Quantum GIS **users session**

QGIS as tool for teaching

Kārlis Kalviškis, University of Latvia

Valmiera
2013. 04.12.

About the author

- Background – biology.
- Occupation – IT specailist at Faculty of Biology, University of Latvia.
- The first step in GIS field – in 1991.

Software experience:

- ESRI ArcGIS
- ESRI ArcInfo
- ESRI ArcView
- ER Mapper
- Idrisi
- MapGrafix
- MapInfo
- Microimages TNT lite

- Microstation
  - Descartes
  - Geographer
- TRETOP

- ImageJ
- Media Cybernetics Image-Pro Plus

Experience with *Quantum GIS*

- Starting from *Quantum GIS* 0.7

Experience with Quantum GIS

- *QGIS* is used as a tool for teaching GIS basics starting from version 1.0.1

Experience with Quantum GIS

- The developer version is used now.

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Why to use *QGIS?*

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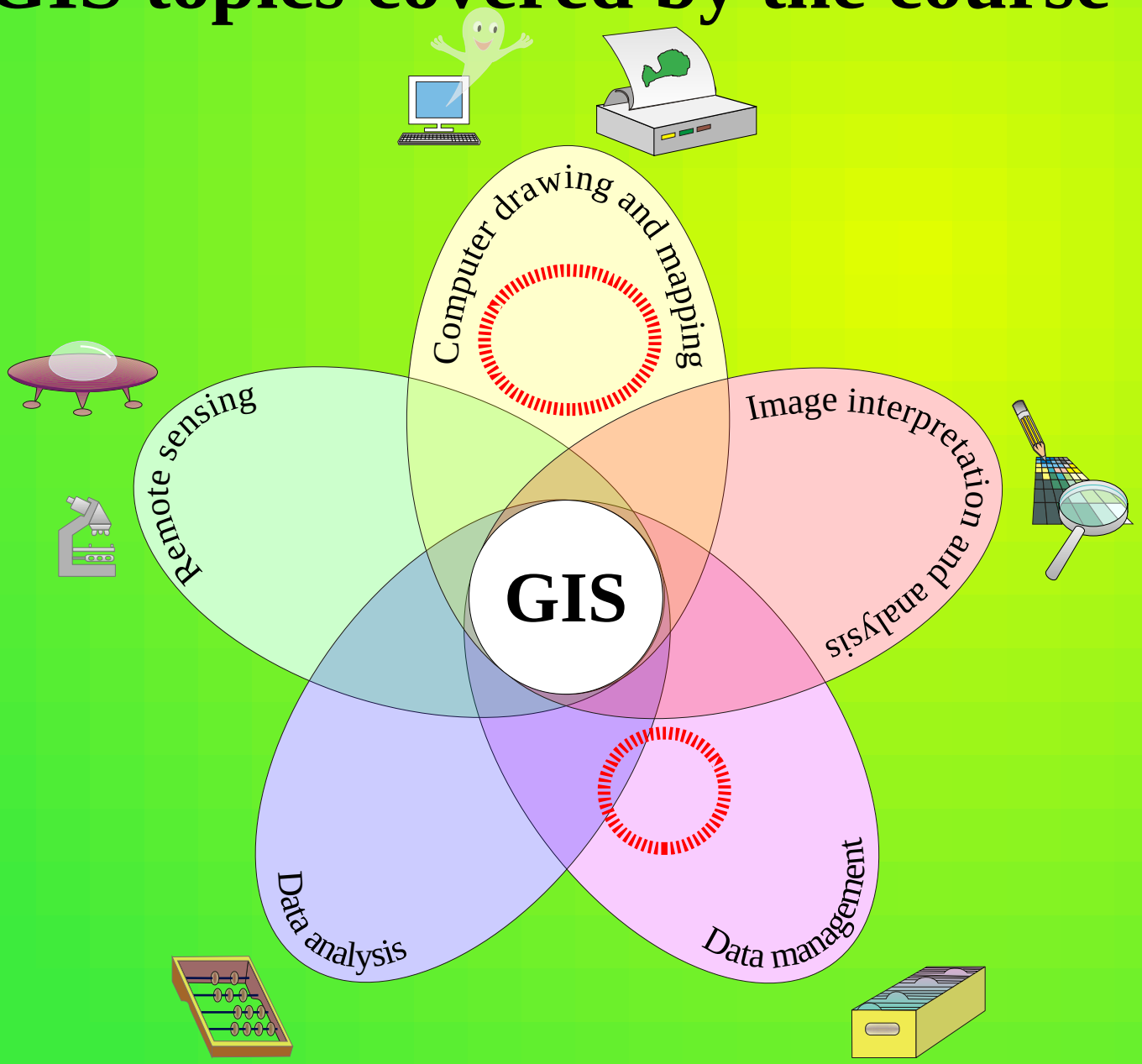
Course description

- The Maintenance and Transformation of Spatial Data.
- Audience – students of bachelor study programme "Biology":
  - lack of knowledge in mapping;
  - limited time for GIS courses;
  - the course graduates should gain practical knowledge to be applied in the environment of limited resources.

The course software specification

- Easily to learn and use.
- Functionality must correspond to the course exercises.
- Should be platform independent.
- Should use open file formats.
- Should be allowed to use on any computer.

GIS topics covered by the course



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QGIS availability

- *Mac OS X*
- Most of *Linux* distributions.
  - Rather easy to compile by yourself if missing.
- *Windows* (*XP*, *7*, ...)
- *Windows 2000*
  - *Quantum GIS* 1.7.4
  - *NextGIS* 2012.05.10 (*Quantum GIS Master* 1.8.0)

QGIS availability

- *Quantum GIS* functionality and interface is platform independent.

File formats

- *QGIS* uses *GDAL/OGR* for reading/writing operations:
  - pros:
    - widespread library;
    - mostly based on open source code.
  - cons:
    - the availability of several file formats may vary from platform to platform;
    - some file formats are accessed only with closed source and platform dependent code.

License

- *Quantum GIS* is open source software available under the terms of the *GNU General Public License*.

Free as in Freedom

Useful features

- Different data sources are accessed differently. Users should understand the data structure – good for teaching purposes.
- The user interface is available in many languages.
- The GUI is rather common for GIS packages – the obtained skills maybe used to work with other GIS software.

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Topics covered by the course "The Maintenance and Transformation of Spatial Data"

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Course abstract

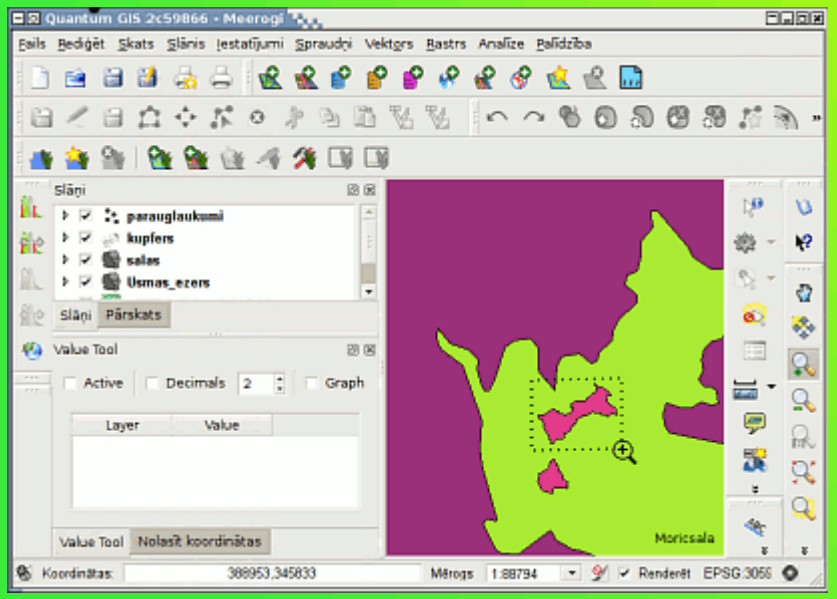
- The course provides with an introduction to the fundamentals of the maintenance and transformation of spatial data with the main focus on geographically located data.
- Practical sessions focus on data acquisition, analysis and visualisation.

