



# Διαθεσιμότητα των δορυφορικών δεδομένων και εργαλεία επεξεργασίας τους



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## Πηγές δορυφορικών δεδομένων και εργαλεία επεξεργασίας



[Αρχική Σελίδα](#)
[Διακτέα Ύλη](#)
[Ομαδικές Εργασίες](#)
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[Δορυφορικά Δεδομένα](#)

### Δορυφορικά Δεδομένα

#### Εργαλεία Επεξεργασίας Δορυφορικών Δεδομένων

- [ESA Toolboxes](#)
- [SNAP download](#)
- [Developers corner](#)
- [OGIS](#)
- [Google Earth Engine](#)

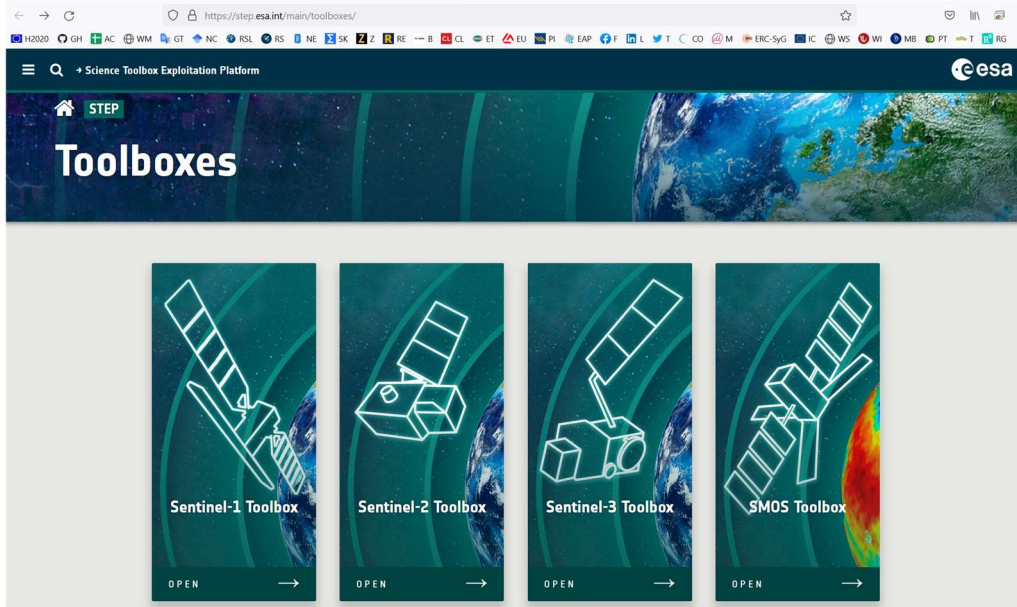
#### Πηγές Δορυφορικών Δεδομένων

- [USGS - Earth Explorer](#)
- [Copernicus Open Access Hub](#)
- [Planet Explorer](#)
- [Sentinel Hub](#)
- [European Space Agency](#)
- [European Association of Remote Sensing Laboratories](#)
- [NASA Earth Observatory](#)
- [National Oceanic and Atmospheric Administration](#)



Heraklion, 10/08/2013, WorldView II

# Εργαλεία επεξεργασίας



# Εργαλεία επεξεργασίας

esa
Science Toolbox Exploitation Platform

Sentinel-2 Toolbox Features

### Supported Products

- Sentinel-2 L1B, L1C, L2A and L3, Landsat-8, Spot 1 to Spot 7, Spot4 Take5, Spot5 Take5, RapidEye, Deimos

### Processors

- Sen2Cor for Atmospheric Correction
- Sen2Three level-3 processor for Spatio-Temporal Synthesis of bottom of atmosphere corrected Sentinel-2 level 2a images
- L2B biophysical processor (LAI, fAPAR, ...) from this [ATBD](#)
- Reflectance to Radiance Processor
- Radiometric Indices
  - Vegetation indices : DVI, RVI, PVI, IPVI, WdVI, TNDVI, GNDVI, GEMI, ARVI, NDI45, MTCI, MCARI, REIP, S2REP, IRECI, PSSRa
  - Soil indices : SAVI, TSAVI, MSAVI, MSAVI2, BI, BI2, RI, CI
  - Water indices : NDWI, NDWI2, MNDWI, NDPI, NDTI
- MCI Processor: Maximum Chlorophyll Index by exploiting the height of a measurement over a specific baseline.
- OTB tools: MultivariateAlterationDetector, Pansharpening-bayes, Pansharpening-lmvm, Pansharpening-rs, Rasterization-image, Rasterization-manual, Segmentation-cc, Segmentation-meanshift, Segmentation-mprofiles, Segmentation-watershed and SFSTextureExtraction

# Εργαλεία επεξεργασίας

Science Toolbox Exploitation Platform

**TOOLBOXES**

## SNAP

A common architecture for all Sentinel Toolboxes is being jointly developed by Brockmann Consult, SkyWatch and C-S called the Sentinel Application Platform (SNAP).

The SNAP architecture is ideal for Earth Observation processing and analysis due to the following technological innovations: Extensibility, Portability, Modular Rich Client Platform, Generic EO Data Abstraction, Tiled Memory Management, and a Graph Processing Framework.

### Feature Highlights

- Common architecture for all Toolboxes
- Very fast image display and navigation even of giga-pixel images
- Graph Processing Framework (GPF): for creating user-defined processing chains
- Advanced layer management allows adding and manipulation of new overlays such as images of other bands, images from WMS servers or ESRI shapefiles
- Rich region-of-interest definitions for statistics and various plots
- Easy bitmask definition and overlay
- Flexible band arithmetic using arbitrary mathematical expressions
- Accurate reprojection and ortho-rectification to common map projections,
- Geo-coding and rectification using ground control points
- Automatic SRTM DEM download and tile selection
- Product library for scanning and cataloguing large archives efficiently
- Multithreading and Multi-core processor support
- Integrated WorldWind visualisation

Navigation: Home, STEP, Toolboxes, SNAP, Sentinel-1 Toolbox, Sentinel-2 Toolbox, Sentinel-3 Toolbox, SMOS Toolbox, Proba-V Toolbox, PolSARpro, Download, SNAP, PolSARpro, Gallery, Documentation, Tutorials, FAQ, Developer Guide, Community, Forum, Blog, Developers, Issue Reporting.

