

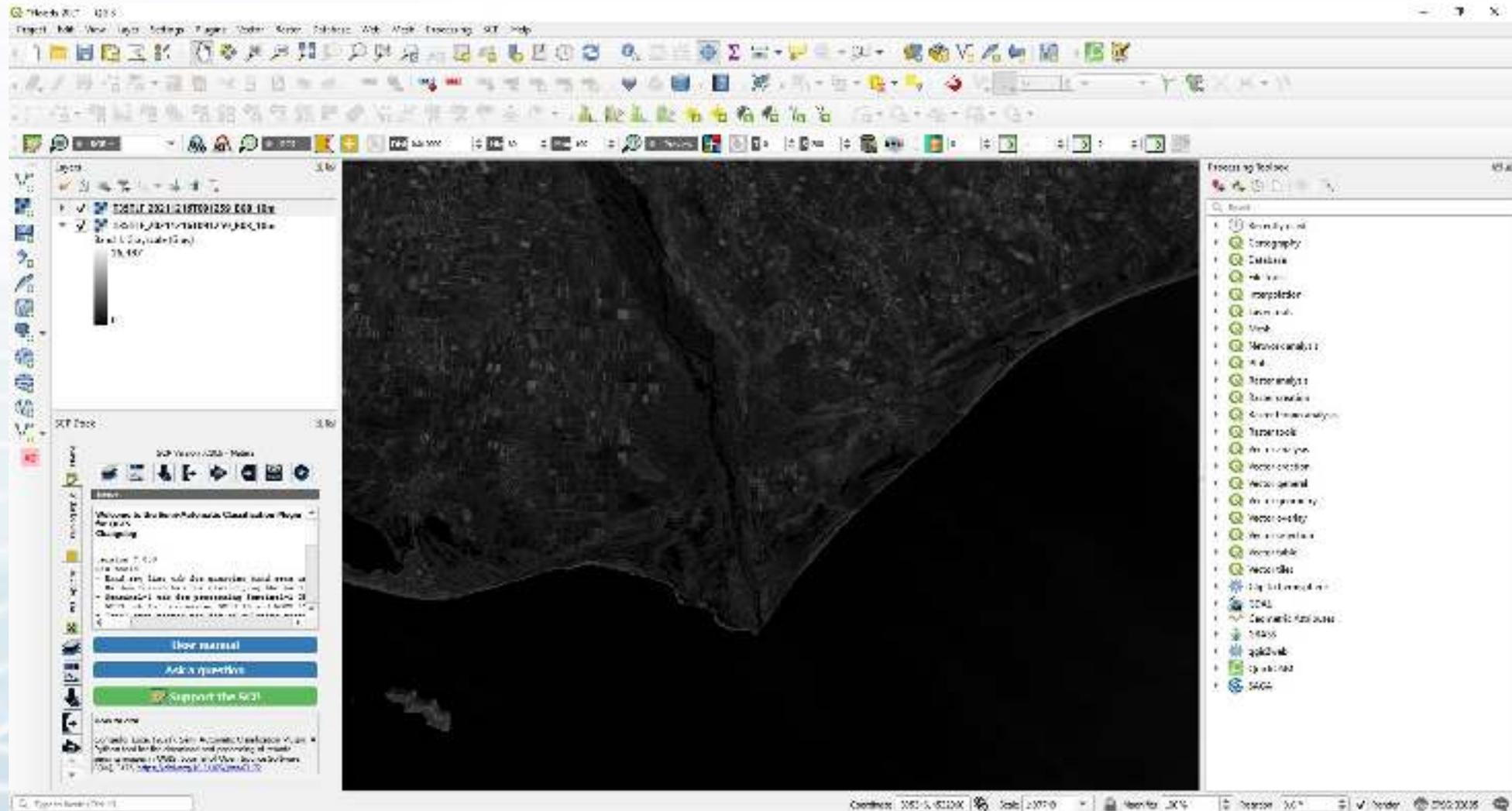
Practical Session 2.1

Import Bands in QGIS

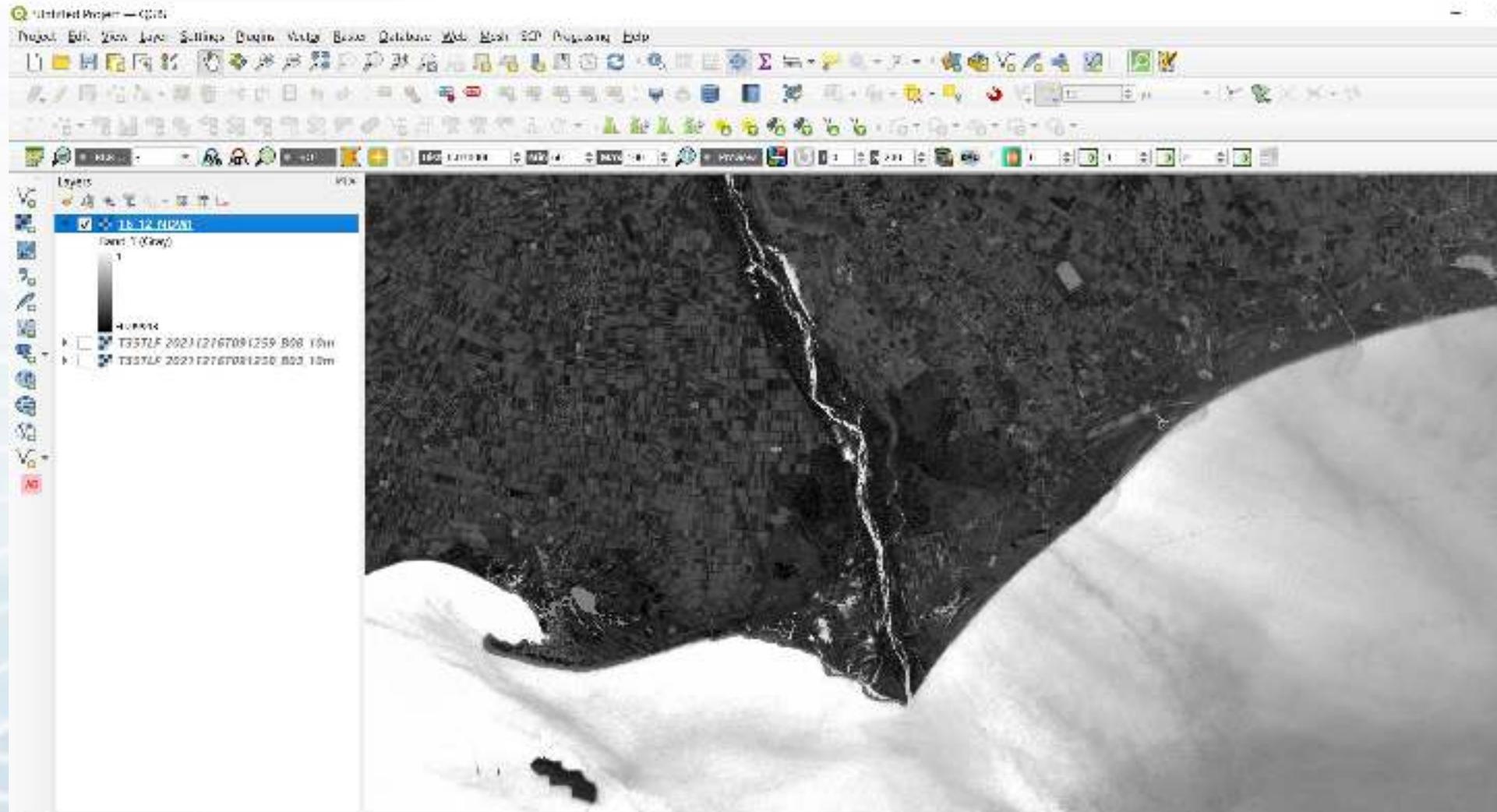
NDWI Index Estimation



Import Green and NIR Bands



NDWI calculation

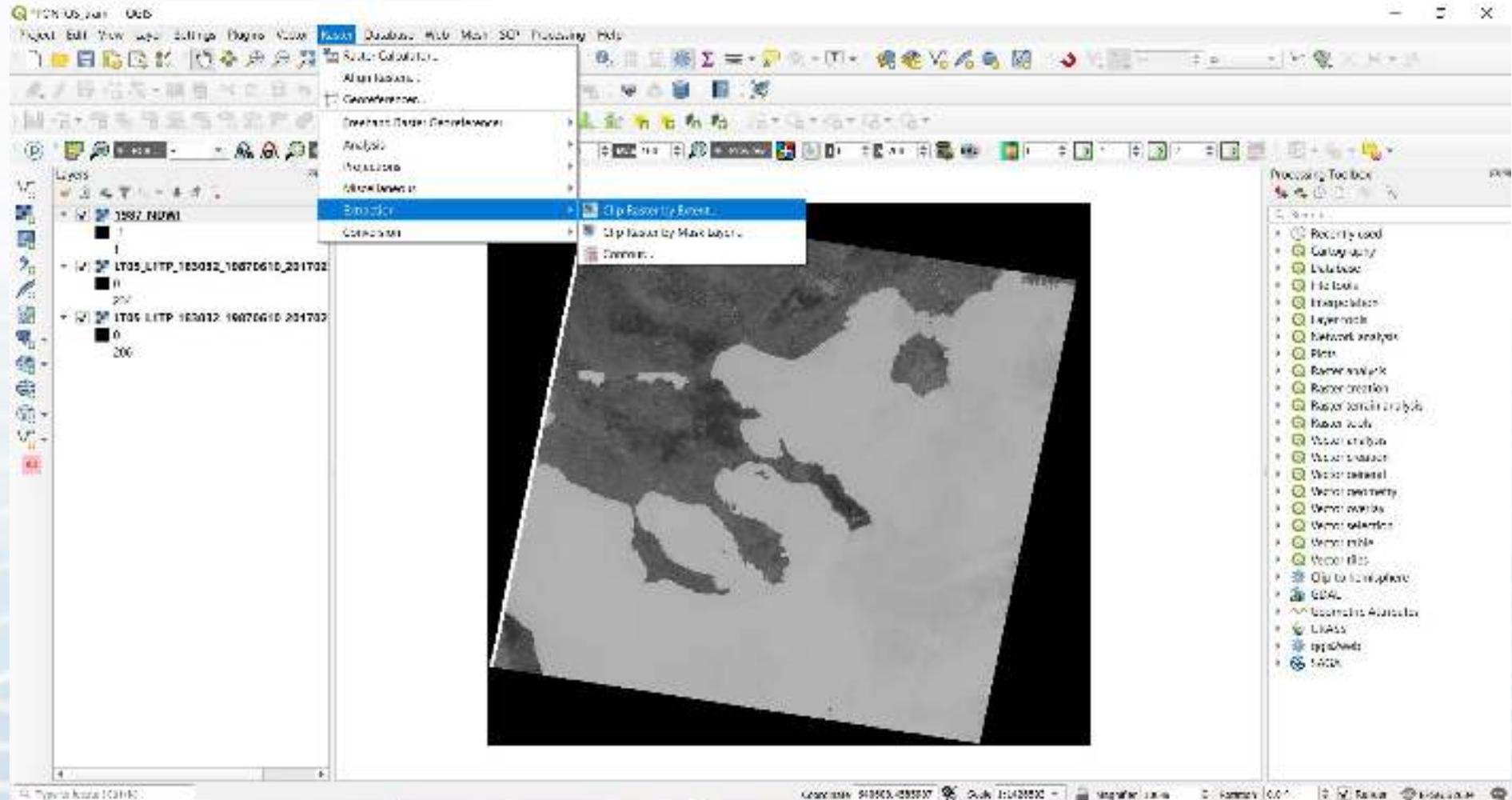


Practical part 2.2

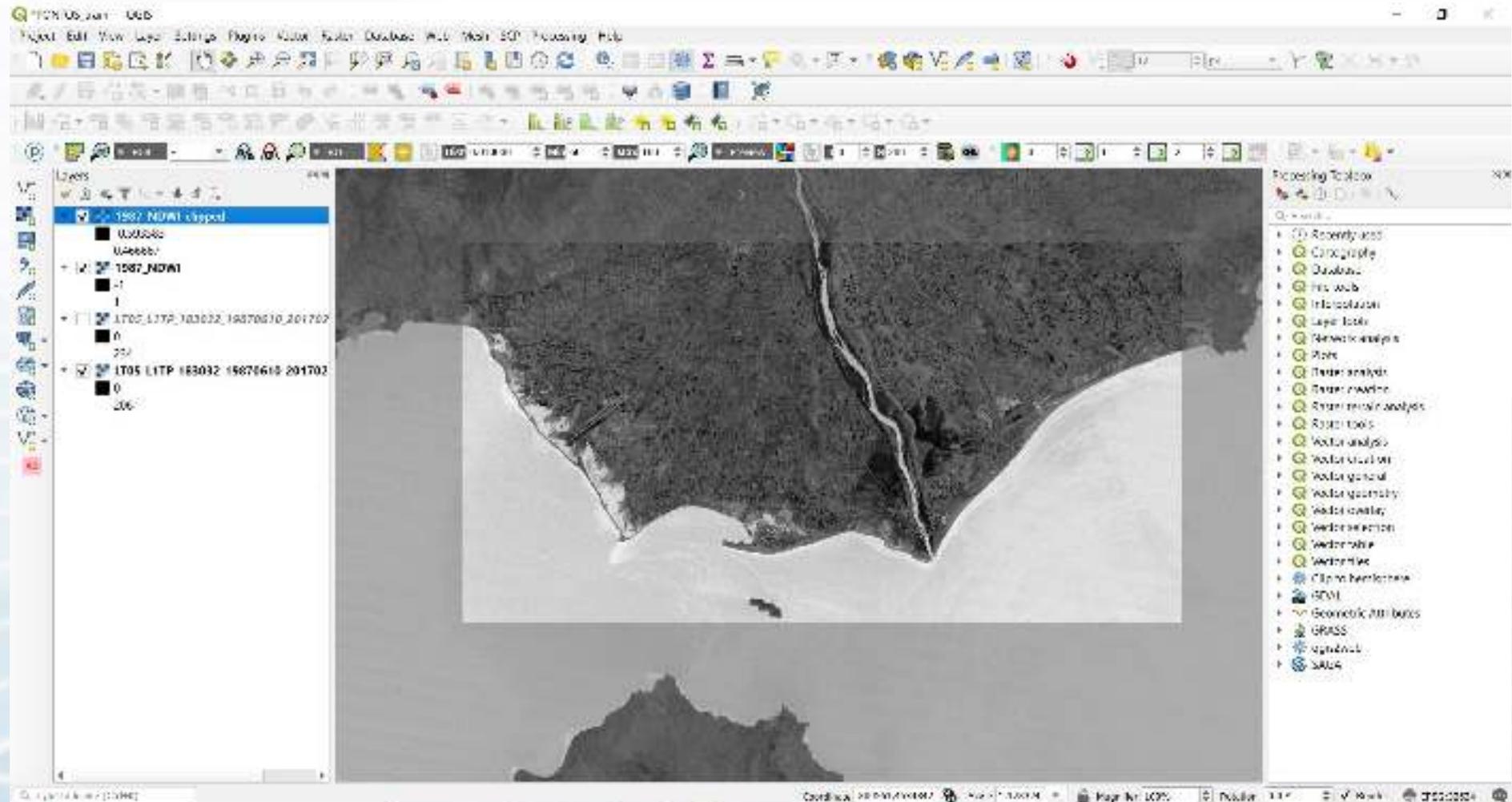
Clip Image



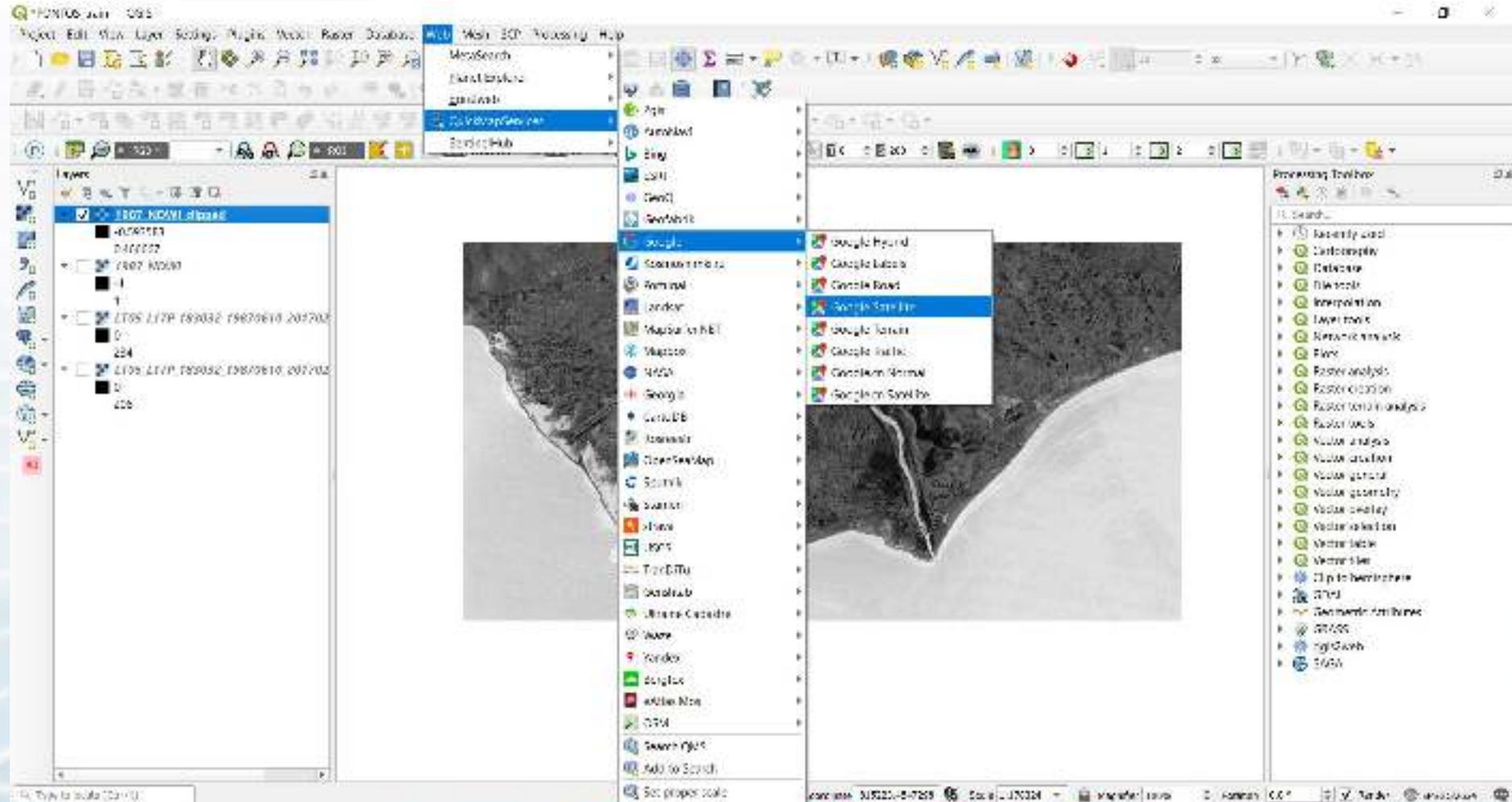