Main topics

- Basic principles.
- Elements of spatial data bases.
- Digital maps.
- Map projections.
- Georeferencing.
- Digitizing and topology.
- Data interchange.
- Spatial queries.
- Mapping basics.

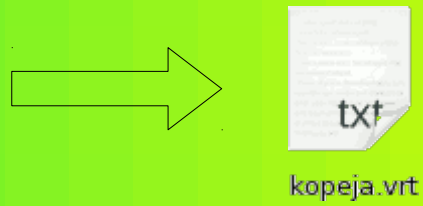
Digital maps.
Map projections.

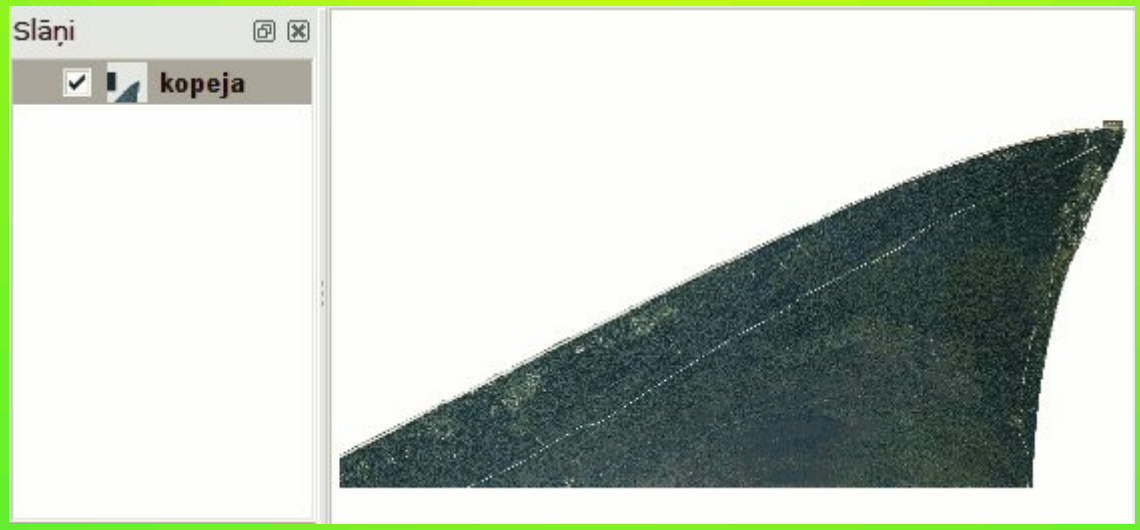
- Data layers and project.
- On the fly coordinate reference system transformation.
- Scale dependent rendering.



Digital maps.
Map projections.

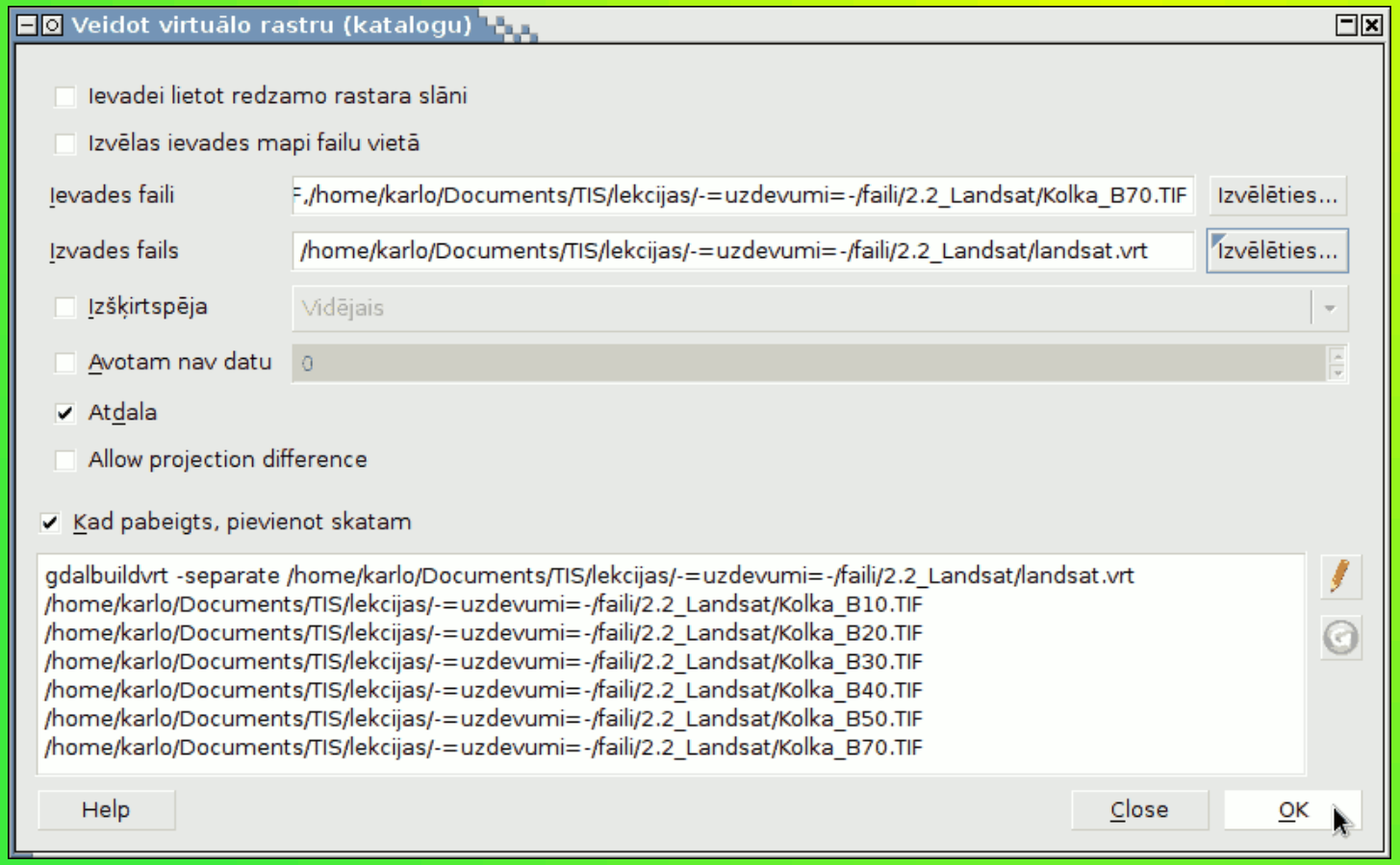
- Virtual raster map – mosaic.





Digital maps.
Map projections.