# Εργαλεία επεξεργασίας

Science Toolbox Exploitation Platform

## SNAP Supported Plugins

**Sen2Cor**

ATMOSPHERIC CORRECTION FOR SENTINEL-2 IMAGES (LEVEL 2A)

VIEW →

**Sen2Three**

SPATIO-TEMPORAL SYNTHESIS OF SENTINEL-2 LEVEL 2A IMAGES

VIEW →

**Sen2Res**

RESOLUTION ENHANCEMENT OF SENTINEL-2 IMAGES (BANDS AT 10M)

VIEW →

**SNAPHU**

RECOVER UNAMBIGUOUS PHASE DATA FROM A 2-D ARRAY OF PHASE VALUES

VIEW →

# Εργαλεία επεξεργασίας

← → ↻ <https://step.esa.int/main/download/snap-download/> ☆

Science Toolbox Exploitation Platform

## DOWNLOAD

# SNAP Download

Here you can download the latest installers for SNAP and the Sentinel Toolboxes.

Data provision is available to all users via the [Sentinel Data Hub](#).

### Current Version

The current version is 8.0.0 (19.10.2020 15:00 UTC).

For detailed information about changes made for this release please have a look at the release notes of the different projects: [SNAP](#), [S1TBX](#), [S2TBX](#), [S3TBX](#), [SMOS Box](#), [PROBA-V Toolbox](#)

We offer three different installers for your convenience. Choose the one from the following table which suits your needs. During the installation process, each toolbox can be excluded from the installation. Toolboxes which are not initially installed via the installer can be later downloaded and installed using the plugin manager. Please note that SNAP and the individual Sentinel Toolboxes also support numerous sensors other than Sentinel.

	Windows 64-Bit	Windows 32-Bit	Mac OS X	Unix 64-bit
	These installers contain the Sentinel-1, Sentinel-2, Sentinel-3 Toolboxes, download size is close to 900MB.			
Sentinel Toolboxes	<a href="#">Main Download</a>	<a href="#">Main Download</a>	<a href="#">Main Download</a>	<a href="#">Main Download</a>
	<a href="#">Mirror Download</a>	<a href="#">Mirror Download</a>	<a href="#">Mirror Download</a>	<a href="#">Mirror Download</a>

# Εργαλεία επεξεργασίας

← → ↻ <https://step.esa.int/main/> 67% ☆

Science Toolbox Exploitation Platform

## STEP - Scientific Toolbox Exploitation Platform

### Sentinel-2 NDVI over Midi-Pyrenees

Sentinel-2 Normalized Difference Vegetation Index (NDVI) included in the Radiometric Indices Processor of the ESA SNAP Toolbox.

[READ](#) →

● ○ ○ ○ ○

ESA is developing free open source toolboxes for the scientific exploitation of Earth Observation missions under the Scientific Exploitation of Operational Missions (SEOM) programme element. STEP is the ESA community platform for accessing the software and its documentation, communicating with the developers, dialoguing within the science community, promoting results and achievements as well as providing tutorials and material for training scientists using the Toolboxes.

The ESA toolboxes support the scientific exploitation for the ERS-ENVISAT missions, the Sentinels 1/2/3 missions and a range of National and Third Party missions. The three toolboxes are called respectively Sentinel 1, 2 and 3 Toolboxes and share a common architecture called SNAP. They contain some functionalities of historical toolboxes such as BEAM, NEST and Orfeo Toolbox that were developed over the last years.

TOOLBOX

SNAP Features

FEATURE

Download

DOCUMENTATION

Tutorials

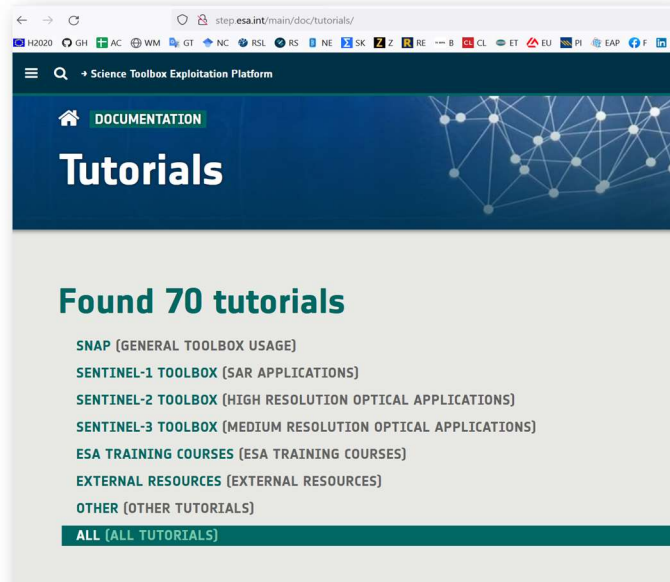
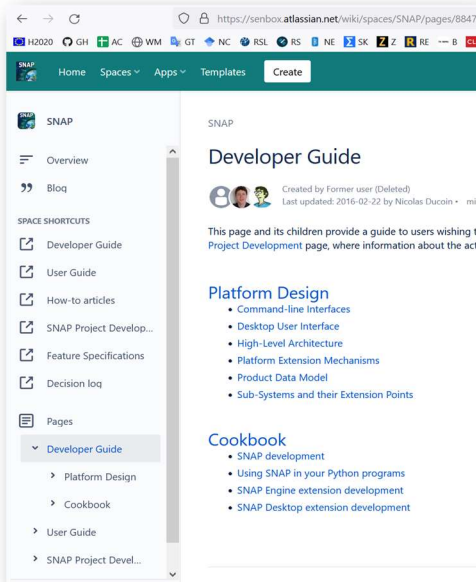
COMMUNITY

Community

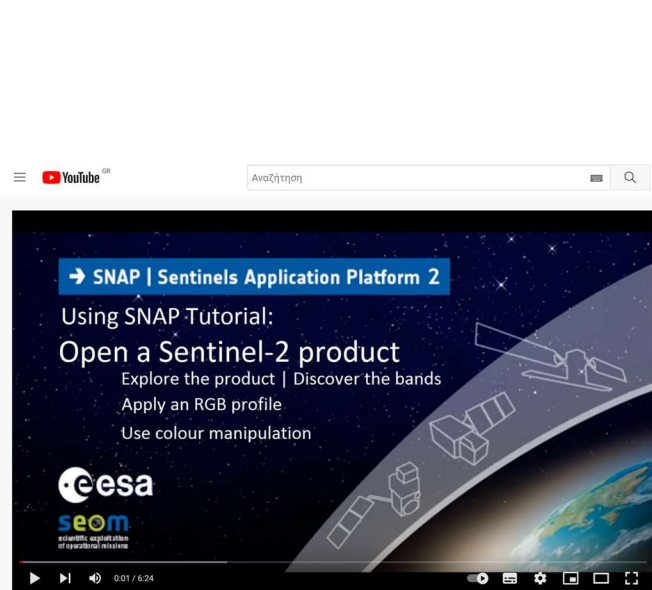
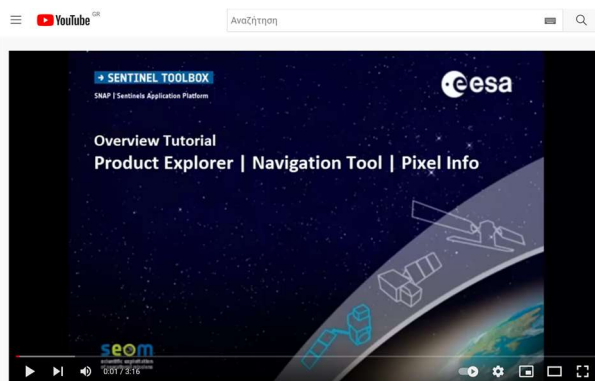
Earth Science for Society