Clip Image



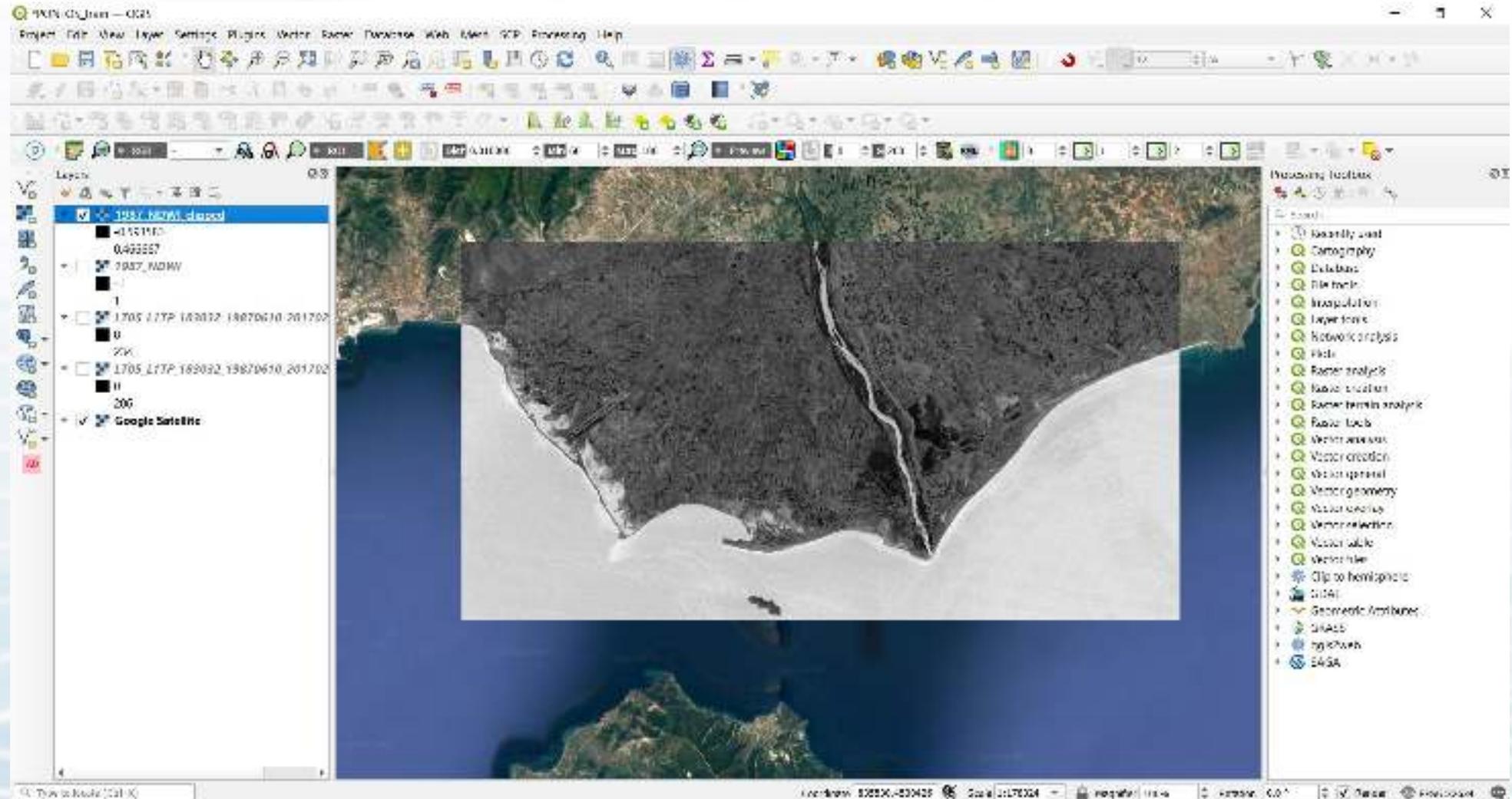
Clipped file



Open Basemap – QuickMapServices plug-in



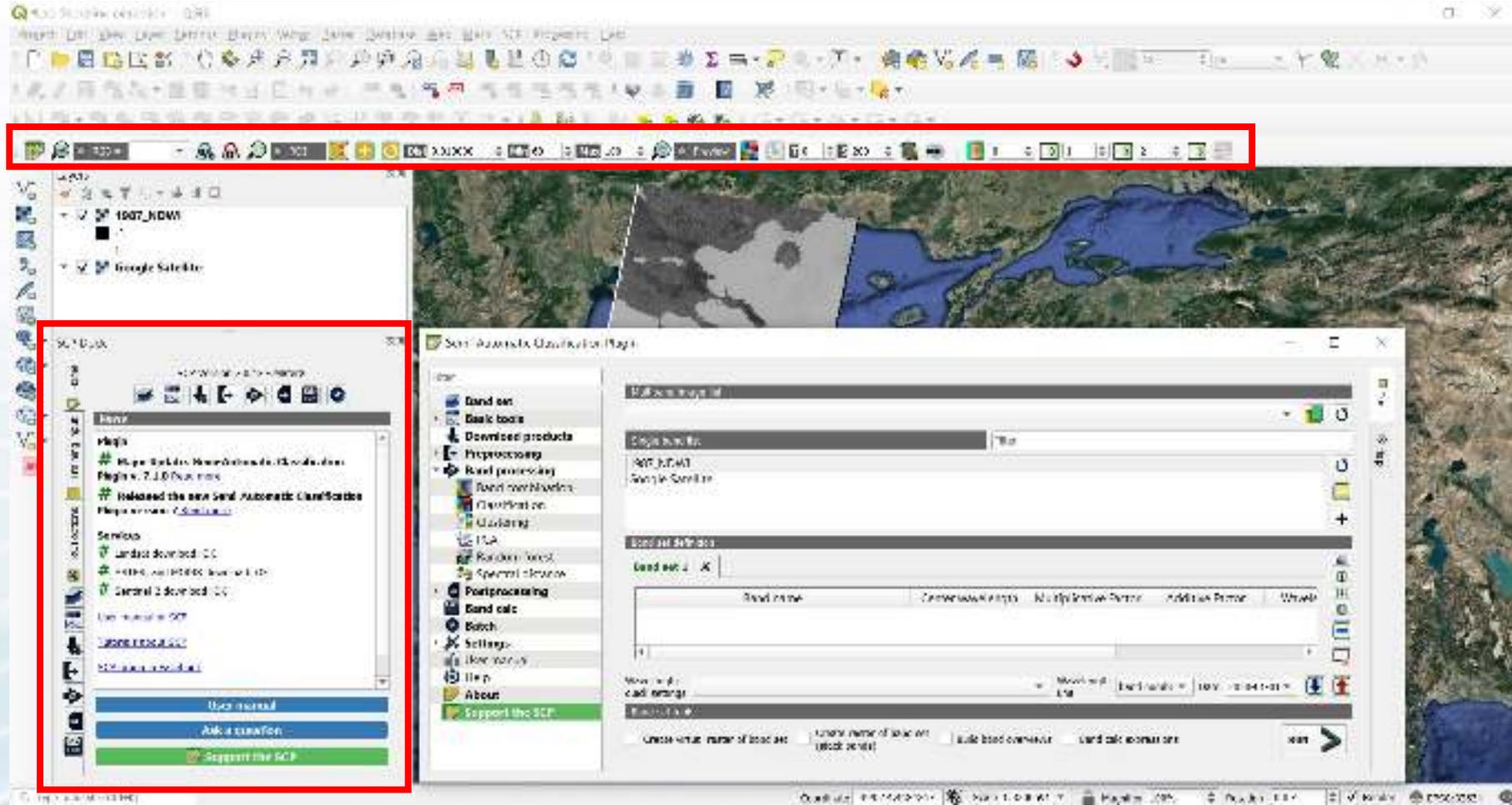
Open Basemap – QuickMapServices plug-in



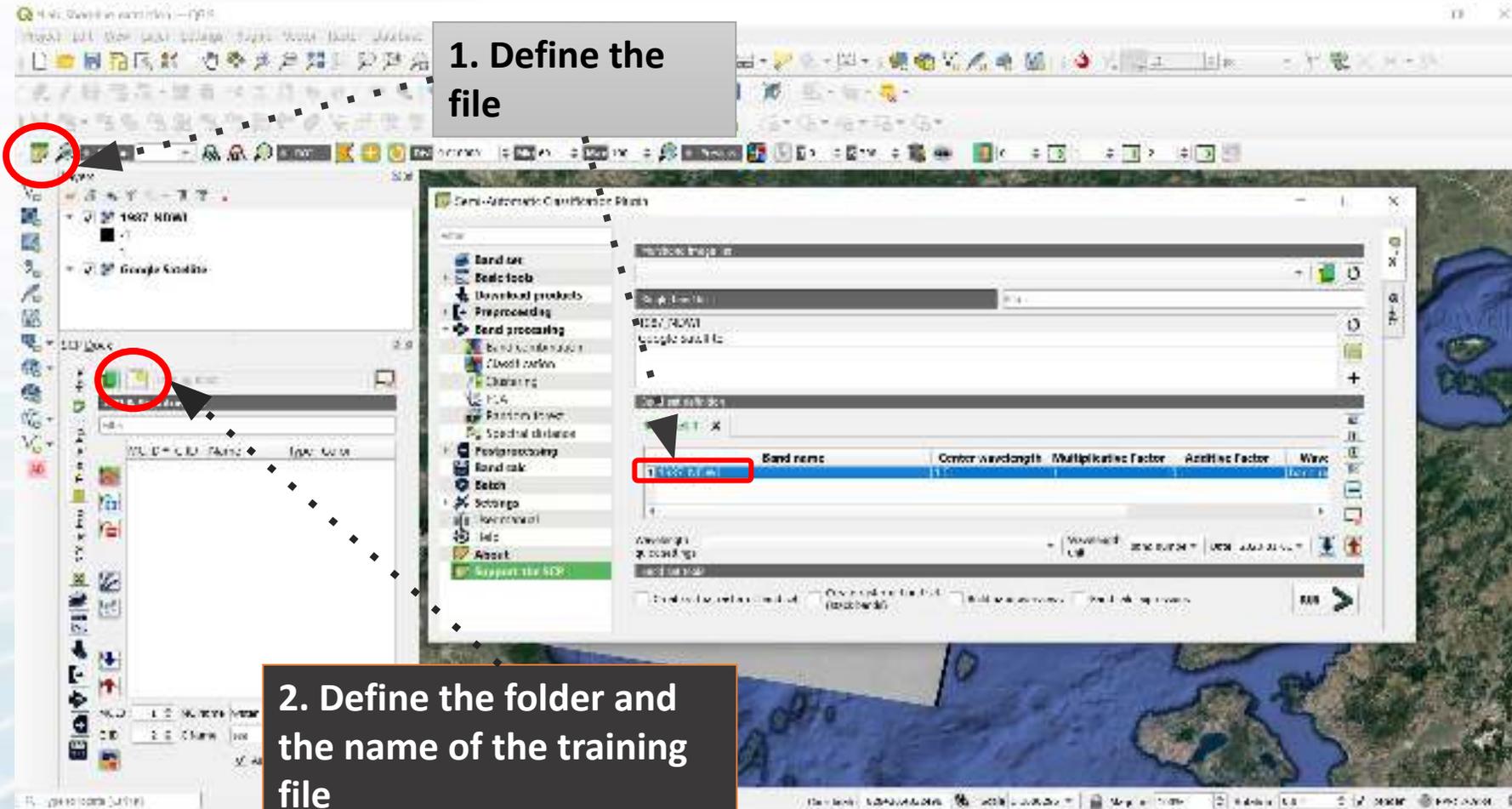
Practical part 2.3

Shoreline Extraction

Semi-Automatic Classification plug-in



Working file definition and training file creation