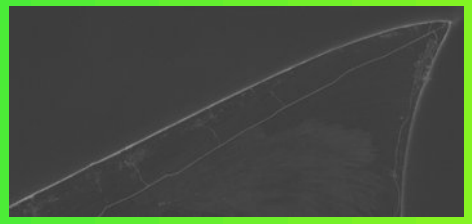
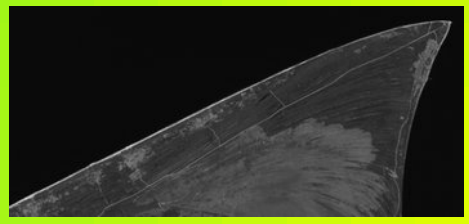
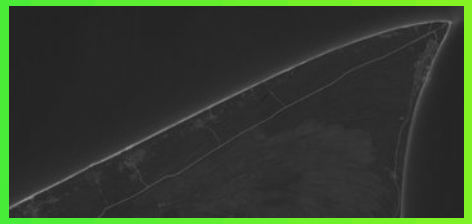
- Virtual raster map – multiband.
- Rendering of raster maps.



Landsat 7 TM bands

Band	*Wavelength (μm)*	*Name*	*Resolution (m)*
1	0,45 – 0,52	Blue	30
2	0,52 – 0,60	Green	30
3	0,63 – 0,69	Red	30
4	0,76 – 0,90	Near infrared	30
5	1,55 – 1,75	Middle infrared	30
6	10,4 – 12,5	Termal	60
7	2,08 – 2,35	Middle infrared	30
8	0,50 – 0,90	Panhromatic	15

Landsat 7 TM image as separate bands

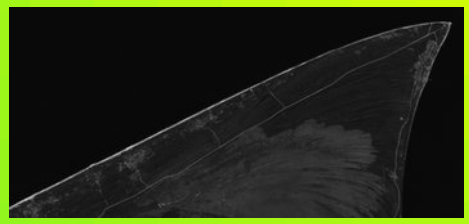
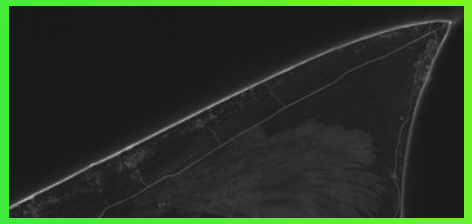
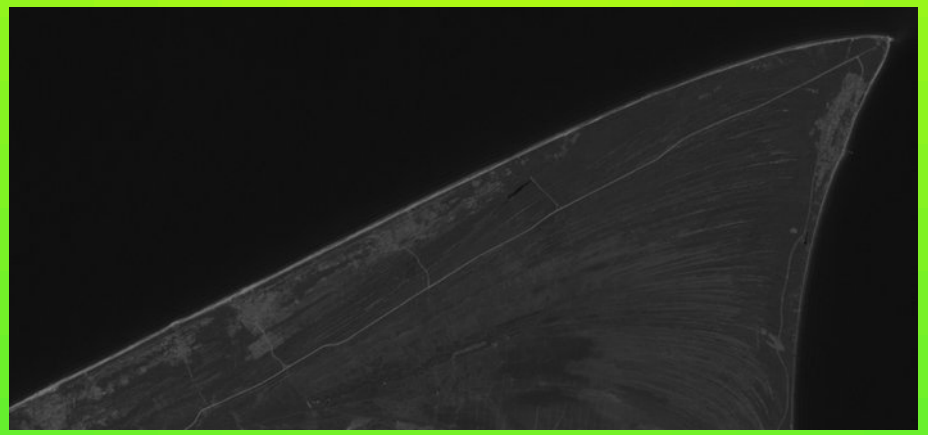
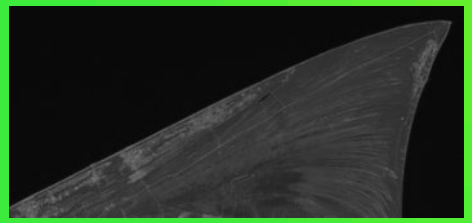





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Image in RGB colour space

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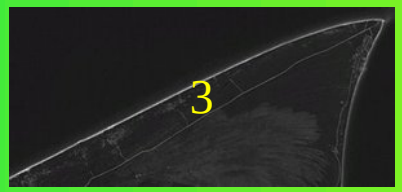
Landsat 3-2-1 > RGB
(true colour composite)



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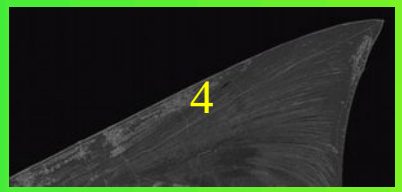
Landsat 4-3-2 > RGB
(*False Colour Composite*)



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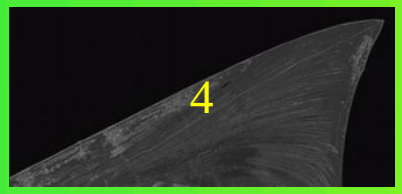
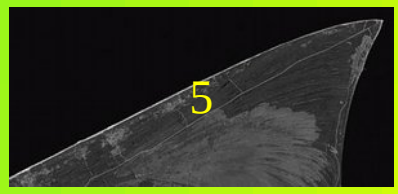
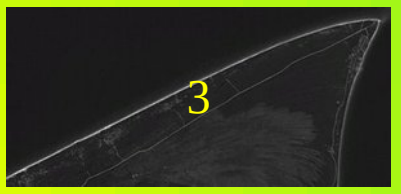
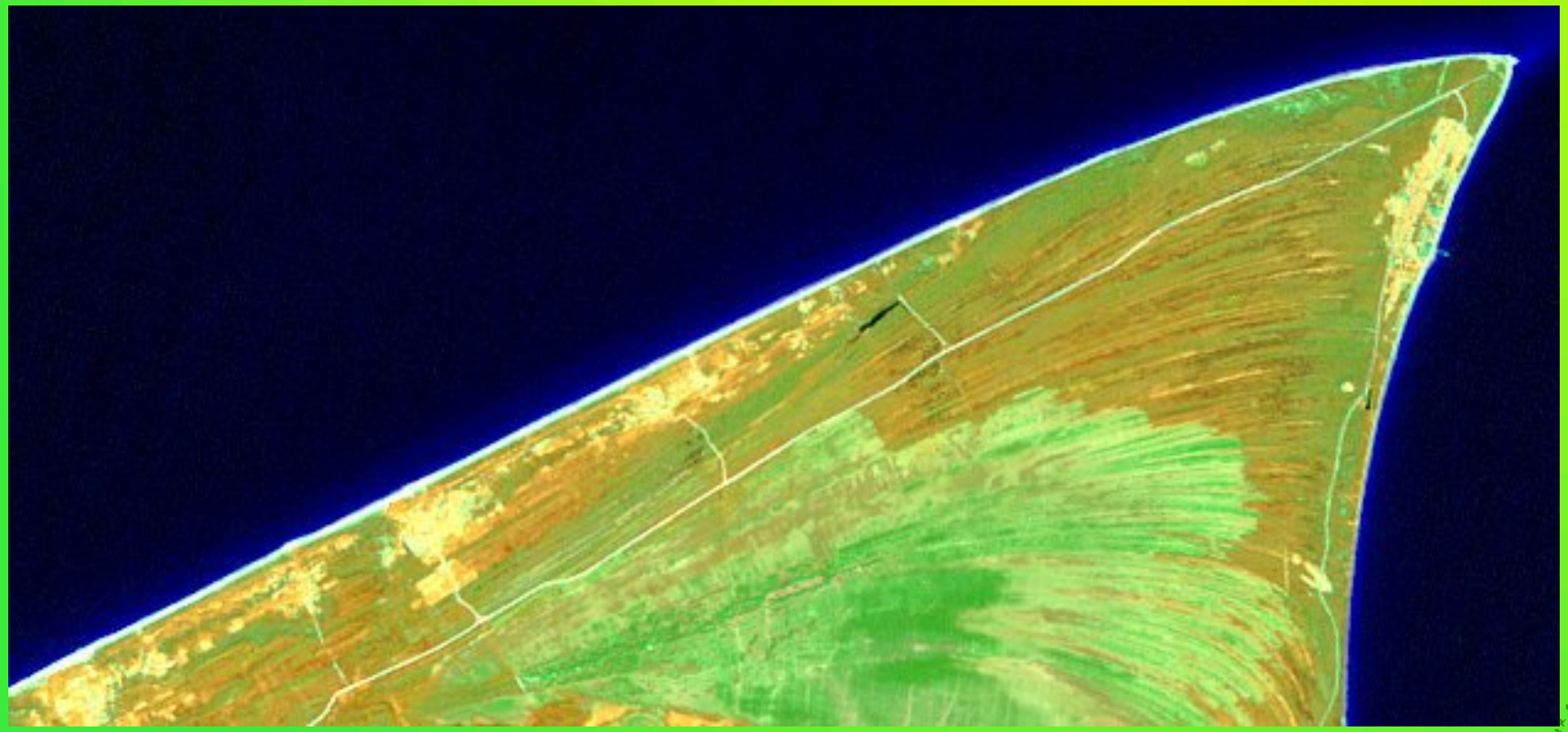
Landsat 4-5-3 > RGB
(*False Colour Composite*)