2018

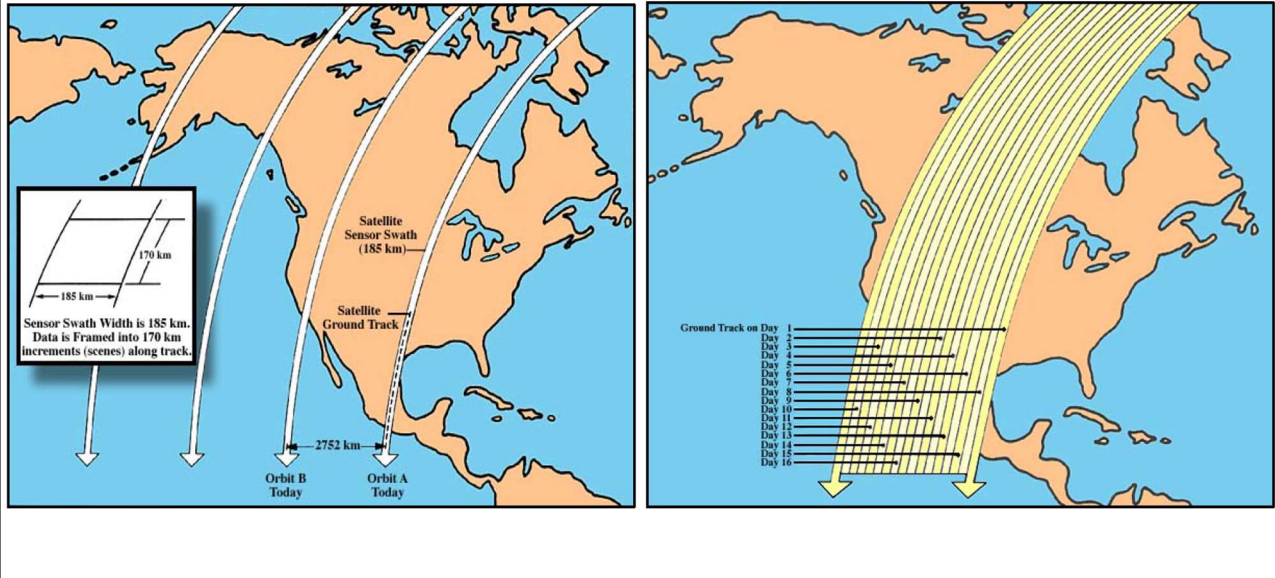
## Εργαλεία επεξεργασίας



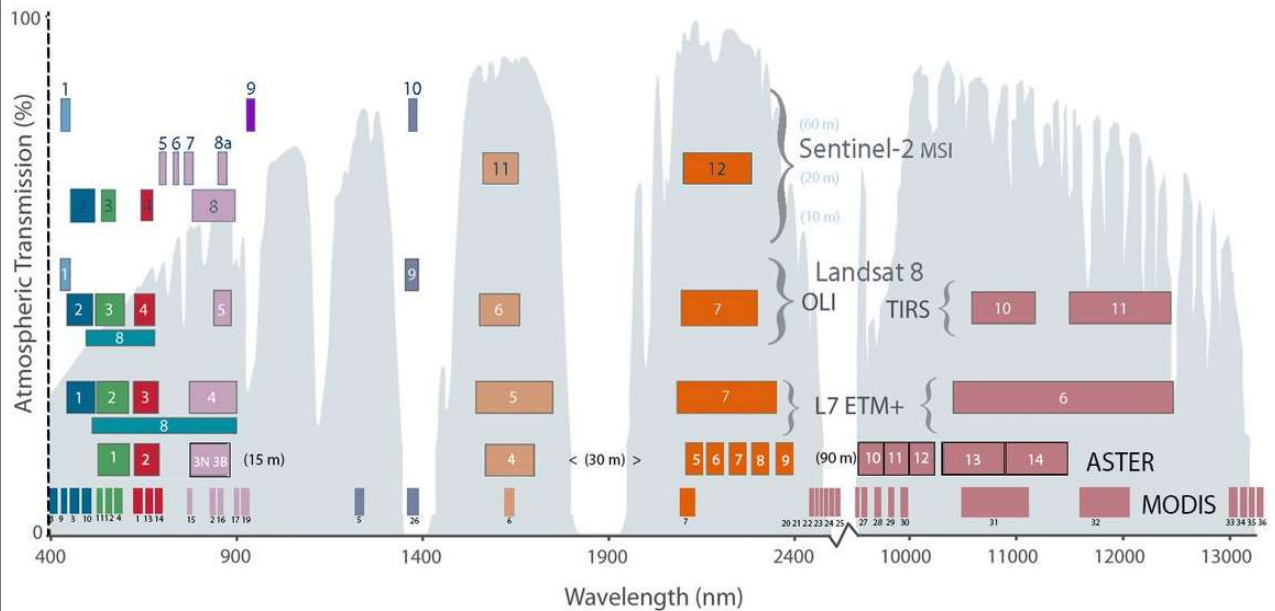
## Εργαλεία επεξεργασίας



## Σάρωση Landsat



## Φασματικά κανάλια Landsat vs Sentinel 2



# Δομή δεδομένων Landsat

## Landsat Collection 2

Landsat Collection 2 Level-1 and Level-2 scene-based products are processed and delivered from a commercial cloud environment. Additional functionalities, tools and services relating to the commercial cloud environment will be included on this web page as they become available.

### Landsat Collection 2 Data Access Portals

	Level-1 Scenes (Global)	Level-2 Scenes (Global)	U.S. Landsat Analysis Ready Data Tiles (U.S.)
Products Available/ Format	Digital Numbers	Surface Reflectance - Surface Temperature	Top of Atmosphere (TOA) Reflectance - TOA Brightness Temperature - Surface Reflectance - Surface Temperature - Pixel Quality Assessment

Landsat 8 File Naming Convention	
LXSS_LLLL_PPPRRR_YYYYMMDD_YYYYMMDD_CC_TX	
L	Landsat
X	Sensor ("C" = OLI/TIRS combined, "O" = OLI-only, "T" = TIRS-only)
SS	Satellite ("08" = Landsat 8)
LLLL	Processing correction level (L1TP/L1G/L1Gs)
PPP	WRS path
RRR	WRS row
YYYYMMDD	Acquisition year (YYYY)/Month(MM)/Day(DD)
YYYYMMDD	Processing year (yyyy)/ Month (mm)/ Day (dd)
CC	Collection number (01, 02...)
TX	Collection category ("RT" = Real-Time, "T1" = Tier 1, "T2" = Tier 2)
<b>Example:</b>	<b>LC08_L1GT_029030_20151209_20160131_01_T1</b>

## Appendix C Metadata File (MTL.txt)

The MTL.txt file is included with all L8 Level 1 Data Products. Landsat MTL files contain beneficial information for the systematic searching and archiving practices of data. Information about data processing and values important for enhancing Landsat data (such as conversion to reflectance and radiance) are also included in this file.