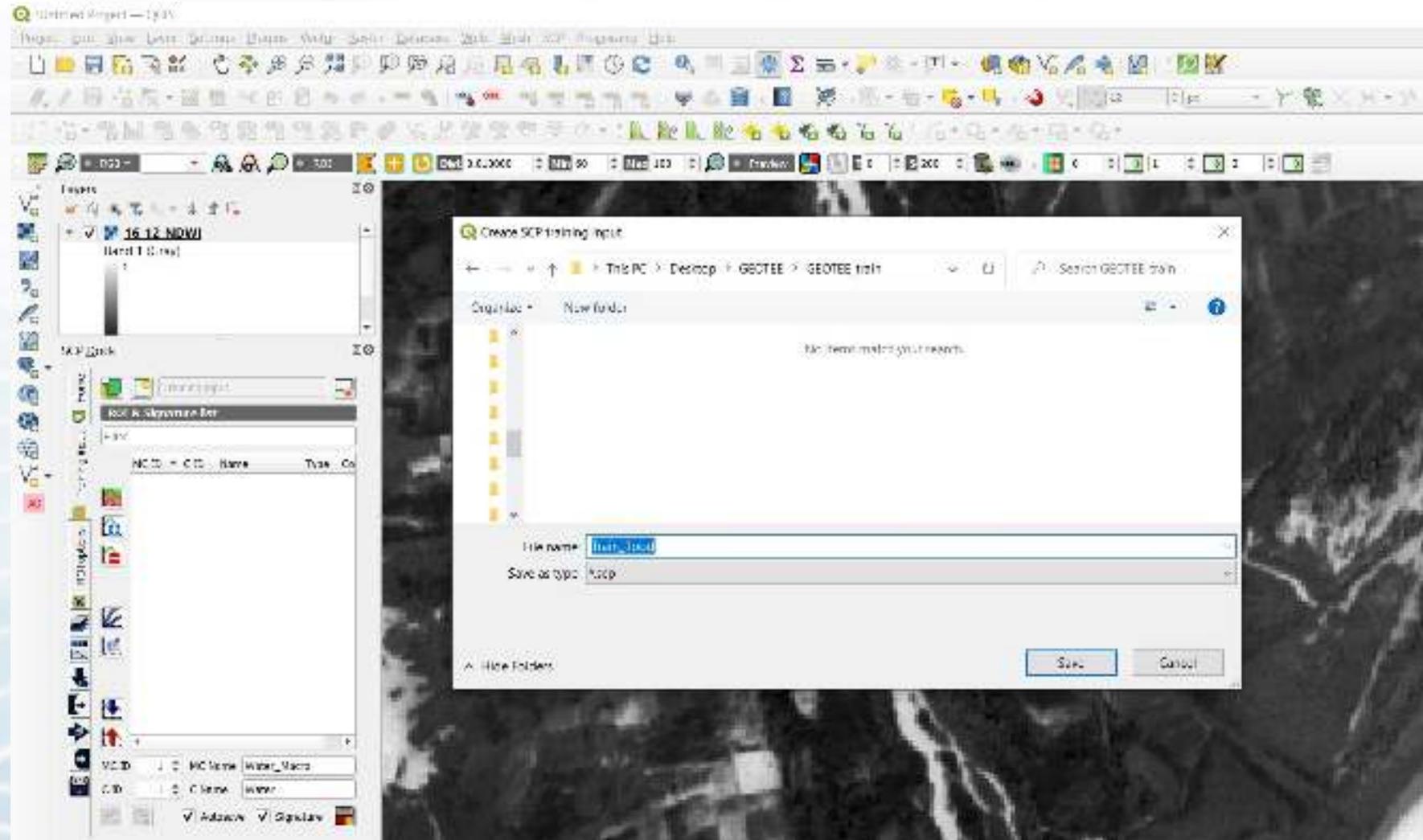
1. Define the file

2. Define the folder and the name of the training file

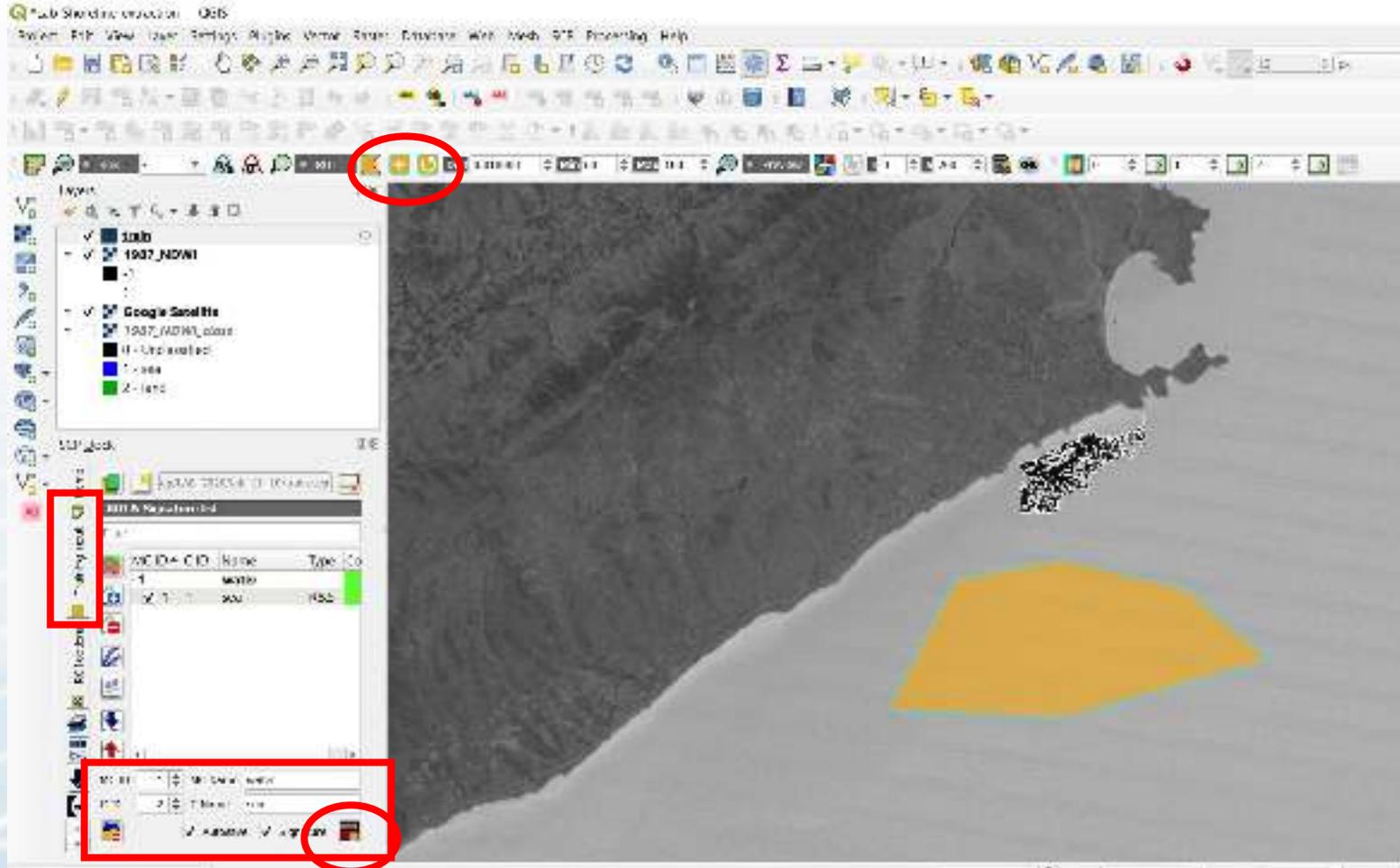
Band name	Center wavelength	Multiplicative Factor	Additive Factor	Warc
1				



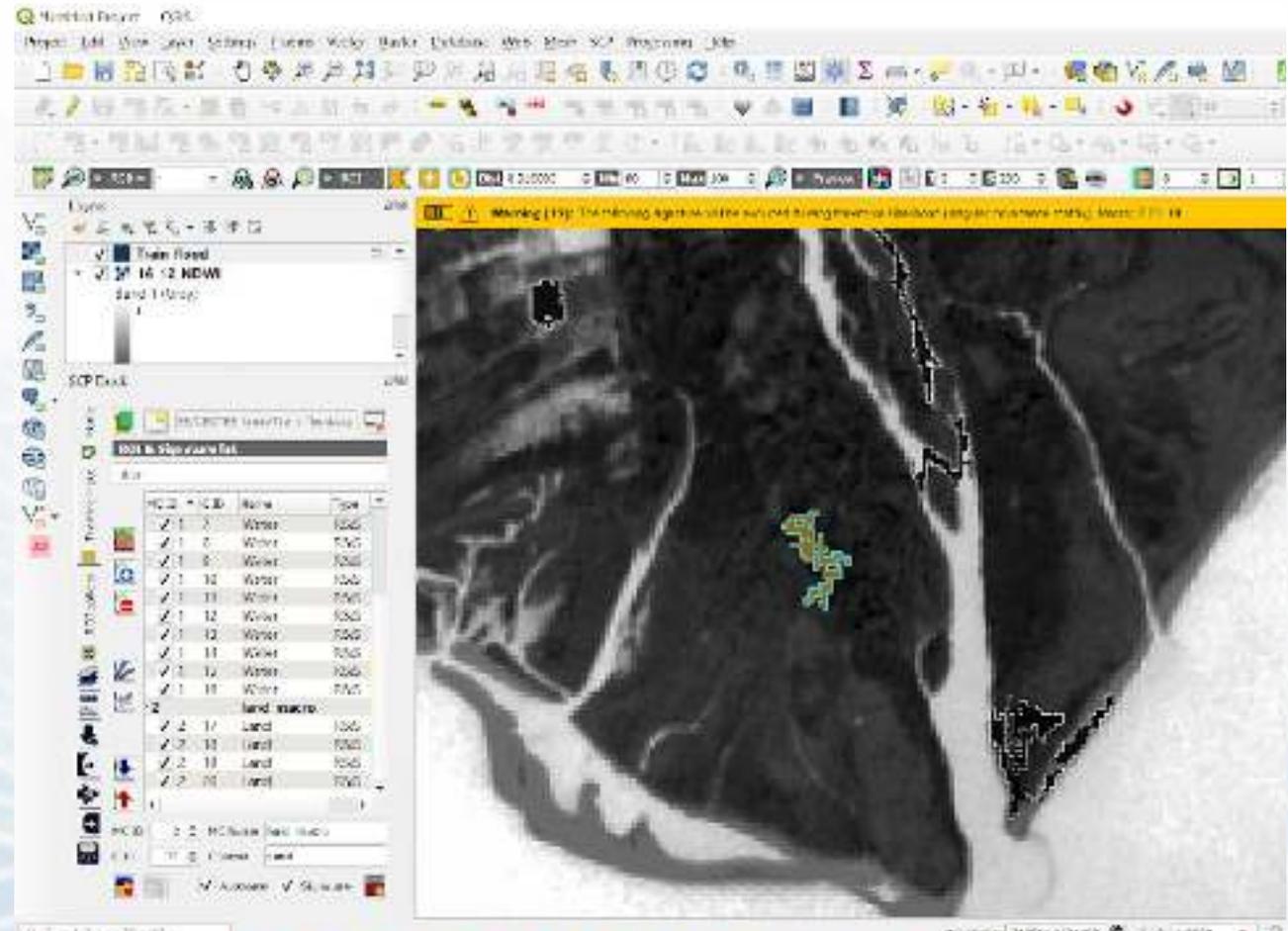
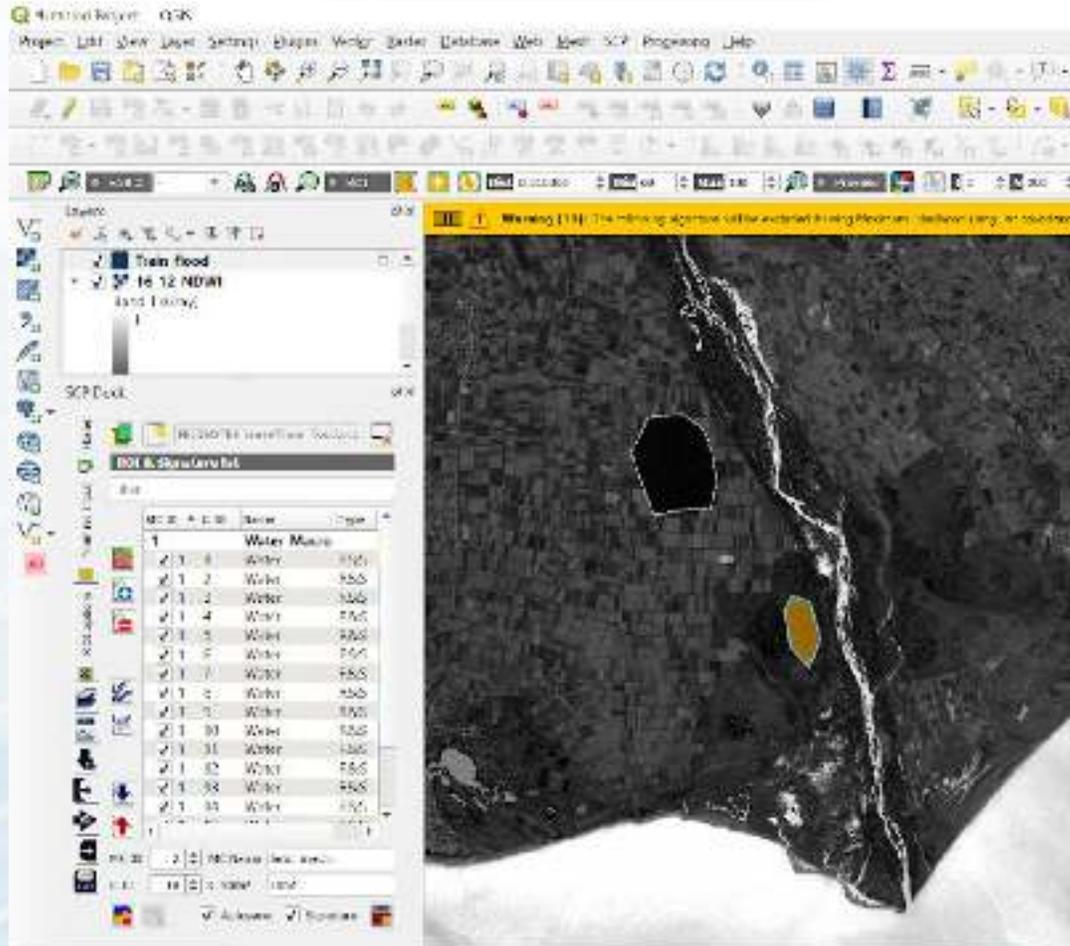
Create train .scp file