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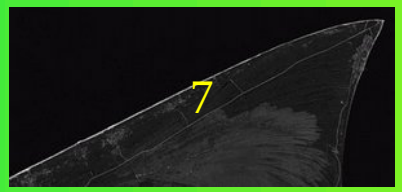
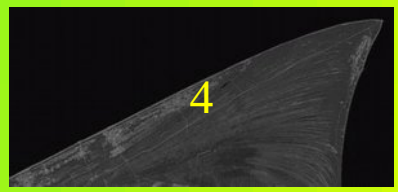
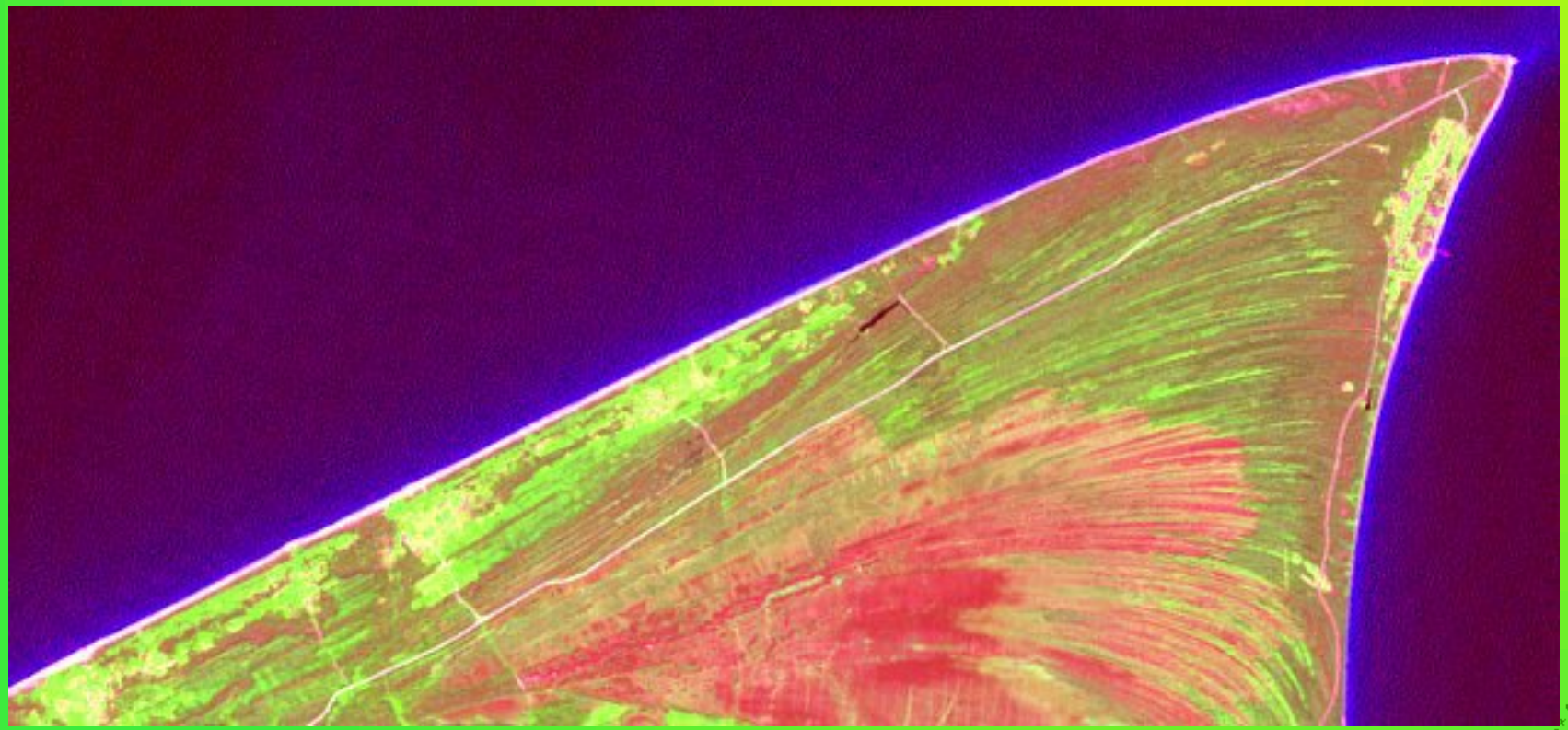
Landsat 7-4-2 > RGB
(*False Colour Composite*)