Data Format Control Books (DFCBs) define and describe Landsat metadata. DFCBs for all sensors are located at <https://www.usgs.gov/land-resources/nli/landsat/landsat-project-documents>.

Sample L8 MTL.txt file:

```
GROUP = L1_METADATA_FILE
GROUP = METADATA_FILE_INFO
ORIGIN = "Image courtesy of the U.S. Geological Survey"
REQUEST_ID = "0701809117441_00014"
LANDSAT_SCENE_ID = "LC80330282018251LGN00"
LANDSAT_PRODUCT_ID =
"LC08_L1TP_033028_20180908_20180912_01_T1"
COLLECTION_NUMBER = 01
FILE_DATE = 2018-09-12T22:00:27Z
STATION_ID = "LGN"
PROCESSING_SOFTWARE_VERSION = "LPGS_13.1.0"
END_GROUP = METADATA_FILE_INFO
GROUP = PRODUCT_METADATA
DATA_TYPE = "L1TP"
COLLECTION_CATEGORY = "T1"
ELEVATION_SOURCE = "GLS2000"
OUTPUT_FORMAT = "GEOTIFF"
SPACECRAFT_ID = "LANDSAT_8"
SENSOR_ID = "OLI_TIRS"
WRS_PATH = 33
WRS_ROW = 28
NADIR_OFFNADIR = "NADIR"
TARGET_WRS_PATH = 33
TARGET_WRS_ROW = 28
DATE_ACQUIRED = 2018-09-08
SCENE_CENTER_TIME = "17:35:18.06918692Z"
CORNER_UL_LAT_PRODUCT = 47.09933
CORNER_UL_LON_PRODUCT = -103.71778
CORNER_UR_LAT_PRODUCT = 47.02553
CORNER_UR_LON_PRODUCT = -100.69517
CORNER_LL_LAT_PRODUCT = 45.00187
CORNER_LL_LON_PRODUCT = -103.76543
CORNER_LR_LAT_PRODUCT = 44.93325
CORNER_LR_LON_PRODUCT = -100.85461
```

## Landsat data

<https://earthexplorer.usgs.gov>

<https://glovis.usgs.gov>

The screenshot shows the USGS GloVis web interface. On the left, there are several control panels: 'Choose Your Data Set(s)' with radio buttons for 'DOQ', 'EO-1 ALI', 'EO-1 Hyperion', 'Global Land Survey', 'IRS AWIFS', and 'IRS LISS-3'; 'Metadata Filter' with 'Date Range' (07/07/2021 to 08/08/2021), 'Cloud Cover' (0-100 or empty), and 'Months' (Jan, Feb); and 'Selected Scenes (3)'. The main area is a map of the Middle East region, showing countries like Turkey, Iraq, and Saudi Arabia. The USGS GloVis logo and coordinates (Lat: 36.8995, Lon: 72.2461) are visible in the top right corner of the map area.

## Landsat data

The screenshot shows the USGS GloVis web application. On the left, there are 'Interface Controls' including a 'Choose Your Data Set(s)' section with radio buttons for various Landsat sensors (IRS LIS-3, Landsat 1-5 MSS C1 Level-1, Landsat 4-5 TM C1 Level-1, Landsat 7 ETM+ C1 Level-1, Landsat 8 OLI/TIRS C1 Level-1, and OrbView-3). Below this is a 'Metadata Filter' section with fields for 'Date Range' (07/07/2021 to 08/08/2021), 'Cloud Cover' (0 to 40), and 'Months' (Jan, Feb). The main map area shows a satellite image of the Aegean Sea region with a red box highlighting a selected scene. Below the map is a 'Timeline View' showing a timeline from 2020 to 2022, with a vertical line indicating the current scene's acquisition date in 2021. The scene ID is 'Landsat 8 OLI/TIRS C1 Level-1 LC08\_L1TP\_181036\_20210727\_20210804\_01\_T1'.

## Landsat data

Metadata for LC08\_L1TP\_181036\_20210727\_20210804\_01\_T1

Field	Value
Landsat Product Identifier	LC08_L1TP_181036_20210727_20210804_01_T1
Landsat Scene Identifier	LC81810362021208LGN00
Acquisition Date	2021/07/27
Collection Category	T1
Collection Number	1
WRS Path	181
WRS Row	036
Target WRS Path	181
Target WRS Row	036
Nadir/Off Nadir	NADIR
Roll Angle	-0.001
Date L-1 Generated	2021/08/04
Start Time	2021:208:08:53:19.3567640
Stop Time	2021:208:08:53:51.1267640
Station Identifier	LGN
Day/Night Indicator	DAY
Land Cloud Cover	0.03
Scene Cloud Cover	0.01

Download Options for LC08\_L1TP\_181036\_20210727\_20210804\_01\_T1

- DOWNLOAD LandsatLook Natural Color Image (2.19 MB)
- DOWNLOAD LandsatLook Thermal Image (1.18 MB)
- DOWNLOAD LandsatLook Quality Image (460.45 KB)
- DOWNLOAD LandsatLook Images with Geographic Reference (3.82 MB)
- DOWNLOAD** Level-1 GeoTIFF Data Product (792.50 MB)

CLOSE



# Landsat data

The screenshot shows the USGS GloVis web interface. On the left, there are 'Interface Controls' including a 'Data Set Filter' with options for various Landsat sensors and a 'Metadata Filter' with 'Date Range' (07/07/2021 to 08/08/2021) and 'Cloud Cover' (0 to 40) settings. The main area displays a map of the Mediterranean coast with a red rectangle indicating the selected scene. A 'Metadata for LC08\_L1TP\_181036\_20210711\_20210720\_01\_T1' window is open, showing the following details:

Field	Value
Landsat Product Identifier	LC08_L1TP_181036_20210711_20210720_01_T1
Landsat Scene Identifier	LC81810362021182LGN00
Acquisition Date	20210711
Collection Category	T1
Collection Number	1
WRS Path	181
WRS Row	036
Target WRS Path	181
Target WRS Row	036
Nadir/Off Nadir	NADIR
Roll Angle	-0.001
Date L-1 Generated	20210720
Start Time	2021:192:08:53:12:7445060
Stop Time	2021:192:08:53:44:5145060
Station Identifier	LGN
Day/Night Indicator	DAY
Land Cloud Cover	2.71
Scene Cloud Cover	0.47