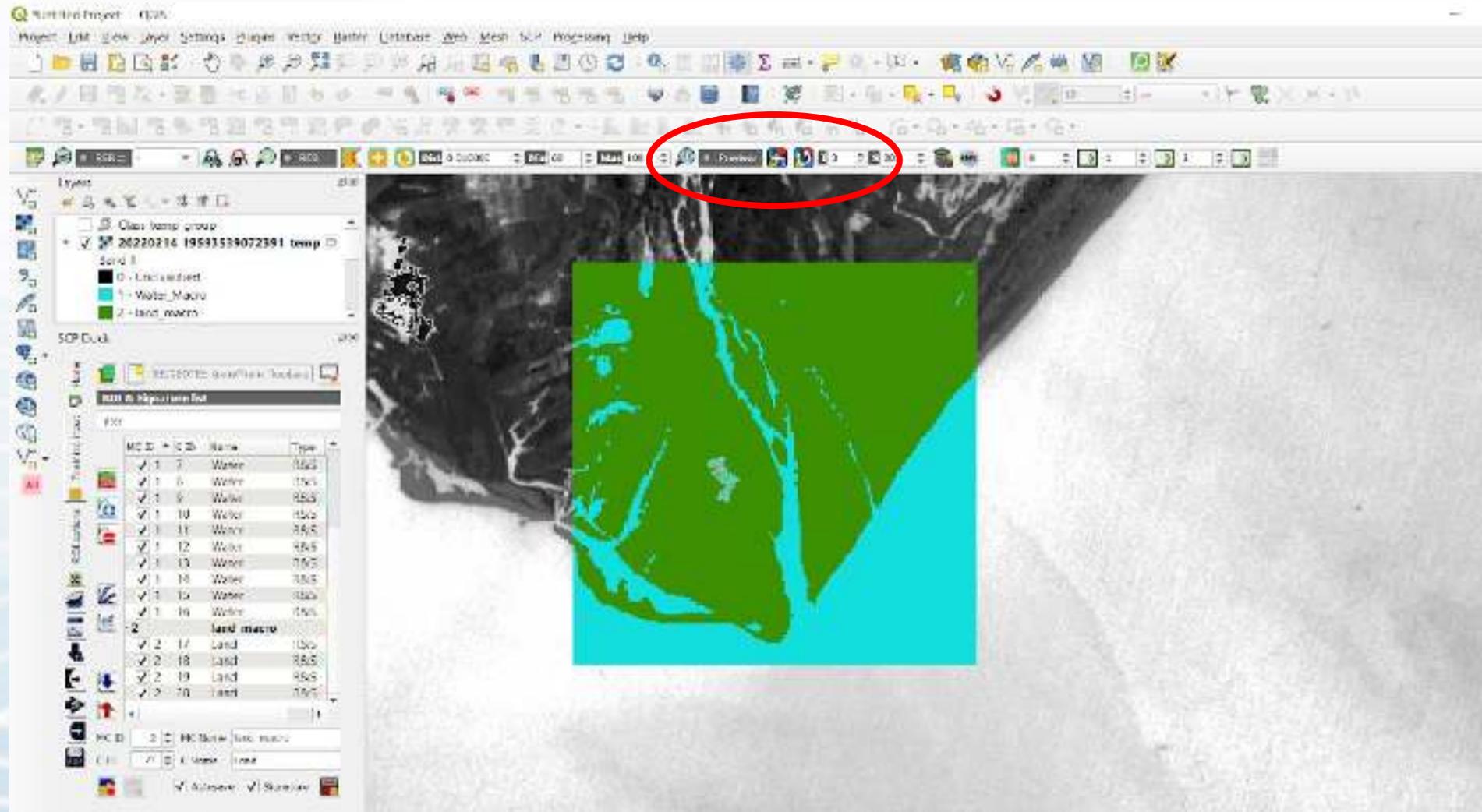
Create Regions of Interest (ROI)



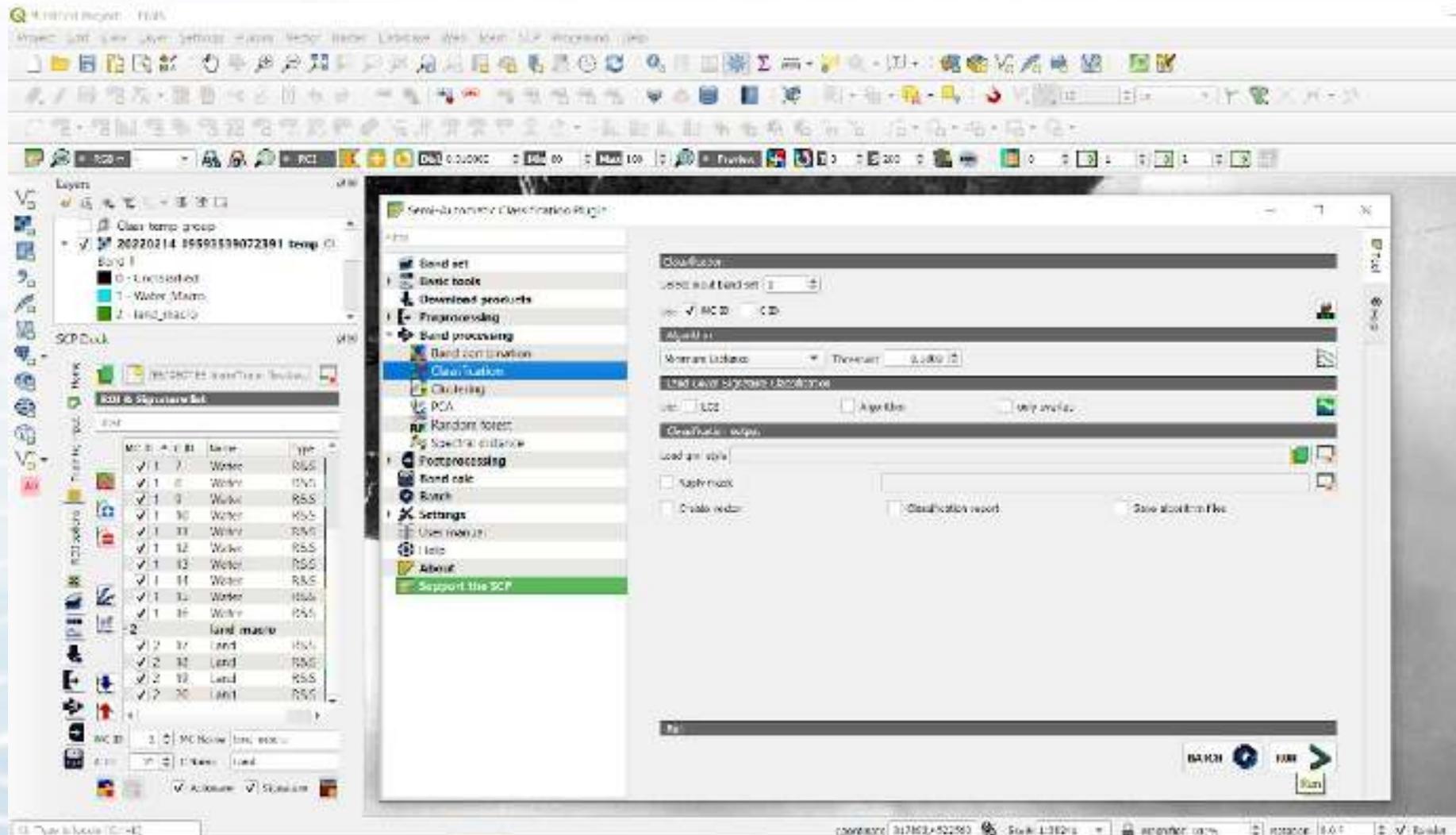
Create Regions of Interest (ROI)



Classification Preview



Run the Semi automatic classification algorithm



The screenshot displays the QGIS desktop environment with the Semi-automatic Classification Plugin configuration window open. The main window shows a list of processing algorithms on the left, with 'Semi-automatic Classification' selected. The right pane contains the configuration options for this algorithm.

Configuration Options:

- Classification:** Job and band set (dropdown), MC ID, C ID.
- Algorithm:** Minimum likelihood (dropdown), Threshold (0.0000).
- Used Layer Symbology:** LUT, Aggr. file, Map style.
- Classification output:** Load an style (dropdown), Save mask, Create vector, Classification word, Save algorithm file.

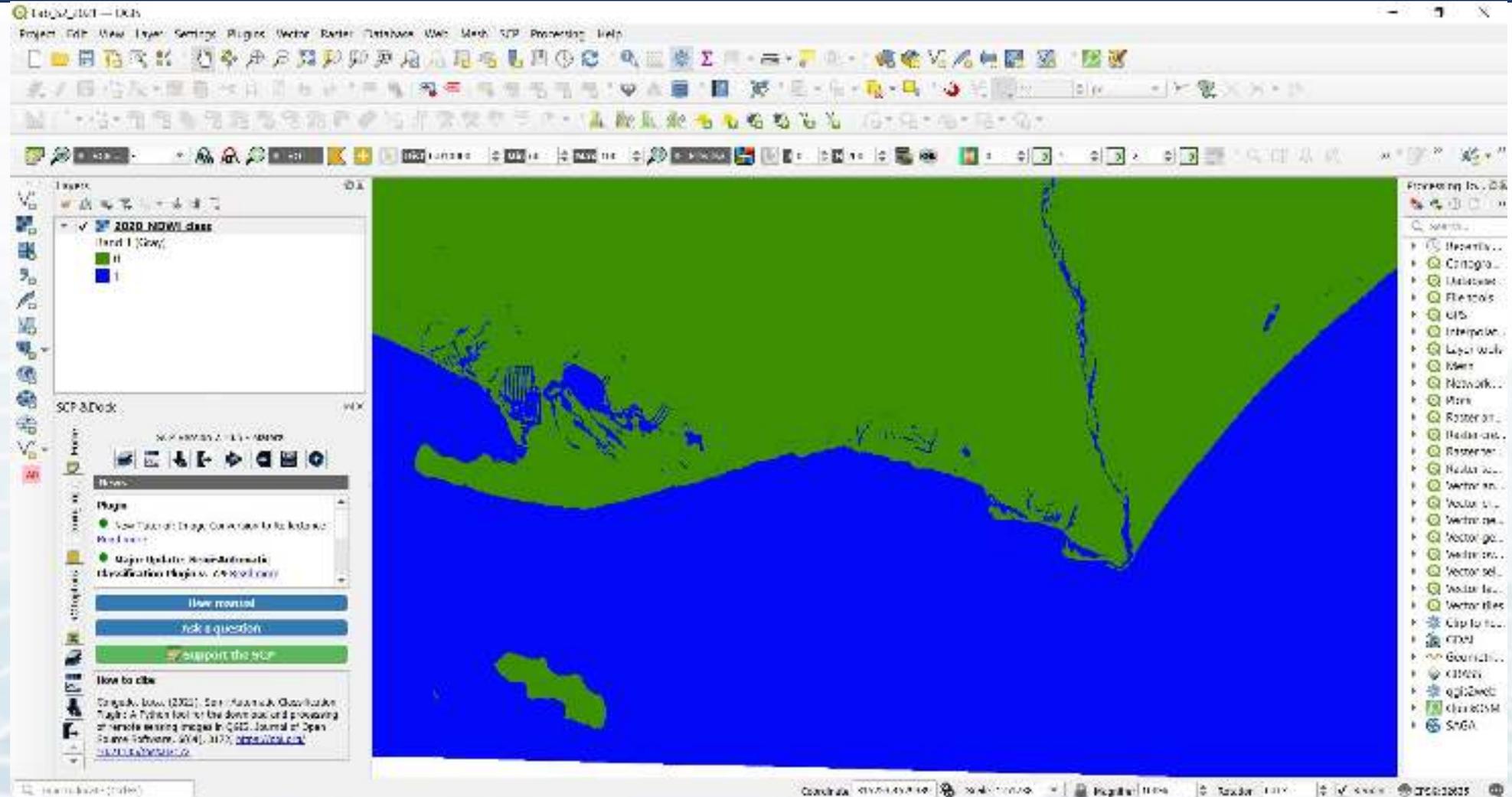
Layers Panel:

- Clear temp group
- 20220214_05591539072391 temp CL
- Band 1
 - 0 - Unclassified
 - 1 - Water/Mar
 - 2 - land/forest

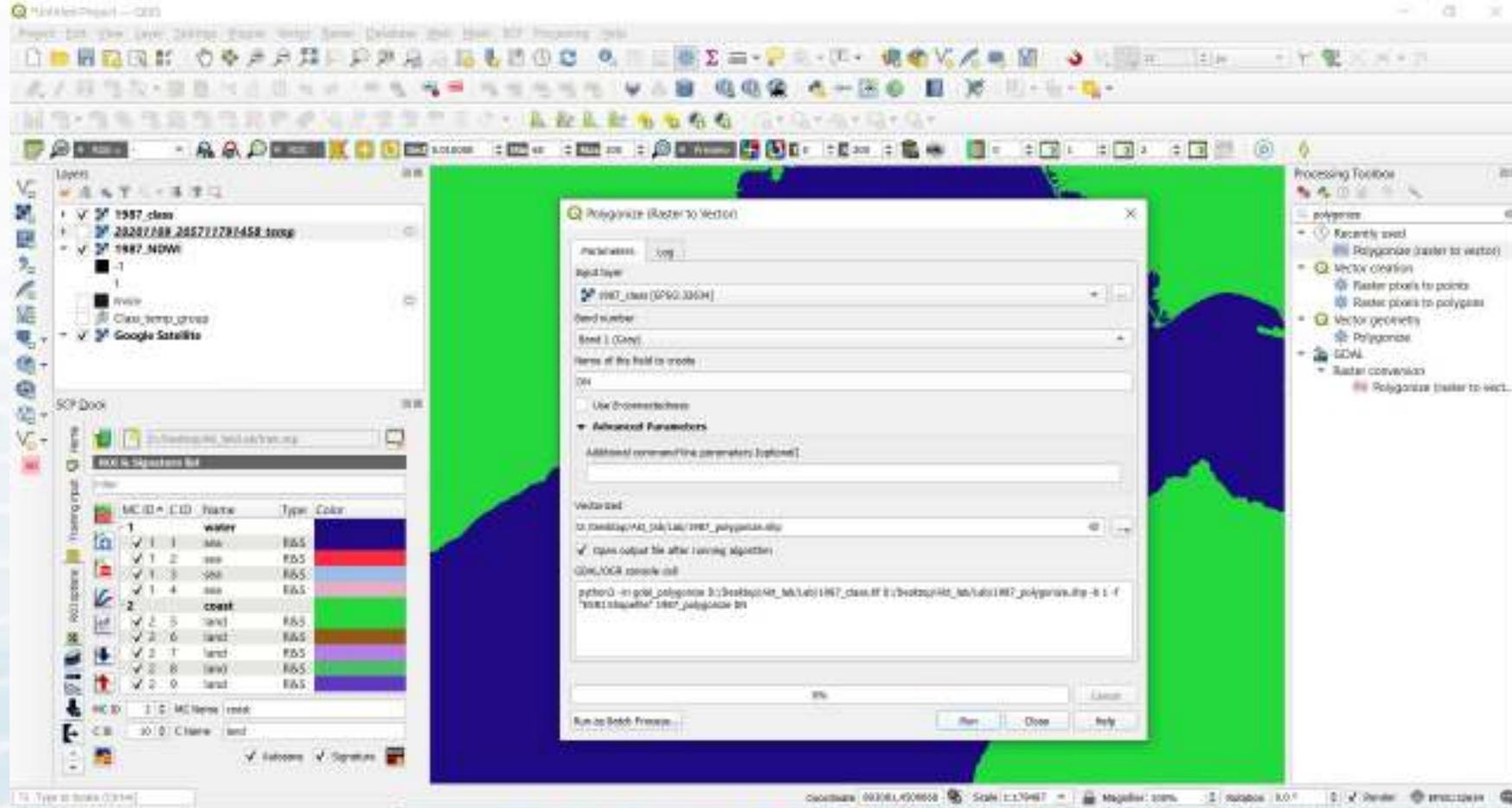
SCP Data Panel:

MC ID	A	B	Band	Type
✓ 1	7		Water	RSS
✓ 1	0		Water	ONS
✓ 1	0		Water	RSS
✓ 1	30		Water	RSS
✓ 1	33		Water	RSS
✓ 1	32		Water	RSS
✓ 1	33		Water	RSS
✓ 1	34		Water	RSS
✓ 1	35		Water	RSS
2			land/forest	
✓ 2	37		Land	RSS
✓ 2	32		Land	RSS
✓ 2	32		Land	RSS
✓ 2	30		Land	RSS

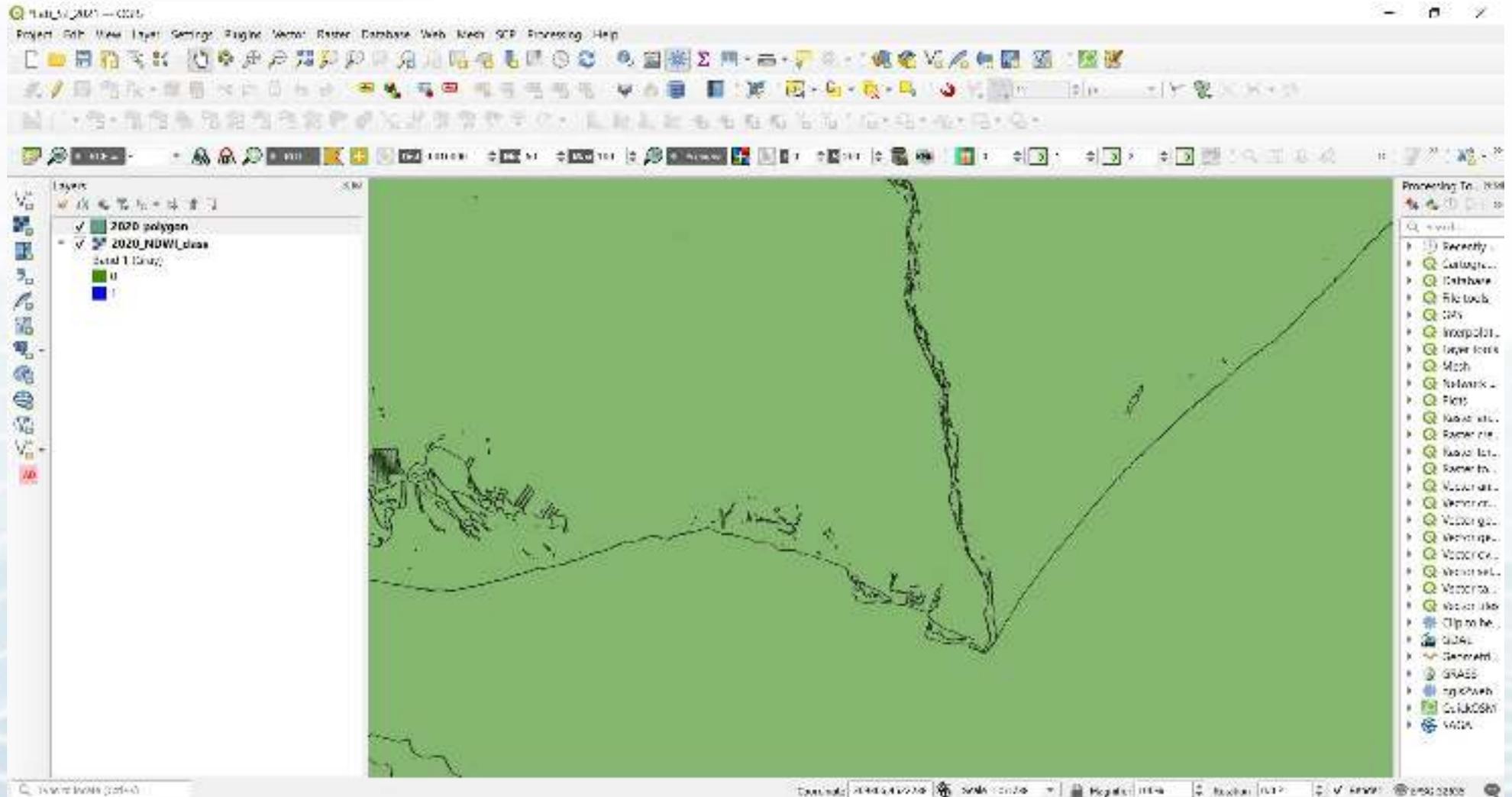
Generate a Classified image



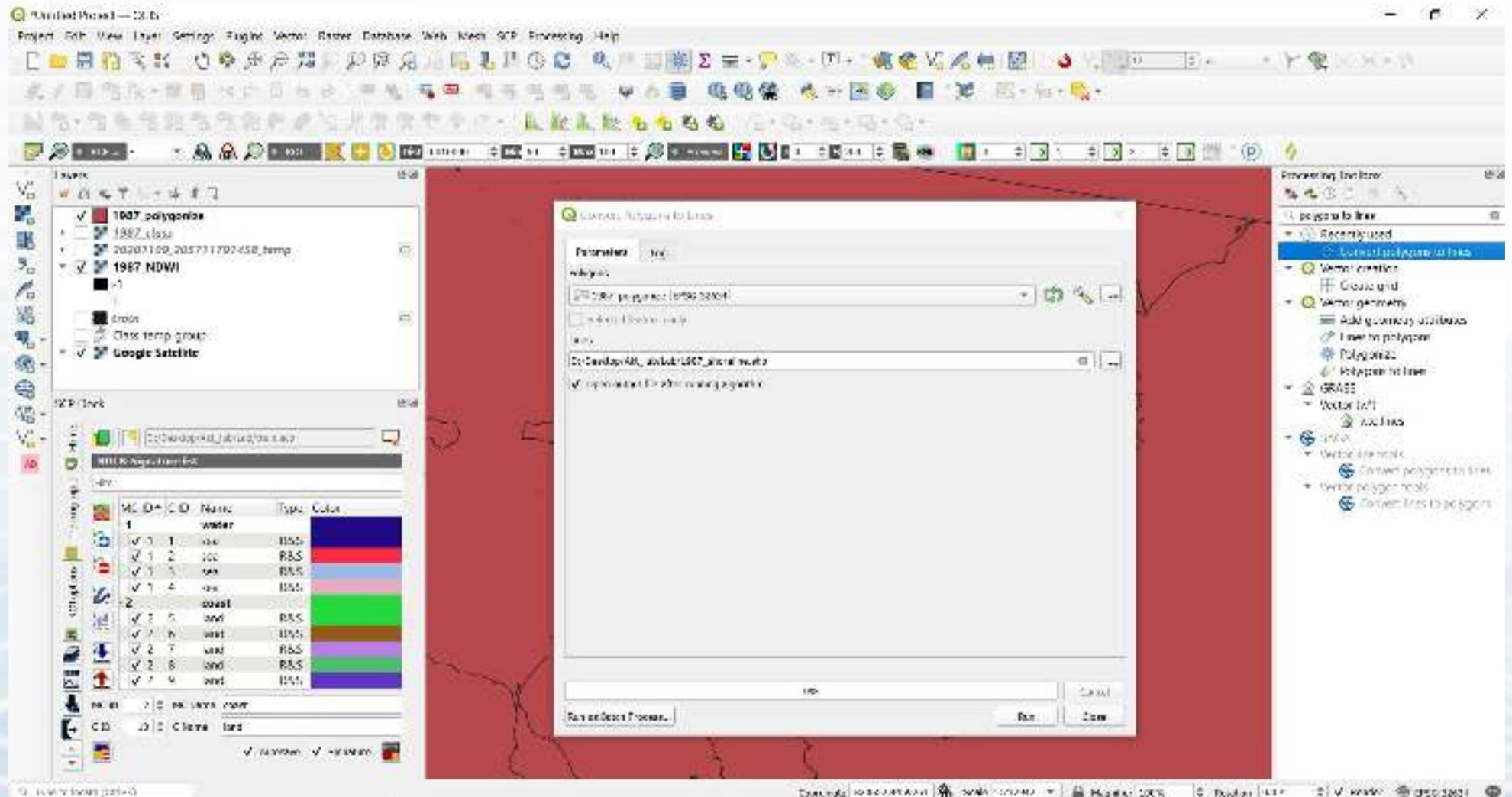
Convert the Raster to Vector



Convert the Raster to Vector



Convert the Polygons to Lines



The screenshot shows the QGIS interface with the 'Convert Polygons to Lines' dialog box open. The dialog box contains the following information:

- Input:** 1967_polygons
- Output:** D:\Development\lab\1967_area.shp
- Save as vector file

The background map shows a red area with black outlines. The left sidebar shows a layer list with the following items:

- 1967_polygons
- 1967_class
- 20207100_205771797458_temp
- 1967 NDWI
 - 1
- roads
- Class temp group
- Google Satellite

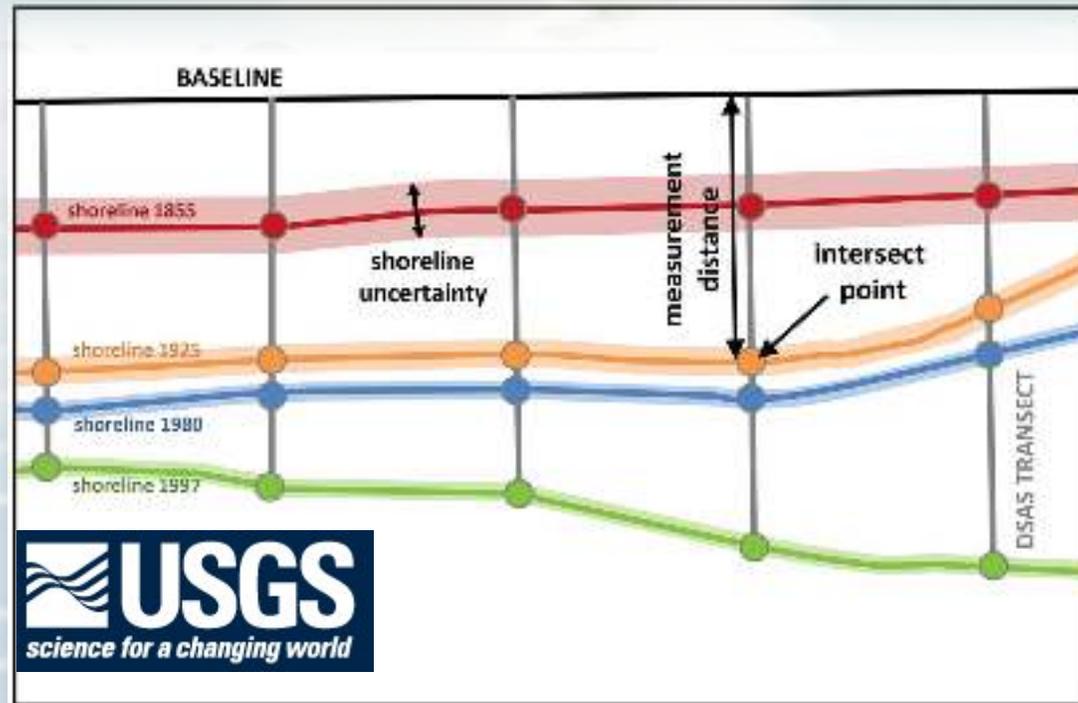
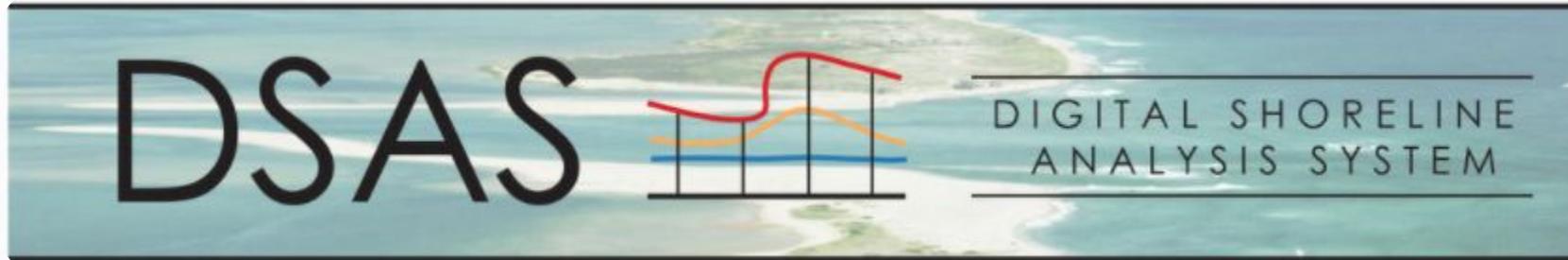
The bottom left corner features logos for 'Black Sea' and the European Union. The bottom right corner features a small portrait of a man.