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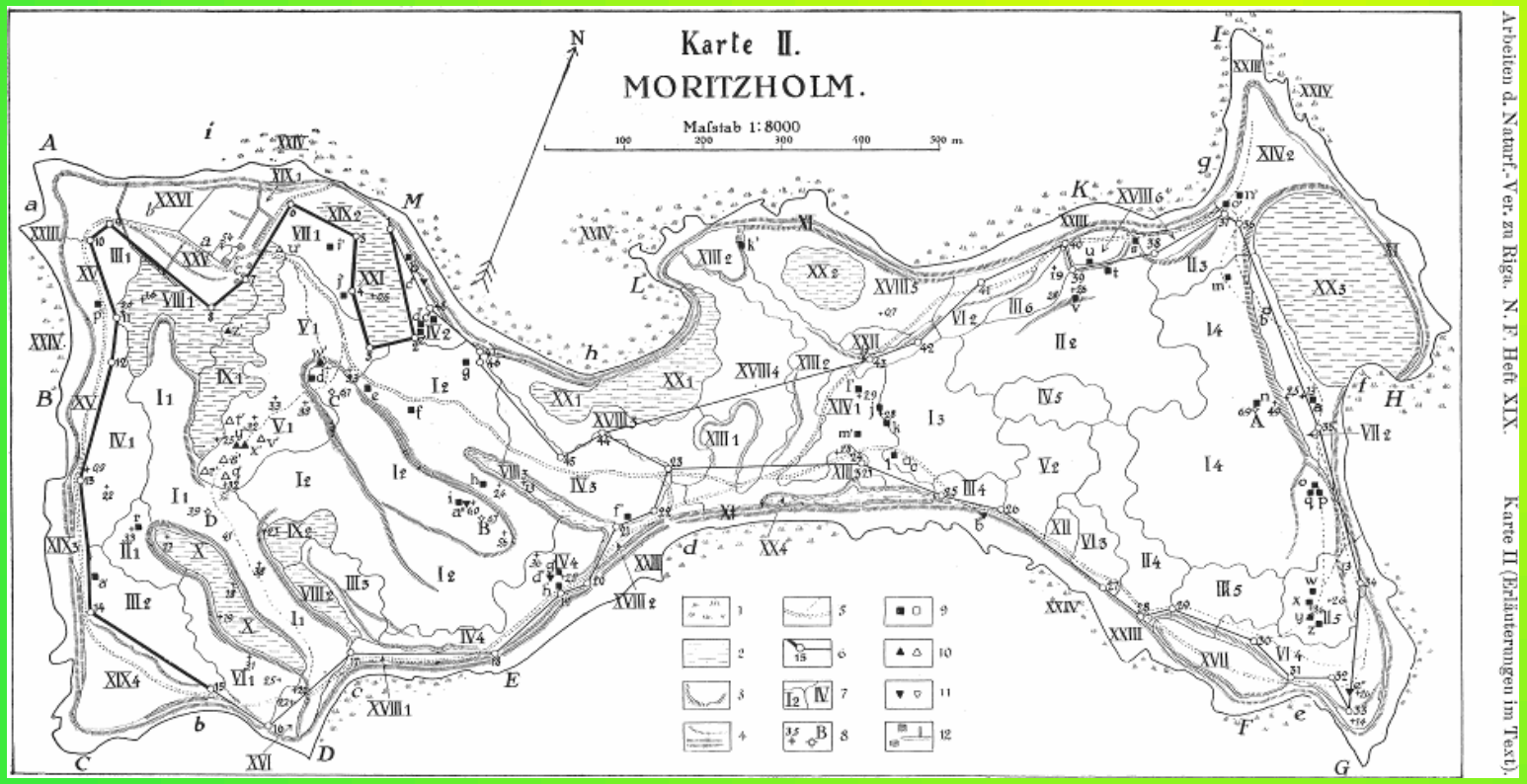
Georeferencing.

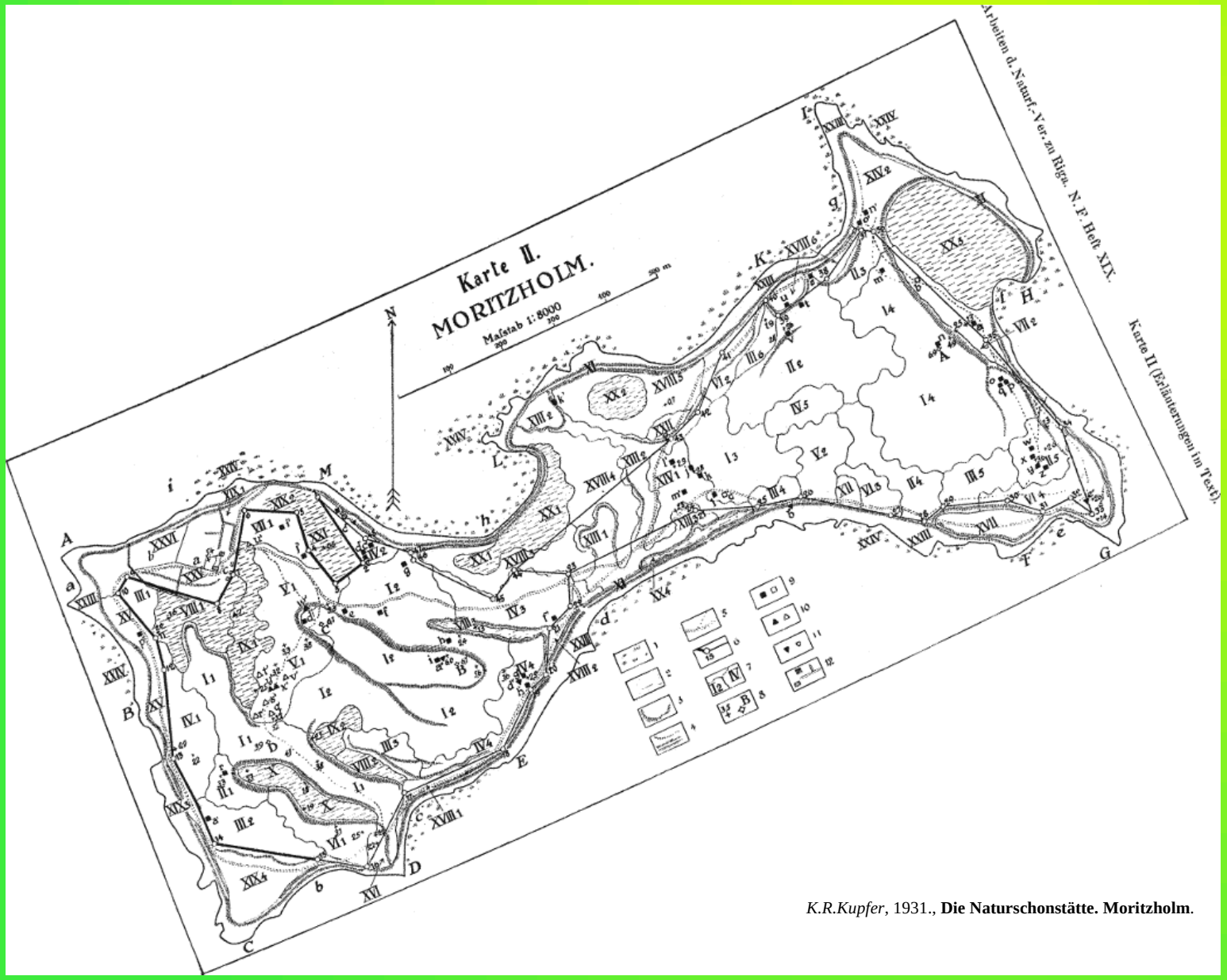
- Georeferencing using image corner points.
- Georeferencing using points from other maps.
- Clipping raster maps.