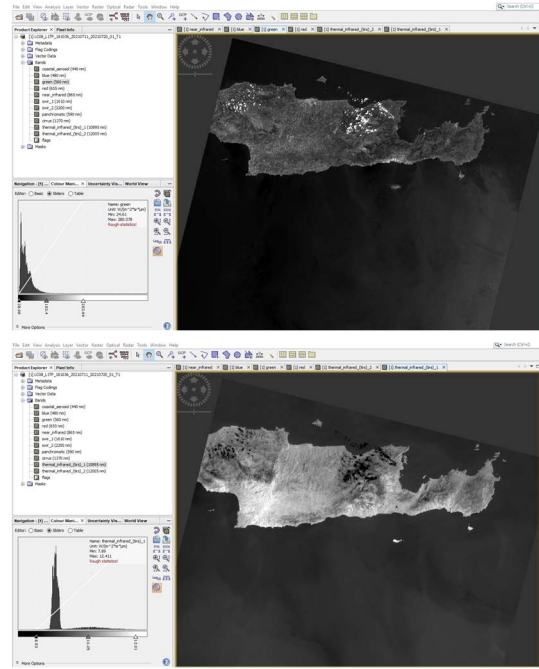
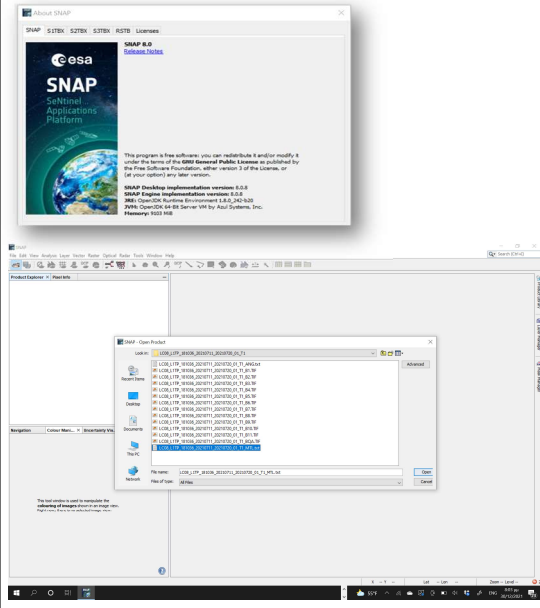
At the bottom, a 'Timeline View' shows the scene's position on a timeline from 2020 to 2022, with the current scene highlighted at 2021-07-11.

# Landsat data

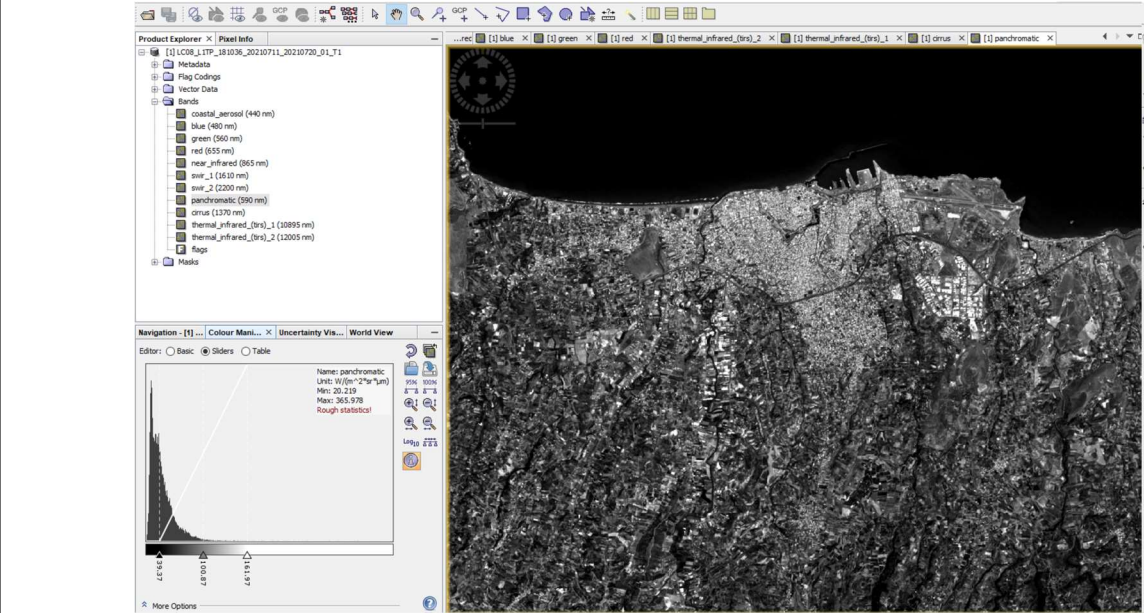
The screenshot shows a Windows File Explorer window displaying the directory structure of the Landsat data. The path is 'C:\Data\Landsat\LC08\_L1TP\_181036\_20210711\_20210720\_01\_T1'. The files are organized into sub-directories for each WRS Row (1810, 1811, 1812, 1813, 1814, 1815, 1816, 1817, 1818, 1819, 1820) and each WRS Path (A, B, C, D, E, F, G, H, I, J, K, L, M). The files are named according to the Landsat product identifier and the WRS Path/Row. For example, the files in the 1810 row are:

- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_A
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_B
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_C
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_D
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_E
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_F
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_G
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_H
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_I
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_J
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_K
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_L
- LC08\_L1TP\_1810\_36\_20210711\_20\_210720\_01\_T1\_M

# Landsat data



# Landsat data



# Landsat data

The first screenshot displays a metadata table with the following data:

Name	Value	Type	Units
K_CONSTANT_BAND_10	774.8853	float64	
K_CONSTANT_BAND_10	101.6789	float64	
K_CONSTANT_BAND_11	460.8883	float64	
K_CONSTANT_BAND_11	1201.1442	float64	