Historical shorelines



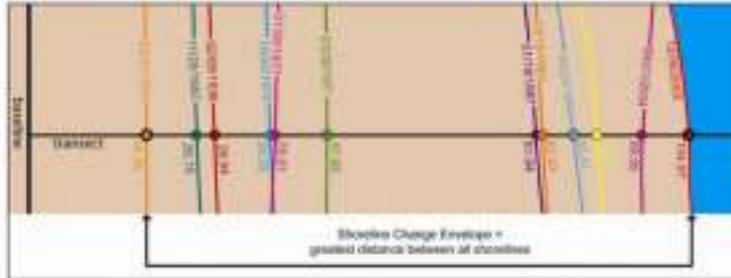
Evaluation of the Shoreline Evolution

Introduction in DSAS tool

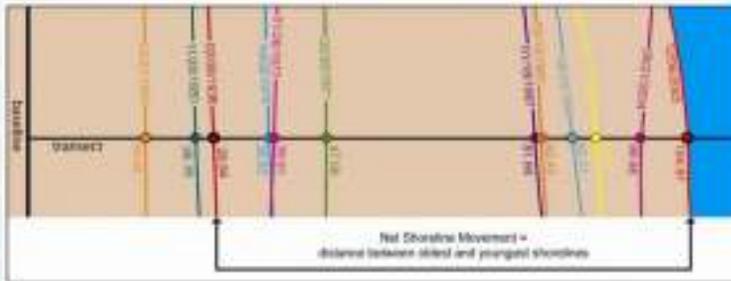


DSAS statistical parameters

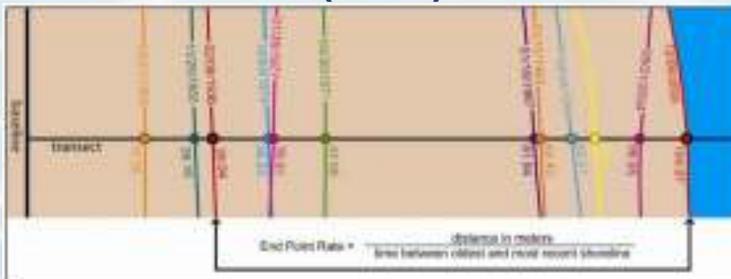
Shoreline Change Envelope (SCE)



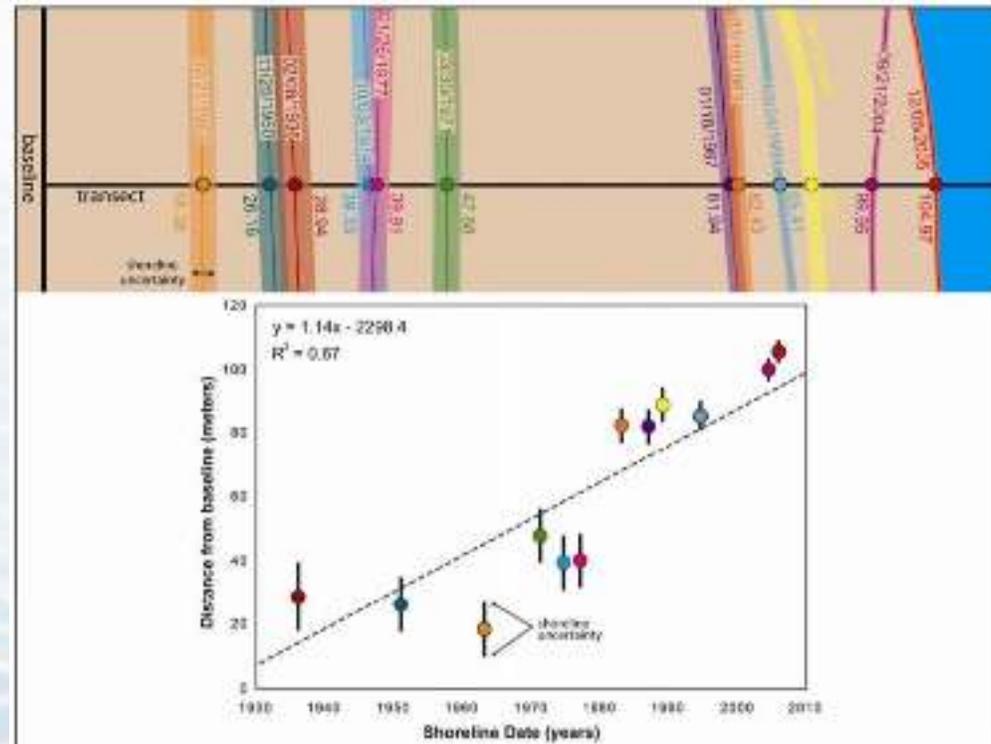
Net Shoreline Movement (NSM)



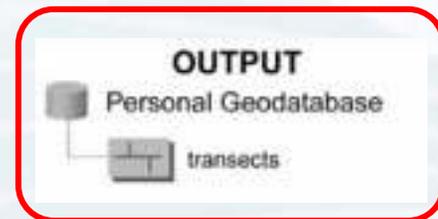
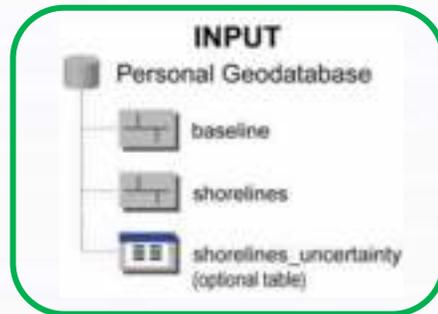
End Point Rate (EPR)



Weighted Linear Regression (WLR)



Methodology in steps - ArcMap & DSAS



Step 1st : Import the shorelines In ArcMap

Step 2nd : Design a **baseline**

Step 3rd : Create a new **Personal Geodatabase (. mdb)**

Step 4th : Define the technical characteristics of the vertical **Transects** in DSAS toolbox

Step 5th : Edit **Transects**

Step 6th : Select the **Statistical Parameters**

Step 7th : **DSAS calculates and export** the results

Step 8th : **Visualization** of the results

Step 9th : **Post- processing** of the results

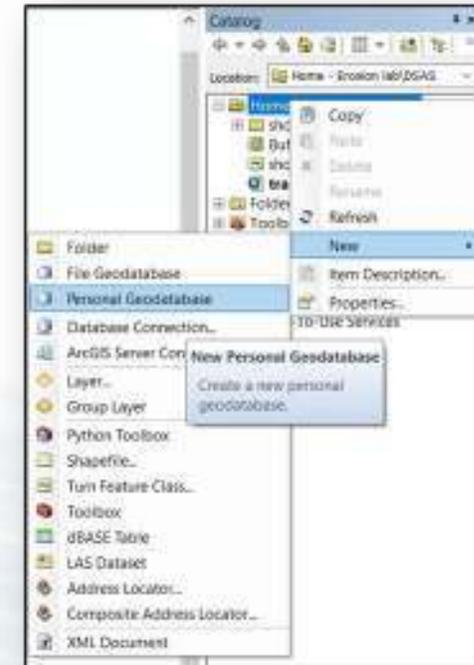
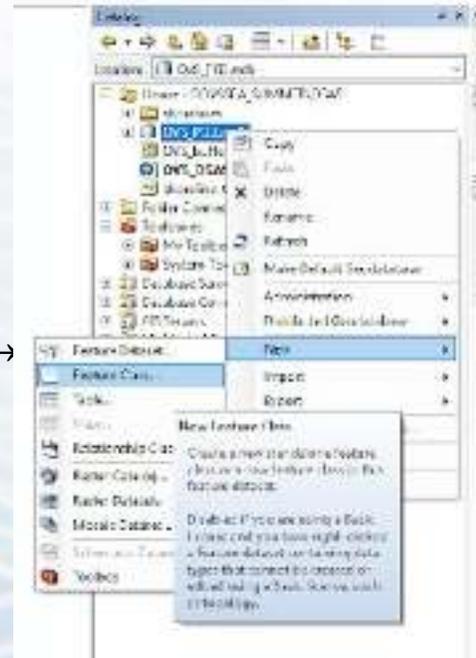
Create a new Personal Geodatabase

1. Create a new Personal Geodatabase

- Catalog → New Personal Geodatabase
- Rename → OVS_PGB.mdb

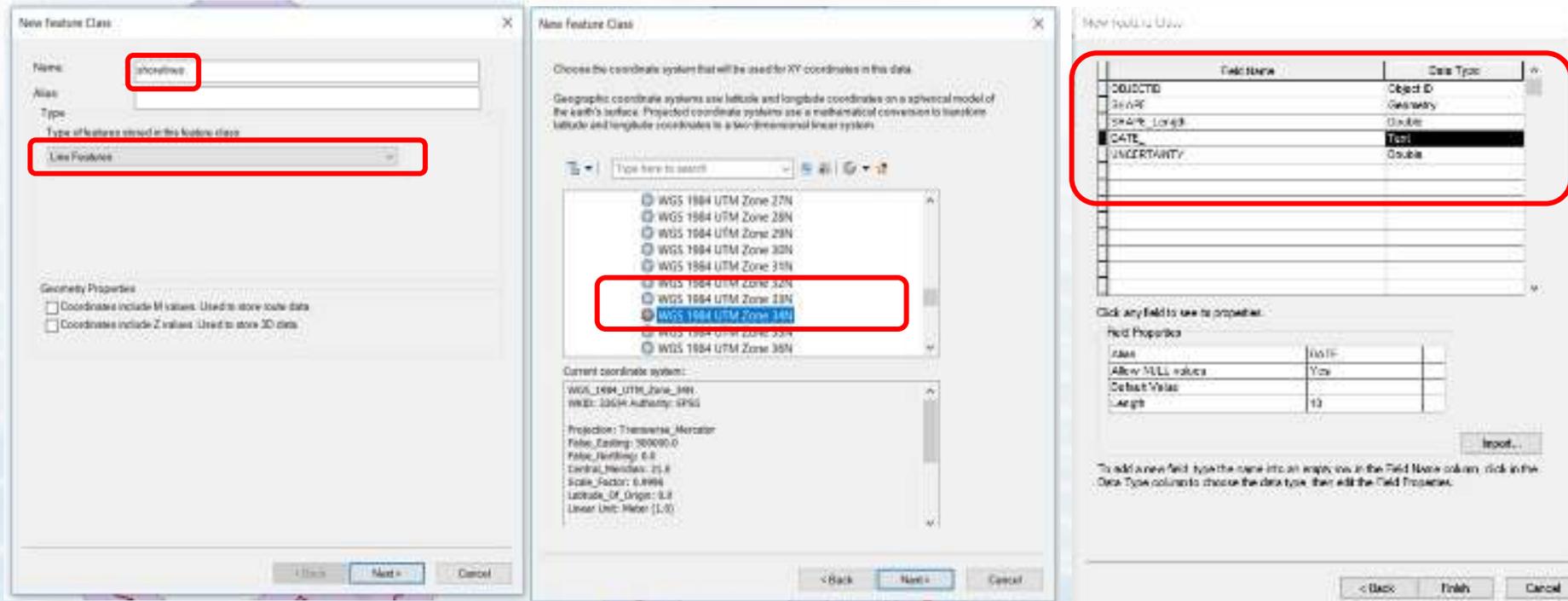
2. Create 2 Feature Classes (shoreline & baseline)

- OVS_PGB.mdb (Right click) → New → Feature class...



Create new Feature Classes for shorelines and baseline

- In the Tab **Catalog** → **OVS_PGB.mdb** (right click) → **New** → **Feature class...**



The image shows three screenshots of the ArcGIS software interface, illustrating the steps to create a new feature class:

- New Feature Class:** The 'Name' field is set to 'shorelines'. The 'Type of features stored in the feature class' is set to 'Line Features'.
- New Feature Class:** The 'WGS 1984 UTM Zone 34N' coordinate system is selected from the list.
- NEW TABLE DSN:** The 'DATE' field is highlighted in the table, indicating it is being added to the feature class.



Create new Feature Classes for shorelines and baseline

New Feature Class

Name:

Alias:

Type:

Type of Feature Class for the Feature Class:

Geometric Properties:
 Geometric Properties: Area and Volume Calculations
 Geometric Properties: Perimeter Calculations

OK Cancel

New Feature Class

Choose the coordinate system that will be used for all coordinates in the data.

Geographic coordinate systems use longitude and latitude coordinates on a spherical model of the earth's surface. Projected coordinate systems use a mathematical convention to transform altitude and longitude coordinates to a two-dimensional linear system.

Use type to search

- WGS 1984 UTM Zone 27N
- WGS 1984 UTM Zone 28N
- WGS 1984 UTM Zone 29N
- WGS 1984 UTM Zone 30N
- WGS 1984 UTM Zone 31N
- WGS 1984 UTM Zone 32N
- WGS 1984 UTM Zone 33N
- WGS 1984 UTM Zone 34N
- WGS 1984 UTM Zone 35N

Current coordinate system:
WGS_1984_UTM_Zone_35N
WKID: 32635 Authority: EPSG

Projection: Transverse Mercator
False_Bearing: 100000.0
False_Easting: 0.0
False_Northing: 0.0
Scale_Factor: 0.9996
Latitude_Of_Origin: 0.0
Linear_Units: Meter (L0)

Back Next Cancel

New Feature Class

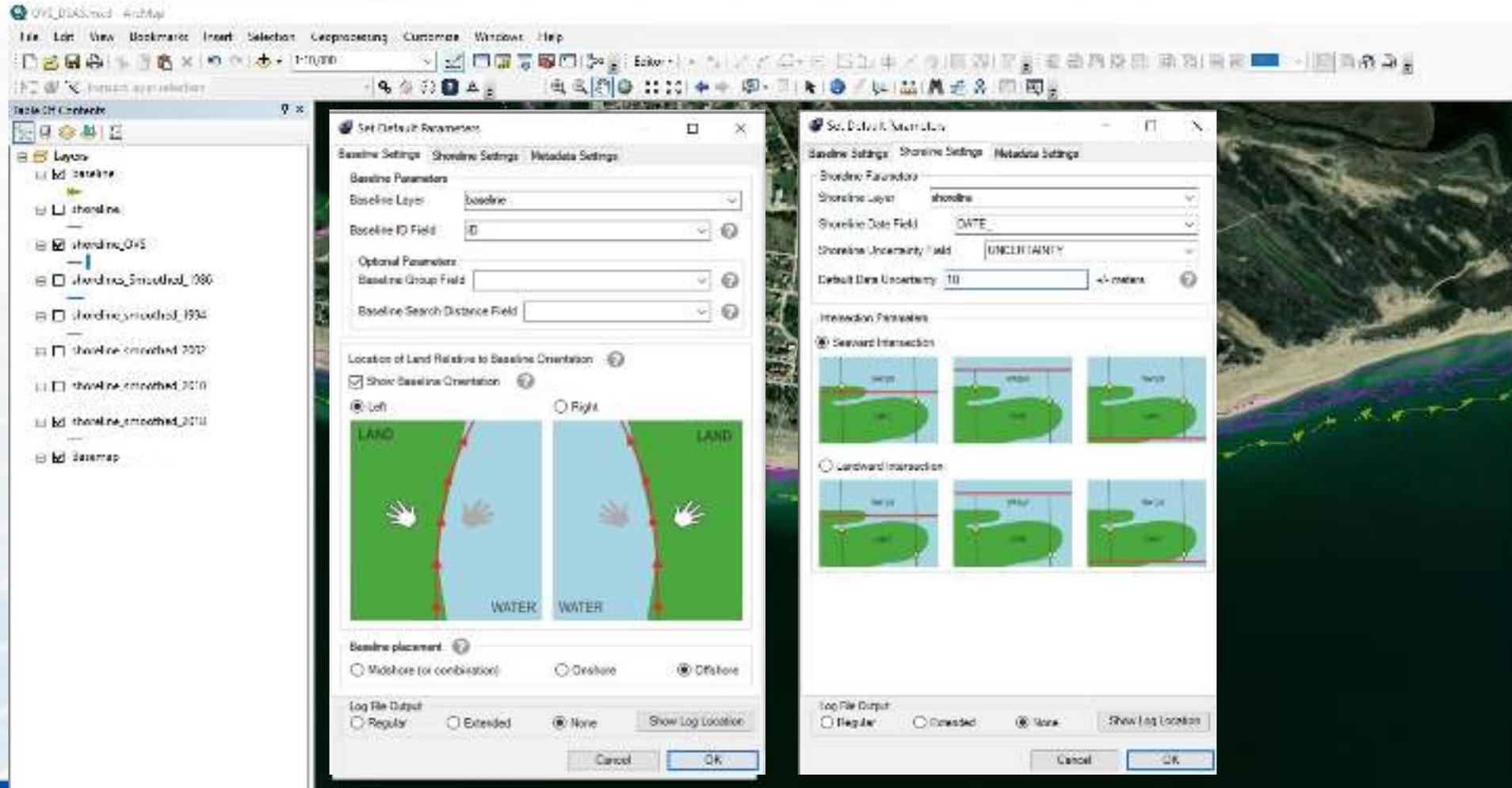
Field Name	Data Type
OBJECTID	Object ID
SHAPE	Geometry
SHAPE_Length	Double
ID	Long Integer
Group	Long Integer
SHAPE_DISTANCE	Double