Map of Moricsala (1931)



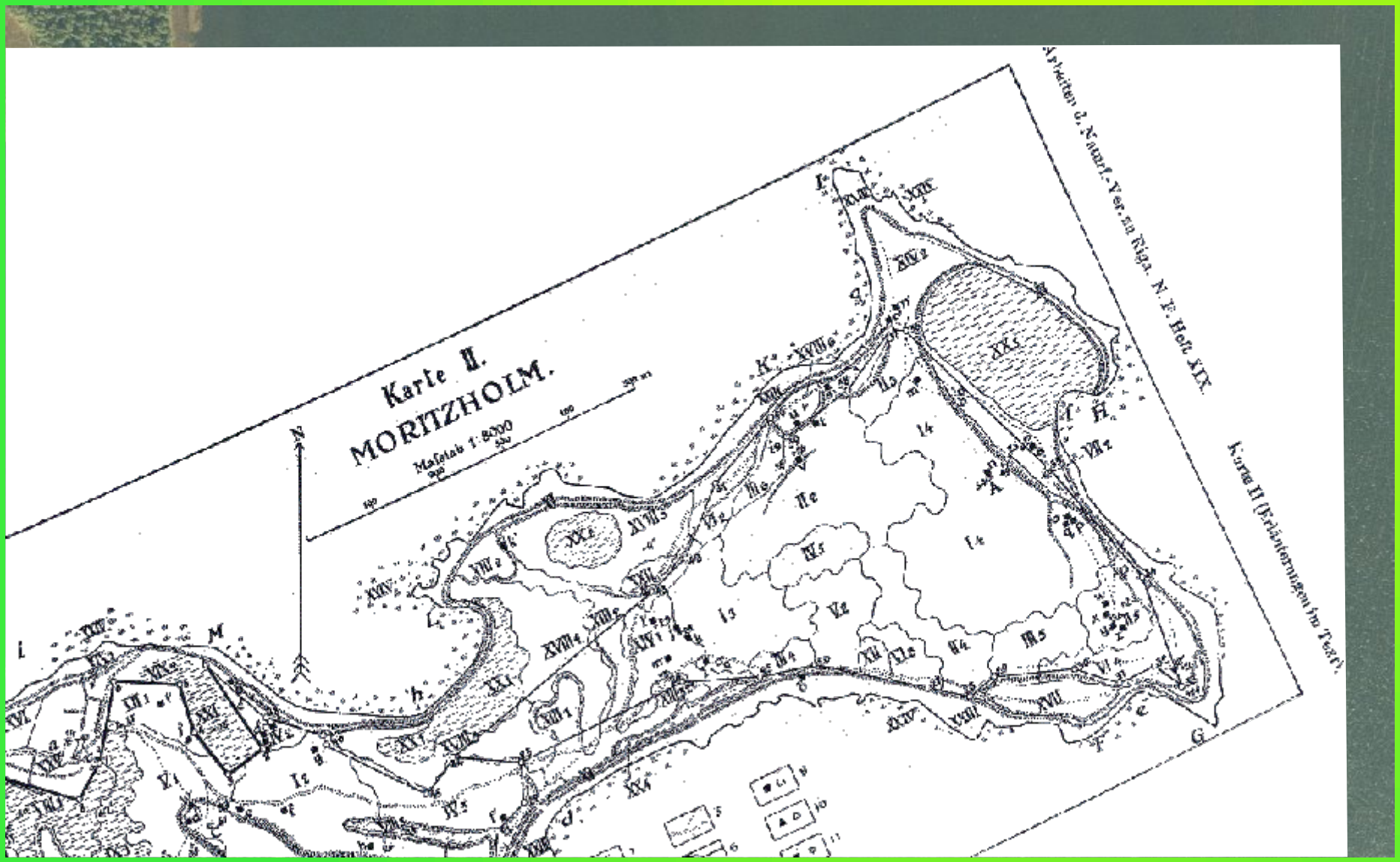
K.R.Kupfer, 1931., **Die Naturschonstätte. Moritzholm**.

Map of Moricsala (1931)



K.R.Kupfer, 1931., **Die Naturschonstätte. Moritzholm**.

Raster map + raster map



K.R.Kupfer, 1931., **Die Naturschonstätte. Moritzholm**.
http://kartes.lgia.gov.lv/kartes.html

Raster map + raster map

K.R.Kupfer, 1931., **Die Naturschonstätte. Moritzholm**.
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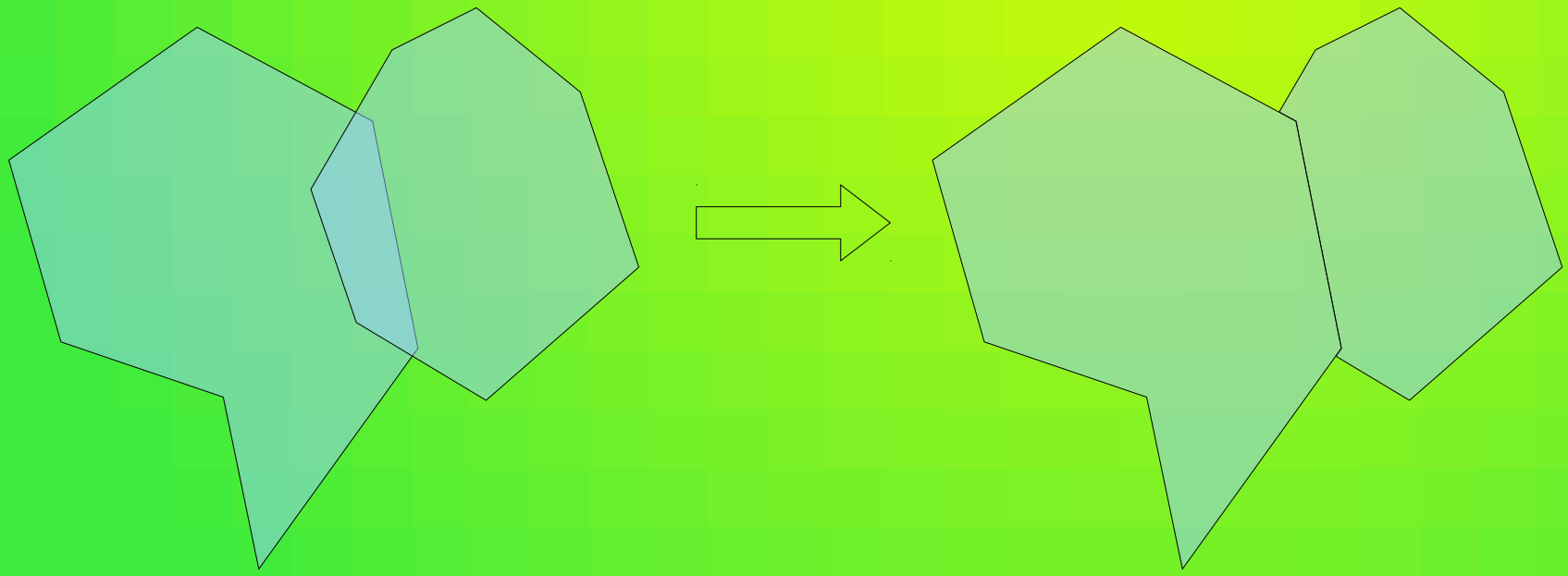
Raster map + raster map

K.R.Kupfer, 1931., **Die Naturschonstätte. Moritzholm**.
http://kartes.lgia.gov.lv/kartes.html

