Software User Manual

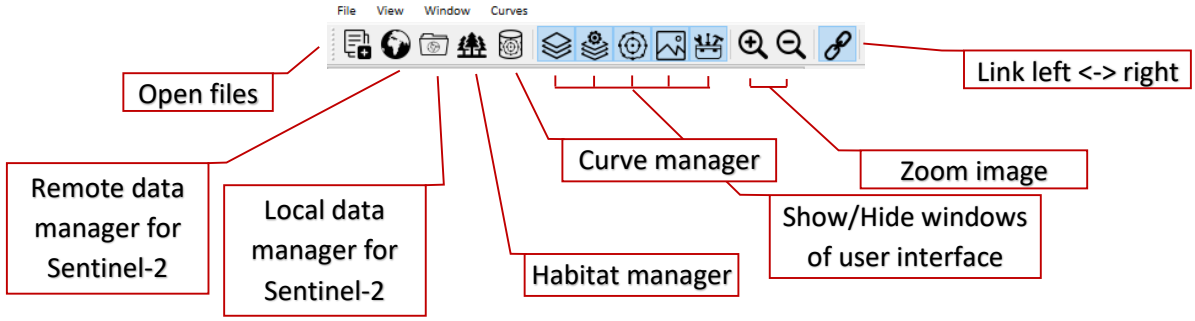
NaturaSat-Wetlands and NaturaSat-Historic

Contents

User interface

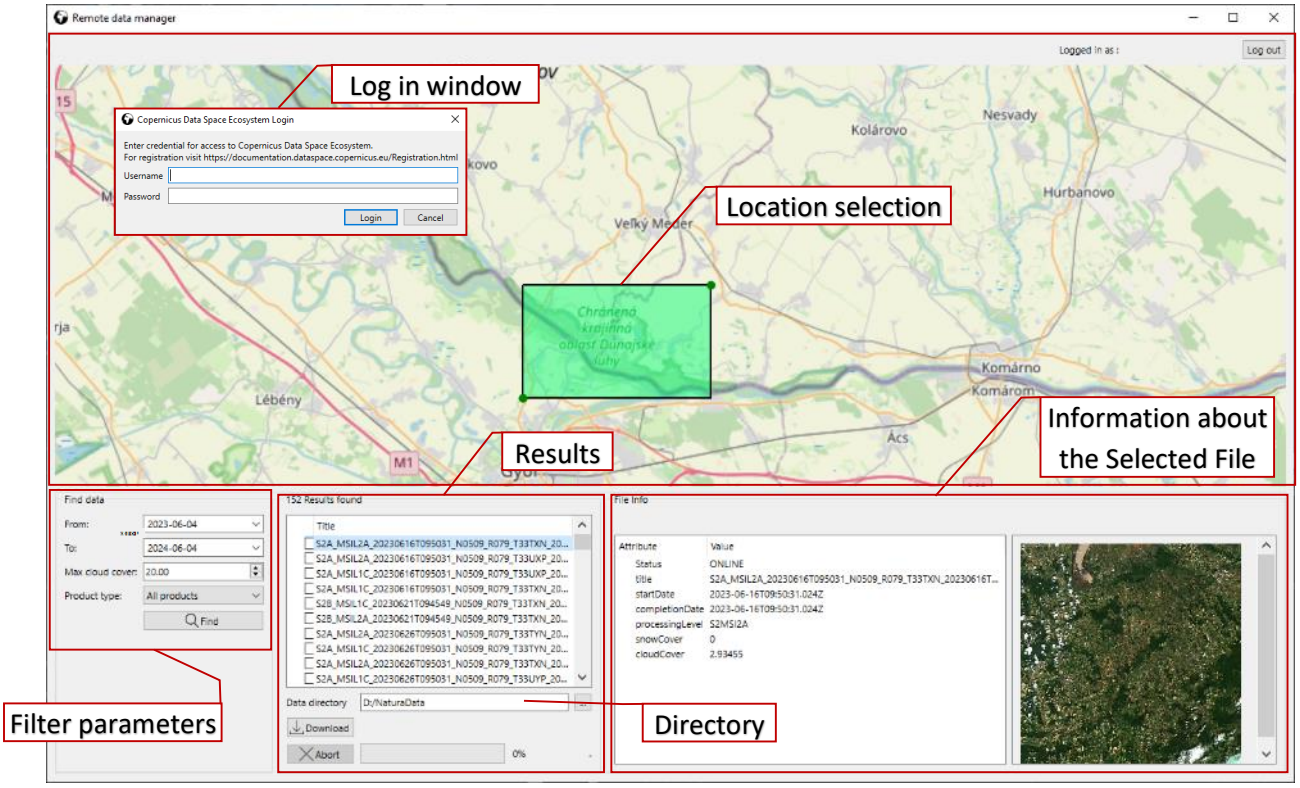
Component	Description
Main Menu and Main Menu Toolbar	This section contains menu actions for managing data and curves, as well as options for customizing the user interface.
Viewer for Loaded Data	Displays the data selected in the *Data Explorer*.
List and Settings for Files and Curves	Includes the *Data Explorer* for managing data, the *Curve Explorer* for managing curve sets and curves, and the Properties panel for adjusting visualization settings of data and curves.
Preview Map	Displays a preview image of the data selected in the *Data Explorer*, with the visualized area also visible in the *Viewer for Loaded Data*. **only for Sentinel-2*
Tool	Contains the settings and controls for NaturaSat software tools.

Main menu



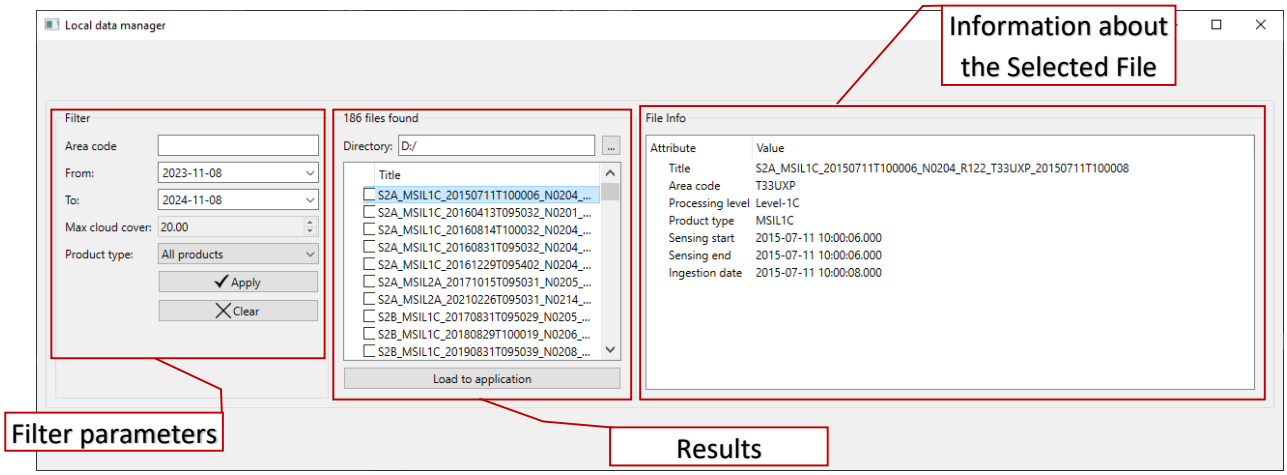
Component	Description
Open file/files	This main menu action allows you to load one or more files into the *Data Explorer* directly from a selected folder.
Remote data manager for Sentinel-2	This main menu action opens a module that allows you to download Sentinel-2 files from Copernicus Data Space Ecosystem remote servers and save them to a selected folder.
Local data manager for Sentinel-2	This main menu action opens a module that allows you to locate and load Sentinel-2 files from a selected folder.
Habitat manager	This main menu action opens a module that allows you to add and modify the phytosociological relevés of habitats stored in a .csv database file.
Curve Manager	This main menu action opens a module that allows you to browse the database of validated curves, select multiple curves, and load them into the *Curve Explorer*.
Show/Hide windows of user interface	A group of buttons for showing or hiding user interface windows, such as the *Preview Map*, *Data Explorer*, *Curve Explorer*, and more.
Zoom image	Buttons for zooming in and out of the image visible in the *Viewer for Loaded Data*.
Link left <-> right	When this button is active, the left image tab is synchronized with the right image tab (including zoom, position, etc.). **only for Sentinel-2*

Remote data manager for Sentinel-2



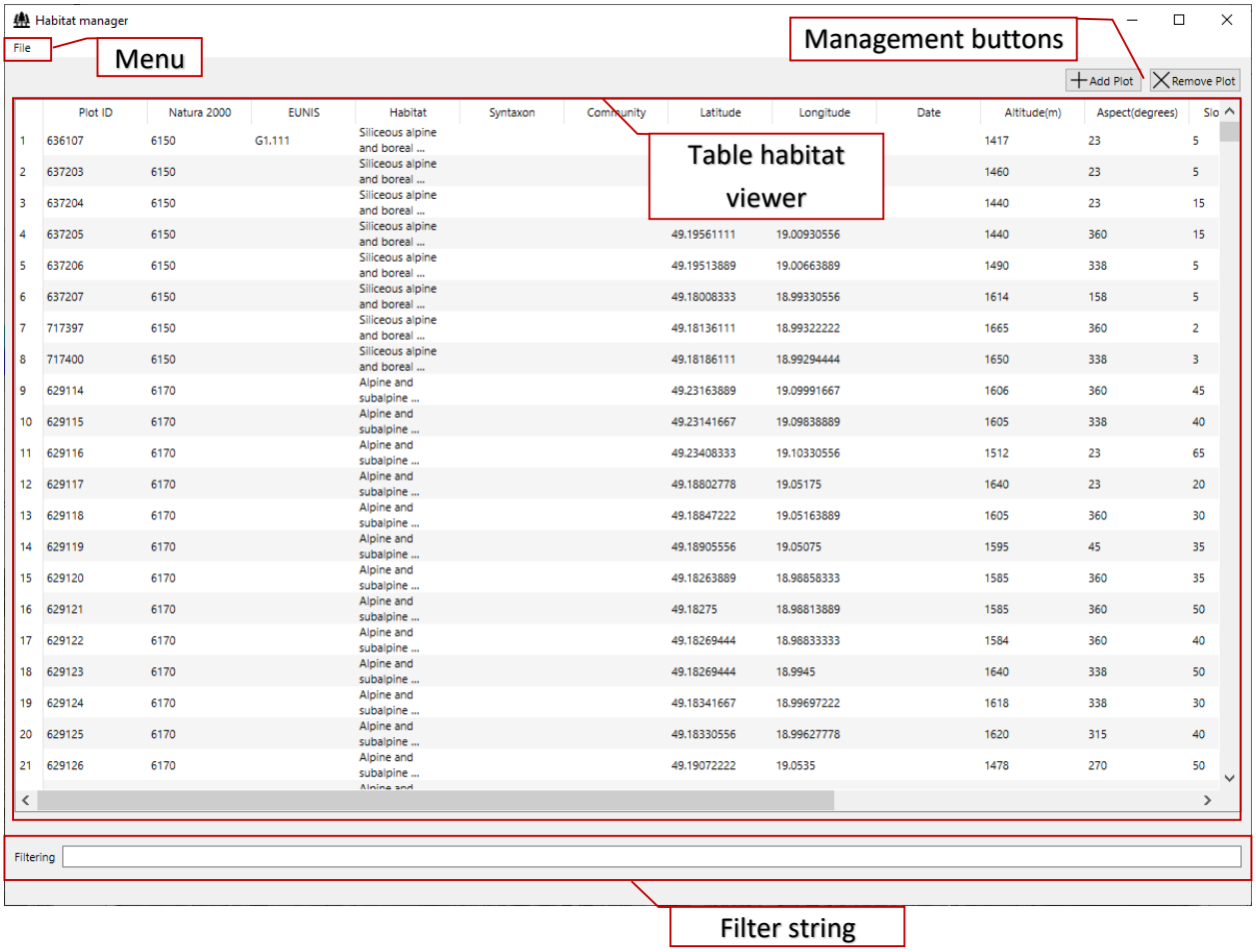
Component	Description
Log in window	To use the *Remote Data Manager*, you must log in. The username and password are the same as those for the Copernicus Data Space Ecosystem. For registration, visit https://dataspace.copernicus.eu/
Location selection	Allows you to select a region using a rectangular bounding box grid, created by clicking with the left mouse button.
Filter parameters	Contains parameters such as sensing date, cloud coverage, and product type, used to search for available Sentinel-2 images on the Copernicus Data Space Ecosystem.
Results	Displays the search results from the Copernicus Data Space Ecosystem based on the selected *Filter parameters*. You can download multiple images by checking the checkboxes and clicking the download button.
Directory	All selected images will be downloaded to the chosen *Directory*.
Information about the selected file	When an entry from the *Results* list is selected, its information and *Preview map* will be displayed in the *Information About the Selected File* section.