Click on fields to add to new class

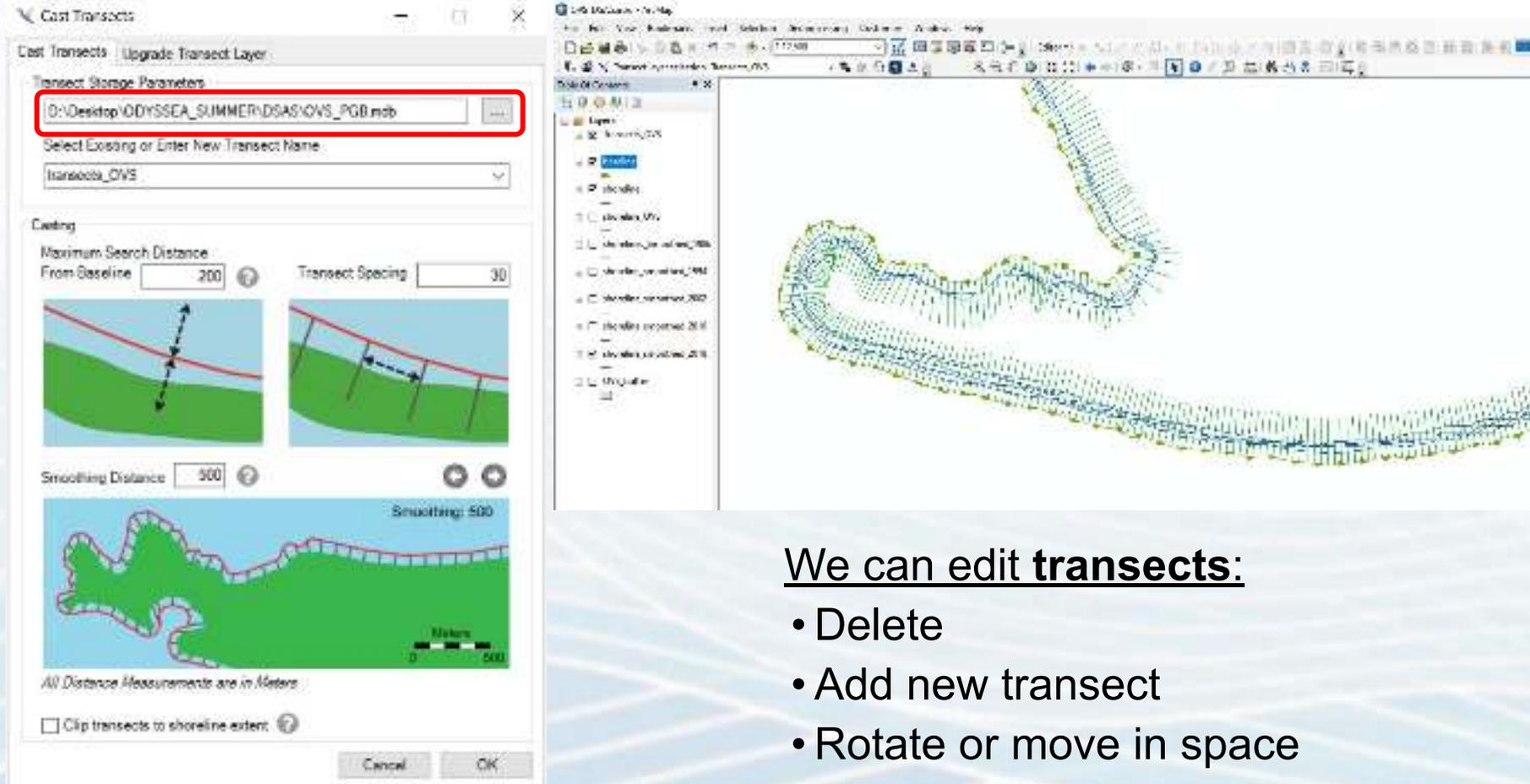
Field Properties

OK Cancel

Transects creation in DSAS tool



Transects creation in DSAS tool



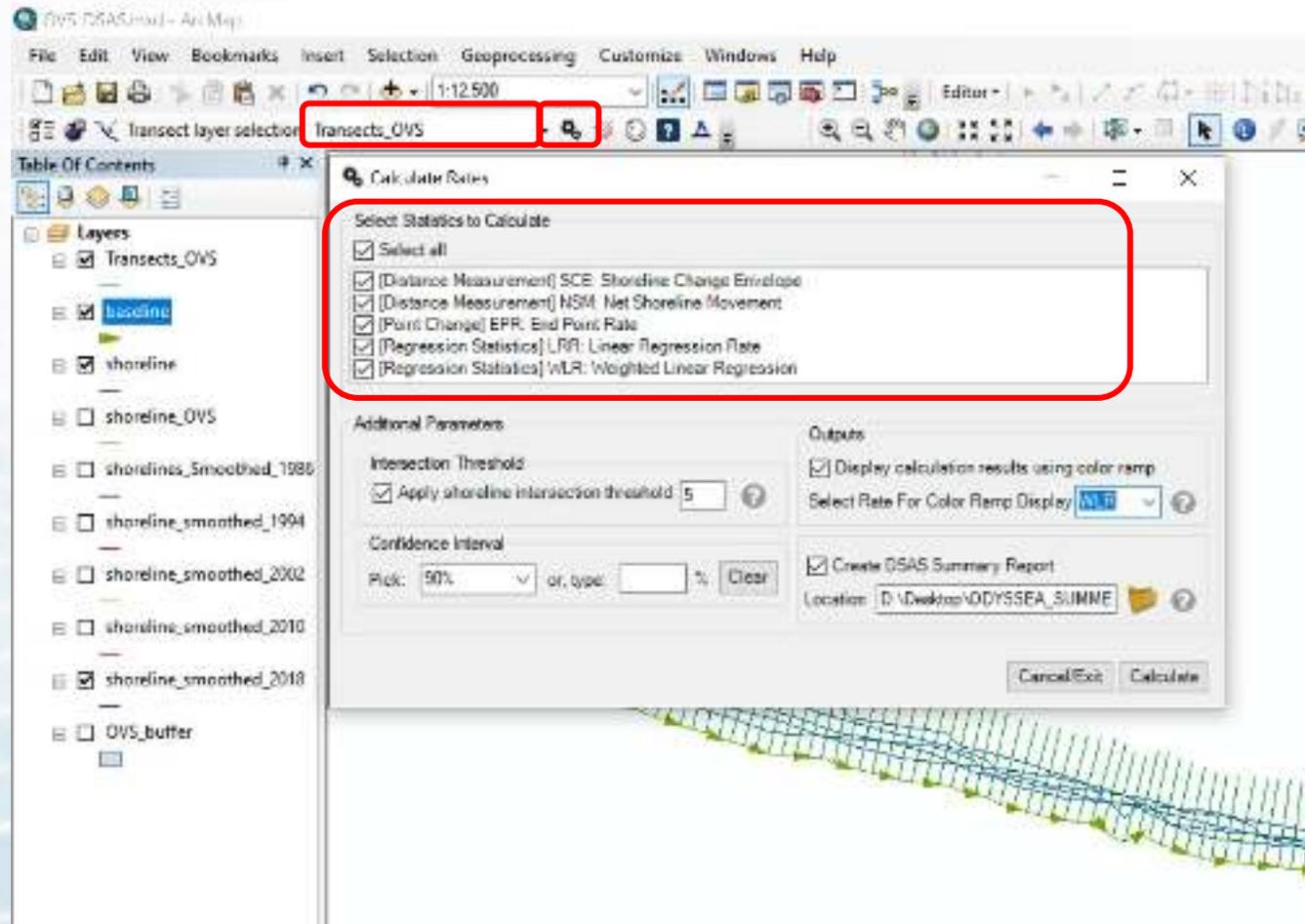
The image shows the 'Cost Transects' dialog box in the DSAS tool. The 'Transect Storage Parameters' section has a file path 'D:\Desktop\ODYSSEA_SUMMER\DSAS\OVS_PGB.mdb' highlighted with a red box. Below it, the 'Transect Name' is set to 'transecta_OVS'. The 'Costing' section includes 'Maximum Search Distance From Baseline' set to 200, 'Transect Spacing' set to 30, and 'Smoothing Distance' set to 500. There are three diagrams illustrating the search distance, spacing, and smoothing. At the bottom, there is a checkbox for 'Clip transects to shoreline extent' which is currently unchecked. The map on the right shows a coastline with numerous blue and green transect lines extending inland from the shore.

We can edit **transects**:

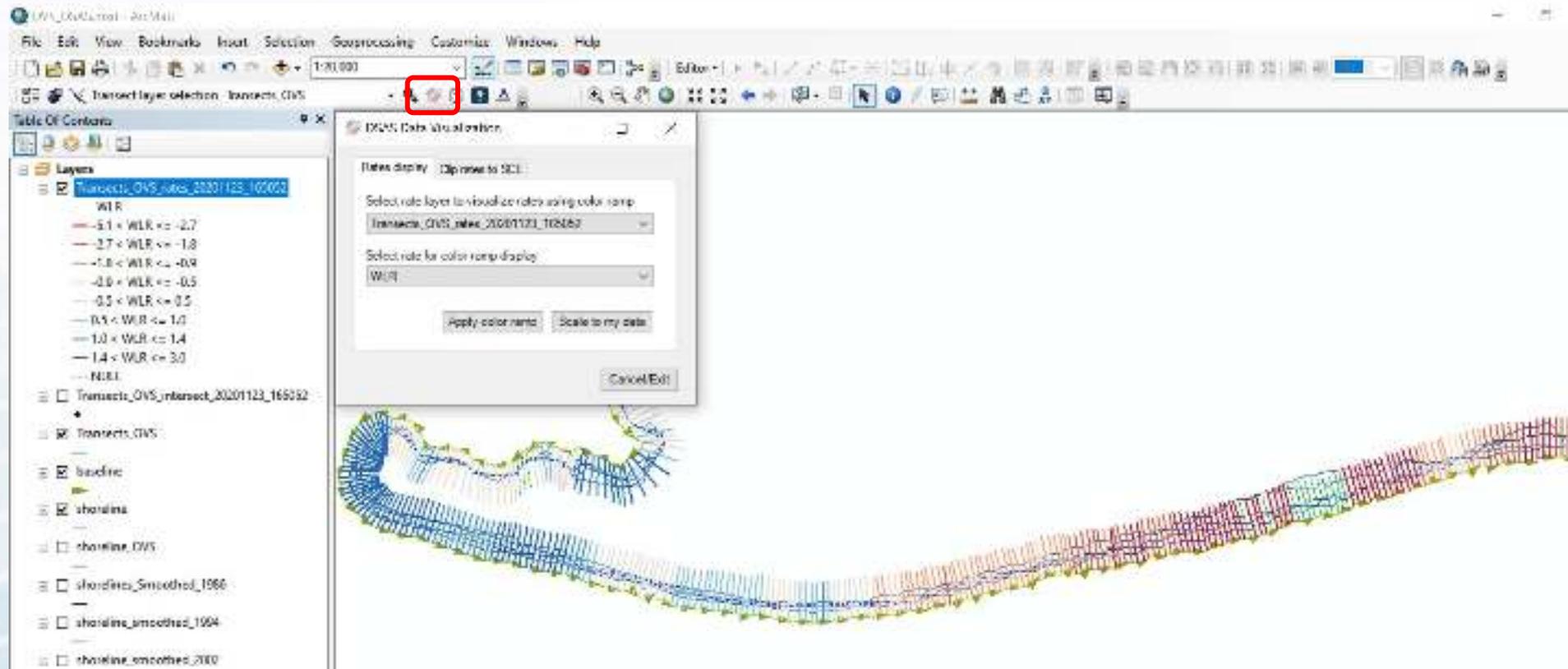
- Delete
- Add new transect
- Rotate or move in space



Calculation of Statistical parameters in DSAS tool



Visualization of the DSAS analysis results in ArcGIS



Data produced from DSAS tool

Table

Transects_OVS_interest_20201123_165052

object identifier	geometry	TransectID	BaselineID	ShorelineID	TransOrder	Distance	IntersectX	IntersectY	Uncertainty
1 Point		2	2	1	06/05/1986	-53.82853	237338.838740	4523617.322503	30
2 Point		2	2	1	06/05/1994	-53.281586	237343.118035	4523621.888066	30
3 Point		2	2	1	06/062002	-53.281586	237343.118035	4523621.888066	30
4 Point		2	2	1	06/062010	-80.69344	237353.362591	4523623.617000	30
5 Point		2	2	1	0/0/72018	-80.595233	237357.848248	4523637.353052	30
6 Point		3	3	1	06/05/1986	-50.337482	237356.708189	4523733.203851	30
7 Point		3	3	1	06/05/1994	-80.652053	237363.915458	4523661.084542	30
8 Point		3	3	1	06/062002	-80.652053	237363.915458	4523661.084542	30
9 Point		3	3	1	06/062010	-71.288625	237371.124747	4523686.875253	30
10 Point		3	3	1	0/0/72018	-81.261132	237378.334038	4523676.685084	30
11 Point		4	4	1	06/05/1986	-51.436667	237368.386208	4523772.315886	30
12 Point		4	4	1	06/05/1994	-80.237549	237366.463584	4523775.516418	30
13 Point		4	4	1	06/062002	-80.237549	237366.463584	4523775.516418	30
14 Point		4	4	1	06/062010	-70.719804	236888.184279	4523782.407881	30

Table

Transects_OVS_interest_20201123_165052

object identifier	geometry	TransectID	TransOrder	BaselineID	ShorelineID	Distance	IntersectX	IntersectY	Uncertainty
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6 Point		3	3	1	06/05/1986	-50.337482	237356.708189	4523733.203851	30
7 Point		3	3	1	06/05/1994	-80.652053	237363.915458	4523661.084542	30
8 Point		3	3	1	06/062002	-80.652053	237363.915458	4523661.084542	30
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14 Point		4	4	1	06/062010	-70.719804	236888.184279	4523782.407881	30

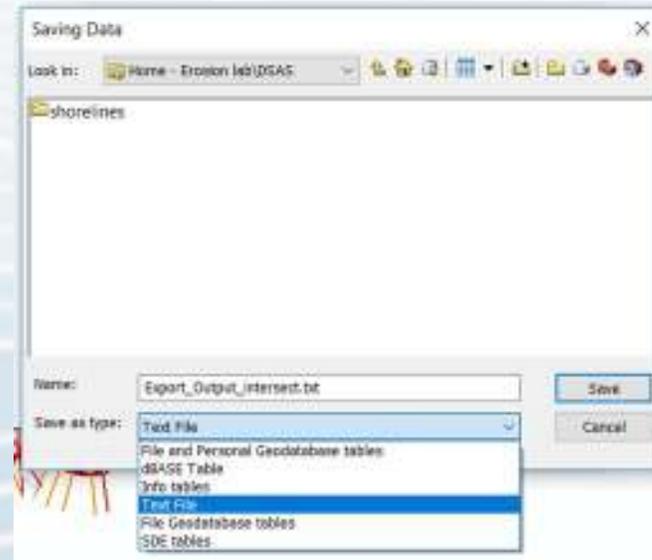
Saving data

The parameters estimated from DSAS are:

- **TRANSECT INTERSECT** (data of the transect position)
- **TRANSECT RATES** (results of the **Statistical Analysis** for each transect)

Save the file as .txt:

Table of Contents → **List by source** → **transects_intersects** (right click) → **Data** → **Export** → **Save**