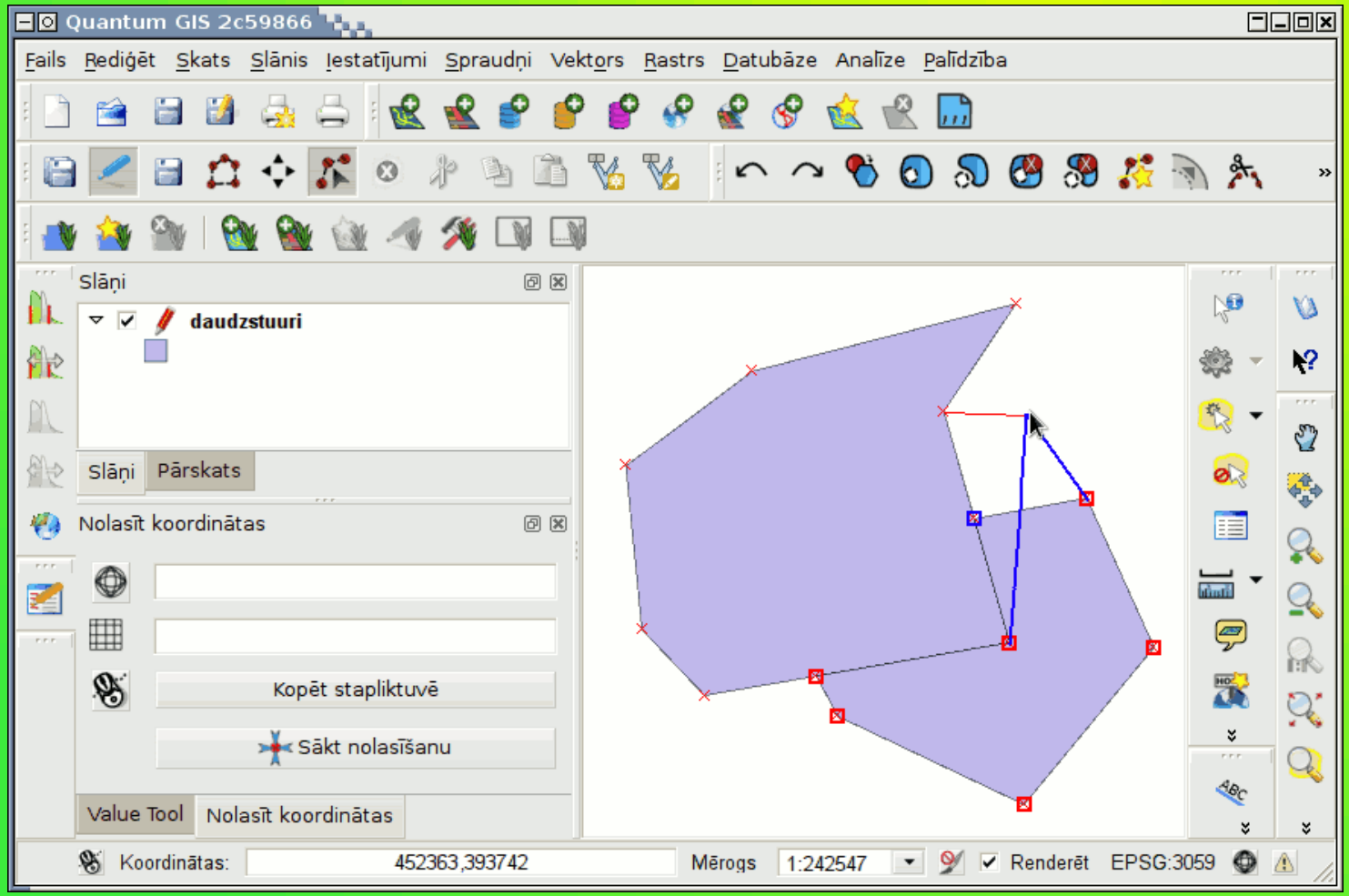
Digitizing and topology.

- Point, lines and polygons.
- Snapping.
- Polygon intersections and how to avoid them.



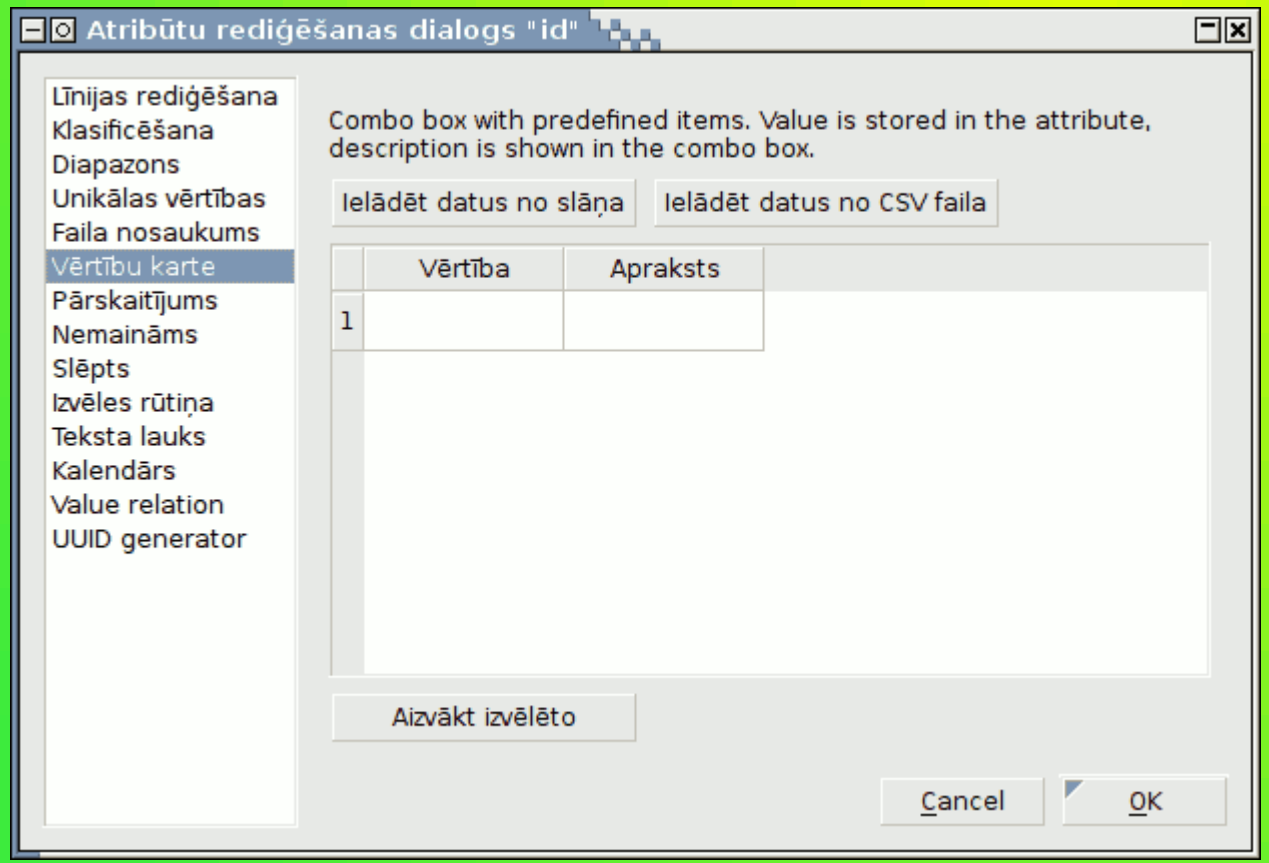
Digitizing and topology.

- Topological editing.



Digitizing and topology.

- Zooming in/out, map panning.
- Edit widgets.