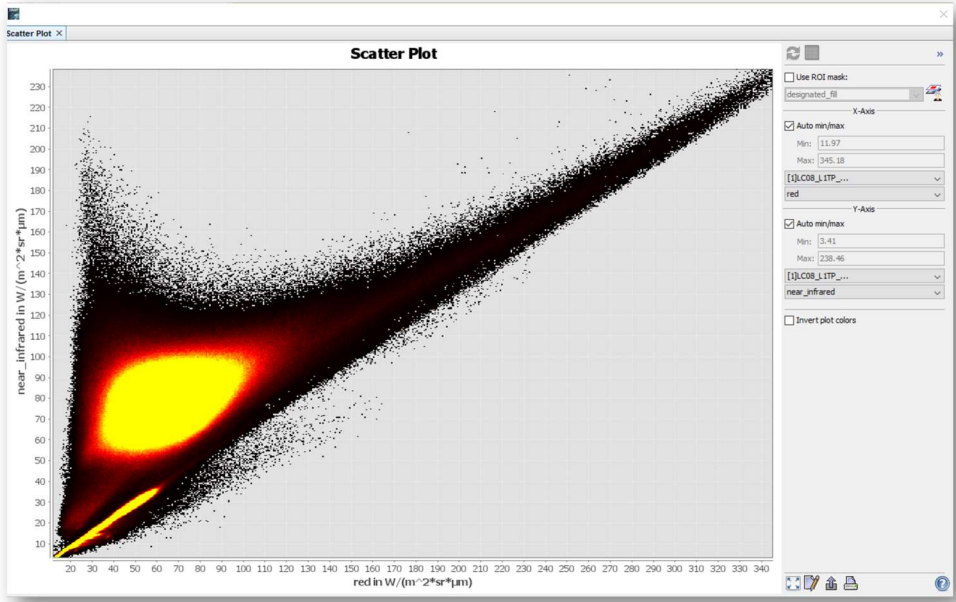
The second screenshot displays a metadata table with the following data:

Name	Value	Type	Units
RADIANCE_MANDM_BAND_1	735.30202	float64	
RADIANCE_MANDM_BAND_1	-60.72808	float64	
RADIANCE_MANDM_BAND_2	753.04016	float64	
RADIANCE_MANDM_BAND_2	-63.39653	float64	
RADIANCE_MANDM_BAND_3	693.52004	float64	
RADIANCE_MANDM_BAND_3	-57.30414	float64	
RADIANCE_MANDM_BAND_4	585.15247	float64	
RADIANCE_MANDM_BAND_4	-46.32286	float64	
RADIANCE_MANDM_BAND_5	339.04814	float64	
RADIANCE_MANDM_BAND_5	-29.57071	float64	
RADIANCE_MANDM_BAND_6	89.05227	float64	
RADIANCE_MANDM_BAND_6	-7.05397	float64	
RADIANCE_MANDM_BAND_7	30.11528	float64	
RADIANCE_MANDM_BAND_7	-2.47668	float64	
RADIANCE_MANDM_BAND_8	662.23157	float64	
RADIANCE_MANDM_BAND_8	-54.68721	float64	
RADIANCE_MANDM_BAND_9	128.94974	float64	
RADIANCE_MANDM_BAND_9	-11.5969	float64	
RADIANCE_MANDM_BAND_10	22.0018	float64	
RADIANCE_MANDM_BAND_10	0.10033	float64	
RADIANCE_MANDM_BAND_11	22.0018	float64	
RADIANCE_MANDM_BAND_11	0.10033	float64	

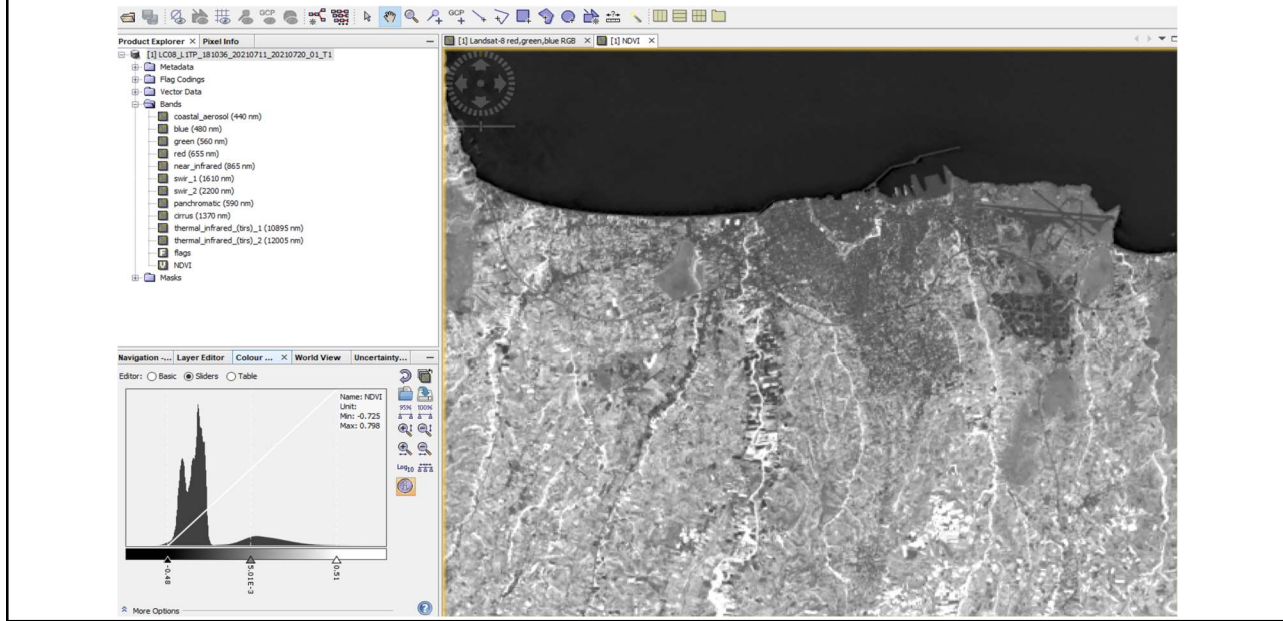
The third screenshot displays a metadata table with the following data:

Name	Value	Type	Units
MAP_PROJECTION	UTM	str	
DATUM	WGS84	str	
ELLIPSOID	WGS84	str	
UTM_ZONE	35	int32	
GRID_CELL_SIZE_PANCHROMATIC	15.0	float64	
GRID_CELL_SIZE_REFLECTIVE	30.0	float64	
GRID_CELL_SIZE_THERMAL	30.0	float64	
ORIENTATION	NORTH_UP	str	
RESAMPLING_OPTION	CUBIC_CONVOLUTION	str	