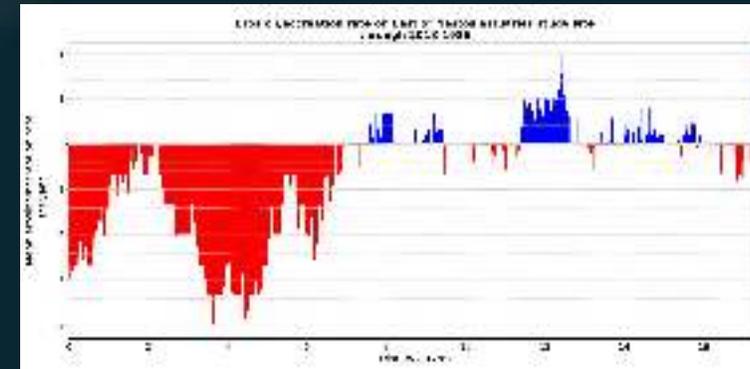
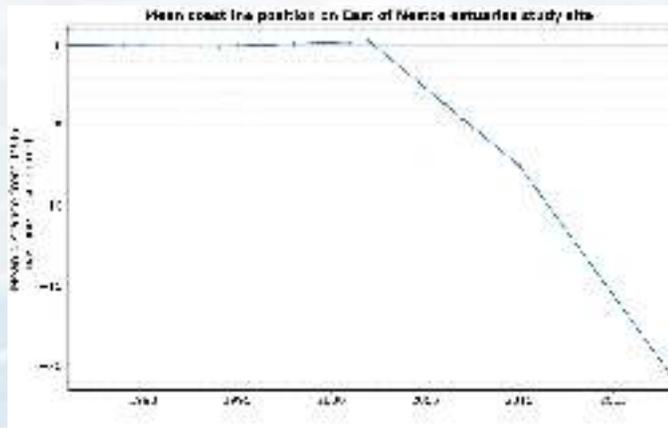
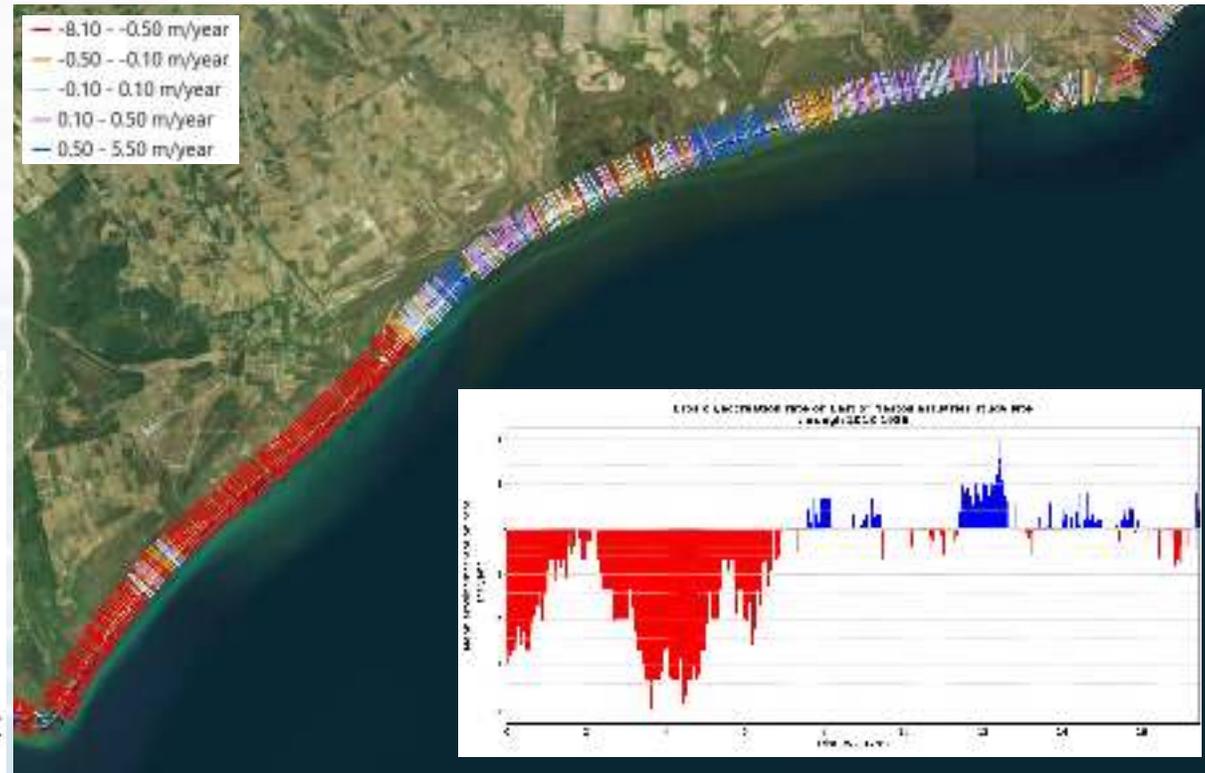


Results for Thracian sea



Results – East Nestos Estuaries

	Value	Units
Average rate	-0.70	m/year
max accretion	1.93	m/year
max erosion	-3.78	m/year
Average Error	0.35	m



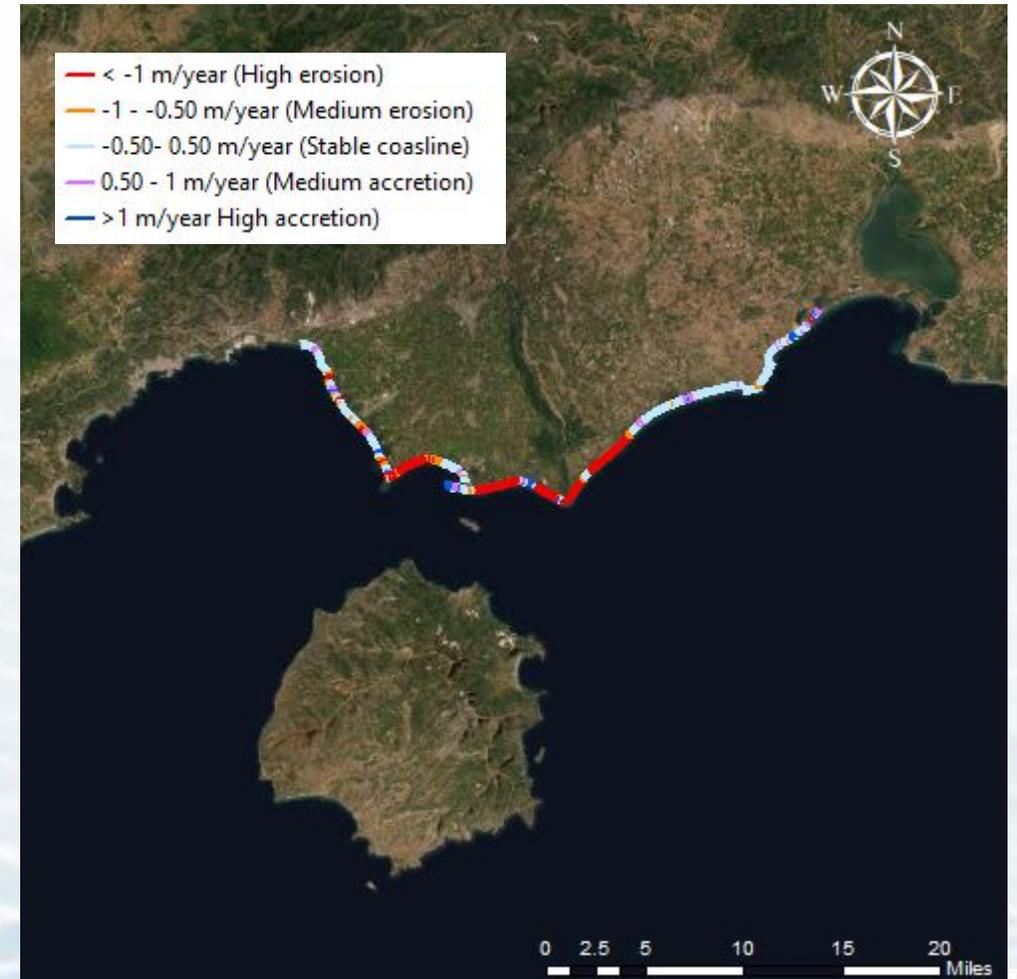
Shoreline change from 1985 to 2020



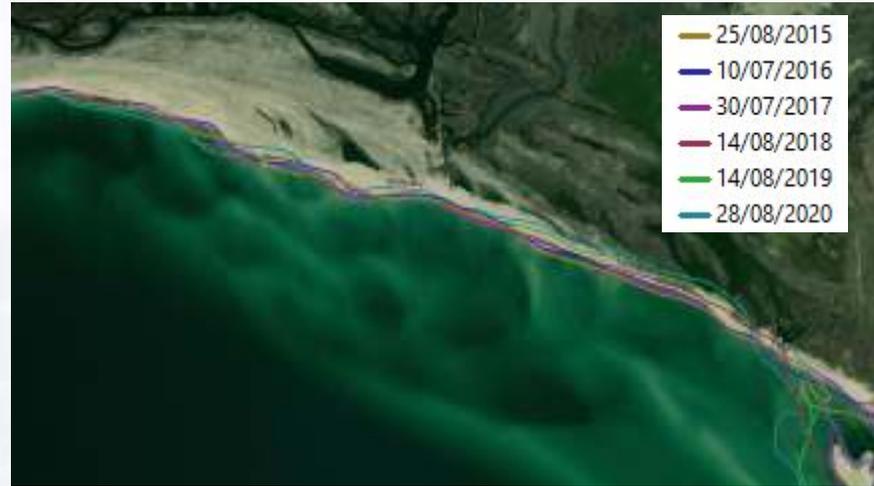
Coastline on the West of the Nestos Estuaries



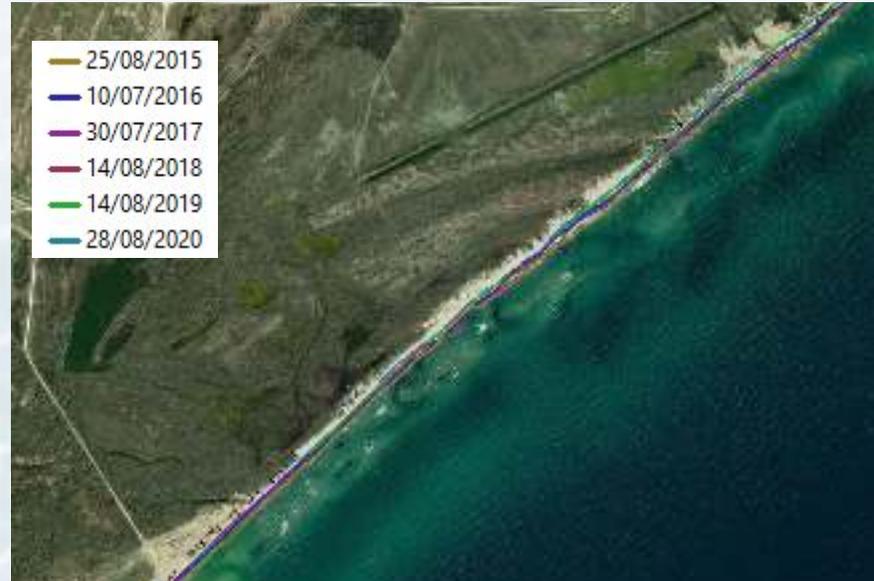
Coastline on the East of the Nestos Estuaries



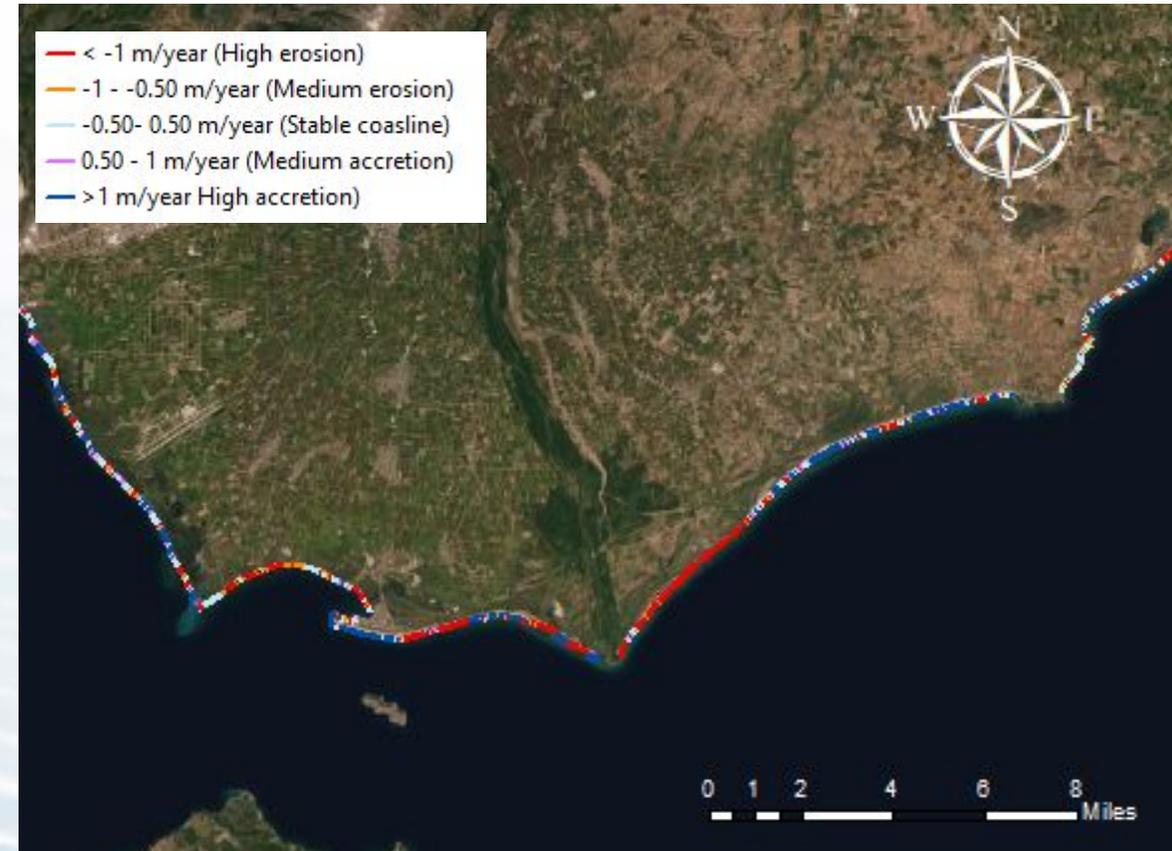
Shoreline change from 2015 to 2020



Coastline on the West of the Nestos Estuaries



Coastline on the East of the Nestos Estuaries



Links for software and manuals

Satellite images:

- Earth Explorer: <https://earthexplorer.usgs.gov/>
- Copernicus Hub: <https://scihub.copernicus.eu/dhus/>
- Planet Explorer: <https://www.planet.com/explorer/>

Plug-ins

- SCP plug in:
<https://plugins.qgis.org/plugins/SemiAutomaticClassificationPlugin/>
- DSAS tool:
https://www.usgs.gov/centers/whcmsc/science/digital-shoreline-analysis-system-dsas?qt-science_center_objects=0#qt-science_center_objects

GIS Links

- QGIS: <https://qgis.org/en/site/forusers/download.html>
- ArcMap:
<https://pro.arcgis.com/en/pro-app/get-started/install-and-sign-in-to-arcgis-pro.htm>