Local data manager for Sentinel-2



Component	**Description**
Directory	The target directory must be set for browsing in it.
Filter parameters	Contains parameters, such as area code, date and cloud coverage, for searching within the selected folder in the *Directory*.
Results	Displays the search results from the selected folder in the *Directory* based on the chosen filter parameters. You can load multiple images by checking the checkboxes and clicking the *Load to Application* button.
Information about the selected file	When an entry from the *Results* list is selected, its information will be displayed in the *Information About the Selected File* section.

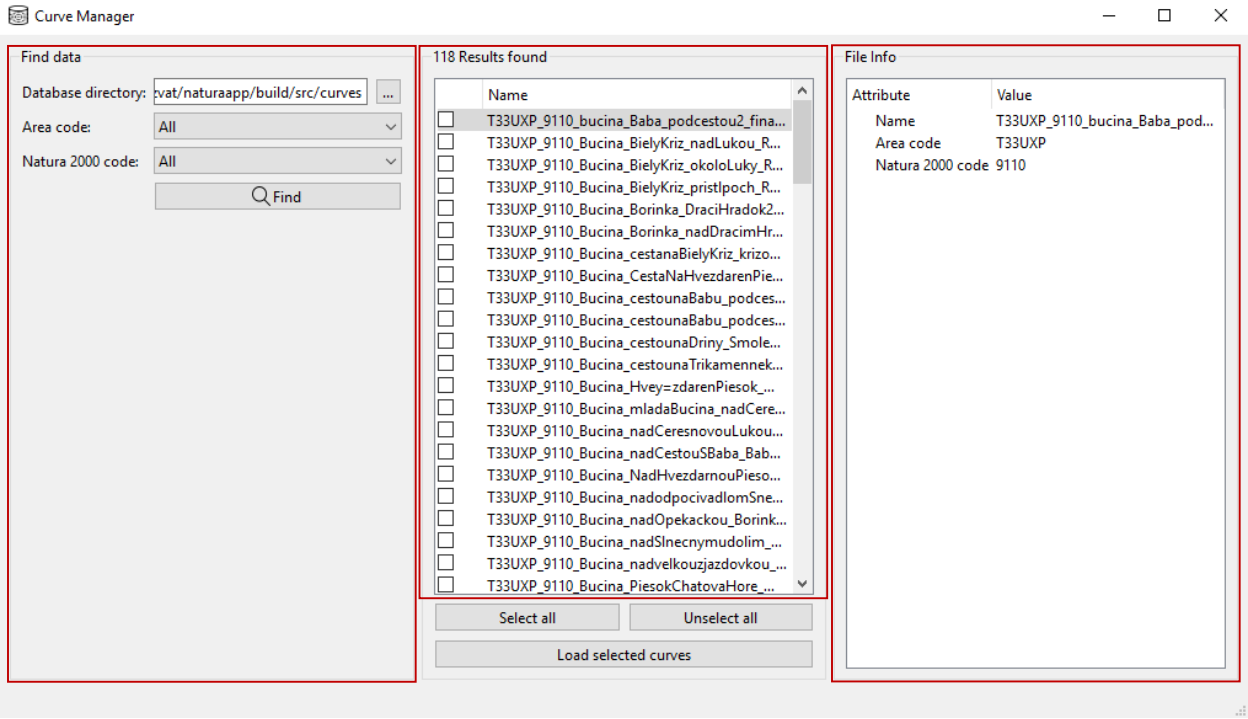
Habitat manager



Plot ID	Natura 2000	EUNIS	Habitat	Syntaxon	Community	Latitude	Longitude	Date	Altitude(m)	Aspect(degrees)	Slo
1 636107	6150	G1.111	Siliceous alpine and boreal ...						1417	23	5
2 637203	6150		Siliceous alpine and boreal ...						1460	23	5
3 637204	6150		Siliceous alpine and boreal ...						1440	23	15
4 637205	6150		Siliceous alpine and boreal ...			49.19561111	19.00930556		1440	360	15
5 637206	6150		Siliceous alpine and boreal ...			49.19513889	19.00663889		1490	338	5
6 637207	6150		Siliceous alpine and boreal ...			49.18008333	18.99330556		1614	158	5
7 717397	6150		Siliceous alpine and boreal ...			49.18136111	18.99322222		1665	360	2
8 717400	6150		Siliceous alpine and boreal ...			49.18186111	18.99294444		1650	338	3
9 629114	6170		Alpine and subalpine ...			49.23163889	19.09991667		1606	360	45
10 629115	6170		Alpine and subalpine ...			49.23141667	19.09838889		1605	338	40
11 629116	6170		Alpine and subalpine ...			49.23408333	19.10330556		1512	23	65
12 629117	6170		Alpine and subalpine ...			49.18802778	19.05175		1640	23	20
13 629118	6170		Alpine and subalpine ...			49.18847222	19.05163889		1605	360	30
14 629119	6170		Alpine and subalpine ...			49.18905556	19.05075		1595	45	35
15 629120	6170		Alpine and subalpine ...			49.18263889	18.98858333		1585	360	35
16 629121	6170		Alpine and subalpine ...			49.18275	18.98813889		1585	360	50
17 629122	6170		Alpine and subalpine ...			49.18269444	18.98833333		1584	360	40
18 629123	6170		Alpine and subalpine ...			49.18269444	18.9945		1640	338	50
19 629124	6170		Alpine and subalpine ...			49.18341667	18.99697222		1618	338	30
20 629125	6170		Alpine and subalpine ...			49.18330556	18.99627778		1620	315	40
21 629126	6170		Alpine and subalpine ...			49.19072222	19.0535		1478	270	50

Component	**Description**
Menu	Contains actions for loading data from a .csv database file into the *Table Habitat Viewer* and for saving any modifications.
Management buttons	The *Add Plot* button creates a new row in the *Table Habitat Viewer*, where you can enter information for the new habitat relevés. The *Remove Plot* button removes the selected row from the *Table Habitat Viewer*.
Table habitat viewer	The table displays information for all habitat relevés from the loaded .csv database.
Filter string	Allows you to enter a filter condition. Only entries that meet these conditions will be displayed in the *Table Habitat Viewer*.

Curve manager



Component	Description
Filter parameters	Contains parameters such as the path to the directory of validated curves, area code, or Natura 2000 code, for searching available validated curves.
Results	Displays the list of search results based on the chosen filter parameters. You can load multiple curves by checking the checkboxes and clicking the *Load Selected Curves* button.
Curve information	When an entry is selected from the *Results* list, detailed information about the curve is shown in the *Curve Information* section.

Viewer for loaded data

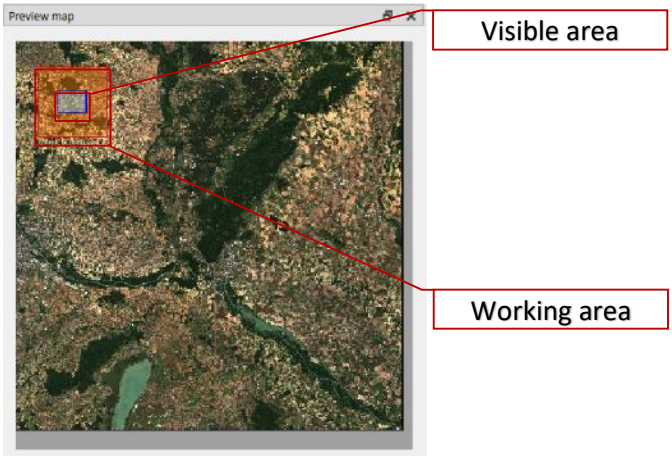
Component	Description	
Tabs	Allows you to display two tabs with images of loaded data simultaneously. A button with a plus symbol next to the first tab creates the second tab. Both tabs can be viewed in the example: *Viewer for Loaded Data with Two Tabs*.	
Loaded data	Displays the image of the data selected from the *Data Explorer*.	
	Hold the Left Mouse Button + Move the Mouse	Moves the displayed image within the loaded data.
	Scroll with the Mouse Wheel	Zooms in or out on the displayed data.
Navigation panel	Displays the GPS coordinates of the pixel where the mouse cursor is located. For Sentinel-2 data, it also shows the North indicator and the scale of the displayed data.	

Example: *Viewer for loaded data* with two *Tabs*

Component	Description
Tabs	You can display two tabs with images of loaded data simultaneously. This example shows two tabs with data from the same location but on different dates. A button with a minus symbol next to the first tab closes the second tab.

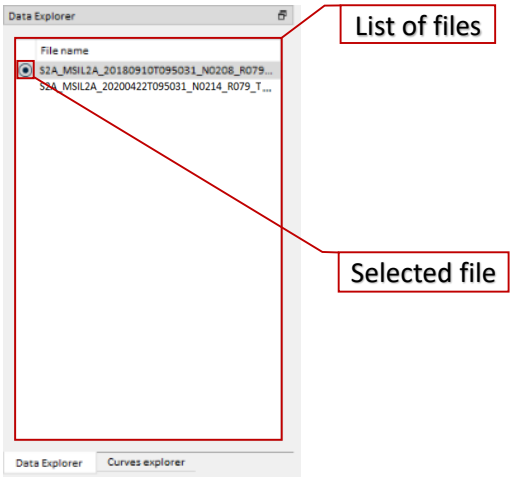
Preview map

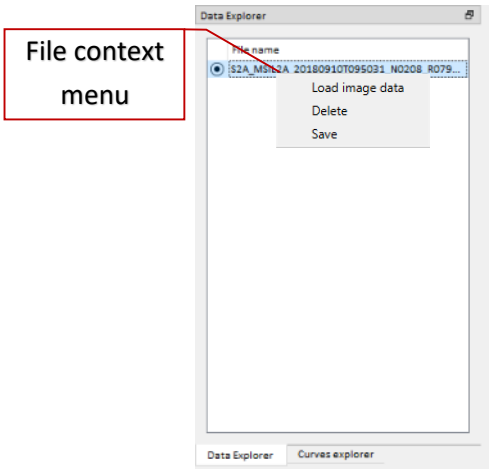
**only for Sentinel-2 data*



Component	Description
Visible area	The portion of the loaded data that is visible in the *Viewer for Loaded Data*.
Working area	The area of the data where software tools can be applied.

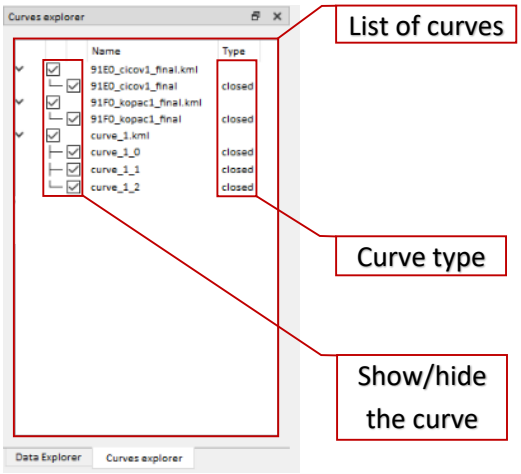
Data Explorer



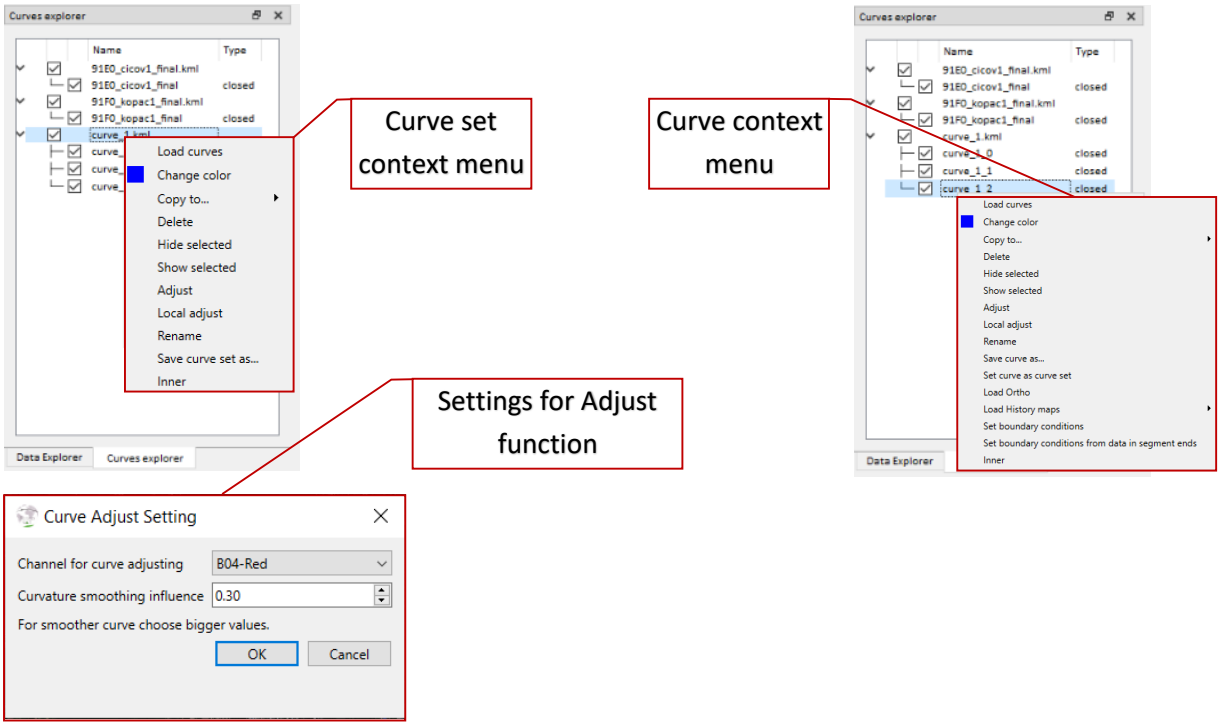


Component	Description	
List of files	Contains a list of all loaded data.	
Selected file	The file that is selected is displayed in the *Loaded Data* section of the *Viewer for Loaded Data*.	
File context menu	Right-clicking a file in the *List of files* opens the context menu.	
	Delete	Deletes the selected files from the *List of Files* in the *Data Explorer*. If the selected file is being deleted, it will also be closed in the *Viewer for Loaded Data*.
	Load image data	Loads a new file into the application.
	Save	Saves a copy of the selected file.
Double-click the Left Mouse Button	Double-clicking a file in the *List of Files* makes it the *Selected File* and displays it in the *Loaded Data* section of the *Viewer for Loaded Data*.	

