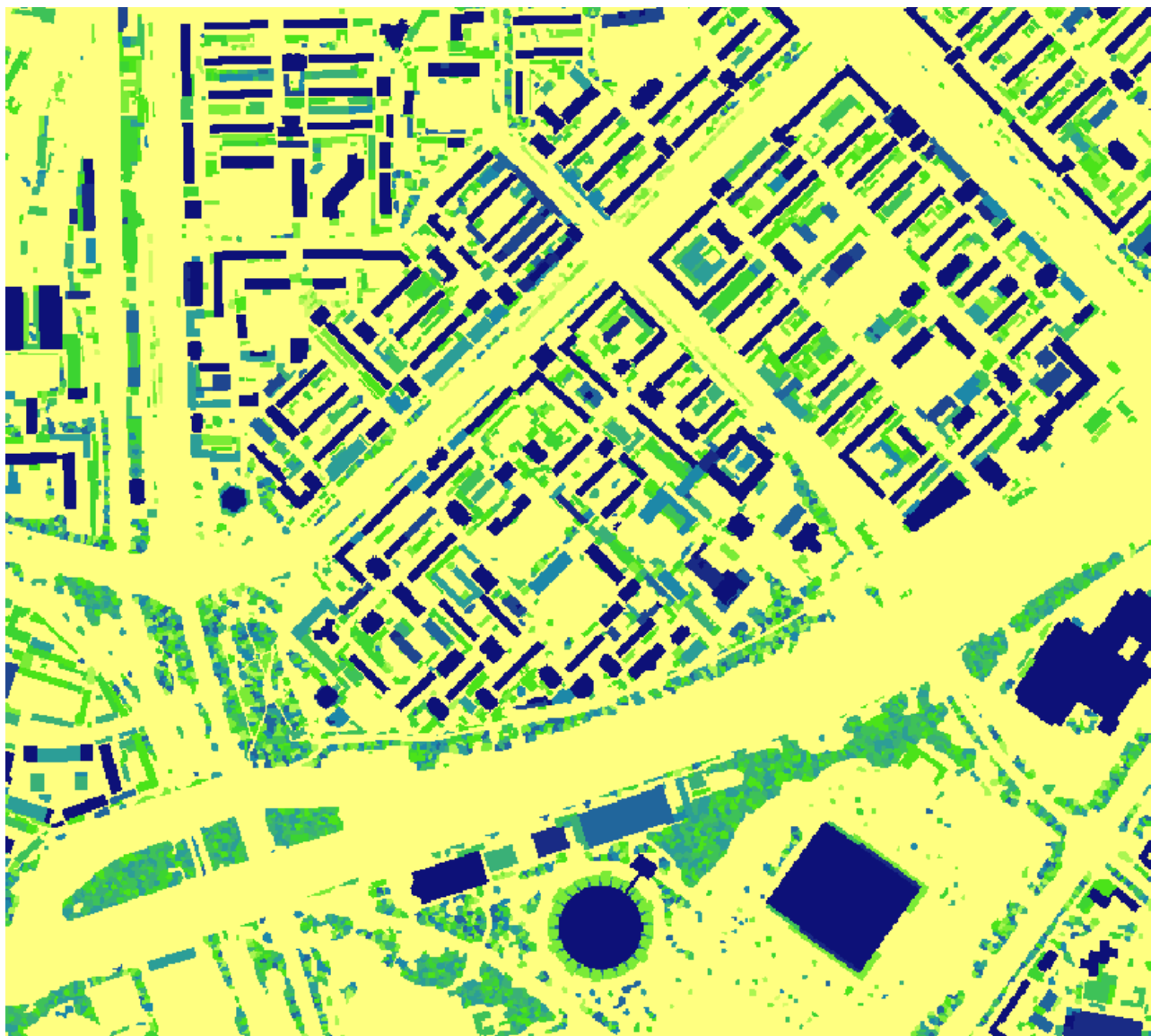
The value which is stored with each pixel of image corresponds to the code that represents land type (clutter class). The table of correspondences between codes and clutter class names (22 clutter classes in all) is presented below.