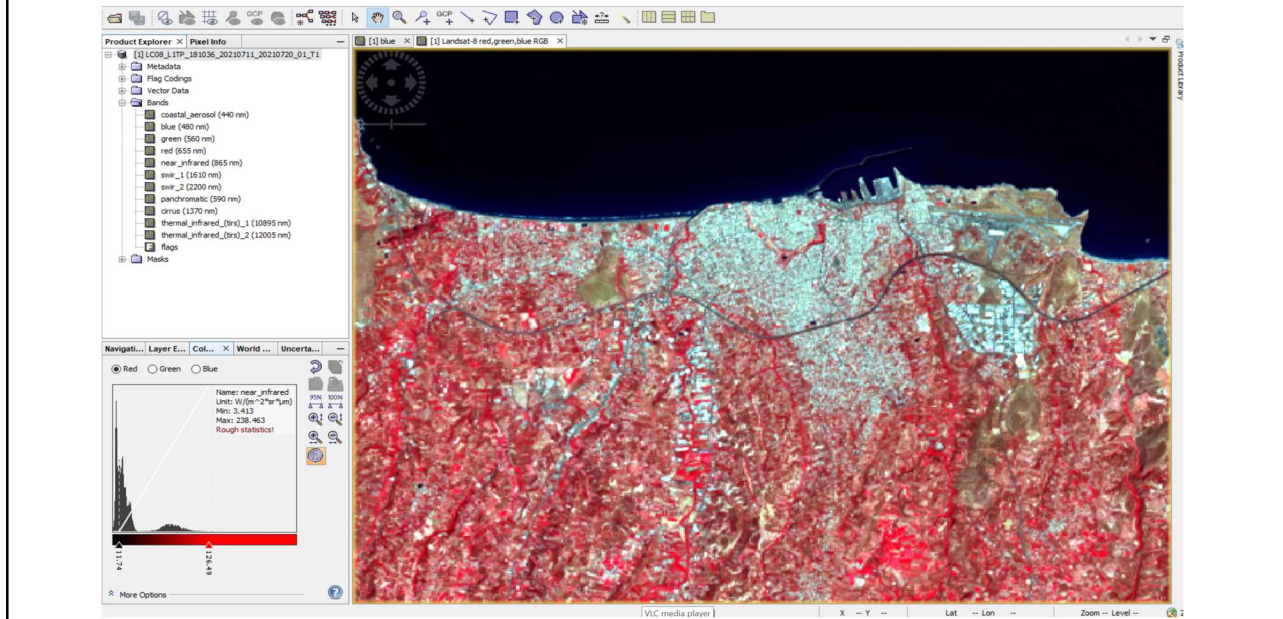
# Landsat data



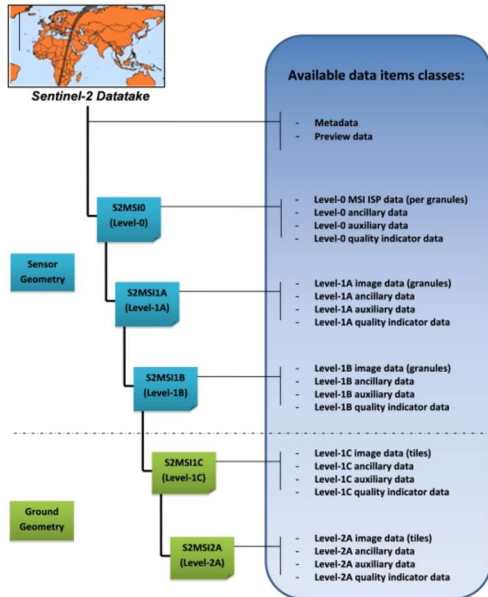
# Landsat data



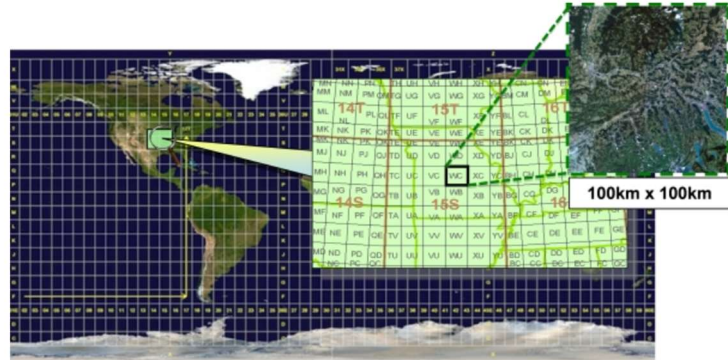
# Landsat data



## Δομή δεδομένων Sentinel 2



Name	High-level Description	Production & Distribution	Data Volume
Level-1C	Top-of-atmosphere reflectances in cartographic geometry	Systematic generation and on-line distribution	600 MB (each 100x100 km <sup>2</sup> )
Level-2A	Bottom-of-atmosphere reflectance in cartographic geometry	Systematic generation and on-line distribution and generation on user side (using Sentinel-2 Toolbox)	800 MB (each 100x100 km <sup>2</sup> )

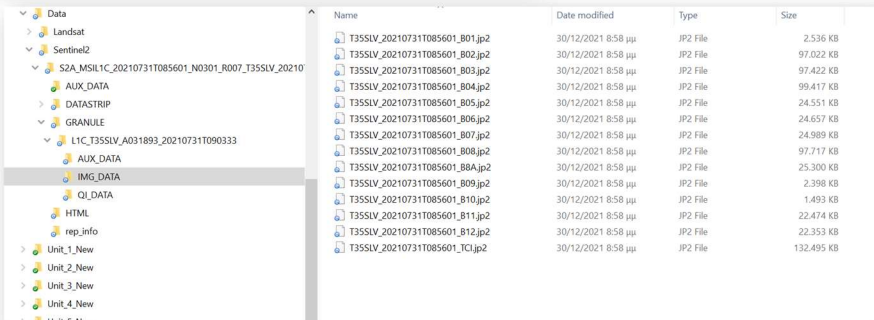
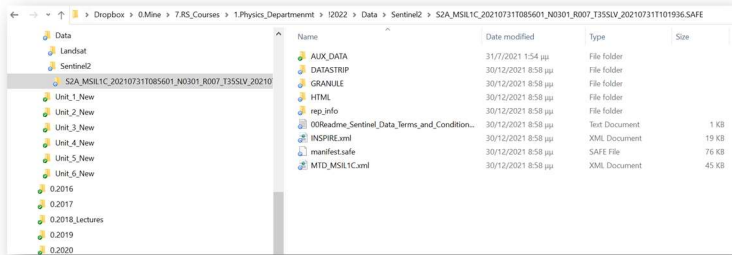