Curve explorer



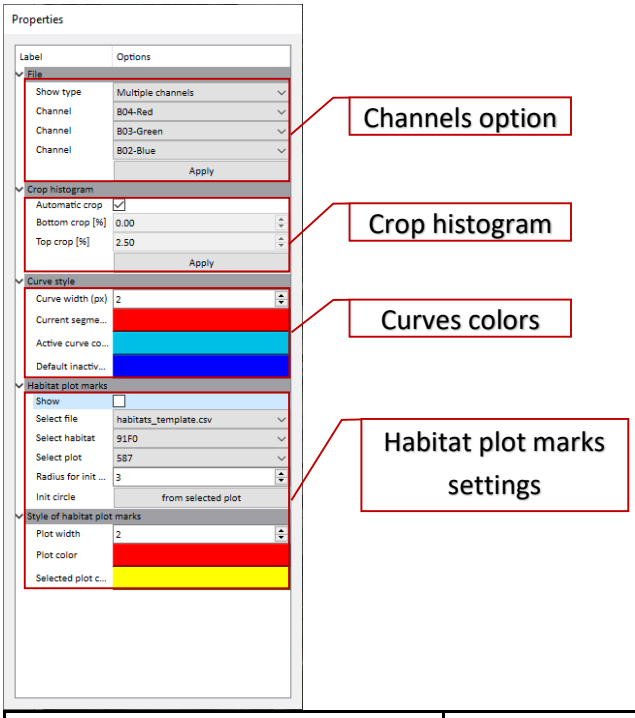
Component	Description
List of curves	Contains a list of all loaded curves for the selected file in the *Data Explorer*. The *List of Curves* follows a specific hierarchy: it consists of curve sets, each containing one or more curves. For example, the third loaded curve set contains three curves.
Curve type	Provides information about the type of the curve.
Show/hide the curve	If the checkbox is checked, the curve set (with all curves) or the individual curve is shown in the *Loaded Data* section of the *Viewer for Loaded Data*. If unchecked, the curve set (with all curves) or the individual curve is hidden.
Double-Click the Left Mouse Button	Double-clicking a curve set or individual curve in the *List of Curves* sets it as active and focuses the image in the *Viewer for Loaded Data* on that curve set or curve.



Component	Description		
Curve set/Curve context menu	Right-clicking on a curve set or curve in the *List of Curves* opens the context menu.		
	Load curves	Allows loading one or more curves into the *Curve Explorer* directly from the selected folder.	
	Adjust	Allows adjusting selected curve sets or curves. When adjusting a curve set, all curves in the set are adjusted.	
		Channel for curve adjusting	Select the channel that will be used for adjustment.
		Curvature smoothing influence	A parameter for adjustment. To achieve a smoother curve, choose a larger value closer to 1.
	Local adjust	Allows adjusting part of a selected curve set or curve. The first click sets the first point defining the adjustment part, and when adjusting a curve set, the first click also selects the curve to adjust. The second click sets the second point, and the third click defines the part of the curve to be adjusted. Mouse movement adjusts the selected part. The final click ends the local adjustment. The adjustment can be canceled by right-clicking.	
	Change color	Allows changing the color of selected curve sets or curves. When changing the color of a curve set, all curves in the set adopt the same color. Curves within a set can have different colors.	
	Copy to …	Allows copying selected curve sets or curves to another file with the same georeferencing in the *Data Explorer*.	
	Delete	Allows deleting selected curve sets or curves.	
	Hide selected	Allows hiding selected curve sets or curves. When hiding a curve set, all curves in the set are hidden.	

	Show selected	Allows showing selected curve sets or curves. When showing a curve set, all curves in that set are shown.
	Rename	Allows renaming a selected curve set or curve.
	Save curve set as / Save curve as…	Allows saving the curve set as a .kml file.
	Set curve as curve set	Allows setting the selected curves as new curve sets and adding them to the *List of Curves*. This action is available only in the curves context menu.
	Load Ortho	Initiates the download and loading of an orthophoto map for the area bounded by the selected curve. (For more details, see the *Orthophoto API* section.)
	Load History Map	Initiates the download and loading of historical maps for the area bounded by the selected curve. (For more details, see the *Historical Map API* section.)
	Set boundary condition	Begins the process of setting boundary conditions for hydrological modeling. Left-click near the vertex of the selected curve to input the water level height at that vertex.
	Set boundary condition from data in segment ends	Automatically retrieves water levels from the loaded Digital Terrain Model (DTM) dataset at the segment ends of the selected curve and sets them as boundary conditions for hydrological modeling. **Only for DTM .tif files*.
	Inner	Allows setting selected curve sets or curves as "inner." When a curve set is set as inner, all curves in that set are marked as inner. Curves within a curve set can have different inner statuses.

Properties

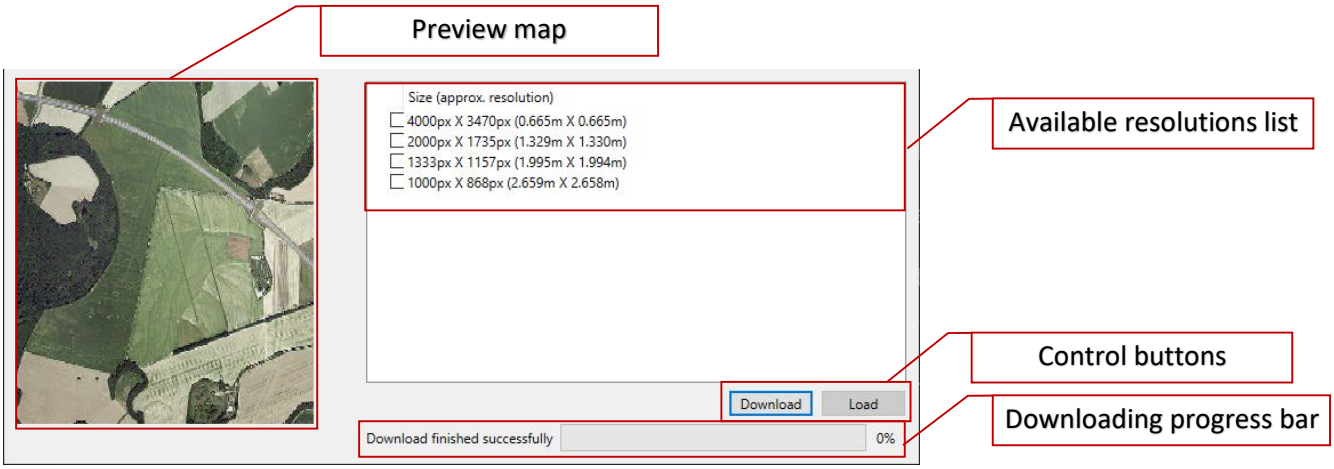


Component	Description	
Channels option	Show type	Allows choosing between two display types: *Single Channel* – the image in the *Viewer for Loaded Data* consists of one optical channel, or *Multiple Channels* – the image in the *Viewer for Loaded Data* consists of three optical channels.
	Channel	Contains the names of all available channels from the loaded data. This choice is possible in both single and multiple display types.
Crop histogram	Bottom crop [%]	Sets the lower boundary for the crop histogram. Image intensities below this boundary will be set to zero.
	Top crop [%]	Sets the upper boundary for the crop histogram. Image intensities above this boundary will be set to one.
Curves colors	Curve width (px)	Sets the width of the curve line in the *Viewer for Loaded Data*.
	Current segment color	Sets the color of the current segment during semi-automatic segmentation.
	Active curve color	Sets the color of the selected curve set or curve.

	Default inactive curve color	Sets the color of the non-selected curve set or curve.
Habitat plot marks	Show	Show/hide habitat plot marks.
	Select file	Select the .CSV file of the habitat marks database.
	Select habitat/plot	Select the active habitat/plot.
	Radius for Init from Habitat Plot Mark	Radius of the initial circle for automatic segmentation with the center in the selected active habitat mark.
	Init Circle from Selected Plot	Create an initial circle curve with the selected radius.
Style of habitat plot marks	Plot width	Width of the visible habitat plot mark.
	Plot color	Default color of the habitat plot mark.
	Selected plot color	Color of the selected active plot mark.

Ortophoto API

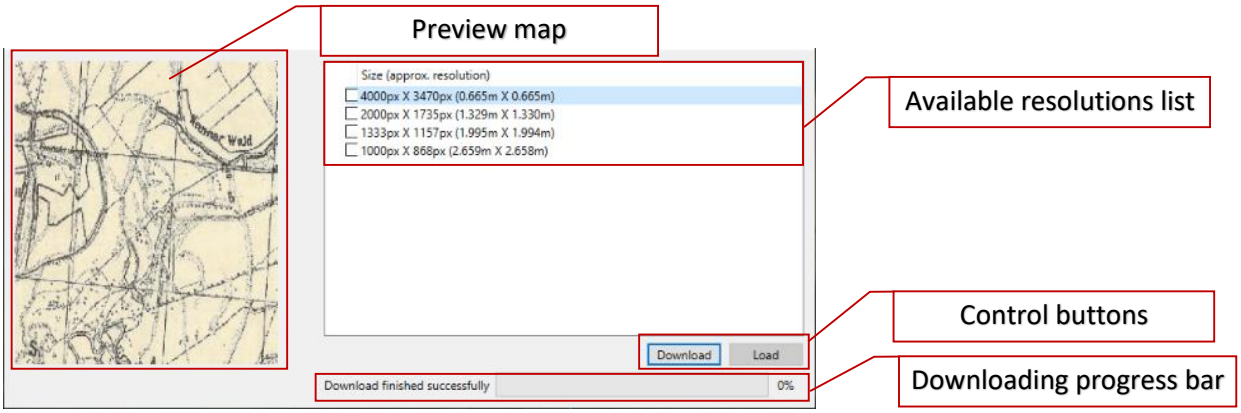
- To initialize the Orthophoto API, left-click on the selected curve and choose *Load Ortho* from the context menu.



Component	Description
Available Resolution List	Contains a list of all available image sizes with their resolutions.
Control Buttons	To download images, first check the checkbox next to the desired resolution in the list, then click the *Download* button. Click *Load* to load the downloaded data into the application.
Downloading progress bar	Displays the current status of the downloading process.
Preview map	Displays a low-resolution image preview of the selected data.

Historical map API

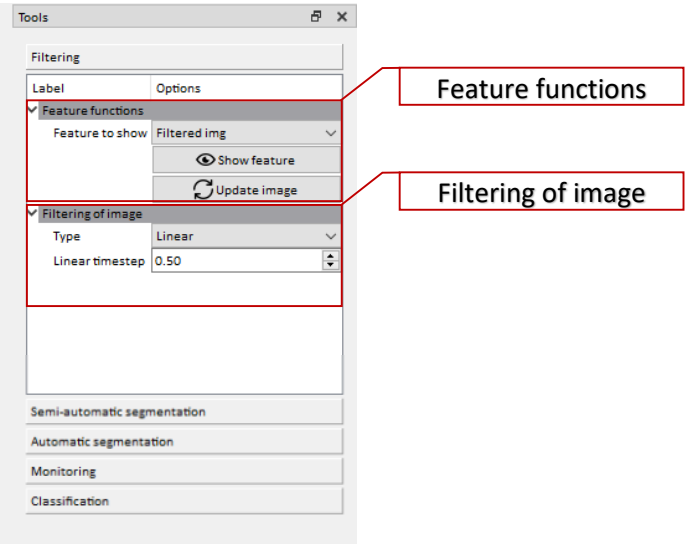
- To initialize the *Historical Map API*, left-click on the selected curve, choose *Load History Map*, and select the desired product from different military mapping periods in the context menu.



Component	**Description**
Available Resolution List	Contains a list of all available image sizes with their resolutions.
Control Buttons	To download images, first check the checkbox next to the desired resolution in the list, then click the *Download* button. Click *Load* to load the downloaded data into the application.
Downloading progress bar	Displays the current status of the downloading process.
Preview map	Displays a low-resolution image preview of the selected data.