| Code | Clutter Class name        | Class Description                                                                                                                                                                                                                                                                           |
|------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | Open                      | 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 and 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 40m                                    |
| 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<br>It also includes built-up features of the downtown district with heights below 40m.                                                  |
| 8.   | Buildings Blocks          | Groups of buildings, either parallel or not, that may be separated by large green spaces.<br>Average height is up to 30 meters.                                                                                                                                                             |
| 9.   | Industrial and commercial | Areas including buildings with large footprints separated by streets (factories, shopping malls, storehouses etc.)                                                                                                                                                                          |
| 10.  | Villages                  | Small built-up area in rural surrounding                                                                                                                                                                                                                                                    |
| 11.  | Open in urban             | Small open land area with no vegetation surrounded by mean urban, dense urban or residential                                                                                                                                                                                                |
| 12.  | Sparse forest/Park        | Any vegetation land in urban environment. Golf courses, municipal parks, extensive cemeteries or recreational lands                                                                                                                                                                         |
| 13.  | Airport                   | Territory of airport                                                                                                                                                                                                                                                                        |
| 14.  | Wetland                   | Swampland                                                                                                                                                                                                                                                                                   |
| 15.  |                           |                                                                                                                                                                                                                                                                                             |
| 16.  | Desert                    | Territory of desert, sands                                                                                                                                                                                                                                                                  |
| 17.  | Wasteland/Barren          | Waste stony lands                                                                                                                                                                                                                                                                           |
| 19.  | Mangrove                  | Mangrove                                                                                                                                                                                                                                                                                    |
| 20.  | Agricultural land         | Agricultural lands, fields                                                                                                                                                                                                                                                                  |
| 23.  | Dense Residential         | Groups of houses or collectives 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                                         |
| 25.  | Buildings                 | Isolated cluster of high towers or skyscrapers higher than 40m                                                                                                                                                                                                                              |
| 26.  | Buildings Blocks High     | Groups of buildings, either parallel or not, that may be separated by large green spaces. Average height is more than 30 meters                                                                                                                                                             |
| 27.  | Dense Urban Low           | Dense low buildings, 1-3 floor buildings of downtown without vegetation                                                                                                                                                                                                                     |



## BUILDING HEIGHTS MODEL

### General view



| Parameters of accuracy                                                                                                                   |          |
|------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Resolution (cell size)                                                                                                                   | 2 m      |
| Absolute Planimetric accuracy (x,y)                                                                                                      | 3-5 m    |
| Absolute Altimetric accuracy of buildings (h)                                                                                            | 2-3 m    |
| Minimal Recognizable Obstacle Height                                                                                                     | 3 m      |
| Minimal Mapping Unit                                                                                                                     | 16 sq. m |
| Sources                                                                                                                                  |          |
| <ul style="list-style-type: none"> <li>• Stereo pairs of Pleiades satellite images with 0.5 m/pixel resolution. Vintage 2019.</li> </ul> |          |



## VECTOR DATA

### Partial view



| Parameters of accuracy                                                                                                                 |                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Absolute Planimetric accuracy (x,y)                                                                                                    | 3-5 m                                                                                                                                                              |
| Building height accuracy                                                                                                               | 3 m                                                                                                                                                                |
| Accuracy of Buildings Heights (h):                                                                                                     | 2-3 m                                                                                                                                                              |
| Minimal Mapping Unit                                                                                                                   | 16 sq. m                                                                                                                                                           |
| Minimal Recognizable Obstacle Height                                                                                                   | 3 m                                                                                                                                                                |
| Accuracy of Vegetation                                                                                                                 | <b>Vegetation with detailed separated canopies:</b> <ul style="list-style-type: none"> <li>heights accuracy - 3 m</li> <li>minimum mapping unit 25sq.km</li> </ul> |
| Sources                                                                                                                                |                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>Stereo pairs of Pleiades satellite images with 0.5 m/pixel resolution. Vintage 2019.</li> </ul> |                                                                                                                                                                    |