Level-1C product tiling

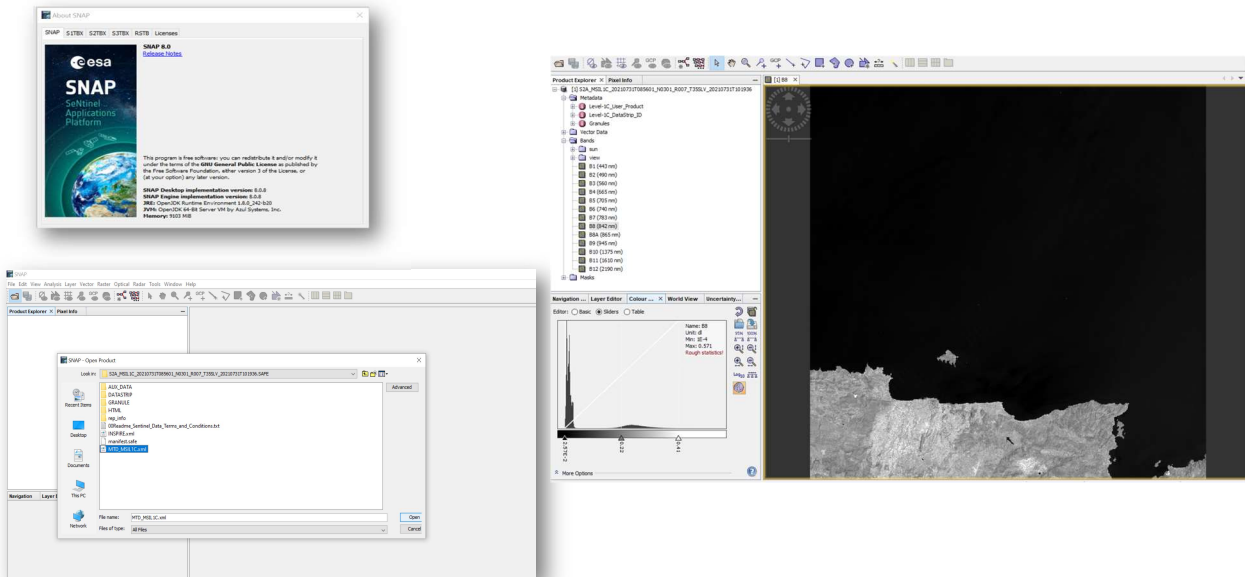
## Sentinel 2 data

<https://browser.dataspace.copernicus.eu/>

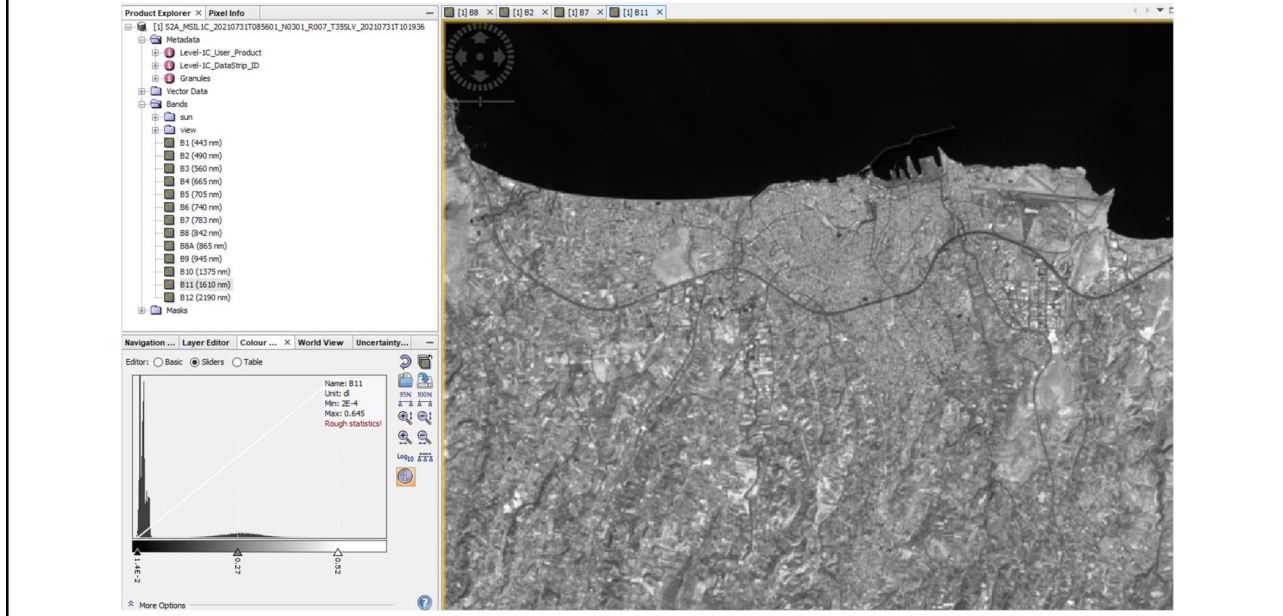
# Sentinel 2 data



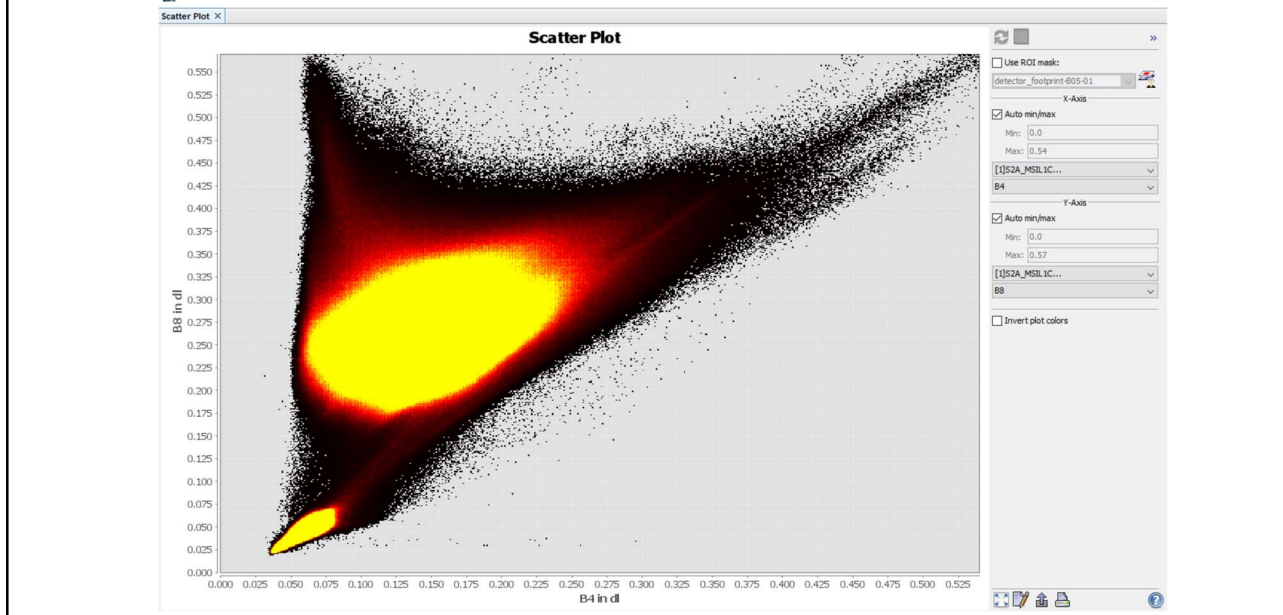
# Sentinel 2 data



# Sentinel 2 data



# Sentinel 2 data



# Sentinel 2 data