Tools

Filtering tool



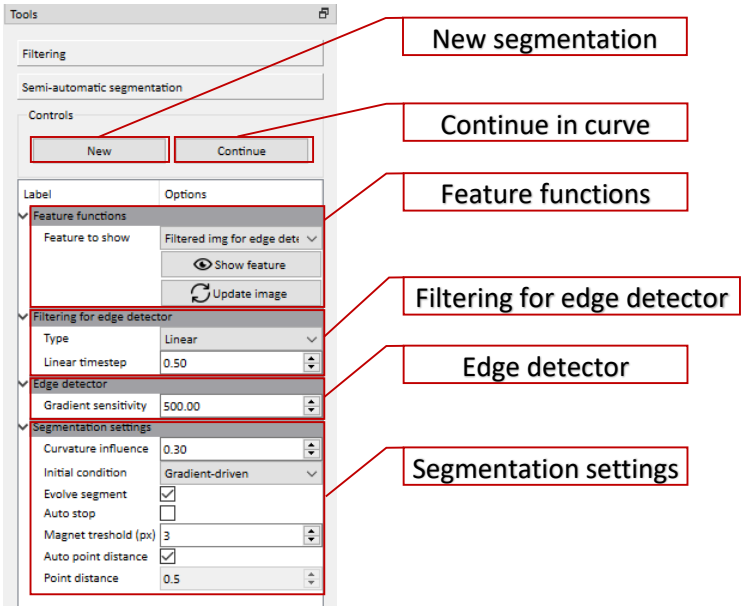
Component	Description	
Feature functions	Feature to show	Allows choosing between two features: *Filtered Image* and *Edge Detector* for *Nonlinear Diffusion*.
	Show/hide feature	If the feature image is hidden, the button *Show Feature* will compute the feature from *Feature to Show* from data in the *Working Area* based on the parameters from *Filtering of Image* and show it next to the *Loaded Data in the Viewer* for *Loaded Data*. If the feature image is shown, the button *Hide Feature* will close the feature image.
	Update image	If the feature image is shown, the button *Update Image* will update the feature from *Feature to Show* from data in the *Working Area* based on the parameters from *Filtering of Image* and redraw the shown feature image.
Filtering of image	Type	Allows choosing between three types of filtration: Linear, Nonlinear, and Geometric-MCF.
	Parameters of filtration	Depending on the chosen type of filtration, the parameters differ. In the case of Linear Diffusion, the parameter for the length of the filtration needs to be set. In the case of Nonlinear or Geometric-MCF, the

		length of prefiltration of the data for the edge detector and the sensitivity of the edge detector need to be set, as well as the length of the final filtration.

Example: *Loaded Data* with *Feature image* in the *Viewer for Loaded Data*

Component	Description
Feature image	Contains the image of the selected feature function for the software tools. The visualization of the feature functions allows tuning the parameters of the software tools.

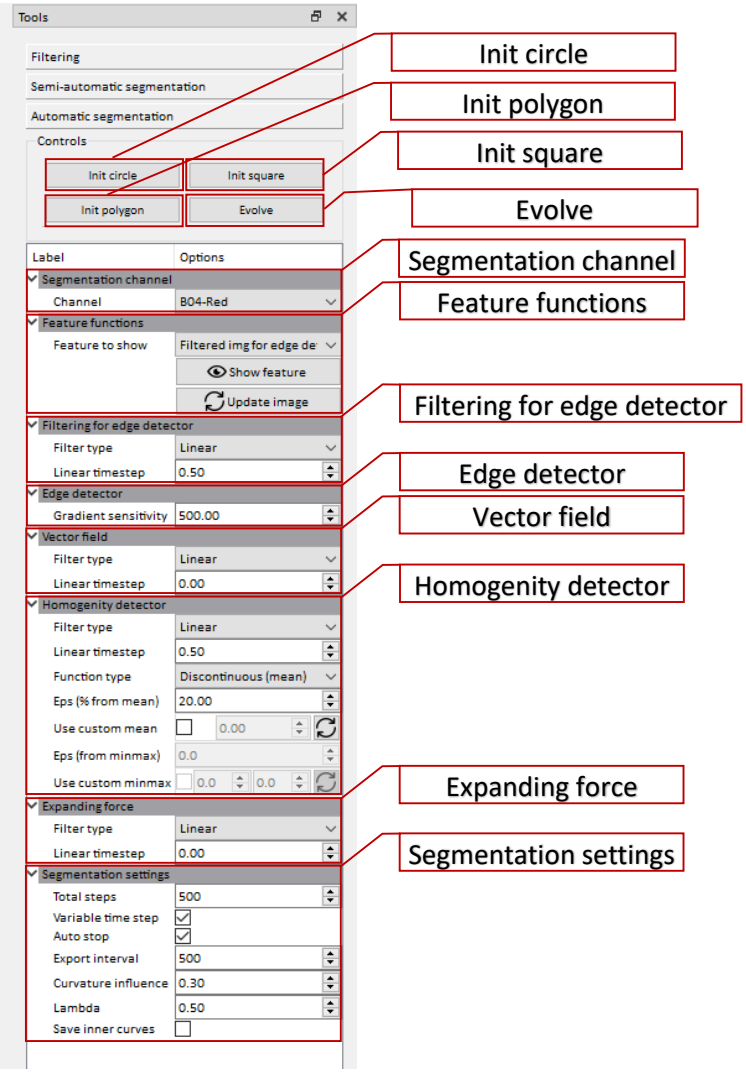
Semi-automatic segmentation



Component	Description	
New segmentation	The button *New* initializes the semi-automatic segmentation. The semi-automatic segmentation is prepared in the background based on the parameters from *Filtering for Edge Detector*, *Edge Detector*, and *Segmentation Settings*. The semi-automatic segmentation starts by clicking the left mouse button in the *Loaded Data* in the *Viewer for Loaded Data*. Another click of the left mouse button in the *Loaded Data* in the *Viewer for Loaded Data* creates one segment of the semi-automatic segmentation. The segmentation ends by clicking the right mouse button in the *Loaded Data* in the *Viewer for Loaded Data*. If the final curve needs to be a closed curve, the last segment must end at the same point as the starting point of the first segment.	
Continue in curve	It is possible to continue an unclosed curve that was previously started. First, select the unclosed curve in the *List of Curves* in the *Curve Explorer*. Then, clicking the *Continue* button allows continuing the semi-automatic segmentation of that selected curve. In the example, the *Continue* button is unavailable because the selected curve is closed.	
Feature functions	Feature to show	Allows choosing between three features: Filtered Image for Edge Detector, Edge Detector, and Norm of Vector Field.
	Show/hide feature	If the feature image is hidden, the *Show Feature* button will compute the feature from *Feature to Show* from data in the *Working Area* based on the parameters from *Filtering for Edge Detector* and *Edge Detector* and show it next to the *Loaded Data* in the *Viewer for Loaded Data*. If the feature image is

		shown, the *Hide Feature* button will close the feature image.
	Update image	If the feature image is shown, the *Update Image* button will update the feature from *Feature to Show* from data in the *Working Area* based on the parameters from *Filtering for Edge Detector* and *Edge Detector* and redraw the shown feature image.
Filtering for edge detector	Type	Allows choosing between three types of filtration: Linear, Nonlinear, and Geometric-MCF.
	Parameters of filtration	Depending on the chosen type of filtration, the parameters can differ (see *Filtering Tool*).
Edge detector	Allows setting the sensitivity parameter for detecting the edges in the data.	
Segmentation settings	Curvature influence	Allows setting the level of curvature influence in the semi-automatic segmentation of one segment.
	Initial condition	Allows choosing between two types of initial conditions: Gradient-Driven and Linear.
	Evolve segment	If the checkbox is checked, the segment evolves to the edge during the creation of one segment in the semi-automatic segmentation.
	Auto stop	If the *Evolve Segment* checkbox is checked, the *Auto Stop* checkbox is enabled. If the *Auto Stop* checkbox is checked during the evolution of one segment, the evolution is automatically stopped according to the stopping criterion.
	Magnet threshold (px)	Represents the threshold value necessary to close the current semi-automatic curve automatically. If the distance between the mouse cursor and the first point in the first segment is smaller than *the Magnet Threshold*, the curve will be closed automatically.
	Auto point distance	Select this option if the distance between points in the curve should be computed automatically. Alternatively, the distance can be manually set using the value from the Point Distance field.
	Point distance	Specifies the desired distance between points in the created curve.

Automatic segmentation



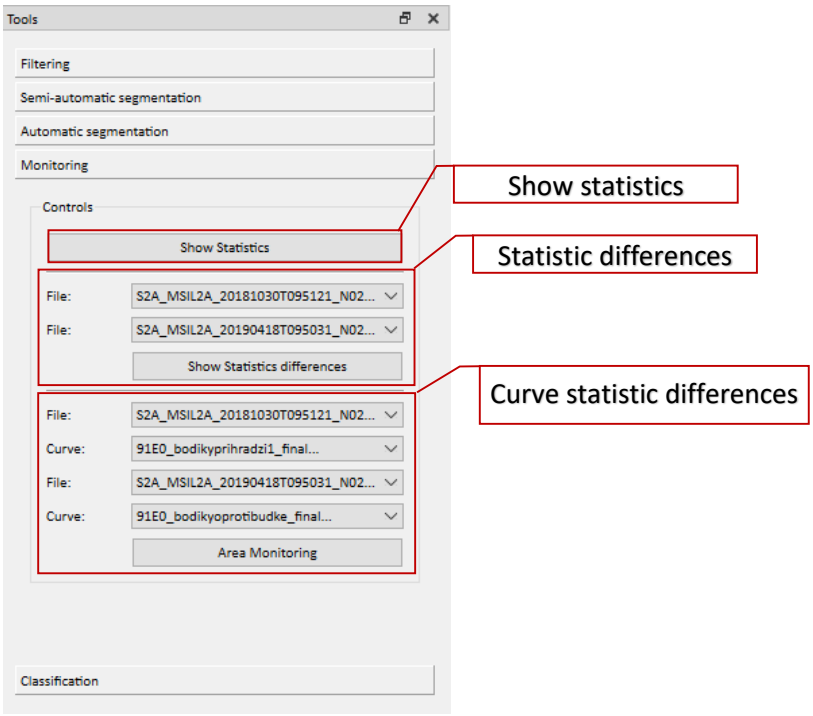
Component	Description
Init circle	The *Init Circle* button creates a circle curve, which can be used as an initial curve for automatic segmentation. The first click of the left mouse button in the *Loaded Data* in the *Viewer for Loaded Data* sets the circle center, and the second click sets the size of the circle.
Init square	The *Init Square* button creates a square curve, which can be used as an initial curve for automatic segmentation. The first click of the left mouse button in the *Loaded Data* in the *Viewer for Loaded Data* sets the square center, and the second click sets the size of the square.
Init polygon	The *Init Polygon* button creates a polygon, which can be used as an initial curve for automatic segmentation. The first click of the left mouse button in the *Loaded Data* in the *Viewer for Loaded Data* sets the first point of the polygon, and the subsequent clicks set the other vertices. Clicking near the first point with the left mouse button will close the polygon.

Evolve	For automatic segmentation, a curve must be selected from the *List of Curves* in the *Curve Explorer*. Then the automatic segmentation starts by clicking the *Evolve* button. Evolution is computed according to the parameters from *Filtering for Edge Detector*, *Edge Detector*, *Vector Field*, *Homogeneity Detector*, *Expanding Force*, and *Segmentation Settings*. All curves set as inner curves will shrink during the evolution.	
Segmentation channel	Contains the names of all available optical channels from the loaded Sentinel-2 image. It allows the choice of the optical channel for automatic segmentation.	
Feature functions	Feature to show	Allows choosing between six features: Filtered Image for Edge Detector, Edge Detector, Norm of Vector Field, Filtered Image for Homogeneity Detector, Homogeneity Detector, and Expanding Force.
	Show/hide feature	If the feature image is hidden, the *Show Feature* button will compute the feature from *Feature to Show* from data in the *Working Area* based on the parameters from *Filtering for Edge Detector, Edge Detector, Vector Field, Homogeneity Detector*, and *Expanding Force*, and show it next to the *Loaded Data* in the *Viewer for Loaded Data*. If the feature image is shown, the *Hide Feature* button will close the feature image.
	Update image	If the feature image is shown, the *Update Image* button will compute the feature from *Feature to Show* from data in the *Working Area* based on the parameters from *Filtering for Edge Detector, Edge Detector, Vector Field, Homogeneity Detector*, and *Expanding Force*, and redraw the shown feature image.
Filtering for edge detector	Type	Allows choosing between three types of filtrations: Linear, Nonlinear, and Geometric-MCF.
	Parameters of filtration	Depending on the chosen *Type* of filtration, the parameters differ (see Filtering Tool).
Edge detector	Allows setting the sensitivity parameter for detecting the edges in the data.	
Vector field	Filter type	Allows choosing between three types of filtrations for vector field: Linear, Nonlinear, and Geometric-MCF.