Data interchange

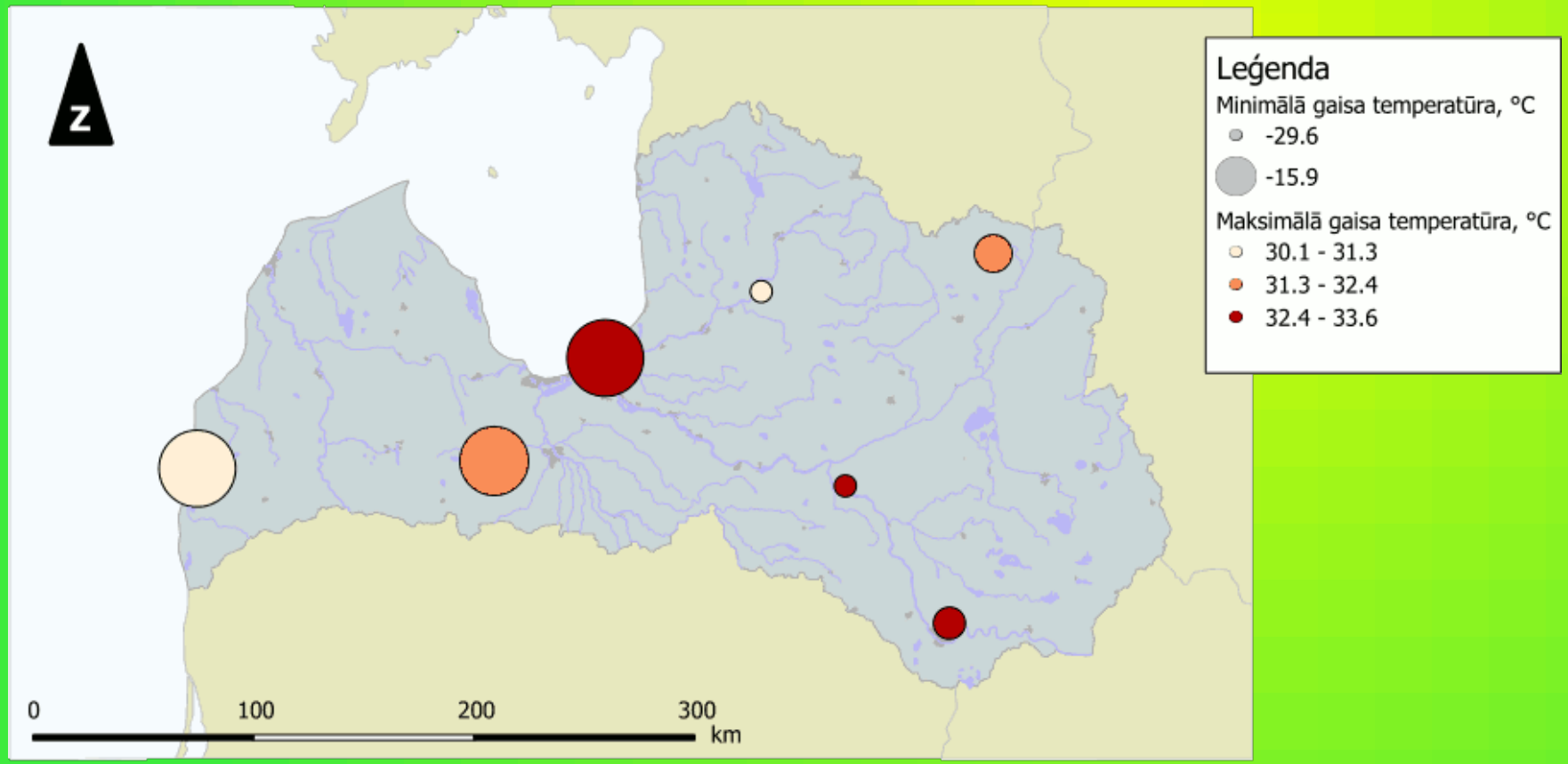
- CSV
- MIF
- WKT

Spatial queries

- Vector maps
  - Example: Locate any wetland not further then 6 km from cities with population not less then 9000 people.
- Raster maps

Mapping basics

1999. gada maksimālā un minimālā gaisa temperatūra



Valsts statistikas pārvaldes dati. Pieejams: http://data.csb.gov.lv/
Izmantotā projekcijas sistēma: LKS92 / Latvia TM

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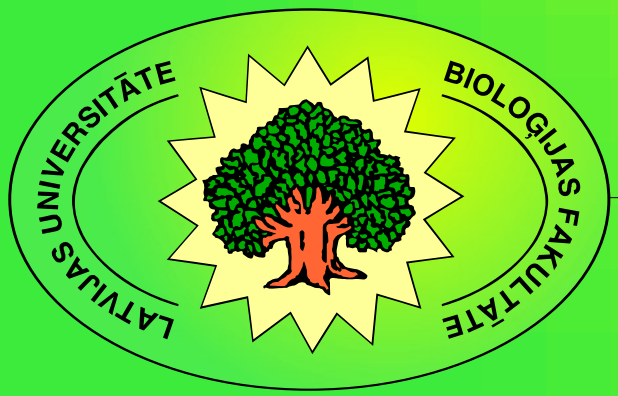
Quantum GIS user community



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Web resources

- http://www.qgis.org/documentation.html
- http://www.youtube.com/:
  - „*QGIS*” – 5640 hits;
  - „*Quantum GIS*” – 3 280 hits.

Web resources (in Latvian)

- Pictorial user guide (maintained by the author)

  http://priede.bf.lu.lv/scripts/atteli/albums.cgi?d=tis&k=programmas/QGIS/&s=uzskatei

List of chapters

- 0. *Quantum GIS* set up.
- 1. Properties and options. GUI.
- 2. *QGIS Browser*.
- 3. Data layers – adding and creating.
- 4. Exploring and querying.
- 5. Mapping.

Different views of the pictorial user guide

- Icon view of the directory. Images' thumbnail preview (divided into one or more pages).
- Small images with descriptions. Images preview as one page.
- A separate good quality image with a full description. For additional tips and links an image map may be used.
- Animation based on given image (or image sequence).

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File Edit View Go Bookmarks Tools Tabs Window Help

http://priede.bf.lu.lv/scripts/atteli/albums.cgi?a=1&d=tis&f=1&s=uzskatei&k=programmas/QGIS/atver

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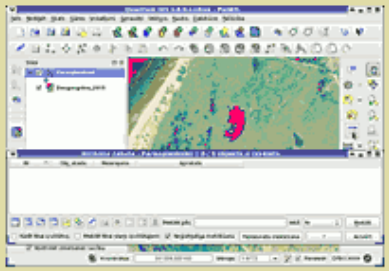
Paskaidrojumi lietotājiem

[1] Punktu slānis



Attēla autors: (C) *Kārlis Kalviškis*
Tapšanas laiks: 2012.12.04.
Licence: CC BY-SA (var izplatīt atsaucoties un nemainot nosacījumus) [3. ver.]

Šajā piemērā tiks izmantots punktu slānis ar attēlā redzamo atribūtdatu struktūru.

Apskati arī citus:

- 03.05. Jaunu objektu pievienošana 2 :: Līniju pievienošana. Virsotņu labošana un dzēšana. Pielipšana. Pārvietošanās.
- 03.05. Jaunu objektu pievienošana 3 :: Daudzstūru pievienošana. Topoloģiskā labošana.

Tavas pārdomas par attēlu

Any questions?

karlis.kalviskis@lu.lv