### Vector data (10 classes):

|  | Nº | Class Name   | Class Description                        |
|--|----|--------------|------------------------------------------|
|  | 1  | Highways     | International motor roads                |
|  | 2  | Major roads  | Regional motor roads                     |
|  | 3  | Streets      | Town street axial lines with street name |
|  | 4  | Minor roads  | Other roads                              |
|  | 5  | Inland Water | Coastline of rivers and lakes.           |
|  | 6  | Boundaries   | Administrative boundaries                |
|  | 7  | Railways     | Axial lines of railways                  |
|  | 8  | Coastline    | Coastline of oceans and seas             |
|  | 9  | Buildings    | Building footprints with heights         |
|  | 10 | Vegetation   | Vegetation with canopy heights           |



## TEXT LABELS

### Text label classes

There are 4 classes of text labels:

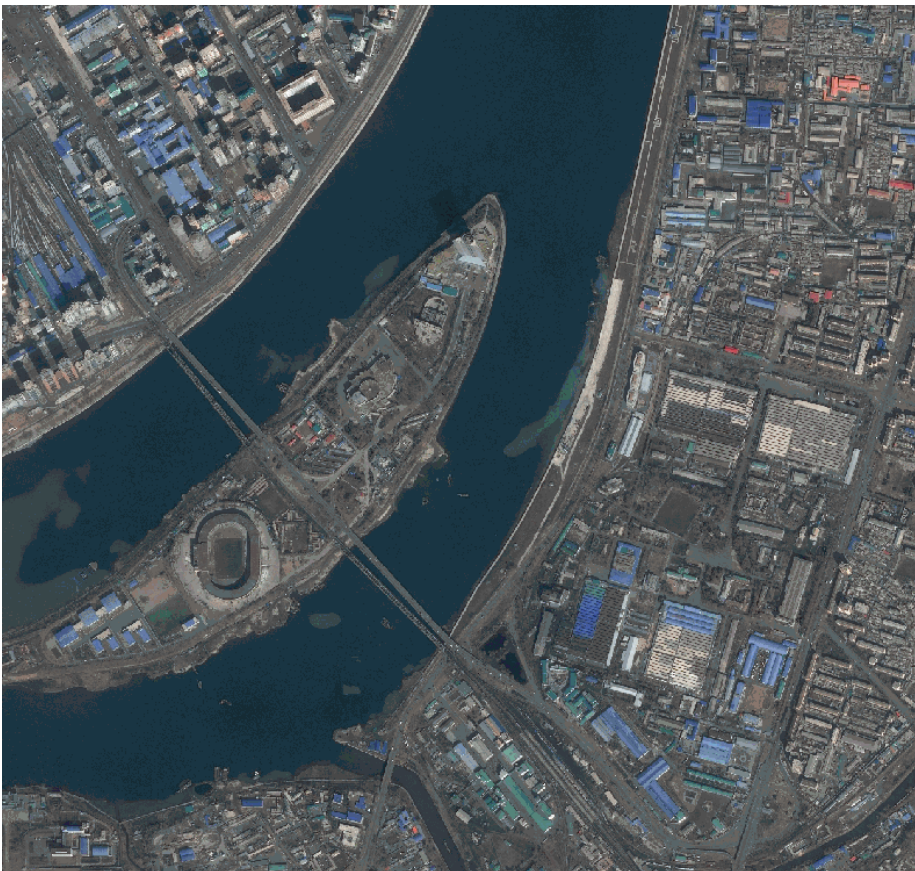
| No | Class Name       | Class Description             |
|----|------------------|-------------------------------|
| 1  | Cities           | Names of cities               |
| 2  | Water            | Names of Hydrographic objects |
| 3  | Railway stations | Names of railway stations     |
| 4  | Villages         | Names of villages             |

### Sources:

- Open sources

## ORTHOIMAGE

### General view



**Sensor:** Pleiades  
**Satellite image provider:** Airbus DS Geo SA, USA  
**Orthoimage resolution:** 0.5m  
**Chromatic level:** PAN+Multispectral  
**Source Date:** 2019  
**Planimetric accuracy:** 3-5m