	Parameters of filtration	Depending on the chosen F*ilter type* of filtration, the parameters differ (see Filtering Tool).
Homogeneity detector	Filter type	Allows choosing between three types of filtrations for homogeneity detector: Linear, Nonlinear, and Geometric-MCF.
	Parameters of filtration	Depending on the chosen F*ilter type* of filtration, the parameters differ (see Filtering Tool).
	Function type	Allows choosing between two types of homogeneity functions: Discontinuous (mean) and Discontinuous (min/max). This choice affects the availability of the Eps parameter below.
	Eps (% from mean)	Allows setting the percentage share of homogeneous pixels around the mean value in the selected area. For example, the pixel will be considered homogeneous if it falls within an interval of 20% around the mean value of the selected area.
	Use custom mean	If the checkbox is checked, it is possible to set the mean value manually.
	Eps (from minmax)	Allows setting the percentage share of homogeneous pixels below the minimum value and above the maximum value in the selected area. This option is unavailable if the Function Type for the homogeneity detector is set to Discontinuous (mean).
	Use custom minmax	If the checkbox is checked, it is possible to set the minimum and maximum values manually.
Expanding force	Filter type	Allows choosing between three types of filtrations for expanding force: Linear, Nonlinear, and Geometric-MCF.
	Parameters of filtration	Depending on the chosen *Filter type* of filtration, the parameters differ (see Filtering Tool).
Segmentation settings	Total step	Represents the total number of time steps permitted for automatic segmentation.
	Variation time step	If the checkbox is checked, automatic segmentation can adapt the length of time steps.
	Auto stop	If the checkbox is checked during the evolution of the curve, that

		evolution is automatically stopped according to the stopping criterion.
	Export interval	Allows exporting and adding preliminary curves to the *Curve Explorer* after the *Export Interval* time steps.
	Curvature influence	Allows setting the level of curvature influence in the automatic segmentation.
	Lambda	Represents the repartitioning of the influence of the *Vector Field* (attracting to the edge) and *Expanding Force* (expansion from the initial position). If Lambda is closer to one, the *Vector Field* term dominates. If Lambda is closer to zero, the *Expanding Force* term dominates.
	Save inner curve	If the checkbox is checked and the exporting curve contains some inner curves, then the curve with all inner curves will be added to the *Curve Explorer*.

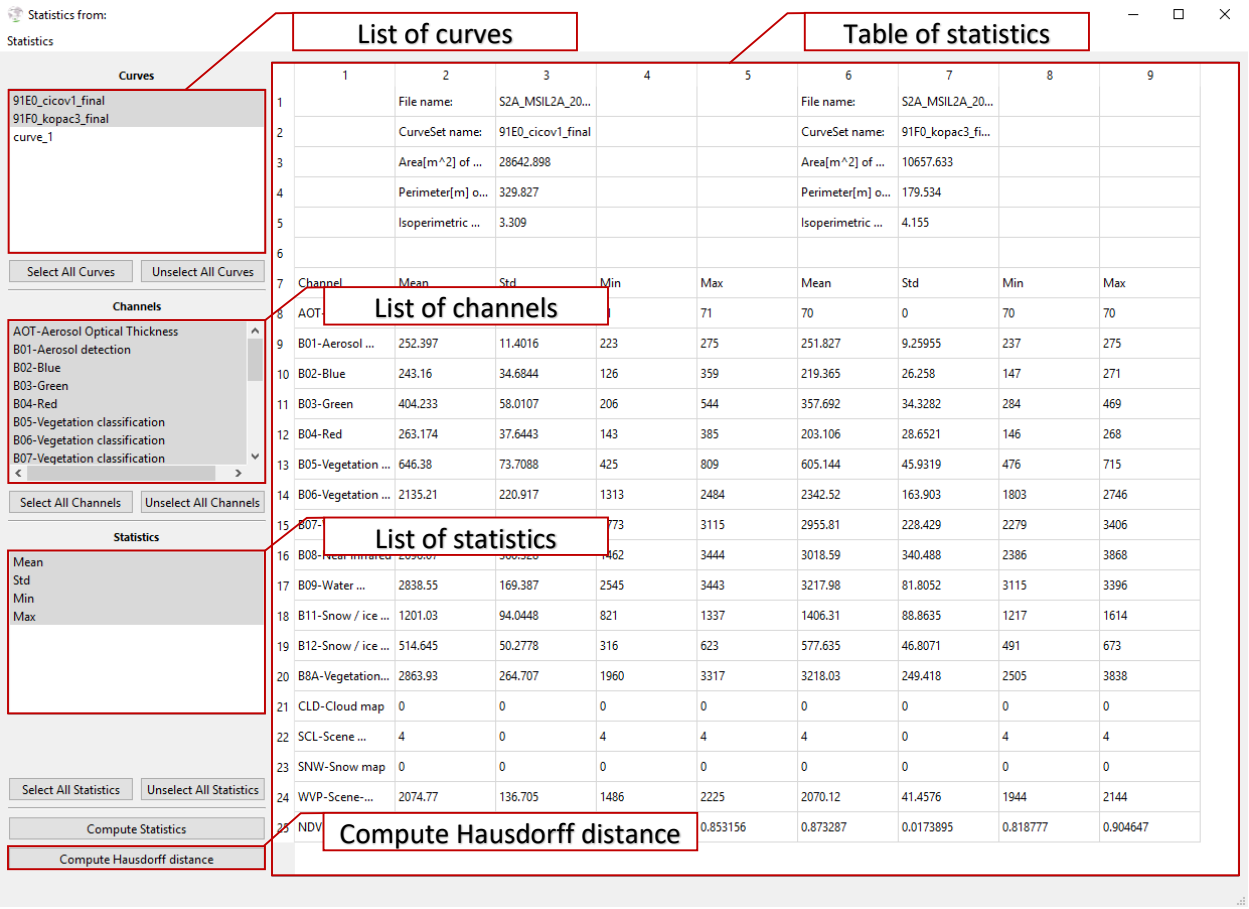
Monitoring



Component	Description	
Show statistics	The button *Show Statistics* opens a new window for computing the statistics from all available optical channels from the loaded Sentinel-2 image and all available loaded curves in the *List of Curves* in the *Curve Explorer*.	
Statistic differences	File	Select the first file for the statistical differences.
	File	Select the second file for the statistical differences. It must have the same geolocation as the first file.
	Show statistics differences	The button *Show Statistics Differences* opens a new window for computing statistical differences from two selected files and for one selected loaded curve in the *List of Curves* in the *Curve Explorer*.
Area monitoring	File and curve	Select the first file and one corresponding curve for area monitoring.
		Select the second file and one corresponding curve for area monitoring. The second file must have the same geolocation as the first file.
	Area monitoring	The button *Area Monitoring* opens a new window where the Hausdorff

		distance between two curves is computed.

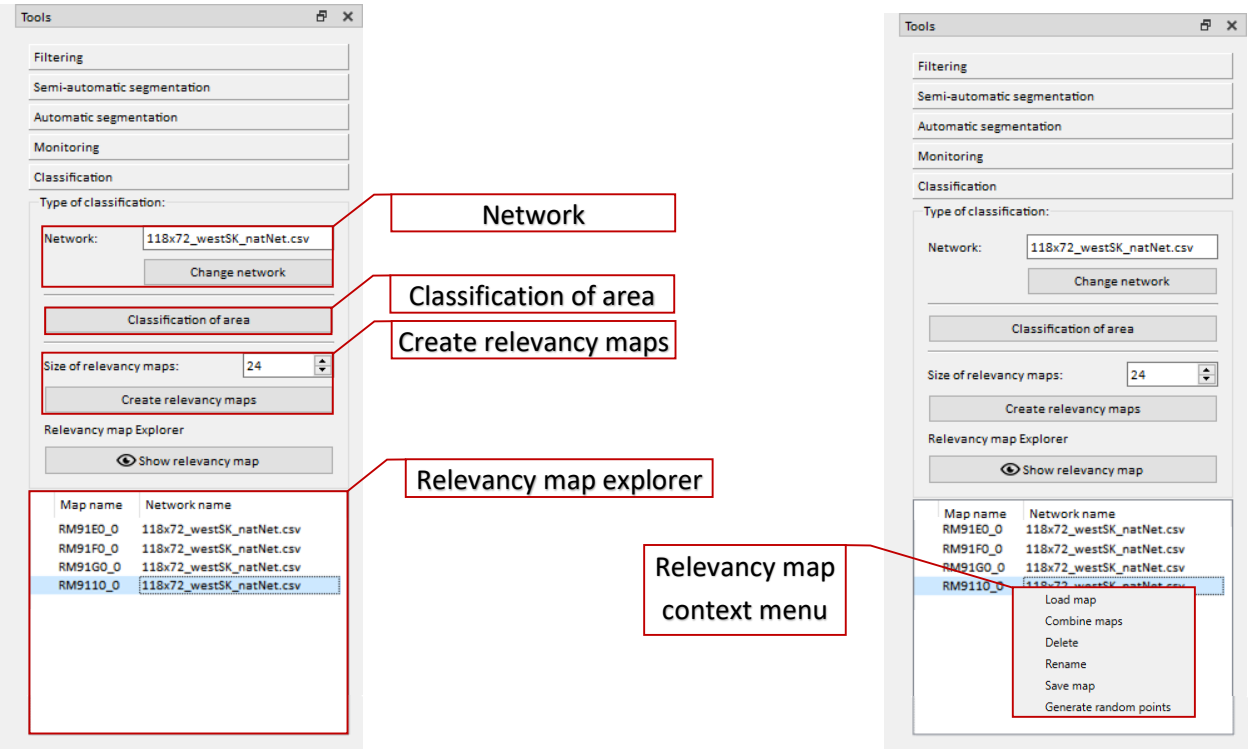
Show statistics

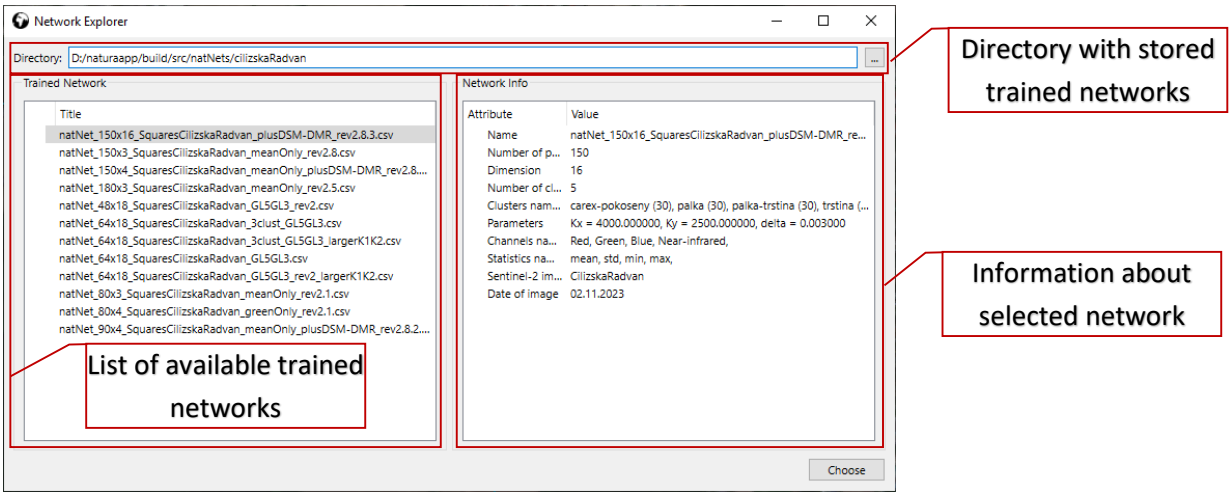


	1	2	3	4	5	6	7	8	9
1		File name:	S2A_MSIL2A_20...			File name:	S2A_MSIL2A_20...		
2		CurveSet name:	91E0_cicov1_final			CurveSet name:	91F0_kopac3_fi...		
3		Area[m^2] of ...	28642.898			Area[m^2] of ...	10657.633		
4		Perimeter[m] o...	329.827			Perimeter[m] o...	179.534		
5		Isoperimetric ...	3.309			Isoperimetric ...	4.155		
6									
7	Channel	Mean	Std	Min	Max	Mean	Std	Min	Max
8	AOT				71	70	0	70	70
9	B01-Aerosol ...	252.397	11.4016	223	275	251.827	9.25955	237	275
10	B02-Blue	243.16	34.6844	126	359	219.365	26.258	147	271
11	B03-Green	404.233	58.0107	206	544	357.692	34.3282	284	469
12	B04-Red	263.174	37.6443	143	385	203.106	28.6521	146	268
13	B05-Vegetation ...	646.38	73.7088	425	809	605.144	45.9319	476	715
14	B06-Vegetation ...	2135.21	220.917	1313	2484	2342.52	163.903	1803	2746
15	B07-			773	3115	2955.81	228.429	2279	3406
16	B08-			462	3444	3018.59	340.488	2386	3868
17	B09-Water ...	2838.55	169.387	2545	3443	3217.98	81.8052	3115	3396
18	B11-Snow / ice ...	1201.03	94.0448	821	1337	1406.31	88.8635	1217	1614
19	B12-Snow / ice ...	514.645	50.2778	316	623	577.635	46.8071	491	673
20	B8A-Vegetation...	2863.93	264.707	1960	3317	3218.03	249.418	2505	3838
21	CLD-Cloud map	0	0	0	0	0	0	0	0
22	SCL-Scene ...	4	0	4	4	4	0	4	4
23	SNW-Snow map	0	0	0	0	0	0	0	0
24	WVP-Scene-...	2074.77	136.705	1486	2225	2070.12	41.4576	1944	2144
25	NDV				0.853156	0.873287	0.0173895	0.818777	0.904647

Component	Description
Table of statistics	The table contains computed selected statistics from the *List of Statistics* for data from selected channels from the *List of Channels* for selected curves from the *List of Curves*.
List of curves	It contains the list of curve sets from the *List of Curves* in the *Curve Explorer*. Clicking on a curve will exclude that curve from the computation of statistics. In the example, *curve_1* is excluded from the computation of statistics.
List of channels	It contains the names of all available loaded file channels from the Sentinel-2 image. Clicking on a channel will exclude that channel from the computation of statistics.
List of statistics	It contains the names of possible statistics that can be computed in this module. Clicking on a statistic will exclude that statistic from the computation of statistics.
Compute Hausdorff distance	If only two curves are selected in the *List of Curves*, it is possible to compute the Hausdorff distance between them by clicking on the button *Compute Hausdorff Distance.*

Classification



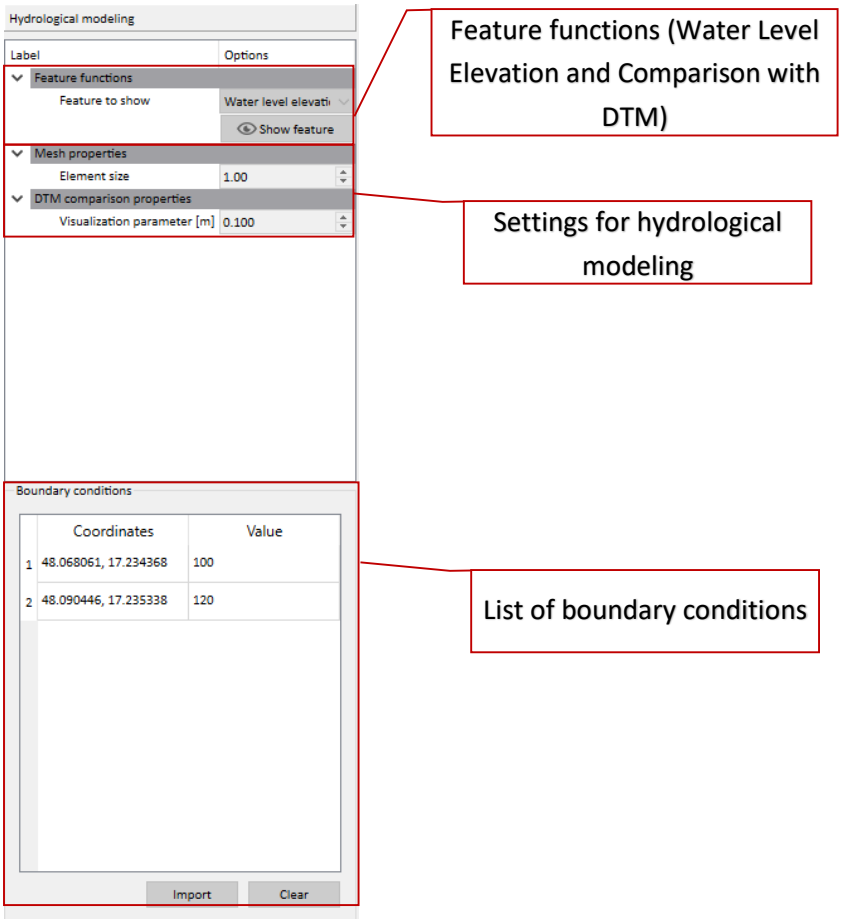


Component	Description	
Network	Network	Represents the name of the selected trained natural numerical network for the *Classification tool*.
	Change network	The *Change Network* button opens the *Network Explorer*, allowing you to select a different trained network for the *Classification tool*.

Classification of area	The *Classification of Area* button opens a new window for computing relevancies for all available loaded curves in the *List of Curves* in the *Curve Explorer*.	
Create relevancy maps	Size of relevancy maps	Specifies the size of the relevancy maps.
	Create relevancy maps	The *Create Relevancy Maps* button computes relevancy maps based on the selected natural numerical network in the Network. The number of relevancy maps depends on the number of habitats in the selected natural numerical network.
Relevancy map explorer	The *Relevancy Map Explorer* contains a list of all computed relevancy maps for the selected file in the *Data Explorer*. To view a relevancy map from the *Relevancy Map Explorer*, select one map and click the *Show Relevancy Map* button, which will display that map as the feature image. If another relevancy map is shown by double-clicking a different map, it will be replaced. The *Hide Feature* button will close the feature image if the relevancy map is shown.	
Relevancy map context menu	Right-clicking on a relevancy map in the *Relevancy Map Explorer* opens the context menu with the following options:	
	Delete	Deletes the selected relevancy maps from the *Relevancy Map Explorer*. If one of the maps marked for deletion is currently shown as the feature image, it will be closed and deleted.
	Rename	Allows renaming the selected relevancy map.
	Save map	Saves the selected relevancy map.
	Load map	Loads a previously stored relevancy map.
	Generate random point	Generates a set of random points within the computed relevancy map, used for validation of results.

Hydrological modeling

- To initialize the input of boundary conditions for hydrological modeling, right-click on a curve in the *Curve Explorer* and select *Set boundary conditions* from the context menu. Then, left-click near the vertex of the selected curve to input the water level height at that vertex.
- If the loaded data is a Digital Terrain Model (DTM), boundary conditions can be set by right-clicking on a curve in the *Curve Explorer* and selecting *Set Boundary Condition from Data in Segment Ends* from the context menu. This will automatically retrieve water levels from the loaded DTM dataset at the segment ends of the selected curve and set them as boundary conditions for hydrological modeling.

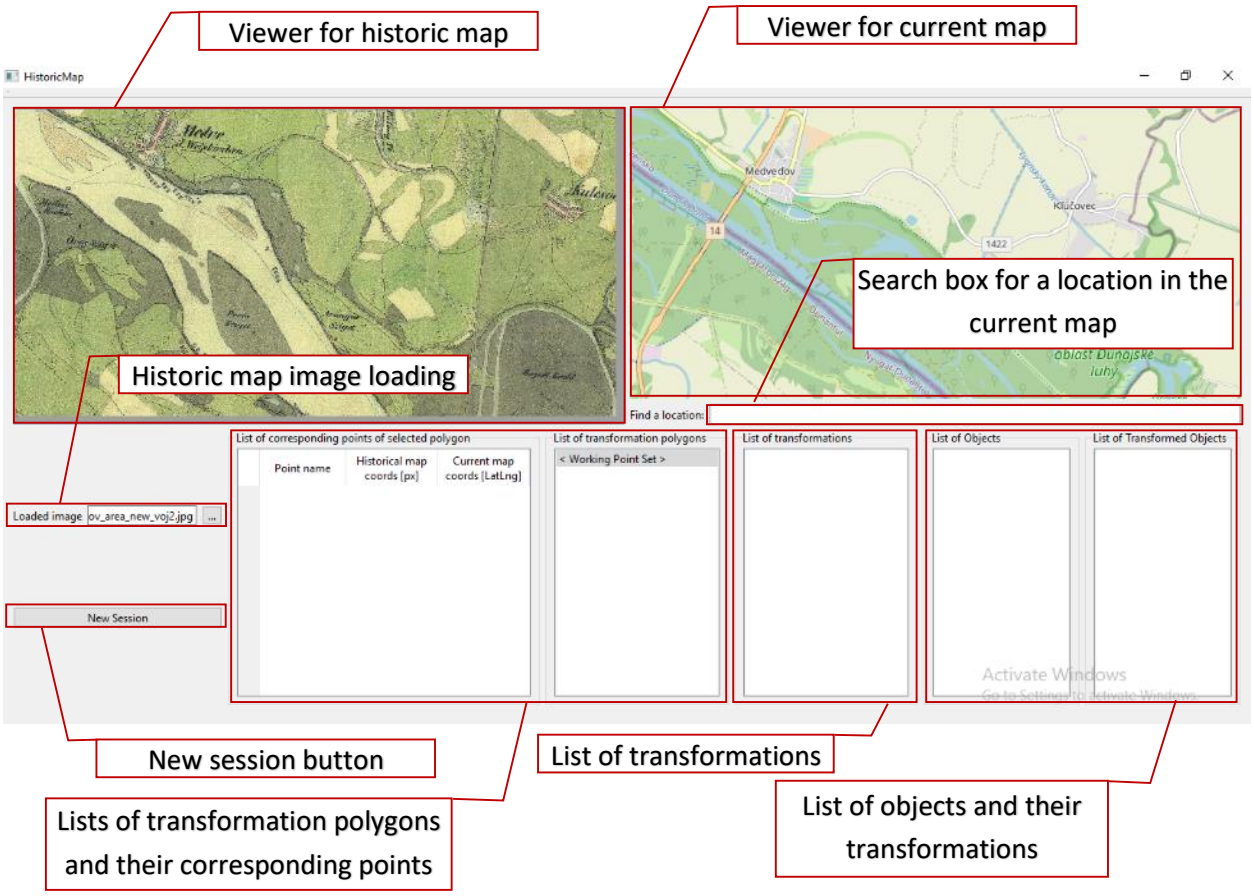


Component	Description	
Feature function	Selects the feature to show or hide. Available features include Water Level Elevation and Comparison with DTM. Note: Comparison with DTM is available only if a Digital Terrain Model (DTM) dataset is used as input data.	
Settings for hydrological modelling	Element size	Sets the desired minimum element size value.
	Visualization Parameter [m]	Used in Comparison with DTM, shifts the entire scale by this parameter value.

List of Boundary Conditions	Displays the names of all available loaded file channels from the Sentinel-2 image. Selecting a channel will exclude it from the computation of statistics.	
	Import	Imports boundary condition values from an input .txt file.
	Clear	Clears all boundary condition values for the selected curve.

Historic

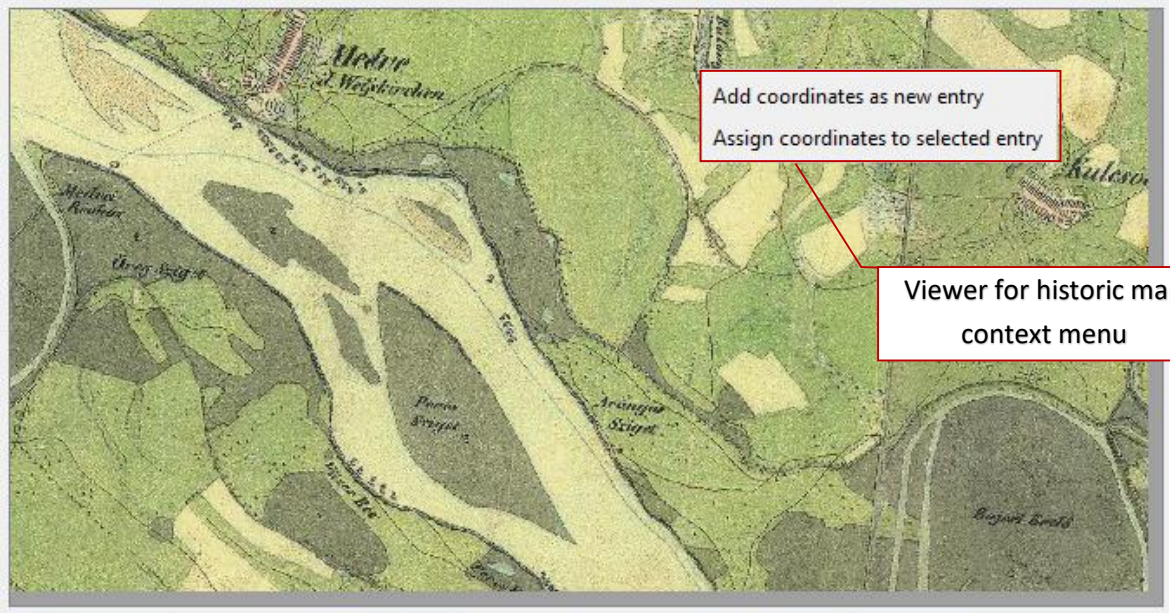
User interface



Component	Description
Viewer for historic map	It displays image selected in the *Historic map image loading*.
Viewer for current map	It displays current map (OpenStreetMap)
Search box for a location in the current map	It searches for geographical places by their name and displays the selected one in the *Viewer for current map.*
Historic map image loading	It allows loading a historic map image file into the Viewer for historic map and starts a new session. Georeferencing is also loaded if available.
New session button	It starts a new session by deleting all lists.
Lists of transformation polygons and their corresponding points	It consists of two lists: *List of corresponding points* and *List of transformation polygons*. *List of corresponding points* contains pairs of corresponding points in the <Working Point Set> or in the polygon selected in the *List of transformation polygons.*

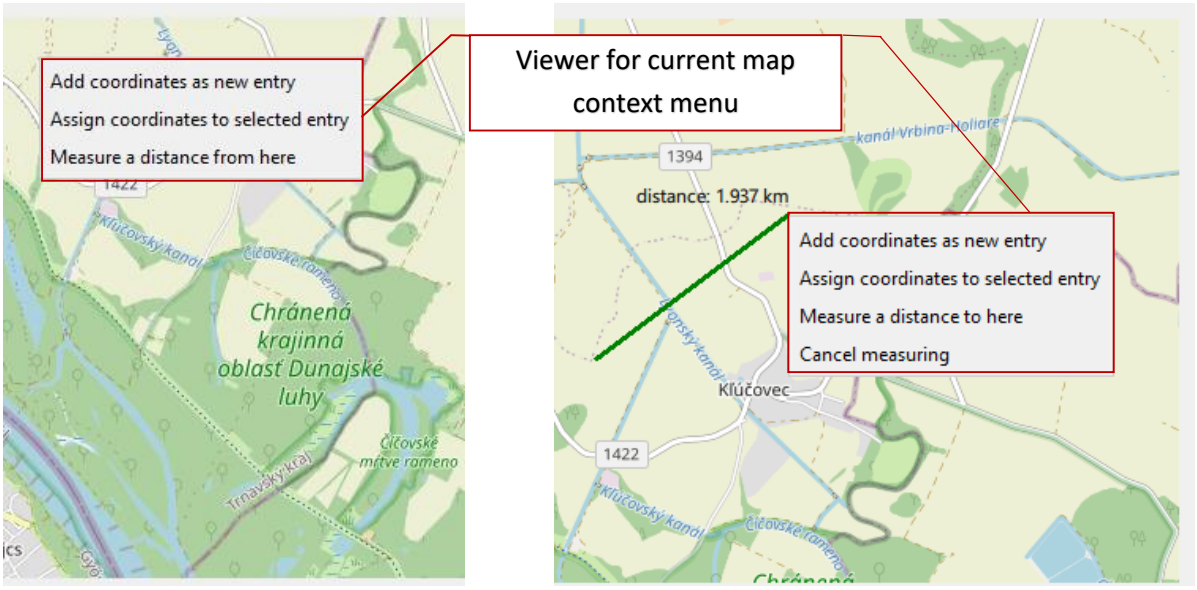
	List of transformation polygons contains pairs of transformation polygons consisting of at least 3 corresponding points and the <Working Point Set> for creating new pair of transformation polygons.
List of transformations	It contains the local transformations created from a set of transformation polygons and the global transformations created from a set of local transformations.
List of objects and their transformations	*List of objects* contains the objects (points or polygons) on the historic map that can be transformed. *List of transformed objects* contains the transformed objects (points or polygons) on the current map.

Viewer for historic map



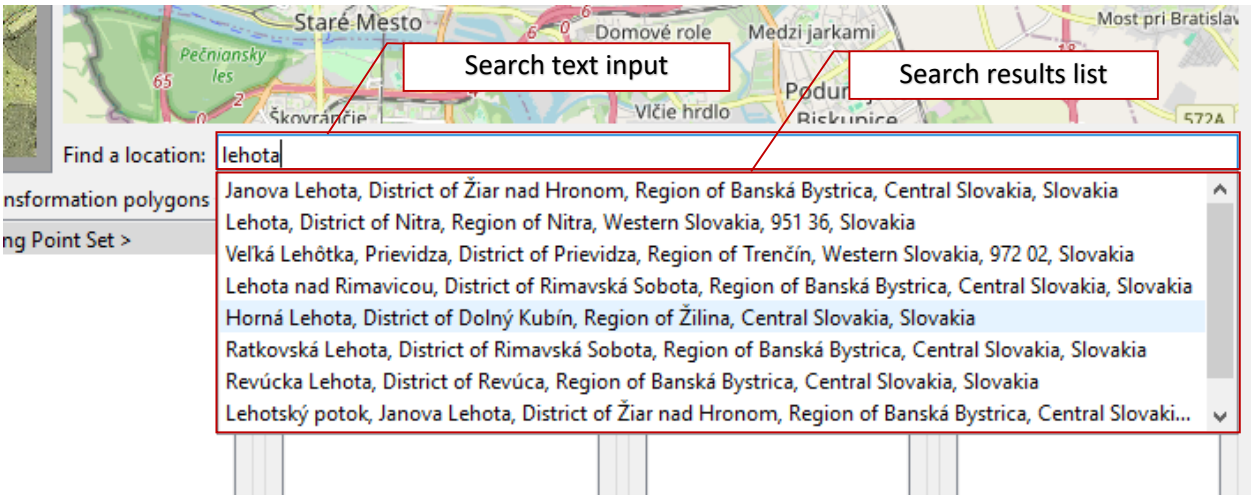
Component	Description	
Viewer for historic map context menu	Right-clicking in the viewer opens the context menu.	
	Add coordinate as new entry	This context menu action adds coordinates of a location as a new entry in the *List of corresponding points*. This entry is added to the <Working Point Set>.
	Assign coordinate to selected entry	This context menu action assigns coordinates of a location to the current entry in the *List of corresponding points*.

Viewer for current map



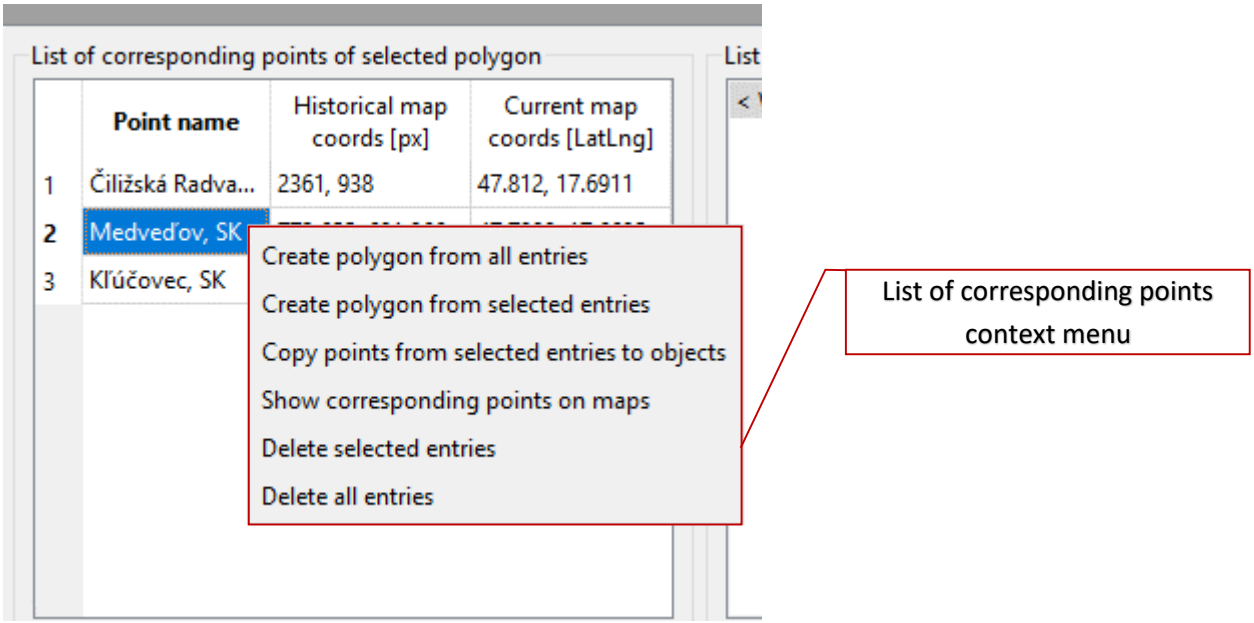
Component	Description	
Viewer for current map context menu	Right-clicking in the viewer opens the context menu.	
	Add coordinate as new entry	This context menu action adds coordinates of a location as a new entry in the *List of corresponding points*. This entry is added to the <Working Point Set>.
	Assign coordinate to selected entry	This context menu action assigns coordinates of a location to the current entry in the *List of corresponding points*.
	Measure a distance from here	This context menu action starts the measuring of geodesic distance from current mouse position.
	Measure a distance from here	This context menu action stops the measuring of geodesic distance in the current mouse position. The measured distance is still visible near the mouse cursor and is visualized by the abscissa connecting selected locations.
	Cancel measuring	This context menu action ends the started or stopped measuring of geodesic distance.

Search box for a location in the current map



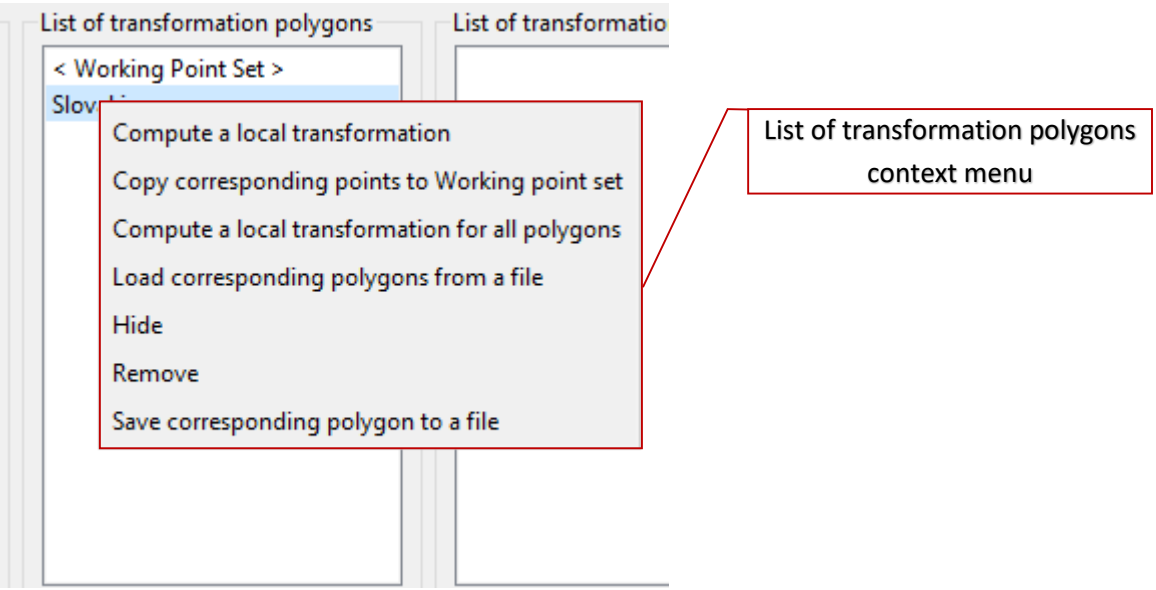
Component	Description
Search text input	It allows to enter a location name. Entering a text triggers a search and search results are shown in the *Search results list.*
Search results list	It displays geographic location names found by the text in the *Search text input*. After clicking on one of the results the *Viewer for current map* focuses on the selected location.

List of corresponding points



Component	Description	
List of corresponding points context menu	Right-clicking in the viewer opens the context menu.	
	Create polygon from all entries	This context menu action creates a new polygon in the *List of transformation polygons*. This polygon consists of all entries in the <Working Point Set>.
	Create polygon from selected entries	This context menu action creates a new polygon in the *List of transformation polygons*. This polygon consists only of the entries selected in the <Working Point Set>.
	Copy points from selected entries to objects	This context menu action copies the selected entries to the *List of objects*, so they can be transformed using one of the transformations in the *List of transformations*.
	Show corresponding points on maps	This context menu action focuses the *Viewer for historic map* and *Viewer for current map* on the corresponding points.
	Delete selected entries	This context menu action deletes the selected entries in the *List of corresponding points*.
	Delete all entries	This context menu action deletes all the entries in the *List of corresponding points*.

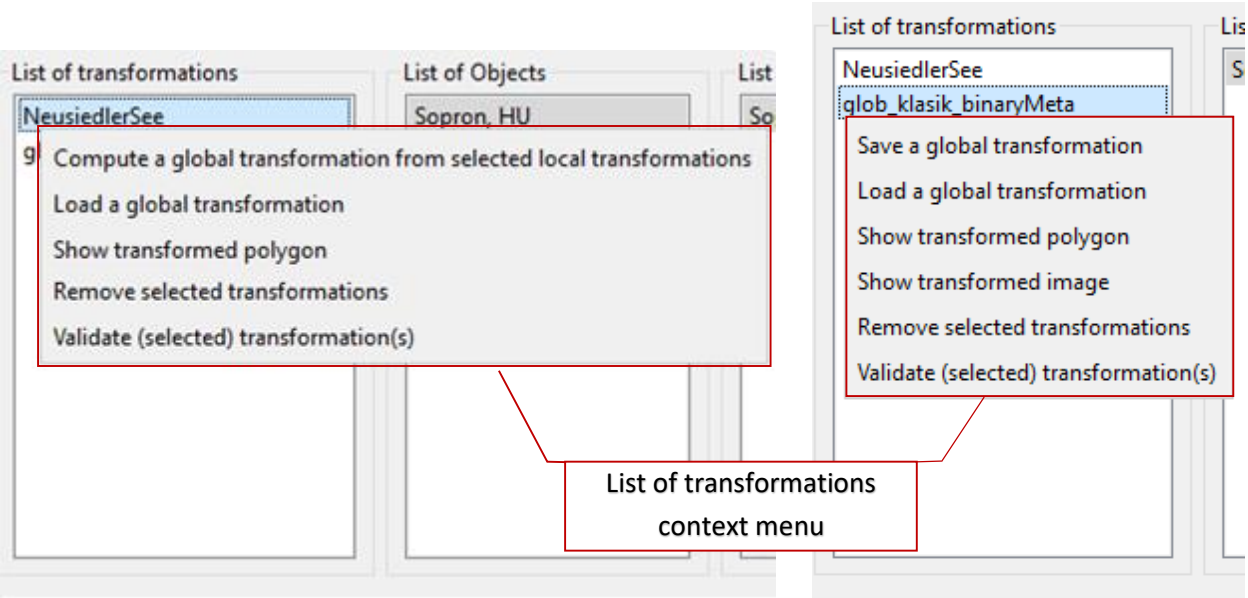
List of transformation polygons



Component	Description	
List of transformation polygons context menu	Right-clicking in the viewer opens the context menu.	
	Compute a local transformation	This context menu action computes a local transformation for the current transformation polygon. This transformation is added to the *List of transformations.*
	Copy corresponding points to Working point set	This context menu action copies the corresponding points of current polygon to the <Working point set>.
	Compute a local transformation for all polygons	This context menu action computes a local transformation for all the transformation polygons in the *List of transformation polygons*. These transformations are added to the *List of transformations.*
	Load transformation polygons from a file	This context menu action loads the transformation polygon from a .csv file and adds them to the *List of transformation polygons.*
	Hide/Show	This context menu action changes the visibility of the polygon in the *Viewer for historic map* and *Viewer for current map*.

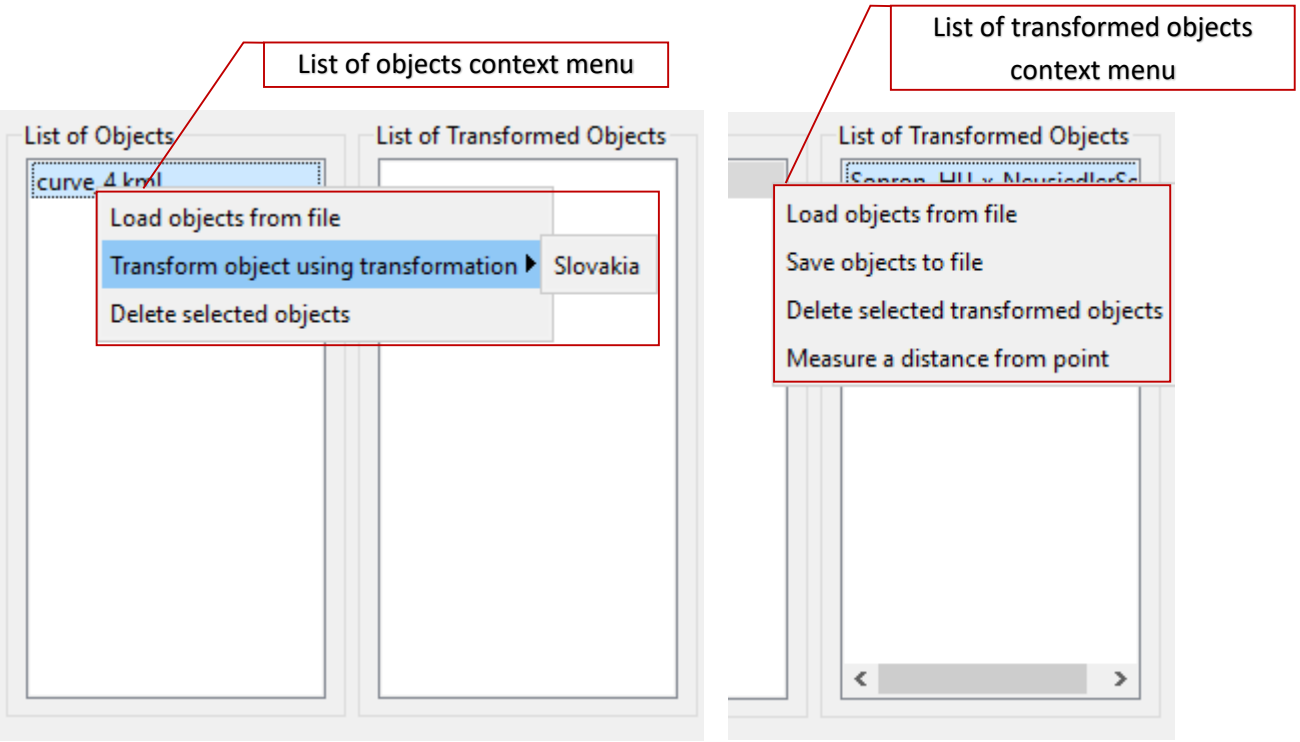
	Delete	This context menu action deletes current polygon in the *List of transformation polygons*.
	Save transformation polygon to a file	This context menu action saves the current transformation polygon to a .csv file.

List of transformations



Component	Description	
List of transformations context menu	Right-clicking in the viewer opens the context menu.	
	Compute a global transformation from selected local transformations	This context menu action computes a global transformation over the entire historic map file. The computation is done using Locally Affine Globally Laplace transformation.
	Load a global transformation	This context menu action loads a .gt file, containing data of a global transformation.
	Show/Hide transformed polygon	This context menu action controls the visibility of transformed polygon in the current map. This transformed polygon is created by applying selected transformation to the corresponding polygon from the historic map.
	Delete selected transformations	This context menu action deletes the selected transformations from the *List of transformations*.
	Validate selected transformation	This context menu action opens a new window for the validation of selected transformation.
	Save a global transformation	This context menu action saves selected global transformation to a .gt file.

Lists of objects and their transformations

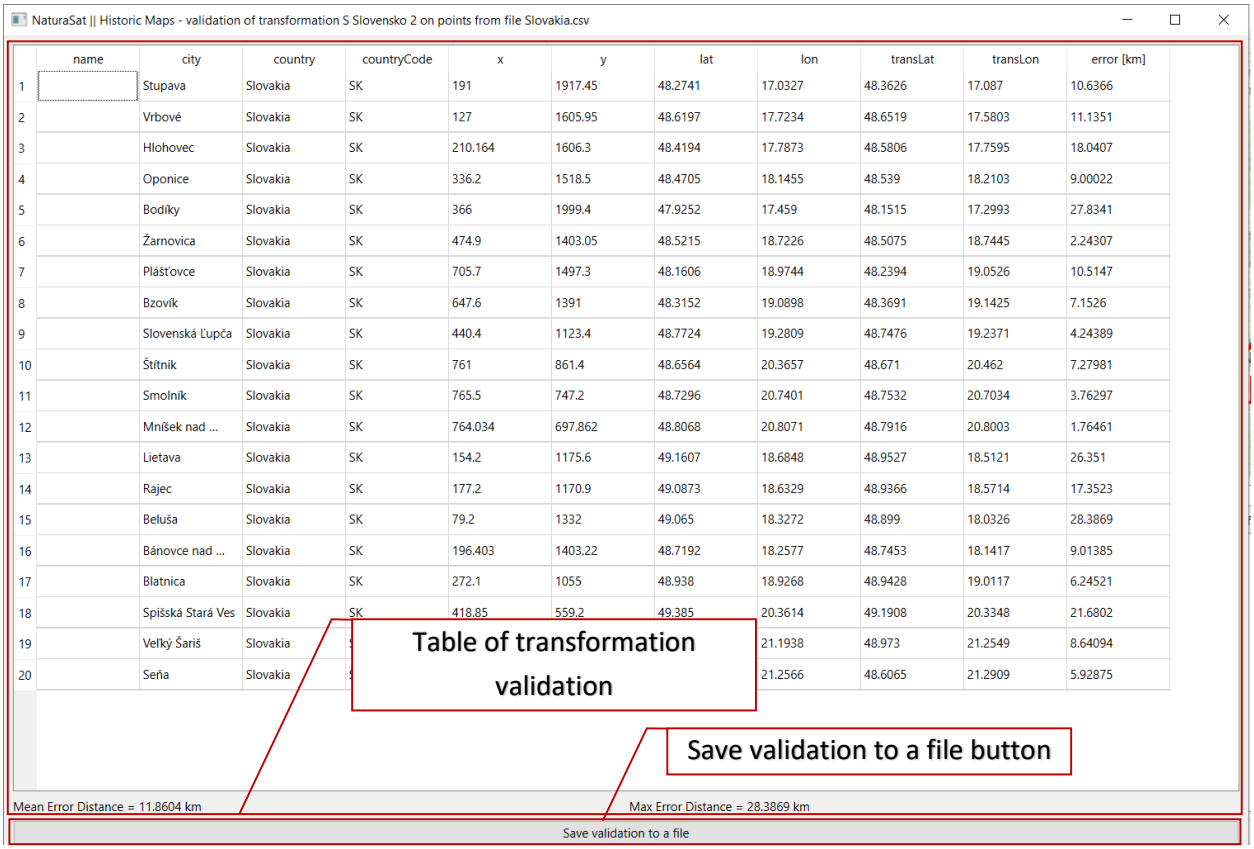


Component	Description	
List of objects context menu	Right-clicking in the list opens the context menu.	
	Load objects from file	This context menu action loads objects from a .kml file.
	Transform selected objects using transformation	This context menu action transforms the selected objects to a transformed objects and adds them into the *List of transformed objects*. After clicking on this action, the list of available transformation is displayed and by choosing one, the transformation of objects is triggered.
	Delete selected objects	This context menu action deletes the selected objects from the *List of objects*.

Component	Description	
List of transformed objects context menu	Right-clicking in the list opens the context menu.	
	Load objects from file	This context menu action loads transformed objects from a .kml file.
	Save object to file	This context menu action saves selected transformed object to a .kml file.

	Delete selected transformed objects	This context menu action deletes the selected transformed objects from the *List of transformed objects*.
	Measure a distance from point	This context menu action starts a measurement of a geodesic distance in the selected point.

Validation of transformation



	name	city	country	countryCode	x	y	lat	lon	transLat	transLon	error [km]
1		Stupava	Slovakia	SK	191	1917.45	48.2741	17.0327	48.3626	17.087	10.6366
2		Vrbové	Slovakia	SK	127	1605.95	48.6197	17.7234	48.6519	17.5803	11.1351
3		Hlohovec	Slovakia	SK	210.164	1606.3	48.4194	17.7873	48.5806	17.7595	18.0407
4		Oponice	Slovakia	SK	336.2	1518.5	48.4705	18.1455	48.539	18.2103	9.00022
5		Bodíky	Slovakia	SK	366	1999.4	47.9252	17.459	48.1515	17.2993	27.8341
6		Žarnovica	Slovakia	SK	474.9	1403.05	48.5215	18.7226	48.5075	18.7445	2.24307
7		Plášťovce	Slovakia	SK	705.7	1497.3	48.1606	18.9744	48.2394	19.0526	10.5147
8		Bzovík	Slovakia	SK	647.6	1391	48.3152	19.0898	48.3691	19.1425	7.1526
9		Slovenská Ľupča	Slovakia	SK	440.4	1123.4	48.7724	19.2809	48.7476	19.2371	4.24389
10		Štítnik	Slovakia	SK	761	861.4	48.6564	20.3657	48.671	20.462	7.27981
11		Smolník	Slovakia	SK	765.5	747.2	48.7296	20.7401	48.7532	20.7034	3.76297
12		Mníšek nad ...	Slovakia	SK	764.034	697.862	48.8068	20.8071	48.7916	20.8003	1.76461
13		Lietava	Slovakia	SK	154.2	1175.6	49.1607	18.6848	48.9527	18.5121	26.351
14		Rajec	Slovakia	SK	177.2	1170.9	49.0873	18.6329	48.9366	18.5714	17.3523
15		Beluša	Slovakia	SK	79.2	1332	49.065	18.3272	48.899	18.0326	28.3869
16		Bánovce nad ...	Slovakia	SK	196.403	1403.22	48.7192	18.2577	48.7453	18.1417	9.01385
17		Blatnica	Slovakia	SK	272.1	1055	48.938	18.9268	48.9428	19.0117	6.24521
18		Spišská Stará Ves	Slovakia	SK	418.85	559.2	49.385	20.3614	49.1908	20.3348	21.6802
19		Veľký Šariš	Slovakia	S				21.1938	48.973	21.2549	8.64094
20		Seňa	Slovakia	S				21.2566	48.6065	21.2909	5.92875

Component	Description
Table of transformation validation	It displays data of transformation validation. Besides the basic information of the pairs of corresponding points it displays transformed location on the current map and the error between this transformed location and exact location. Below the table, there are also mean and max error distances.
Save validation to a file button	It allows to save the validation data from the *Table of transformation validation* into a .csv file.